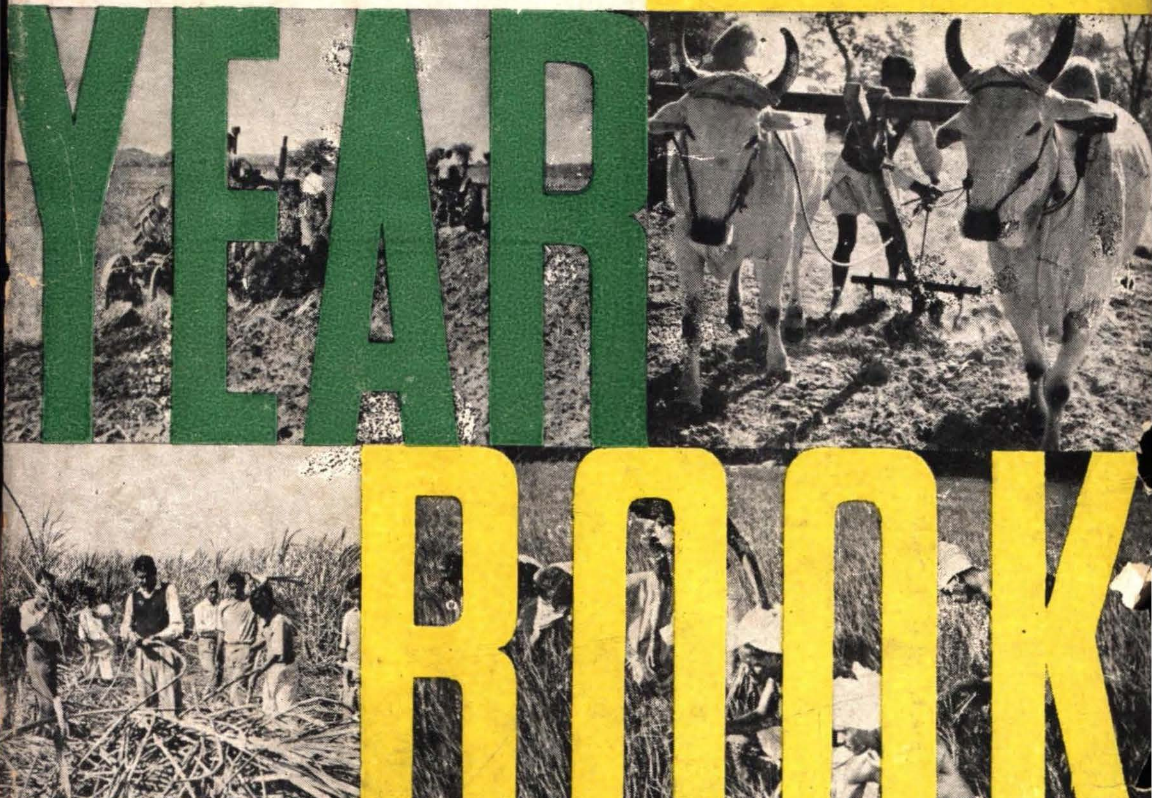
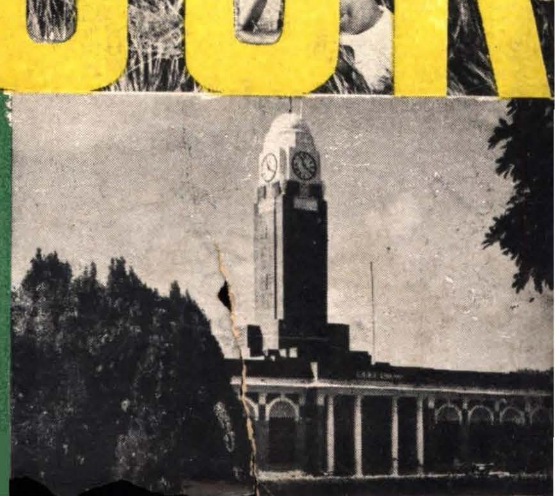
BHARAT KRISHAK SAMAJ



YEAR BOOK

1968



BHARAT KRISHAK SAMAJ YEAR BOOK 1968

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DEDICATED TO THE MEMORY OF

DR. PANJABRAO S. DESHMUKH

Our Founder President

The colosus who strode along the length and breadth of this vast continent organising the much neglected farmer under one banner, the great champion of the kisans, who left us for his Heavenly abode on Sunday the 11th April 1965.

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President:

BHARAT KRISHAK SAMAJ

Shri Jagjivan Ram, Union Minister for Food, Agriculture, Community Development and Co-operation, was born in April 1908 in Bihar, educated in the Banaras Hindu University and Calcutta University. From very early times he took active interest in the uplift of depressed classes and was also for sometime President of the All India Depressed classes League. Entering the legislature in Bihar as a nominated M. L. C. in 1936 by sheer merit he rose in politics and came to occupy the position of a Cabinet Minister in the Central Government and has been in charge of several important portfolios and left his mark on each. He is an accredited leader of the scheduled castes and has successfully led several delegations and sponsored many bills to better conditions of the workers and labouring classes. He was responsible for starting the Agricultural Labour Movement in Bihar and for Nationalisation of Air-Transport in India.

Chairman:

BHARAT KRISHAK SAMAJ

Shri S. N. Mushran, Chairman of the Bharat Krishak Samaj is an Agricultural graduate. He has been a close associate of the Founder President Dr. Panjabrao S. Deshmukh for more than 30 years. He has also been associated with the organisation right from its inception and is a familiar figure in our conventions and conferences. Hailing from Madhya Pradesh Shri Mushran brings with him into the organisation a large amount of practical wisdom and administrative ability gained by him as Minister for Agriculture in his Home State. He had been to the U. S. A. as a Farm Leader under Farm Leaders Exchange Programme and has visited U. S. S. R. as a member in the delegation of Ministers of Agriculture which went to U. S. S. R. in 1960.

PREFACE

The Indulgent favour with which our 1964 Year Book has been received, as evidenced by enquires for copies even now, five years after the first publication, has emboldened us to present to the public the 1968 Year Book of Agriculture. Few persons besides those engaged in agriculture realise the real hazards of farming. Weather, insects, pests, plant diseases and other natural factors much too often affect the healthy productivity of our land and crops. It is some satisfaction that inspite of the many handicaps we are productively progressive. However, there is much room for improvement

Thanks to advanced scientific research, we have very many high-yielding strains which under proper care and cultural treatment have given three or four times the normal yield. Application of the results of farming research in a purposeful way in agriculture pays good dividends. We hope this Year Book will be a contribution to that end.

No brief statement of thanks or acknowledgment can do justice to the many individuals who have helped us and participated in the preparation of this work. We are very grateful to all our contributors both official and non-official; and to Smt. Nandhini Satpathy, then Deputy Minister, Information & Broadcasting and now Deputy Minister attached to the Prime Minister for all up-to-date statistics and data which she was good enough to arrange to be provided to us.

Our thanks are also due to our collegues in the Bharat Krishak Samaj; special mention must however be made of the co-operation offered by Shri Anwikar, Vice-President of the Bharat Krishak Samaj and Shri Sawhny, Secretary, Jammu and Kashmir Unit of the Samaj. We are also indebted to Dr. Bholay and the staff of the Bharat Krishak Samaj for the ready help given by them as and when needed in the preparation of this work.

Three five-year plans have pumped several millions of rupees into agriculture within the past two decades; and still short-fall in production of foodstuffs continues to be one of the country's worst head-aches. There is urgent need to deal with agricultural problems on the basis of actual conditions, with programmes planned to meet the diverse requirements of particular areas and crops. The time lag between aquisition of knowledge and its use in the field is greater than it should be and this should be avoided. The use of new knowledge must be quick and should aim at closer integration of new techniques in agriculture and in the segments of our life that are tied to agriculture. That is our goal for Indian Agriculture. Then only can we hope to have ample food for all, as a result of efficient farm activities. And this is also the way, which we can try to bring prosperity to farmers who are linchpins of society.

Farmers' Forum,
Madras,
2-10-'69.

R. SRINIVASAN

PART I

SPECIAL ARTICLES

ROLE OF AGRICULTURE IN INDIAN ECONOMY

M. S. GURUPADASWAMY

Minister of State, Ministry of Food, Agriculture, Community Development & Co-operation

In India agriculture has from time immemorial been holding a crucial and overwhelming role in the economy. The beginnings of industrialisation which were seen in Europe even by the end of the middle ages could be seen in India only two or three centuries later, though cottage industries and handicrafts of various kinds continued to flourish alongside agriculture, when the machine was displacing the human hand in industry and agriculture in many other countries. It is remarkable to find that in 1881, only 61 per cent of the population had agriculture as a source of livelihood, while from 1911 onwards this percentage is hovering around 70 per cent. One refers to this fact in view of the persistent, overwhelming role of agriculture as a means of livelihood for the people in spite of the headway the country has been making in industrialisation willy-nilly since the commencement of the present century. The figure indicates the preponderance of the rural population, its continued dependence on agriculture for a living and the inadequacy of the pace of growth of industry.

Agriculture has been contributing about one half to the total national income—even in a bad crop year as 1966-67 it has not been very much below that. The proportion of consumer's expenditure spent on food is also comparatively much higher than in economically developed countries where again it is usually not more than 25 per cent, even when a good bit is accounted for by cost of processing and other services which are very meagre in India. In the developed countries the contribution of agriculture to national income is invariably less than 20 per cent except where they are primarily dependent on agricultural exports.

It is well-nigh impossible that the traditional proportion between agriculture on the one side and industries and services on the other undergo a sharp change, specially at a time of high rate of growth in population. Here one may also recall two of the most conspicuous adverse effects of Partition—some of the richest foodgrains surplus regions going to Pakistan, thereby leaving the Indian Union in heavy deficit for food and a like overturn in respect of the supply of the two principal agricultural raw materials, cotton and jute. The Indian Union had to bear the burden of substantial imports of agricultural produce right from the beginning.

The aim of planned development has been to achieve self sufficiency in food, to correct the adverse position in regard to other produce and in general to develop agriculture in a manner which would meet the full requirements of a growing population. After three Five Year Plans, we can claim a fair measure of success here. The extent of success achieved in the development of agriculture in these

and 1964–65, as against an average rate of less than ½ per cent per annum in the previous decade. Recent developments in agricultural production indicate that it might be reasonable to expect and aim at a growth rate of about 5 per cent in the agricultural sector during the Fourth Plan.

The contribution of agriculture to industrial raw materials is also substantial. Jute, cotton, tea, tobacco, coffee, oilseeds, rubber, cashewnut and a number of other commodities go into processing or manufacturing industries. The latest figures available show that out of over 46 lakh persons employed in industrial production, over 50 per cent are accounted for by agriculture-based industries.

In export trade, the proportion of agricultural products to total exports though showing annual fluctuations does not suggest any declining trend. Incidentally, this is a circumstance quite in contrast with the experience of other developing countries. Our export trade

COMPOUND GROWTH RATES IN AGRICULTURAL AREA. PRODUCTION AND PRODUCTIVITY 1949-50 to 1964-65

Commodities	Area under crops (per cent)	Production (per cent)	Productivity (per cent)
1. Foodgrains	1·34	2·98	1·61
2. Non-foodgrains	2·52	3·61	1·06
3. All Commodities	1·55	3·19	1·60

years can be seen from the following figures:

The index of agricultural production has gone up from a level of 100 in 1949-50 to 158 in 1964-65, an increase of about 58 per cent in 15 years. In agriculture the rate of growth has been about 3 per cent (compound) between 1950-51

in agriculture is getting largely diversified and there is a conspicuous trend towards imports substitution. Cotton which enters as an important item both in export and import can be cited as an example of this phenomenon. The greater diversity in agricultural exports also partly explains the constancy in proportion which agricultural exports have maintained to total exports. In terms of value, exports of agricultural products, including semi-processed materials, account for about 40 per cent of the total exports in 1967-68.

We have yet to have precise data on saving and investment in the agricultural sector. According to a study by the Reserve Bank of India the gross investment in agriculture in the year 1950-51 did not amount to more than Rs. 191 crores, equivalent to 3·9 per cent of the total agricultural income. In the Third Five Year Plan, the annual investment in agriculture including co-operation, community development, panchayats, major irrigation and flood control is likely to have averaged an annual rate of roughly Rs. 390 crores. In addition, the investment on power, transport and communication partially goes into development of agriculture and the rural economy. In the Third Plan period, the annual investment on these two items has been of the order of 1,000 crores.

Since 1966 the entire dynamics of Indian agriculture has begun to change. The principal force behind this change is the introduction of the high-yielding varieties for several crops and the associated changes in inputs. With the help of new strains of hybrid seeds, application of high doses of selected chemical fertilizers and other agricultural inputs, the high-yielding varieties of cereals are able to give an average yield over large areas of not less than 1·5 tonnes per acre for wheat, 1·25 tonnes per acre for rice and jowar, 1·33 tonnes per acre for hybrid maize and 0·75 tonnes per acre for bajra. Ordinarily intensive cultivation at present gives 0·8 tonnes per acre for rice and wheat and 0·6 tonnes per acre for millets. The result of this application of modern science and technology to agricultural production is seen from the tremendous strides we have made in increasing our food production per acre as well as the gross production. During the year 1967–68, for example, our food production has touched all time record of 95·6 million tonnes. This is 6·6 million tonnes (or 7·4%) higher than the highest production that was achieved in the past during the year 1964–65 and 28·8% higher than the partially Revised Estimates of 74·2 million tonnes for 1966–67. The important role of the new strategy in increasing the production of foodgrains in the country is seen from the fact that when the Fourth Plan formulations were made in 1964, which were based on traditional agriculture, it was estimated that given a good year of rainfall we can, by tightening the administration and the services, reach a target of 120 million tonnes of foodgrains in 1970-71. The technological pay off in farm production is already there. The performance of high-yielding varieties has been remarkably encouraging. They have yielded two or three times that of the traditional ones and a much higher net return on investment; they mark the beginning of a new revolution in Indian economy whose full manifestations and impacts are only vaguely visible just now.

A new nexus between industry and agriculture, increasingly higher levels of consumption among the rural population, more sophisticated and balanced food items, new patterns of urban and rural relationship—all these can be envisaged in the coming years. The average peasant who has already begun to play a vital role in the development of the economy has started looking on agriculture more as a business than as a mere means of livelihood. His earnings have started increasing. He is seeing the prospects for new investment, better utilisation of resources, more and more amenities in life and a more vital place in the economic and social life of the country. Already wheat production in India has doubled from what obtained at the time of Independence. For other crops too, the sharp increases in yields promise similar results. There is no reason to think that an occasional failure of seasons will have any of the perplexing effects which they used to have till recently.

With all-round increases in production for various crops naturally the contribution of agriculture to the development of the economy as a whole is bound to increase. While for some years the striving for self-sufficiency for the major crops will have to continue, the need to diversify further the production and supplies in a manner calculated to enable the masses to have a balanced diet is also now amply recognised. But here, in spite of the gains secured in development of subsidiary foods like dairy products, fish, fruits and poultry, we have yet to travel a long way to attain a level of production in these items adequate for the needs of the entire population.

Is agriculture putting by enough savings to be drawn back into investment on itself? Immediately through sharp increases in productivity from the high-yielding varieties, through the extension of irrigation and other facilities even for the traditional patterns of cultivation, through price policies intended to stimulate production and secure for the producer better earnings, a large section of the farmers are able to put by more savings and utilise a part of it at least for investment in agriculture. When more and more areas are brought under irrigation and with the new methods of cultivation and the facilities and assistance offered by the State and other agencies for enabling the farmers to raise more and better crops every year, and rural industries developed on an extensive scale, the extent of rural savings is bound to rise at a substantial rate and be made available for investment on productive purposes in industry and agriculture.

Hitherto, agriculture has functioned as an all-round feeder of industry by way of supplying of raw materials. Under the traditional pattern of agriculture in India, the role of industry as a supplier of accessories for agricultural production has been comparatively negligible. With the modernisation of agriculture this relationship has started changing. A new balance and a new type of reciprocity between agriculture and industry has commenced with industry supplying to agriculture a number of direct or indirect inputs like electric motors, cement, storage equipment, pump sets, tractors and other implements, not to speak of a growing range of the consumer goods which the higher levels of income in the hands of the farmer would enable him to go for.

INDIA GIVES A LEAD WITH NEW CROPS

JOHN DRAKE

Chief Features Section Food and Agricultural Organization of the United Nations

In India over the past two years there have been some very unusual developments which suggest that today's critical world food problem could be eased rather sooner than most people have expected.

Over this period the Indian Government has imported very large supplies of seed of high-yielding varieties of cereals and has encouraged their cultivation on about 10 per cent of the total cereals area. The Government has taken a short cut past many of the precautions which are sometimes taken with the introduction of new plant varieties, and its boldness has paid off in a surge in cereals production which seems likely to take the harvest past 100 million tons this year. And looking ahead, the Government estimates that by the end of the decade India could reach self-sufficiency for food grains.

At a press conference on the 20th June, at which he discussed the implications of India's bumper harvests and similar, if usually smaller, successes in a number of other countries, Mr. A. H. Boerma, Director General of FAO, was cautiously optimistic about the outlook.

He pointed out that developing countries looking to the use of high-yielding cereal varieties would have to make sure of substantial supplies of fertilizer and irrigation water if these plants were to live up to expectations. He noted that the new varieties were often very vulnerable to disease and insect pests and would require a great deal of protection. And abundance itself could bring problems; material problems of storage and transport as well as the economic burdens of holding large reserve stocks.

But, he said, it was nevertheless possible that man might be on the verge of a breakthrough in agriculture.

" In short, years of patient activity in research in extension work, in trials and demonstrations, in long-term investments in water development and in agricultural institutions, are at last beginning to bear fruit," Mr. Boerma said. "We are now able to say that there is real hope, given the right conditions and provided the right steps are taken in the right sequence, that the food situation can be transformed at least in Southern Asia, which contains the world's greatest concentration of people and where famine has so often stalked the land."

Thus India, which is too often cited as the country of lagging progress and imminent disaster, is today taking a major role in the large-scale application of new agricultural techniques which could make a real contribution to the solution of the world food problem.

It is certain that there must be a substantial change in the trends of recent years if the critical world situation is not to continue or even deepen into a state of recurrent famine in many of the developing countries of the world.

Last year FAO estimated that in 1966 world food production rose by 4 per cent but most of this gain was scored in the prosperous parts of the world and in the developing world the gain was little more than 1 per cent. But world population had continued to increase so that per capita production in the developing countries had actually fallen to the lowest level since 1957.

By June of this year FAO was able to report that preliminary figures indicated that in 1967 food production had risen by about 3 per cent in the world as a whole and *by almost 6 per cent in the developing world.* There was more than one reason for this remarkable rise in production. It was a good crop year in 1967 and thus a good harvest was set off by unusually poor harvests in the previous two years. But even taking these effects of weather into account, an appreciable part of the improvement was a result of wider use of the new high-yielding crop varieties.

What is more if supplies of irrigation water and fertilizer keep step with increased plantings of the new crops, if there are no major outbreaks of plant disease or insect plague, if the weather is not disastrously bad, then we can expect further increases in food production on a roughly similar scale in coming years. This is quite a list of its but none of these conditions is stretching our expectations unreasonably. There is good reason for cautious optimism.

Successful introduction of the new crops will provide a welcome relief from the great pressure to increase food production under which the world has worked in recent years. With something like one-half of the world's population underfed or malnourished, or both, it has been a desperate battle merely to maintain this position and in the years when some ground has been gained it has been a small advance. Now we seem to have the prospect of a reasonable increase every year. The greatest effect will be the contribution to the hunger aspect of the food problem; it will improve the situation of tens of millions of people who are simply not getting enough food. But greater supplies of staple cereal foods will also make a notable contribution on other areas where FAO sees need for intensive action today.

Greater supplies of cereals will help to fill the protein gap. A special UN advisory committee recently reported that: "Today there are over 300 million children who, for lack of sufficient protein and calories, suffer grossly retarded physical growth and development, and for many of these mental development, learning and behavior may be impaired as well."

The high-yielding varieties will in themselves provide extra vegetable proteins. But through their higher efficiency they will also release cereal lands for the production of other protein-rich plants particularly the legumes. The higher cereal crop will make supplies of grain available at suitable prices for supplementary stockfeeding to increase production of milk and meat.

The high-yielding varieties will help ease the load on foreign exchange reserves by reducing the amounts that many countries must spend today on food imports. This saving will make possible higher spending on the industrial goods which the developing world needs in such large quantities if it is to go ahead.

And the high-yielding varieties will make a contribution to agriculture which FAO regards as basic to all economic development. It will turn millions of farmers who are working on the subsistence level, or not far above, into cash crop producers. It will give them a greater share of the profits of national economic growth and provide them with a worthwhile livelihood from the land instead of a mere existence.

These are some of the promises that the high-yielding cereal varieties hold out to world agriculture and FAO is sparing no effort to help countries surmount the various problems which might impede the introduction and cultivation of these new plants.

But even if these hopeful developments may speed up the transformation of the world agricultural economy FAO does not see them as altering the pattern of action that needs to be taken.

The answer to world poverty and want continues to be overall economic development and agriculture will make a most basic contribution to that development.

There will continue to be a need for great expansion of educational systems for agricultural producers and for the development of the huge institutional and other supporting services that the farmer needs. He must be able to obtain credit and farm supplies on equitable terms, his operations must be supported by extension and information services providing advice and day-to-day information, he must have access to properly organized markets where he will receive a just price for his harvest. The technological needs of agriculture spread far beyond the problem of cereal production. There is an enormous need for development of the livestock industries which in the developed countries are producing ever greater quantities of high quality protein foods at decreasing cost. Great improvements are needed in the preserving and distribution industries; today we are losing, through spoilage, far too high a proportion of the food which men have worked to produce. In the forestry and fishery industries, which relate and interact so closely with farming, there is still room for a great deal of expansion and development. The fishermen of the world are today meeting about 12 per cent of man's protein needs but, even by fishing only conventional stocks, could double and triple this contribution. In a world where a new synthetic material comes along almost every day, the tree still holds its importance as a raw material in the chemicals industry, as a building material and as the basis of the paper industry.

To meet the needs for integrated development of all these aspects of the world agricultural economy there has been in recent years a profound change in the philosophy and programme of FAO. Once conceived as an agency which would provide information and advice, as well as sponsor international consultation, it is today an action-oriented agency on a very large scale.

Today FAO has almost 2,000 experts in the field in scores of countries working at every level from helping to set up child welfare clinics in the villages to assisting in the preparations of national development plans.

Through its co-operative programme with the World Bank it is helping to increase the level of international financing for the development of the agricultural sector. From 1964 to 1967 the total of World Bank loans and credits approved for projects prepared or appraised with FAO assistance was $ 362 million.

Through the World Food Programme, which it administers jointly with the United Nations, more than $ 246 million in food and cash has been committed to the support of development programmes in many lands.

Under the umbrella of the Freedom from Hunger Campaign, citizen committees have been set up in more than 80 countries to help rouse public concern over the lagging development of so much of the world, to give encouragement and support to government aid programmes and to stimulate action programmes supported by citizen groups.

India has been closely involved in FAO's work ever since 1945 when it was one of the countries that founded the Organization. And Indian nationals have played a prominent part in the secretariat of the agency. Dr. B. R. Sen retired from the Director-General ship of FAO only last year after giving more than a decade of dynamic and imaginative leadership, and more than 100 other Indian citizens continue to serve the agency in Headquarters and field posts.

India has also been the scene of some very important, and some very successful, development programmes carried out with FAO assistance.

For instance, FAO is giving assistance in the development of the 4,000 mile Rajasthan canal system which should be bringing water to these thirsty lands by 1970. And an additional World Food Programme project is under consideration for planting 10 million young trees in the canal zone over the next five years.

FAO, with the support of a number of national Freedom from Hunger Campaign Committees, is helping the Government operate four regional catering institutes. These institutes are training hundreds of young people in food preparation and handling and in management. They are going out to work in hotels and restaurants, hospitals and factories, providing better meals for the Indian people as well as supporting the growing tourist industry.

Another Freedom from Hunger Campagin project is introducing improved breeds of chickens and better husbandry methods to village poultry runs. This programme has helped to double Indian egg production over the past five years and production is expected to double again by 1970.

A German expert has helped to develop measures to deal with nematodes, tiny parasites of many crops which live in billions underground.

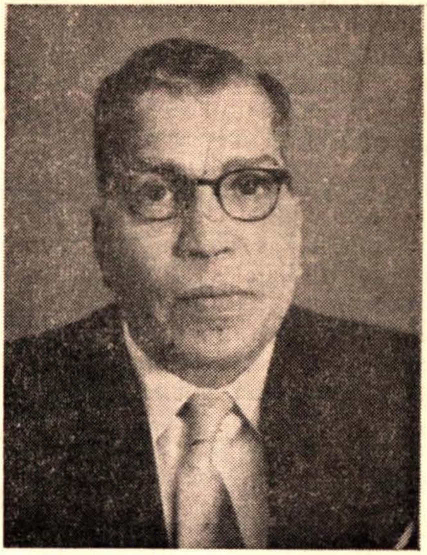
Finnish citizen groups are paying for wells and pumps to provide water in scores of villages in the Ratnagiri district, south of Bombay, where, in the past, village women have walked miles for a jug of water.

A group of FAO experts working under the UN Development Programme is helping to revolutionize Indian sheep and wool production. It is developing flocks of sheep with finer and heavier fleeces and is already putting extra money into the pockets of shepherds whose lives have never previously risen above subsistence level.

Thus, in a fertile two-way traffic, India has done much to build FAO into the Organization it is today and, FAO, in turn, has contributed much to India's agricultural progress.

Today India is giving a new lead to agricultural progress through its bold experiment with high-yielding crop varieties and not only FAO, but the whole developing world, is watching the experiment with keen interest and growing hope.

PROGRESS OF THE CO-OPERATIVE MOVEMENT IN INDIA



P. P. I. VAIDYANATHAN

Secretary, Ministry of Food Agriculture, Community Development Co-operation (Department of Co-operation)

In developing countries like India, Co-operation presents itself as the most suitable method of enlisting the capacities and talents of the largest number of people in the cause of economic development. It affords them a sense of participation in promoting their own as well as the community's well-being. Properly nurtured and developed, it can form the surest foundation of enduring economic democracy without entailing any centralisation of resources, power or direction. It also ensures a more or less complete socialisation of economic functions without tampering with individual freedom and initiative or destroying the incentives which are essential for enterprise.

2. In the sphere of agricultural production, co-operatives have a most vital role to play. Progress on the agricultural front and more particularly in the spreading of the new technological revolution in the countryside will, in the ultimate analysis, be dominated by two factors namely the adoption by the farmers of the technological improvements developed and recommended by modern science and the placing at the farmers' disposal of the wherewithal in the form of money and material inputs which would enable them to modernise their farming techniques. About 62% of our land holdings are less than 5 acres in size. In certain States like West Bengal and Kerala, the average size of the holding is less than 1·3 acres. Thus we have a situation where millions of farmers with small holdings mostly below 5 acres in size have to be motivated and actively assisted to modernise their farming techniques. The best and surest method of bringing this about is through their own voluntary co-operative organisations.

3. The role of a farmers' co-operative is to disseminate information and facilitate the actual adoption of the new techniques by the

farmers and to compress this into the shortest possible period of time. Till about 3 years ago the techniques adopted by the majority of our farmers, and the seeds and other material inputs available to them were mostly traditional which, while capable of increasing the yield by a small percentage every year did not permit of any *spectacular increase* within a short time span. With the evolution and the popularisation of new high-yielding varieties and the sophisticated techniques necessary to derive the maximum advantage from the use of these varieties and the abundant supplies of the inputs required for their cultivation, increase in output by 200 to 300% on farms which adopt these varieties and technology have become quite feasible. By the very nature of things, adoption of new technology involves a change in practices and a certain amount of risk. It is, therefore, not surprising that in the initial stages advantage of the new technology and new seeds and other inputs was taken mostly by medium and large farmers who were generally more enterprising and could afford to take risks. Essentially, however, the sustained growth of agricultural production and achievement of the target of self-sufficiency as well as the general well-being of the rural community depends on our ability to ensure that in the coming years even the smallest farmer is encouraged and assisted to adopt these technologies and become viable farmers. The extension agencies of the government, the community development organisation the panchayats-and the farmers' co-operatives have a very vital role to play in bringing about such a transformation of the countryside, in the shortest possible time span.

4. In this country, the co-operative movement started with agricultural credit as the main activity and considerable progress has been made in organising co-operative societies all over the country and enabling them to undertake large-scale credit operations. The policy of organising a strong integrated co-operative credit structure from the village upwards, followed by the government, has paid rich dividends. 1,81,000 primary agricultural credit societies with a membership of over 272 lakhs and a working capital of over Rs. 600 crores now cover 90 per cent of our villages and 43% of the agricultural population. The emphasis is now on reorganisation of the weak links by cutting out the dead wood and placing the potentially viable units firmly on their feet. The achievements so far are quite spectacular. The short and medium-term credit disbursed in 1967–68 are about Rs. 400 crores, which compares quite favourably with Rs. 23 crores advanced in 1950–51 i.e., the beginning of the First Plan. During recent years, we have been able to keep up a sustained expansion of 15 per cent per annum in short-term credit. Long-term credit also increased from a level of about Rs. 1·4 crores in the beginning of the First Plan (1950-51) to about Rs. 78 crores during 1967-68 and the average rate of expansion has been of the order of 25 per cent per annum during the last few years. The progress has, however, not been uniform. In certain States like Assam, Bihar, West Bengal and Rajasthan, the co-operative credit structure is still very weak and ineffective.

5. A new feature which has contributed to the steady increase in short-term credit provided by co-operatives is the 'crop loan' system. This visualises assessment of the credit needs of a cultivator with reference to his production

requirements and repaying capacity. Credit is provided partly in cash and partly in kind under a three component formula even to tenants who do not own any land. After the credit limit is fixed, the inputs like fertilisers can be drawn from the credit society if it is a distributor or otherwise from other retail distributors against cards or delivery coupons issued by the society. A close linking of marketing with credit is also envisaged as repayment is linked to the marketing of the produce.

6. Similar progress has been maintained both on the agricultural marketing side as well as in respect of the supply of agricultural inputs. The importance of these two sets of activities lies in the fact that they form integral parts of the process of agricultural production. The farmer is equally concerned with agricultural inputs, agricultural operations, as well as agricultural marketing, and it is only when we look upon all these three together that we can evolve a stable service structure for agricultural production. Any weakness in one sector would lead to a retardation of the programme. Our weakness in the marketing sector has already affected the recoveries of loans and hampered the growth of credit. The agricultural inputs supplied through the co-operatives have been increasing rapidly and today they form about 20 per cent of the total materials going into agriculture. In the same way, the marketing of the produce has increased from about Rs. 47 crores in 1950 to about Rs. 400 crores today, which is about 15 per cent of the total agricultural produce marketed.

7. Co-operative processing units carry one step further the effort of the farmer to obtain maximun benefit from his produce. Co-operative units are now processing a large number of agricultural products such as sugarcane, paddy, oil seeds, cotton, groundnut, fruits and vegetables, fish, milk etc. More than 1,000 processing units including sugar factories have been set up with the active assistance of government and are now in operation. A striking example of how a virtual transformation of the rural areas can be achieved by an integrated co-operative structure covering supply of credit and inputs for production, marketing and processing of the crops raised in the area, is provided by the new co-operative sugar mills which have come up in several States and more particularly in Maharashtra. The licensed capacity of sugar factories in the co-operative sector is now about 32% of the total licensed capacity of the industry. 53 co-operative sugar factories were in production during 1967-68 and produced 4·45 lakh tonnes of sugar. The sugarcane farmers in areas covered by these factories formed 92% of the total membership and provided 87% of the share capital collected by these factories from members other than State Government. The only factor holding up further progress, is the difficulty in securing licenses for co-operative sugar factories. The co-operatives in these areas meet almost the entire requirements of the farmers for production requisites and credit and also arrange for the marketing and processing of the crop. The economic and social advancement of the farmers in these areas has been phenomenal and provide a clear illustration of the economic benefits of efficient co-operative institutions. The progress of the Kaira district in Gujarat after the establishment of the Co-operative Dairy (AMUL) is now frequently quoted as an instance of what co-operatives can

achieve even in areas poorly endowed with natural resources. I think the day is not far off when some of the sugarcane growing areas like Kolhapur will start disputing the claim of Kaira for pre-eminence in this field.

8. All these achievements are quite significant, but the part the co-operatives play in agricultural production taken as a whole all over the country, will be made clear only by certain dimensions. The value of the agricultural production is about Rs. 8,000 crores of which about Rs. 2,500 crores from the value of the marketed surplus. It is from the sale of this surplus that the farmer has to find all the inputs of agriculture, including the wages paid by him and also his other consumer requirements. The gross value of these inputs, which are essential for the agricultural operation, will be of the order of about Rs 1,200 crores at the present level of use of the different items. This means that the credit supplied to the farmer by the co-operatives is about 35 per cent of his real requirements and the materials supplied by co-operatives form about 20 per cent of the materials actually made available for the entire farming sector.

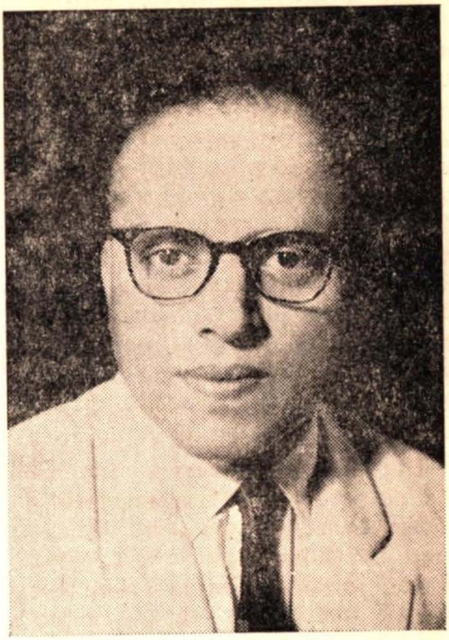
9. The position can be analysed from the point of incidence of this credit on the farmers, but looked at from that angle, things do not appear so bright. Studies have shown that the proportion of farmers who are getting adequate credit for the agricultural operation ranges from 20 to 40 per cent in different states. This means that even with the substantial growth which we have achieved, the major part of the ground is yet left uncovered. How to bridge this gap is a problem constantly facing the co-operative organisations. The rate of growth of co-operative credit and inputs is about 15 per cent per annum, and even this growth has resulted in considerable strains in the administrative organisation. Assuming that this rate of growth can be sustained over the next five years, we reach a coverage of about 50-60 per cent. In other words, if co-operatives expand at the present rate, without experiencing any set back they would be able to provide 50-60 per cent of the credit needed for agricultural operations in five years.

10. But these 'ifs' are quite significant, specially when we deal with administration of programmes covering millions of small farms. Arithmetical projection may not be of much help in this sort of planning. The ability of the administrative organisation to implement the tasks will prove the crucial factor, and as I have stated above, the organisation is already exhibiting signs of strain, when a sustained growth of 15 per cent is imposed on it. One of the symptoms of this strain is the slackness shown by the cultivator in repayment of his dues. After all, any credit organisation can function only if the money loaned comes back on the due date. A certain amount of occasional slackness may probably be tolerated by the system, particularly when it is caused by the adverse seasonal conditions. Defaults arising from partial crop failures can be covered by the grant of extension in deserving cases. Defaults caused by major crop failures and natural calamities like floods and droughts are now covered by a "credit stabilisation scheme" under which the Reserve Bank and the Co-operative Banks use their credit stabilisation funds to convert such overdue short-term loans to medium-term loans repayable in

the next few years. Our studies have, however, shown that there is still a large accumulation of overdues which could be attributed primarily to the slackness of the farmer and the society. The position can certainly be rectified by more rigorous collection and by better realisation on the part of the farmer that repayment is as essential for the functioning of the machine as the issue of the loans. Whether the co-operative organisations and the political leadership will be able to impose this essential discipline on the farmers is another question. But the future of the co-operative organisation depends on a firm answer being given and implemented.

11. The general picture that emerges is that the co-operatives have rapidly expanded the scope of their activities and today give adequate credit to finance about 25 per cent of the farmers and some sort of credit to another 15%. If the present rate of expansion is sustained, the co-operative agency may be able to handle about 50 per cent of the total agricultural credit requirements in another five years. These are all India figures which are not of particular significance when we consider each State separately. If we look at a State or a smaller region, we can say that, in a few regions, the co-operative credit can be brought up to the stage of meeting the bulk of the requirements. But in much vaster areas, the role of co-operative credit is likely to remain at the level of 30 or 35 per cent for quite some time. Some are likely to get impatient with this situation and seriously think of by-passing the co-operative structure. Various suggestions have been made like commercial banks operating in the agriculture sector, agricultural credit corporations functioning in some areas and agricultural development corporations being set up in some States. All this can and is being done, but it must be realized that when we are thinking of agricultural credit of the magnitude of hundreds of crores of rupees, these smaller efforts will by themselves hardly make any serious dent on the problem. Moreover, whatever be the organisation which is built up, will also run into the same difficulties which the co-operative organisation has had to face when dealing with millions of small farmers. The co-operatives need not seriously object to these alternative agencies coming into being, because rural organisation and finance is such a vast sector that many flowers can bloom without causing any detriment to one another.

RECENT DEVELOPMENTS IN RESEARCH AT THE INDIAN AGRICULTURAL RESEARCH INSTITUTE: NEW DELHI AND REGIONAL CENTRE: COIMBATORE



M. S. SWAMINATHAN

Director, Indian Agricultural Research Institute

The Indian Agricultural Research Institute, popularly known as Pusa Institute or I. A. R. I., is located on a self contained, beautifully laid-out, 1,200 acre estate about four miles west of New Delhi Railway Station. The National Physical Laboratory and the Institute of Agricultural Research Statistics of the Indian Council of Agricultural Research are situated adjacent to the Institute's campus.

With its vast library, a large body of well-trained scientific personnel, well-equipped laboratories and facilities for field experimentation, the Institute is today the premier agricultural institution of the country, and is considered as one of the finest agricultural research centres in the world. In 1958, the Institute received the status of a university and was authorized to impart instruction at the post-graduate level in the various disciplines of agricultural science leading to the degrees of Master of Science and Doctor of Philosophy.

Features of the Institute:

The Institute has excellent research and teaching facilities, with up-to-date laboratory equipment, which are the best of their kind in the country. These attract students not only from all over India but also from several countreis in Asia, Africa, Europe and America. A unique feature is the location, within a single campus, of co-ordinated research activity in almost all the disciplines related to scientific agriculture and a complete integration of research programmes with post-graduate training.

Results of Research:

Among the outstanding contributions of this Institute to Indian agriculture, mention must be made first of the production of the famous Co. varieties of sugarcane, which have revolutionised the Indian sugar industry. This was followed by many other achievements, the most significant being the evolution of superior varieties of food, fodder, vegetable and industrial crops capable of giving high yields and possessing tolerance or resistance to drought, pests and diseases. Thus, improved varieties have been developed in a wide range of crops, including wheat, barley, oats, paddy, maize, *jowar*, *bajra*, gram, *arhar*, pea, lentil, linseed, safflower, seasame, tobacco, chilli, *Hibiscus*, *berseem*, grasses and cotton.

The Institute serves as the Co-ordinating centre for several All-India Crop Improvement Projects, such as those relating to wheat, maize, *jowar* and *bajra*. The work carried out under these Projects has given rise to outstanding hybrids.

Two forage crops, namely, Pusa Giant Napier Grass and Pusa Giant Berseem, have also been developed. Pusa Giant Napier Grass is the result of crossing Napier or elephant grass with *bajra*. It is capable of giving over two Lakh pounds of green fodder per year, and it is the most productive grass so far developed any where in the world. This Grass has performed well in almost all parts of India and has already spread very widely. The fodder is rich in protein and sugar and is relished by cattle.

Pusa Giant Berseem has been developed by a process of chromosome engineering—the first variety to be released in India through the application of this technique. It gives twenty to thirty per cent more fodder than the varieties under cultivation at present, is more resistant to cold and also gives higher yields during the peak winter period when there is acute fodder shortage. Seeds of the new variety are in great demand in countries in Europe, particularly in the Netherlands for the reclamation of saline lands.

A rotation of Giant Napier and Giant Berseem has been developed at the Institute. This rotation ensures the supply of nutritious fodder throughout the year.

Improved varieties giving excellent performance as regards yielding ability and freedom from diseases have also been bred in vegetables, including tomato, brinjal, potato, bottle gourd, table cowpea, table *guar*, sweet potato, garden peas and *bhindi*, and these varieties are extremely popular both with cultivators and kitchen garden lovers.

In recent years, developments in atomic energy have given a great impetus to agricultural research by making available a wide variety of radioisotopes and ionizing radiations. Research carried out at the Institute's Gamma Garden has resulted in the development of several superior crop varieties. A variety of wheat, named N. P. 836 has been released for cultivation in Bihar State, and this variety differs from the parent strain in having very well developed awns or bristles on the flower. Introduction of these awns leads to an increase in yield of about ten per cent and also satisfies an important preference of the farmer.

Recently introduced high-yielding dwarf Mexican varieties of wheat have also been improved upon for their protein content and grain colour. A variety named *Sharbati Sonora*, has recently been released for general cultivation.

Radioisotopes have also been used to study such problems as the availability and adequacy of various nutritional elements in the soil, the correct depth at which fertilizers should be applied, and the optimum time of fertilizer application. These studies have shown that, contrary to the widely held belief, over fifty per cent of Indian soils are dificient in phosphorus. Therefore, it is important to apply phosphorus in addition to nitrogen if we are to get high yields as well as a good return from the nitrogenous fertilizer applied.

It has also been found that the depth at which fertilizer should be applied may vary from plant to plant and even variety to variety. Some varieties of paddy respond better when fertilizer is applied on the surface of the soil, while some varieties of wheat give good yields only when fertilizer is placed about two inches below the soil surface. Results of this kind have given information of great precision and value, the like of which cannot be obtained through the use of conventional methods of analysis. In a similar way, radioisotopes are being used to provide information on the most effective methods of controlling insect pests and diseases, of crop plants.

Regional Research :

The Regional Research Centre, Coimbatore, initially established under the Project for Intensification of Regional Research on Cotton, Oilseeds and Millets, financed by the I. C. A. R. has been integrated with the Indian Agricultural Research Institute, New Delhi as a Regional Centre for this Institute, effective May, 1966.

The Centre has been concentrating on research programmes primarily on cotton and *jowar* and since recently, work on soybean and pulses has been initiated under the relative Co-ordinated Projects. Introduction of wheat as a winter crop has also been taken on hand.

The Co-ordinating Centre for cotton under the All India Co-ordinated Research Project has been located here.

Recent and important developments in research at this Centre are briefly reviewed below.

World collection of cotton germplasm :

A world collection of cotton germplasm comprising 1978 lines has been assembled and grown during 1967 for evaluation.

Several superior lines with early maturing habit and high productivity have been identified in the accessions from the U. S. A. and Africa. In preliminary yield trials, Coker-201 and Mc Nair 1032 from U. S. A. and Reba B. 50 and Allen from Africa have recorded high yields.

Release of short duration varieties :

Intensive breeding work on the utilisation of cotton germplasm from the U. S. S.R. resulted in the development of an early maturing *hirsutum* cotton strain PRS-72. This short duration strain which completes the harvest in about 125 days was released by the Central Variety Release Committee in December, 1966.

The major area of adaptation of this strain is the rice fallows tract of Thanjavur district in Madras State, where the duration available in the summer season after the harvest of rice is a limiting factor for the introduction of cotton cultivation. The release of strain PRS-72 has thus opened up new land use pattern in this area.

Agronomic and plant protection schedule for realising high yields from this short duration strain have been developed by the Regional Centre.

Several high-yielding strains with shorter duration (140 to 150 days) and better fibre quality (1·09 inch length) like PRH-30/2 have been developed and are under Co-ordinated trials. Breeding varieties of cotton resistant to jassids is also in progress.

The concept of a new plant type-a morphological frame-suited for achieving high levels of production is receiving special attention in the breeding programme.

Breeding extra long staple cotton:

An Egyptian *barbadense* type of cotton suitable for cultivation in India has been developed with the following performance record:—

1. Duration: 5½ to 6 months (March-August 1967).
2. *Kapas* yield: 1850 kg/ha.
3. Ginning outturn: 30% to 34%.
4. Staple length: 1-8/32 inch.
5. Highest Standard count: About 100's.

In fibre and spinning properties, this new strain is comparable to imported Egyptian 'Menoufi' which is consumed in large quantities by the cotton mills in India.

The trial of the new strain has been taken on hand in different cotton-growing States during 1968. In Madras State, trials have been arranged during the 1968 summer season on eight different holdings, outside the Research Centre.

Concurrent programme of research on agronomy and plant protection for realising high yields from the new strain is also in progress.

Jowar:

In the intensive programme for the development of hybrid jowar carried out under the I. C. A. R. Project, with Coimbatore as one of the Main Centres, several high-yielding hybrids have been identified and Co-ordinated Sorghum Hybrid No. 1 was released in 1964 for the irrigated summer tract of Madras State. This hybrid gave 61% increased grain yield over the best local improved strain Co-18.

The agronomic and plant protection schedules for maximising yield of CSH-1 developed by the Regional Centre have largely formed the basis for recommendations in this regard by the State Department of Agriculture.

New male-sterile *jowar* lines combining good grain quality, increased plant height and tolerance to shootfly have been developed at this Centre and the hybrids synthesised with the new male-sterile have been advanced to Regional trials.

Hybrid ms 2219 x I. S. 3691-2 performed extremely well, both in 1966 monsoon season and 1967 summer and monsoon seasons with grain yields over 7000 kg/ha.

Other new hybrids which are of promise are ms 3675 x Karad local and ms 2219 x I.S. 3541.

As a result of screening of about 4125 genetic stocks of jowar for shootfly reaction, several lines have been identified as sources of resistance to this pest.

Ratooning of sorghum hybrid and multiple cropping:

The potentiality for ratooning of the sorghum hybrid CSH-1 was demonstrated and in an yield maximisation trial 14·2 tonnes per ha. grain were produced from the seed sown and ratoon crops during

1966. Experiments on new cropping patterns involving Mexican dwarf wheat as a winter crop and hybrid sorghum (including ratoon) or long staple cotton as summer crops are in progress with promising results.

Introduction of wheat :

The I.A.R.I. Regional Research Centre demonstrated for the first time in 1966 winter season that the Mexican dwarf wheat varieties can be successfully grown in this tract. This has been confirmed again in large-scale trials conducted during 1967–68 winter season also. Among the varieties tested Kalyan Sona, Sharbati Sonora and Safed Lerma recorded good yields of about 34 quintals per hectare within about 100 days duration (November–February).

On the strength of its achievements the Institute can now look forward to an era of yet greater endeavour to energize Indian agriculture through modern scientific techniques. Faced with feeding India's increasing millions Indian agriculture has to meet the demands made on it by turning to scientific farming. The country needs intensified agricultural research and more and more scientists devoting their attention to the solution of the manifold problems that are unique to our agriculture. In a static agriculture, there is neither scope nor need for research conversely, a dynamic research programme cannot be sustained without an adequate research and training base. The I.A.R.I. is conscious of this new resposibility and will strive its best to contribute towards the growth of rural prosperity and the banishing of hunger.

NATIONAL SEEDS CORPORATION IN THE SERVICE OF INDIAN SEED INDUSTRY

SHAH NAWAZ KHAN

The National Seeds Corporation was established in 1963 primarily for producing hybrid seeds of maize, jowar and bajra. But since the hybrids of jowar and bajra were not released by that time, work in the beginning was confined to hybrid maize. To a limited extent vegetable seeds were also taken up. Hybrid jowar was introduced towards the end of 1964 and hybrid bajra in the beginning of 1965.

Originally the National Seeds Corporation was envisaged only as a foundation seeds organization and the production of certified seeds was left entirely to private enterprise, either to individual producers or Co-operatives or Joint Stock Companies. As the demand for certified seed in the country outstripped production by these agencies, the National Seeds Corporation had to enter the field of production of certified seed to meet the requirements of the farmers. As the situation stands now, the National Seeds Corporation deals with the major crops like hybrid maize, hybrid jowar and hybrid bajra, rice and wheat, both as a foundation seed organization to produce foundation seed and to meet part requirements for certified seeds.

In addition to handling seeds of food crops like hybrids of maize, jowar and bajra; IR–8 Paddy and T. N. 1 Paddy, newest varieties of dwarf wheat and maize composites; the Corporation has taken up seed production programme in respect of the following fibre, fodder and vegetable crops:

1. Fibre Crops	Jute JRC 321,212, JRO 632
2. Fodder Crops	(i) Berseem Diploid & Tetraploid (ii) Cowpeas (EC 4216) (iii) Oat (Kent) (iv) Soyabean (Type 49)

(v) Pusa Giant Napier Grass
(vi) Lucerne (T-9)

3. Oilseed Crops
Groundnut
(a) TMV-2
(b) Asiriya Mwitunde

4. Vegetable Crops
1. Bhindi (Okra or Lady's finger)
2. Brinjal (Egg-Plant)
3. Chillis
4. Cauliflower
5. Onion
6. Peas
7. Tomato
8. Cowpeas
9. Bitter-gourd
10. Bottle-gourd
11. Luffa (Sponge-gourd)
12. Methi (Fenu Greek)
13. Palak
14. Dolichos Lab-lab (Sem)
15. Watermelon
16. French Bean
17. Carrot
18. Radish
19. Turnip
20. Cabbage
21. Amaranthus

The Corporation renders different types of services in developing the entire programme of certified seed production.

1. Foundation Seed

NSC arranges production of foundation seed of newest released varieties of hybrids and other seeds. Breeder's seed for production of foundation seed is made available by research institutions. The Corporation has set up its own farms for producing high quality foundation seed stocks of different crops. Arrangements for production of foundation seed are, however, made through contract growers also on a restricted scale, in order to meet the fast increasing demand for certified seed and to boost up certified seed production. The foundation seed crop is inspected for its high quality and genetic purity by a team of experts drawn from various organizations.

2. Certified Seed

The Corporation organises the production of certified seed through registered seed growers/producers, State Governments, co-operatives and seed production agencies. The foundation seed is supplied by the Corporation and maximum care is taken to see that the seed crop is raised in accordance with the highest international standards. For this purpose, NSC maintains a cadre of technical personnel, who assist the seed producers in the growing of seed crop and production of certified seeds. In the production of certified seeds, it is ensured that all quality factors like trueness to variety; optimum moisture for safe storage; freedom from weed-seeds and admixtures; and high germination are strictly given greatest importance. In the process of seed production, the farmer is given definite guidance and is educated on the use of improved cultural practices. In this manner, the farmer is also able to understand the superiority of the certified seed and is able to distinguish really good seed from the bad one.

3. Processing and Packing

Field inspection is only one part of the maintenance of quality in the seed crops. The mechanical processing of seed after harvest is the most important factor to be recognised. The seed is dried to a prescribed moisture content by artificial means, cleaned and graded and is treated with fungicides and insecticides. The seed is tested at

Government laboratories for germination, moisture content, purity and other factors. Only such seed as is up to the required minimum standards is put in bags and sealed effectively and a blue tag/label declare the variety germination percentage and other quality particulars of the seed contained in the bag. All seed is supplied to the farmer in standard sized packages, moisture proof, where necessary. The certified seed is not sold loose.

4. Processing Equipment

As stated above seed processing plays very important part in the entire seed production arrangement. It is, therefore, necessary that modern seed production and processing equipment should be used, in order to ensure the maintenance of required standards. The Corporation assists the seed producers, State Governments and others engaged in seed production in the setting up of processing plants making available equipment. The Corporation is also helping indigenous manufacturers in the production of machinery and equipment which were earlier imported or made available by USAID and other international organizations.

5. Extension and Training

In order to organise the seed industry on sound footing and make farmers fully aware of the quality in seed, the Corporation organises comprehensive extension, training and publicity programmes. The Corporation organises 'six weeks' Training Programme for those engaged in the development of seed industry in order to equip them with the latest information and know-how about the production of certified seeds. This programme is open to the representatives of seed producer, State Agriculture Departments and others, besides the technical personnel of the Corporation. This programme is assisted by the Rockefeller Foundation, Indian Council of Agricultural Research and Indian Agricultural Research Institute.

The Corporation also undertakes different publicity and extension programmes for the guidance and information of the farmers and others. Radio talks, features, television relays, newspaper advertising and publicity, production and distribution of educational and publicity materials like periodicals, news articles, guide books on seed production, educational and informative charts, calendars, pocket diaries, etc., form some of the main part of the publicity and extension services rendered by us to the developing seed industry.

NSC's initiative in organising the certified seed production programme in the country has helped not only the seed industry in many ways, but has also provided basic technical know-how about the latest techniques in agricultural production capable of helping in the increase of food production in the country. Important features of this assistance can be summarised as under :

* Development of quality consciousness in seeds.
* Introduction of seed certification on large scale in hybrids, vegetables and other crops for the first time in India.
* Popularization of Hybrid Maize, Hybrid Jowar, Hybrid Bajra and the outstanding varieties of Paddy and Wheat.
* Development of certified seed production indigenously of imported varieties of Snowball Cauliflower and Perfection New Line Peas.

* Establishment of large number of seed processing plants in the private and government sectors.
* Help indigenous manufacture of seed sowing and processing equipment to replace imports.
* Organization of training programmes for seed producers, State Government personnel and others for certified seed production.

Organizing the production of certified seeds is a very big step forward in improving the basic input of agriculture, that is, seed. To make certified seed available to the fullest extent is, however, a task of great magnitude and this cannot be handled by one or a few agencies. The co-operation of all interested individuals and institutions is necessary to successfully take up this task. The National Seeds Corporation seeks to provide the necessary assistance and guidance to the programme of organising a certified seed industry in the country, which would assure the farmer of the availability of the best quality seed of the newly evolved hybrids and other varieties.

AGRICULTURAL MARKETING IN INDIA

B. D. JOSHI

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Introduction

Marketing is not merely buying and selling as is very often thought of. It embraces many functions. According to the definition commonly accepted by the economists, "marketing is the performance of all physical and business activities involved in the flow of goods and services from the point of production till they reach the ultimate consumer". The marketing activities in consequence involve not only the functions of buying and selling and of price determination but also of processing, transport, storages, grading and standardisation, retailing, financing, risk-bearing, etc. It is through the system of marketing that the food produced by thousands of small farmers is assembled, processed, packed and transported hundreds of miles away and made available to the consumers in urban areas. Likewise, the industries like textiles and jute are assured of regular supplies of raw materials through the process of marketing.

Although agriculture is the oldest profession in the world and some of the cultivated grain crops are reported to have been raised in India from ancient times, North America and West European countries were the first to realise at the turn of the present century the important role that marketing played in the development of agriculture. In India, the subject of agricultural marketing did not receive the attention it deserved till the 'thirties although sporadic attempts were made here and there to improve the marketing conditions of one or two commercial crops which were important from the point of view of export as a raw material to feed the British industry. Mention in this connection may be made of the statutory regulation of cotton markets in 1897 in the Berar region. It was, however, only in 1935 that the Government of India, recognising the importance of agricultural marketing as an aid to the general well-being of the farming community and in pursuance of the recommendations made by the Royal Commission on Agriculture which were subsequently endorsed by the Central Banking Enquiry Committee in 1931 that an organisation designated as Office of the Agricultural Marketing Adviser to the Government of India was set up. Simultaneously, similar marketing organisations were set up in the then provinces and some of the then Indian States

Functions of Marketing Organisations

In the initial stages, the first and foremost task of the newly established marketing organisations at the Centre and the then Provincial states was to take up marketing surveys of important agricultural and animal husbandry products, as little or no information as to where these products were produced and how they were being marketed was available. As a result of these surveys, certain developmental activities such as standardisation and grading of farm produce, regulation of markets and market practices, standardisation of weights and measures, promotion of cooperative marketing, provision of warehousing facilities, standardisation of contract terms, collection and dissemination of market information and regulation of forward markets were initiated. The activities of the central marketing organisation continued to grow from time to time. For some of the activities which were originally initiated by the Central Marketing Organisation, now known as the Directorate of Marketing and Inspection, separate organisations such as the Central Warehousing Corporation, National Co-operative Development Corporation, Forward Markets Commission, Directorate of Metric Units, Indian Institute of Packaging, have been set up to attend to specialised areas of marketing.

The main functions of the Directorate of Marketing and Inspection can broadly be described under five main heads:

1. Marketing surveys and investigations of major agricultural and animal husbandry produce and compilation of reports therefor;
2. Work on standardisation and grading of agricultural and animal husbandry products;
3. Training of marketing personnel;
4. Regulation of markets and market practices; and
5. Marketing Extension.

1. Marketing surveys and investigations

As marketing surveys help in identifying the short-comings existing in the marketing process during the movement of the produce from the farm to the consumer and thus serve as a basis for undertaking developmental work in the field of agricultural marketing, the Directorate of Marketing and Inspection, right from its very inception has attached considerable importance to this work. Practically all the important agricultural and livestock commodities numbering over 100 have been surveyed for this purpose and All India Marketing Reports published therefor. These reports bear a number of suggestions for making improvements in the marketing system of those commodities. Research is a pre-requisite not only for progress and advancement, but is also necessary for finding solutions to the problems confronting the marketing of farm products in India. In consequence, a separate market research cell was established in the Directorate during the Third

Five Year Plan to intensify the work already being done. As a result, basic data and information in regard to costs and margins, prices, arrivals, etc., in respect of important agricultural commodities is being regularly collected. *Ad hoc* studies are also undertaken, whenever special marketing problems are encountered with a view to suggesting solutions therefor.

2. Grading and Standardisation

Realising the important role which standardisation plays in promotion of orderly marketing of farm products, the Government of India enacted in 1937, the Agricultural Produce (Grading and Marking) Act. This is an enabling legislation which empowers the Government to prescribe grade standards for various agricultural and livestock commodities and the respective designation marks. Grading under the Act is permissive. It gives the necessary authority to the Agricultural Marketing Advisor to the Government of India to issue Certificates of Authorisation to different parties for grading agricultural and livestock commodities as specified under the Act and the Rules framed thereto. Only parties holding such a Certificate of Authorisation are allowed to grade the produce under Agmark.

The grades for various commodities prescribed under the Agricultural Produce (Grading and Marking) Act are popularly known as Agmark grades and the "AGMARK" insignia has come to be recognised as a mark for purity and quality.

The first Rules under the Agricultural Produce (Grading and Marking) Act were promulgated for grading and marking of eggs, hides, skins, mangoes, oranges and tobacco in 1937. More commodities were added to the list in quick succession. Nine tonnes of mangoes and 34,000 kg. cigarette tobacco were graded and marked under Agmark and exported to London in 1937. Six experimental stations for grading ghee and a Central Ghee Quality Control Laboratory at Kanpur were started in that year. In 1937, the total value of Agmarked goods came to Rs. 8·5 lakhs. Agmark has not looked back since then. Thirty years later, in 1967-68, the value of commodities graded and packed under Agmark stood at Rs. 150 crores – several hundred times the value in 1937. The aggregate value of commodities graded under Agmark during the last 30 years has already crossed the Rs. 1,000 crore mark.

Formulating Grade standards

The first pre-requisite for introducing standardisation is collection of data. To determine the extent of variation due to space and time in a commodity, genuine control samples are collected from different reigions in different seasons and got analysed. Draft grade standards specifying the limits for the major characteristic attributes of a commodity which go to determine its purity and quality are then prepared. These grade designations are finalised in consultation with all interested parties - producers, traders, processors and consumers. International standards and special requirements of various overseas consumers are also taken into account while considering standards for commodities with good export potential.

Agmark is dynamic and keeps pace with the shifts in the pattern of trade both internal and export, changes in the consumer's preference, development of new products, etc. Agmark standards are accordingly reviewed and amended from time to time. So far, Agmark grade standards have been finalised for over 277 varieties of 90 commodities.

The different agricultural and livestock products graded under Agmark widely vary in their nature and physical as well as chemical characteristics. For example, one can find Agmark essential oils and spices as also Agmark wool, bristles and animal casings. One can get Agmark ghee as well as Agmark cotton, wheat flour (*atta*) and rice.

To ensure that consumers of Agmark products get only products of standard quality and purity, four essential steps are taken before the lot of a commodity is given the Agmark label. Firstly, the produce is cleaned and prepared into homogeneous lots. Next a representative sample is drawn from the lot. Until the sample is analysed and the conformation to the Agmark specifications established, the lot is invariably kept in safe custody. The third step is to pack the produce in containers as provided under the rules. The last step is to affix the Agmark label. This is so done that any tampering of the contents of the package results in the destruction or mutilation of the label.

Supervision over all the four stages may be by the authorised party or by the special inspectorate staff of the Directorate of Marketing and Inspection. A certain percentage of the graded and marked lots is checked by the field staff of the Directorate of Marketing and Inspection. These samples may be drawn at the premises of the packers, at railway stations, docks or in retail shops.

Only parties holding the Certificate of Authorisation from the Agricultural Marketing Adviser are allowed to grade produce under Agmark. A certificate is issued after the *bona fides* of the party are proved and necessary prerequisites like laboratory, hygienic premises etc., are ensured. At present, about 3,500 parties hold the authorisation for grading and marking different commodities under Agmark.

Compulsory Export Quality Control

While grading under Agmark is voluntary in so far as the produce is consumed within the country, in respect of 34 agricultural and livestock commodities, the lots offered for export have to be compulsorily inspected, graded and marked before leaving the shores of India. The power to do this is derived under the Sea Customs Act. Agmark has thus become an integral part of the export quality control movement of the country in respect of agricultural commodities.

The first commodity that was brought under compulsory quality control and pre-shipment inspection under Agmark was sannhemp fibre in 1942. The step proved beneficial in promoting orderly marketing, increasing export earnings and in keeping the image of India high in foreign markets. It was gradually extended to all principal agricultural and livestock products exported out of India. In 1967-68, commodities worth more than 85·8 crore rupees were agmarked before they were exported. The value of Agmarked commodities constituted nearly 23 per cent of the value of all agricultural and livestock products exported from India excluding products of fisheries and plantation crops in 1966-67.

Laboratories

Laboratories have always formed an inseparable part of the Agmark organisation. The first laboratory, the Central Ghee Quality Control Laboratory, was established in Kanpur in 1937 simultaneously when Agmark was introduced.

Laboratories help quality control work in three ways; in formulating standards, in evolving analytical techniques and in arriving at correct decisions regarding check-samples. In the case of commodities like oils, fats, honey and spices, where detailed chemical analysis is essential for quality control, the initial grading work is done by the 200 and odd grading laboratories located in the principal assembling centres. Some of these laboratories have been set up by the State Governments to help small merchants to derive the benefits of Agmark. A few have been set up by co-operatives, while the largest number has been established by packers themselves. To keep a supervisory check over the work done in these grading laboratories and to analyse check-samples, the Directorate of Marketing and Inspection has set up a chain of eight Regional Agmark Laboratories at Kanpur, Bombay, Calcutta, Madras, Guntur, Cochin, Rajkot, Sahibabad near Delhi and two Wool Testing Houses at Bombay and Jamnagar. The Central Agmark Laboratory—the apex and appellate laboratory is located at Nagpur.

Grading at Producer's Level

To help cultivators realise prices commensurate with quality, the Directorate, in conjunction with the State authorities has introduced a system of grading agricultural produce prior to sale in primary assembling markets. There are over 420 such centres already operating.

A farmer who brings a parcel of well-dried and clean produce usually receives no more than a neighbour who has taken no care in the preparation of his lot. There is thus no incentive to a farmer to bring clean produce in the market. Regulation of the market practices does not help in this respect since the price of any lot is settled between the buyer and the seller. To improve the situation, it was decided that a grading-cum-advisory service should be provided, free of charge, to farmers, and the quality of any lot assessed by the grader was made known to the seller before sale.

Under this scheme, as soon as produce is brought to the market, a trained grader who is either an employee of the Government or of the market committee examines the individual lots and assigns appropriate grades before they are sold. As the grades can be correlated with prices, the bargaining position of the farmer is strengthened. The cultivator thus is encouraged to bring in clean, dry produce of better quality.

The scheme was started in 1962 during the Third Plan. In 1967–68 about 88 crore rupees worth of produce was graded before sale under this scheme at over 420 centres. Ultimately, it is envisaged that grading will be introduced in all primary markets and in marketing co-operatives.

3. Training of Personnel

To man the expanding marketing organisations in the States, it was found necessary to conduct systematic training courses in agricultural marketing. Accordingly, in 1956, in the Second Five-Year Plan, two such courses were initiated by the Directorate of Marketing and Inspection. The first course provides one year's training to officers of the State Marketing

Departments. Only graduates are usually accepted for this course. So far, 284 persons have received this training.

The second course started by the Directorate is meant exclusively for secretaries and other employees of the regulated markets. For this purpose, initially two training centres were established at Sangli and Hyderabad and a third centre was opened at Lucknow in 1963. The centre at Sangli has been closed from February this year and it is being shifted to another place. The course offered at these centres is of 5 months' duration. So far 945 persons have successfully completed the training.

A third training course for graders, assessors and supervisors has also been started by the Directorate at Nagpur and Madras during the Third Plan. This training is of 3 months' duration and so far, over 676 persons have completed the course.

A fourth six-months' course in Livestock marketing has also been started by the Directorate at Nagpur in 1968, and the first batch of 8 trainees have completed training.

The Directorate has also started a six months' course in tobacco grading at Guntur and the first batch of trainees is undergoing the training at present.

4. Regulation of Markets

As mentioned earlier, regulation of markets was first attempted in 1897 for cotton in Berar. Due to sporadic and isolated action, no worthwhile progress was made in the matter of regulation of markets. The problem received earnest attention only after the setting up of the Office of the Agricultural Marketing Adviser. A model Agricultural Produce Markets Act was drafted in which procedure for sales and purchases in centralised market yards and licensing of functionaries were incorporated to protect the interests of the farmer-sellers. The draft was circulated to all the then Provincial and State Governments. While suitable action was initiated in some of the then Provinces, progress remained tardy on account of the pre-occupation of the Provincial and State Governments with the efforts needed for the prosecution of War. In 1951, when the First Five-Year Plan was launched only 322 markets were regulated in the country. The First Plan stressed the importance of regulated markets as an agency which would secure to the cultivators their due share in market price. At the end of the First Plan the number of regulated markets rose to 525. The number further increased to 709 in 1961, at the end of the Second Plan. The total number of markets and sub-yards regulated at the end of March 1968 was 1855. Excepting West Bengal, Kerala and Assam, all the States of the Union have enacted Agricultural Produce Markets Acts. It is expected that by the end of the Fourth Plan all the important markets and sub-yards numbering about 3,400 would have been brought under the purview of regulation.

It may be added that a survey conducted by the Directorate of Marketing and Inspection in 1965 showed that on an average, the cultivator was able to save as much as Rs. 6·17 in marketing the produce worth Rs. 100/- by selling in a regulated market. Besides reduction in the marketing costs, the cultivator is assured of correct weighment, prompt payment and a competitive price in a regulated market.

5. Marketing Extension

During the Third Plan, a Marketing Extension Cell was established in the Directorate of Marketing and Inspection with the main object of educating all the agencies involved in the marketing process—producers, traders, processors, consumers—in the improved marketing techniques. It was expected that similar cells would be established in the State Marketing Departments and the cell in the Directorate of Marketing and Inspection would act as a co-ordinating body. Unfortunately, not many cells were established in the State Marketing Departments.

However, a beginning was made by the Cell in the Directorate of Marketing and Inspection in initiating the State Marketing personnel in extension methods and introducing them to the various media of communication by holding communication workshops.

Similarly, the subject of Marketing Extension has now been included in the syllabus of the One-Year training course and the six-months' livestock marketing course.

It is envisaged that full-fledged marketing extension cells will be established in all the State Marketing Departments during the Fourth Plan, and allocations have been made for the purpose.

Conclusion

It needs to be mentioned that the economic prosperity of the farmer is largely dependent upon his ability to get fair prices for his produce. In fact, the success of the agricultural plan itself is dependent upon the farmers receiving remunerative prices. It is only through an efficient system of marketing that the farmers can be assured of a fair share of the price paid by the consumer for the various farm products.

No doubt, progress in varying degrees has been made in various States for ameliorating the conditions for marketing of farm products, but much more needs to be done. It is, therefore, imperative that concerted efforts be made during the Fourth Plan to achieve the targets set forth in the marketing development programmes.

METEOROLOGY IN THE SERVICE OF AGRICULTURE

M GANGOPADHYAYA
Director, Agricultural Meteorology Division, Poona-5

1 Introduction

India will continue for a long time to have an economy immensely dependent on agricultural production which in turn largely depends on the vagaries of weather. The droughts that affected large areas of India during 1965 and 1966 and their disastrous effects on the economy of the country lend added weight to the well-known saying that the Indian Budget is a gamble of the monsoon rains. In fact, the setting up of the India Meteorological Department as a central organization in 1875 was due to the occurrence of repeated famines on a country-wide scale and the ravages caused by weather. Although the India Meteorological Department came into existence about 90 years ago and the importance of meteorology to agriculture had long been recognized, it was only in 1932 that a special Division for the study of Agricultural Meteorology was established with its headquarters at Poona as a result of the recommendation of the Royal Commission for Agriculture in 1928. Initially it was set up with funds provided by the Indian Council of Agricultural Research. On their recommendations, the Government of India took it on a temporary basis in 1940 and on a permanent basis from 1943. The Division celebrated its Silver Jubilee in 1957.

Important service aspects relating to weather warnings for farmers and crop outlooks as well as the co-ordinated all India studies on crop weather relationship (including pests and diseases) and phenology had been described in the Year Book of Bharat Krishak Samaj 1964. Some other recent activities of this Division are stated here.

2. Recent activities at the Central Agrimet Observatory at Poona

Extensive research on measurement and estimation of evaporation and evapo-transpiration is carried on here. Evaporimeters of Russian and American designs are being used under varying conditions of exposure for finding the most reliable method of observing

Fig. 1

this parameter (Fig. 1). Gravimetric and volumetric lysimeters designed by the Division have been used for measuring evapotranspiration on wheat, sugarcane and cotton under field conditions (Figs. 2 & 3). Efforts are now in progress to get similar lysimetric data recorded at a few more agricultural farms in the country. Besides researches on evaporation, this observatory is also the venue of a few other important international works like the comparison of instruments for measuring duration of leaf wetness, net radiation and rainfall (Figs. 4-5).

3. Agro-climatic Atlas of India

The preparation of an Agro-climatic Atlas of India is continuing to engage attention since the Third Five-Year Plan. It is planned to include in this Atlas various meteorological data of interest to agriculture in the form of maps, graphs and tables. Among the data proposed for inclusion are rainfall (weekly, seasonal and annual), temperature (means, frequencies and extremes), evaporation, radiation, sunshine, wind, soil temperature, soil moisture, etc. The Atlas is also likely to contain some selected crop information relevant to the subject.

The Atlas will thus provide in one place much of the information of interest to agricultural scientists, farmers and others connected with the various agrometeorological problems, such as the adoption of crops suitable for cultivation in the various parts of the country, delineating areas susceptible to extreme climatic conditions, frost damage, high winds and hail storms.

4. Drought Studies

Drought is one extreme of the hydrologic cycle. Whenever it occurs, it causes enormous amount of human misery, suffering and hard-

GRAVIMETRIC METHOD

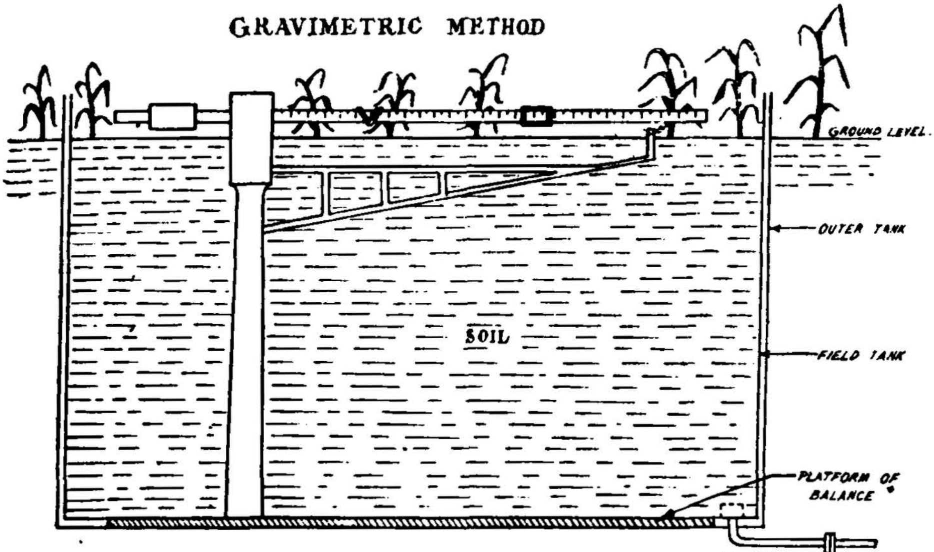


FIG.-2

VOLUMETRIC METHOD

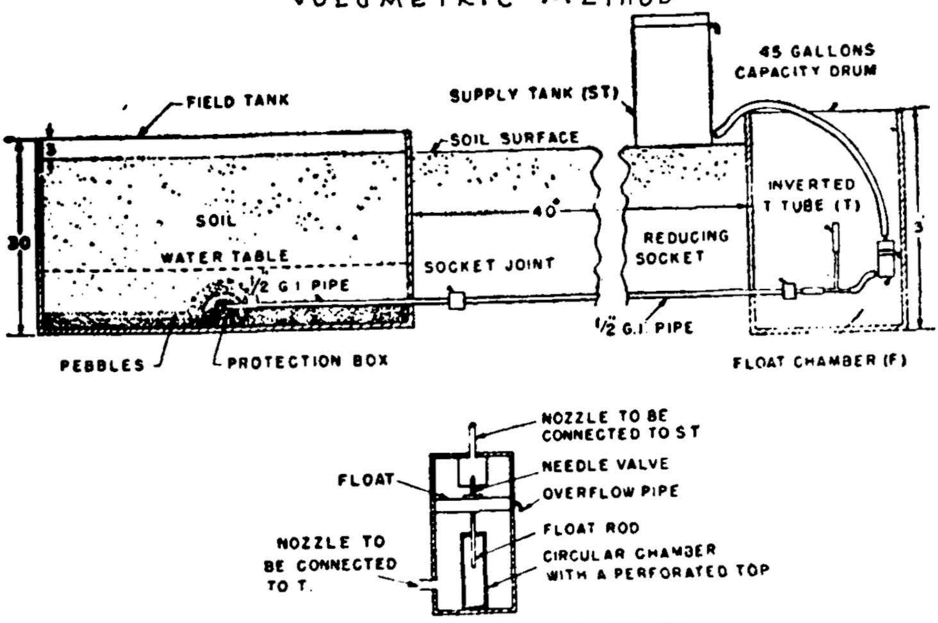


FIG. 3

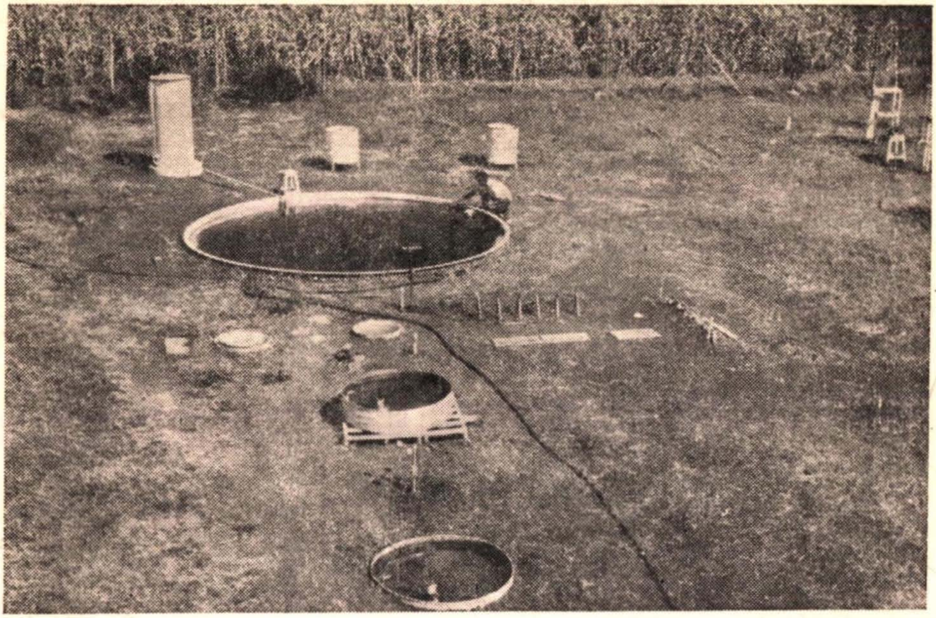


Fig. 4

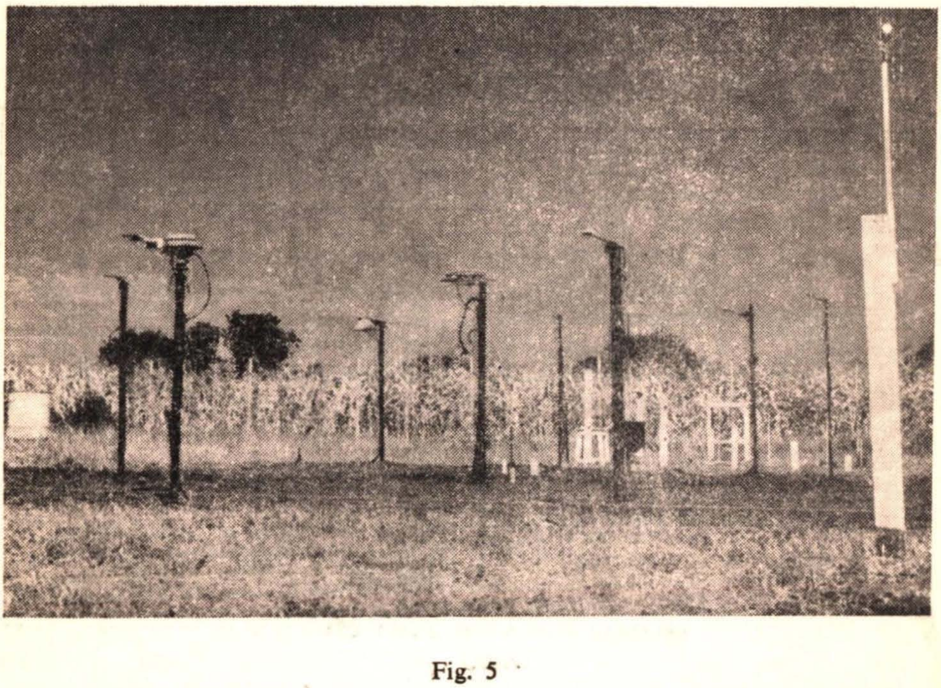


Fig. 5

ship. The Bihar drought of 1966 and consequent famine conditions there are well-known. Its repercussion on the national economy has been disastrous. Human endeavour can do little to prevent such vagaries of nature, but their consequences, however, can be mitigated to a large extent by proper planning, suitable protective measures and husbanding of resources. Which are the areas more prone to drought? What are their intensities and probabilities of occurrence? Is there any periodicity in them? What are their effects on crop yield etc., are the burning questions which have to be answered for sound planning of agriculture and effective utilization of available facilities and development of water resources. Our knowledge on these different aspects of drought is rather limited. So, at the instance of the Planning Commission, the Department has taken up a detailed study of overall food production based on drought incidence in the country.

5. Forecasts

Besides the above, work has also been started to develop equation for formulation of rough monthly forecasts of meteorological data.

6. Training

The Agricultural Meteorology Division has been imparting training to the staff who man the agro-meteorological observatories in the country. The period of training is 1-2 months depending upon the type of station that the concerned person has to man. Short period familiarization training is also given to Professors of agricultural colleges and other agricultural scientists. The Division has also been recognized as an international training centre in the field of agricultural meteorology. The countries who have deputed officers to this Division for such training include Thailand, Indonesia, Laos, Cambodia, Philippines, Ceylon and Afghanistan.

7. Collection of meteorological data needed for agricultural development

In addition to the studies made by the Division of Agricultural Meteorology, a need was felt for intensive use of data on rainfall, temperature, humidity, sunshine and dew fall by the various agricultural research farms themselves for their studies and researches in the fields of cropping pattern, plant breeding, agronomy, plant protection etc. At the instance of the Ministry of Food & Agriculture (Central) a unit has been set up in the Division to cater to the required past and current meteorological data from a network of about 400 stations (which includes general purpose observatories also) to all the Central and State agricultural research farms and Directorate of Economics & Statistics, Govt. of India. Under the scheme, dew fall observations from a number of stations and few more agrometeorological observatories at selected centres are being started with a view to covering more important agricultural regions, particularly the command areas of new irrigation projects.

8. Future Plans

There are many other aspects in which meteorology can be of service to agriculture. The serious devastation that can be caused to crops by locust swarms is well known. The breeding of locusts and their movement are very largely dependent on antecedent and current meteorological conditions and the meteorology of locust movement is a separate subject by itself. This has international importance. It is well known that Meteorology plays a very important role in Soil Conservation. Another useful field of study is testing the new varieties evolved by plant breeders for their resistance to low temperatures, high temperatures, low humidity, high humidity etc., by the use of suitably designed control chambers. Schemes for taking up these studies have been included under the Fourth Plan. Other aspects to which the Agricultural Meteorology Division hopes to pay increased attention in the years to come are evaporation and evapotranspiration control, protection of crops from frost, study of the loss of crops due to hail storm damage, the role of dew in the agriculture of arid and semi-arid areas, use of radio active tracers in studying effect of weather on the uptake of water and nutrients by plants and the influence of weather on animal husbandry, poultry and forest meteorology.

UNITED STATES ASSISTANCE TO INDIAN AGRICULTURE

R. O. OLSON

Assistant Director, Office of Agricultural Development, United States of America Agency For International Development

Interesting changes are taking place in Indian agriculture. Traditional practices are giving way on a broad scale to new systems of farming, involving the application of modern science and technology in many aspects of farm production. The expanding demand for farm products, created by a growing population and rising levels of income, requires that this transformation be continued, and at a rapid rate. The change to improved, modern practices comes as decisions of millions of individual independent farmers. The experience of the last few years indicate that significant numbers of Indian farmers are willing and eager to adopt better farming methods when provided with suitable price incentives and the opportunities. USAID has been assisting through grants, loans and technical assistance in development of institutions that provide farmers the opportunities and incentives necessary for modernization.

One of the important conditions for a sustained high rate of adoption of new technology by farmers is a steady flow of reliable information on appropriate new technology. Agricultural scientists must be engaged in the adaptation of new scientific knowledge to conditions under which farmers in various parts of India work. The results of this applied research must be interpreted and transmitted to the farmers in a timely and comprehensible way. For the past thirteen years USAID has been assisting in the development of improved institutions for conducting agricultural research, for training agricultural scientists and for operating efficient extension education programs. The Agency is now assisting in the development of agricultural universities in eight States. These new universities are becoming increasingly vital forces in the agricultural revolution. Assistance to these agricultural universities has included books and equipment, arrangements for advanced training of staff members abroad, and the assistance of agricultural specialists from American universities working at the agricultural universities with

Indian scientists, scholars and administrators in introducing new concepts of education and research and extension organization.

More recently, USAID has provided teams of specialists to work with the High Yielding Varieties program in six states. These specialists work closely with their counterparts in the Departments of Agriculture and in the Agricultural Universities and research institutions to identify field problems encountered in introducing new varieties and intensive production methods. These teams aim at getting research directed at the immediate problems and getting the results of research more quickly incorporated into farmers' practices. An objective of the program is to develop a more fruitful link-up of research with agricultural production activities in these states.

The consumption of commercial fertilizers has been increasing at a rate of more than 20 per cent per year in the last several years. Similarly, there has been a rapid rate of increase in the use of other production inputs such as pesticides, insecticides, new seed varieties and farm machinery. USAID has been assisting in development of increased capacity for production of these inputs within India, importation of additional supplies in the meantime, and improvement in their handling and distribution. The assistance has included dollar and rupee loans for establishment of additional capacity for producing fertilizers, seeds and farm machinery; technical assistance to the seed, plant protection and fertilizer industry and training program in India and abroad for Indians employed in government, cooperative, and private agencies concerned with various aspects of farm input production and distribution.

USAID is providing technical assistance for improving efficiency in soil and water use through a set of programs with the Centre and State governments. These programs include systematic inventory and evaluation of soil and water resources and development of projects for testing and demonstrating alternative soil and water management practices appropriate for some of the major problem areas of India. The pilot demonstrations are being used also to train Indian technicians at various levels on all aspects of planning and implementing sound soil and water management programs.

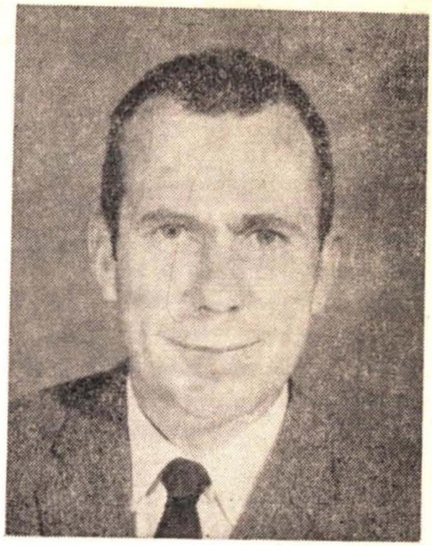
The Agency is carrying out a project for development of cooperative rural electrification distribution systems in five states in India. This program was developed to draw on American experience with rural electric cooperatives. USAID has contracted with the National Rural Electric Cooperative Association of the United States to provide, from among its member cooperatives, technicians experienced in organizing and operating rural electrification cooperatives to assist in the development of efficient low cost cooperative-owned electricity distribution systems in India.

As per capita incomes in India rise we can expect a substantial rise in demand for food. While there will be some increase in demand for cereal grains there is likely to be a more than proportionate increase in demand for foods that will improve the quality of the diet - foods higher in protein, particularly. USAID is providing a team of agricultural scientists who are assisting in a comprehensive program for development of pulse crops, which have great potential for meeting the major protein requirement of Indian consumers.

The Mission also carries out programs in the broad area concerned with production incentives. The primary technical assistance program in the area has been advisory services to the Food Corporation of India, aimed at helping this agency develop greater competence to carry out its important functions as an instrument for stabilizing foodgrain supplies and prices.

In recent years the United States has provided agricultural commodities to India under the Food for Peace Act (P.L. 480). During the drought years of 1965–66 and 1966-67 imports under this program were particularly important in meeting food consumption requirements In the next few years imports under this program may be useful in building up adequate buffer stocks to help stabilize food supplies and prices.

SUMMARY OF ROCKEFELLER FOUNDATION ACTIVITIES IN AGRICULTURE IN INDIA



Guy B. BAIRD

Field Director, Indian Agricultural program, The Rockefeller Foundation

The Rockefeller Foundation's Indian Agricultural Program came into legal being in April 1956 when a Memorandum of Understanding was signed by the Government of India and The Rockefeller Foundation. This agreement provided for co-operative efforts in developing a post-graduate agricultural training center at the Indian Agricultural Research Institute, New Delhi, and for cereal improvement research with particular emphasis on hybrid corn, sorghum and millets. Subsequently this was extended to include wheat and rice. Likewise, as a result of the cereal improvement programs, the Foundation is involved in seed production activities, primarily through the National Seeds Corporation.

Under this Memorandum of Understanding the two phases of the program research and post-graduate training—are conducted in close inter-relationship. The Government of India and the Foundation have specific responsibilities in all of this co-operative work.

The Government of India on its part arranges for the necessary land and facilities and the budget for local sta f and for recurring costs of the program.

The Foundation assigns to the program permanent staff members, who are specialists in agricultural research and education, and appropriates funds for certain items of equipment and library materials. There are now 13 permanent Foundation staff members assigned to this program who are resident in India. In addition, a limited number of well-known scientists from the USA serve as temporary staff members in the capacity of visiting professors with the Post-Graduate School and as consultants in the crop improvement work. An important aspect of the Foundation's contribution is the in-service training provided by having a limited number of young

Indian scientists directly associated with the staff members of the Foundation through temporary appointments.

In addition to the cost for providing the services of its staff members resident in India, the Foundation has appropriated annually sums of the order of $ 200,000 to $ 300,000 for equipment and other expenses in direct support of the field operating program. Further, the Foundation has made a number of grants to selected agricultural institutions in various parts of India, and provides scholarships for post-graduate and post-doctoral study and research for a limited number of Indian scientists for work in the USA each year.

Emphasis is being placed on training for scientific research and teaching, on development of leadership in agricultural sciences, and on strengthening and improvement of the institutions serving agriculture.

Graduate Education in Agriculture

The initial and principal focus of the Foundation's participation in graduate education in agriculture in India was the Post-Graduate School at the Indian Agricultural Research Institute. However, through the All-India Co-ordinated Cereal Crop Improvement Projects, attention is being directed to Agricultural Colleges and Agricultural Universities in the States.

The Post - Graduate School at the Indian Agricultural Research Institute was inaugurated in October, 1958. There are at present over 400 post-graduate students in residence, about half of whom are candidates for M.S. degree and the other half for the Ph.D. degree. The Institute has provided for integration of research and instructional functions and has more than 150 persons on its Post-graduate Faculty. The Post-Graduate School held its first Convocation in December 1961 and awarded 16 Ph.D. and 112 M. S. degrees - now from 60–30 M.Sc. and the same number of Ph.D. degrees are awarded each year. The institute has autonomous authority for developing its instructional program and granting of degrees.

The instructional program has been developed along a pattern quite similar to that followed in American Universities. Formal courses are organized on a trimester basis, and the individual instructors are responsible for the assessment of progress of the students in their respective courses. Each student's program is planned with an advisory committee consisting of representatives from his major field of studies and from the supporting minor fields External examiners are brought in to work with the local staff members in the comprehensive examinations, and in the assessment of the student's theses. Students have been admitted from all States of India and a limited number from several other countries.

Cereal Crop Improvement

Cereals constitute the major share of India's food. Adequate increases in production of these crops, with a concomitant improvement in nutritional quality, can overcome the country's food deficit in large measure. All-India Co-ordinated Cereal Improvement Projects with a multi-discipline approach have been established, or are in the process of being established, to provide the improved varieties and associated technology to permit this increased production of higher quality cereals. These projects, sponsored by the Indian Council of Agricultural Research, are jointly planned, financed and operated by ICAR and State institutions.

Maize

The coordinating headquarters of the Maize Improvement Project are located at the Indian Agricultural Research Institute, and research is conducted at various stations in the country representing different ecological zones where maize is, or is apt to become, important. Breeding materials have been introduced from the maize-growing areas in all parts of the world and evaluated for performance under Indian conditions. In 1961 four new hybrids namely, Ganga 1, Ganga 101, Ranjit and Deccan, were released from this program and put into production. Three additional hybrids were approved for release in 1963. By 1967 a total of nine hybrids had been released. In 1967 the first maize composites were also released for multiplication.

Under good cultural practices these hybrids have the capacity to yield up to 50% more grain than local varieties commonly grown under the same conditions in these areas. Further, they have been developed with a grain type and quality which are acceptable to Indian cultivators, and they are developed from inbred lines which are sufficiently vigorous and well-adapted to permit dependable seed production under Indian conditions. Some of the composites have demonstrated a yield potential approaching that of the best hybrids.

One hundred and thirty-five acres of double cross seed production were carried out in 1961 and 1,134 in 1962. The estimated area under hybrid maize for 1967–68 is 1,500,000 acres. There are about 12 million acres of maize in India. The U. S. Agency for International Development is likewise intimately involved in the seed production and in the educational and demonstrational work which form a part of maize improvement.

Sorghum

More than 40 million acres in India are devoted to the culture of sorghum. Under the cooperative program with the Government of India and the Indian states, a systematic program of collection and evaluation of the various varieties of sorghum grown in India was undertaken. In addition, a large number of varieties have been introduced from Africa, the USA and certain other countries. This total collection, consisting of some 10,000 entries, has been planted at several locations in India, and has been made available to sorghum research workers in other countries.

Uniform varietal tests have been established in various parts of India and a systematic program undertaken for selecting and proving the most productive and useful varieties for Indian use. The more promising ones are being crossed on to male sterile lines to produce hybrids with a potential for higher yields and better performance under local conditions.

Two hybrids CSH-1 and CSH-2 were approved for release in 1964 and 1965. These hybrids are, to a considerable extent, photo-period insensitive, and perform well from the southern tip of the country to Punjab in the north. Yields up to six tons per hectare have been obtained under good cultural practices. The estimated area to go under these two hybrids in 1967-68 is 3,500,000 acres. The shootfly and stem borer are serious pests of sorghum and efforts are being made to identify and utilize sources of resistance from the world collection.

Millets

Collectively millets constitute an important group of cereals in the country. The estimated area and production for 1966-67 were 39 million acres and 7·5 million metric tons, respectively. The two most important millets are bajra (*P. typhoides*) and ragi (*Eleusine coracana*). Bajra alone occupies around 25 million acres.

An All-India Coordinated Millets Improvement Project has already resulted in the release of two hybrids in 1965 and 1966 making use of male sterile seed parents. Although traditionally bajra is grown in low rainfall areas and under relatively low levels of management, the new hybrids bid to receive more prominent attention. Under good cultural practices yields of 3-5 tons of grain per hectare have been obtained. Approximately 1,500,000 acres are expected to be seeded to hybrid bajra in 1967-68.

Dwarf lines of bajra look very promising and prospects seem good for early development and release of high yielding dwarf varieties and hybrids. This crop in the dwarf form would seem to lend itself for use under intensive rotations.

Wheat

Until recently increase in wheat production was severely limited by the characteristics of the varieties in use. The local varieties were tall, with the associated tendency for lodging under high fertilizer and irrigation. With the introduction of dwarf materials from Mexico prospects have increased rapidly for a real breakthrough in Wheat production.

The Coordinated Wheat Improvement Project, making use of the introduced germplasm, has already identified high-yielding lines with suitable grain qualities and disease resistance. An expanded breeding program has resulted in many promising selections from crosses with the introduced materials and between these materials and the Indian lines. Yields of 5-7 tons per hectare have been obtained by farmers in several areas.

In the rabi of 1966-67 some 0·50 - 0·75 million acres were seeded to the dwarf wheats. This early large acreage was made possible by the Government's decision to import about 18,000 tons of commercial dwarfs from Mexico.

Rice

As with wheat, increases in yield of rice were limited, to a large extent, by the tall, leafy characteristics of the varieties used in India. The introduction of high-yielding dwarf varieties and breeding materials from Taiwan and the International Rice Research Institute has greatly enhanced the opportunities here for increased production through higher yields.

The Coordinated Rice Improvement Project, with headquarters at Hyderabad, is mounting a country-wide program to identify, develop and evaluate improved varieties making use of the recently introduced materials. Already yields of up to 10 tons per hectare of grain have been obtained on experimental plots. Yields in cultivators' fields of 6-7 tons per hectare are fairly common. The performance of the Introduced Taichung Native 1, and Tainan 3 from Taiwan, and the IR-8 from the IRRI has been particularly outstanding.

It is estimated that 6 million acres of high-yielding dwarf varieties of rice will be planted in 1967-68.

Seed production

Associated intimately with the development of the maize hybrids in 1961 was the recognition that inadequate provision existed to rapidly capitalize on those hybrids. There was a lack of organization, personnel and resources to permit and promote production of quality seed to meet the expanding scale of anticipated needs. In response to this situation the National Seeds Corporation was formed in 1963.

The major emphasis of the National Seeds Corporation was on foundation seed production of the hybrids. Its purpose also was to help the development of a seed industry, seed certification programs, a seed law and assist in the promotion of the new hybrids and varieties.

Approximately, 6,000 acres of foundation seed will be multiplied in 1967-68 for the hybrids. Several seed production organizations have been started and hundreds of seed growers are increasing seed for these organizations, the National Seeds Corporation, and State governments. A Seeds Act has been passed and rules are being drafted. Numerous intensive training programs have been conducted for the staffs of the National Seeds Corporation, State governments and private seed producers.

Interdisciplinary approach

Since the inception of the coordinated cereal improvement projects emphasis has been placed on a teamwork approach. It is recognized that it is not enough just to develop strains or hybrids of cereals that have a high-yielding potential. It is equally important to have corresponding results and materials that permit effective utilization of the improved crops. These include control measures for disease and pests, and information on cultural practices such as fertilizer requirements and water management.

The importance attached to an interdisciplinary approach is reflected in the research program of the cereal improvement projects and the specialization of the scientific personnel provided, or to be provided. It is also reflected in the composition of the specialists provided by theRockefeller Foundation. Included in the latter are several plant breeders, a plant pathologist, an entomologist, an agronomist-soil scientist, an agricultural engineer, a seed specialist and an agricultural economist.

Recently a decision was made to intensify the work on grain quality. A laboratory has been established at the Indian Agricultural Research Institute which is equipped to determine the quantity and quality of protein in grain. Through identification of promising materials that have a high level of protein and favourable amino-acid balance, it is anticipated that breeding procedures will be modified to permit incorporation of these quality factors into the high-yielding varieties and hybrids.

Rockefeller foundation grants for agricultural sciences

Balwant Rajput College, Agra, for building and equipment, student aid program, agricultural equipment and library development. $ 280,000

Institute of Agriculture, Anand, for library development. $ 10,000

Allahabad Agricultural Institute, Allahabad, for equipment for rural development program; support for research. $ 172,000

West Bengal College of Agriculture, Calcutta, for equipment and library books. $ 65,000

Central Rice Research Institute, Cuttack, for equipment and library materials. $ 135,000

Agricultural College and Research Institute, Coimbatore, for scientific equipment. $ 135,000

Central Potato Research Institute, Simla, for equipment and library books. $ 69,900

Punjab Agricultural University, Ludhiana, toward cost of developing agricultural experiment station facilities and procurement of laboratory equipment, books and periodicals; development of architectural and structural plans for construction of the Home Science College. $ 335,000

Indian Agricultural Research Institute, New Delhi, for new library wing. $ 145,000

Government of Uttar Pradesh, Rural research and Action Center, Lucknow: for building; Govt. Horticultural Research Station, Saharanpur: for equipment and library materials.

Etawah Pilot Development Project. $ 189,2C0

Uttar Pradesh Agricultural University, Pantnagar, for development of an agricultural experiment station at the University, and for construction of an International Hostel. $ 260,000

Avinashilingam Home Science College, Coimbatore, for equipment and for nutrition study programs. $ 5,000

CENTRAL INLAND FISHERIES RESEARCH INSTITUTE, BARRACKPORE & ITS PROGRESS DURING THE LAST FIVE YEARS

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The Central Inland Fisheries Research Institute, which was established by the Government of India at Calcutta in 1947, has since grown into one of the premier fishery research institutes in the world. The Headquarters of the Institute, however, has been shifted to Barrackpore, about 23 km north of Calcutta, in 1959 where new buildings were constructed for the Institute and its staff. Considerable progress has been made by the Institute during the last 20 years both in the field of capture and culture fisheries research which has helped greatly in the development of the inland fisheries of the country. The problem of fish seed has been solved to a considerable extent by the location of a large number of productive fish seed collection centres in various States and in minimising the mortality during its transport. The paucity of quality fish seed for stocking culturable waters also led to a major break-through in the field of induced fish breeding techniques. Ever since its inception, detailed research work is being conducted on increasing the survival rate of fry, fingerlings and adults in culture fishery operations with a view to enhancing production from fish ponds. A continuous search for an economic and easy method of weed clearance has been one of the problems associated with increasing the present yield. Exotic species of fish were also introduced with a view to controlling the menacing weeds, besides supplementing the existing varieties in bulk by fully utilizing the available fish food in ponds. It is indeed gratifying to note that some of the centres of this Institute, which were established to deal with certain specific problems, having achieved their objective, have since been wound up and new centres opened to deal with various other problems.

A brief review of the progress made in the field of inland fisheries research at the Central Inland Fisheries Research Institute during the last five years is given in the following pages.

CULTURE FISHERIES

Increased fish production from ponds

It is now well-known that fish nurseries have to be free from predators and teeming with fish food organisms if cent per cent survival of fish fry is desired. One of the commonly used fish poison viz , derris root powder being not available in the country, intensive search was made to get at a cheap and easily available substitute. Endrine (Tafdrin 20) has been found to be an effective clearing agent which could kill predatory fishes within 2-6 hours at 0·01 ppm. The search for an effective, indigenous plant poison led to the studies on a wide variety of materials such as the unripe fruit of *Anona squamosa* (Sitaphal) and *Calophyllum ionophyllum*, stem of *Euphorbia thirucalli* (koupal), stem and root bark of *Barringtonia acutangula* (hijal) and seeds of *Croton tiglium*. While a dose of 3·5-4 ppm of powdered and emulsified seed kernel of *C. tiglium* was found to be sufficient to kill the weed and predatory fishes within 3-6 hours, root bark powder of *B. acutangula* at 10 ppm killed tilapia within 2–2½ hours. A final selection of one or two indigenous fish poisons, their standardised dosages and suitable detoxifying agents would greatly help in the economic and timely preparation of nurseries which is so essential for increasing fish production.

Recently, a project has also been taken up for mass production of fish food organisms in the laboratory. Unialgal cultures of *Chlorella* sp. and *Nitzschia* sp. have already been done and it is hoped that unialgal cultures of *Cosmarium*, *Oedogonium*, *Spirogyra*, *Melosira*, *Navicula* and *Pinnularia* and uni-animalcule cultures of *Moina*, *Daphnia*, *Diaptomus*, *Cyclops* and *Brachionus* will soon be achieved in the culture laboratory, whence the operations would be shifted to the field.

Studies on increasing the fertility of fish ponds through artificial fertilization have shown that a fertilizer combination with a high proportion of nitrogen content and rated at 18–8–4 (N : P : K), when applied at 500 kg/ha, is an efficient fertilizer both for the nurseries and rearing ponds. Studies on increasing the nitrogen status of fish ponds with soils deficient in nitrogen have indicated that the pH of the soil plays an important role in determining the efficiency of different nitrogenous fertilizers in maintaining higher nitrogen level in pond soils. Recent experiments have also indicated that addition of manganese ($MnSO_4 . H_2O$) has a marked beneficial effect on the plankton production of a pond.

A Central Radio Tracer Laboratory has been set up recently in Calcutta to study soil chemistry in relation to productivity of fish ponds using the C_{14} technique.

As natural food organisms alone are not sufficient for faster and better growth of carp fry, a cheap and indigenous artificial food has been developed and has been found to be more effective than the mixture of rice bran and mustard oil-cake currently used in nursery operations. The new feed is a triple mixture of aquatic insects (notonectids), prawns and cow-peas (5 : 3 : 2) and can be easily prepared by collecting these insects and prawns, which are a nuisance in nursery ponds, almost at no cost. Algae powder, obtained by drying

Oedogonium obtru catum, has also been found to be a good source of protein food for mrigal (*Cirrhinus mrigala*) fry. Experiments with other algae and growth promoting substances such as proloid, eltroxin, berin, macrabin, starch, yeast, B-complex, terramycin, amino-acids and cobalt compounds are in progress.

With a view to increasing fish production from ponds, experiments with various species of fish in different ratios and combinations have been undertaken and a remarkable progress has been made in this direction. A net production of 3564 kg/ha/annum has been obtained by seeding the pond with fingerlings of catla (*Catla catla*), rohu (*Labeo rohita*), mrigal (*C. mrigala*), silver carp (*Hypophthalmichthys molitrix*), grass carp (*Ctenopharyngodon idella*), common carp (*Cyprinus carpio* var *communis*) and calbasu (*Labeo calbasu*) in the ratio of 2·5 : 5 : 2·5 : 5 : 2 : 2·5 : 0·5 and at 5000/ha. The survival of different species ranged from 85·0 to 99·2%. Further, about 3400 juveniles of common carp, resulting from its natural breeding in the pond, were also recovered. It needs to be noted that the pond was manured both with organic (cowdung at 25,000 kg/ha/annum) and inorganic (975 kg/ha/annum) manures and the fishes fed artificially with mustard oil cake and rice bran at 3,000 kg/ha/annum. The grass carp were, however, given a feed of fresh aquatic weeds (14,000 kg/ha/annum).

The Institute, besides supplying the spawn, fry and fingerlings of the Indian major carps, *C. carpio* and chinese carps to various States within the country, has also sent gift consignments to the Philippines and Nepal.

Induced breeding of fishes

During the earlier experiments, it was noted that the success in inducing breeding depended upon the nature, particularly the temperature (74°-87° F). To do away with the dependency on nature, Indian major carps were induced to spawn successfully in an air-conditioned laboratory. As the breeding season of Indian major carps is very short, it has been proposed to undertake induced spawning in air-conditioned laboratories provided with breeding and hatching rooms where optimum conditions could be provided throughout the season for large scale operations.

Hitherto, the pituitary extract solution, once prepared for injecting fishes, had to be used up almost immediately. As the preparation of the extract is a time-consuming process, it affects the speed with which commercial operations should otherwise be undertaken. Experiments were, therefore, conducted with preserved pituitary extracts and it was found that pituitary extract preserved in glycerine, kept in ampoules and stored under refrigeration for one year could induce spawning in carps Propylene glycol has also been found to be an effective preservative for fish pituitary extract. Fish pituitary extract can now be preserved in ampoules, mass production of which can be undertaken in some centralized laboratory, and supplied to fish farmers in remote areas who do not possess the necessary technical know—how and equipment for the extraction of the pituitary gland and the preparation of the extract. These experiments are certainly a step towards simplifying the induced breeding techniques to enable commercial production of carp seed in the country.

Studies on the sex specificity of carp pituitary glands have clearly indicated that there is no significant difference between the male and female glands in their capacity to induce spawning and as such separate collection of glands from the two sexes is not necessary.

As a substitute to fish pituitary extract, human chorionic gonadotrophin (HCG), extracted from the urine of pregnant human females, and certain synthetic hormones such as synahorin, lutocycline, ovocycline, etc., have been tried. While HCG at 1 mg/kg. in combination with a threshold dose of pituitary extract at 2-3 mg/kg of body weight of the recipient fish, could induce spawning, HCG alone, synahorin, lutocycline or ovocycline had no effect at all.

Studies on advancing the stage of gonadial maturity of carps by administration of weekly injections of pituitary extract or HCG, by feeding vitamin E (Ephynal) and by increasing light hours with temperature regulation are in progress at the Institute. A very interesting problem, now under investigation, is the cause of excess of fat deposition in fishes which hampers the proper development and maturity of gonads.

The success achieved in inducing the two exotic species of fish, the grass and silver carp, to breed by pituitary injections was a major achievement of the Institute. A further measure of success has come in achieving the natural spawning of the two species without resorting to stripping operations.

A new vista of developmental activity has been opened by the success in induced breeding techniques in that selective breeding and hybridisation of fishes has been rendered possible. Several intergeneric and interspecific F_1 hybrids of the Indian major carps e.g. catla x mrigal, mrigal x catla, rohu x mrigal, mrigal x calbasu and rohu x calbasu have been produced and some of them have even been back-crossed with parent species. Observations on their growth and various aspects of their biology are in progress with a view to selecting and further propagating hybrids of superior qualities than the parent species.

Control of aquatic weeds

A very large number of ponds and tanks, besides the *beels* and *jheels*, in the country are choked with weeds of one type or another. The Central Inland Fisheries Research Institute has all along been conducting extensive work on the control of weeds of common occurrence in fishery waters. It is heartening to note that a technique for the control of one of the most menacing of weeds, *Eichhornia crassipes* (water hyacinth), has now been standardised. Field experiments with "Taficide-80" (80% sodium salt of 2, 4-D) at 6 kg/ha, along with 0 25% detergent (surf) at 1 kg/ha and kerosene at 4 litres/ha, have given over 90% clearance in about 3 months, when uniformly sprayed over thick infestations of water hyacinth without showing any adverse effect on the fish or fish food organisms. The cost of clearance work out to be Rs. 210/- per hectare.

2, 4-D sodium salt has also been found to kill *Cyperus* and *Nymphoides* infestations. Mud - pelleted 'Taficide-80' has proved effective in controlling *Hydrilla, Cyperus* and *Panicum.*

Another menacing weed, *Hydrilla verticillata,* so commonly met with in fishery waters, has been effectively controlled by application of copper sulphate mud-pellets at 35 kg/ha in three or four doses. Other aquatic weeds which are also affected by copper sulphate mud pellets are *Vallisneria*, *Eichhornia*, *Cyperus* and *Limnanthemum*.

Experiments with various other weedicides such as B. V. 201, Tok E-25, Gramoxone, ammonia and Phenoxylene plus are in progress.

However, the most effective and cheapest way to control the aquatic weeds is through grass carp seeding. Grass carp has been found to feed on *Hydrilla*, *Ceratophyllum*, *Nechamandra*, *Utricularia*, *Nitella*, *Salvinia*, *Potamogeton*, *Halophila* and *Myriophyllum*. The voracity with which it feeds on the weeds would be clear by a few examples. In one instance, 1,250 kg of *Hydrilla* was cleared by 97 grass carp (av. wt., 955 gm) in 14 days and on another occasion 425 grass carp (av. wt., 113 gm) cleared 25 tonnes of *Hydrilla* and 19 tonnes of *Najas* in a 0·65 ha pond in six weeks' time, the fish weighing 332 gm on an average at the end of the experiment.

Freshwater prawn culture

Though prawns are not cultured in freshwater ponds in India, their growing importance as a dollar earner suggests the possibilities of expanding the trade through scientific culture and development of the resources. A significant achievement made by the Central Inland Fisheries Research Institute in this connection is the breeding of two large freshwater species, *Macrobrachium rosenbergii* and *M. malcolmsonii* in the laboratory. However, much headway has not been made so far in that the young ones could not be reared beyond the mysid stage (IV stage), probably due to the paucity of knowledge regarding the right type of food required by the young ones. Extensive surveys have been made to locate the centres for the collection of the juveniles of cultivable species from the Hooghly estuary (West Bengal), Mahanadi river (Orissa), Godavari river (Andhra Pradesh) and Vembanad Lake (Kerala).

Attempts are being made by the Pond Culture Division of this Institute to rear these species in the ponds on scientific lines. Large scale transplantation of *M Malcolmsonii* from Rajahmundry (Andhra Pradesh) to the fish farms, tanks and reservoirs of Mysore State has met with success as the species has acclimatised there. In Kanwa reservoir, they have grown to about 190-200 mm in size and are found in the berried condition.

Brackishwater fish culture

The so-called brackishwater "farms" of West Bengal and Kerala offer vast potentialities for development. Methods of scientific fish culture developed in these states could then be applied for the development of the coastal swamps, lagoons and impounded brackishwaters in other areas. Attempts at collecting scientific data for the development of these fisheries have been in progress. Studies on the hydrobiology and soil conditions of various "farms", growth requirements of blue-green algae, effects of salinity on nitrogen transformation and the type of fertilizer for brackishwater soils, have been made.

However, scientific studies in this direction are possible only when a large number of ponds of various sizes are available for statistical treatment of results. With this end in view, a brackishwater fish farm has recently been constructed at Kakdwip (Dist. 24-Parganas) in West Bengal and another experimental farm is under construction at Bokkhali (Dist. 24-Parganas).

Centres for the collection of the seed of some important cultivable species such as bhetki (*Lates calcarifer*), mullets (*Mugil* spp.) and prawns have been located in the Hooghly estuarine system and for chanos and mullets in the Mahanadi estuary. Studies on the transport of prawn and mullet fry and on the food of the mullet fry and fingerlings are in progress.

Coldwater fish culture

Realising the importance of the fisheries of the coldwater regions, the Institute established a centre for scientific investigations of these fisheries in November 1963 at Kangra (Punjab). The Unit was, however, shifted to Srinagar in August, 1967. The breeding grounds and spawning season of *Tor putitora* (mahseer) and *Oreinus plagiostomus* in Himachal Pradesh have been determined and surveys to locate the breeding grounds of *Schizothorax* spp. in Kashmir are in progress. An ecological survey of the mahseer and trout streams in parts of Himachal Pradesh and Kashmir has been completed.

Experimental observations on the rate of survival of various stages of trout in the hatcheries of Himachal Pradesh and Kashmir have indicated that it can be considerably enhanced by the application of modern scientific knowledge. The work taken up by the Unit at the Achabal Trout Farm in Kashmir resulted in a survival of 49·34% from the eggs to fry stage in case of brown trout (*Salmo trutta fario*) as against 22·5% obtained by the State fisheries Department. Similarly, in case of rainbow trout (*S. gairdnerii*,) application of the same techniques increased the percentage survival from the green egg to fry stage from 17·0 to 39·3. Studies on the diseases of both the young and adult trout have been made and various treatments given to increase the rate of survival.

Fish pathology

Investigations on fish diseases in carp nurseries have indicated sporozoan (*Myxobolus* sp., *Ichthyophthirius* and *Thelohanellus* sp.), ciliate (*Trichodina*) and monogentic trematode (*Gyrodactylus* spp., *Dactylogyrus* spp. and *Paradactylogyrus* sp.) parasites to be of common occurrence. Incidence of *Saprolegnia parasitica* and gill rot caused by *Branchiomyces* sp. are also met with commonly amongst carps. *Acanthogyrus acanthogyrus* has been found to be a common intestinal parasite of catla and rohu. Control and preventive measures for most of these diseases were tried and suggested to fish culturists to prevent mortalities in ponds and tanks.

Studies on the parasites of hilsa and trout have also been made. Remedial and control measures have been tried for the diseases prevalent in trout hatcheries.

Observations on the spoilage of fish in Calcutta fish markets have shown that six strains of bacteria are responsible for producing conditions considered to be "spoilage" of fish. It was found that a bacterial load of 10^7 to 10^{10} / ml was enough to rot the fish within 24 hours. Bacteria isolated from various sources, such as pond water, surface of freshly caught live fish (*C. carpio*), fish intestine and the fluid from the rotting fish, were found to belong to Micrococci (yellow and white), *Proteus* spp., *Corynbacterium* spp. *Klebsiella* spp., *Vibrio* spp. *Achromobacter* spp., *Pseudomonas* (group III & IV), *Escherichia coli*, and Enterobacteriaceae.

Frog farming

The frog-leg export industry has developed considerably during the last decade so much so that there is a clear threat to the natural frog resources of the country. In order to give a fillip to the developing industry as well as to conserve the natural frog wealth, frog farming on scientific lines is being attempted at this Institute for the first time in India. A small frog farm comprising six nurseries (0·1 acre each) and a rearing pond (0·2 acre) has been established by converting a part of the present fish farm of the Pond Culture Division at Cuttack (Orissa).

Twenty live specimens of the American build frog (*Rana catesbeiana*) from Texas have been introduced into India and at the same time *R. hexadactyla*, hitherto not available in Orissa, has been introduced at Cuttack from West Bengal, where the species have acclimatised.

Both *R. tigrina* and *R. hexadactyla* have been bred by injecting homoplastic pituitary gland extracts and the tadpoles raised. Analysis of the gut contents of the tadpoles of *R. hexadactyla* and *R. tigrina* has revealed the former to be a vegetable feeder and the latter a carnivore as it feeds on tubifex and mosquito larvae. Investigations on fish-cum-frog culture are in progress at the farm where early frogs of *R. hexadactyla* / *R. tigrina* at 2,000/ha and fingerlings of catla, rohu and mrigal at 3,750/ha and in the ratio of 3 : 4 : 3 have been stocked.

Capture Fisheries

As has already been stated earlier, progress in the field of capture fisheries research has not been inconsiderable though it may not seem spectacular. Detailed investigations on the fish and fisheries of the Ganga, Godavari, Krishna and Narbada and Tapti river systems as also on the Hooghly-Matlah and Mahanadi estuarine systems have been conducted. The biology of several species of carps, catfishes, mullets and prawns and that of hilsa has been studied. Suitable suggestions for the development of the fisheries of Narbada river and Mahanadi estuary have been given to the respective State Governments.

An echo-sounding survey of the lower reaches of the Hooghly estuarine system (Lower Sunderbans) has been conducted and areas suitable for fishing operations demarcated.

Spawn prospecting investigations

As the rivers are still the largest single source contributing to about 92% of the total spawn production, it was considered imperative to locate productive fish seed collection centres on various rivers in the country not only with a view to minimizing the cost and mortality during transhipment but also with a view to achieving regional self sufficiency. Comprehensive investigations, with a view to prospecting new areas of occurrence of quality seed and collecting scientific data regarding the qualitative and quantitative potentiality of spawn-yielding river stretches, were initiated by the Institute for the first time in 1964. Studies on spawn behaviour in relation to various hydro-dynamical factors are an important adjunct of the present investigations. The concept of catch per unit of effort has been introduced to enable comparison of spawn yields from different rivers of the country. Attempts are also afoot to standardize the collection procedure and the gear.

Prospecting investigations for spawn have so far been carried out in 9 States covering 36 centres located on 22 different river stretches, some of which have already been established as regular centres by the State Governments. A large number of technical personnel, fishermen and other field staff of the State Governments and interested local fishermen have also been trained in the techniques of spawn collection and transport.

Reservoir fishery investigations

Detailed studies on the hydrobiology and the dynamics of fish population of the Tungbhadra reservoir (Mysore State), being conducted by the Institute since 1957-58, were concluded and suitable suggestions for the development of the fisheries of the reservoir made to the State Government. Intensification of the fishing activity throughout the year, selective fishing for the catfish population and intensive stocking of the reservoir with Indian major carps are some of the important suggestions made in this regard.

Surveys have also been conducted to locate breeding grounds of carps and centres for the collection of their spawn and fry in the riverine stretches of many reservoirs such as Tilaiya and Panchet Hill (D. V. C.), Tungbhadra and Vanivilas Sagar (Mysore State) and Badua (Bihar).

Multipurpose reservoirs being very large and deep present a great many problem with regard to fishing. Suitable improvements have been made in the native nets after detailed experimental fishing operations in various reservoirs by two FAO experts. New nets have also been designed to gradually replace the local ones and new methods of fishing such as light and electrical fishing have been suggested. Use of echo-sounders for charting bottom configurations and locating fish congregations was made for the first time in Indian reservoir fishery research investigations.

Detailed work has also been done by the Institute to assess the magnitude of tank fishery resources of peninsular India and suggestions for their development have been formulated.

The Institute is currently engaged in detailed investigations on the Konar reservoir (D. V. C.) and a group of small reservoirs around Rewa in Madhya Pradesh.

Investigations on brackishwater lakes

Detailed investigations on the reported depletion of fisheries of the Chilka Lake (Orissa) were conducted by the Chilka Investigation Unit of the Institute for about 10 years. These studies have shown that there is no clear cut evidence of depletion of the lake fisheries and that the fluctuations in the levels of production appear to fall within limits of variation due to natural causes. Further, on the basis of the low average lengths of most of the economic species in the commercial landings and their very high mortality rate, it is concluded that there is great scope for stepping up fish production through conservation and lake improvement. Suggestions for the conservation and development of the lake fisheries have been given and a 13-point programme for future research investigations by the State Fisheries Department has been drawn up.

Investigations on the fish and fisheries of the Pulicat Lake (Madras) are in progress.

Hilsa fishery investigation

Hilsa fisheries, known for its marked fluctuations, continue to be the subject of detailed investigations at the Institute. Recent studies have helped in delimiting its spawning grounds in the Hooghly river. In the Ganga river, however, the fish is known to breed all along the stretch, with concentration in certain regions. While a very high concentration of hilsa larvae has been observed between Sindhoraghat and Chunar in the upper sector of the Ganga, large concentrations have been found at Farakka and Dhulian in the lower sector.

These observations have also indicated the existence of three distinct resident subpopulations of hilsa in the Ganga river. Since it is known to migrate over long distances, the extent of the breeding and feeding grounds of the various resident populations of hilsa assumes special importance in connection with the river valley development projects. Observations on the pattern of intermingling have indicated that the three subpopulations intermingle in varying magnitudes during all the seasons of the year.

Attempts have also been made to induce hilsa to breed through pituitary administration at the Dowleiswaram anicut on Godavari river near Rajahmundry but without success, the main problem being how to keep the fish alive for a sufficiently long period to enable pituitary administration and spawning to occur.

Water pollution

A large number of factories have been established in India after independence on various small and big rivers. The discharge of effluents from these factories, which are legion, is fast creating a problem for the fish and fish food organisms in these streams. Alive to the need of saving our fisheries from these effects, studies on the problems of pollution have been going on in the Institute ever since the early fifties. Bioassay experiments have established that while the paper and pulp effluents are not toxic to fish life and fish food organisms, tar, distillery, tannery and cycle-rim wastes are highly toxic. Various methods of effluent treatment have been developed, of which a new method of treating the paper and pulp mill effluents by electricity has been found to be both cheap and effective.

Recently, the services of an FAO expert were made available to the Institute by the Government of India to evaluate the investigations on water pollution that have been carried out so far in India with respect to inland fisheries. A programme of work for future investigations has also been formulated by the expert after detailed surveys.

Conclusion

There is no gainsaying the fact that the Institute has made great strides in the field of fisheries research during the last five years notwithstanding the difficulties faced in respect of finances and staff due to the emergency caused by the hostile actions of our neighbours on the country's borders. The research programme of the Institute has been thoroughly revised during 1967 and made production oriented with clear-cut priorities for projects such as optimum/ha production in culture fishery operations, induced fish breeding techniques, fishery investigations in reservoirs, riverine fish seed investigations, etc. Two new projects, viz., fish farm designing and study of economics in fishery research, which have a direct fishery developmental value have been included in the new programme. It is hoped that the Institute will help solve the country's food problem through greater fish production from inland waters in the years to come.

DEVELOPMENT OF ARECANUT AND SPICES

T. T. PAULOSE

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Arecanut is one of the commodities which has a unique place from time immemorial in the social and cultural life of our people. It is considered a valuable stimulent particularly among the working class We are however not self-sufficient in this commodity and large quantities were imported in the past from countries like Malaya, Ceylon, etc. As a result of the developmental activities initiated by the Indian Central Arecanut Committee, the production of arecanut has considerably increased and imports were substantially reduced as will be seen from the following figures:—

	Production	*Imports*
1956-57	75,000 tonnes	40,000 tonnes
1966-67	1,26,000 tonnes	600 tonnes

The imports have since been stopped altogether.

With a view to supply quality planting materials, the Indian Central Arecanut Committee established a series of Arecanut nurseries in the states of Kerala, Mysore, West Bengal, Assam, Madras and Andhra Pradesh. The nurseries raised quality arecanut seedlings and supplied them to the farmers. In addition, as a result of the research work done by the Arecanut Research stations functioning in different States control measures for various diseases and pests of arecanut were recommended for general application by the cultivators.

The paucity of accurate statistics of acreage and production of arecanut and its cultivation practices, was a serious handicap in planning development projects. No regular statistics were available in respect of arecanut. To fill this gap, a comprehensive scheme for collection of statistics of area and production was initiated by the Committee. This scheme is now being implemented in all the arecanut growing states under the supervision of the State Directors of Statistics.

The developmental measures initiated paid good dividents and the production during the III plan exceeded the target of 1,06,000 tonnes by about 15,000 tonnes i.e. an increase of about 14% over and above the targetted production. From the trend of increase in consumption in the past, it is estimated that an increase of 4 to 5% per annum is required to be planned. On this basis, the requirement by the end of the Fourth Plan may be of the order of 1·5 lakh tonnes of processed arecanut, which would mean an increase of 24,000 tonnes in production during the Fourth Plan period. The developmental programmes for arecanut for the Fourth Plan are based on this target.

The Indian Central Arecanut Committee was dissolved in 1965. The good work done by the committee is however, being continued by the Indian Arecanut Development Council, an advisory body set up by the Government of India for looking after the development of arecanut cultivation. A Regional Office of the Ministry of Food, Agriculture, Community Development and Co-operation has also been set up in Calicut in Kerala State for co-ordinating the developmental activities in the different states.

Spices

Work on development of spices was in the past looked after by the Indian Central Spices and Cashewnut Committee. This Committee was dissolved in 1965. Since then the Indian Spices Development Council has been set up by the Government of India to advice Government on development measures to be undertaken for spices-all spices other than cardamom. The Regional office in Calicut for arecanut development work also attends to work on spices development. Work on cardamom is looked after by the Cardamom Board constituted under the Ministry of Commerce.

Work on development of pepper, ginger, and other spices has been in progress during the past. As a result of the research work done at the Pepper Research Station at Taliparamba in Cannanore District, Kerala, an improved hybrid plantting material has been made available. This hybrid pepper 'Panniyur-I' is capable of yielding about four times the yield of the best local variety and is also early bearing. Large scale multiplication and distribution of this planting material is one of the most important developmental measure for increased production. With this end in view, a central Nursery has been started in Kerala for large scale production of the planting materials of this variety of pepper

Control of the 'Wilt disease' on Pepper which accounts for a considerable shortfall in production is another important item of development work.

Work on improving the quality and yield of Indian ginger and cultivation of exotic varieties of Ginger viz.. Rio-de-janeiro and China variety are also under way. In addition, package programme for development of cultivation of Pepper, Ginger, Turmeric, Chillies and other minor spices have also been contemplated during the Fourth Plan.

The Council also encourages co-operative marketing, grading, establishment of Regulated markets etc. for arecanut, and spices so as to ensure a proper return to the cultivators.

Spices earn considerabie foreign exchange. The total foreign exchange earnings from spices is of the order of about Rs. 27 crores of which Pepper alone accounts for about Rs. 13 crores. The developmental measures proposed are aimed at considerable expansion of the export trade in spices. Detailed figures of exports are given in the table below.

TABLE 1

E. GENERAL

EXPORTS OF SPICES FROM INDIA FROM 1964-65 TO 1967-68
(Quantity in Tonnes, Value in thousand Rupees)

Items		1964-65		1965-66		1966-67		1967-68	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Pepper	...	1/,381	67,939	25,721	108,547	21,366	116,298	24,824	129,778
Ginger	...	3.608	13,267	3,987	13,249	5,035	16,054	3,915	13,076
Chillies	...	11,889	25,066	9,532	24,871	6,170	27,816	7,226	20,987
Turmeric	...	9,548	15,564	10,403	13,754	9,490	13,990	5,976	13,795
Cardamom	...	1,760	28,357	1,391	43,935	1,723	81,280	1,543	71,221
Curry poweer	...	1,513	4,693	1,554	4.992	1,090	4,623	1,254	5,089
Cumin	...	1,115	3,284	3,516	10,268	1,553	6,069	412	1,804
Fennel seed	...	1,773	2,892	1,487	2,265	892	2,033	570	1,605
Celery seed	...	1,081	1,834	2,150	3,871	1,842	4,272	1,782	5,120
Fenugreek	...	1,255	967	981	991	1,097	1,604	714	1,527
Garlic	...	731	552	795	713	265	706	999	1,861
Ani seed	...	241	450	81	137	kg. 139	Rs. 348	9	23
Coriander	...	234	438	142	313	489	1,159	2,435	4,167
Tejpat	...	696	120	70	33	229	96	181	64
Cassia	...	29	41	65	106	42	102	113	344
Cinnamon	...	—	—	21	49	49	122	20	80
Nutmeg	...	—	—	7	33	kg. 140	1·2	—	—
Mace	...	—	—	4	24	11	120	5	33
Total	...	52,854	161,464	61,907	228,151	51,343·3	2,76,345	51,978	270,574

IMPACT OF AGRICULTURAL EXTENSION ON AGRICULTURAL PRODUCTION

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Introduction

Agricultural Extension is essentially an educational process through which farmers are trained to help themselves. It aims at the development of the farmer and his family by inducting and guiding them in the best tillage practices and fullest utilisation of the advances made by science and technology and by motivating them to take desired actions. The success of all agricultural production efforts depends ultimately on an effective extension agency which is capable of reaching the millions of farmers on whose fields production take place.

Agricultural extension and farm education have grown over the years with the growing needs of agriculture in our country. The needs of the country are, of course, colossal and require enormous resources to build an educational and extension system capable of providing adequate support to our vast and complex agriculture. Since the inception of planning, the crucial role of agricultural extension and education in agricultural development has been increasingly realised and systematic efforts have been made to create the necessary institutions and organizations and also to strengthen them. Extension Training Centres have been set up to train the village level workers in the different aspects of agriculture before they are saddled with the responsibility of actually guiding and helping the farmers in the task of agricultural production. Arrangements also exist to impart higher level training to the staff at the higher rungs of the extension ladder so as to develop in them adequate technical competence and skills. Similarly, the number of agriculture colleges and universities has increased considerably over the last fifteen years to match the needs of our agriculture to the extent possible.

Agriculture in India before commencement of Planning

To be able to assess the impact of extension on agricultural production, it is necessary to have a look at the state of our agriculture before the initiation of the process of planned development of the national economy in 1951-52. For decades, agriculture in India had remained confined to traditional moorings. Oppressive systems of tenancy and land tenure constituted a major impediment to agricultural development, impeding even modest efforts to improve agriculture. These systems and practices led to the emergence of unsatisfactory and un-economical cropping patterns. The application of improved methods in agriculture was retarded to a great extent, because of the impoverishment of the peasantry and the exorbitant rents extracted from them by absentee landlords. Farming under such circumstances was mainly a subsistance occupation in which farmers had little incentive to produce anything beyond their immediate requirements. The environment in which farmers produced food and fibre in those days was characterised by a number of factors inimical to progressive agriculture, namely, absence of ownership title on land; lack of finance and resurces; inadequacy of inputs like irrigation, improved seeds, fertilizers, insecticides and implements; limited research and extension facilities; lack of economic and social institutions etc. The inevitable consequences of such environmental conditions were inadequate inputs, low crop-yields, meagre food supplies, low per capita income, poor housing and home amenities, insanitary conditions, poor health, inadequate educational opportunities and adherence to out-moded customs and farming practices.

The beginning of change

It was this environment that was sought to be drastically altered through a series of land reforms and process of planning as soon as the country regained her independence. The land reform measures, enacted during the early fifties, had for their main aim the elimination of intermediaries and conferment of rights of proprietorship on the tenants. "Land to the tiller" was adopted as the main plank in the scheme of land reforms which contemplated that owner-cultivator should be established on the widest possible scale, and all cultivators should come into direct relation with the State. Consolidation of holdings was another important programme under land reforms.

Since the beginning of our planning, concerted efforts have been made to develop agriculture in all its facets. Upto the end of the Second Plan period, however, production efforts and resources were widely diffused over the country. Educational and extension efforts among the large number of cultivators consequently remained thin and restricted. It was only at the commencement of the Third Plan period that a departure, in a limited way, was made in the direction of intensive agriculture based on the principle of concentration of resources and efforts in potential and responsive areas with assured irrigation. An intensive Agricultural District Programme (popularly known as 'Package Programme'), based on the above approach, was initiated in selected districts in the year 1960-61. Subsequently, in the light of the experience gained, this approach was extended to larger areas. The main extension tools adopted under this programme to stimulate change in agricultural production have been (i) the package approach which emphasises the adoption by the farmers of scientific combination of the various factors of production based on the latest research. Such a package has to be developed for each area keeping in view the soil, water and climate complex. (ii) Adoption of farm planning approach which envisages preparation of farm production plans by each farmer with the assistance of Extension Workers. Such a farm plan takes into account the available on-the-farm and off-the-farm resources of the farmers and inputs such as fertilizer, pesticides, implements, credit etc., which he will need to maximise his farm output. An attempt is being made to apply the principle of farm management in an extensive way, both at micro and macro level, for increasing agricultural production. The objective is to create conditions under which the cultivator can use improved farming practices that are available to him in such a combination that he gets the optimum results. This device has been instrumental in bringing technology and economics together in the programme of up-to-date business of farming. The other important aspect of this approach is its being an effective extension or teaching tool in the hands of an extension worker. In a country like India, wide-spread adoption of this approach has been found to be essential to change the outlook and attitudes of the bulk of the farmers.

Development of Intensive Agriculture

The I. A. D. P. was operated in a few selected districts (16) having favourable conditions for increasing production. During a brief period of five years (Third Plan period), the operation of the programme demonstrated the validity and efficacy of the concept of concentrations of resources and efforts in selected responsive areas in securing rapid and significant increase in agricultural production. The approach was, therefore, applied over much wider areas and a programme known as the 'Intensive Agricultural Areas Programme' was initiated in the districts in 1964–65. The areas of such intensive production efforts steadily increased and the programme came to cover about 9% of the total cultivated are a in about 130 districts in the country.

Then came the High-Yielding Varieties Programme which added a new dimension to the intensive agricultural production efforts in the country. A few high-yielding strains of paddy and wheat have been identified and a number of hybrids of jowar, bajra and maize, which are responsive to high doses of fertilizers, have been evolved by the scientists. This significant development has a vital bearing on agricultural production. The programme for cultivation of high-yielding varieties of foodgrains was initiated in the beginning of 1966-67 in selected districts and aims at covering about 32·5 million acres in the country by the end of 1970-71. This development has opened new possibilities and revolutionised agriculture. Exotic varieties of paddy like Taichung Native-I, Taichung-65, Tainan-3 and IR-8 have given yields as high as 5,000 to 6,000 kgs. per hectare which is in sharp contrast to the present low yields in the country. ADT–27, a variety developed in Thanjavur, has yielded over 4,000 kgs. per hectare. The new dwarf varieties of Mexican Wheat (Sonora-64 and Lerma Rojo) have also been tried during the last 2 to 3 years and the yields obtained have been as much as 5,000 to 6,000 kg. per hectare, which also is a remarkable improvement over the present yields. Similarly, the hybrids of maize, Jowar (Cholam) and bajra (Cumbu) have been found to be capable of giving very high yields under favourable conditions. The cultivation of these high-yielding strains is being confined to areas with assured water supply to realise their maximum yield-potentialities and the effort is mainly concentrated in the areas covered by the Intensive Agricultural District Programme and the Intensive Agricultural Areas Programme where the necessary extension machinery has already been built up and other facilities have been created for promotion of IADP.

The H. V. P. has already run for four full crop seasons during 1966 67 and 1967-68. In a brief period of two years, the programme has led to a break-through in agricultural production and shown promise of realising the goal of self-sufficiency in food in foreseeable future. In the very first year of their introduction, the high-yielding varieties spread over an area of about 5 million acres. This was no mean achievement of extension efforts considering the fact that the varieties were new, they required new methods and technology for cultivation and, above all, the year was one of unprecedented drought in most areas of the country. Farmers' response was encouraging beyond expectations and there was substantial expansion in coverage during the second year (1967-68) as compared to the preceding year. Even in the drought conditions of 1966-67, the high-yielding varieties stood reasonably well and gave better performance as compared to the local varieties in different parts of the country.

The initial success achieved in the implementation of the programme enthused the farmers to bring larger acreages under the cultivation of the high-yielding varieties and the overall target for the country was set at 15 million acres during 1967-68. This was nearly three times the actual coverage attained in the previous year. There were indications of preparedness on the part of the States to bring still larger acreages under the coverage of the programme if the required inputs, especially fertilizers were available. Reports received from the States indicate that the target of 15 million acres has been fully realised. The bumper crop of 95·6 millions tonnes of foodgrains harvested during 1967-68 bears ample testimoney to the successful implementation of the high-yielding varieties programme. The area of operation of the programme is likely to extend to nearly 21 millions acres during 1968-69 or even more if seasonal conditions are favourable. The farmers have shown commendable response, and have participated actively in the production efforts.

Under intensive agriculture, more yields per acre and more crops per year per acre is the objective. To this end, a multiple cropping programme was initiated in the country in 1967-68 as another major plank of the new agricultural strategy. At present, only about 20% of the total irrigated area in the country is being used for double cropping. Low intensity of irrigation in certain areas and use of long duration varieties have been the principal limiting factors in adoption of multiple cropping. However, with the introduction of short duration high-yielding varieties, opportunities are now available for making maximum use of land and water resources. In fully irrigated areas the aim is to raise 2 to 3 crops per year; in partially irrigated areas two crops a year may be possible where only, one crop was hitherto raised. Also, by introduction of new crops in an area in place of or along with the traditional crops and by adjustments of planting dates cropping intensity can be substantially augmented by arranging cropping sequences in such a way that even during the normal off-season period land and water resources are put to productive use.

Keeping in view the possibilities of multiple cropping a target of 7·5 million acres was fixed for 1967-68. In addition to cereals, the State Government had included under the programme crops like oil-seeds, vegetables, potatoes, pulses, etc. According to the reports available from the State Government it is estimated that against the target of 7·50 million acres, it was possible to cover as much as 9·20 million acres under the multiple cropping programme during the year.

Measures taken to strengthen Extension Work

The extension system in India operates through a certain well-defined set of tools which are designed to reach and influence the farmers in a decisive way. These tools constitute various forms of motivation and aids to farmers for increasing farm production and improving their economic condition. Some of the important measures which have been taken during the last 16 to 17 years to improve the effectiveness of agricultural extension, in terms of quality and coverage are briefly indicated below:

(a) Strengthening of field extension agency

Under the Community Development Programme an organisation consisting of a Block Development Officer, 8 Subject]Matter Specialists, 10 Village level Workers and 2 Women Village Level Workers was created at the block level as a link between the farmers on the one :side and all other agencies, whether official or non-official, involved in agricultural production, on the other side. The jurisdiction of a village level worker extended over an area of about 5,000 acres, operated by nearly 1,200 farm families. With such unmanageable area and farm population under his charge the extension worker was not in a position to establish personal contact with farmers and do his job effectively. With a view to increasing his efficiency, the area under his charge was reduced to half in IADP districts by doubling the number of VLWs. in each block, Three to four additional agricultural Extension Officers were also posted at the block level to look after the extension work more effectively. The extension set-up was also strengthened at the district level by appointing a Project Officer supported by 4 to 5 Subject-Matter Specialists. In other intensive agricultural districts also the extension agency has been strengthened to the extent the availability of trained and experienced workers permitted such a move. Strengthening of the extension agency has resulted in establishing a more intimate rapport between the Government Departments and the farmers in a large number of districts. It has also facilitated better arrangement for the supply of inputs, credit, technical guidance and also organisation of quick remedial action against pests, diseases and other natural calamities whenever and wherever such action was called for, in these districts.

(b) Improving the technical competence of the extension workers

Implementing an effective programme of agricultural development and advising farmers on their problems requires a high level of professional skill and technical competence on the part of the extension workers. In point of fact this meant weaning farmers away from their less-productive traditional ways to new methods. It was recognised that if this job was to be done properly, the extension personnel should be both technically competent and qualified by training. Elaborate arrangements were, therefore, made to impart both pre-service and in-service training to the extension workers. However, with the general improvement in agricultural practices, certain inadequacies were observed on the part of the extension workers, particularly at the block level, and this came into sharper focus in areas covered by IADP where the farmers demanded a higher level of technical advice from the village level workers. To overcome this problem, it is proposed to gradually replace all the village level workers by agricultural graduates over a period of time. As this is likely to take a long time to materialise, an intensive upgraded training programme of one year's duration has been initiated at selected Gramsevak Training Centres, besides providing them regular inservice training and sending the experienced and qualified village level workers to agricultural colleges, universities for degree course. In recent years, there has also been increased emphasis on providing on-the-job training to the extension workers at all levels.

(c) Adequate and timely supply of inputs and credit

It has been observed that large scale adoption of improved technology is possible only in areas where supplies have kept pace with the educational aspect of extension; in other words, where the package of practices and the package of services (including supplies) have gone hand in hand. The main inputs which the farmers require for increasing production are improved seeds, fertilizers, pesticides and improved implements. In the intensive agricultural areas arrangements have been made at all levels to ensure that these inputs are made available to him in the required quantities and in time when needed. The co-operatives are playing an important role in the distribution of agricultural inputs, and also in the marketing of agricultural produce besides in their main field of credit disbursement, particularly in the IADP districts. The number of retail points for the purpose of distribution of inputs with cooperatives increased from 1,587 at the inception of the programme to 4,838 at the end of 1965-66 and the value of articles distributed annually increased by about 5 times from Rs. 2 crores to Rs. 9·6 crores during the period. The value of agricultural produce marketed by the cooperative marketing societies recorded a six-fold increase by 1966-67 as compared to the pre-programme period. Co-operative godowns and warehousing facilities for storage of inputs and members' produce have also increased substantially. These facilities, extended to the farmers by the Co-operatives, have provided additional incentive and motivation for active participation in the programme.

(d) Price Incentive

Extension efforts have to be aided by a sound scheme of price incentives for the farmers. It has to be made worth-while for the farmer to adopt improved technology which involves larger investments, by guaranteeing him remunerative prices for the produce. The price support measures taken by the Government of India in recent years have gone a long way to provide this incentive to the farmer.

(e) Extension Techniques

The techniques at present adopted by the extension workers to educate the farmers in improved methods of cultivation have mainly been (1) demonstrations, (2) distribution of literature like leaflets, pamphlets, circulars, newspapers etc., (3) visual aids like posters, films, etc., (4) direct contacts through tours, songs, shows etc. and (5) working with village leaders. The extension workers are employing these tools, in greater and greater measures, for educating farmers, especially in the context of the IADP and H.V.P.

A large number of field demonstrations of different types are being laid out on the cultivators' fields in each crop season under the supervision of the V.L.Ws. and the Agricultural Extension Officers. Demonstrations constitute the most effective extension tool for motivating farmers to adopt improved agricultural practices. This has, therefore, received the greatest emphasis under the programme of intensive agriculture. The quality of these demonstrations is being ensured by entrusting only a small number of demonstrations to each extension worker which he could easily manage and supervise. Whole-farm and area-wide demonstrations are also being conducted in the Intensive Agricultural Districts. The objective of all these demonstrations is to demonstrate in actual operation the superiority of the recommended farm practices to the farmers with a view to convincing them of their possibility and persuading them to adopt these practices in their own interest. The organization of what is called 'National Demonstrations' under the direct supervision of research scientists marks a very important development in this field. The results of these demonstrations are widely publicised so that cultivators are encouraged to adopt scientific methods of farming with proven superiority over the traditional practices.

In the areas covered by the intensive programmes, package of practices based on the latest research findings, is printed and widely circulated amongst extension workers and farmers. Mass communication media like exhibition of films and radio broadcasts on different aspects of agricultural production, including the cultivation of high-yielding varieties are being widely used. Recently, the Ministry of Information and Broadcasting have set up a Farm and Home Unit in the All India Radio under the charge of a Director to provide a strong radio support to the Intensive Agricultural Programmes Similar Units have also been established in some regional radio stations to cater effectively to the needs of the farmers in the intensive agricultural areas. The extent of popularity gained by the new programmes in agriculture is a convincing index of the powerful impact made by the various information media on the farmers.

(f) Training of Farmers

Farmer is the ultimate adopter of improved practices of farming which are recommended to him by the extension agency to increase his farm output. His training in the know-how of increasing production, is, therefore of the utmost importance. With the advent of of the High-Yielding Varieties Programme, a new dimension has been added to the farmers training and education. A massive programme of Farmers Training and Education has been undertaken from 1967-68 as a support to the High-Yielding Varieties Programme. Under this scheme, 100 Training Centres are proposed to be set up in selected H. V. P. districts in the country. The programme is based on audio-visual aids of which demonstrations conducted by the experts will form the principal tool. In the case of the farmers in India the bulk of whom are illiterate and who cannot be convinced through abstract ideas from word of mouth or the printed literature, demonstrations constitute the only effective tool of transmitting knowledge of improved practices. The object of demonstration work in the Farmers Training and Education Programme is to bring the best farm practices to the notice of the farmer in such a way that he will accept them. What a farmer hears he may doubt but what he does he cannot doubt. To most people "seeing is believing". Therefore the importance of demonstrations for local acceptance hardly needs any emphasis. The effects can be far-reaching especially in the case of small farmers to whom more attention is now to be directed in order that they may benefit from the High-Yielding Varieties Programme to the maximum extent. The programme of Farmers Training and Education is, therefore, sought to be linked with the National Demonstrations and full advantage of these demonstrations is being taken in providing training to the farmers in various crop operations. The programme of National Demonstrations will also be supplemented by additional demonstrations to be conducted by paripatatic teams which are being provided under the Farmers Training Programme and the Subject - Matter Specialists of the district. Wide publicity about the programme of laying out demonstrations and actual dates of important agricultural operations will be broadcast through the All-India Radio so that largest number of farmers can take advantage of the demonstrations. There will be Farmers Discussion Groups which will be linked up with Radio broadcasts and will discuss all kinds of field problems and bring them to notice of the experts for solution. Thus, the future programme of training of farmers will be linked with demonstrations and radio so that it can produce the maximum impact on the farmers in terms of adoption of improved methods of farming.

Conclusion

Where as the necessary infra-structure to sustain a higher level of agricultural production was created through different schemes under the Plans like those for minor, medium and major irrigation, soil conservation, flood control, rural electrification, rural road development and through programmes for creating industrial capacity in fertilizers, pesticides, improved implements, irrigation equipment etc., the measures, detailed above, created the necessary conditions which made possible a change in the attitude and out look of the farmers and the catalyst involved in this process was the extension agency. What we see today in the rural areas is not just a bumper harvest but a widespread process of technological change in agriculture, deliberately brought about by persistent efforts. What has been achieved so far is quite creditable, but if the long-term goals set under the Plan are to be realised, the effort has to be intensified many-fold. The intensive agricultural programmes, including I.A.D.P., I.A.A.P. and H.V.P., cover only about 12% of the total cropped area and this is also confined to comparatively better endowed areas. For a wider diffusion of the fruits of planning and for ensuring uniform progress in the rural sector, incresingly more attention will have to be given to agricultural problems of dry farming areas in the coming years. A lot more has to be done in a general way, and also in the direction of modifying the extension techniques in vogue, and adapting them to changing conditions.

The extension efforts during the last one and a half decades have made a profound impact on agricultural production in the country. In certain areas where the extension leadership provided was bold and imaginative, supported by the necessary where-withals, new grounds have been broken. The main problem today is how to keep continuously feeding the process of change and progress with knowledge to avoid stagnation and levelling off of production at a new plateau. More than any one else, the extension agency has to think and plan for taking the agricultural development programmes a step ahead and adding new dimensions to it whenever and wherever necessary. A number of problems have come up to the fore in recent years, real as also superficial. It will be the main task of the extension agency to identify the more critical areas of crop production under present conditions, and initiate suitable remedial measures. These, no doubt, would include irrigation (with water as a planned and managed input); strengthening plant protection programmes; improved training at all levels with emphasis on upgrading expertise of extension workers, coupled with farmers' training with more effective use of audio-visual techniques, strengthening the role of the agricultural universities; building up new and improved credit institutions, agro-industries corporations and agricultural development corporations and development of the infrastructure to serve a modern agriculture built on science and technology. There is also an urgent need to strengthen the administrative arrangements and co-ordination among all organisations and agencies involved in agricultural production. If satisfactory solutions are found to these problems, there is no doubt that agricultural production in this country would rise to new levels which would meet not only the country's food requirements but also provide substantial surpluses for purposes of processing, exports for building up of buffer-stocks.

DAIRY INDUSTRY IN INDIA

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Milk processing plants for the supply of pasteurised milk have become a common feature in important towns throughout the country. This development has taken place as a result of resources provided under the three plans. Ninety-one dairies have been set up so far, ranging in milk handling capacity from 5,000 litres to 6,00,000 l/day. Some of these plants also manufacture products like condensed milk, milk powder, baby foods, cheese, etc. About 50 more plants are in various stages of completion. This development is in a great measure due to the active interest and participation of international agencies like the UNICEF, Colombo Plan, US AID, World Food Programme and others, for ensuring cheap and wholesome milk to large groups of vulnerable population. A consciousness has thus been created amongst the public to the benefits of milk supplies handled under hygienic conditions, with a guarentee for quality and regularity. As a result of this, for the first time a provision has now been made this year under the Indian Food Laws for laying down standards for pasteurised and sterilized milk, so that these terms are not used merely for sales promotion but to ensure a quality product for the consumer. Besides the dairy projects set up by the State Governments and co-operatives, several milk products manufacturing factories have also come up through private enterprise.

Pattern of Future Development

It is aimed to set up milk processing plants in all towns with a population of 50,000 and above. In all there are about 220 such towns. It is expected that with the development programme envisaged the target will be very nearly attained by the end of the Fourth Plan. Besides, substantial additions will be made to the existing capacities for the manufacture of milk products. At present the total quantity of milk handled by these plants is reckoned as about 18 lakh l/day, against an estimated production of 560 lakhs l/day, based on the 1961 cattle census. Thus, only 3 per cent of milk coming to the market, or about 7 per cent of milk used for liquid consumption, is handled by the organised sector of the dairy industry.

Though much headway has been made in organising town milk supplies, the unit of milk production continues to be small and scattered. Milk production is still taken up by the farmer as a subsidiary occupation. Setting up a dairy plant provider an incentive to the farmer producer in finding a guarenteed market for the milk produced at a fair price based on quality. Thus, both dairy cattle development and dairy development are integrated. Progressive farmers are showing keen interest in taking to improved cattle managgement practices and to take up milk production in a big way using crosses with bulls of exotic breeds noted for their high production. There is an urgent need to double the present production of milk to meet the pressing demand and cope up with the requirements of the growing population. Such a target will need persistent efforts, as the present rate of annual increase in milk production is of the order of 2 per cent.

In the dairy development programme in hand, it has been envisaged that farmer producers will be encouraged to organise into co-operative societies so that the price paid for milk reaches them direct. Such an arrangement will assist the dairy plants in minimising the overheads for the collection of milk as this function is taken over by the co-operatives on behalf of the members. Through the co-perative societies loans for the purchase of milch animals, and incentives like veterinary aid, supply of concentrate feeds at a fair price, development of irrigation facilities and fodder resources, housing for cattle, regular payment for milk supplied, equipment for testing milk, a part of the cost for the management of the societies, etc., are channelled. The Agricultural Refinance Corporation and some of the banks have formulated schemes for assisting farmer producers on liberal terms in case they wish to take to milk production and also for setting up milk processing plants. The recovery of loans is arranged through the milk supplied to the dairy, an arrangement which has worked very satisfactorily. Till recently loans were given only on the basis of agricultural land available with a farmer. Now loans for the purchase of milch animals can be had on personal surety only.

Whilst organising larger production of milk, care has been taken to ensure that all the milk that will be generated through various incentives will be taken by the dairy plant. In areas where large seasonal surpluses of milk occur, facilities for conserving these in the form of milk products have been set up. Preference is given to the manufacture of products like milk powder and condensed milk which could be utilized in the summer season to keep up milk supplies and also for utilization in places which are not so favourably situated for milk production, like some of the industrial townships. Milk production in India is highly seasonal and for nearly 5 months in a year the available supplies go down by 40 to 50 per cent. At present there are six milk powder manufacturing plants. With the experience gained, twelve new spray-drying plants are being set up and by the end of the fourth plan about 25,000-30,000 tonnes of milk powder will be available per annum. Larger dairy plants are being supported by Intensive Cattle Development Projects, covering an area with one lakh breedable population of milch animals so that a regular supply of milk is ensured for the efficient utilization of costly equipment, lowering the cost of production. It has been estimated that for handling each 1,000 l of milk/day, involves an initial outlay of a lakh of rupees by way of cost of land, buildings transport, processing, storage and distribution equipment, which go to make a modern dairy.

Milk Pricing

A fair price for milk, based on a common acceptable yardstick, provides the major incentive to the producer. Milk is purchased both on its fat content and solids-not-fat content, by providing a sliding bonus on the stipulated minimum content. This helps to check adulteration which is still a common feature of market milk supplies. Due to the low yield of milk given by the animals in general, the cost of production of milk is high. In evaluating a fair price for milk, weightage has to be given to the prevailing price of milk products like ghee and *khoa* for which nearly 36 per cent of the total milk production is even now used. Diary plants pay a price varying from Rs. 12 to Rs. 27/kg. of butterfat depending on the locality. In terms of milk containing say 6 per cent butterfat, this comes to Rs. 0·80 to Rs. 1·60/1. To this, a dairy plant must add on an average Rs. 0·06/1 towards collection and transport to the processing centre. The cost of processing raw milk, bottling, distribution and other incidentals ranges from Rs. 0·16 to Rs. 0·30/1, depending on various factors like utilization of installed capacity, etc. Thus the overheads per litre of milk from the time it leaves the producer and reaches the consumer come to nearly Rs. 0·25. This point is often overlooked by the consumer who expects not only milk of high quality but also low in price. For a dairy catering to liquid milk supplies and manufacturing milk products, the price can be balanced between various items. On the other hand, a project which caters only for town milk supplies, there is no option but to recover the cost from the consumer or work at a loss. The special need for supplying a nutritious food like milk at a low cost has been recognised all over the world. In many countries, public milk supplies are subsidised either by the local bodies or the Government. Whilst there are no direct subsidies for milk supplies in India, several projects supply toned milk (3% butterfat and 8·5% SNF) and double-toned milk (1·5% butterfat and 9·0% SNF) at a price lower than the actual cost, the element of subsidy varying from Rs. 0·10-0·20/1. One of the conditions stipulated by the UNICEF in donating equipment to a dairy project is that one and a half times the value of the equipment gifted should be returned by the project in the form of subsidised milk to selected vulnerable groups of populations. To enable this to be done import of some skim milk powder is necessary at present so that this could be mixed with buffalo milk containing 6·0-7·6% butterfat to give double the amount in the form of toned milk, or four-fold of double-toned milk. No duty is levied on the import of SMP which is one of the richest and cheapest source of valuable proteins. Steps have been taken to link up within next 2–3 years every major dairy project with a milk powder manufacturing plant so that imports are minimised. Whilst at present hardly about 4,000 tonnes of powder are produced annually, by the end of the fourth plan the output will increase seven-fold.

The above review gives some idea of the silent revolution that has taken place in the past two decades in dairy development. To achieve this much ground work has been necessary. Along with the organisation of production and processing of milk, facilities for the manufacture of most of the equipment needed have been built up. India is in a position to supply equipment according to international standards, and also provide complete consultative service for planning and execution of dairy projects. The Indian standards Institution has evolved standards for several of the equipment needed by dairy projects to ensure quality and taking into account the present international usage. Side by side a programme of training of dairy personnel is in hand to cover the entire field of dairy science including husbandry, technology, engineering, quality control, economics and extension, to the highest university standards possible. At present there are six dairy training centres giving various courses. India has the added advantage of having had its own indegenous technology which has not been utilized to the desired extent in the cur-rent phase of developments. Products like *dahi*, *khoa*, ghee, *chhanna*, paneer, etc., are being prepared both on small and large scales throughout the country. A fuller study of these products is essential so that by a synthesis of the old and the new, a better use is made of the available milk supplies.

THE FERTILISER ASSOCIATION OF INDIA AND ITS WORK

Origin and Character of the FAI

The Fertiliser Association of India is dedicated to the task of rapidly bringing about increased agricultural production by modernising farming through the use of fertilisers. The Association came into being on 27th May 1955 as a national non-profit company registered under Section 26 of the Indian Companies Act, 1913. It owes its origin to the initiative of Mr. T. T. Krisnamachari, then Union Minister of Commerce and Industry and a group of progressive fertiliser manufacturers. It is unique in several ways; its membership includes both public sector and private sector factories; its scope extends to manufacturers of nitrogenous, complex, mixed and phosphatic fertilisers as well as distributors of imported potash.

Objects

It is basically and structurally a Trade Association for promoting and protecting the interests of fertiliser manufacturers, importers, distributors and dealers. It naturally endeavours to serve the interests of its members. But its aims, objects and functions have been framed in the larger context of serving the interest of rapidly stepping up national agricultural production with fertiliser playing the central role. In other words, 'Promoting progress with fertilisers, more profit for every acre is the motto of the Association'. The main objects of the Association may be summarised as under:

'To unite those engaged in the Fertiliser Industry;

To promote consideration and discussion of all questions that contribute to sound agricultural practices and to economic development of the fertilisers and agricultural industries;

To institute, prosecute, develop and carry on scientific and economic research regarding preparation of fertilisers increasing soil fertility and crop production;

To improve practices within the country in the production and distribution of fertilisers;

To encourage the use of more and better plant foods;

To seek to obtain more efficient use of fertilisers of all types; and

To make the cultivator aware of the benefits of fertiliser usage.

Activities

The Association has been recognised as the national body representing the fertiliser industry by the Central and State Governments. It maintains close liaison with the Central and State Governments, mainly with the Ministries of Food and Agriculture, Petroleum and Chemicals and Industrial Development and the Planning Commission.

During the first decade of its life the main task of the Association was to fight prejudice and disarm suspicion against the use of chemical fertilisers and to propagate the efficient and expanded use of chemical fertilisers as the master factor in agricultural production.

The Association can legitimately claim a share of the credit for changing the attitudes of Central policy makers and State Governments towards increased production and use of fertilisers. It presents from time to time to the Government of India in the form of memoranda the problems faced by the fertiliser industry, such as the raw materials position, the requirements and availability of indigenous and imported fertilisers, etc.

It is represented in official committees concerned with fertilisers at both the Central and State levels. It enjoys the confidence of the Government of India and is frequently consulted by it in fertiliser matters.

In 1966 the Ministry of Food and Agriculture delegated its powers to FAI to fix the exworks price of superphosphate. The Association continues to fix the exworks price of superphosphate from September 1966 on a quarterly basis on the same procedure as was earlier followed by the Ministry of Food and Agriculture.

Publications

One of the objects of the Association, viz., the propagation and dissemination of information of sound agricultural practices is promoted by the monthly journal 'Fertiliser News'. Over the years it has grown in volume, value and coverage of information of a diversified nature, viz., agronomical, technological and statistical, and evokes much interest among those interested in agriculture, including extension research workers.

A similar publication in Hindi, viz., 'Khad Patrika' is published monthly with a view to propagating knowledge among the users of fertilisers, namely, the cultivators. Since agronomic practices including fertiliser application vary not only from region to region but also from State to State, adequate coverage for some of the regional practices is being provided by the establishment of Regional Journals. The following Regional Journals are brought out periodically by the Regional offices of the Association :

'Khad Patrika' in Marathi 'Khatar' in Gujarati	Western Region
'Saar Samachar' in Bengali	Eastern Region
'Uramum Payirum' in Tamil	Southern Region

Another major publication of FAI is "Fertiliser Statistics"—a unique annual publication in the whole world. This annual publication makes data available in a consolidated form on different aspects of fertilisers and related subjects. The demand for such information is increasing at such a rapid rate that the contents of the publication have to be diversified so as to include varied subjects, such as maps showing soil, location of factories, soil testing laboratories, Statewise/Districtwise fertiliser recommendations, manuring season and plant nutrients, etc.

With the rapid rise in the consumption of fertilisers, statistics of production and consumption of fertilisers including forecasts have become necessary. These are published in the form of an 'Annual Review'.

The Association also brings out an Abstract Service (monthly) and FAI Information Service (fortnightly).

In addition, numerous adhoc publications on fertilising various crops have been published. At the request of the Government of India, the Association published Dr. Donahue's "Estimates of Fertiliser Consumption by 1970-71". Recently it brought out a "Fertiliser Handbook".

Special Programme

The Association commissioned in 1964 a study by the National Council of Applied Economic Research of the factors affecting fertiliser consumption. This report was published by NCAER.

The Association took active part in the deliberations of the "Report of the Committee on Fertilisers of the Ministry of Food and Agriculture," brought out in 1965.

It was requested by the Estimates Committee of the Parliament in 1967 to submit notes on certain questions raised by them relating to Fertiliser Industry. This was done in the form of two successive notes and the Association had two meetings with the Committee and clarified all the points raised by them.

A Fertiliser Credit Committee was set up by the Fertiliser Association of India to make specific proposals in respect of the credit required at all the different stages subsequent to the manufacture of fertilisers including distribution by the wholesaler and the retailer and purchase by the cultivator, under the Chairmanship of Mr. B. Venkatappiah, ex-Chairman of the State Bank of India and now Member, Planning Commission. The report of the Committee was published in February 1968, one of the main recommendations being the setting up of a Fertiliser Credit Guarantee Corporation for ensuring adequate institutional credit facilities for distribution of fertilisers throughout the country.

Set-up

The effective direction of the Association is in the hands of an elected Board of Directors-representatives of the regions as well as the plant foods handled by the producers.

The Central office of the Association is located in New Delhi and the activities of the Association are directed by the Executive Director, assisted by officers in charge of Statistical, Agronomy, Publicity and Secretarial Divisions.

It has regional branches and committees at Madras, Bombay and Calcutta. There is a regional committee at New Delhi but not yet a full-fledged branch.

Membership

The membership of the Association consists of Active Members, Associate Members, Overseas Associate Members, Technical and Professional Associate Members. Besides, the regions have a different class of members known as 'Regional Members'. Both unit-wise and tonnage-wise the Association represents by far the greater part of the Fertiliser Industry in India.

Seminars

The Association has completed twelve years of life. Its tenth anniversary was celebrated by holding a 'National Seminar on Fertilisers' organised on the national level. Holding seminars on topics of interest to the Fertiliser Industry in conjunction with the Annual General Meetings has become an annual feature. Two more seminars-one on 'Costing and Financing Fertiliser Projects in India' and the other on 'Fertiliser Credit and Distribution' were held in conjunction with the Eleventh and Twelfth Annual General Meetings of the Association. The Seminars were well attended and a number of distinguished scientists and specialists from FAO, USA, Europe, Japan and Germany participated in the proceedings.

Fertiliser Institute Division

At the decennial general meeting Mr. Asoka Mehta speaking as the Chief Guest, suggested that the time was ripe for the Association to turn its attention to fertiliser technology by setting up a technological cell. An expert Committee appointed by the Association went into the matter and made a recommendation for constituting a Fertiliser Institute as a Division of the Association. The objectives of the Institute will be to promote the collection, study and dissemination of information relating to the fertiliser industry with reference to the technological and agronomical aspects of the industry. The Fertiliser Institute Division of the Association was inaugurated by Mr. Morarji Desai at the Twelfth Annual General Meeting and is expected to commence functioning actively shortly. The Institute Division will serve as a very useful adjunct of the Association in rendering valuable service to the Industry and to the farming community on more or less the same lines as the Fertiliser Round Table of the United States and the Fertiliser Society of U. K.

Library

The Association library has a good collection of books and journals on fertilisers and allied subjects and is frequently consulted by member-firms, regional offices, Government offices, students and research workers.

It has also a stock of films on fertiliser use for use of the members.

Representation in Foreign Organizations

FAI has been recognised as the National Association for India by the International Superphosphate Manufacturers' Association and it serves as ISMA'S Statistical Correspondent.

The Association has also been elected as a member of the Steering Committee of the World Fertiliser Federation.

Summing up, "The Fertiliser Association of India is the vanguard of the progressive forces which are at work in bringing about an agricultural revolution in the country"

DEVELOPMENT OF VIRGINIA TOBACCO IN INDIA

K. C. CHETTY, B. Sc., (Agri.), Edin.,

Director, Regional Office, Tobacco Development

Introduction

Tobacco, which belongs to the genus Nicotiana was believed to have been introduced into India by the Portugese during the early 17th century. India is the third biggest tobacco-growing country in the world, coming next to U. S. A. and China. The acreage under tobacco in India during 1966-'67 was 398·2 thousand hectares with a production of 350 million kg. which is roughly 8 per cent of the total world production. India is also the third major exporter of Virginia fluecured tobacco in the world.

Tobacco occupies a prominent place in the agricultural economy of our country. It contributes nearly Rs. 190 crores to the national economy, about Rs. 154 crores toward excise revenue and more than Rs. 35 crores by way of foreign exchange which is earned mainly by the export of Virginia Tobacco. As such, the crop is of immense value though its cultivation covers only about 0·25 per cent of the total cultivated area in the country. A table showing the production of tobacco, excise revenue and foreign exchange earned from 1959-'60 onwards is given below:

TABLE

Year	Production in million kg.			Excise duty in Crore Rs.	Value of exports in Crore Rs.
	Virginia	Others	Total		
1959-60	71·1	220·5	291·6	54·4	14·5
1960-61	70·1	236·9	307·0	59·4	15·7
1961-62	62·7	276·3	339·0	63·2	15·0
1962-63	73·0	292·8	365·8	73·5	18·9
1963-64	114·4	244·0	358·4	86·8	22·5
1964-65	94·7	250·9	345·6	96·1	25·8
1965-66	78·2	219·5	297·7	106·5	21·2
1966-67	90·7	259·3	350·0	119·2	19·5
1967-68	N.A.	N.A.	...	153·7	35·6

N. A.: Not Available.

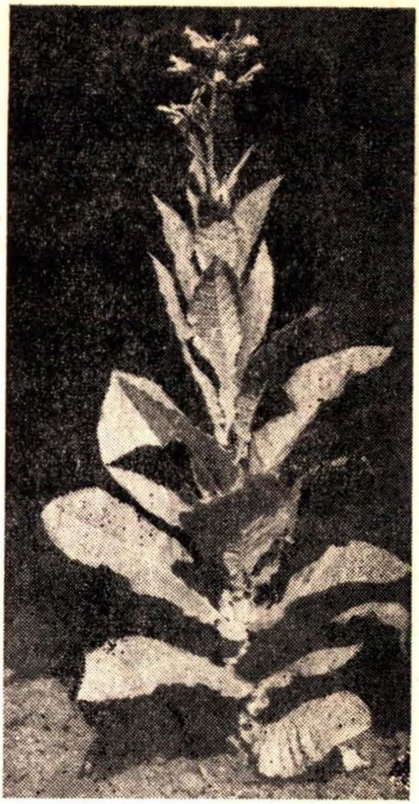
Source: For Production:

Directorate of Economics and Statistics, New Delhi.

Value of Exports & Excise Duty	}	Department of Commercial Intelligence & Statistics., Calcutta.

The cultivation of Virginia tobacco commenced in early 1920's in the Guntur district and it gradually spread to other areas. In view of the national importance of tobacco the Government of India set up in November, 1945 the Indin Central Tobacco Committee for adopting coordinated measures for the improvement in the production and marketing of different types of tobacco. The Committee established the Central Tobacco Research Institute at Rajahmundry in 1947 for fundamental research work on V. F. C. and *Lanka* tobacco and later started regional research stations in different areas. Consequent on the abolition of the Committee in September, 1965, its research activities (including the administrative control of the Central Tobacco Research Institute and Tobacco Research Stations) were taken over by the Indian Council of Agricultural Research. The Government of India took over the development and marketing activities handled by the erstwhile Committee and for this purpose it set up from April 1966 a Subordinate Office of the Ministry of Food, Agriculture, Community Development and Cooperation, (Department of Agriculture), viz., Regional Office, Tobacco Development with Headquarters at Madras.

The contribution of Virginia tobacco to the nation's economy during the last decade has been extremely encouraging and the prospects for its further development look brighter than ever before. The production of Virginia had gone up from 56·9 million kg. in 1956-57 to 78·2 million kg. in 1965-66. Exports have also increased from 38 million kg. to 49 million kg. during this period, and the domestic consumption had more than doubled from 16·7 million kg. to 33·6 million kg. During 1966-67 the production of Virginia tobacco registered a further rise to about 91 million kg.



Single plant of Virginia Flue-Cured Tobacco

Andhra Pradesh is the most important Virginia tobacco producing State accounting for over 95 per cent of the country's total production. Virginia tobacco is also grown to some extent in the States of Mysore, Gujarat, Madras and Maharashtra.

In Andhra Pradesh Virginia tobacco was hitherto being grown mainly on black cotton soils whereas in other major tobacco growing countries of the world, it is grown on sandy soils of acidic pH receiving considerable rainfall during the growth period of the crop. Indian V. F.:C. tobacco-was once famous in world markets for its golden yellow colour and neutral flavour very useful in the blending for the manufacture of cigarettes. But with the change in the consumers' preference for filter-tipped cigarettes due to cancer scare, the emphasis on colour has been substantially reduced and the trade has now become quality conscious, demanding leaf with such essential quality as open grain, good burning and aroma with fluffyness and low nicotine content. In this aspect the U. S. A. and Southern Rhodesia who are our keen competitors in foreign markets have made much progress.

The ban on Rhodesian tobacco by several importing countries has led to a greater demand of this valuable foreign exchange earning commodity. With a view to widening the prospects of our tobacco exports to a large number of countries, exploratory trials were conducted in various States and as a result, the cultivation of Virginia tobacco is being extended to light soil areas in Andhra Pradesh, Mysore, Gujarat and Madras. The produce raised in light soil areas in these States was found to be quite good and comparable to Rhodesian leaf. With a view to increasing the production of this variety of tobacco, a crash programme was drawn up in consultation with the various State Governments. The Scheme which is popularly known as Centrally Sponsored Scheme is functioning from 1966-67. The Government of India meets the entire expenditure of the scheme. The importance of this project has been greatly increased due to the possible diversion of about 17,000 ha. in the traditional area to other irrigated crops on account of expansion of the Nagarjunasagar irrigation ayacut in the Guntur district. It is estimated that the Centrally Sponsored Scheme for the development of Virginia tobacco in the new light soil areas would cost Rs. 56·43 lakhs in 1968-69. The bulk of the amount, i.e. Rs. 35·67 lakhs will be spent in Andhra Pradesh for bringing an additional 2023 ha. under V. F. C. tobacco in the light soils of Nellore, East and West Godavari and Kurnool districts. This will be besides 2023 ha. already covered under the scheme in the previous two years. In Mysore State it is proposed to develop V. F. C. tobacco on an additional area of about 405 hectares in the established areas and about 202 hectares in new areas of Mysore, Hassan and Shimoga districts. In 1967-68 Burley tobacco, another exportable variety was grown on an area of 181 hectares in Mysore. It is programmed to increase the acreage under this variety to 363 hectares during 1968-69. A new area of about 308 hectares in Mehasana, Thasara and Jabugam areas of Gujarat State will also be under V. F. C. cultivation during 1968-69.

Among the tobacco producing States in India, Madras ranks third with an annual production of about 24 million kg. from an area of about 16 thousand hectares. Till 1962-63, mainly chewing, cigar, cheroot and snuff types of tobaccos were being grown in this State. On the basis of the trials conducted in 1962-63 and 1963-64, with a view to developing the production of exportable types of tobacco in suitable areas in this country, it has been found that good quality Virginia tobacco could be grown in Hosur area of Dharmapuri district. Under the Centrally Sponsored Scheme about 21·5 hectares in 1966-67 and about 41·5 hectares in 1967-68 were brought under Virginia tobacco cultivation in the Madras State. A target of 120 hectares has been fixed for the year 1968-69. Owing to the drought conditions during the planting season, the yield during 1966-67 and 1967-68 was poor. In spite of this, the farmers were able to get good price as the quality of tobacco grown in the area was quite good. It may be pointed out in this connection that the transplanting of V. F. C. tobacco in Hosur area is akin to Mysore Planting season; i.e. in June and July and not in October and November, as in the traditionally tobacco-growing districts of Andhra Pradesh. The cultivation of Virginia tobacco is totally new to this State and therefore with greater acquaintance of the farmers with the crop and adoption of improved techniques of cultivation, the yield per hectare is bound to go up. The farmers are also evincing lot of interest in the cultivation and curing of this crop as there is no other commercial crop grown under monsoon conditions in Hosur area which gives good return to the farmers. It is also envisaged to take up the grading and marketing of this tobacco through Co-operative Societies when sufficient quantity is grown in the area.

Prospects for cultivating this variety of tobacco in the Elagiri, Vellore and Kancheepuram areas of Madras State are also being explored.

By the end of the Fourth Plan (1973-74), it is aimed at developing exportable types of tobacco on about 28,327 hectares in the above four States. According to the projections that have been worked out, the demand for V.F C. tobacco alone is likely go up to 168 million kgs. (Farm Production) by the end of Plan period. This challenging demand could be met through a combined effort at intensive cultivation of the crop in the existing areas and introducing this variety in new areas suitable for growing this crop.

Availability of sufficient credit facilities to tobacco growers is of considerable importance as the crop needs heavy investments. Under the Centrally Sponsored Scheme, the tobacco farmers are given loans at the rate of Rs. 5,000/- per barn for constructing barns for curing produce of which Rs. 1,000/- is treated as subsidy. In order to induce the farmers to raise early nursery and to provide for supplementary irrigation facility to save the crop from drought, assistance is also offered for sinking wells to the tune of Rs. 5,000/- per well which includes a subsidy of Rs. 1,250/-. This will also help the farmers to raise a second crop.

On the recommendation of the Regional Office, Tobacco Development, special quota of fertilisers and pesticides are made available to tobacco growers. Seeds and seedlings of approved varieties of tobacco are produced at the Central Tobacco Research Institute, Rajahmundry and other Research Stations and supplied to the tobacco growers either directly or through the Extension Agencies have also been organised in the important V. F. C. tobacco producing States for increasing the production of V. F. C. tobacco consistent with leaf quality in the traditional areas.

Necessary inputs such as improved-seeds, fertilisers, etc., and advices regarding adoption of improved cultural and curing practices are made available through the Extension staff.

Other important steps taken to make V. F. C. tobacco attractive to farmers in the new areas where there are many other crops to compete with it, are the facilities provided for better marketing. Statutory grades for all varieties entering the export trade have been prescribed under the provision of the Agriculture Produce (Grading & Marketing) Act, 1937. The grade specifications are based on colour, texture and freedom from blemish. These grade specifications are popularly known as Agmark Grades.

In some of the major tobacco producing countries of the world, tobacco is graded on the basis of the plant leaf position, as it is known to stratify the leaf nicotine and other quality components. This method of grading is becoming more popular with the manufacturers due to increasing demand for filter-tipped cigarettes in the country as well as abroad. The introduction of the system of grading on the basis of the leaf on the plant requires that the mature leaves from different positions of the plant are harvested, cured and handled separately. It becomes therefore necessary that the farmers should be educated and trained so that the practices relating to harvesting and curing are correctly performed. Grade specifications on the basis of leaf position are also being worked out. As the return from tobacco depends on the quality of the cured leaf and its grade, market yards have been organised to help the grower to grade his produce under supervision of trained Government Inspectors. The produce thus graded and agmark labelled are auctioned and these grades often fetch prices equal to the parity value based on the export prices fixed for the grades.

At present sufficient trained personnel for grading of tobacco at farmers levels are not available in the country. Therefore the Directorate of Marketing and Inspection of the Government of India on the advice of the Regional Office, Tobacco Development have undertaken a scheme for training Inspectors and other personnel in grading, and the State Governments of Andhra Pradesh, Madras, Mysore and Gujarat were requested to sponsor the candidates. As the training scheme started in April 1968 by which time the marketing of high grade V. F. C. tobacco was almost completed in Guntur area, the Governments of Mysore, Madras and Gujarat could not send their candidates. 19 candidates from Andhra Pradesh were however deputed for the training during the year 1968. The total number of persons required for the whole V. F. C. tobacco area in Andhra Pradesh is estimated to be about 140. The training programme which will ultimately meet this need will be phased gradually increasing the number of trainees in the coming years.

Tobacco is now exported to over 60 countries in the world and about 85 per cent of the exports consist of V. F. C. tobacco. Apart from Andhra Pradesh, Mysore, Gujarat and Madras where the Centrally Sponsored Schemes operate West Bengal, Bihar, Maharashtra and Uttar Pradesh are also important tobacco producers. Among the development schemes to be taken up is one to explore the prospects of growing V. F. C. tobacco, in Uttar Pradesh and

Bihar. As for the present world situation, the increased demand coupled with the ban on Rhodesian tobacco imports augur well for larger exports of Indian Tobacco. With the advancement that India is making in the field of tobacco research, technology and development programmes, quality is bound to improve further leading to an even larger share of foreign exchange through exports.

LATEST TRENDS IN COTTON DEVELOPMENT AND MARKETING

AVTAR SINGH and K. RAMACHANDRAN

One of the problems which arose from the partition of the Indian Sub-continent in 1947 was the serious cleavage created between demand and supply of raw cotton in India. While a significant part of the best cotton producing lands formed part of Pakistan nearly 96 per cent of the textile mills were left in India. There was, therefore, urgent need to step up cotton production to keep the mills going and the Government of India lost no time in launching special Cotton Extension Schemes for the purpose in all the cotton-growing States. These schemes were subsequently continued under the first two Five Year Plans. During the Third Plan, the cotton development work was further streamlined by integrating these schemes and the cotton seed multiplication and distribution schemes financed by the erstwhile Indian Central Cotton Committee into the Coordinated Cotton Development Scheme.

During the First Plan period, for achieving a rapid breakthrough in increasing cotton production, primary emphasis was laid on extension of area. To facilitate this, the controls clamped on cotton cultivation owing to the earlier "Grow - more - food" campaign were removed and several incentives were provided for cotton cultivation. These measures quickly paid rich dividends and the cotton area jumped up from 58·82 lakh hectares in 1950-51 (base year) to 80·85 lakh hectares during 1955-56. This 37 per cent increase in area resulted in a corresponding increase in production which rose from 28·74 lakh bales in 1950-51 to 39·52 lakh bales in 1955-56.

During the first three years of the Second Plan period, the acreage remained at the same level reached by the end of the First Plan, but registered a slight decline during the last two years owing to the prevalence of unfavourable weather conditions at the sowing time. The production which somewhat improved from 39·52 lakh bales in 1955-56 to 46·77 lakh bales in 1956-57 also continued to be almost stationary at that level upto 1958-

59. The year 1959-60 was characterised by exceptionally unfavourable weather conditions and consequently the production dropped to 36·33 lakh bales. It, however, recovered during the next year and reached a record level of 53·28 lakh bales in 1960-61.

During the Third Plan period, particularly from 1962-63 onwards, the key-note of cotton development work underwent a change. From extension of area, the emphasis shifted to raising the yield per hectare and towards this end, Package Programmes were launched in the case of cotton also. Several other incentives, such as, subsidy on improved seed, pesticides and equipments, allocation of additional quantity of fertilizers for cotton, extension of aerial spraying to cotton and meeting two-thirds of the operational cost thereon by the Government of India, appointment of additional development staff, raising the floor and ceiling prices of cotton, etc., were provided for stepping up production. As a result of these measures and the prevalence of favourable weather conditions, the production gradually rose from 44·57 lakh bales in 1961–62 to 56·64 lakh bales in 1964–65. During the last year of the Third Plan, i.e., 1965-66, unfortunately the seasonal conditions again proved to be very unfavourable for cotton, in fact to all agricultural crops, owing to the prevalence of large scale drought. The cotton production during that year came down to 47·62 lakh bales. The data on area and production of cotton from 1950-51 to 1967-68 are given in Table I appended.

One of the remarkable features of cotton development work during the three Plan periods was the qualitative transformation brought about in the Indian cotton crop. While formerly the dominant component was the short and medium staple cottons with the long staple component trailing far behind, the position has now been reversed. The comparative figures for the year 1950-51 and 1964-65 giving the quality-wise break up of cotton production in India are given below:

Year	Total production of cotton	Long Staple (7/8″ & above)		Medium Staple (7/8″ & below 11/16″)		Short Staple (11/16″ and below)	
		Actual production	% to Total	Actual production	% to Total	Actual production	% to Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1950-51	2874	662	23	1401	49	811	28
1964-65	5664	2626	47	2009	35	1029	18

It must be mentioned that this creditable achievement was made possible by the evolution of a number of improved cotton strains under the research schemes and their extension under the seed multiplication and distribution schemes, both financed by the erstwhile Indian Central Cotton Committee.

From the year 1966–67 onwards, the emphasis in cotton development is entirely focussed on increasing the yield per hectare. Towards this end, attention is mainly concentrated on the three aspects which contribute to increase in yield, viz. improved seed, fertilization and plant protection. For realising the cumulative effect of these three factors, Package Programmes are being implemented on increasing areas. During 1968–69, these programmes are planned to cover 10·24 lakh hectares in the different States. As the State Governments may not be in a position to finance all these programmes from their own funds, the Centre is sponsoring the programmes covering 4·72 lakh hectares out of the above, meeting the entire cost thereon. The requirements of improved seed for these programmes as well as the general cotton area are being taken care of under another Centrally Sponsored Scheme aimed at the production of Nucleus and Foundation seed of all the improved varieties of cotton and their subsequent stage-wise multiplication under the Co-ordinated Cotton Development Schemes which are in operation in all the States.

As regards fertilization, special allotments for meeting the requirements in full have been made by the Government of India. During 1968–69, the requirements of fertilizers for cotton have been assessed at about a lakh tonnes in terms of Nitrogen which are likely to cover about 33·67 lakh hectares.

The third major contributory factor for increased cotton production is plant protection. With a view to providing necessary incentive for the farmer to adopt plant protection measures, pesticides required for the Centrally-Sponsored Package Programmes on 4·72 lakh hectares are being given to the farmers at 50 per cent subsidised rate, the entire subsidy of 50 per cent to be met by the Government of India. Further, it is proposed to cover about 5·73 lakh hectares by aerial spraying, 50 per cent of the operational cost thereon to be borne by the Government of India. In addition, a gross area of 15·59 lakh hectares is proposed to be covered by ground application.

Marketing is an aspect which is intimately linked up with cotton production. In order that cotton may find its own level in prices, guaranteeing at the same time that the farmers are assured of a minimum price for their produce, the Government of India, since 1967-68, have removed the statutory ceiling prices on cotton which were in vogue since 1943–44 and support prices at which the Government may be prepared to buy cotton, if offered by the farmers, have been fixed for individual varieties. The question of revising these support prices upward is now under active consideration and it is likely that for the 1968-69 season they might be fixed at a level which would be one to five per cent higher than those for 1967-68. It may, however, be stated that the ruling prices for all the varieties of cotton are 20 to 40 per cent higher than the support prices and there is no room for any apprehension on the part of the farmers that their produce will remain unsold.

In tracts like the Krishna and Guntur districts of Andhra Pradesh and Thanjavur district of Madras, cotton is being newly introduced as a rotational crop in paddy lands, and its development and marketing are interdependent. Therefore, there is need in the initial stages to devote special attention to such areas so as to facilitate easy marketing of the cotton produced. It would be advisable if the cotton farmers in these areas form separate Co-operative Societies for promoting the development of cotton and marketing their produce. The establishment of adequate ginning and pressing facilities in these areas also needs special attention from the State Governments and other private interests.

As a result of the promotional efforts made, the cotton production during 1967-68 is expected to touch a new record of 63·20 lakh bales according to trade circles. This works out to an average yield of 140 kg. of lint per hectare compared to 88 kg. in 1950-51. While, no doubt, this is a remarkable achievement, there is still considerable leeway to be made for meeting our future cotton requirements, which are likely to be of the order of about 80 to 81 lakh bales by 1973-74. This would mean that the average yield would have to be increased to about a bale (180 kg.) of lint per hectare which is not unattainable in view of the fact that yields of the order of 2,500 kg. of *Kapas* per hectare under irrigated conditions and 1,000 kg. per hectare under rainfed conditions are realised by the progressive farmers. To achieve this on a mass scale would, no doubt, call for great effort on the part of the Governmental agencies for providing the technical know-how and the essential inputs and greater willingness on the part of the farmers to adopt on a more intensive scale, the improved practices recommended for cotton. Organisations like Farmers' Forum, have to play a significant role in this sphere and one has no doubt that with their effort and that of other agencies concerned, cotton development work would enter a new era during the Fourth Plan period.

APPENDIX I

Area and Production of Cotton in India

Year	Area in '000 hectares	Production in '000 bales Target	Achievement
1950-51 (Base Year)	**5882**		**2874**
1951-52 ...	6556	3190	3095
1952-53 ...	6359	3439	3155
1953-54 ...	6987	3484	3896
1954-55 ...	7561	3931	4175
1955-56 ...	8085	4178	3952
First Plan Average (1951-56)	**7110**		**3655**
1956-57 ...	8051	4999	4677
1957-58 ...	8092	5344	4680
1958-59 ...	8064	5666	4629
1959-60 ...	7610	6044	3633
1960-61 ...	7637	5340	5328
Second Plan Average (1956-61)	**7891**		**4589**
1961-62 ...	7719	5371	4457
1962-63 ...	7845	5722	5308
1963-64 ...	8160	6122	5494
1964-65 ...	8271	6571	5664
1965-66 ...	7827	7000	4762
Third Plan Average (1961-66)	**7964**		**5126**
1966-67 ...	7834	6322	4931
1967-68 ...	7753	6651	6300
	(Third estimate)		(Trade estimate)

MACHINES LIGHTEN THE LOAD OF FARMERS TODAY

HERMAN SIMPER

Any farm operation is an application of power, and food production is often limited to the power available or the degree of efficiency. The growth in mechanisation has come about by replacing the horse or ox on the one hand or the non-sedentary human on the other.

Britain has mechanised the work done by oxen, horses ahead of that done by human hands. This may be right or wrong but certainly it does not have to be the right way round for all countries.

Having mechanised field work to a point near perfection while neglecting somewhat the toil connected with livestock, we are now striving to achieve equilibrium. The advantages of mechanising the basic arts of the primary producer are tremendous and I doubt whether our farmers suffered from any imbalance. Men could always be diverted to farmyard chores and livestock care, if redundant on the arable side.

In 1946 there were 695,000 workers on Britain's farms: today the figure is 330,000. But the number of farm tractors has risen from 195,000 to 430,000, and this has increased production.

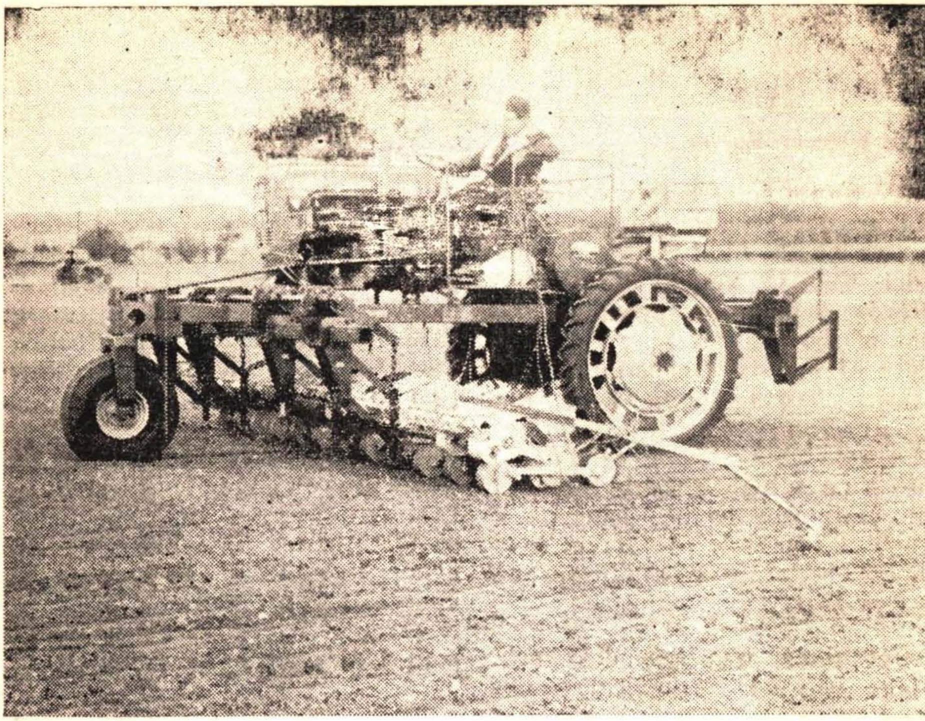
Co-efficiency has resulted from farm amalgamations, with holdings reduced from 525,000 to 435,000.

Within the individual boundaries of farms, many field amalgamations have taken place. The availability of high-powered bulldozing equipment is partly responsible but a contributory factor has been that modern equipment gives a greater output. Arable farmers have long since realised the importance of time and motion being applied to field operations. The larger the equipment being used the larger the fields need to be if the best return on the capital invested in machinery is to be achieved.

Concurrent with achievement in Britain, British Agricultural Engineers have won remarkable export orders. By 1956, exports of farm machinery had risen to £75,000,000 and ten years later the figure was a little short of £180,000,000. The agricultural tractor has been responsible for much of the export success.

A Common Sight

But mechanisation of other aspects of farming have increasingly occupied the British agricultural



machinery manufacturer in recent years and today—to take only one example—tower silos for forage or moist grain are a common sight.

Controversy sometimes ranges around the point of whether the unloading from such silos should be from the top or from the bottom, with possible bridging troubles, but this has not stopped livestock feeding machanisation from becoming a growth market.

Then, although the combine harvester appeared in Britain in the last century and did not re-appear until 1926, it has since then been a great success. By 1946 the number of combines had risen to over 3,000, and with a jump to over 16,000 by 1952, had reached more than 52,000 ten years later. By 1966 there were more than 60,000 combines in Britain.

Not only has this been lucrative market for both British and Continental manufacturers, but the unit cost of such machines has also risen tremendously, because of the British farmer's leaning towards self-propulsion.

In 1953 came the merger between the Canadian firm of Massey-Harris and Ireland's Harry Ferguson. Soon the Massey-Ferguson 780 combine was seen on every sizeable farm, to be followed in 1962 by the present low-profile models. This firm is easily Britain's largest producer of combines and and probably still supplies the greatest share of the market, though many others have jumped into this expanding market. Now, possibly Britain is approaching saturation point, but in the meantime, farmers were in trouble with straw collection. This opened up the market for something that would collect or compress straw. The old hay collectors like the Bamford, were tried at first.

High Density Balers

It was not long before compression became essential in the quest to save labour. First the low density baler was in vogue. These had already begun to appear at the rear of the old threshing drums in place of the straw elevator. High density balers soon swept the country and now the British farmer who wants his straw for livestock, insists on a high density baler, in the same way as he demands a combine harvester for his grain—almost certainly a self-propelled one at that.

But there was one drawback. There was no mechanical equipment to lift the hay or straw after it was baled and the work had to be performed manually. But within the last year or two, Britain's agricultural engineers have found the answer to the problem and now various gadgets are being developed to deal with high density bale.

Both the tractor and the combine harvester (and any other self-propelled machine used on British farms), reaped huge dividends from the change to diesel fuel from petrol and vaporising oil. As far back as 1897 the English firm of Hornsby had won a silver medal for an oil engine at the Royal Show. But the tractor began to make an impression in Britain only when Henry Ford started exporting his Fordsons in 1917.

Yet this was probably not a real growth market until Harry Ferguson's famed TE20 materialised in 1946. As Britain entered the 1950s and the internal combustion engine moved from spark ignition to compression, another metamorphosis was completed. Ignition troubles, starting troubles, switching from petrol to TVO during winter had taken their toll of the British farmer's patience.

The battery-started diesel tractor not only convinced any remaining doubters about the effectiveness of horses or steam, but soon British diesel tractors were crossing the Atlantic in the opposite direction to Henry Ford's early models. Indeed, the British diesel tractor was immediately the kingpin on which a growing agricultural engineering business was to hinge, besides being the basis of an export market soon to become the country's fifth largest.

Still not satisfied

While the early mechanisation of the corn harvest followed by near-perfection in grain handling and drying equipment released men for early autumn work in sugar beet and potatoes, farmers were still far from satisfied. I saw two sugar beet harvesters exhibited at the 1939 Suffolk show. Yet when I started farming in 1946, even the Ford Root Spinner had not yet arrived.

The fact that the home market was capable of absorbing about 1,500 machines a year is to the credit of British developing engineers who persuaded farmers to go 100 per cent for machine harvesting of beets. With such a limited market possibly potato harvesting techniques have lagged a little behind because farmers have been able to employ labour to pick up behind the spinner.

This half-hearted programme of mechanisation cannot go on for long and already self-propelled beet and potato harvesting machines are appearing. One of the two machines I saw in 1939 was a Catchpole. To this day, Catchpoles is one of Britain's leading sugar beet harvester firms, atlhough Standen is now the outstanding firm in this sphere. Salmon, with the other two, dominates the British market.

The growth in the market of machines dealing with roots in the spring season has been slow. It is true that complete potato harvesters in Britain do not number much over 6,000 but beet harvesters have risen to about 15,000. Yet the number of mechanical gadgets to single roots in the spring is insignificant. Over the years, this market has been heartbreaking for the developers. Many machines, good, bad and indifferent, have been tried and abandoned. Some deserved a better fate. Now, labour costs are compelling farmers to take a second look at the discarded machines and techniques.

Other farming advances

Britain's farms are still comparatively small and have suffered because research was directed mainly towards the large and sophisticated machinery. But farmers are quickly moving towards the mechanisation of the smaller jobs on the property—for example, muck spreading for which task an automatic machine is currently being developed.

Segmented beet seed, even pelleted monogerm seed, has been precision drilled for years and today more than 90 per cent is planted. Yet hoeing by manual effort is still a common sight in the spring. Farmers have spurned mechanical thinners bur are at the point of accepting either electronic singlers or chemical singlers.

The sprayer has superseded inter-row horse-hoeing in grain crops, but not in root crops. Farm workers hump sacks of corn and fertiliser around almost with the alacrity of their fathers. But there is a sudden realisation that bags of granular fertiliser have to make way for either bulk or liquid fertiliser and, because tractors have become rather heavy for spraying and inter-row work, the Standen Crophopper could succeed.

This is a high clearance tool frame that can be fitted with a new or second-hand power unit. It might have an application in the maize field or cotton field, even on rice, with tracks instead of wheels. Combine harvester production in Europe now outstrips demand.

Tractor production in Britain must be at its peak. This is the era of growth in gadgetry around the farmstead. Immediate growth will come in mechanising the chores hitherto done by man with his one-eighth of a horse-power output.

Firms named in this article with their addresses, are:

Massey-Ferguson (U. K.) Ltd., Banner Vane, Coventry.

Catchpole Engineering Co. Ltd., Risbygate Street, Bury St. Edmunds, Suffolk, Eastern England.

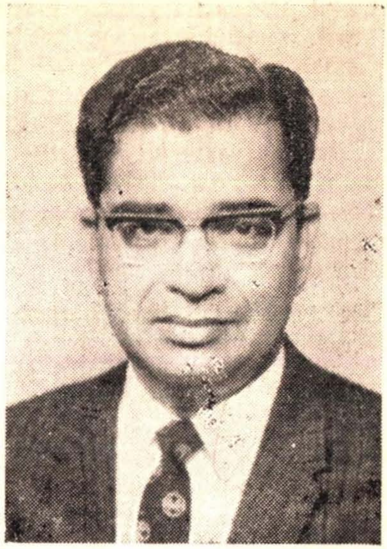
F. A. Standen and Son (Engineering) Ltd.. Hereward Works, Ely, Cambridge.

John Salmon Engineering Co. Ltd., Martels, Dunmow, Essex, South-east England.

Fort Motor Co., Ltd., Basildon, Essex.

Bamfords Ltd, Uttoxeter, Staffordshire.

RECENT RESEARCH DEVELOPMENTS AT CFTRI



Dr. H. A. B. PARPIA

Central Food Technological Research Institute, Mysore

The Central Food Technological Research Institute at Mysore was started in the year 1950. Its main function is to promote the maximum utilisation of the food resources of the country to attain self sufficiency and to achieve better nutritional standards. Emphasis is laid on the development of modern methods of storage, processing, preservation, packaging, and handling of food materials. The results of research are carried to the industry by effective consultancy and advisory work, publications and extension. Seven experiment stations have been set up in different parts of India to handle the regional problems and also to feed back information on problems for necessary research or developmental work.

Storage and processing of foodgrains

Foodgrains constitute the bulk of agricultural production in India, and the quantity available for human consumption is considerably reduced by the heavy losses in the field, and during handling and storage, due to insects, moulds and rodents. A major effort is being made at this Institute to prevent these losses and thereby to improve the food supply both quantitatively and qualitatively. Several techniques have been developed to control the insect pests at different stages. Durofume process for fumigation, for example, when combined with a prophylactic treatment, is ideal for destroying insects in stocks of foodgrains stored in warehouses and is being used by over 100 pest control organisations in the country. Fumigation techniques have also been developed to suit the requirements of rural and domestic stores; fumigants absorbed on pressed paper and strip-packaged, are well suited for use under these conditions and are economical. Similarly, certain insecticidal formulations sprayed on the surface of gunny bags can prevent entry of insects into the grain.

New types of insecticides have also been prepared from inorganic salts and activated earths which, unlike the organic compounds commonly used, are non-toxic to human beings and domestic animals. They are particularly useful in rural areas where over 70% of the country's food grains are stored.

Rodent damage of food materials is yet another vicious problem which had to be studied in a systematic manner in order to develop suitable measures for their control and eradication. The integrated method of rodent control developed here, combines the fumigation of burrows, and also the use of poison baits in a manner safe to cattle. It is being tried on a field scale in villages.

Parboiling and milling of rice

Rice contributes 40–50% of the total cereal production in the country and about half of it is parboiled. The modern parboiling process developed at the institute is more economical in operation, and yields an attractive product free from unpleasant odour and microbial toxins and with better storage qualities.

Once the paddy is parboiled, it is very necessary to dry it properly to avoid spoilage and to reduce milling losses. Studies concluded recently have shown that tempering of paddy after drying it to 15-16% moisture level, before drying it again, prevent the milling losses.

Rice milling is perhaps the largest food industry in the country; but most of the mills have old equipment which have to be improved in order to get better milling yields. A study has been made of the performance of rice mills; and as a result, an inexpensive paddy dehusker consisting of rubber roller shellers has been designed and fabricated. By introducing this equipment in indigenous rice mills, it is possible to improve the milling yields by 1-4%.

Economically, the most promising by-product of rice milling is the bran which contains 16–20% of oil. The bran however, must be stabilised soon after rice milling, in order to obtain good quality of edible oil. Experiments are in progress to stabilise the bran by steaming or by heating, and the equipment designed for this purpose is being tested on a commercial scale.

To facilitate the work of city dwellers, instant-mixes have been developed for fermented breakfast dishes like *idli* and *dosai* and released for commercial exploitation.

Studies on the operating conditions in *dal* mills were also initiated from years ago. By making some modifications in the processing and use of better equipment, it has been found possible to increase the milling yield of *tur dhal* by 10–15% over conventional methods.

Protein Foods

A few years ago, a baby food suitable for Indian infants was processed from buffalo milk, and it is now being produced under the name "Amul Baby Food". The supplies of milk are steadily getting shorter and the baby food produced in the country is barely sufficient. even to meet a part of the requirement. Consequently an alternative baby food, has been developed based on the groundnut flour and skim milk powder, its nutritive value is similar to that of the baby food based entirely on animal milk.

An average Indian gets only 60-70% of his dietary protein requirements from the available supplies of food grains, milk and other animal products. The unutilised reserves of proteins in oil seeds have, therefore, been exploited to produce a protein-rich supplementary food like Indian Multipurpose Food and substitute foods like *Paushtik atta* and tapioca macaroni.

In recent years, emphasis is laid on providing inexpensive protein rich foods to weaned infants, particularly of low-income groups, which suffer from inadequate protein consumption. *Bal Ahar* is one such food produced from cereals, oilseed and pulse flours, with adequate addition of vitamins and minerals; it can also be produced in cooked and dried powder form.

Further work has resulted in the production of a groundnut protein isolate which can be used in different formulations. A plant designed for its production has already gone into operation. This protein isolate has been used to produce Lao-Tone-a kind of toned milk, which is economical, nutritious and can extend the city milk supplies.

The production of predigested protein-rich foods by the fermentation of groundnut meal and Bengalgram is under investigation and a product suitable for Indian dietary pattern has been developed on an experimental scale. Studies are also in progress to obtain protein of edible quality from green leaves.

Groundnuts obtained from the field are liable to contain aflatoxin, a poisonous substance produced by moulds which is harmful to poultry and young animals. The danger arising from its presence in processed foods, has been overcome by: (a) a special fumigation treatment of freshly harvested pods to prevent mould growth ; and (b) treatment of peanut flour by hydrogen peroxide to destroy aflatoxin.

Fish and Eggs

A major portion (69%) of the fish catch in our country is used in fresh form ; but the marketing has been restricted to short distances since fish spoils rapidly due to lack of refrigeration facilities during transport. A drip-proof insulated basket developed here enables the transport of iced fish for about 25 miles on cycles or up to 250 miles if carried in lorries.

The preservation and processing of eggs have also been emphasised in recent years. An egg coating emulsion has been developed from petroleum fractions, which prevents development of fungus and can double the storage life of eggs without refrigeration. A safe, sanitizer detergent powder mixture was also developed recently to wash the dirt from market eggs and thereby increase their consumer appeal. This treatment also reduces the microbial load on egg surfaces. Conditions have been worked out for spray-drying of egg powder from Indian material on semi-industrial scale and a project report has been prepared for an egg powder plant.

Fruits and Vegetables

The annual production of fruits and vegetables (18,000,000 tonnes) is far below the requirements; even so about 30% of them spoil before they can be consumed. Therefore, considerable effort has been directed to the preservation of fruits and vegetables in the fresh state by coating them with fungicidal wax emulsion and on spraying them with growth regulators before or after harvest. Recently, studies were undertaken on the harvesting, transportation, storage and packaging of bananas and three large shipments were made to U. S. S. R. sucessfully. Mango cereal flakes, fruit juice powders and papain from papaya are some processed products which can be exported, while pectin from raw papaya and citrus wastes and fruit bars can be sold on the internal market.

Dehydration

A special line of study has led to the development of precooked, dehydrated rice, *dhal*, and mutton mince which were particularly useful to defence forces. Spraying of instant tea is under active study. Processes for roller drying of baby foods, fruit pulps, and fruited cereals have been undertaken and a new freeze-drying unit has been designed and fabricated.

Export promotion

A good deal of effort has been put in to improve the quality of some of our traditional export products. A process has been developed and demonstrated for making white pepper from green pepper; the pepper husk removed during the process can be employed for obtaining the oil. A method which involves dip treatment in an alkali has proved very effective in improving and preserving the green colour of processed cardamom. A commercial still has been developed for the distillation of cardamom oil from inferior grade cardamom. An accelerated process for monsooning of coffee which is in demand in some buying countries is being worked out to avoid the defects noticed in the traditional method.

Pilot plant experiments on the production of instant tea have yielded a product which retains the desired flavour and taste. Recently a unit has been organised to conduct sensory evaluation studies on foods and beverages.

YOUNG FARMERS' AND COUNTRY GIRLS' CLUBS (YFC and CGC)

By the kind Courtesy of the New Zealand Background

Two organisations cater for young people living in country districts in New Zealand-the Federation of Young Farmers' Clubs (YFC) and the Federation of Country Girls' Clubs (CGC). The 370 young Farmers' clubs are grouped into 48 districts and have a total membership of 11,000. The girls' movement has 158 clubs in 24 districts with an active membership of 3,000.

Young Farmers' Clubs

"Youth - Farming - Citizenship" is the motto of the New Zealand Federation of Young Farmers' Clubs. During the past 30 years the federation has become a powerful influence in rural life. Its members are mainly farmers' sons and farm employees aged 14-30 -young farmers' organisations in other countries usually have lower age limits. The relatively higher age of New Zealand's YFC members means that they are all old enough to be actively engaged or at least interested in farming, and responsible enough to manage the affairs of the federation and its constituent clubs. All executive officers of the federation are active YFC members.

The first club was founded in 1932, and in 1934 the eight clubs, nearly all in the Otago district of the South Island, combined to form a federation. The movement then spread rapidly. The first North Island clubs were started in the Wairarapa district. In 1936 Federation headquarters were established in Wellington. The Government agreed to provide an annual grant and the services of officers of the Department of Agriculture as full-time general secretary and district organisers and secretaries.

In the early days members of the federation executive were "elder statesmen" of the farming industry, chosen for their ability to guide the young movement. Nowadays, the entire movement is run by its own members, although advisers still give assistance at lower levels.

Aims

The aim is to make better farmers and citizens: not only to develop knowledge and farming techniques, but also to assist in building character and fostering social activities and international relationships. The YFC spans the gap between school leaving age and the time when a young farmer feels ready to join a senior farmers' organisation.

Activities

At their regular meetings, usually monthly but sometimes more frequently, clubs have lectures, discussions and debates. Interclub visits and debates are arranged.

The Department of Agriculture, research institutions, dairy factories and farm equipment firms help clubs by giving lectures and demonstrations. Local livestock breeders and farmers speak and give demonstrations. From Government instructors, scientists, farmers, businessmen and economists, YFC members learn about practical farming, farm improvement research and the business side of farm management.

Clubs also organise social activities Sports meetings, dances, card parties and social evenings are held to raise funds and attract members In some districts the YFC is the main social centre for young people. It helps to counteract the drift to towns and cities, and to revive rural entertainments which flourished before the age of the motor car, films and radio.

Field days are important YFC activities. Sometimes members visit local farms and attend talks and demonstrations on pastures, stock and crops given by farmers and specialists; and a field day is often rounded off with a social evening or dance. Clubs with a normal attendance of 20 often attract 50 or 60 people to a field day. Many guests are older farmers who enjoy themselves as much as the YFC members. Larger field days, which are sometimes held in conjunction with farm machinery displays, are frequently attended by 1,000 people.

Adjacent young farmers' clubs sometimes hold combind field days. Their more elaborate programmes may include competition in stock-judging, which is most important in the farming industry. Critical study of animals and demonstrations by official judges teach club members how to improve their own livestock. In 1959 the federation published a stock-judging handbook, which is believed to be the first of its kind in New Zealand.

Recent educational activities have included many courses designed to develop group leadership and discussion techniques and to assist members to develop their abilities as chairmen. The art of ploughing has been fostered by contests organised by young farmers' clubs. Most New Zealand entrants in the world ploughing championships have been YFC members.

For many years New Zealand young farmers have been the guests of similar organisations in Britian, America and Australia, and have in their turn been hosts to young farmers from overseas. This important aspect of YFC work has been assisted by the New Zealand wool, dairy and meat producers' boards, banks and private companies. These organisations have also helped to finance local YFC projects.

Community services

YFC members are prominent in the farm safety campaign—80-100 members are honorary district farm safety officers. In lecturing to farmers they use material provided by the National Safety Association. Special courses for farm-safety officers, held at Massey and Lincoln agricultural colleges, provide them with information on safety methods and show them how it can best be presented. The YFC movement was one of the first organisations to advocate compulsory hydatids control; there is a YFC representative on the National Hydatids Council

The federation supports the activities of Volunteer Service Abroad and in 1965 contributed about £3,000 to sponsor volunteers who are YFC members The organisation has also been active in the Freedom-from-Hunger campaign of the Food and Agriculture Organisation and in addition to supporting various campaign appeals it contributed £ 1,400 to buy sheep sent to India to help establish a wool industry. Other community organisations that the federation actively supports include CORSO, Outward Bound, the National Safety Association and the National Youth Council.

Country Girls' Clubs

"Courtesy - Grace - Companionship" is the motto of the Federation of Country Girls' Clubs. Development of the CGC movement has been linked with the post-war revival of the YFC. The first CGC was established at Arno (South Canterbury) in 1946 and in the following year two more clubs, Scargill (North Canterbury) and Owhango (Central King Country), were formed. In August, 1948, representatives from five of the nine clubs met at Timaru to form a New Zealand federation, and a dominion organising secretary was appionted in October. Membership is open to any young woman, 14-30 years, married or single,living in a rural or urban area.

Aims of the federation

To advance the educational and cultural pursuits of members and their knowledge of agriculture, homecraft and community life; and to develop the spirit of leadership among youth. Clubs meet monthly or fortnightly and district committees bi-monthly or quarterly.

The Government provides an annual grant and the service of two officers of the Department of Agriculture as full-time secretaries. The movement is run by its own members with the assistance of advisory members.

Activities

At their regular meetings clubs have lectures, discussions, debates and demonstrations. Interclub and district exchanges are held and social functions (often combined with the YFC include dances, sports days, barbecues and money raising activities. Field days include visits to farms, factories local industries and nearby cities.

Annual cooking, dressmaking, needle work, floral art and photography competition days are held and the girls also participate in YFC stock-judging competitions. With the YFC, courses are held to develop group leadership, discussion techniques and chairmanship.

Exchange schemes

Each year the federation sends one member to the United States under the International Farm Youth Exchange Scheme and one or two members to Australia. CGC members are hosts to representatives from these countries each year. In 1959 a delegate was sent to the ninth triennial conference of the Associated Country Women of the World in Edinburgh; in 1962 six delegates were sent to the 10th triennial conference in Melbourne, and in 1965 five delegates attended the 11th triennial conference in Dublin.

Community services

Members play a prominent part in community affairs and assist organisations such as CORSO, crippled and intellectually handicapped children and the blind. The federation has "adopted" the women's clubs of Niue Island and is raising £2,000 to help build a meeting hall on Niue, as well as sending sewing and knitting materials and clean used clothing. The YFC and the CGC share an informative magazine, "The Young Farmer," published by the Department of Agriculture. The federation is assisted by banks, the New Zealand Wool Board and airline companies.

ANIMAL HUSBANDRY IN NORWAY

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Because of its location, (one quarter of the country is north of the Arctic Circle), and its topography, which is predominantly mountainous, only three per cent of Norway consists of arable land. Of this three per cent most of the land is situated in areas with a marine climate and is thus mainly suitable for growing hay and feeding grains For this reason forty per cent of the arable land is fodderland. This is why animal husbandry is a very important part of Norwegian agriculture and its various forms of produce are very important to the Norwegian economy.

Since the Second World War development in animal husbandry has been concentrated on more scientific breeding in which artificial insemination has been extensively used. Due to intensive research and the use of artificial fertilisers in the growing of feed grains, the production of livestock has been raised.

Norwegian livestock farmers have specialised in breeding dual purpose cattle, that is to say, the animals are good either as milk producers or for beef. Planned breeding and improved feeding have resulted in a greater supply of milk per cow. Therefore, although the number of milch cows has decreased the production of milk has increased. Milk production dominates the livestock sector of agriculture in Norway. The sharp rise in production has created a surplus of milk products for which there is no market in the country. Because of this, Norway has been exporting large quantities of butter and cheese. The marketing of these products is centralised in the Norwegian Dairies' Export Co-operative, which is owned by the dairies themselves.

Because of rising costs and the difficulty in obtaining qualified helpers, many dairy farmers have begun to join communal or collective dairy barns. The advantages of co-operative milk production are both substantial and striking, for by rationalising and mechanising production the costs can be greatly reduced and the output can be large enough to pay for qualified labour. In this manner the small holding farmer can enjoy the benefits of up to date equipment and expert help, as well as more leisure time ; an unknown luxury for the independent small dairy farmer because of the time consuming nature of the work. The one difficulty involved in such co-operative projects lies in the considerable capital investment required.

Apart from beef and pork, mutton is another important produce of livestock farming in Norway, as the conditions in many districts are very suitable for sheep rearing. In the mountainous regions to the west and north and in the upland valleys of the eastern countries, sheep can utilise pastureland which is not suitable for other animals.

Slaughtering and the subsequent sale of carcasses is undertaken by slaughtering co-operatives. The prices of meat are fixed through the weekly quotation of wholesale prices for different types and qualities issued by the Norwegian Farmers' Meat Marketing Organisation. The co-operatives also act as selling agents for live animals between breeders and merchants. One of the reasons for this participation in the live animal business is to improve the animal breeds on the individual farms.

Health conditions among livestock in Norway are very good; foot and mouth disease does not exist and tuberculosis among cattle is very rare.

Yet another aspect of animal husbandry, which is a traditional part of agricultural production in Norway, is the breeding of fur bearing animals. After the export of forest products, fur skins is the largest single export item of Norwegian agriculture. Fur production has expanded rapidly in recent years because of increasing demand and excellent natural conditions. The rearing of fur bearing animals is carried out on relatively small farms all over the country. The Norwegian Fur Breeders' Association promotes rational organisation and operation of the fur farms, encouraging the kind of feeding, breeding and care that will produce the best quality skins. Members of the Association are provided with such amenities as expert advice, instruction, technical aid, insurance, etc.

AGRICULTURAL CO-OPERATIVES IN JAPAN-ORGANIZATION AND FUNCTIONS

SADANOBU MIYATA

International Co-operation Section, Ministry of Agriculture & Forestry, Government of Japan

1. What is an agricultural co-operative?

Around 1557 there was a local clan which owned a vast territory of land at around Hiroshima. In those days was the age of disunity and chaos and local clans were independent from any integrated control. All those local clans must have always been conscious of invasion from neighbouring clans.

The head of the clan, after having been sick in bed for a long time, realized that he would die soon. One day he called his three sons to his bedside and ordered each one of them to break an arrow by himself. The three sons were puzzled for and looked at one another for a while and broke the arrows quite easily. Then their father asked them to break three arrows together. The sons thought it would be quite easy to break three arrows but they failed.

The father told them: "It was quite easy for you to break one thin arrow, but when three arrows are bundled together you failed to break them. This means that power of each one of you is small and weak but when three of you are united together you can show a strong power." In this way he tried to instruct his three sons how co-operations was necessary and important for protecting his land from invasion of enemies. After his death his sons kept their father's words in their minds and protected their land by uniting their power together and even to now this spirit of co-operation has been transcended through their offsprings as the family constitution and the family has been successful in maintaining their land through the period of Tokugawa Era up to the time of Meiji Restoration in 1867.

The significant features of Japanese Agricultural Co-operatives can be explained by the above mentioned episode. That is to say, an agricultural co-operative is an organisation where the poor and weak farmers get together and unite their powers together for the purpose of securing their own benefit and also for enhancing their welfare and social standing.

The fundamental differences between an agricultural co-operative and a stock company is that the latter is an enterprise to seek profit while the former does not seek profit but aims at serving co-operative members in improving their and agricultural and daily life. Accordingly, an agricultural co-operative has the following characteristics in its management.

(i) Entry or withdrawal of a member whose qualification is specified by the articles of an agricultural co-operative is free.

(ii) The member of an agricultural co-operative has the equal right of voting regardless of the amount of the contribution he makes to the co-operative.

(iii) The surplus which a co-operative makes will be shared among the members not according to the amount of contribution which a member makes to the co-operative but according to how much the member utilizes the co-operative. Also the maximum amount of the share for a member is limited.

2. Kinds and Functions of Japanese Agricultural Co-operatives.

(A) Agricultural co-operatives in Japan can largely be classified into share capital co-operatives and non-share co-operatives, or multi-purpose co-operatives and specialised co-operatives.

(1) The difference between a share capital co-operative and a non-share capital one is that the former is set up by the capital invested by the members, while the latter is set up by imposing necessary expenses on the members. Majority of share capital co-operatives conduct business as part of their activities. Most of the multi-purpose co-operatives and around 37% of the specialised co-operatives in Japan belong to this type of co-operatives. Around 64% of the specialisep co-operatives and very few of the multi-purpose co-operatives belong to the non share capital co-operatives. The main task of a specialised co-operative is to give technical guidance to members in related agricultural production.

(2) The difference between the multi-purpose co-operatives and specialised co-operatives is that the former conduct various economic activities like crediting, marketing and purchasing, while the latter is composed of particular agricultural producers (horticulture, livestock, sericulture and others) or by those farmers who specialize in agricultural enterprises as land reclamation and others. A specialized co-operative is not authorized to conduct a credit business. However, most of the members of specialized co-operatives have membership in multi-purpose co-operatives.

(B) Another way of classifying agricultural co-operatives is according to the administrative level of the co-operatives. That is to say, Japanese agricultural co-operatives adopt a three stage system, namely, a national federation on the national level, a prefectural federation on the prefectural level and unit co-operatives on the village level.

(1) Most of the unit co-operatives cover such small administrative regions as towns or villages and the members in the region make direct entry in the co-operatives. The above mentioned multi-purpose and specialised co-operatives rank in this unit co-operatives. As of 1965, the multi-purpose unit co-operatives in Japan numbers 7,858 (out of which 459 are non share capital co-operatives) and the number of farm household regis-

tered as full members of these co-operatives is 5,265,759 which occupies 95% of the total number of farm households in Japan The multi-purpose co-operatives conduct the following business:

a. Loaning funds necessary for the business or livelihood of members.
b. Acceptance of deposits from members.
c. Supply of articles for the business or livelihood of the members, or installation of common facilities.
d. Marketing of agricultural products produced by the members.
e. Facilities for mutual relief from loss or damage.
f. Facilities relating to co-operation in agriculture of the promotion of efficiency of agricultural labour.

These agricultural co-operatives started their activities in a very small scale at their initial stage in around 1947. One of the rooms of the director's private home was used as the office of the co-operative and the clerks received the members in a shabby looking room. Nowadays after the lapse of twenty years, the agricultural co-operatives in Japan has made such a remarkable progress and prosperity as to come to have ferro-concrete building as their offices. Stores attached to a co-operative has a size equivalent to a supermarket in a large city. Members of the co-operatives who come to the office for consulting and other purposes are received into spacious rooms where they are served tea or coffee. Inside these buildings are housed a clinic and a nursery room and some co-operative offices have facilities for conducting wedding ceremonies for young members. Also some have even cars for funeral ceremonies. Actually agricultural co-operatives in Japan have so developed as to look after the life of a member from the cradle to grave.

Later I should like to describe in detail how our farming people came to have such an advanced co-operative. Financial assistance extended by the Government cannot be overlooked in the history of postwar development of Japanese agricultural co-operatives. But what has more greatly contributed to the remarkable development is the fact that the excellent capability of the farm extension agent attached to the co-operatives and the self-consciousness of each member to foster the co-operative as their own.

(2) Prefectural federations are the organisations which have the unit co-operatives in the prefecture as its members. Unlike the multi-purpose co-operatives which conduct various types of business of which I have explained before, the prefectural federations are divided into such specific federations as economic, credit, mutual relief and others. In each prefecture there is a prefectural federation which conducts the abovementioned activity. Some of the prefectural federations are based on the specialised co opera tives of the unit level and the number of this type is not always one in prefecture. There are many prefectures which do not have any of this type of federation. Apart from the federations of the prefectural level there are a good number of federations of Gun (county) level, the activities of which are not active as those of Prefectural Federations.

(3) Agricultural Co-operative Federations of the National Level are composed of the Prefectural Federations and Gun Federations. Each national federation carries out its business independently i,e.

National Marketing Federation; National Purchasing Federation; National Mutual Relief Federation; National Welfare Federation; National Transport Federation and others numbering 27 in 1966. However, prefectural credit federations do not have their national federation. Instead, a financing institution called Central Co-operative Bank for Agriculture and Forestry functions as the national level credit federation.

(4) Apart from the agricultural co-operatives of three different levels as explained so far, the Central Unions of agricultural co-operatives have been set up on both the national level and prefectural level. The main functions of these Central Unions are to provide effective guidance and education in the light of the past and future of the co-operatives and the social and economic conditions surrounding them. The members of a Prefectural Union are the unit co-operatives in a prefecture and the members of National Union are prefectural unions, National Federations and unit co-operatives.

3. The Development of Agricultural Co-operatives

The history of the development of agricultural co-operatives can roughly be classified into four stages as follows:

(1) The first agricultural co-operative was established in the middle of 19th century. In those days, this country was under the strong feudalistic control of the Tokugawa Shogunate Government. Therefore any agricultural co-operative which had any intention of enhancing the mutual welfare of the members suffered from the strong oppression of the Government and their landowners. Most of these co-operatives could not develop so much but were crushed before their activities were extended beyond the district where the promoters of the agricultural co-operatives lived. But the agricultural co-operatives which were established around 1843 were favoured in developing their activities because they had landowners as their promoters and their business was confined to mainly conducting credit and education of the farmers. Besides, many of the leaders of co-operatives in those days were the people who rendered distinguished services for the Shogunate Government and in spite of the strong control toward any movement of the people, the agricultural co-operatives thus started were welcomed by the Government and their activities were extended widely in around 1877.

(2) The development of Industrial Co-operative Associations.

After Meiji, the ruling power of this country was transcended from the Tokugawa Shogunate Government to the Meiji New Regime. From around 1877, capitalism started to penetrate into farming villages. In order to protect themselves from this invasion producers of tea and raw silk organized Marketing Associations by themselves. By 1900 when the Industrial Co-operative Association Law was enacted, a good number of credit, marketing, purchasing and utilization co-operatives had been established voluntarily by the farmers.

The Government enacted the Industrial Co-operative Association Law in 1900 and started to extend co-operatives. Particularly after the Russo-Japanese War which lasted from 1904 to 1905, capitalism made a remakable strive and established itself firmly. For the purpose of protecting the weak and poor agricultural producers from the influence of commercialism, the Government set up the Central Union of Industrial Association with an aim of keeping closer relations among the co-operatives and of giving proper guidance for the development of co-operatives. Thus, the industrial co-operative associations came to have the character of governmental agencies. Through several amendments industrial associations came to be more and more of governmental agencies. As of 1910, industrial co-operative associations numbered around 7300 in total.

World War I which broke out in 1914 ended in 1918 was followed by a serious economic panic. Particularly a world wide depression, started in 1929, attacked farming villages of Japan. Being influenced badly by the depression and also along with the anti-industrial associations campaign, the number of industrial associations decreased very remarkably at this time.

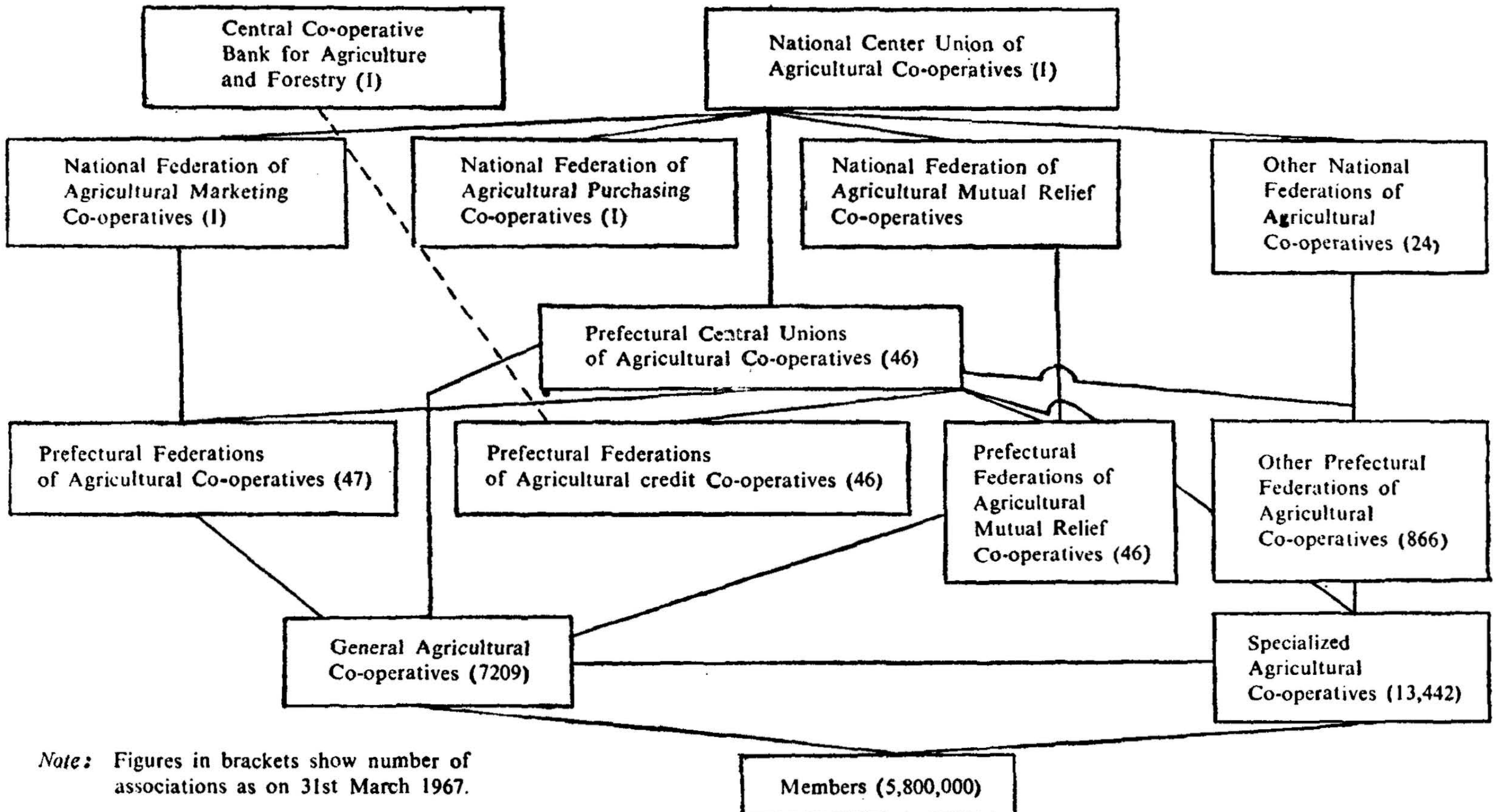
But along with the Farming Villages Rehabilitation Campaign promoted by the Government from 1932 and also by the reactionary movement against the anti-industrial associations of the merchants, agricultural co-operatives in Japan made a remarkable progress and it was at this time that the industrial co-operatives of the three different levels were established.

(3) Industrial associations acted as the control organ in war time. Manchuria incident broke out in 1931 and this incident was the turning point for Japan to switch over gradually to become a militaristic country prepared itself to start World War II. As mentioned earlier, assistance from the Government with an intention of utilizing the industrial association as the control organ contributed much to the development of the Industrial Associations. When Japan entered World War II, those industrial associations were abolished or unified into bigger ones and eventually changed to governmental agency to extend control of the Government over the farmers. In 1943 the Agricultural Organisations Law was enacted and by this law the industrial associations and various other agricultural co-operatives were unified and changed to new organisations called "Agricultural Associations". This association functioned as the war time control organ and remained as such until 1947 when agricultural co-operatives were established.

(4) The establishment of agricultural co-operatives.

Research on forming new agricultural co-operatives had been made in postwar Japan. In November 1947, the Agricultural Co-operative Law was enacted. In establishing these new agricultural co-operatives, the Government stood completely neutral and the establishment of the co-operatives were promoted by the farmers themselves. Incidentally, Japan was suffering from the serious inflation in those days but fortunately by applying a new financial policy called 'Dodge Line' the economic inflation was put to an end. Because of bad assets and liabilities which the new agricultural co-operatives had succeeded from the old organisations and because of poor management of the co-operatives, the activity of these co-operatives became dull and inactive. In order to strengthen these poor co-operatives, the Government enacted the Agriculture, Forestry and Fisheries Co-operative Reconstruction and Rehabilitation Law and decided to

ORGANISATION OF AGRICULTURAL CO-OPERATIVES IN JAPAN



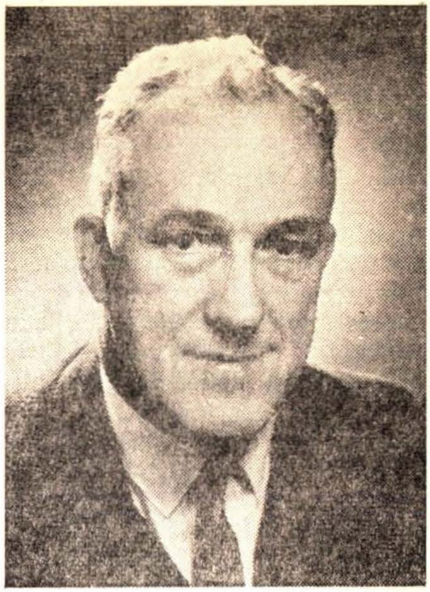
Note: Figures in brackets show number of associations as on 31st March 1967.

render financial support to those co-operatives with liabilities and bad stocks and promoted to increase the capitals of co-operatives. By this law, the Government gave a loan of 3,300 million yen to 2,480 co-operatives, and 178 federations. Even after seven years after this law was enacted, the reconstruction and rehabilitation of the co-operatives were not conducted smoothly. Therefore, in 1953 the Government enacted two other laws. One was called the "Federation of Agriculture, Forestry and Fisheries Co-operatives Rehabilitation Law" and intended to rehabilitate federations. The other was called the "Agricultural Co-operative Rehabilitation Special Measure Law" aiming at the rehabilitation of inactive multi-purpose unit co-operatives. By the former law, the Government spent 2,500 million yen for ten years and by the latter law 600 million yen and five years were spent. Fortunately the Japanese economy met an economic boom at that time and along with positive efforts exerted by the co-operatives themselves, most of the co-operatives shortened the period of rehabilitating and reconstructing themselves.

Along with the prosperity of the Japanese industries which have been developed with a high rate of economic growth, agricultural co-operatives in Japan are again facing difficulties in surviving. Also in order to narrow the difference of (per capita income) between those people who are engaging in the industrial sector and those who are engaging in agriculture, it has been keenly realized that the capital and scope of the co-operative should be intensified further. In view of such tendency and necessity, the Government enacted the "Agricultural Co-oparatives Unification Promotion Law" in 1961.

Consequently, in five years the number of multi-purpose co-operatives had been reduced from 12,050 to 7,320 while the number of membership of a co-operative has been increased, averagely speaking from 445 farm households to 721 farm households. Also the amount of capital share of a co-operative has increased from Yen 5,194,000 to Yen 13,527,000 in average.

AGRICULTURE IN AUSTRALIA



E. A. SAXON

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1. Historical Perspective

Agriculture in Australia is less than 180 years old. It was not until some years after the first European settlers arrived in 1788 that the infant colony was able to support itself from its own agriculture.

In an alien environment, crop failures were common at first, but before long more suitable soils were found and methods were adapted to the environment.

With the import of merino sheep early last century, the foundations of Australia's greatest rural industry were laid. Wool became the principal export, and has continued in first place ever since. At first, crops were grown for local consumption only, but later a considerable export trade developed in wheat. With the advent of refrigeration, exports of meat, dairy products and fruit also began.

So important were the rural industries in Australia that up to about ten years ago at least 80% of all exports were of rural origin. Recent expansion of mineral and manufactured exports has caused this percentage to decline by some 10%, but rural industries are likely to remain the principal sources of export income for many years to come.

2. Recent Trends

With increasing industrialization following the First World War, secondary industries overtook agriculture in their contribution to gross national product. Employment in rural industries reached a peak in the 1930's, and has since declined. However, the absolute contribution of agriculture to the economy has continued to increase; in fact, the rate of increase has accelerated since the Second World War, and output is now almost double what it was thirty years ago.

This expansion has been achieved with a relatively modest increase in total land area devoted to rural purposes and with a decline of some 25% in the farm labour force. The principal factors responsible for this expansion are :

(a) Greatly increased investment in machinery, equipment, and buildings.

(b) Dissemination of knowledge of improved methods of cultivation and farm management, together with advances in pest and disease control.

(c) Greatly increased availability and use of chemical fertilizers and agricultural chemicals generally.

(d) Development of higher yielding varieties of plants and of scientific livestock breeding.

3. Present Patterns of Resource Use

(a) Land Utilization

The principal determinant of land use in Australia is rainfall, although the nature of the soil and terrain are also important where rainfall is adequate.

Australia is by far the world's driest continent, half the area having an average annual rainfall of less than 13 inches. The area with more than 30 inches is only 13% of the total, while less than 9% receives more than 40 inches Further, a large part of this area is in latitudes where the long dry season seriously limits its usefulness for agriculture.

A further indication of the limitations of Australia's water supply is given by the fact that the average total flow of *all* Australian rivers is considerably less than that of the Irrawaddy.

The land surface of Australia is 1,900 million acres (almost three million square miles). Of this about one-third is mainly desert, and almost one-half receives such a low or erratic rainfall that it is suitable only for extensive grazing, except in the limited areas where irrigation is possible. Less than a

quarter of the land receives rainfall adequate for agriculture or more intensive livestock production, and two-thirds of this small area is too rocky or mountainous for cultivation.

About 1,200 million acres (or 62% of the total area) is held under some form of tenure for agricultural or pastoral purposes, but 1,100 million acres of this land is in its natural state, being used only for rough grazing of sheep and cattle. Only 5% of the area of rural holdings is cultivated.

There are 252,000 rural holdings, in Australia, their median area being 340 acres. Three quarters of the holdings are less than 1,000 acres, but there are 2,870 holdings of more than 50,000 acres and these contain 70% of Australia's rural land.

These large pastoral holdings, usually referred to as "stations", exceed one million acres in some instances. Their existence has given rise to some ludicrous misconceptions about the size of Australian farms, but in reality they are not farms in any normal sense of the term. They represent the only practicable means of utilizing a large part of the dry interior.

(b) Land Tenure

While most rural holdings contain at least some freehold land, only 10% of the total area of Australia is held under freehold tenure for all purposes. Of the remaining 90%, 57% is leased by the Crown, mainly for grazing and other rural uses. This leasehold land is the predominant component of the large grazing properties just mentioned. The leases are generally for long periods at low rentals, and lessees have security of tenure, provided they comply with the liberal conditions of the leases.

Very few Australian farms are leased from private landlords, so that the landlord-tenant problems found in some countries are almost entirely absent. Share-farming agreements are common in certain localities.

(c) Rural Labour

Most of Australian holdings are operated by their owners or lessees who with their families make up 60% of the total farm labour force. Permanent hired labour is required on many properties, but there has been a substantial decline in hired labour in the past thirty years. The total number of males engaged in rural industries in 1966 was 356,000, two-thirds of these being owners or lessees.

(d) Capital

The recent expansion in agricultural production has been due in large measure to increased capital investment in mechanized equipment and in farm improvements such as water storage, irrigation, fencing, pasture improvement and fodder conservation. While farmers have provided a substantial amount of capital themselves, these funds has been supplemented by credit provided by banks, pastoral finance companies, and various Government institutions. The substitution of capital for labour is illustrated by the increase in the number of tractors on farms. These now exceed 300,000 compared with 43,000 in 1939.

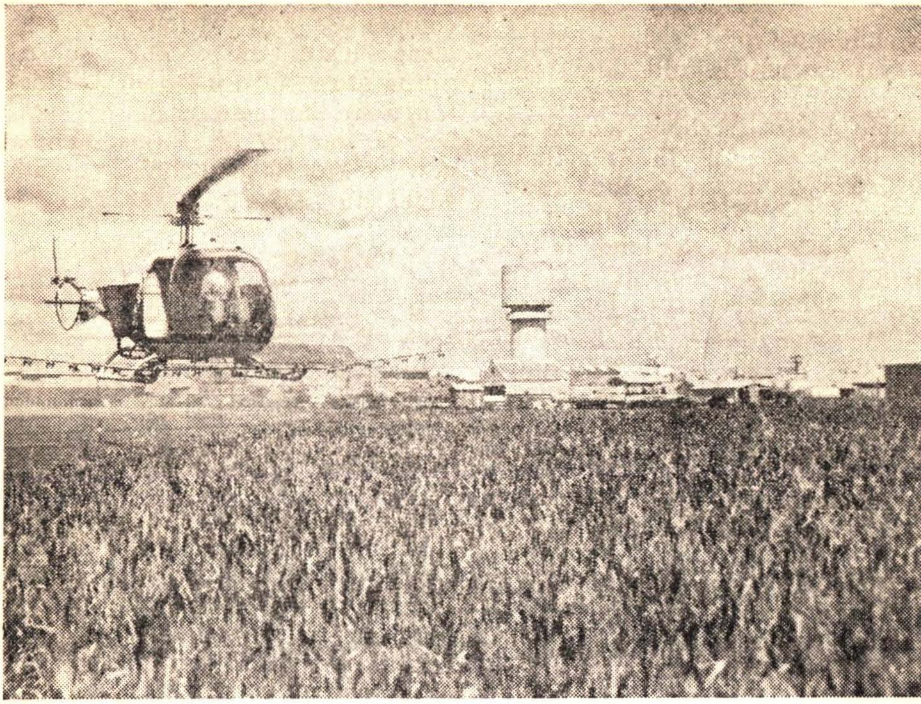
(e) Irrigation

It is natural that a dry country such as Australia should undertake considerable research into irrigation and related questions. Increasing attention has recently been given to the management of Australia's water resources, and the area of irrigated land now exceeds three million acres, double the area 20 years ago. Irrigated crops include fruits, vines, vegetables, rice and cotton, but more than half the irrigated area is pasture.

While further expansion of irrigation is envisaged, there are many problem to be overcome. One of these is the excessive salinity of many areas. The over-riding limitation is the fact that even if the run-off of all rivers could be made available for irrigation, it would not be possible to irrigate adequately even 5% of the area of the continent. The practicable limit is obviously very much below this figure.

4. The Significance of the Rural Sector in the Australian Economy

As in other countries at a similar stage of economic development, the relative importance of the rural sector in Australia has been declining for a number of years. In 1966 8½% of the population lived on farms and 9% of all occupied persons were engaged in rural production. These proportions have approximately halved in thirty years.



The relative contribution of rural industries to gross national product is now about 10%, a percentage which is considerably lower than it was before the Second World War, even though agricultural production in absolute terms has increased rapidly.

Since rural production has recently increased more rapidly than population, a growing volume of rural products has been available for export, and it is in the field of exports that the Australian rural industries make the most important contribution to the national economy. As already mentioned, even with rapid increases in exports of non-rural products, exports of rural origin still account for some 70% of all out-going merchandise.

The direction of Australia's export trade has changed considerably recently. Before the Second World War, more than half went to the United Kingdom; today Japan is Australia's principal customer, while other Asian countries are also receiving a growing volume of Australian produce.

5. Comparative Importance of Rural Industries

Having examined the place of rural industries in the economy as a whole, it is of interest to note the relative importance of individual products.

The prime importance of the sheep industry has already been mentioned, but the relative importance of some other industries varies with the criteria used for comparison.

In the table below, three bases of comparison have been used, and the major rural industries are examined in the light of each of these in turn.

This table shows clearly the dominance of livestock industries

Relative Imporatance of Rural Products according to Selected Criteria

Product	1. Percentage of Gross Value of Rural Production 1964-65 to 1966-67		2. Percentage of Exports of Rural Origin 1964-65 to 1966-67		3. Percentage of Rural Male Employment 1966	
	%	Ranking	%	Ranking	%	Ranking
Wool	23·2	1	44·7	1	22	1
Mutton and Lamb	5·1	6	2·2	7	4	7
Total Sheep	28·3	—	46·9	—	26	—
Beef and Veal	15·0	3	10·3	3	10	4
Dairying and Pigs	13·1	4	5·9	4	20	2
Wheat	15 0	2	17·4	2	14	
Other Cereals	4·0	7	1·7	8	3	8
Sugar	3·7	8	5·3	5	5	6
Fruit and Vines	5·3	5	4·3	6	8	5
Other	15·6	—	8·2	—	14	—
	100·0		100·0		100·0	

which are well in front of crop industries whichever criterion is used.

Wheat is the most important single crop, and is grown in all States of the Commonwealth of Australia. The great range of climates has contributed to a wide variety of crops, some of which are very important in individual localities (e.g. sugar on the coast of Queensland). Other major crops are barley, oats, rice, maize, sorghum, potatoes, cotton and tobacco. The principal fruits are apples, oranges, grapes, bananas, pears, peaches and pineapples.

6. The Years Ahead

From the trends outlined above it may be concluded that a slowly decreasing number of persons working on the land, supported by greatly increased capital, but with less human physical efforts, has achieved a rate of increase in rural output appreciably in excess of the rate of increase in population.

The question then arises – can this increase be sustained?

There is no doubt that Australian agriculture is still capable of expanding considerably, both by opening up new lands, and by more intensive use of lands already developed. But with each such expansion, increasing difficulties are liable to be encountered, leading to increasing costs unless appropriate cost-reducing technology can be developed meanwhile.

The current situation is one wherein potential production is restrained by the limited availability of commercial markets rather than by deficiency in physical resources.

From time to time drought conditions interpose to reduce production, but the weakening of world market prices for wool and other major export products has led to declining real incomes and has thus discouraged the achievement of production increases which are physically possible.

These declining incomes have strengthened pressures on the Government for assistance to agriculture, and have also contributed to the decline in persons engaged in rural production.

However, by world standards, Australia is one of the most efficient rural producers, and the pressures felt here have been even more severely felt by many other countries where declines in farm income have been greater and consequently there has been a greater rate of decline in the number of people engaged in agriculture and more intense pressure for Government assistance. Thus if Australian farmers can continue to increase their efficiency as they have done in the past, they should be able to face the future with confidence.

DYNAMIC DEVELOPMENT OF YUGOSLAV AGRICULTURE

Dr. SKAVKO KOMAR

Ambassador of the S. F. R. of Yugoslavia

Although total production in Yugoslav agriculture last year was some 4 per cent below that in 1966 because of unfavourable weather, the amounts of agricultural products bought up under the compulsory state purchase system were the same as in the record bumper year of 1966. What seems to be still more important is the fact that marketability equally increases on both the socially and privately owned farms. Naturally, it increases much more quickly with the former and much less so with the latter, but the trend is present with both.

Big Socially-Owned Farms in the Fore

Socially-owned farms in Yugoslavia, though having some 14 per cent of the total arable land, are the principal factors for the continuous ascent of the country's agri. culture. The year 1967 was less favourable for them than the previous one. Nevertheless they turned out about 31 per cent of all wheat, 18 per cent of maize, 59 per cent of all sugar beet, 41 per cent of fattened cattle and 38 per cent of fattened hogs.

However, because of the significant advantages of the socially owned means of production, mechanized production and modern vocational services, the share of socially-owned farms in the total state purchase of farm produce is much higher than that of the privately owned farms. Last year these big farms gave 66 per cent of all quantities of bought up wheat, 45 per cent of maize, 58 per cent sugar beet, 42 per cent of fattened cattle and 44 per cent fattened hogs.

Arrangements between socially owned farms and self-employed farmers for joint production have also turned out considerable success. As these arrangements are essentially specific forms of socially organized production, the dominant role of the socialized sector in agriculture becomes still more obvious today. The large farms and their co-operants, individual farmers, together yield about 54 per cent of total wheat output and 88 per cent of all wheat bought up under the state purchase system. Respective figures for other produce are: 50 and 78 per cent maize and 100 per cent in both cases for sugar beet, which means that the total production and total state purchase of sugar beet comes from the socialized sector.

Large socially - owned farms possess today 76 per cent of the total number of tractors. Having well mechanized equipment they achieved very high average crops and insured a continuous rise in productivity. This helps one to visualize the true role of agrarian and economic pattern of Yugoslav agriculture.

Significant Trends in Foreign Trade

Another significant feature in overcoming the extensive development of agriculture is its increasingly broad inclusion in the international division of labour, as seen in finding more outlets. Neither in this respect were the conditions favourable last year, but agriculture scored big success, even greater than the tourist trade, for its net foreign exchange effect was far above any other branch of the economy, according to the final data.

The latest figures published these days reveal that last year's total agricultural exports, principally cattle, meat and maize, were valued at 248 million dollars, or 40 million more than in the record high year of 1966 (60 million dollars more than in the year of good crops 1965). Together with the food and tobacco industries which use agricultural raw materials, agriculture in 1967 effected an export value of 356 million dollars, or more than any other branch of the economy.

The current difficulties in Yugoslav agriculture, although not limited to this branch alone, are more evident in this than in other sectors, perhaps because of its still great share in the gross national product.

Chief difficulties ensue from excessive purchases of agricultural products abroad, from non-economic barriers of EEC countries, and from still low productivity of some producers. Liberalization of foreign trade enabled uncontrolled imports of a number of farm produce and foodstuffs at dumping prices. Such imports harmed particularly the major agricultural enterprises which specialize in the production of certain articles on the long-term basis For this reason agricultural organizations suggested that a "green calendar" should be introduced to specify the periods of free or banned imports of particular farm produce and foodstuffs; such calendars existing in nearly all countries in Europe.

TRENDS IN BELGIAN AGRICULTURE

H. NOPPEN
Counsellor, Belgian Embassy.

In physical terms, Belgium is a small country covering 11,730 square miles of land with about 9·5 million inhabitants.

Under the compulsions of a highly industrialised economy agriculture in Belgium has undergone various structural changes during the last few years. According to the census carried out on 15th May 1966, total area under cultivation stood at 1,639,500 hectares. Of this 507,100 hectares were devoted to cereals, 66,500 hectares to sugar-beet, 23,600 hectares to flax, 749 hectares to chicory, and 655 hectares to tobacco. Not less than 42,991 hectares were devoted to fruit culture and some 36,070 hectares were used for growing vegetables. The quantitative production for the year 1966 was as follows:

		(in thousand metric quintals) 1966
Winter wheat crop	...	2,872·6
Spring wheat crop	...	3,628·7
Rye.	...	756·3
Winter Barley	...	780·4
Barley	...	4,079·5
Oats	...	2,933·6
Maize grown for seeds	...	25·6
Dry peas	...	158·3
Sugar-beet	...	25,857·4
Flax	...	1,439·3
Chicory	...	291·0
Potatoes (late season)	...	3,787·1
Potatoes (mid-term)	...	9,963·9
Potatoes (early)	...	997·4
Mangold-wurzel	...	30,316·5

The average yield per hectare for different items for 1966 was as follows:

		(in thousand metric quintals) 1966
Winter wheat crop	...	30·1
Spring wheat crop	...	31·0
Rye	...	25·1
Winter barley	...	31·0
Barley	...	30·2
Oats	...	32·1
Maize grown for seeds	...	44·2
Dry peas	...	25·6
Sugar-beet	...	388·6
Flax	...	61·1
Chicory	...	388·5
Potatoes (late season)	...	277·4
Potatoes (mid-term)	...	245·9
Potatoes (early)	...	194.5
Mangold-wurzel	...	795·5
Ordinary clover (hay)	...	51·6
Lucern (hay)	...	55.8
Hay (permanent grasslands)	...	50·7

Belgian farms and market gardens have grown in recent years to be one of the most dynamic sectors in the country's export trade. Traditional selling lines, such as chicory (or witloof) are finding markets for bigger tonnages and value; and at the same time, there is an enormous expansion in exports of new products such as peaches, cut flowers, ornamental plants, beans and other products. Production and trade, of course, depend to some extent on the weather; and the climate of northern Europe sometime plays tricks with the growers, whether their cultivated area has been expanded or not. This, however, is a difficulty they seem to take in their stride.

For some years, the quality of the produce has not been the problem. Action has been concentrated on the marketing problem for Belgian fruit, green vegetables, flowers, livestock, meat and dairy produce, shrubs poultry, plants and a number of other products. With this in view, the Ministry of Agriculture placed extra funds at the disposal of the Agricultural and Horticultural Marketing Office, a body which has played an important part in recent developments. It is known for short in Dutch as "AFZET" (market) and in French from the initials of its full title, it is called ONDAH (Office National des Debouches Agricoles et Horticoles). The budget provided for the office was on a more liberal scale, and Belgian representation was strengthened in agricultural and produce exhibitions, both in Europe and further afield. "What we need" said the Belgian Minister for Agriculture, M. Charles Heger "is an aggressive export policy".

The Marketing Office is a semi-official organisation; and it has the special characteristic that its activities are financed largely by levies on certain product-exports, and only to a small extent by Government subsidies. It is thus no mere bureaucratic organ, but takes an active and important part in organising and stimulating the export trade. Exporters of fruit and vegetables and a number of other products take part in propaganda activities of the office and provide personnel of their own at Fairs and Exhibitions, and help in renewing the exhibit so that fresh products are always on show.

According to Mr. P. A. Vandendael, the Director-General of the Office, the deciding factor is nearly always the quality. Important markets have been won for Belgian produce, because foreign buyers are enthusiastic about the quality of Belgian fruit, vegetables and livestock products, and have learned from experience that the quality can be trusted. With the rise in standards of living in the industrial west, the opportunities for expansion in this field are continually growing. An example is the growing of apples and pears which is scheduled to increase its exports considerably as soon as the cordon growing comes into full production. Already the export of apples has risen from 9,524 tons in 1961 to 16,734 tons the following year, and about 15,000 tons in 1963. In the same way, the export of cherries nearly trebled between 1961 and 1963 with a rise from 1,532 tons to 4,436 tons. The export of peaches, too, rose from 219 tons in 1961 to 1,425 tons in 1964. It sometimes happens, of course, that the crop yields less than expected; but, the general trend over the whole sector is one of continued expansion.

Flower growing in Belgium is an industry which works for export of between 60% and 80% of its products. The best known Belgian lines are azalea, orchids and ornamental plants and shrubs; and after these come cut flowers, begonia and dahlia. A number of new products, however, are now coming into the market including Ficus, Philodendron, Sanseviera, Bromeliacia and a number of others. An increasingly significant trade is being done, too, in medical plants and herbs, more particularly by the Valerian growers around Lessines.

In some areas it has been necessary to break away from traditional lines of cultivation, and strike out into new fields. An example is in the Roeselare region of West Flanders where the traditional cultivation was chicory beans, but where a large part of the area has been turned over to aid in the enormous expansion in black salsify.

Some distance away from this, in the Campines or Kempenland area, a slaughterhouse has been set up at Hulshout to deal with 10,000 chickens a day. Apart from this, of course, Brussels chickens and Belgian roasting fowls in general are well known in many countries.

Belgium's big glass house industry seems to have absorbed the impact of the import of open-air grapes from Italy and France. This is another case in which the rise in European standards of living is telling in favour of the Belgian growers; and this is producing renewed activity in the glass house areas around Hoeilaart and Overijse near Brussels. In the London market, Belgian grapes sell well, even though their prices are materially higher than open-air grapes; and in many centres in West Germany, too, Belgian grapes are finding increasingly enthusiastic buyers.

A renewed expansion is also expected in the sales of chicory (known locally as witloof or white-leaf and among the Dutch as "Brussels leaf"). The traditional growing area is between Louvain and Brussels; but the growers have lately signed a number of contracts to supply roots for new growers in the Waterloo areas and it is also planned to develop chicory around Aalst and Ghent. The product is washed, classified and packed in accordance with Common Market rules at a number of special centres recently erected for the purpose, so that the growers are saved a great deal of detailed work. This product is now selling well in the British market and has indeed been widely used instead of bread or toast as a bed for cocktail snacks. This, however, is not its main outlet. The essential propaganda for chicory is aimed to show housewives in foreign countries that chicory is an attractive vegetable for cooking and comes into season during the winter when fresh vegetables are hardest to come by. In the Ardennes hills in southern Belgium, the great speciality is smoked ham. The method of smoking gives the ham a characteristic dark red colour, and a taste which ordinary ham does not achieve. Another speciality from southern Belgium comes from the Abbey of Orval where the Trappist fathers brew an outstanding beer of high density and a hard cheese of their own special brand. These are only examples of the Ardennes products which are now doing well in the European market. Other local specialities are strawberries which are grown at their finest in the country between Brussels and Ninove, and in the Meuse-side area at Wepion. Here again, the exports are trending vigorously upwards; as also are those from the rose nurseries centered in the northern part of east Flanders, and particularly around Maldeghem. One of the nurseries in this area has a big branch at Orleans and issues a catalogue in colour covering a million items.

These examples are evidence enough that the success of Belgian market gardening lies in concentrating on top-quality specialities. It is the maintenance, and where possible, the raising of these quality standards which is the main task of the Marketing Office. The programme of the office has for some years included participation in Fairs and Exhibitions abroad. These include as a matter of regular practice, the Grune Woche in Berlin, the Agriculture Week in Paris, the Ideal Homes Exhibition in London, the International Agricultural Fair in Verona and the Ikofa in Munich.

A number of other Exhibitions are under consideration involving, in some cases, the breaking of new ground, in others, a policy of substituting an exhibit for the Information Office which has hitherto been considered sufficient. In the latter class, are the international fairs at Barcelone, Milan and Lille, and the Food Show at Bologna. Others include the international fairs at Marseilles, Strasbourg, Metz, the international horticultural show at Vienna, the Chelsea Flower Show in London, the L. E. F. A. in Hamburg, the Paris Food Exhibition and the Varese Poultry Fair.

BALANCED FERTILIZATION—THE KEY FOR BREAK—THROUGH IN INDIAN AGRICULTURE

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Indian Agriculture is at present undergoing a revolution. A break-through in agriculture is envisioned through the widespread use of high-yielding varieties, complete fertilization and increased plant protection measures. Also, serious attention is being given to greater exploitation and utilization of underground water resources. This new agricultural strategy, initiated about two years ago, is proving effective and has yielded encouraging results. It cannot, however, be said that the results expected have been achieved in full measure.

High-yielding varieties are essentially high nutrient consumers and respond well when they receive the right balance of essential nutrients of NPK in sufficient quantities at right time. On the other hand, these varieties can give poor yields-perhaps poorer than normal varieties if the supply of NPK is inadequate, untimely or not in a well-balanced combination. Therefore, balanced fertilization holds the key for a break-through in Agriculture.

Chemical fertilizers have only come into use on a wide scale in Indian agriculture for the past two decades. Nitrogen was the only nutrient applied to the agricultural crops until about the nineteen fifties. Thereafter, phosphatic and potassic fertilizers and physically compounded mixtures became available, which marked the beginning of balanced fertilization.

In 1952-53, the consumption of fertilizers was only about 58,000 tons of nitrogen and 4500 tons of phosphate, which works out to a NPK ratio of 1:0.08:0. By 1962-63, the consumption increased to 360,000 tons of nitrogen, 81,000 tons of phosphate and 36,500 tons of potash, improving the NPK balance to a ratio of 1:0·2,0·1. It showed further improvement and stood at 1:0.28:0·14 in 1966-67. Compared to some countries, who during the same period advanced rapidly in fertilizer usage, India has considerable room for improvement. For example some typical 1965-66 ratios are:

	N	P	K
Europe	1 :	0·9 :	0·9
Japan	1 :	0·7 :	0·8
U.S.A.	1 :	0·7 :	0·6
India	1 :	0·23 :	0·16

Madras Fertilizers Limited, a Government of India undertaking is building a large fertilizer factory at Madras in collaboration with American International Oil Company. In recognizing the importance of balanced fertilization, Madras Fertilizers Limited plan the production of complete NPK complex fertilizers of different grades to meet the balanced needs of different crops. It is now engaged in developing the market for their complex fertilizers through demonstration and technical extension plots.

Here are the results of a couple of demonstrations and the reactions of the users.

Mr. K. Balakrishna Udayar of Mayuram and Mr. Panchanatha Iyer of Chithamur village in Mannargudi Taluk, each raised ADT 27 paddy in two acre plots, using complex fertilizer.

Record Yields

Mr. K. Balakrishna Udayar obtained a grain yield of 2248 kg. per acre. "This", he says, "is the highest yield I ever got from this field; the highest yield I obtained before was 1704 kg. per acre from ADT 27 crop". The average grain yield for the area is 1500 kg. per acre, and the record yield of 2248 kg. per acre this farmer obtained is about 50% greater than the average of the area.

Mr. Panchanatha Iyer got grain yield of 2306 kg. per acre. This is about 54% higher than the highest yield of 1454 kg. per acre he ever obtained from his plot.

Planned approach

They had purchased MF complex fertilizers from the Tanjore Co-operative Marketing Federation, one of the distributors of MF complex fertilizers.

Mr. Balakrishna Udayar's plot was located at Manganallur Pandaravadai about 8·5 kms from Mayuram on the Mayuram-Tiruvarur Road and Mr. Panchanatha Iyer's, at Kudithangicheri about 7 km. from Mannargudi on the Mannargudi-Tiruvarur Road. The soils from these two plots were analysed at the Madras State Soil Testing Laboratory at Aduthurai and the correct dosages of MF complex 12 : 24 : 12 and urea to be used to meet the balanced nutrient needs of ADT 27 paddy were determined.

The soil analyses of both plots were similar in available phosphate and potash. As a result each plot was given the same basal dosage of 120 kg. per acre of complex 12 : 24 : 12, or a nutrient application of N–14·4 kg., P–28·8 kg., and K–14·4 kg. Differences were noted in the available nitrogen. Hence, the two plots were top dressed with different amounts. The plot at Manganallur required 30 kg. of urea per acre in two equal doses on the 20th & 40th day after planting while the plot at Kudithangicheri required 40 kg. per acre in two equal doses on the 20th & 40th day after planting.

All other cultivation and prophylactic operations were the same as those normally practised by the farmers for ADT 27 crop.

Three factors - NPK balance, adequate dosage and timely applications - boost yields

The farmers had not been accustomed to using doses of fertili-

zer as high as these recommendations and were, therefore, hesitant to adopt the recommended levels. They had to be convinced about the need to balance the supply of NPK according to the plant requirements and also about the ability of the crop to absorb and utilize these increased dosages. As the plants grew the results were found convincing and impressive—the uniform and healthy stand of the crop, the increased number of tillers bearing stout and sturdy stems, the long earheads with a greater number of well set grains and finally the yield of grain itself.

The farmers did not notice the crop turning deep green during any stage of its growth even after the application of urea. This was because of the best utilization of the balanced NPK by the plants. It should be recognized that farmers are accustomed to the appearance (color) of their paddy crops as a result of high nitrogen application with little or no phosphate and potash. High application of nitrogen not balanced by phosphate and potash results in high vegetative growth and a dark green color. This is not necessarily a healthy sign conducive to increased grain production.

The farmers are now convinced that the correct balance of NPK in complex fertilizers, the adequacy of the dosage and timely application are the three factors responsible for the record yields they obtained.

To use complex is profitable

Is it profitable to use MF complex? Yes, it is. Mr. Balakrishna Udayar spent about Rs. 144/- per acre for urea and complex. This is Rs. 76/- more than the cost of fertilizers he has normally been applying to ADT 27 crop. The additional income obtained by using MF complex works out to Rs. 261/-. So Mr. Udayar says, "Every extra rupee I invested on MF complex 12 : 24 : 12 has yielded me an income of Rs. 3·50".

Even greater is the profit obtained by Mr. Panchanatha Iyer. He has invested Rs. 153/- per acre in the cost of MF complex 12 : 24 : 12 and urea. This is Rs 81/- more than the cost of fertilizers he has been normally using for ADT 27 paddy. The additional income of Rs. 404 he obtained by way of increased grain yield shows that he got Rs. 5 for every extra rupee invested on MF complex.

Complex fertilizers will be produced in different grades to meet the balanced NPK requirements of various crops. The nutrient contents of the complex fertilizers should be in the proper form to suit the soils and be in a readily available and assimilable form.

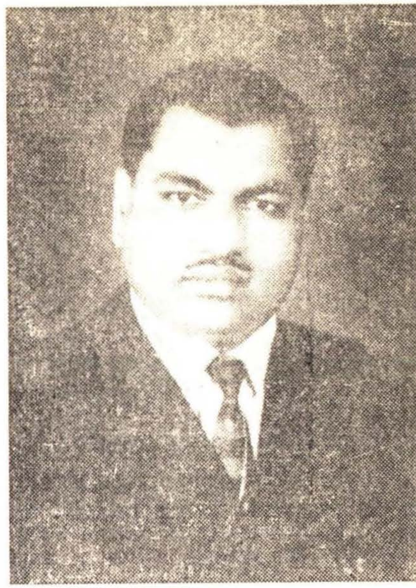
These complex fertilizers are high grade materials and cost less to transport and store. Because of the high concentration of nutrients, they cost more per bag but result in less cost to fertilize an acre as compared to the cost of physically compounded fertilizer mixtures.

Complex fertilizers—a tool to step up national production

Complex fertilizer with its advantages of high analysis, readily available nutrients, convenient granular form will contribute heavily to increased agricultural production and self-sufficiency for India in the future. Crop response to balanced nutrition found in NPK complex has been outstanding wherever good farming practices are followed and when the right amount of complex and urea is applied at the right time.

Needless to say complex fertilizers have a key role to play in the Agricultural Revolution of India by helping to exploit the full potential of the high yielding strains.

PROBLEMS AND PROSPECTS OF FISHERIES DEVELOPMENT IN INDIA



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With rapid increase in the human population and per capita income, there have been heavy demands for increasing the production of supplementary and subsidiary protein rich foods in recent years. The prospects of increasing nutritional efficiency, the supply of fish depends ultimately on the development of marine and inland fisheries. The fish being easiest and cheapest source of protein and mineral substances which is largely lacking in the diet of the Indian population, has only one kg. per capita consumption per year as against 23 kgs. in Japan, 16 kgs. in Denmark, 11 kgs. in South Africa, 10 kgs. in United Kingdom, 7 kgs. in Newzealand and Ceylon, 5 kgs. in United States, United Arab Republic and Australia.

Although India has a comparatively low catch but it has developed export trade in fish. According to the available figures, India has exported in the form of about 59% salted fish, 25% unsalted fish and 16% prawns to Ceylon during the year 1962 as against 34% salted, 58% unsalted and 8% prawns during 1964. Value of exports of fish and fish products during the first ten months of 1966 was Rs. 10·69 crores as against Rs. 5·27 crores in the same period of 1965, showing an increase of about 103 per cent. The total value of exports in 1965 was Rs. 6·46 crores as against Rs. 6·53 crores in 1964 and Rs. 5·6 crores in 1963.

The sharks fish has a good economical value in the sense of extraction of oil and fins which are exported. Its skin can also provide a good quality of leather which is very tough. It has been estimated that from the total quantity of sharks landed in the country, about 20 lakh square feet skin can be made available for the manufacture of leather which may be used for making many necessary items like shoes, handbags, straps, etc.

In the fourth Plan, about Rs. 113 crores have been allotted for development of fisheries as against Rs. 2·8 crores in the First, Rs. 9 crores in the Second and Rs. 24 crores in the Third Five Year Plan.

Production

About 70% of the country's estimated fish production comes from sea. The production of fish during 1966 was 1367·4 thousand tons as against 961·0 thousand tons in 1961, 1012·1 thousand tons in 1956 and 744·2 thousand tons in 1952. This shows a percentage increase of 84%, 29% and 36% during 1966, 1961 and 1956 respectively over 1952 production as can be seen from following table.

TABLE 1

Production of fresh water and Marine fish in India[1]

(In thousand tons)

Years	Fresh water	Marine	Total	% increase over 1951–52
1951–52	215·8	528·4	744·2	—
	(29·00)	(71·00)	(100·00)	
1955–56	293·3	718·8	1012·1	+36·00
	(28·98)	(71·02)	(100·00)	
1960–61	277·4	683·6	961·0	+29·13
	(28·87)	(71·13)	(100·00)	
1965–66	477·5	889·9	1367·4	+83·74
	(34·92)	(65·08)	(100·00)	

(Figures in parenthesis show percentage to total production).

1 *Source:* Agricultural Situation in India, Directorate of Economics & Statistics, Ministry of Food, Agriculture, C. D. and Co-operation, October 1967, p. 870.

The percent increase of production of fish over previous year, 3-yearly and 5-yearly moving average has been calculated in the following table which gives an idea about the general trend of fish production.

TABLE 2

Annually percentage variation and average production of fish

(In thousand tons)

Years	Total production	% Variation over previous year	3-yearly moving average	5-yearly moving average
1951	752·0	—	—	—
1952	744·2	− 1·03	771·7	—
1953	818·9	+10·03	797·8	796·5
1954	828·5	+ 1·17	828·8	848·5
1955	839·0	+ 1·26	893·2	946·3
1956	1012·1	+20·63	1028·0	995·4
1957	1233·0	+21·82	1103·1	994·2
1958	1064·4	−13·67	1040·0	1058·4
1959	822·8	−20·69	1015·7	1048·2
1960	1159·9	+40·97	981·2	996·4
1961	961·0	−17·14	1031·6	992·6
1962	974·0	+ 1·35	993·5	1092·1
1963	1045·7	+ 7·36	1113·3	1126·4
1964	1320·2	+26·25	1232·4	1207·7
1965	1331·5	+ 0·85	1339·7	—
1966	1367·4	+ 2·69	—	—

The above table reveals that the average production of fish from 1952 to 1966 was 1207·7 thousand tons while average production from 1951–55 was 796·5 thousand tons.

Disposal of fish

Most of the quantity of total catch and landings was fresh marketed. From the year 1951 to 1959 the percentage of fresh marketing was almost the same and accounts for about 43 per cent, from 1960–62 the percentage of fresh marketing was about 48 per cent. After 1963 it has shown steady progress in fresh marketing. During the year 1964 about 70% of the total catch and landings was fresh marketed, 11% was sundried, 12% was salted and the remaining 7% was in reduction. The details can be seen from table 3.

TABLE 3

Disposal of fish catch in India

Year	Percentage to total catch and landing			
	Fresh marketing	Cured		Reduction
		Sundried	Salted	
1951	42·67	25·91	24·80	6·62
1956	42·70	25·90	24·80	6·60
1957	42·70	25·91	24·80	6·59
1958	42·70	25·89	24·80	6·61
1959	42·70	25·90	24·80	6·60
1960	47·90	23·20	20·50	8·40
1961	47·90	23·20	20·50	8·40
1962	47·90	23·20	20·50	8·40
1963	67·41	14·42	13·16	5·01
1964	70 24	10·77	11·90	7·09

Prices of different varieties of fish at different markets

Due to sudden change on the demand or supply side, market price may fluctuate. Big arrivals of fish may effect the price in a particular market. It will be observed from the following table that price per quintal of Rohu in the year 1965 was Rs. 265·00 and in the year 1967 it increased to 437·50. This shows a percentage increase of 65 per cent. Similarly, percentage increase of price over 1964–65 for Prawns and Pomfret was observed by 100% and 19% respectively.

TABLE 4

Annual wholesale price of fish in different markets [2]

(Price per quintal)

Year	Rohu at Calcutta market	Prawns (Fresh water) at Madras market	Pomfret at Bombay market
1964-65	265·00	149·17	336·25
1965-66	312·08	220·58	356·25
1966-67	437·50	308·33	400·83

2. Wholesale price of fish relating to the year 1964–65, 1965–66 and 1966–67 has been collected from the Agricultural Situation in India, August 1966 and 1967 issues.

Monthwise fluctuation of Wholesale and Retail Price

Price fluctuation was almost the same for Rohu and Prawns. The wholesale price of Rohu at Calcutta market was minimum in five months (January, February, May, July and November) having the same price of Rs. 500/- per quintal and maximum price of Rs. 650/- was in the month of December. As regards retail price per kilogram of Rohu, it was minimum in 4 months (February, May, July and November) having the same price of Rs. 6·00 and highest price was in the month of December.

According to the available figure about wholesale and retail prices of Prawns at Madras market, the minimum wholesale price was the same from January to May i.e., Rs. 370/- per quintal and maximum in the month of July and August having Rs. 400/- per quintal. Retail price per kg. was also minimum in the same period from January to May having

Rs. 4·00 and maximum in four months from September to December having Rs. 4.60 per kilogram.

As regards wholesale price of Pomfret at Bombay market, it was minimum in October having Rs. 290/- per quintal and maximum of Rs. 575/- in the month of September 1967, as can be seen from following table.

TABLE 5

Monthwise wholesale and retail price of fish at different markets during the year 1967[3]

Months	Rohu at Calcutta market		Prawns at Madras market		Pomfret at Bombay market
	Wholesale price per quintal	Retail price per Kg.	Wholesale price per quintal	Retail price per Kg.	Wholesale price per quintal
January	500	6·50	370	4·00	400
February	500	6·00	370	4·00	400
March	550	6·50	370	4 00	550
April	550	6·50	370	4·00	400
May	500	6·00	370	4·00	N.A.
June	N.A.	N.A.	N.A.	N A.	N.A.
July	500	6·00	400	4·50	500
August	600	6·50	400	4·50	550
September	600	7·00	N.A.	4·60	575
October	550	6·50	N.A.	4·60	290
November	500	6 00	N.A.	4·60	315
December	650	7·50	N.A.	4·60	400

3. Source : Wholesale and retail price has been collected from different month issues of Agricultural Situation in India, 1967.

Obstacles in the progress of Fisheries

The fishing industry is lying in the hands of illiterate and poor people due to which it has not much progressed. At present there is inadequate facilities for fish seed, cold storage, refrigeration, transport, boat building yards, mechanisation of fishing boats and the most important problem faced is the lack of finance.

Boat building engaged in Fishing

For the progress of fisheries during 1963, 390 marine diesel engines were provided and number of mechanised fishing boats will be about 3140. At present, there are about 6,000 mechanised fishing boats operating in the country and during the Fourth Plan it is proposed to add 8,000 small mechanised boats and 200 medium and large boats for fisheries development.

Lack of Finance

Fishermen are generally in lack of necessary financial resources for the purchase of fishing accessories. They are largely indebted to middlemen and other money lenders. Majority of the fishermen were obliged to sell their catch mostly to a creditor and thus they do not get reasonable price of their catch due to forced sale. In this respect State Governments have felt the need to organise fisherman's co-operative societies which will provide finance to the fishermen and undertake the marketing of their catch to provide better returns.

The progress of fisheries societies is revealed by table 6, which gives the details of working capital, loan advanced, catch and sale value per society and per member.

It is observed from the following table that number of societies during 1964-65 was 3205 as against 2111 in the year 1959-60. This shows a percentage increase of about 52%. Loan advanced, total catch and sale value through co-operatives have also shown a percentage increase of 156%, 64%, 225% and 316% respectively.

TABLE 6

Progress of fisheries societies and loan advanced during 1960-65[4]

S. No.	Particulars	1959-60	1964-65	% increase over 1959-60
1.	No. of societies	2111	3205	+ 51 82
2.	Membership	2,20,358	3,26,296	
(a)	Membership per society	104·38	101·80	
3.	Working capital	13,998,000	35,894,000	+156·42
(a)	Per society	6,630·98	11,199·37	
(b)	Per member	63·52	110·00	
4.	Loan advanced	5,340,000	8,791,000	+ 64·62
(a)	Per society	2,529·60	2,742·90	
(b)	Per member	24·23	26·94	
5.	Catch value	7,018,000	22,825,000	+225.23
(a)	Per society	3,324·49	7,121·68	
(b)	Per member	31·84	69·95	
6.	Sale value	9,404,000	39,211,000	+316·96
(a)	Per society	4,454·76	12,234·32	
(b)	Per member	42·67	120·17	

4. Data have been taken from Statistical Statement relating to co-operative movement in India, 1960-61, and 1964-65, issued by The Reserve Bank of India.

The conference of Directors of Fisheries held in June 1965, emphasised the important role of co-operatives in mechanised fishing and recommended that in future mechanised boats should be issued only through co-operatives.

Inadequate supply of Fish seed

The main difficulty has been lack of adequate quantity of fish seed. The fish seed is obtained by natural sources or by induced breeding with harmone injections. According to the available figures, the annual production of fish seed is estimated at 5,765 lakhs while 17,797 lakhs of fish seed will be required to stock the available water areas.

Refrigeration and cold storage facilities

Fish being a highly perishable commodity, adequate facilities for marketing are essential. Ice cold storage and processing are necessary for securing a reasonable price for the catches. During 1964, two ice plants and 8 more cold storages came into existance. The six refrigerated rail vans continued to run to facilitate movement of fish in good condition to consuming centres.

Education and Training course

There must be some provision for short term training course on the various fisheries subjects. The eight fisheries extension units conducted short term training courses in which 2,744 persons were participated.

Suggestion

For the development of fisheries, following points must be taken into consideration :

1. Co-operatives provide inadequate amount of finance to the fishermen so it should be enlarged and supply of fishing accessories as well as marketing through co-operatives should be encouraged.

2. Well trained and qualified persons should be appointed as Managers of fisheries co-operatives.

3. In order to meet the demand of fish seed and fish breeding nursery management should be improved and fish seed farm should be enlarged

4. There must be provision for adequate cold storage facilities, construction of feeder roads, quick transport facilities, boat building yards and mechanization of fishing crafts.

5. Proper organization for the marketing of fish and fish products should be made.

6. Education of the fishermen is also quite essential. Some short term training camp may be organised under which demonstration on the technique of major carp breeding by hormone injections and common carp breeding under controlled conditions should be undertaken.

GREEN REVOLUTION IN INDIA AND THE ROLE OF TAMILNADU

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It is fashionable to talk about "Green Revolution" in this country nowadays. The Press and the Radio, are frequently featuring about the progress in the direction. The wheat production in this country was only of the order of 11·4 million tonnes during 1966-67. The previous highest yeild of 12·3 million tonnes was recorded during the year 1964-65. But it was during the year 1967-68 that the production of wheat in India made a big leap to 16·6 million tonnes. The increase in wheat production was almost 50% over the previous year. This was a remarkable achievement, which ushered in a new era with the production of High Yielding Mexican varieties. The achievement was rightly recognised by the issue of a Special stamp commemorating the "Wheat Revolution".

The position with regard to the production of rice in the country has not been so spectacular. The production of rice during the year 67-68 was of the order of 37·9 million tonnes as compared to 39 million tonnes in 1964-65. Even so, Tamilnadu has been maintaining a very speedy progress right from the beginning. The production of rice in Tamilnadu during the year 1949-50 was 1,821,000 tonnes. At the end of the first plan, the total production was of the order of 3,002,000 tonnes. At the end of the second plan period, the total production of rice in Tamilnadu was 3,559,000 tonnes. During the last year of third plan, there was a set back in yield, due to adverse seasonal conditions, the yield being 3,524,000 tonnes. During 1967-68, 4,291,000 tonnes of rice were produced in Tamilnadu.

The production of rice has almost doubled during the period of 10 years covered by the first and second plans in Tamilnadu. The production of millets and other food grains increased by 35% during these years registering an overall food grain increase of about 70%. It can safely be commented that the increase in production during the first two five year plan periods was due to increase in area, partly due to increase in irrigated area and also due to increased scale of adoption of improved agricultural practices. No doubt the seasonal conditions were favourable during this period, facilitating better utilisation of inputs resulting in appreciable increase in production.

During the Third Five Year Plan it was programmed to reach production level of 70 lakh tonnes of all food grains to be achieved at the end of the third plan. But due to unfavourable South West monsoon and consequent poor storage in irrigation reservoirs, the achievement was as low as 53·6 lakh tonnes. Luckily the agricultural production picked up during 1966-67 and 1967-68 resulting in increased production. But during the current year the seasonal conditions have been most unfavourable. Against the projected target of 63 lakh tonnes of food grains, the present forecast is likely to be somewhere between 53 and 55 lakh tonnes. This goes to establish the fact that if seasonal conditions are adverse in any year, production may go down by as much as 10 lakh tonnes in that year. This important factor has been taken into account in projecting our target, and for the new Fourth Five Year Plan a production level of 79 lakh tonnes is aimed at. Of this we need 64·25 lakh tonnes for feeding the adult population of our State in the year 73-74.

In Tamilnadu unlike the Northern Part of India there are no distinct seasons as Khariff and Rabi. The total area under paddy in this state is 68 lakh acres, out of which twelve lakh acres are cropped, during June to September or October (first crop); 10 lakh acres during October to February or March (as a 2nd crop); 3 lakh acres during January to April (Navarai Season); and the balance of 43 lakh acres covered during August-January or February (Samba season). The first and the third crop seasons are of short duration and will be covered by High Yielding Varieties like ADT. 27, Co, 29 and IR. 8. For the second crop season which falls during the winter we have not so far been successful with any High Yielding Variety. However trials with IR5 last year in this season has shown encouraging results. Under the fourth category viz. the samba season, quality rice varieties (i. e.) like TKM6, BAM3, GEB 24, etc. are generally grown, this showing a tendency to raise rice which has a consumers preference and this too in about 27 lakh acres which are under assured irrigation, mostly through irrigation projects including wells. In this category the only High Yielding variety grown is Co. 25 and it covers an extent of about 5 lakh of acres. Possibilities of introducing IR 8 and IR 5 in this growing of 27 lakh acres has to be pursued. However for the remaining 16 lakh acres which may be called as problem areas no suitable High Yielding Variety is available. There is a dire need to establish experimental stations, atleast three, one at Paramakudi (Ramnad Dist.), another Peravurani (Tanjore Dist.) and third at Vellore (North Arcot Dist.) for evolving suitable High Yielding Variety to cover this tract.

The High Yielding Varieties programme was launched in Tamilnadu during the Kuruvai season of 66 67. ADT. 27 a cross between Norin 8 and GEB. 24, which was cultivated in an area of 5,000 acres gave very encouraging results during the year 1965-66. A bold and ambitious programme was launched to induce farmers to raise ADT. 27 over large areas During the Kuruvai season 66-67 an area of 2,79,:55 acres were covered with this strain. The average yield obtained over this area with this strain was 1,725 kgs. of paddy per acre which compares very favourably over the local strains. In the national Demonstrations conducted, this year the ADT. 27 recorded an average yield of 2,100 kgs. per hectare.

The high yielding varieties like IR. 8, Co. 25 and Co. 29 are proving quite popular with the farmers. IR. 8, the "Wonder Rice" has been giving excellent results and is spreading rapidly in all the Districts of the State except Tanjore and Trichy. The High Yielding strains of millets namely CSH. 1. cholam, HB. 1. cumbu and Deccan Maize have been gaining rapid ground. During the Fourth Five Year Plan it is programmed to cultivate High Yielding varieties, in an area of 35 lakh acres under paddy and 2·50 lakh acres under millets. It is proposed to achieve this target during the penultimate year of the plan, resulting in an additional production of 11·86 lakh tonnes by 1973-74 over the 68-69 level of production.

The strategy to be adopted during the fourth plan period is to concentrate on increase in yield per unit area.

Multi-cropping programme aims at raising two or three crops in a year where previously one or two crops were raised. Considerable success has already been obtained in this regard. The massive conversion programme of traditional single crop wet land to double cropping area, is a classical example of the success of this programme. In the district of Tanjore alone, during the period of one year (1967-68), the area under double cropping was increased from the traditional 3 lakh acres to 5·1 lakh acres resulting in considerable increased production. This programme has been rightly described as a "Silent Revolution."

Besides, integrated steps are being taken to intensify agriculture and increase yield by adoption of package of practice in the Intensive Agricultural Area Programme districts of Chingleput, Coimbatore, Madurai and Tirunelveli.

Unfavourable seasonal conditions and drought have been frequently interfering with agricultural production programme in this State. The scope for undertaking major irrigation project is very limited in this state, as all the available sources have already been put to maximum use. The Tamilnadu Government is, therefore, concentrating mainly on Minor irrigation projects. Special emphasis is laid on tapping under ground resources of water, resources to provide adequate irrigation facilities to bring fresh area under irrigation and to stabilize irrigation in areas where flow irrigation facilities exist. Out of about 9 lakh wells about 4,00,000 have been energised with electricity and connection given to pumpsets. It is worth pointing out here that a third of the Agricultural Service connections given for irrigation in India are located in Tamilnadu. During the year 1967-68, 51,746 power sets were energised.

Apart from producing all the food grains required by the growing population, there is need for stepping up production of commercial crops to feed the Agro-Industries and also to develop the economy of the State. Tamilnadu Government is therefore bestowing due attention to the development of commercial crops in the State.

Cotton is an important money crop of the State, covering an area of nearly 10 lakh acres. Intensive research in cotton and development of the crop have been undertaken to improve the quality of cotton, as well as the yield per acre. At the end of the third plan period, a total production of 4·35 lakh bales were produced in Tamilnadu. Out of the 10 lakh acres under cotton crop in this State, only 2·5 lakh acres are under irrigation. With the provision of additional irrigation facilities (Projects and wells) and extending cotton in rice fallows particularly in Tanjore District, it may be expected that about 0.5 lakh acres may be additionally brought under irrigated cotton. By this, the area under cotton is likely to be increased to 3 lakh acres at the end of the Fourth Plan. It is also proposed to cover 2 lakh acres under package programme. The introduction of new strains like MCU. 4, MCU. 5 and PRS. 72, besides improving the quality will help considerably in stepping up cotton production. It is planned to achieve a production level of 5·5 lakh bales at the end of the fourth plan.

Sugarcane, an important cash crop of Tamilnadu occupies a prominent place in the agricultural economy of this state.

With the increasing demand for both sugar and jaggery, there is urgent need for increasing production of these two commodities

There are at present 15 sugar factories in this state and one more factory is just coming up. It is anticipated that a total of 20 factories may be in production by the end of the Fourth Plan. Besides, the crushing capacity of the existing factories is expected to be expanded. A number of khandesari units are also springing up. Taking all these factors into consideration, it is planned to achieve a level of production of 11 lakh tonnes of gur at the end of the fourth plan (an additional production of 2·15 lakh tonnes of gur).

The above additional production is proposed to be achieved through intensive cultivation measures mostly. The yield per acre is to be raised from the present level of about 31 tonnes to an average of 35 tonnes in non package areas. In package areas, the production will be stepped up at 2 tonnes per acre per year.

Of the 25 lakh acres of Oilseeds sown in this State, 22·40 lakh acres are under groundnut. Groundnut is therefore an important commercial crop of Tamilnadu, earning valuable foreign exchange. The production of oilseeds at the end of the second five year plan was 10·86 lakh tonnes. At the end of the third five year plan, the production came down to 9·51 lakh tonnes. The production during 64–65, however, was 11·50 lakh tonnes. The adverse seasonal conditions during 65-66 were responsible for bringing down production level.

The target of 15·50 lakh tonnes have been fixed for the Fourth Five Year Plan. It is proposed to achieve the target through implementation of groundnut Export Orientation Programme, package schemes, distribution of improved seeds, application of fertilizers, adoption of improved agronomic practices, adoption of plant protection measures and extension of area by 60 thousand acres.

Being protective foods, vegetables and fruits are essential for safeguarding the health of the people. Various schemes are implemented to step up the production of vegetables and fruits so as to make them available to the consumers at prices within their reach.

To help farmers in protecting their crops from pests and diseases, the Government of Tamilnadu have taken up aerial spraying in a big way. Both fixed wing aeroplanes and helicopters are used for the purpose. Vast areas of food and *commercial* crops are treated each year through aerial spraying, facilitating speedy plant protection measures. During the year 1968-69, 2,90,000 acres of agricultural crops have been protected against pests and diseases through aerial spraying. It has been planned to cover an area of 7·5 lakh acres through aerial spraying at the end of the Fourth Five Year Plan period.

Tamilnadu farmer is known for his hard work and intelligence. He has been ready to take up the improved techniques of agriculture. His past performance in stepping up production has been commendable.

The Department of Agriculture in Tamilnadu on its part is taking all out action to streamline and strengthen its entire extension activities, undertake soil service, maximise soil testing facilities, to speed research and experiments in developing new techniques that will aid in bringing about rapid maximisation of agricultural production. Accelerated research is giving rich dividends by evolving new techniques to help farmers to produce more.

The activities of the Department of Agriculture form one side of the Triangle in bringing a revolution in agricultural production. The other two being private trade, Co-operatives, Commercial banks, on one side and the farmers themselves constituting the third side of the triangle. It is heartening to note that there has been happy co-operation among all the three sides and each side is forging ahead in maximising agricultural production.

Tamilnadu, one can dare say, is on the threshold of a "Green Revolution." Given normal seasonal conditions even during the present year the triangular effort would have achieved a break through in 68-69. Nevertheless, 69-70 is not far off.

PROPCORN SAVES THE GRAIN

P. J. SMEDLEY,

BP Chemicals (UK) Limited.

Each year about 3½ million tons of grain is harvested, stored on the farm and subsequently used as animal feedingstuffs by the British farmer. In a year such as 1968, when a wet summer was followed by severe flooding the grain would be wet; it would probably sprout and certainly would require treatment before storing, otherwise decay would begin immediately posing a major storage and conservation problem.

This is a task which is constantly faced not only by the British cereal farmer, but by farmers almost everywhere. Until now, grain has had to be dried, refrigerated or put into sealed silos, methods which require elaborate and expensive equipment. This year, after the completion of a four year development programme, a new and revolutionary method of treatment called "Propcorn" which eliminates costly drying and specialised storage has become available.

Event of Major Significance

Propcorn, a British development, uses small quantities of mild organic acids to "pickle" the grain lightly and preserve it. Developed and manufactured by BP Chemicals (UK) Limited, Propcorn provides a simple, economic method of safely storing grain for animal feeding at moisture contents as high as 30 per cent without specialised storage units of refrigeration. This is an event of major significance for farmers, with potential social consequences far beyond the farming industry and the United Kingdom. Just what was the problem that took four years of research and development by a major chemicals company to overcome and how was success achieved?

Each year, even after a comparatively dry harvest, there is a substantial loss of grain because it deteriorates through bad storage. Much of this loss is caused by the development of mould and bacteria, which not only presents a hazard to the health of animals and humans, but also consumes valuable nutritive components of the grain. Mould spores and bacteria, present on grain at harvest time, grow rapidly in a favourable environment. A wide range of micro-organisms develop which have different requirements for growth, but two important and interdependent factors are the moisture content and the temperature of the grain. Moulds and many bacteria also require oxygen for growth. Traditional storage methods attempt to control attack by restricting one or more of these essential requirements, for example, by sealed storage or by refrigeration.

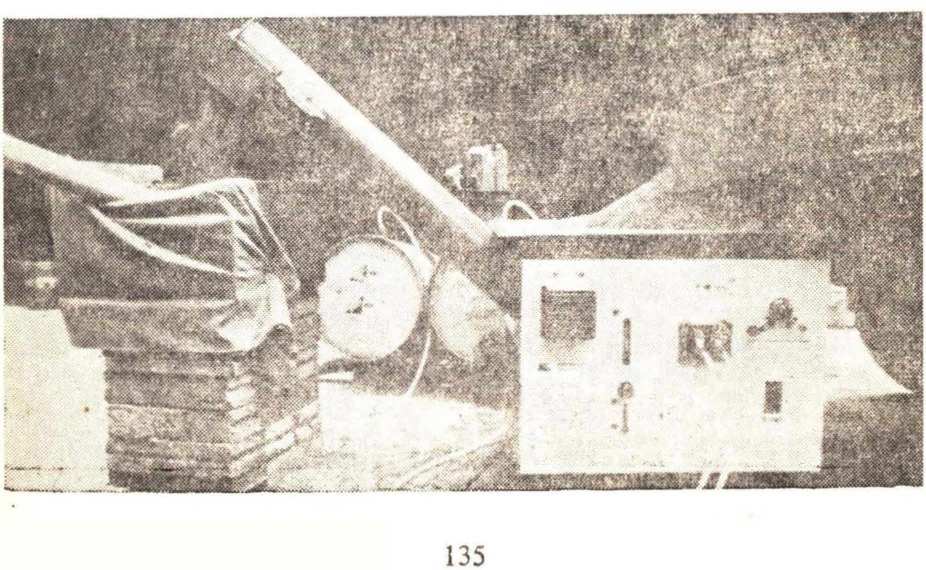
Propcorn, on the other hand, a 100 per cent active liquid preservative, kills moulds and bacteria when sprayed on to moist grain. So grain can be stored in good condition for periods of at least 12 months without sealed containers or refrigeration. All that is needed is a covered container to protect the grain from rain. Storage on the barn floor is ideal, since it needs the least capital investment and allows the most flexible use of buildings. Suppression of moulds and bacteria with Propcorn prevents dry matter loss and thus preserves the full value of the grain. It also ensures that the grain remains free flowing for ease of removal from store.

An important advantage

An important advantage of Propcorn treatment over other moist grain storage methods is that its effectiveness is maintained even after the grain is removed from store. This means that moist grain can now be handled and transported in bulk without deterioration. Its preservative action persists even when treated grain is ground or rolled. No nutritive value is lost and larger batches of feed can be prepared at one time.

Propcorn is now being sold as a preservative for barley, wheat and oats intended solely for animal feed and trials on maize and beans are near their end.

Although it is only four years since work began on Propcorn, like so many other subsequently successful developments this one began almost by accident. More uses were being sought for propionic acid, produced as a co-product from BP Chemicals' highly successful "DF" acetic acid from naphtha process, which had made



the company Europe's largest producer of acetic acid. Licences to use the "DF" process were being taken up by other countries and it was apparent that more scope for the co-products would make BP Chemicals' own plant cheaper to run and make the "DF" process more attractive abroad.

Propionic Acid As preservative

At that time the main outlets for propionic acid were in herbicides and salts used as a preservative in cattle feeds or in bread. In bread, calcium propionate prevents the formation of mould and "rope". (An interesting point is that propionic acid also occurs in nature in the digestive tracts of certain ruminants.) It was established that propionic acid and its salts possessed useful preservative powers, and that, in small quantities at least, they were harmless.

The search for other materials suitable for preservation began. It was reasonable that from bread, cake and animal feed, attention should be drawn to grain. The first year of work was occupied mainly by laboratory examination of grain for micro-biological development and to find out how much acid would be needed as a preservative. It soon became clear that, although this varied with the moisture content, approximately 0·5 to 1·25 per cent by weight (i.e. about 2 to 3 gallons) of propionic acid to a ton of grain was needed. Under British regulations then, that proportion of acid was too high to allow the grain to be used for human consumption.

Successful trials

Small scale farm trials came during the second year, eight farms treating a total of 50 tons of grain. During the third year about 1500 tons were treated at 25 farms, scattered geographically throughout the grain-growing areas of Britain. Feed trials were then conducted using the Propcorn treated grain. The method was subjected to intense scrutiny, but all the trials went well and at last the BP Chemicals development team were satisfied that the Propcorn system worked and that the treated grain could safely be fed to animals. The enthusiasm of the farmers in the trials was a valuable pointer to future commercial success. At the same time a suitable means of applying Propcorn had been developed which distributed it evenly and accurately and combated the mildly corrosive effects of the acid in bulk.

The wet harvest of 1968 saw the close of the fourth season. More than 300 farms, in four selected areas, successfully treated over 20,000 tons of grain. Five different applicators from agricultural engineering companies have been used, each type based on the BP Chemicals trials applicator and checked by the company for efficiency of acid handling and distribution. The advantages to mankind if grain and other fodder crops could be preserved cheaply, with negligible loss or deterioration need no emphasising.

BHARAT KRISHAK SAMAJ

(FARMERS' FORUM INDIA)

Dr. D. A. BHOLAY

Secretary General, Bharat Krishak Samaj

Why Farm Organization ?

The idea of farmers' organization is not new. Millions of farmers all over the world, and particularly in the agriculturally advanced countries of North America and Western Europe, have organised themselves in independent associations of their own for safeguarding and promoting their mutual interests. They represent broad cross-sections of the opinions of farmers of their respective countries and on this account their leaders are listened to with respect when they speak on legislation and other matters affecting the welfare of the farmer. These organizations fight for the interest of the farmer and have been responsible in raising the status of the farming community. They are considered as the responsible and effective voice of the farmers they represent. The united and strong voice gives considerable scope and weight to their actions which may otherwise receive scant attention. Moreover such organizations of farmers tend to give them a feeling of belonging to a large community whose problems and aspirations are entirely their own and this results in the most efficient contribution to the overall economic development of their country.

Birth of Bharat Krishak Samaj

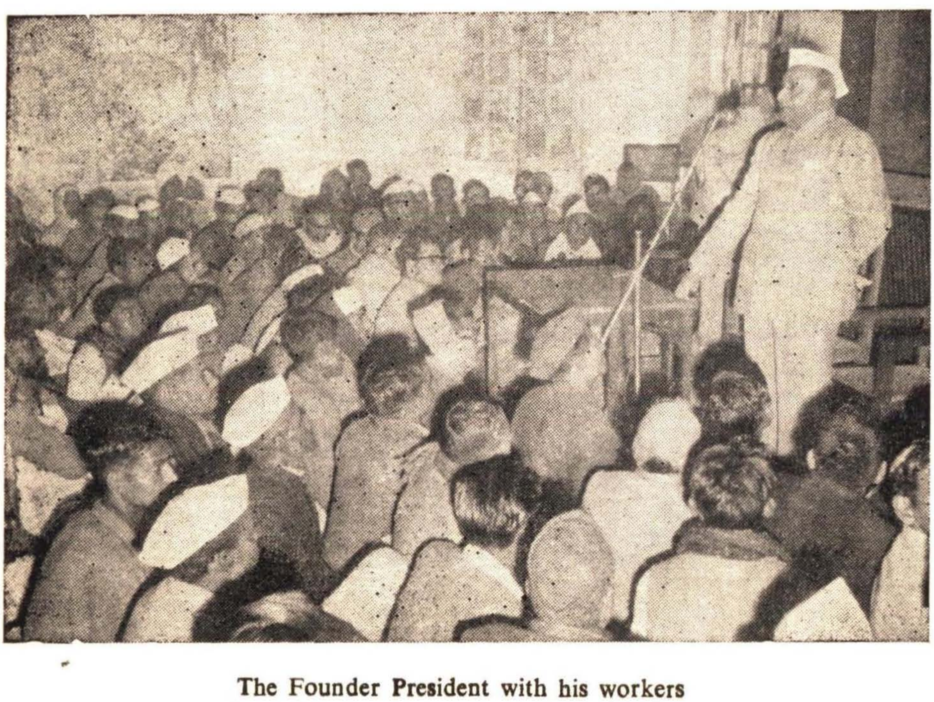
In India the need for a strong representative organization of the farmers was felt since long, realizing the miserable economic and social condition of our farmers who form about 80 per cent of the country's population. In spite of this fact, and that about 50 per cent of the national income is from agriculture and allied vocations, agriculture remained the only major industry in the country without any organization.

It was realized that without an organization of farmers themselves it would never be possible to reach individually the millions of farmers in the country. It was, therefore, necessary to have a farmers' organization which could solve not only the individual problems of farming but also the collective problems of the farming community and also of the country in a steady and constructive manner.

The necessity for such an organization was particularly felt after the launching of the First Five-Year Plan and it has now become indispensable, when there is all round demand to step up agricultural production. Efforts, such as the setting up of the community projects and National Extension Service, were initiated with the sole aim of winning the confidence of the farmers and securing their co-operation for success of the various schemes. It was at this juncture that the well-wishers of the farmers thought that an earlier and a fuller success in these efforts could be ensured if the official attempts were blended suitably with non-official efforts by the farmers themselves, so that the much needed two-way traffic could be established between the Government and the farmer. It was realized by every body that the one-way traffic which had been existing till recently from the Government to the farmer was not the correct approach and was not expected to achieve the goal within the desired period.

The decision to establish such an organization of farmers was, therefore, taken at a meeting of the State Ministers of Agriculture, Co-operation and Animal Husbandry held in July 1954, in Srinagar (Jammu & Kashmir).

Thus the seed of the Bharat Krishak Samaj was first sown. The late Dr. Panjabrao S. Deshmukh, the Union Minister of Agriculture, was unanimously requested to be its first Founder President. A Constitution for the Samaj was formed and the Samaj registered on February 7, 1955



The Founder President with his workers

The Founder President with his lieutenants

under the Societies' Registration Act XXI of 1860 and on April 3, 1955, the first National Convention of Farmers was held in New Delhi, which was inaugurated by the late Prime Minister, Shri Jawaharlal Nehru. This is briefly the history of the origin of the Bharat Krishak Samaj.

A Farmers' organisation is a must in every country especially in Democratic countries to safeguard the interests of the Farming Community, to voice their aspirations and to find solutions for their problems.

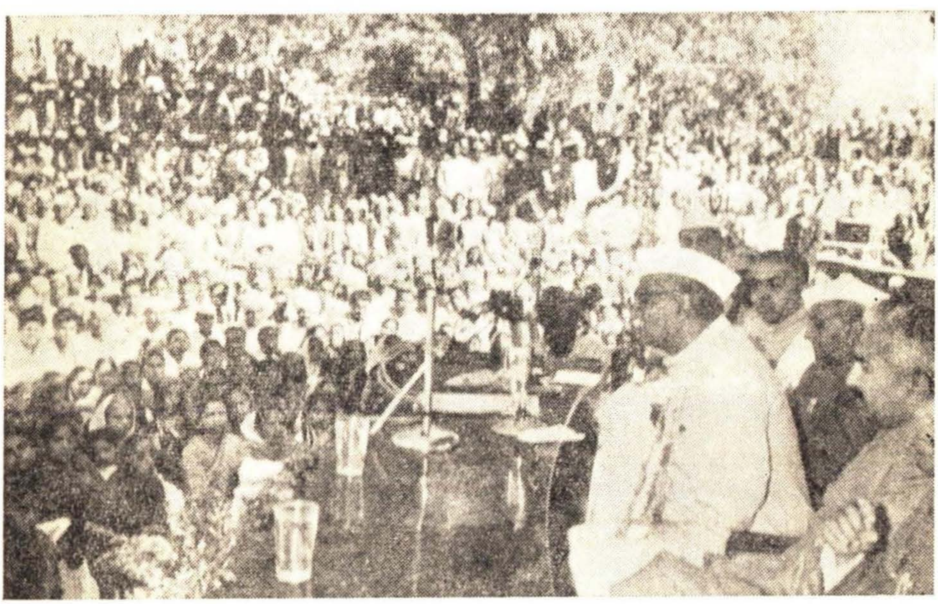
In India where 80% of the population are concerned with farming and 50% of the National Income is from Agriculture the need for such an organization was all the more necessary. Bharat Krishak Samaj filled this long felt need.

The State Ministers of Agriculture, Co-operation, Animal Husbandry, who met in Srinagar in 1954 decided its form and shape and Dr. P. S. Deshmukh its First Founder President built it up. It was registered on 7-2-55 under the Societies Registeration Act XXI of 1860 and held its first National Convention of Farmers in New Delhi on April 3, 1955. which was inaugurated by the late Pandit Jawaharlal Nehru.

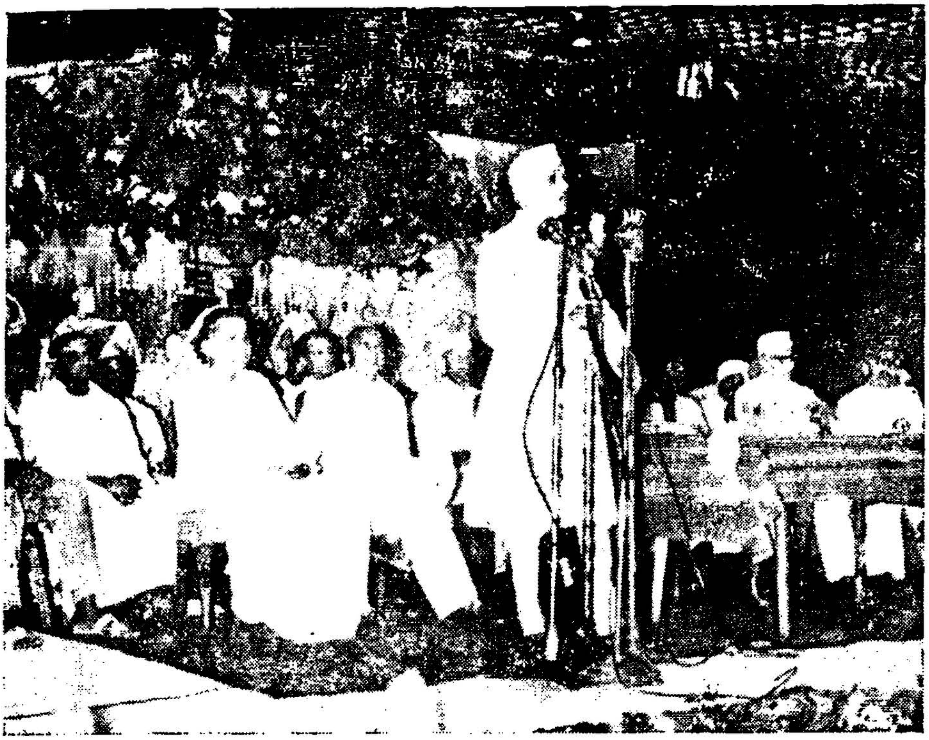
The birth of Bharat Krishak Samaj has been hailed in all quarters in the country. It has created a very healthy enthusiasm among the farmers, who are eager to take an active part in the activities of the Samaj as they feel that it will help them to safeguard their interests and promote their economic welfare. Very encouraging reports are being received from all the States, where branches of the Samaj have been established and letters are constantly received in the Central Office from eager farmers who are keen to play an active role in promoting its activities.

Stability of the Samaj

At the beginning the Union Ministry of Food and Agriculture liberally helped the Samaj monitarily and in other ways also for which the Samaj will ever remain grateful to them. This help, the Ministry gradually withdrew. For the last seven or eight years the Samaj has not even asked for any help from Government or any one else. The financial position of the Samaj is sound. The two funds created by the Samaj in 1960, viz. Bharat Krishak Samaj Freedom from Hunger Fund of Rs. 5,83,137·40 being the balance of the gate money received by the World Agriculture Fair and the Bharat Krishak Samaj World Agriculture Fair Memorial Fund for Rs. 4 lakhs, have been combined into one to form a Trust Society called the World Agriculture Fair Memorial Farmers Welfare Trust Society The Trust Society was registered in December 1963. Practically the whole amount has been invested in purchasing a building in New Delhi Besides this building, the Samaj possesses three buildings, two in New Delhi, in one of which is located the Central Office of the Samaj. The third building is at Jalgaon in which is located the District Krishak Samaj Office. The state branches are also making efforts to have their own buildings. Some of the State Branches get grant-in-aid from their respective State Governments.



Dr. Rajendra Prásad, the then President of the Indian Republic addressing the farmer delegates of the National Convention held in Talkatora Gardens, New Delhi



The late Jawaharlal Nehru addressing the farmers during the first National Convention of Indian Farmers

Within less than three years of birth of the Samaj, branches of the Samaj were established in all the States including the Union Territories of Delhi, Himachal Pradesh, Tripura, Manipur and Goa. Steps are being taken to start branches in NEFA and Andaman and Nicobar Islands.

In most of the States the Samaj has branches even at District and Taluka levels. Efforts are being made to open branches at Block and Village levels.

The Membership of the Samaj is gradually increasing. The number of Life Members is over ten thousand and that of ordinary members about 4-5 lakhs. Statements of State-wise and year-wise enrolment of life members are given below. It will be seen from the former statement that the Maharashtra State Krishak Samaj has enrolled the highest number of Life Member so far. Madhya Pradesh stands second, Punjab third, Haryana fourth and Madras fifth.

Statement of State-Wise Enrolment of Life Members Upto 31-12-1968

	Name of State	No. of Life Members enrolled
1.	Andhra Pradesh	208
2.	Assam	10
3.	Bihar	117
4.	Gujarat	292
5.	Jammu & Kashmir	23
6.	Kerala	219
7.	Madhya Pradesh	1,590
8.	Madras	553
9.	Maharashtra	4,451

10.	Mysore	162
11.	Orissa	388
12.	Punjab	1,342
13.	Rajasthan	94
14.	Uttar Pradesh	266
15.	Haryana	929
16.	West Bengal	61

Union Territories

1.	Delhi	68
2.	Himachal Pradesh	85
3	Manipur	10
4	Tripura	13
5.	Goa	27
6	Nagaland	1
7.	Pondicherry	4
8.	Chandigarh	5
		10,918

Statement of year-wise enrolment of Life Members

Year	No. of members enrolled
1954	2
1955	59
1956	417
1957	440
1958	1,337
1959	811
1960	2,388
1961	1,914
1962	612
1963	470
1964	408
1965	806
1966	500
1967	205
1968	549
	10,918

Aims and Objects of the Samaj

The aims and objects of the Samaj are :

1. To study the problems facing the agricultural producers in India ;

2. To protect, advance and promote the social, economic and cultural interests and activities of the agricultural producers, farm youth and farm women in this country ;

3. To undertake propoganda, training and education of the farmers and co-operate with governmental and other agencies for the uplift and amelioration of the farming community and rapid progress of farming in India ;

4. To assist in formulating and promoting national and international agricultural policies, in the interest of the agricultural producers and to collaborate and co-operate with similar organizations of agricultural producers in this country or abroad for the furtherence of the said objectives ;

5. To take such steps for the fulfilment of the above as may be necessary from time to time, in particular collection and expenditure of funds, holding meetings, conferences, seminars and exhibitions, sending representations, deputations, memoranda etc., and exchanging delegations.

The Samaj is a non-political, non-sectarian association of the agricultural producers and all those who are interested in the promotion of their welfare.

Benefits of Becoming Life Member of the Bharat Krishak Samaj

For a small contribution of Rs. 110/- once in his/her life time, the life member of the Bharat Krishak Samaj gets the following concessions and facilities :

1. He/she is entitled to attend National Conventions of Farmers wherever they are held;

2. He/she can travel by rail to and from the place of Convention at half the cost;

3. Once enrolled as a life member, he/she gets the monthly 'Krishak Samachar' as long as he/she lives without any payment, in English, Hindi, Marathi or Gurumukhi;

4. Special facilities are provided for his/her benefits for visiting the National Agriculture Fairs which the Samaj has been holding in the different States every year;

5. For every group of 20 life members enrolled he/she is entitled to nominate one of them as a member of the All India Farmers Council of the Samaj;

6. A life member thus appointed on the Farmers' Council continues to function on that body for the Council's term of 3 years having the opportunity of attending the Council meetings twice a year in various parts of India without any travelling cost to himself/herself;

7. An enthusiastic, enlightened and active life member has many opportunities of serving on various Councils and Committees of the Samaj or of the Government and other organizations;

8. He/she may be included amongst those selected for visiting different States in India and even foreign countries;

9. Out of this small amount of Rs. 110/-, Rs. 25/- go to build up the State Organizations of the Samaj.

Governing Body

The Governing Body of the Samaj is the supreme administrative body and its decisions on all matters relating to the Samaj are final. The Governing Body is constituted by the President after his election by the All India Farmers' Council after every three years. It carries out the policies of the Samaj as directed by the All India Farmers' Council. Its strength is 51 including the President.

National Convention of Farmers

The National Convention of Farmers is a general meeting of farmers together with Government and other experts. This Convention is held every year and farmer delegates from all over India participate in the function. The holding of such a Convention is authorised to the Samaj under Article II (Objects) - Object No. 4 of its Constitution. The main object of the Convention is to generate a general feeling of enthusiasm among farmers and to enable them to meet and discuss their problems and difficulties with their brothern from all over the country to make social and cultural contacts.

The Samaj has so far held twelve National Conventions of Farmers, seven being held in Delhi, and one each in Mysore, Calcutta, Madras, Ahmedabad and Jaipur.

The Convention have been largely attended by farmers hailing from the remotest parts of India. This has been made possible mainly due to the generosity and thoughtfulness of the Railway

The impressive main gate of the first World Agriculture Fair

Board in issuing railway concessions at single fare double journey rates. This enables the poorest of farmers to participate in the Conventions.

These Conventions have been inaugurated by eminent persons, like the President of India, the Prime Minister of India, Governors of States and Congress Presidents. The Conventions were also addressed by eminent authorities on agriculture, animal husbandry, co-operation, farm organization, etc.

In conjunctions with the Conventions, seminars on agricultural and allied subjects, agricultural and industrial exhibitions and trips to agriculturally important places have also been arranged. The sixth Convention coincided with the World Agriculture Fair in 1960 and the 7th, 8th, 11th and 12th with the National Agriculture Fairs in Calcutta, Madras, Ahmedabad and Jaipur respectively.

All-India Farmers' Council

The All-India Farmers' Council is the policy making body of the Samaj and has a strength of 600 members drawn from life members of the Samaj, representatives of the States (one from each District), representatives of life members, representatives of other organizations (Boards, Commissions, etc.) agricultural experts, project and other officials etc. Its tenure is three years and it meets twice a year. The Council was constituted in pursuance of the resolution of the Governing Body of the Samaj adopted at its meeting held during the first National Convention of Farmers held in 1955. It was naugurated by the late Prime Minister, Shri Jawaharlal Nehru. The present Council is the fourth one reconstituted in January, 1966.

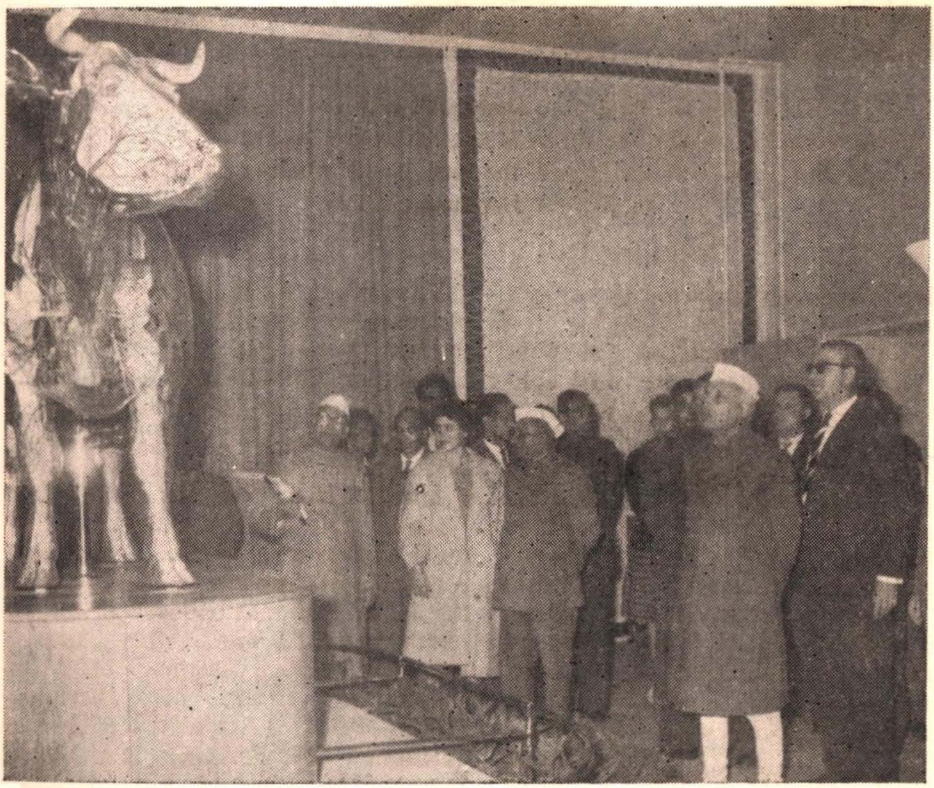
The purpose of setting up the Council is to make available to the Governing Body of the Samaj from time to time the representative views of the farmers of India. Its meetings are business meetings and formal in nature. It helps in propagating the views and policies of the samaj in all parts of the country and also to promote co-operation between the Samaj and the Government Departments.

The Council has so far held 21 meetings in the different parts of the country.

The Council meetings have been inaugurated and addressed by eminent persons. Exhibitions, Seminars, etc. were also held in conjunction with these meetings.

Standing Committee

The Standing Committee of the Samaj is a Committee of eleven members which is constituted by the President from among the members of the Governing body. It meets occasionally and looks after the day-to-day work of the Samaj.



The late Prime Minister Shri Jawaharlal Nehru accompanied by our founder President keenly interested in the glass cow in the German Democratic Repuhlic pavilion in the World Agriculture Fair

The late Dr. Punjabrao Deshmukh with the President, Dr. Radhakrishnan, the Prime Minister, the late Jawaharlal Nehru and Shri V. K. Krishna Menon, the then Union Minister for Defence at the World Agriculture Fair

The World Agriculture Fair

The idea of holding the first World Agriculture Fair was conceived of by the Samaj within a year or two of its birth, and the late Dr. Deshmukh, President of the Samaj, mentioned it in his address requesting Shri A. P. Jain, then Union Minister for Food and Agriculture, to open the Agricultural Exhibition which was organised on the occasion of the Second National Convention of Farmers in April 1956. Since then the Samaj had been working on the idea and it got the 'go ahead' signal when the All India Farmers' Council resolved in March, 1958, that the Fair should be held in New Delhi during the winter of 1959-60.

The world Agriculture Fair was inaugurated by the late Dr. Rajendra Prasad, then President of the Indian Union, on December 11, 1959, in the presence of Mr. Eisenhower, then President of the United States of America, and our revered late Prime Minister, Pandit Jawaharlal Nehru. The Fair remained open upto February 29,1960. Twelve foreign Governments participated in the Exhibition and had set up huge pavilions which were highly educative. The Foreign Sector comprised the United States of America, Union of Soviet Socialist Republic, German Democratic Republic, People's Republic of Poland, Republic of Iraq, Iran, Afghanistan, Ceylon, Burma, Republic of Vietnam, People's Republic of China, Republic of Mongolia, Food and Agriculture Organization of the United Nations and the International Federation of Agricultural Producers. The pavilions in the Foreign Sector told a tale of man's achievements in the laboratory and in the field.

The Indian participants in the Fair were the various Divisions in the Union Ministry of Food and Agriculture, Animal Husbandry, Horticulture and Community Development of different States, the Central Commodity Committees, the Agriculture and Animal Husbandry Institutes, Commissions, Associations and business houses dealing in agricultural machinery, fertilizers, plant protection, chemicals equipment, etc. Their exhibits showed the latest developments in agriculture and allied sciences.

The Fair was essentially an exhibition of food and agriculture and brought home to Indian farmers through educative demonstrations how the battle on the food front was being waged and gradually won by farmers all over the world, and thus enabled them to equip themselves better to produce more of what are India's immediate needs of food and fibre.

The Fair, a pioneering venture seen by more than three million people from all parts of India and also by numerous people from several foreign countries, was adjudged as a remarkable achievement in the annals of the history of world agriculture. Amongst the dignitaries from foreign countries, besides the President of the United States of America, who visited the Fair, were the President, the Prime Minister and the Minister for Agriculture of the German Democratic Republic, Prime Minister of Poland, Nepal, U. S. S. R., and Combodia, Lady Mountbatten, Field Marshal Montgomery, etc.

Prize Distribution at the World Agriculture Fair

Her Majesty Queen Elizabeth and Dr. Punjabrao Deshmukh in the first National Agriculture Fair at Calcutta

They applauded the Bharat Krishak Samaj for conceiving and holding such a unique Fair for the first time in the history of world agriculture. The historic words of Eisenhower at the inauguration of the Fair are noteworthy.

"I am singularly honoured by the invitation to join President Prasad at the opening of the World Agriculture Fair, the first such Fair ever held. And it is entirely right that it is held in India.

My country was quick to accept when invited to participate in this unique and historic event. And today, I am particularly honoured that India's Chief of the State will be with me when, in a few minutes, I officially open the United States Exhibit at the Fair."

National Agriculture Fairs

The success of the World Agriculture Fair also gave birth to the idea that it would be more useful if such exhibitions could be organised on a national level in various parts of the country. This idea was also stressed by the late Prime Minister Shri Nehru in his address to the conference of Ministers of Agriculture held in New Delhi in September, 1960. He felt that such exhibitions were so useful that they should be held even up to District level.

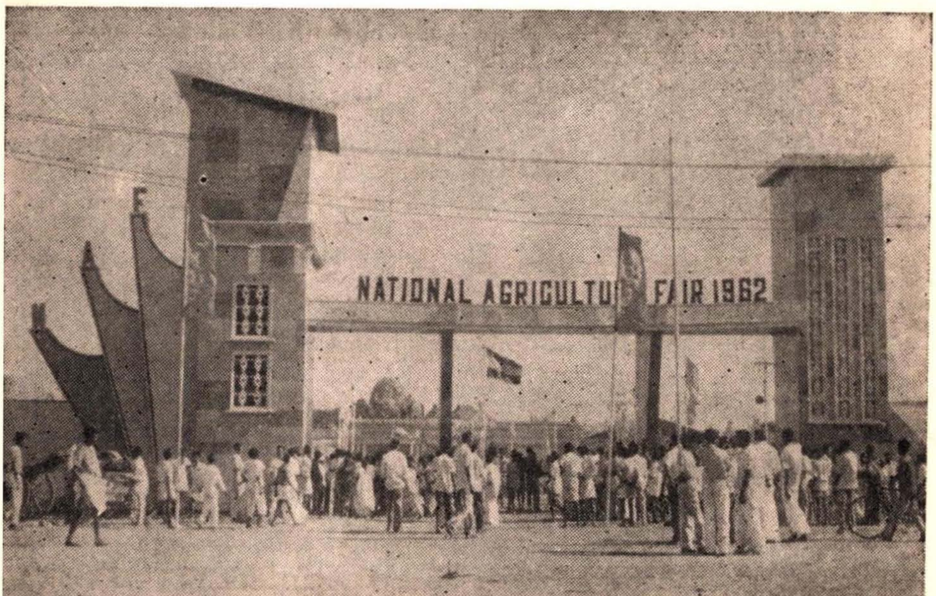
Encouraged by the success of the World Agriculture Fair and by suggestions from the late Prime Minister Shri Nehru and several others, the Samaj ventured to shoulder the responsibility of following up the World Agriculture Fair by holding an annual National Agriculture Fair in the different parts of the country in rotation.

The First National Agriculture Fair

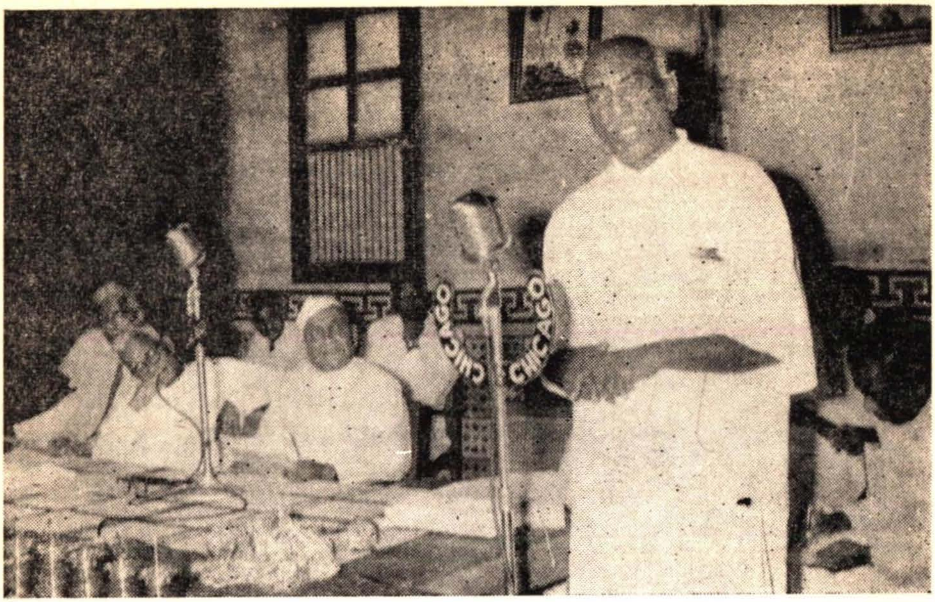
Thus the First National Agriculture Fair was held in Calcutta in 1961 at the invitation of the Government of West Bengal. It was inaugurated by President Radhakrishnan, then Vice-President of India, on January 8, 1961. It closed on March 14, 1961. Nearly a million and a half of persons, including thousands of farmers from different parts of the country, visited the Fair. Covering an area of nearly 40 acres, the first National Agriculture Fair had the participation of three foreign countries, viz. the U. S. S. R., the Federal Republic of Germany and Japan, the Union Ministries of Food & Agriculture, Information and Broadcasting, Railways and Commerce and ten State Governments.

The Second National Agriculture Fair

The second National Agriculture Fair was organised at Madras. It was inaugurated by the then Governor of Madras, Shri Bishnuram Medi on January 14, 1962. It was a grand success. In many respects it was a greater success than the Calcutta Fair. Eleven States of the Indian Union, the Union Ministries of Food and Agriculture, Information and Broadcasting, Transport and Communication, Railways and Commerce participated in the Fair. This Fair also had the partcipation of two foreign Governments, viz. the United States of America and the Federal Republic of Germany. The Fair was praised by all sections of the public. The Press in Madras



The attractive main gate of the second National Agriculture Fair at Madras



Shri K. Kamaraj delivering his Presidential address during the inauguration of the Second National Agriculture Fair

as well as in other parts of the country paid glowing tributes to the efforts of the Bharat Krishak Samaj. Nearly 16 lakhs of people, a considerable percentage of whom were farmers, visited the Fair. The Fair closed on March 11, 1962.

The late Prime Minister Nehru was the patron of the Fair.

The Third National Agriculture Fair

The Samaj had decided to hold the third National Agriculture Fair in Bombay in 1963 and had made all preliminary arrangements in that connection but due to the National Emergency the Samaj had to cancel the Fair.

The Third National Agriculture Fair was, however, held in Ahmedabad in January 1965. It was inaugurated by Shri Manubhai Shah, the then Union Minister of Commerce on January 15, 1965 and closed on March 15, 1965.

The Fourth National - Agriculture Fair

The Fourth National Agriculture Fair was held in Jaipur in 1966. It was inaugurated by Shri Mohan Lal Sukhadia, Chief Minister of Rajasthan on November 14, 1966. The Fair closed on December 31, 1966.

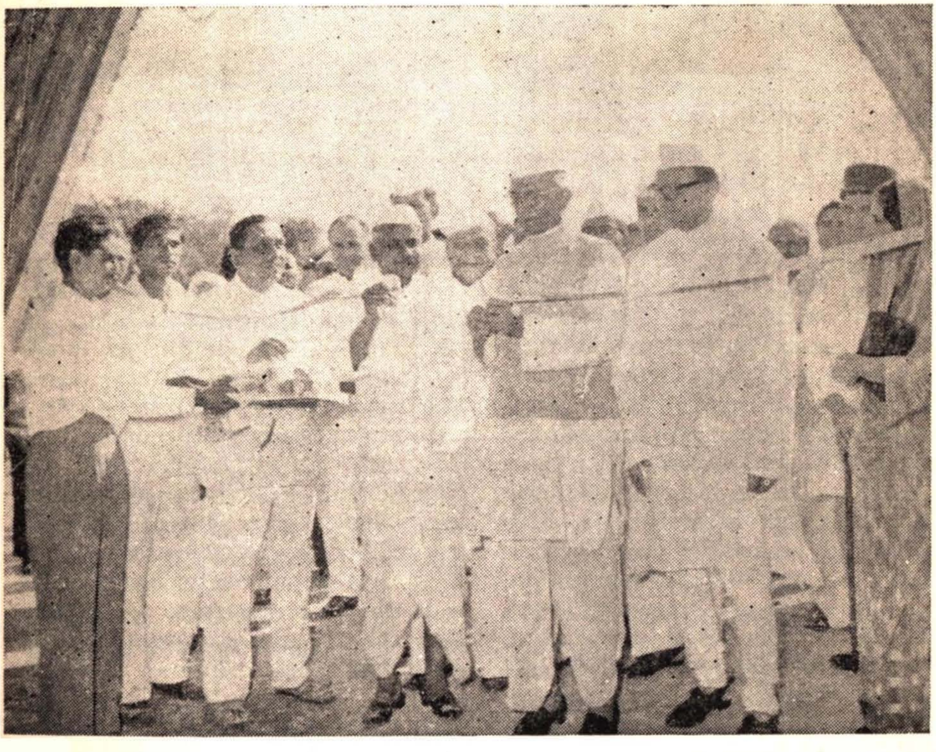
The Fifth National Agriculture Fair

The Samaj is organising the 5th National Agriculture Fair at Bombay at the invitation of the Govt. of Maharashtra. The Fair will be held during March-April, 1969. It is expected to be the biggest ever held Fair in Bombay on a 90 acre plot of land in Mahim Creek area of Bombay with an area of 4,50,000 sq. ft. display area. Many State Governments and Ministries of the Central Government are expected to participate in the Fair. In addition about 60 private concerns dealing with the manufacture of agricultural machineries, farm implements, plant protection chemicals, pesticides, insecticides etc., are participating in the Fair. A few foreign embassies and high commissions are also participating in the Fair. The Fair will have a shopping and Eating Corner in addition to an Amusement Park.

The Samaj proposes to hold the 13th National Convention and 22nd meeting of the All India Farmers Council at Bombay during the last week of April, 1969. The Samaj also proposes to have conducted tours of farmers from all parts of the country to visit the Fair.

Holding of the Eleventh General Conference of the International Federation of Agricultural Producers

The Bharat Krishak Samaj became a member of the International Federation of Agricultural Producers in 1955, that is from the very first year of its existence. It made bold enough to invite the International Federation of Agricultural Producers to hold their Eleventh General Conference in New Delhi from November 27 to December 5, 1959. The Conference was inaugurated on Novem-



Chief guest of the evening Shri Morarji Desai opens the Agriculture Exhibition first before the inauguration of Council Meeting. The Exhibition was organized by Government of Gujarat

Fifth National Agricultural Fair at Bombay, inauguration by Shri Jagjivan Ram, Union Minister for Food, Agriculture, Community Development and Co-operation

ber 27, 1959 by the then President of India, late Dr. Rajendra Prasad. He was welcomed on his arrival, by Mr. James G Patton, the then President of the International Federation of Agricultural Producers and President of the National Farmers' Union, U.S.A. The Conference was also addressed by the Prime Minister of India, late Shri Jawaharlal Nehru. Bharat Krishak Samaj was the host to the foreign delegates and it received great appreciation and praise from the delegates for conducting the conference efficiently and successfully.

National Agricultural Co-operative Marketing Federation

The National Agricultural Co-operative Marketing 'Federation was set up on 2nd October, 1958, the auspicious birthday of Mahatma Gandhi. The main objectives of the Agricultural Co-operative Marketing Federation are to co-ordinate and promote the marketing and trading activities of the members in agricultural and other commodities, to undertake to promote inter-State and International trade and commerce in agricultural and other commodities, to undertake supply of agricultural requisites, like seed, manures, agricultural implements, etc. The setting up of the Federation was the implementation of a resolution passed by the 5th meeting of the All India Farmers' Council of the Bharat Krishak Samaj in 1958.

Farmers Co-operative Bank of India Limited

Bharat Krishak Samaj had been anxious to establish a Farmers' Co-operative Bank in India since long. Apart from the reference to it by the late Dr. Panjabrao Deshmukh, President, Bharat Krishak Samaj, in the Srinagar Conference of Farmers and Ministers of Agriculture and Co-operation in July 1954, the National Convention of farmers as early as 1958 adopted a definite resolution to the effect that such a Bank be organised by the Bharat Krishak Samaj.

The Bank has started functioning and is making good progress. The Bank will, there is no doubt, solve to a great extent the long standing credit problem of the Indian farmers and their institutions.

First Afro-Asian Rural Reconstruction Conference

The Samaj has yet another great achievement to its credit. This is the holding of the First Afro-Asian Rural Reconstruction Conference in New Delhi in January, 1961, in which 23 Asian and African countries and five International Organisations participated. The late Dr. P. S. Deshmukh, President, Bharat Krishak Samaj was elected the President of the Conference. The Conference was inaugurated by the late Dr. Rajendra Prasad, the then President of India. Shri K. D. Sharma, Formerly Secretary of the Bharat Krishak Samaj, was its first Secretary General.

Freedom From Hunger Campaign Fund

The late Dr. Deshmukh, President, Bharat Krishak Samaj, in his address of welcome on the occasion of the inauguration of the World Agriculture Fair on 11th December, 1959, made the following announcement:

"The Bharat Krishak Samaj wishes to commemorate this great occasion by deciding to give concrete shape to this campaign envisaged by F. A. O. We, therefore, propose to constitute a Freedom From Hunger Trust Fund of our own which would be devoted to fulfilling the first two aims of the campaign, viz. imparting information and education to the farmers of India and helping agricultural research. For this purpose all gate money received in the course of this Fair would be credited to this fund. The Samaj will also approach various Governments, religious and other organisations, private foundations, as well as individual donors to add to this fund. I have great pleasure in making this announcement at this moment so as to secure the blessings of His Excellency President Eisenhower who, I believe, has already associated himself with this campaign. We could not have chosen a better moment to make a move in this direction. I hope and trust we will enjoy the blessings and support of everyone present here as well as those outside."

Accordingly the Governing Body of the Bharat Krishak Samaj at its meeting held at Bhopal (Madhya Pradesh) in September, 1960, passed a resolution to the effect that a sum of Rs. 5,83,137·40, the balance out of the gate money received by the World Agriculture Fair be constituted into the Bharat Krishak Samaj "Freedom From Hunger Fund" which may be used for projects to help the farmers to increase agricultural production in the country and to finance any campaign which may be organized by the Samaj to support the Freedom From Hunger Campaign initiated by the F.A.O. W.A.F. Memorial Fund.

The Governing Body of the Bharat Krishak Samaj at the same meeting also decided that a sum of Rs. 4,00,000 be transferred from the receipts of the World Agriculture Fair and created into Bharat Krishak Samaj World Agriculture Fair Memorial Fund for granting scholarships to the sons and daughters of Indian farmers for study of agricultural science both in India and abroad or for any other suitable educational purpose which the Committee to be appointed for the administration of the fund might propose.

W.A.F. Memorial Farmers Welfare Trust Society

The Governing Body of the Bharat Krishak Samaj at its meeting held in Ahmedabad in November 1963 passed a resolution to the effect that the two funds viz. Bharat Krishak Samaj Freedom From Hunger Fund and Bharat Krishak Samaj World Agriculture Fair Memorial Fund consisting of Rs. 5,83,137·40 and Rs. 4,00,000 respectively may be combined into one to form a Trust Society under the Societies Registration Act to be called "World Agriculture Fair Memorial Farmers Welfare Trust Society." In pursuance of this resolution, the Trust was registered under the Societies Registration Act in Delhi in December, 1963.

The Trust is giving scholarships to the students for higher studies in agriculture and allied subjects since its formation every year.

U. S. Government's Co-operation and Help to the Samaj.

The International Co-operation Administration, U. S. A. (now U. S. A. I. D.) had placed at the disposal of the Samaj a Farm Organization Adviser, Mr. John H. Webb, for a period of three years, 1959-61 and has also made available to the Samaj a fully equipped publicity van with movie and public address system for use by the Samaj. The Samaj is grateful to U. S. A. I. D. for this generous help. The Samaj is also grateful to Mr. Webb for his valuable advice and help during the period of his tenure with the Samaj.

Foreign contacts And farmers exchange

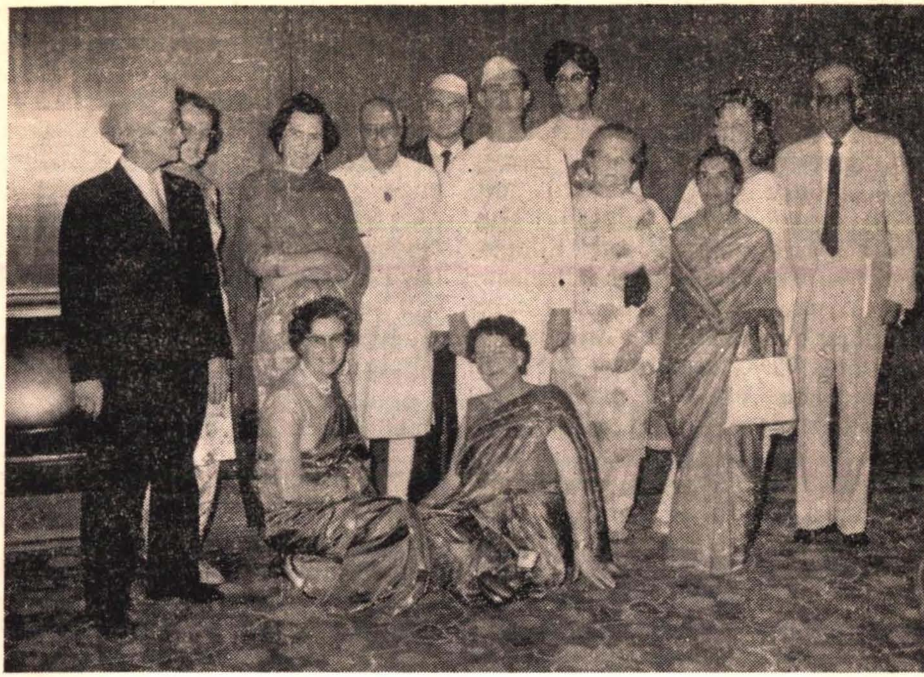
BKS Becomes A member of IFAP

The Samaj became a member of the International Federation of Agricultural Producers in the very first year of its existence, i. e. 1955. The late Dr. P. S. Deshmukh, President, Bharat Krishak Samaj was elected as Vice-President of IFAP in 1963. Shri S. M. Wahi, a former Vice-President of the Samaj is a Vice-President of the IFAP now. He was a Vice-President of the IFAP before the late Dr. Deshmukh also.

The Samaj is an Honorary Member of the International Association of Fairs and Expositions of U.S.A.

Farmers Exchange Project
(a) with U. S. A.

The Bharat Krishak Samaj has undertaken a project of farmer to farmer exchange in collaboration with Farmers and World Affairs, Inc., Philadelphia, U. S. A. The object of the project is briefly two-fold : (1) to study farming methods and problems, working of farm organizations, co-operatives, credit system, extension methods, etc., and (2) to help build friendship and mutual understanding and co-operation between the people in



Some of our American guests in Indian custumes with the late Pandit Jawaharlal Nehru

general and the farmers in particular, of these two great democratic countries at the grassroots level.

Under this project eight groups of American farm leaders have so far visited India. The groups consisted of both men and women totalling about ninety-five. Six groups of Indian farm leaders (about sixty men and women) have also visited U. S. A. under the Programme.

(b) With G. D. R.

The Samaj has also undertaken an exchange programme with the Peasants Mutual Aid Association of the German Democratic Republic. About thirty Indian farm leaders have so far visited G.D.R. and about a dozen delegates from G. D. R. have visited India.

Both these programmes are at non-Governmental level.

Farm Leader Training Programme

The Bharat Krishak Samaj has undertaken a project called Farm Leader Training Programme in collaboration with Farmers and World Affairs, Inc., U. S. A., with which we are having Farmers Exchange Programme. Under this new Training Programme two Indian Farm Leaders will be in U S. A. with U. S. Farm Families under training as Trainees for about one year. The first group of trainees will leave for U. S. A. in March, 1968.

Family Planning and Agricultural Production Pilot Project

The Samaj has undertaken a "Co-operative Family Planning and

Agricultural Production Pilot Programme" in collaboration with and financial assistance of Farmers & World Affairs, Inc., U.S.A. Three Project Centres have already been started as Pilot Projects one each in Madras (Chingleput Dist.), Maharashtra (Jalgaon Dist.) and in Mysore (Anakal Taluka). The Samaj has appointed one Education Worker each for the Project. The Worker is collecting necessary statistical datas etc. on family planning, and agricultural production. The Workers have been provided with Motor Cycles.

The three centres are doing excellent work on both family planning and agricultural production.

World Agriculture Fair Memorial Shivaji College

The World Agriculture Fair Memorial Shivaji College was started in 1961, in the rural area of Delhi at Matiala, Najafgarh Road, in a temporary building. The Bharat Krishak Samaj donated Rs. 4,00,000·00 to the College Endowment Fund. The College is well established now and is making good progress. It has at present over 500 students both boys and girls students. A new site for the College has been obtained where the College will be shifted shortly. The Delhi Administration has taken over the administration of the College.

Publications And Publicity

The Samaj has its own monthly journal called Krishak Samachar. The publication of this journal was taken up from December, 1956. It was being published both in English and Hindi upto July 1962, but since August 1962, it is also being published in Marathi from the District Krishak Samaj Office, Jalgaon. Since February 1964 the

Seminar on Agricultural Production-cum-Family Planning journal is being published in the Gurumukhi script also from the Punjab State Krishak Samaj Office, Chandigarh. The journal is sent free of cost to all life members in the languages of their choice.

The Samaj has also published several special publications, Souvenirs, Reports, etc. on the occasion of Conventions, Seminars, Fairs, etc. In 1964, the Samaj published the Bharat Krishak Samaj Year Book 1964. Eminent scientists and experts in agriculture, animal husbandry, co-operation, etc. both from India and foreign countries have contributed very fine articles. This book is very highly commented upon by experts.

The Samaj intends to bring out Year Book every year.

Seminars and Symposiums

The Samaj has organized several Seminars on important subjects during Conventions, Conferences, World Agriculture Fair, National Agriculture Fairs, etc.

In these Seminars progressive farmers, Government and non-Government experts in agriculture and allied subjects participated. In the symposium on Radioisotopes Fertilizers and Cowdung Gas Plant a large number of scientists from foreign countries also participated.

National Farmers Day

To Commemorate April 3, 1955, on which day the first National Convention of Farmers was inaugurated by the late Prime Minister, Shri. Jawaharlal Nehru, the Bharat Krishak Samaj decided to celebrate April 3, as the National Farmers Day.

Since then the Bharat Krishak Samaj has been celebrating this day-April 3, throughout India. The Krishak Samajs in the States at the State, District, Taluk and village levels have been celebrating this day by arranging meetings, discussions, etc. in which both the farmers and agricultural experts have been participating. On this occasion the President has also been sending to the farmers in India a message of good wishes and encouragement.

Miscellaneous Activities of the Samaj

The Samaj has whole-heartedly co-operated with the Government in their Kharif (Rainy season) and Rabi (Winter) crop campaigns.

To meet the National Emergency, the Samaj immediately formulated a five point programme for National Defence and appealed to the Nation's peasantry to shoulder bravely its due share of the task of safeguarding the freedom of the Motherland and helping to beat back the invader, and to step up agricultural production.

The Central Office and the State branches of the Samaj also liberally contributed to the National Defence Fund

The Punjab State Farmers Forum has set up Farm Machinery and Implements (Production-cum-sale) Co-operative Industrial Society Ltd. They have also applied for license for manufacture of small tractors.

The Jalgaon District Krishak Samaj has taken an agency for the supply of tractors, spare parts and other agricultural machinery and implements and also has undertaken servicing of tractors and other agricultural machinery and implements.

The Mysore Farmer's Forum has undertaken supply of good quality seed potatoes of improved varieties to growers and has also applied for license to import seed potatoes from Burma and other countries.

The Mudhol Farmers' Forum (District Bijapur, Mysore State) with the full co-operation of the the technical personnel of U. S A. I. D. and State Government has been able to successfully implement a new Mysore System of Soil and Water Conservation and Contour Bunding of fields on a large scale. The new methods have helped to a great extent to increase agricultural production. This is a very important line of work undertaken by the Mudhol Farmers' Forum. The success of this project has created enthusiasm in other State Krishak Samajs and work on similar lines is likely to be undertaken by them. The Mudhol Farmers Forum is also producing seeds of hybrid maize, jowar and bajra for supply to cultivators after getting the seeds certified by the National Seeds Corporation.

The Mudhol Farmers' Forum was the first to organize a Quintal Club.

The Punjab Krishak Samaj and Madhya Pradesh Krishak Samaj under the auspices of the Planning and Development Department have undertaken, training of the Panchayat Secretaries, Panchas, Sarpanchas, Upsarpanchas, etc., at Ferozepur and Bhopal respectively under the scheme of the Panchayat Raj Training Programme.

Many of our progressive farmers collaborate with the Central and State Governments for undertaking field trials on their own fields under the supervision of Government experts. Many of them have also been multiplying on a large scale improved certified seeds recommended by the Central Institutes and the State Governments.

Some of our progressive farmers are also members of Government Committees, Planning Commission, etc.

Future Programme of work of the Samaj

The future programme of work of the Samaj includes:

1. Strengthening the organization in the States by appointing whole-time paid Secretaries or Assistant Secretaries, intensification of the effort to enrol life and ordinary members, holding farmers' conventions at State and District levels, Training Camps for Samaj workers, organizing Crop Competitions, Farmer's Days, Agricultural Museums, etc.

2. Promotion and organization of co-operatives; viz. formation of National Council of Farmers Co-operatives, Krishak Samaj Central Co-operatives, Seed Multiplication Associations, Agricultural and Machinery Co-operatives.

3. Popularisation of the main features of the Japanese method of paddy cultivation wherever suitable and popular, firstly, by studying the method and secondly by propagating it amongst other farmers. Wherever the Japanese Government farms are located, efforts to take advantage of these farms for the training of farmers, especially the younger generation, to be made. The knowledge gained is then to be practised by the trainees on their lands so as to become focal of radiation of the method.

4. Getting soils analysed and popularising fertilizer use and plant protection methods.

5. Grading agriculture produce.

6. Taking utmost possible advantage of warehouses constructed by Government.

7. Advising and undertaking co-operative farming on voluntary basis wherever possible.

8. Popularising Farmer's Co-operative Bank of India.

9. To get agency for the distribution of tractors, farm implements, spares, etc. through the State Krishak Samajs.

10. To give practical training to farm men and farm women in the increased agricultural production who are members of the Bharat Krishak Samaj in all the States and Union Territories with the help and guidance of the Directorate of Extension, Ministry of Food & Agriculture, Government of India.

The Samaj Conducted 14 short duration farmers training courses in the States, with the aid of grants from the Government of India for its members in its progressive members farms.

11 Expanded Family Planning And Agricultural Production Pilot Projects

Inspired by the success of the three Pilot Projects already running one each in Jalgaon, Chingleput and Anakal, the Samaj and the Farmers & World Affairs, Inc., USA are considering the expansion of the Project and to have 14 such Pilot Projects in the country. The idea is that each State should have one such 'Family Planning and Agricultural Production Pilot Project' Centres. The Samaj and the FWA is negotiating with the Ministry of Health and Family Planning and the US AID for necessary financial help to the Samaj for running the Projects in 14 Centres.

The Samaj hopes that the Government will lend its helping hand to the Samaj for the Pilot Projects in the States.

CALENDAR OF IMPORTANT EVENTS OF BHARAT KRISHAK SAMAJ

1954

1. July	The decision to establish an Organisation of farmers was taken at a meeting of State Ministers of Agriculture, Co-operation, and Animal Husbandry held in Srinagar under the Chairmanship of late Dr. P. S. Deshmukh, the then Minister of Agriculture, Government of India.

1955

2. February 7	The Constitution for the Samaj was registered under the Societies Registration Act of XXI of 1860.
3. February 13	The first meeting of the Governing Body of the Samaj was held at 12, Janpath, New Delhi, the then residence of late Dr. Deshmukh.
4. April 3	The first National Convention of Farmers was held in New Delhi and was inaugurated by late Shri Jawaharlal Nehru, the then Prime Minister of India.

1956

5. April 2	2nd National Convention of Farmers was held in Delhi and was inaugurated by late Dr. Rajendra Prasad, the then President of India.
6. April 3	1st All India Farmers Council meeting at Delhi was inaugurated by late Shri Jawaharlal Nehru, the then Prime Minister of India.
7. September 10	2nd All India Farmers Council meeting at Delhi was inaugurated by late Dr. K. N. Katju, the then Union Minister for Defence.
8. December	Started publication of 'KRISHAK SAMACHAR' in English and Hindi languages.

1957

9.	March 24	3rd National Convention of Farmers was inaugurated by Shri U. N. Dhebar, the then President, Indian National Congress, in New Delhi.
10.	March 24	3rd All India Farmers Council meeting was inaugurated by late Shri V. T. Krishnamachari, the then Deputy Chairman, Planning Commission, in New Delhi.
11.	November 2	The 4th All India Farmers Council meeting was held at Amravati (Maharashtra) and was inaugurated by Shri Y. B. Chavan, the then Chief Minister of Maharashtra.

1958

12.	March 15	Fourth National Convention of Farmers was held in New Delhi and was inaugurated by late Shri Jawaharlal Nehru, the then Prime Minister of India.
13.	March 19	5th All India Farmers Council meeting was held at New Delhi and was inaugurated by Shri A. P. Jain, the then Union Minister for Food and Agriculture.
14.	June 27	The announcement about the holding of the "World Agriculture Fair" in New Delhi from December 1959 to February 1960 was made by Shri A. P. Jain, the then Union Minister of Food and Agriculture at a special function held at the Exhibition Ground, Mathura Road, New Delhi, where the office of the World Agriculture Fair was opened.
15.	October 2	The National Agricultural Co-operative Marketing Federation was registered in connection with a resolution of the Bharat Krishak Samaj.
16.	November 22	6th All India Farmers Council meeting was held at Bhubaneswar and was inaugurated by Shri Harekrishna Mahtab, the then Chief Minister of Orissa.

1959

17.	May 2	5th National Convention at Mysore was inaugurated by Shri Mangaldas Pakvasa, the then Governor of Mysore.
18.	May 2	7th All India Farmers Council meeting was held in Mysore and was inaugurated by Shri A. P. Jain. the then Union Minister for Food and Agriculture.

19.	November 25	The first group of 12 American Farm Leaders arrived Palam, India, under the Farmers Exchange Programme of BKS.
20.	November 27	The 11th General Conference of International Federation of Agricultural Producers was inaugurated in Vigyan Bhavan, New Delhi, by late Dr. Rajendra Prasad, the then President of India. The Conference was held in Delhi at the invitation of the Samaj.
21.	November 29	8th All India Farmers Council meeting was held in New Delhi and was inaugurated by Shri S. K. Patil, the then Union Minister for food & Agriculture.
22.	December 11	World Agriculture Fair was inaugurated by late Dr. Rajendra Prasad, the then President of India in New Delhi, who was also the Chief Patron of BKS, in the presence of Mr. Dwight D. Eisenhower, the then President of USA, late Shri Jawaharlal Nehru, late Dr. P. S. DESHMUKH and many other distinguished guests.

1960

23.	February 11	9th All India Farmers Council meeting was inaugurated by Shri Morarji Desai, the then Union Minister for Finance at Delhi.
24.	February 12	6th National Covention of Farmers was inaugurated by late Dr. Rajendra Prasad, the then President of India, in New Delhi.
25.	February 29	Closing of the World Agriculture Fair. Dr. S. Radha Krishnan, the then Vice-President of India gave away prizes and late Jawaharlal Nehru, the then Prime Minister presided over the closing function.
26.	September 16	The 10th All India Farmers Council was inaugurated by Shri H. P. Pataskar, the then Governor of Madhya Pradesh at Bhopal.
27.	November 22	Farmers Co-operative Bank of India Ltd., was established at Delhi.

1961

28.	January 8	Inauguration of the First National Agriculture Fair at Calcutta by Dr. Radha Krishnan, the then Vice-President of India.

29.	February 15	11th All India Farmers Council meeting at Calcutta was inaugurated by Shri Shriman Narayan, the then Member, Planning Commission.
30.	February 16	7th National Convention of farmers was inaugurated at Calcutta by Shri Sanjiva Reddy, the then President, Indian National Congress.
31.	March 14	Closing of 1st National Agriculture fair at Calcutta. Shri Taran Kanti Ghosh, the then Minister for Agriculture and Food Production, Government of West Bengal, presided over the function.
32.	June 1	The first group of 12 Indian farm leaders reached Washington D. C. under the farmers Exchange Programme.
33.	July	Started World Agriculture Fair Memorial Shivaji College at Matiala, Delhi State.
34	October 18	12th All India Farmers Council meeting was inaugurated at Srinagar by Shri Karan Singh, the then Sadar-i-Riyasat, Jammu & Kashmir.

1962

35.	January 14	2nd National Agriculture Fair was inaugurated at Madras by Shri Bishnuram Medhi, the then Governor of Madras.
36.	March 8	13th All India Farmers Council meeting was inaugurated at Madras, by Shri C. Subramaniam, the then Finance Minister of Madras.
37.	March 10	8th National Convention of Farmers was inaugurated at Madras by Shri Bishnuram Medhi, the then Governor of Madras.
38.	March 11	Closing of the 2nd National Agriculture Fair at Madras. Mr. K. Kamraj, the then Chief Minister of Madras presided over the closing function.
39.	March 31	The Afro-Asian Rural Re-Construction Organisation was established. Shri K. D. Sharma became the 1st Secretary General of this International Organization.
40.	May 10	The resignation of Shri K. D. Sharma as Secretary of the Samaj was accepted by the Governing Body of the Samaj and appointed Mr. R. B. Deshpande to succeed Shri Sharma as Secretary of BKS.
41.	August	Started publication of 'Krishak Samachar' in Marathi from Jalgaon (Maharashtra)

42.	October 17	14th All India Farmers Council meeting was inaugurated at Chandigarh by late Sardar Pratap Singh Kairon, the then Chief Minister of Punjab.

1963

43.	February 28	First Patron in chief of the Samaj, Dr. Rajendra Prasad, Ex.- President of India passed away at Patna.
44.	November 5	Inauguration of the 15th All India Farmers Council meeting Ahmedabad by late Shri Balwantrai Mehta, the then Chief Minister of Gujarat.

1964

45.	January 1	The World Agricultural Fair Memorial Farmers Welfare Trust Society was registered under the Societies Registration Act XXI of 1860 as per a resolution passed by the Governing Body at its meeting held at Ahmedabad on November 5, 1963.
46.	February	Started publication of 'Krishak Samachar' in Gurmukhi script also from Chandigarh by Farmers' Forum, Punjab.
47.	March 19	The 16th All India Farmers Council meeting was inaugurated at Delhi by Shri Asoka Mehta, the then Deputy Chairman, Planning Commission.
48.	March 20	The 9th-10th combined National Convention of Farmers was inaugurated at Delhi by Shri Swaran Singh, the then Union Minister for Food and Agriculture.
49.	May 27	Shri Jawaharlal Nehru, Prime Minister of India and Chief Patron of World Agriculture Fair passed away in Delhi.
50.	October 2	The inauguration of the BKS Year Book 1964 was done at the hands of late Shri Lal Bahadur Shastri, the then Prime Minster of India.
51.	October 24	17th All India Farmers Council meeting was inaugurated at Bhubaneswar by Shri S. P. Mohanty, the then Minister for Agriculture and Education, Govt. of Orissa.

1965

52.	January 15	3rd National Agriculture Fair at Ahmedabad was inaugurated by Mr. Manubhai Shah, the then Union Minister for Commerce.

53.	March 8	Inauguration of the 18th meeting of the All India Farmers Council at Ahmedabad by Shri Shah Nawaz Khan, the then Union Deputy Minster for Agriculture.
54.	March 9	Inauguration of the 11th National convention of Farmers at Ahmedabad by Shri Utsavbhai Parikh, the then Minister for Agriculture, Govt. of Gujarat.
55.	March 11	Closing of the 11th National Convention of Farmers and the 3rd National Agriculture Fair at Ahmedabad by Padma Vibhushan Nawab Mehdi Nawaz Jang, the then Governor of Gujarat.
56.	April 10	Dr. P. S. Deshmukh, Founder-President of the Samaj passes away.
57.	June 4	The Governing Body of the Samaj unanimously decided that Shri A. M. Thomas should carry out the duties of the President.
58.	June 4	The Governing Body decided to have a suitable memorial for Dr. Deshmukh

1966

59.	January 28	Shri C. Subramaniam, the then Union Minister for Food and Agriculture was elected as President of BKS at 19th All India Farmers Council meeting at Lucknow.
60.	January 28	The 19th All India Farmers Council meeting was inaugurated at Lucknow by Smt. Sucheta Kriplani, the then Chief Minister of U. P.
61.	January 28	Inauguration of the 1st State Agriculture Fair at Lucknow by Smt. Sucheta Kriplani, the then Chief Minister of U. P.
62.	January 30	Concluding day session of the Council was addressed by Shri Bishwanath Das, the then Governor of U. P.
63.	August 13	The Governing Body agreed that Family Planning and Agricultural Production Pilot Project Centres be started one each at Jalgaon and Madras.
64.	November 12	The 4th National Agriculture Fair at Jaipur was inaugurated by Shri Mohanlal Sukhadia, the Chief Minister of Rajasthan.
65.	December 28	The 20th meeting of the All India Farmers Council elected Mr. A. M. Thomas as the President of the Samaj.

66.	December 28	The 20th meeting of the All India Farmers Council was inaugurated by Shri Ram Niwas Mirdha, the then Speaker, Legislative Assembly of Rajasthan.
67.	December 29	The 12th National Convention of farmers was inaugurated at Jaipur by Shri Ram Niwas Mirdha, the then Speaker, Legislative Assembly, Rajasthan.
68.	December 30	Late Dr. Sampurnanand, the then Governor of Rajasthan delivered address at the closing function of the 4th National Agriculture Fair and 12th Convention of farmers.

1967

69.	July 9	The Governing Body ratified the decision of the President, Shri A. M. Thomas, to handover duties to Shri Ram Niwas Mirdha, as Acting President of the Samaj on the eve of the Departure of Mr. A. M. Thomas as the Indian High Commissioner to Australia.
70.	September 1	Dr. Bholay tookover the Secretaryship of the Samaj from Shri R. B. Deshpande.
71.	October 14	The 2nd State Agriculture Fair at Delhi was inaugurated by Shri A. P. Shinde, the then Union Minister for Food.
72.	November 29	The Arbitrator communicated that the proceedings of the World Agriculture Fair Arbitration case has been finally closed.

1968

73.	March 22	Three young Indian farmers one each from Punjab, Maharashtra and Haryana left for USA as the 1st batch of trainels under the Farm Leader Training Programme with USA.
74.	May 6	Inauguration of the 21st meeting of the All India Farmers Council by Shri Nakul Sen, Lt. Governor of Goa, Daman & Diu.
75.	May 7	Shri S. N. Mushran, M.L.A., was elected as the President of BKS.
76.	May 8	Closing function of the Council meeting was addressed by Mr. Anthony J. D. Souza, Minister for Agriculture of Goa, Daman & Diu, at Panaji.

77.	May 21	Shri S. N. Mushran, the newly elected President of the Samaj assumed charge of his office at Delhi.
78.	August 5	A reception was held at Vithalbhai Patel House, in New Delhi to welcome Shri Jagjivan Ram, Union Minister for Food, Agriculture, Community Development & Co-operation as the President of the Samaj. Mr. Mushran, became the Chairman of the Samaji as per the new constitution of the Samaj.

1969

79.	January 18	The 9th group of nine U.S. Farm Leaders arrived India under the Farmers Exchange Programme with USA.

Subject	Time & Place	Occasion & who inaugurated
Fixation of remunerative and incentive prices for agricultural produce, and State trading in food-grains through the Foodgrains Trading Corporation proposed to be set up by Government.	October 1964	17th All India Farmers Council meeting. Chief Guest was Dr. P. K. Parija, Vice-Chancellor of Utkal University.
Self Sufficiency in Food Grains.	January 1966	19th All India Farmers Council meeting. Mr. A M. Thomas, President Bharat Krishak Samaj and the then Minister for Defence Production, Government of India.
Seminar on Farm Management	December 1966	12th National Convention of Farmers. The Seminar was organised by the National Productivity Council and Rajasthan Productivity Council in collaboration with BKS. Mr. Nathu Ram Mirdha, the then Minister of Agriculture, Govt. of Rajasthan inaugurated the Seminar.
Agricultural Revolution	May 1968	21st meeting of the All India Farmers Council at Panaji. Mr. Nakul Sen, Lt. Governor of Goa, Daman & Diu inaugurated the Seminar.

PART II

AGRICULTURAL STATISTICS

POPULATION AND NATIONAL INCOME

Total Population of India and its Occupational Distribution

(1901 to 1961) — Thousand persons

	1901	1911	1921	1931	1951	1961
Total Population	238,979(100·00)	252,431(100·00)	251,280(100·00)	278,580(100·00)	356,879(100·00)	438,310(100·00)
Total Workers (I to IX) ...	111,393 (46·61)	121,362 (48·07)	117,882 (46·92)	120,645 (43·30)	139,521 (39·10)	188,417 (42·98)
I. Cultivators ...	56,417 (23·61)	60,434 (23·94)	64,118 (25·52)	54,346 (19·51)	69,792 (19·56)	99,510 (22·70)
II. Agricultural Labourers ...	18,811 (7·87)	24,964 (9·88)	20,513 (8·16)	29,905 (10·73)	27,511 (7·71)	31,482 (7·18)
III. Mining, Quarrying, Live-stock, Forestry, Fishing, Hunting and Plantation, Orchards and Allied activities	4,809 (2·01)	5,757 (2·28)	5,275 (2·10)	6,251 (2,24)	4,122 (1·15)	5,190 (1·18)
IV. Household Industry ...	(a)]	(a)	(a)	(a)	(a)	12,031 (2·74)
V. Manufacturing other than Household Industry ...	13,070 (5·47)	12,042 (4·77)	10,949 (4·36)	10,747 (3·86)	12,554 (3·52)	7,957 (1·82)
VI. Construction	867 (0·36)	1,169 (0·46)	993 (0·40)	1,252 (0·45)	1,468 (0·41)	2,055 (0·47)
VII. Trade and Commerce ...	6,741 (2·82)	6,680 (2·65)	6,756 (2·69)	6,745 (2·42)	7,310 (2·05)	7,640 (1·74)
VIII. Transport, Storage and Communications ...	1,252 (0·53)	1,358 (0·54)	1,105 (0·44)	1.239 (0·44)	2,136 (0·64)	3,003 (0·69)
IX. Other Services ...	9,426 (3·94)	8,957 (3·55)	8,173 (3·25)	10,160 (3·65)	14,628 (4·10)	19,543 (4·46)
Non-Workers	127,586 (53·39)	131,069 (51·93)	133.397 (53·08)	157,935 (56·70)	217,358 (60·90)	249,893 (57·02)

(a) Included under Industrial Categories III and V.

Notes : (1) Figures in brackets represent the percentage distribution of Population into workers and non-workers (Workers being further classified by Industrial Categories.)

(2) The figures for 1951 are exclusive of Jammu & Kashmir as no census was conducted during that year. A rough estimate is given below by applying 1961 census proportions of workers and non-workers in Jammu & Kashmir to the 1951 population for that State estimated in the provisional report of population for 1961 :

ESTIMATED MID-YEAR POPULATION

	1961	1962	1963	1964	1965	1966	1967	1968	1969
All India	442.74	453·41	464·34	475·53	486·99	498·86	511·30	524·05	537·12

Source : Office of the Registrar General, India

POPULATION, DENSITY OF POPULATION AND LAND AREA IN INDIA AND OTHER SELECTED COUNTRIES OF THE WORLD

Country	Year	Total Area	Population in thousands *	Density of population per sq. K. M. †	Land area (—) (000' acres)	Agricultural area: Arable 1 and and land under per manent crops (—)	Agricultural area: Permanent meadows and pastures (—)	Forest Land (—)	Other area: unused but potentially productive land (—)	Other area: Bullt area waste land and others (—)
India	1964	327,219	511,115	159	...	162,115	14,220	55,955	17,858	71,071
U. K.	1965	24,403	55,065	224	24,095	7,496	12,127	1,804	...	2,976
U. S. SR.	1964	2,240,220	235,543	10	2,227,200	229,400	372,200	910,009	...	728,611
U. S. A.	1959	1,089,922	199,118	—	1,668,783	185,369	257,433	355,644	51,598	239,426
Canada	1961	997,618	20,441	2	919,423	41,845	21,003	443,380	...	491,390
Burma	1965	67,803	25,811	115	...	15,878	352	45,234	...	6,299
China (Main land)	1954	976,100	720,000	73	...	100,354	1,77,996	76,600	...	612,150
Japan	1960	36,966	99,920	124	...	6,004	948	25,404	...	4,612
Pakistan	1964	94,664	107,258	109	...	26,021	...	...	...	97,326
U. A. R.	1965	100,000	30,907	30	...	2,672	2	...	...	97,358
Indonosia	1954	190,434	109,500	70	181,130	17,698	3	121,825	...	10,258
Italy	1965	30,122	52,334	171	29,402	15,302	5,138	6,089	1,012	2,581

Source: United Nations Monthly Bulletin of Statistics.
* U. N. Monthly Bulletin June 1968.
† 1965.

ESTIMATE OF NATIONAL INCOME, INCOME FROM AGRICULTURE, FORESTRY AND FISHERIES AND PER CAPITA INCOME IN NATIONAL CURRENCIES

Country	Currency	1964	1965	1966	Income from Agriculture, Forestry and Fisheries		Per capita Income
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Australia	Dollar	15·9	16·6	18·2	† 2·156	(1964)	2447
Austria	Shilling	...	18·2	19·6	* 18·8	(1965)	25,220
Burma	Kyat	6488	...	...	† 2,604	(1964)	267
Canada	Dollar	...	38·7	42·9	* 2,991	(65)	1973
Ceylon	Rupee	...	7·8	...	* 3,166	(65)	619
Denmark	Kroner	...	55·1	59·9	* 7·600	(65)	11,410
Finland	Markks	...	20·79	21·91	* 0·619	(65)	4,477
India	Rupee	204	211	242	† 102·7	(1964)	410
Italy	Lira	...	28485	30,666	* 573	(65)	551,875
Japan	Yeu	...	24548	28,116	† 511	(65)	250,560
New Zealand	Dollar	...	3218	3,392	N. A.		614
U. S. S. R.	Rouble	...	193·4	205·3	* 42·4	(65)	N. A.
U. K.	Pound	...	28·5	20·6	* 0·187	(55)	518
U. S. A.	Dollar	...	566	621	* 4·8	(65)	2,893
Pakistan	Rupee	42·5	46·3	56·1	† 21·9	(64)	424

† Estimate relates to 1964. * Estimate relates to 1965.

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Area under principal Crops

Crop	1960-61	1961-62	1962-63	1963-64	1964-65
(1)	(2)	(3)	(4)	(5)	(6)
I. Foodgrains					
(a) Kharif Cereals					
Rice	34,128	34,694	34,934	35,622	36,077
Jowar	18,412	18,249	18,021	17,956	18,022
Bajra	11,409	11,278	10,800	10,785	11,712
Maize	4,407	4,507	4,607	4,584	4,591
Ragi	2,575	2,511	2,316	2,400	2,429
Small Millets	4,955	4,868	4,693	4,580	4,555
Total Kharif Cereals	**75,886**	**76,107**	**75,371**	**75,927**	**77,386**
(b) Rabi Cereals					
Wheat	12,927	13,570	13,657	13,496	13,453
Barley	3,205	3,312	3,022	2,775	2,668
Total Rabi Cereals	**16,132**	**16,882,**	**16,679**	**16,271**	**16,121**
Total Cereals	**92,018**	**92,989**	**92,950**	**92,198**	**93,507**
(c) Pulses					
Gram	9,276	9,566	9,177	9,376	9,011
Tur	2,433	2,447	2,418	2,441	2,473
Other pulses	11,854	12,230	12,364	12,238	12,502
Total pulses	**23,563**	**24,243**	**23,959**	**24,055**	**23,986**
Total Foodgrain	**115,581**	**117,232**	**116,009**	**116,253**	**117,493**
II. Other Crops					
Sugarcane	2,415	2,455	2,280	2,257	2,544
Potato	375	365	411	405	417
Black pepper	103	103	102	103	103
Chillies (Dry)	667	616	629	728	714
Ginger (Dry)	19	21	21	22	22
Tobacco	401	418	416	440	423
III. Oilseeds					
Groundnut	6,463	6,889	6,864	6,809	7,072
Caster seed	466	486	438	477	499
Sesamum	2,169	2,252	2,488	2,395	2,503
Rapeseed&Mustered	2,883	3,168	3,108	3,023	2,814
Linseed	1,789	1,977	1,899	2,006	2,011
Total Oilseeds	**13,770**	**14,772**	**14,797**	**14,710**	**14,849**

in India in Thousand Hectares

1965-66 (7)	1966-67 (8)	1967-68 (9)	
			Foodgrains
			(a) Kharif Cereals
35,273·4	35,250·8	36,721·8	Rice
17,503·9	18,054·1	18,630·3	Jowar
11,562·6	12,239·6	12,539·2	Bajra
4,764·7	5,073·8	5,576·7	Maize
2,256·4	2,315·8	2,351·5	Ragi
5,444·2	4,584·0	4,755·7	Small Millets
75,805·2	**77,518·1**	**80,575·2**	**Total Kharif Cereals**
			(b) Ragi Cereals
12,655·7	12,837·6	14,916·4	Wheat
2,632·8	2,824·8	3,326·4	Barley
15,288·5	**15,662·4**	**18,242·8**	**Total Rabi Cereals**
91,093·7	**93,180·5**	**98,818·0**	**Total Cereals**
			(c) Pulses
7,993·5	8 003·2	8,236·5	Gram (B. Gram)
2,482·9	2,521·0	2,680·9	Tur (Red Gram)
11,604·1	11,597·1	11,748·8	Other Pulses
22,086·5	**22,121·3**	**22,666·2**	**Total Pulses**
113,174·2	**115,301·8**	**121,484·2**	**Total Foodgrain**
			II Other Crops
2,779·7	2,301·3	2,036·9	Sugarcane
480·2	473·3	504·0	Potato
102·3	102·24	102·26	Black Pepper
651·6	673·6	...	Chillies (Dry)
21·79	22·58	22·29	Ginger (Dry)
371·9	398·2	...	Tobacco
			III Oilseeds
7,428·1	7,299·1	7,553·6	Groundnut
408·6	400·9	390·0	Castor
2,480·0	2,793·4	2,686·6	Sesamum (Gingelly)
2,883·5	3,005·9	3,204·0	Rapseed& Mustard
1,727·5	1,495·4	1,671·2	Linseed
14,927·7	**14,994·7**	**15,505·4**	**Total Oilseeds**

ESTIMATES OF AREA AND PRODUCTION OF PRINCIPAL CROPS IN INDIA (contd.)

Area under principle Crops in India in Thousand Hectares (contd.)

	1960-61 (1)	1961-62 (2)	1962-63 (3)	1963-64 (4)	1964-65 (5)	1965-66 (6)	1966-67 (7)	1967-68 (8)
IV. Fibres :								
Cotton	7,610	7,978	7,845	8,160	8,154	7,942·2	7,824·1	...
Jute	629	917	851	868	841	756·5	796·8	885·3
Mesta	274	425	379	393	359	338·9	318·2	...
Sannhemp Fibre	182	204	196	197	194	168·8	179·6	181·9
Turmeric	40	48	55	59	163	66·8	58·6	

NON-FORECAST CROPS AND PLANTATION CROPS

	1960-61 (1)	1961-62 (2)	1962-63 (3)	1963-64 (4)
Banana	163	165	180	184
Papaya	6	6	7	7
Sweet potato	163	138	132	129
Tapioca	274	265	247	239
Cashewnut	114	188	153	154
Cardamum	56	55	56	57
Betelnuts	112	115	119	121
Tea	331	331	333	334
Coffee	114	118	Not available	
Rubber	129	139	144	152
Coconut	717	723	791	799

PRODUCTION OF PRINCIPAL CROPS IN INDIA

(Thousand Tonnes)

Crop	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I. Foodgrains :								
Rice	34,574	35,663	31,914	36,889	38,732	30,655·1	30,437·9	37,858·1
Jowar	9,814	8,029	9,621	9,135	9,811	7,526·9	9,223·8	10,107·2
Bajra	3,283	3,645	3,892	3,734	4,465	3,655·0	4,468·3	5,131·9
Maize	4,080	4,312	4,578	4,553	4,558	4,760·0	4,898·6	6,275·1
Ragi	1,838	2,030	1,891	1,962	1,921	1,176·2	1,630·6	2,031·0
Small Millets	1,909	2,050	1,860	2,017	1,977	1,655·7	1,488·5	1,911·9
Total Kharif Cereals	**55,498**	**55,729**	**53,756**	**58,290**	**61,464**	**49,428·9**	**52,147·7**	**63,315·2**
Wheat	10,997	12,072	10,829	9,861	12,078	10,424·4	11,392·8	16,567·4
Barley	2,819	3,150	2,423	2,037	2,478	2,376·8	2,348·4	3,468·9
Total Rabi Cereals	**13,816**	**15,222**	**13,252**	**11,898**	**14,556**	**12,801·2**	**13,741·2**	**20,036·3**
Total Cereals	69,314	**70,951**	**67,008**	**70,188**	**76,020**	**62,230·1**	**65,888·9**	**83,351·5**
Gram	6,250	5,785	5,343	4,499	5,763	4,205·7	3,622·0	6,042·3
Tur	2,066	1,367	1,592	1,370	1,894	1,736·2	1,129·7	1,734·9
Other Pulses	4,388	4,603	4,505	4,186	4,721	3,858·1	3,595·4	4,458·8
Total Pulses	12,704	11,755	11,440	10,055	12,378	9,800·0	8,347·1	12,236·0
Total Foodgrains	**82,018**	**82,706**	**78,448**	**80,243**	**88,398**	**72,030·1**	**74,236·0**	**95,587·5**

PRODUCTION OF PRINICIPAL CROPS IN INDIA-(contd.)
(Thousand Tonnes)-(contd.)

Grop (1)	1960-61 (2)	1961-62 (3)	1962-63 (4)	1963-64 (5)	1964-65 (6)	1965-66 (7)	1966-67 (8)	1967-68 (9)
II. Other Crops								
Sugarcane (Gur)	11,141	10,563	9,544	10,596	12,315	12,1001·1	9,501·0	9,959·3
Sugarcane (Cane)	108,973	103,967	94,470	104,908	122,127	119,641·7	92,886·1	96,844·3
Potato	2,719	2,447	3,336	2,554	3,452	4,060·2	3,521·5	4,233·2
Black Pepper	28	28	26	25	24	23·25	23·04	22·70
Chillies (Dry)	419	389	420	456	455	383·4	402·9	...
Ginger (Dry)	18	19	20	21	21	21·50	21·22	20·40
Tobacco	307	339	366	358	370	297·7	350·0	...
III. Oilseeds								
Groundnut	4,812	4,994	4,821	5,215	6,176	4,230·5	4,410·9	5,829·1
Castorseed	107	109	101	102	101	79·8	109·8	107·2
Sesamum	318	372	464	439	466	424·7	416·0	421·4
Rapeseed & Mustard	1,347	1,346	1,294	903	1,375	1,275·7	1,227·9	1,481·9
Linseed	398	463	433	379	466	335·2	259·9	398·2
Total Oilseed	**6,982**	**7,284**	**7,113**	**7,038**	**8,584**	**6,345·9**	**6,424·5**	**8,237·8**
IV. Fibres								
Cotton, Jute & Mesta in thousand bales of 140 kgs each								
Cotton	5,293	4,581	5,309	5,494	5,408	6,122·6	6,340·2	...
Jute	4,134	6,358	5,449	5,185	6,079	5,748·7	6,888·7	8,189·1
Mesta	1,129	1,878	1,697	1,874	1,589	1,652·4	1,560·6	...
Sannhemp (Fibre)	73	78	76	75	73	56·6	57·3	73·9
Turmeric	93	87	105	116	122	127·6	113·0	...
Non-Forecast Crops and Plantation crops								
Banana	2.212	2,257	2,391	2,393				
Papaya	6	6	7	7				
Sweet Potato	1,261	858	849	822				
Tapioca	1,969	1,892	1,758	2,771				
Cashewnut	124	129	137	137				
Cardamum	3	3	3	3				
Betelnuts	280	288	405	419				
Tea	321	354	347	346				
Coffee	43·2	40·4	Not available					
Rubber	25·4	27·4	31·9	36·3				
Coconut	4,639	4,478	4,963	4,736 (Million Nuts)				

AVERAGE YIELD PER HECTARE IN KGS.

Crops	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
I Foodgrains							
Rice	1,013	1,028	914	1,036	1,074	869	855
Jowar	533	440	534	509	545	430	497
Bajra	286	323	360	346	381	316	361
Maize	926	957	994	993	993	999	986
Ragi	731	808	816	818	791	521	674
Small Millets	385	421	396	440	434	373	354
Total Kharif cereals	731	732	713	768	794	...	...
Wheat	851	890	793	731	898	824	878
Barley	880	951	802	734	929	903	857
Total Rabi cereals	856	902	795	731	903	...	...
Total Cereals	753	763	728	761	813	683	702
Gram	674	605	582	480	640	526	451
Tur	849	559	658	561	766	...	...
Other pulses	370	376	364	342	378	332	304
Total pulses	539	485	477	418	516	444	401
Total Foodgrains	710	705	676	690	752	636	644
II Other Crops							
Sugarcane (Gur)	4,613	4,303	4,186	4,695	4,841	4353	4,077
Sugarecane (Cane)	45,123	42,349	41,434	46,481	48,006	...	...
Black Pepper	272	277	256	239	237	228	225
Chillies (Dry)	628	631	668	626	637	589	598
Ginger (Dry)	947	913	942	959	946	986	981
Tobacco	766	811	880	814	875	800	879
III Oilseeds							
Groundnut	745	725	702	766	873	570	619
Castorseed	230	224	231	214	225	282	264
Sesamum	147	165	186	183	186	...	...
Rapeseed & Mustard	467	425	416	299	489	...	...
Linseed	222	234	228	189	232	...	...
Total Oil seeds	507	493	481	478	578	351	364
IV Fibres							
Cotton	125	103	122	121	129	108	113
Jute	1,183	1,248	1,153	1,283	1,301	1,064	1,207
Mesta	742	795	806	858	797	...	...
Sannhemp (Fibre)	401	382	388	381	376	...	...
Turmeric	2,325	1,813	1,903	1,973	1,943	1,910	1,928

AVERAGE YIELD PER HECTARE IN KGS.-(contd.)

Non-forecast crops and Plantation crops.

Crops	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Banana	13,571	13,698	13,313	12,987	13,561	13,391	...
Papaya	32,833	36,330	34,824	34,299	34,585	32,032	...
Sweet Potato	7,736	6,229	6,413	6,325	7,016	5,853	...
Tapioca	7,186	7,146	7,117	11,593	12,605	12,896	...
Cashewnut	1,088	1,098	896	888	871	881	...
Cardamum	54	55	71	53	65	65	...
Betelnuts	2,500	2,504	3,403	3,463	745	714	...
Tea	970	1,069	1,042	1,036	...	1,089	1,100
Coffee	379	342	Not	available	...	435	426
Coconut (Nuts)	6,470	6,194	6,274	5,927	5,815	5,597	...

Source: Directorate of Economics & Statistics, Ministry of Food, Agriculture, C. D. & Co-operation, New Delhi.

NET YIELD RATES OF DRIED GRAIN IN KGS./HECTARE

		1965-66	1966-67
(1)		(2)	(3)
Rice	...	788	779
Jowar (Khariff)	...	505	456
Maize	...	1052	919
Wheat	...	799	875
Gram	...	528	389
Jowar (Rabi)	...	544	577

The fall in yield in 1966-67 is attributed to the want of adequate rains at the time of harvest and failure of winter rains coupled with cold wave in January.

Sowice : Report on Inspection of crop cutting experiments at harvest stage on randomised Basis 1966-67. Directorate of national sample Survey (Agricultural Statistics Division), 1967.

NATIONAL INCOME FROM AGRICULTURE AND OTHER INDUSTRIAL ORIGINS

Agriculture	1963-64	1964-65*	1965-66*	1966-67†
(1)	(2)	(3)	(4)	(5)
I. (i) Agriculture including Animal Husbandry & ancillary articles	79·4	102·4	90·8	109·3
(ii) Forestry	1·4	1·5	1·6	1·9
(iii) Fishery	0·9	1·4	1·5	1·5
Total of Agriculture	81·7	105·3	93·9	112·7
II. Mining, manufacturing & Small enterprises	33·3	36·7	40·5	44·7
III. Commerce, Transport & Communication	28·1	30·3	33·3	35·4
IV. Others Services	29·9	33·1	36·9	40·1
V. Net domestic product at factor cost	173·0	205·4	204·6	232·9
VI. Net earned income from abroad	0·9	1·1	1·2	1·7
VII. Net National output at factor cost=National Income	172·1	204·3	203·4	231·2

* Preliminary estimate. † Quick estimate.

ESTIMATES OF AREA AND PRODUCTION OF PRINCIPAL CROPS IN INDIA

Index numbers of area, Production and Productivity of Principal Crops in India

(Agricultural Year 1949-50=100)

Commodity Group	1960-61	1961-62	1962-63	1963-64	1964-65
(1)	(2)	(3)	(4)	(5)	(6)
Rice	114·4	113·5	114·3	116·1	117·6
Jowar	118·3	117·2	115·7	115·3	115·7
Wheat	132·5	139·1	140·0	138·3	137·9
Gram	111·9	115·4	110·7	113·1	108·7
Foodgrains	116·9	118·7	117·5	117·6	118·8
Groundnut	162·6	173·3	172·7	171·2	177·8
Oilseeds	136·0	145·9	146·0	145·1	146·5
Cotton	154·4	161·9	159·2	165·6	165·5
Jute	137·5	194·6	180·7	184·3	178·6
Fibre	151·5	165·8	161·4	167·5	166·3
Tea	105·7	105·6	106·1	106·5*	106·5*
Coffee	126·9	131·4*	131·4*	131·4*	131·4*
Plantation crops	123·5	126·7	128·1	129·9	129·9
ugarcane (Gur)	163·6	166·8	154·5	152·8	172·3
on-foodgrains	141·2	150·7	149·0	150·9	152·7
All Commodities	120·8	123·8	122·5	122·9	124·2

Note : The indices for 1962-63 and 1963-64 are generally based on Partially Revsied Estimates while those for 1964-65 are generally based on Final Estimates. The indices for these years are therefore subject to revision.

* Based on Provisional Estimates.

INDEX NUMBURS OF AGRICULTURAL PRODUCTION IN INDIA

(Agricultural Year 1949-50=100)

Commodity Group	1960-61	1961-62	1962-63	1963-64	1964-65
(1)	(2)	(3)	(4)	(5)	(6)
Rice	137·7	142·4	127·4	146·6	153·9
Jowar	141·1	115·4	138·3	131·3	141·0
Wheat	162·8	178·8	160·4	146·1	178·9
Gram	160·4	148·5	137·2	115·5	148·0
Foodgrains	137·1	140·3	138·4	135·9	149·1
Groundnut	142·1	147·5	142·4	153·9	182·3
Oilseeds	134·0	140·0	137·7	132·8	163·4
Cotton	202·1	174·9	201·7	209·3	206·0
Jute	125.2	192·7	185·1	187·4	184·2
Fibres	176·0	187·5	193·6	207·0	201·1
Tea	120·9	133·4	130·5	130·2*	141·6*
Coffce	246·4	229·6	280·2	341·5*	341·5*
Plantation Crops	129·2	140·0	141·0	145·2	156·9
Sugarcane (Gur)	183·0	173·5	156·8	173·9	202·1
Non-foodgrains	152·6	153·9	151·8	156·2	174·9
All Commodities	142·2	144·8	137·5	142·6	157·6

Note: The indices for 1962-63 and 1963-64 are generally based on Partially Revised Estimates while those for 1964-65 are generally based on Final Estimates. The indices for these years are therefore subject to revision.

* Based on Provisional Estimates.

INDEX NUMBERS OF AGRICULTURAL PRODUCTIVITY IN INDIA

(Agricultural Year 1949-50=100)

Commodity Group (1)	1960-61 (2)	1961-62 (3)	1962-63 (4)	1963-64 (5)	1964-65 (6)
Rice	123·6	125·5	111·5	126·3	130·9
Jowar	119·3	98·5	119·5	113·9	121·9
Wheat	122·9	128·5	114·6	105·6	129·7
Gram	143·3	128·7	123·9	102·1	136·2
Foodgrains	117·3	118·2	111·0	115·6	125·5
Groundnut	87·4	85·1	82·5	89·9	102·5
Oilseeds	98·5	96·0	94·3	91·5	111·5
Cotton	130·9	108·0	126·7	126·4	124·5
Jute	93·9	99·0	91·4	101·7	103·1
Fibres	116·2	113·1	120·0	123·6	120·9
Tea	114·4	125·3	123·0	122·3	133·0
Coffee	194·2	174·7	213·2	259·9	259·9
Plantation Crops	104·5	110·5	110·1	111·8	120·8
Sugarcane (Gur)	112·4	104·3	101·5	113·8	117·3
Non-foodgrains	108·1	102·1	101·9	103·5	114·5
All Commodities	117·7	117·0	112·2	116·0	126·9

Note: The indices for 1962-63 and 1963-64 are generally based on Partially Revised Estimates while those for 1964-65 are generally based on Final Estimates. The indices for these years are therefore subject to revision.

F. A. O. PRODUCTION YEAR BOOK, 1966. AREA, PRODUCTION AND YIELD PER HECTARE OF PRINCIPAL CROPS IN INDIA AS COMPARED TO SELECTED COUNTRIES OF THE WORLD, 1965

Country (1)	Area in 1000 Hectares (2)	Production in 1000 metric tonnes (3)	Yield per hectare in 100 kgs. (4)
Rice (Paddy)			
India	35,022	45,921	13·1
Pakistan	10,590	17,795	16·8
Burma	4,848	8,055	16·6
China (Mainland)	...	89,000	...
Japan	3,225	16,116	49·5
Thailand	5,970	9,588	16·1
Turkey	50	217	43·8
U. A. R.	445	1,862	41·8
U. S. A.	726	3,460	47·7
U. S. S. R.	191	471	24·7
Wheat			
India	13,460	12,290	9·1
Pakistan	5,371	4,625	8·6
China (Mainland)	...	26,000	...
Japan	476	1,287	27·0
U. A. R.	577	1,600	27·7
U. K.	1,026	4,171	40·7
France	4,520	14,760	32·7
Italy	4,288	9,776	22·8
Belgium	230	864	37·5
U. S. A.	20,056	35,805	17·9
Canada	11,445	17,661	15·4
Argentina	4,214	5,400	12·8
Australia	7,088	7,067	10·0
U. S. S. R.	70,200	59,600	8·5
Maize:			
India	4,683	4,632	9·9
Pakistan	546	543	9·9
Japan	30	75	25·0
Indonisia	2,537	2,283	9·0
U. A. R.	693	2,100	30·3
France	871	3,468	39·8
Italy	1,028	3,317	32·3
U. S. A.	22,392	103,746	46·3

(1)	(2)	(3)	(4)
Canada			
Argentina	3,062	5,142	16·8
Australia	80	114	14·3
U. S. S. R.	3,200	7,800	24·4
Cotton (Lint)			
India	7,827	847	1·1
Pakistan	1,569	417	2·7
Turkey	685	325	4·7
U. A. R.	798	520	6·5
Mexico	793	577	7·3
U. S. S. R.	2,442	1,908	7·8
U. S. A.	5,510	3,256	5·9
Jute			
India	757	805	10·6
Pakistan	846	1,154	13·6
Groundnut (inshell)			
India	7,171	4,022	5·6
Japan	67	137	20·4
Turkey	11	30	27·3
U. A. R.	23	50	22·1
Italy	3	7	22·8
Indonosia	372	465	12·5
U. S A.	581	1,081	18·6
Sugarcane			
India	2,749	117,606	428·0
Pakistan	758	30,315	400
Indonesia	110	9,602	873
Hawai	46	10,518	2,300
U. A. R.	51	44,00	863
Cuba	1,500	49,478	330
U. S. A.	192	10,929	569
Brazil	1,705	75,853	445

PRODUCTION OF FOODGRAINS, SUGARCANE (GUR) AND EDIBLE OILSEEDS

ALL-INDIA (Thousand Tonnes)

(Expressed as thousand Metric tons per year)

Food	1961-62	1962-63*	1963-64*	1964-65*	1965-66†
(1)	(2)	(3)	(4)	(5)	(6)
I Cereals					
Rice	35,663	31,914	36,889	39,034	30,614
Wheat	12,072	10,829	9,861	12,290	10,720
Other Cereals	23,216	24,265	23,438	25,234	20,913
Total Cereals	70,951	67,008	70,188	76,558	62,247
II Pulses					
Gram	5,785	5,343	4,499	5,780	4,442
Other Pulses	5,970	6,097	5,556	6,658	5,575
Total Pulses	11,755	11,440	10,055	12,438	10,017
Total Foodgrains	82,706	78,448	80,243	88,996	72,264
III Sugarcane(Gur)	10,563	9,554	10,596	12,031	11,830
IV Edible oilseeds					
Groundnut	4,994	4,821	5,215	5,888	4,022
Sesamum	372	464	439	493	407
Rapeseed & Mustard	1,346	1,295	903	1,466	1,268

* Partially Revised Estimate. † Final Estimate.

Subject to revision:

Note: 1. Production of rice in terms of cleaned rice. 2. Production of Groundnut in terms of nuts in shell 3. Production figures relate to Agricultural Year (July- June). 4. Production figures for the latest two years are comparable, while those for the earlier years are not strictly comparable due to changes in coverage and methods of estimation. For comparison of all India position over time index numbers given in Table No. 2 should be used.

Source: Bulletin on Food Statistics February 1967 Table.

PRODUCTION OF SUBSIDIARY FOODS IN INDIA

(Thousand tonnes)

Commodity	1961-62	1962-63	1963-64	1964-65	1965-66
(1)	(2)	(3)	(4)	(5)	(6)
I Roots and Tubers					
1. Sweet Potato	858	850	859	1,137	...
2. Tapioca	1,892	1,757	2,836	3,044	...
3. Potatoes	2,447	3,336	2,554	3,668	3,893
4. Ginger (dry)	19	20	21	21	21
II Fruits					
1. Banana	2,257	2,425	2,601	2,670	...
2. Papaya	228	232	230	240	...
III Milk Products					
1. Skimmed Milk Powder	0·38	0·69	0·97	2·10	1·20
2. Condensed Milk	1·49	3·47	3·99	4·87	6·60
IV Other processed and Derived Foods					
1. Canned Fruits	2·52	3·01	...	4·17	...
2. Canned Vegetable	5·89	9·18	...	9·63	...
3. Canned Jams Marmalade Jellies	3·05	2·28	...	3·15	...
4. Biscuits	28·82	23·27	37·27	43·30	51·64
5. Confectionery	18·24	20·81	24·14	26·00	23·70

Note: Figures given under the year 1961-62 relate to the calendar year 1962 and so on for subsequent years.

RELATIVE SHARE OF STATES IN THE PRODUCTION OF PRINCIPAL AGRICULTURAL COMMODITIES

Crop	States and their percentage share
(1)	(2)
Rice ...	Andhra Pradesh (12·7) Assam (5·3) Bihar (12·5) Kerala (2·9) Madras (11·3) Madhya Pradesh (8·7) Maharashtra (3·9) Mysore (4·9) Orissa (9·6) Uttar Pradesh (8·5) West Bengal (13·7) Others (6·0)
Jowar ...	Andhra Pradesh (13·2) Gujarat (4·2) Madhya Pradesh (19·6) Madras (5·5) Maharashtra (34·0) Mysore (13·9) Rajasthan (3·4) Uttar Pradesh (4·8) Others (1·4)
Bajra ...	Andhra Pradesh (5·5) Gujarat (23·0) Haryana (8·9) Madhya Pradesh (2·7) Maharashtra (9·9) Madras (5·8) Mysore (2·3) Punjab (3·8) Rajasthan (28·2) Uttar Pradesh (9·4) Others (0·5)
Ragi ...	Andhra Pradesh (14·5) Bihar (11·9) Gujarat (2·5) Madras (15·8) Maharashtra (9·3) Mysore (29·8) Orissa (7·2) Uttar Pradesh (7·3) Others (1·7)
Small Millets ...	Andhra Pradesh (10·6) Bihar (5·6) Gujarat (5·9) Madhya Pradesh (20·8) Madras (19·2) Maharashtra (4·6) Mysore (4·7) Orissa (4·5) Rajasthan (1·7) Uttar Pradesh (20·5) Others (1·9)
Wheat ...	Bihar (5·3) Gujarat (4·2) Haryana (8·8) Madhya Pradesh (11·3) Maharashtra (2·2) Punjab (20·5) Rajasthan (7·9) Uttar Pradesh (35·9) Himachala Pradesh (1·6) Others (2·3)
Gram ...	Bihar (4·1) Haryana (20·9) Madhya Pradesh (14·9) Maharashtra (1·8) Punjab (8·1) Rajasthan (17·7) Uttar Pradesh (27·1) West Bengal (2·5) Others (2·9)
Groundnut ...	Andhra Pradesh (17·1) Gujarat (25·0) Madhya Pradesh (6·5) Madras (15·2) Maharashtra (12·8) Mysore (8·6) Orissa (1·2) Punjab (4·7) Rajasthan (2·8) Uttar Pradesh (5·3) Others (0·8)
Sugarcane ...	Andhra Pradesh (9·9) Assam (1·1) Bihar (4·2) Gujarat (1·5) Haryana (4·9) Kerala (0·5) Madhya Pradesh (1·2) Madras (7·8) Mysore (7·8) Maharashtra (11·01) Orissa (1·5) Punjab (5·5) Rajasthan (0·3) Uttar Pradesh (41·2) West Bengal (1·2) Others (0·3)
Jute ...	Assam (16·3) Bihar (13·2) Orissa (5·3) Uttar Pradesh (2·9) West Bengal (60·5) Tripura (1·4) Others(0·4)

Source : Directorate of Economics & Statistics.

LAND USE AND AGRICULTURAL RESOURCES TYPES OF SOIL

Soil (1)		Area of Occurrence (2)
1. Alluvial Soils	...	Most of Punjab, U. P., Bihar, about half of West Bengal, part of Rajasthan, northern-most extreme of Madhya Pradesh, north of Assam, part of Tripura and coastal parts of Orissa, Andhra Pradesh, Madras, Mysore, Kerala, Maharashtra and Gujarat.
2. Black Soils	...	Most of Maharashtra, Madhya Pradesh, parts of Mysore, Madras, Andhra Pradesh, small patch of Rajasthan, south of U. P., south-east of Bihar and north-west of Orissa.
3. Red Soils	...	Practically in all the districts of Andhra Pradesh, whole of Manipur, most of Madras, Mysore, Bihar, Orissa, Assam, part of Tripura, Maharashtra, Rajasthan and Madhya Pradesh.
4. Laterite and Lateritic Soils	...	Certain parts of Assam, West Bengal, Orissa, Andhra Pradesh, Kerala, Mysore, Madras and Maharashtra.
5. Mountain and Hill Soils	..	Hilly parts in the north of West Bengal, U. P., central part of Bihar, eastern strip of Kerala, parts of Tripura, Punjab and whole of Himachal Pradesh.
6. Tarai Soils	...	A narrow strip in U. P. between plains and hills.
7. Arid and Desert Soils	...	Rajasthan.
8. Peaty and other Organic Matter	...	Parts of Kerala and Bihar.

Source : Indian Agriculture in Brief.

Year	Reporting area for Land utilisation Statistics	Forests	Area not available for cultivation	Other uncultivated land including fallow lands	Net area sown	Total Cropped Area	Area sown more than once col. 7-col-8	Fallow lands
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1954-55	291,378	50,431	48,301	39,793	127,845	144,087	16,242	25,008
1955-56	291,917	51,343	48,356	38,895	129,156	147,311	18,155	34,127
1956-57	292,179	51,391	47,368	39,246	130,848	149,492	18,644	23,326
1957-58	293,435	52,178	47,337	39,520	129,080	145,832	16,752	25,320
1958-59	293,667	51,406	47,455	39,271	131,828	151,629	18,801	23,707
1959-60	297,254	54,021	48,333	38,960	132,939	152,824	19,885	23,001
1960-61	298,862	55,769	49,997	37,553	133,157	152,716	19,559	22,586
1961-62	299,275	54,542	50,471	37,255	135,352	156,099	20,747	21,655
1962-63	305,348	60,843	50,360	36,577	136,341	156,764	20,423	21,227
1963-64	305,603	60,997	50,235	36,639	136,422	156,846	20,424	21,310

Indian Agricultural Statistics, Volume I-1963-64. Directorate of Economics & Statistics, Ministry of Food Agriculture C. D. & Co-operation.

TRENDS IN AREA IRRIGATED AS COMPARED TO NET-AREA SOWN

(In thousand Hectares)

Year	Net Area Sown	Area irrigated	Col. 3 as percentage of Col. 2
(1)	(2)	(3)	(4)
1954-55	127,845	22,088	17·2
1955-56	129,156	22,758	17·6
1956-57	130,848	22,533	17 2
1957-58	129,080	23,156	17·9
1958-59	131,828	23,400	17·7
1959-60	132,939	24,037	18·1
1960-61	133,157	24,634	18·5
1961-62	135,352	24,885	18·4
1962-63	136,341	25,366	18·6
1963-64	136,422	25,871	18·2

Indian Agricultural Statistics, 1963-64, Volume I.

AREA IRRIGATED TO PRINCIPAL CROPS

(LAND UTILISATION STATISTICS (ALL-INDIA)

(Thousand Hectares)

Year	Rice	Wheat	Pulses	Sugar-cane	Total food crops	Cotton	Total non-food crops	Total under all crops
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1954-55	10,551	3,970	2,025	1,135	22,466	765	2,440	24,948
1955-56	11,035	4,150	1,983	1,274	23,065	834	2,577	25,642
1956-57	11,473	4,002	1,742	1,374	23,043	899	2,664	25,707
1957-58	11,747	3,918	2,067	1,380	23,775	1,018	2,853	26,628
1958-59	12,045	4,016	2,063	1,340	24,058	998	2,890	26,948
1959-60	12,146	4,262	2,127	1,479	24,674	938	2,790	27,454
1960-61	12,492	3,234	1,900	1,673	25,057	966	2,884	27,941
1961-62	12,986	4,327	1,972	1,672	25,463	1,040	2,998	28,462
1962-63	13,361	4,594	2,171	1,521	26,387	1,089	3,067	29,454
1963-64	13,235	4,723	2,155	1,565	26,382	1,260	3,310	29,692

1·5 NET AND GROSS IRRIGATED AREA-SOURCEWISE, 1964-65

(Thousand Hectares)

State	Canals			Tanks	Wells	Others	Net irrigated area	Gross irrigated area
	Government	Private	Total					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Andhra Pradesh	1,249	26	1,275	1,341	404	138	3,158	3,850
Assam	72	292	364	...	...	24	612	668
Bihar	583	13	596	200	312	872	1,980	2,208
Gujarat	97	1	98	18	565	29	710	888
Jammu & Kashmir	64	200	264	*	1	7	272	294
Kerala	112	8	170	56	4	122	352	494
Madhya Pradesh	527	17	544	127	364	42	1,077	1,098
Madras	873	1	874	915	604	41	2,434	3,263
Maharashtra	219	31	250	207	651	42	1,150	1,345
Mysore	273	6	279	377	176	128	960	1,069
Orissa	197	28	225	495	38	219	977	1,778
Punjab†	2,227	49	2,276	6	1,057	46	3,385	4,495
Rajasthan	614	...	614	295	1,127	44	2,080	2,080
Uttar Pradesh	2,167	9	2,176	441	2,484	277	5,378	6,018
West Bengal	514	387	901	329	16	184	1,430	1,454
Delhi	12	...	12	1	12	...	25	25
Himachala Pradesh	*	*	*	*	*	40	40	67
Manipur	...	68	68	...	...	...	68	68
Tripura	...	...	...	1	...	13	14	17
Andamans	...	...	...	...	...	...	...	...
Laccadives	...	...	...	...	...	...	...	...
Nagaland	...	...	...	...	...	12	12	12
Goa, Daman & Diu	...	...	...	...	...	8	8	19
Pondicherry	11	...	11	6	9	*	26	39
All India	**9,861**	**1,136**	**10,997**	**4,815**	**7,824**	**2,512**	**26,156**	**31,189**

* Below 200 hectares. † The erstwhile State of the Punjab.

Cropping Pattern, 1963-64

	Area in thousand Hectares (1)	Percentage of total cropped area (2)
1. Rice	35,657	22·7
2. Wheat	13,513	8·06
3. Other Cereals and Millets	44,116	28·1
Total Cereals	**93,286**	**59·4**
Gram	9,359	5·9
Total Pulses	24,289	15·6
Total Foodgrains	**117,575**	**75·0**
Groundnut	6,892	4·4
Total Oilseeds	13,741	8·7
Sugarcane	2,250	1·4
Cotton (Lint)	8,223	5·2
Jute	860	0·5
Other Crops	14,197	9·1
Total Cropped Area	**156,846**	**100·0**
Area sown more than once	20,424	
Net area sown	136,422	

Source: Estimated from the data published in Indian Agricultural Statistics.

CROPPING PATTERN, 1960–61

	Rice (1)	Jowar (2)	Small Millets (3)
Andhra Pradesh	12·7	13·2	10·6
Assam	5·3	—	—
Bihar	12·5	—	5·6
Kerala	2·9	—	—
Madras	11·3	5·5	19·2
Madhya Pradesh	8·7	19·6	20·8
Maharashtra	3·9	34·0	4·6
Mysore	4·9	13·9	4·7
Orissa	9·6	—	4·5
Uttar Pradesh	8·5	4·8	20·5
West Bengal	13·7	—	—
Gujarat	—	4·2	5·9
Rajasthan	—	3 4	1·7
Others	6·0	1·4	1·9

ALL INDIA AGRICULTURAL MACHINERY AND IMPLEMENTS

PLOUGH	
Wooden	3,99,23,891
Iron	31,71,191
Improved Harrows and Cultivators	26,91,285
Improved seed drills	11,21,762
Improved threshers	3,44,292
Rotary chaff cutter	36,67,357
Sprayers and Dusters	2,01,720
Carts	1,26,14,664
SUGARCANE CRUSHER	
Worked by power	42,959
Worked by bullocks	6,37,671
Oil engine with pump for irrigation purposes	4,49,089

AGRICULTURAL MACHINERY AND IMPLEMENTS

Eledrew pumps for irrigation purposes	3,90,505
Persian wheels or Rahats	6,55,957
2 wheel walkery tractor or power tiller	14,705
TRACTORS	
Government	4,835
Private	49,131
CHARIES	
Kilogram and more	73,885
Less than 5 kilogram	1,57,941

ALL INDIA FISHING CRAFTS

FISHING BOATS	
Catamarans	...
Dugout canoes	...
Big size 32 ft. and above	...
Small size less than 32 ft.	...
Total	1,96,247
POWER VESSELS	
Fishing boats worked by power	5,606
Carrier boats worked by power	5,888

ALL INDIA FISHING TACKLE

NETS	
Fixed or Stationery	...
Bag and Purse	...
Boat Seine	...
Shore Seine	...
Drift and gill	...
Scoop	...
Trawal Type	...
Cast	...
Others	...
Total	29,10,580

TENTH ALL-INDIA LIVESTOCK CENSUS, 1966

All India (As on 15-8-1968)

Abstract Statement of livestock, Poultry, tractors and Fishing Tackles

S. No.	Item (1)	1966-Census (Provisional) (2)	1961-Census (Number) (3)
1.	**Cattle**		
	(a) Males over 3 years		
i.	Used for breeding only	433,087	364,226
ii.	Used for breeding & work both	2,251,423	1,964,242
iii.	Used for work only	69,144,615	68,703,615
iv.	Others	1,464,333	1,496,019
	Total	**73,293,458**	**72,528,102**
	(b) Females over 3 years		
i.	*Breeding*		
	a. Milk	20,965,219	20,666,588
	b. Dry	25,797,295	25,016,579
	c. Not calved even once	4,991,514	5,318,580
ii.	Working	1,982.303	2,150,035
iii.	Others	928,765	1,052,120
	Total	**54,665,096**	**54,203,902**
	(c) *Young Stock*	48,028,311	48,825,063
	Total Cattle	175.986,865	175,557,067
2.	**Buffaloes**		
	(a) *Males over 3 years*		
i.	Used for breeding only	329,656	291,445
ii.	Used for breeding & work both	620,419	493,231
iii.	Used for work only	6,972,835	6,644,750
	Others	268,672	253,734
	Total	**8,191,582**	**7,683,160**

(1)	(2)	(3)	(4)
	(b) Females over 3 years		
	i. Breeding		
a.	In milk	12,908,776	12,462,977
b.	Dry	10,434,733	9,495,807
c.	Not calved even once	2,148,171	2,279,298
	ii. Working	385,372	486,897
	Others	244,900	297,444
	Total	**26,121,952**	**25,022,423**
	(c) Youngstock	18,562,4[illegible]7	18,502,339
	Total Baffaloes	52,875,941	51,207,922
3.	SHEEP	42,010,408	40,223,270
4.	GOATS	64,548,624	60,864,026
5.	Horses and Ponies	1,148,256	1,326,879
6.	Pigs	4,972,730	5,176,210
7.	Camels	1,027,084	902,881
8.	Other Livestock	1,156,793	1,173,505
9.	Total Livestock	343,726,701	336,431,760
10.	Poultry	115,070,942	114,253,577
11.	Tractors	53,966*	31,016
12.	Fishing Boats	196,247	N. C.
13.	Fishing and carrier boats worked by power	11,494	N. C.
14.	Fishing nets	2,910,580	N. C.

Note 1. All-India figures given in this table may not tally with all-Indian totals to be arrived at on the basis of State figures published earlier as the data in respect of some of the States have undergone changes.

2. The figures are purely tentative and subject to revision.

3. N. C.—Not collected.

4.*—Includes 127 Tractors in respect of Goa, Daman and Diu for which Livestock census 1966 data is not available.

5.* Livestock census 1966 figures exclude data for Goa, Daman and Diu, and Nefa from which data have not been received so far.

Date of reference of the Census 15-4-1968.

CATTLE—MALES OVER THREE YEARS

State	Used for breeding only	Used for breeding & work	Used for work only	Others	Total
(1)	(2)	(3)	(4)	(5)	(6)
Andhra Pradesh	36,194	281,701	4,884,461	8,204,407	5,407,050
Assam	49,984	221,540	2,155,687	82,453	2,509,664
Gujarat	10,438	14,805	3,052,691	23,401	3,101,385
Jammu & Kashmir	1,344	55,187	497,715	8,380	558,626
Madras	66,697	592,648	4,052,793	234,944	4,947,077
Maharashtra	30,402	314,459	6,105,304	75,102	6,525,267
Mysore	26,469	169,238	3,204,457	266,530	3,666,194
Punjab	9,188	10,737	2,425,606	16,210	2,461,741
Nagaland	9,067	446	4,697	5,733	19,943
Manipur	3,040	16,789	5,354	8,667	114,750

Source: Abstract Statement of Livestock, Fisheries 1966 Census Provisional)

FISH CATCH AND LANDINGS BY GROUPS OF SPECIES

IN 1000 TONNES

Year	Fresh water fishes	Flounders Halibuts Soles etc.	Herrings Sardines Anchories etc.	Tunas Bonitos Mackerels etc.	Miscellaneous Marine teleostoans	Sharles Rays skats etc.	Gues taccans	Total catch & landings
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1961	277·4	14.1	244·2	73·3	253·6	33·6	64·8	961·0
1962	329·6	17·6	186·5	62·9	252·4	40·7	84·2	973·9
1963	390·4	8·8	117·8	95·5	263·9	51·6	92·7	1045.7
1964	455·9	6·2	380·9	66·2	272·7	34·8	99·5	1320·2
1965	507·1	9·8	370·2	97·8	235·5	31·4	79·7	1331·5

DISPOSITION OF CATCH (1000 TONNES)

Year	Marketing fresh	Freezing	Sun dried	Salted	Canning	reduction	Mise. purposes	Offal for reduction	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1961	460·4	...	222·9	197·0	...	80·7	...	...	961.0
1962	466·5	...	225·9	199·6	...	81·9	...	...	973·9
1963	704·9	4·3	146·5	136·2	1·4	52·4	...	...	1045·7
1964	924·3	15·7	156·0	130·7	3·1	77·6	11·3	1·5	1320·2
1965	908·7	17·5	125·7	215·5	5·1	54·9	2.6	1·5	1331·5

Source: Obstract Statement of Livestock, Fisheries 1966 Census Provisional)

NET NATIONAL INCOME

Year	At current prices		At 1960-61 prices	
	Total Rs. (Crores)	Per capita Rs.	Total Rs. (Crores)	Per capita Rs.
(1)	(2)	(3)	(4)	( )
1960-61	13453	310·0	13453	310·0
1961-62	14315	322·3	14037	316·0
1962-63	15179	332·9	14329	314·2
1963-64	17563	376·1	15101	323·4
1964-65 (P)	20424	427·1	16219	339·2
1965-66 (P)	21064	430·1	15441	315·3
1966-67 (Q)	24157	481·5	5706	313·1

(P) = Preliminary Estimate (Q) = Quick Estimate

INDEX NUMBER OF NET NATIONAL INCOME WITH 1960-61 AS BASE

	1960-61	1961-62	1962-63*	1963-64	1964-65*	1965-66†	1966-67
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
At current prices	100	106·4	112·8	130·6	151·8	156·6	179·6
At 1960-61 prices	100	104·3	106·5	112·2	120·6	114·8	116·7

INDEX NUMBER OF PER CAPITA NET NATIONAL INCOME WITH 1960-61

	1960-61	1961-62	1962-63	1963-64*	1964-65*	1965-66†	1966-67
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
At current prices	100·0	104·0	107·4	121·3	137·8	138·7	155·3
At 1960-61 price	100·0	101·9	101·4	104·3	109·4	101·7	101·0

* Preliminary Estimate. † Quick Estimate.

Source : Estimate of National Product, 1960-61 to 1966-67.

PROGRESS OF FERTILISER PRODUCTION AND DISTRIBUTION IN INDIA

(Nitrogen in Metric Tonnes)

Year	Produced	Imported	Distributed
(1)	(2)	(3)	(4)
1963-64	219,072	197,691	452,872 (*)
1964-65	243,230	256,517	492,249 (*)
1965-66	237,889	376,270	582,588 (*)
1966-67	308,993	514,628	830,171 (*)

* Constitute actual despatches of fertilisers made under the "Central Fertiliser Pool" and also those fertilisers which are outside the pool.

Phosphoric Acid ($P_2 O_5$ in metric tonnes)

(1)	(2)	(3)	(4)
1963-64	107,836	12,267	120,847 (*)
1964-65	131,021	12,293	148,530 (*)
1965-66	118,779	21,766 (†)	134,075 (*)
1966-67	145,678	129,158	274,601 (*)

† Includes Basic Slag

* Constitutes actual despatches of fertilisers made under the "Central Fertiliser Pool" and also those fertilisers which are outside the pool.

Potash

(1)	(2)	(3)
1964-65	99,593	124,785
1965-66	1,58,143	132,129
1966-67	2,50,136	195,896

10·8 DENSITY OF POPULATION, FERTILISER CONSUMPTION AND YIELD, 1965-66

Country	Fertiliser Consumption ($N+P_2O_5+K_2O$) per hectare of arable land (kg.)	Density of Population per hectare of arable land	Yield per hectare ('00 kg)					
			Paddy	Wheat	Maize	Barley	Potato	Cotton (lint)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Netherlands	580·79	12·70	...	43·6	41·7	37·8	262	...
Belgium	474·84	10·01	...	37·5	44·6	35·5	250	...
Germany (West)	348·80	7·14	...	30·8	35·9	28·2	231	...
Japan	321·12	16·32	49·5	27·0	25·0	29·2	190	1·0
China Taiwan	255·84	13·97	37·8	21·1	22·0	12·6	131	3·7
United Kingdom	295·16	6·59	...	40·7	...	37·5	253	...
Austria	203·19	4·20	...	24·0	37·3	23 8	176	...
Korea Rep. of	149·15	12·58	38·5	10·7	8·0	11·1	75	2·1
France	148·14	2·35	32·9	32·7	29·8	30·4	195	...
U. A. R.	114·00	11·08	41·8	27·7	30·3	24·6	180	6·5
Israel	101·95	6·24	...	20·9	39·0	12·9	215	12·3
Italy	71·02	3·37	40·2	22·8	32·3	15·3	102	3·1
U. S. A.	59·62	1·05	47·7	17·9	46·3	23·1	232	5·9
U. S. S. R.	24·45	1·01	26·3	8·5	24·4	10·3	102	7·8
India	4·97	3·00	13·1	9·1	9·9	9·4	85	1·1

Source: Calculated from F. A. O. Year Book, 1966.

FOREIGN TRADE
VALUE OF EXPORTS OF IMPORTANT AGRICULTURAL COMMODITIES

	1966-67	1967-68
Live animals	16,52,284	16,95,431
Meat and meat preparations	98,93,037	76,99,079
Dairy products and Eggs	4,19,156	9,89,572
Fish and Fish preparations	17,24,59,090	17,96,03,250
Cereals and cereals preparations and dried Leguminous vegetables and flour thereof	4,96,96,331	1,88,59,902
Fruits and vegetables	55,01,65,284	51 60,33,368
Sugar, Sugar preparations and Honey	18,24,07,999	16,50,93,448
Coffee	15,83,89,294	18,17,78,669
Cocoa & Chocolate	28,21,433	36,72,804
Tea & Mate	158,40,79,034	180,19,74,193
Spices	29,13,59,571	27,24,09,796
Feeding stuff for animals excluding unmilked cereals	52,34,73,411	46,90,05,059
Miscellaneous food preparations	352,86,67,829	362,14,68,091
Tobacco and Tobacco manufactures	22,51,35,866	35,59,13,080
Hides, Skins and Fur skins undressed	16,47,07,969	7,57,05,460
Oilseeds, Oilnuts and Oil Kernels	35,67,490	1,79,53,250
Grud rubber (including synthetic & reclaimed)	69,513	1,19,265
Wood, Lumber and Cork	3,29,88,198	4,33,75,334
Cotton	17,52,27,430	19,40,32,419
Textile fibres not manufactured into yarn, thread of fabric and their waste excluding cotton and human hair	19,45,11,241	11,04,98,479
Crude Animal and Vegetable materials n. e. s.	36,03,91,446	31,36,60,269
Animal oils and fats	59,128	1,25,290
Fixed vegetable oils & fats	2,83,37,069	3,96,25,060
Animal and Vegetable oils and fats processed and waxes of Animal or vegetable origin	21,28,277	18,32,083
Essential oils and perfume materials	5,26,78,606	5,39,48,177
Agricultural Machinery and implements	13,81,950	25,66,299
Export of all commodities	1,152,87,68,838	1,192,80,26,581

Source material: Monthly Statistics of the Foreign Trade of India Vol. I–Exports and Re-Exports.

EXPORT OF PRINCIPAL COMMODITIES

(In Lakhs of Rs.)

Commodity (1)	1967-68 (2)
1. Wheat	378,57
2 Rice	54,76
3. Others	84,97
4. Cashewnuts	25,08
5. Spices	94
6. Others	34,91
7. Tobacco unmanufactured	1,33
8. Hides and skins (raw)	1,29
9. Copra	4,42
10. Crude rubber	4,39
11. Cotton (raw other than linters)	83,48
12. Jute raw including cuttings and waste	1,77
13. Wool raw and other animal hair	11,82
14 Others	84.16
15. Petroleum crude and partly refined(a)	59,73
16. Other petroleum products	15,10
17. Animal and vegetable oils and fats	33,44
18. Chemical elements & compounds	78,04
19. Dyeing, tanning & colouring materials	7,74
20. Medicinal and pharmaceutical products	17,52
21. Fertilizers, manufactures	134,40
22. Paper and paper Boards & manufactures thereof	17,64
23. Newsprint	9,44
24. Art silk yarn & thread	3,72
25. Iron and steel	106,16
26. Non-ferrous metals	88,48
27. Metal manufactures	14,11
28. Others	23,60
29. Machinery other than electric	335,96
30. Electric machinery, apparatus & appliances	83,95
31. Transport equipment	76,32
(i) Railway vehicles	22,57
(ii) Others	53,75
32. Miscellaneous manufactured articles	27,65
Grand Total (b)	1,972,38

Source: Monthly Statistics of the Foreign Trade of India, issued by the Dapartment of Commercial Intelligence and Statistics, Government of India.

VALUE OF IMPORTS OF IMPORTANT AGRICULTURAL COMMODITIES AGRICULTURAL MACHINERY AND FERTILISERS.

Item	1966-67	1967-68
(1)	(2)	(3)
Live animals	10,01,621	17,52,311
Meat and Meat preparations	1,04,308	33,936
Dairy Products and Eggs	22,65.02,102	14,23,44,055
Fish and Fish preparations	46,431	71,546
Cereals and Cereal proparations and dried leguminous vegetables and flour thereof	6,50,98,08,844	5,18,20,23,816
Fruits and Vegetables	30,81,61,880	39,25,39,615
Sugar, Sugar preparations and Honey	49,50,270	54,60,504
Cocoa and Chocolate	21,278	1,03,07,370
Spices	30,77,055	94,02,719
Feeding Stuff for animals including unmilked cereals	21,24,868	41,86,342
Miscellaneous food preparations	16,32,173	4,00,08,835
Tobacco and Tobacco manufactures	25,65,832	1,35,15,185
Hides, skins, and fur skins undressed	1,79,59,326	1,30,57,146
Oilseeds, oilnuts and oilkernels	4,72,45,931	5,22,87,050
Crude Rubber (including synthetic and reclaimed)	11,67,21,282	4,39,38,599
Wood, lumber and cork	1,48,95,513	1,66,65,003
Silk	51,92,225	59,76,016
Wood and other animal hair	11,77,98,946	11,81,81,994
Cotton	56,47,20,524	83,48,15,297
Jute	20,57,11,941	1,77,40,867
Vegetable fibres except cotton and Jute	37,34,86,497	4,21,29,946
Fertiliser Crude	13,26,25,192	9,69,06,691
Animals and vegetables oils and fats processed and waxes of animal or vegetable origin	14,74,26,510	33,43,88,038
Essential oils and perfume materials	1,36,84,006	1,78,66,140
Fertilisers manufactured	89,70,40,213	1,34,39,60,409
Agricultural Machinery and implements	12,92,55,427	13,68,95,457
Total Import of Agricultural Commodities		19,74,27,50,418

Source: Monthly Statistics of the Foreign Trade of India

TABLE X—CASH LONS BORROWED DURING THE YEAR JULY 1961—JUNE 1962 CLASSIFIED ACCORDING TO CREDIT AGENCY—ALL-INDIA

Credit Agency	Cultivators			Non-Cultivators			All Rural households		
	Proportion of households reporting (per cent)	Average per household (Rs.)	Aggregate amount (in crores of Rs.)	Proportion of households reporting (Per cent)	Average per household (Rs.)	Aggregate amount (in crores of Rs.)	Proportion of households reporting (per cent)	Average per house hold (Rs.)	Aggregate amount (in crores of Rs.)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. Government	1·9	5·3	26·70 (2·6)	0·5	0·7	1·31 (0·6)	1·5	4·1	28·01 (2·3)
2. Co-operatives	9·4	31·9	160·53 (15·5)	2·6	6·0	10·93 (5·3)	7·6	25·0	171·46 (13·8)
3. Commercial banks	0·4	1·2	6·08 (0·6)	0·2	1·6	2·91 (1·4)	0·3	1·3	8·99 (0·7)
4. Landlords	0·6	1·2	6·21 (0·6)	0·6	1·3	2·40 (1·2)	0·6	1·2	8·61 (0·7)
5. Agriculturist moneylenders	22·4	73·9	372·21 (36·0)	15·5	25·7	47·06 (23·0)	20·6	61·1	419·27 (33·9)
6. Professional moneylenders	8·1	27·0	136·18 (13·2)	5·6	11·9	21·71 (10·6)	7·4	23·0	157·88 (12·7)
7. Traders and commision agents	6·4	18·1	91·07 (8·8)	3·1	18·4	33·63 (16·4)	5·5	18·2	124·71 (10·1)
8. Relatives	7·5	18·1	91·14 (8·8)	6·3	9·6	17·53 (8·6)	7·2	15·8	108·67 (8·8)
9. Others	16·9	28·6	143·97 (13·9)	15·7	36·6	66·98 (32·8)	15·1	30·7	210·95 (17·0)
Total ...	**52·0**	**205·4**	**1034·09 (100·0)**	**40·0**	**111·8**	**204·45 (100·0)**	**48·8**	**180·4**	**1238.54 (100·0)**

Figures in brakets are percentage to the total.

TABLE III—CASH LOANS OUTSTANDING AS ON JUNE 30, 1962—CLASSIFIED ACCORDING TO CREDIT AGENCY—ALL-INDIA

Credit Agency	Cultivators			Non-cultivators			All rural househols		
	Proportion of house-holds reporting (per cent)	Average per house-hold Rs.	Aggregate amount in crores of Rs.	Proportion of house-holds reporting (per cent)	Average per house-hold Rs.	Aggregate amount (in crores of Rs.)	Proportion of house-holds reporting (per cent)	Average per house-hold Rs.	Aggregate amount (in crores of Rs.)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. Government	6·4	26·1	131,18 (5·5)	2·4	8·6	15·66 (8·8)	5·4	21·4	140·85 (5·3)
2. Co-operatives	12·2	47·0	236·57 (9·9)	3·7	10·0	18·24 (4·5)	10·0	37·1	254·81 (9 1)
3. Commercial Banks	0·4	1·8	8·97 (0·4)	0·2	1·5	2·80 (0·7)	0·4	1·7	11·78 (0·4)
4. Landlords	0·9	4·0	20·28 (0·9)	0·8	3·0	5·40 (1.3)	0·9	3·7	25·68 (0·9)
5. Agriculturist moneylenders	35·0	222·8	1121·84 (47·1)	23·9	87.0	159·19 (38·9)	32·0	186·6	1281·03 (45·9)
6. Professional moneylenders	12·1	70·4	354·35 (14·9)	8·4	33·6	61·55 (15·0)	11·1	60·6	415·90 (14·9)
7. Traders and Commission Agents	7·9	34·2	172·16 (7·2)	4·4	22·9	41·83 (10·2)	7·0	31·2	213·98 (7·7)
8. Relatives	9·5	30·2	152·33 (6·4)	8·9	20·6	37·69 (9·2)	9·3	27·7	190·02 (6·8)
9. Others	14·6	36·2	182·26 (7·7)	16·3	36·4	66·61 (16·3)	15·0	36·3	248·87 (8·9)
Total	66·7	472·7	2379·94 (100·0)	52·0	223·6	408·98 (100 0)	62·8	406·3	2788·93 (100·0)

Figures in brackets are percentages to the total.

Sources: All-India Rural Debt and investment Survey, 1961-62

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CASH LOANS OUTSTANDING AS ON JUNE 30, 1962—CLASSIFIED ACCORDING TO PRINCIPAL AND INTEREST CULTIVATOR HOUSEHOLDS

	Principal				Interest				Total			
	Proportion of households reporting (per cent)	Average per reporting household (Rs.)	Average per household (Rs.)	Aggregate amount (in crores of (Rs.)	Proportion of households reporting (per cent)	Average per reporting household (Rs.)	Average per household (Rs.)	Aggregate amount (in crores of Rs.)	Proportion of household reporting (per cent)	Average per reporting household (Rs.)	Average household (Rs.)	Aggregate amount in crores of (Rs.)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ALL INDIA	66·7	632	421·9	2124·22 (89·3)	50·1	101	50·8	255·72 (10·7)	66·7	708	472·7	2379·94 (100·0)

Note : The figures in brackets appearing in the various statements indicate the percentage shares of the constituent items in the aggregate for all items.

THE CO-OPERATIVE MOVEMENT IN INDIA, 1966-67

CREDIT SOCIETIES

FIGURES AT A GLANCE

(Amount in lakhs of Rupees)

Type of society	Number	Membership (in thousands)	Working capital	Loans			
				Advanced	Recovered	Outstanding	Overdue
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All Credit Societies	2,00,324	3,84,30	24,24,44	6,89,45[1]	5,16,76[1]	8,61,63[1]	1,81,89[1]
A. Short-term :							
1. State Co-operative Banks	25	21	4,02,95	5,13,16	5,00,21	3,25,16	16,92
2. Central Co-operative Banks	346	3,52	6,38,30	9,43,53	8,79,41	4,99,35	1,24,17
3. Industrial Co-operative Banks	29	22	9,51	21,43	19,99	7,67	1,29
4. Primary Credit Societies							
(a) Agricultural	1,78,735	2,67,00	6,25,20	3,66,47	2,78,34	4,77,46	1,60,14
(b) Grain Banks	6,847	9,11	5,92	1,99	1,38	4,65	2,70
(c) Non-Agricultural	13,616	74,85	3,05,39	2,80,15	2,26,31	2 24,85	13,31
(d) Primary Banks	1,241	36,27[2]	2,21,74[2]	1,86,27[2]	1,77,07[2]	1,66,46[2]	6,59[2]
B. Long-term :							
1. Central Land Mortgage Banks	19	773	2,63,58	58,85	16,01	2,07,37	4,53
2. Primary Land Mortgage Banks	707	21,57	1,73,59	40,84	10,73	1,54,67	5,74

Value of Goods (in lakhs of Rupees) sold

Primary Credit Societies	Received or produced	
(a) Agricultural	23,238	23,146
(b) Non-Agricultural	3,654	3,960

[1] Relates to primary agricultural and non-agricultural credit societies, grain banks and primary land mortgage banks.

[2] Relates to 1,105 reporting banks.

Source Material : Statistical Statements relating to the Co-operative movement in India, 1966-67, published by the Reserve Bank of India.

PROGRESS OF PRIMARY LAND MORTGAGE BANKS

Year	Number	Membership	Working capital in crores	Loans advanced in crores	Loans outstanding in crores
(1)	(2)	(3)	(4)	(5)	(6)
1965-66	673	18,44,653	136·93	41·23	124·33
1966-67	707	21,56,816	173·59	40·84	154·67
					Loans overdue in crores.
1965-66					4·42
1966-67					5·74

Source : Statistical Statements relating to the Cooperative movement in India, 1966-67, by the Reserve Bank of India.

TREND OF PROGRESS (All-India)

PRIMARY LAND MORTGAGE BANKS

Year	Number	Membership in (lakhs)	Working capital (Rs. crores)	Loans advanced (Rs. crores)
(1)	(2)	(3)	(4)	(5)
1950-51	286	2·15	6·66	1·29
1955-56	302	3·14	11·35	1·74
1960-61	463	6·69	26·99	7·17
1961-62	535	8·52	38·29	12·58
1962-63	571	10·51	55·02	19·19
1963-64	583	12·78	74·85	23·21
1964-65	643	14·93	100·00	30·83
1965-66	675	18·45	136·93	41·23

Source : Co-operative movement in India : Important Statistics, 1965-66, Part I Credit Sector, Goverment of India, Ministry of FACD & C. (Department of Co-operation), August 1967.

TREND OF BROGRESS (All-India)

PROGRESS OF PRIMARY AGRICULTURAL CREDIT AND MULTI-PURPOSE SOCIETIES

(General Details)

Year	Number	Membership (in lakhs)	Working capital (Rs. crores)	Loans advanced (Rs. crores)
(1)	(2)	(3)	(4)	(5)
1950-51	1,04,998	44·08	37·25	22·90
1955-56	1,59,939	77·91	79·10	49·62
1960-61	2,12,129	170·41	273·92	202·75
1961-62	2,15,081	195·72	325·33	228·31
1962-63	2,11,132	217·34	370·03	257·37
1963-64	2,09,622	237·28	440·39	297·14
1964-65	2,01,046	254·11	486·67	316·16
1965-66	1,93,849	266·23	550·40	344·46

Source: Co-operative Movement In India : Important Statistics, Part I, Credit Sector. Goverment of India, Ministry of FACD & C. (Department of Co-operation), August, 1967.

INDEX NUMBER OF AGRICULTURAL (PRODUCTION-ALL INDIA

(Base: Agricultural Year 1949-50)

Commodity	1961-62	1962-63	1963-64	1964-65	1965-66
(1)	(2)	(3)	(4)	(5)	(6)
I Foodgrains					
(*a*) *Cereals*					
1. Rice	142·4	127·4	146·6	155·1	121·6
2. Jowar	115·4	138·3	131·3	140·1	107·7
3. Bajra	114·1	121·8	116·9	139·5	112·7
4. Maize	154·3	163·8	162·9	166·6	165·7
5. Ragi	132·0	123·2	127·6	123·1	84·7
6. Small millets	105·2	95·4	103·5	100·2	82·2
Khariff cereals (1 to 6)	137·1	128·7	142·2	150·6	119·4
7. Wheat	178·8	160·4	146·1	182 1	158·8
8. Barley	133·5	102·7	86·3	106·2	96·2
Rabi cereals (7 and 8)	170·2	149·4	134·7	167·6	146·9
Cereals (1 to 8)	143·1	132;4	140·8	153·7	124·4
(*b*) *Pulses*					
9. Gram	148·5	137·2	115·5	148·5	114·0
10. Tur or Arban	70·0	80·4	69·2	95·3	85·2
11. Other Pulses	110·2	107·8	100·2	114·0	93·0
Pulses (9 to 11)	121·5	116·9	102·8	126·5	101·0
Foodgrains (1 to 11)	140·3	130·4	135·9	150·2	121·4
Sugarcane (Gur)	173·5	156·8	173·9	200·4	197·0
Groundnut	147·5	142·4	153·9	178·3	121·8
Sesamum	90·3	111·9	105·9	118·8	98·0
Rapseed and mustard	165·6	159·2	111·1	180·5	156·1
II Non-foodgrains*	153·9	151·5	155·6	174·9	152·4
III All commodities†	144·8	137·4	142·4	158·4	131·7

* Includes oilseeds, fibres, plantation crops, sugarcane (gur), tobacco, potato, pepper (black), chillies (dry) and ginger (dry).

† Includes, cereals, pulses, oilseeds. fibres, plantation crops, sugarcane (gur), tobacco, potato, pepper (black), chillies (dry) and ginger (dry)

Note: 1. The indices for 1962-63 to 64-65 are generally based on Partially Revised Estimates while those for 1965-66 are generally based on Final Estimates. The indices for these years are therefore subject to revision.

2. Figures given above relate to Agiricultural year (July-June).

3. Owing to progressive increase in coverages and changes in methods of yield estimation the actual production figures in respect of foodgrains and sugarcane (gur) as given in Table No. 2-1 are not comparable overtime. For comparison of All India position overtime, index numbers of agricultural production as given in this table may be used with a view to enabling Trend Studies.

Bulletin on Food Statistics-February 1967.

WHOLESALE PRICES AND INDEX NUMBERING INDIVIDUAL

COMMODITIES FOR WEEK ENDING JUNE 22, 1968 (Base 1952-53=100)

Groups and sub-groups	Week ended 22-6-68	24-6-67.
(1)	(2)	(3)
I Food Articles	232·3	246·6
(a) Foodgrains	203·3	231·1
(i) Cereals	205·4	218·7
(ii) Pulses	193·4	287·7
(b) Fruits and vegetables	246·00	214·0
(c) Milk and ghee	223·4	206·3
(d) Edible olis	207·5	315·8
(e) Fish, eggs and meat	236·6	227·3
(f) Sugar and gur	398·7	361·6
(g) Others	240·3	234·4
II Tobacco	172·3	131·5
III Fuel, Power, Light and Lubricants	190·0	178·1
IV Industrial Raw Materials	194·1	233·5
(a) Fibres	197·6*	176·2*
(b) Oilseeds	209·1	325·7
(c) Minerals	139·9*	148·9*
(d) Others	162·9*	174·8*
V Manufactures	162·9	166·9
A. Intermediate products	194·0	219·9
B. Finished products	157·8	158·2
(a) Textiles	153·4	151·1
(i) Cotton manufactures	157·3*	156·8*
(ii) Jute	139·4	128·7
(iii) Woolen	193·8*	204·2*
(iv) Silk and Rayon	154·7*	158·3*
(b) Metel products	214·2	211·1
(c) Chemicals	151·1*	151·6*
(d) Oil cakes	244·2*	295·3
(e) Machinery and Transport Equipment	155·8	154·5
(f) Others	135·9*	136·2*
All commodities	203·7	217·0

* Estimated

WHOLESALE PRICES AND INDEX NUMBERING INDIVIDUAL COMMODITIES FOR WEEK ENDING JUNE 22, 1968 (Base 1952-53 = 100)-(contd.)

Group and commodity (1)	Unite of prize (2)	Week ended 24-6-67 (3)
(a) 1. Rice	Quintal	221·1
2. Wheat	,,	171·9
3. Jowar	,,	208·4*
4. Bajra	,,	213·7
5. Barley	,,	170·8
6. Maize	,,	228·5*
7. Ragi	,,	215·2
(b) Pulses	,,	193·4
(i) Gram	,,	193·4
(ii) Moong	,,	204·9*
(c) Fruits and vegetables	,,	246.0
(1) Potatoes	,,	275·3*
(2) Onions	,,	160·9*
(3) Oranges	,,	460·5*
(4) Bananas	,,	200·0*
(5) Cashewnuts	,,	181·7*

* Estimated.

PART III

GENERAL INFORMATION

LIST OF AGRICULTURAL UNIVERSITIES STARTED AFTER 1963

	Name of University (1)	Location (2)	Year of starting (3)	Courses of study (4)
1.	Andhra Pradesh Agricultural University, Dilkusha, Hyderabad (Andhra Pradesh)	Hyderabad	1964	(i) B. Sc. (ii) M. Sc. (Agri.) a. Agronomy b. Agril. Botany c. Agril. Chemistry d. Agril. Entomology e. Agril. Economics f. Horticulture g. Plant Pathology h. Extension Edn.
2.	Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.)	Jabalpur	1964	M. Sc. (Agri.) a. Agril. Chemistry b. Agril. Botany c. Agronomy d. Horticulture e. Extension f. Entomology g. Plant Pathology h. Agril. Economics Vety. Faculty a. Animal Nutrition b. Physiology c. Pharmacology d. Bacteriology e. Parasitology f. Obs. & Gynae. g. Anatomy h. Genetics i. Poultry j. Medicine k. Pathology
3.	University of Agricultural Sciences, 9, Balasundaram, Layout, XI Main, Hebbal, (Bangalore)	Bangalore	1965	M. Sc. (Agri.) a. Plant Pathology b. Microbiology c. Extension d. Entomology e. Soil Science Ph. D. Soil Science & Microbiology
4.	Maharashtra Vidyapeeth, Bombay, Khanna Construction House, 44, Abdul Gaffar Khan Road, Worli, Bombay.			

Constituent Agril. Colleges	M. Sc. Level
1. College of Agri., Poona	Agronomy, Animal Husbandry, Dairy Science, Plant Breeding, Plant Physiology, Agril. Chemistry, Soil Science, Agril. Economics. Agril. Entomology, Agril. Extension, Agril. Engg., Horticulture, Plant Pathology.
2. College of Agri., Nagpur	Agronomy, Agril. Botany, Agril. Extension, Horticulture, Plant Pathology, Agril. Entomology, Agril. Economics.
3. College of Agri., Parbhani	Agronomy, Animal Husbandry, Soil Science, Agril. Chemistry. Plant Physiology, Plant Breeding & Genetics, Plant Pathology, Agril. Bacteriology, Agril. Entomology, Horticulture, Agricultural Economics, Agril. Extension, Agril. Statistics & Dairy Science.
4. College of Agriculture, Dhulia	Upto B. Sc. Level
5. College of Agriculture, Kolhapur	Upto B. Sc. Level
6. College of Agriculture, Dapoli	Upto B. Sc. Level
7. College of Agriculture, Akola	Upto B. Sc. Level
Affiliated Agril. College	
8. College of Agriculture, Amrawati	Upto B. Sc. Level

NAMES OF UNDER-GRADUATE AGRICULTURAL COLLEGES WHICH STARTED AFTER 1963

Name of Colleges (1)	Location (State) (2)	Year of starting (3)	University to which affiliated (4)	Course of Study (5)
1. N. M. College of Agri., Navsari	Gujarat	1965	Gujarat University	Upto B. Sc. level
2. College of Agri., Madurai	Madras	1965	Madurai University	Upto B. Sc. level
3. College of Agri., Dapoli	Maharashtra	1965	Shivaji University	Upto B. Sc. level
4. College of Agri., Kaul	Haryana	1965	Kurukshetra University	Upto B. Sc. level

LIST OF UNIVERSITIES AND INSTITUTIONS DEEMED TO BE UNIVERSITIES IN INDIA

UNIVERSITIES

1. Agra University, Agra.
2. Aligarh Muslim University, Aligarh.
3. Allahabad University, Allahabad.
4. Andhra University, Waltair.
5. Andhra Pradesh Agricultural University, Rajendra Nagar, Hyderabad.
6. Annamalai University, Annamalainagar.
7. Banaras Hindu University, Varanasi.
8. Bangalore University, Mathematics Block, Central College, Bangalore.
9. Bangalore University of Agricultural Science, Hebbal, Bangalore.
10. Maharaja Sayajirao University of Baroda, Baroda.
11. Berhampur University, Berhampur.
12. Bhagalpur University, Bhgalpur.
13. Bihar University, Muzaffarpur (Bihar).
14. Bombay University, Bombay.
15. Burdwan University, Burdwan (West Bengal).
16. Calcutta University, Calcutta.
17. Delhi University, Delhi.
18. Dibrugarh University, Dibrugarh.
19. Gauhati University, Gauhati.
20. Gorakhpur University, Gorakhpur.
21. Gujarat University, Ahmedabad.
22. Indira Kala Sangit Vishwavidyalaya, Khairagarh.
23. Indore University, Indore.
24. Jabalpur University, Jabalpur (M. P.)
25. Jadavpur University, Jadavpur (Calcutta - 32)
26. Jammu & Kashmir University, Srinagar.
27. Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur.
28. Jiwaji University, Gwalior.
29. Jodhpur University, Jodhpur.
30. Kalyani University, P. O. Kalyani, West Bengal.

31. Kameshwara Singh Darbhanga Sanskrit University, Darbhanga.

32. Kanpur University, Kanpur.

33. Karnatak University, Dharwar.

34. Kerala University, Trivandram.

35. Kurukshetra University, Kurukshetra.

36. Lucknow University, Lncknow.

37. Madras University, Madras.

38. Madurai University, Madurai.

39. Magadh University, Bodhgaya.

40. Marathwada University, Aurangabad (Dn.)

41. Meerut University, Meerut.

42. Mysore University, Mysore.

43. Nagpur University, Nagpur.

44 North Bengal University, Siliguri District (Darjeeling).

45. Orissa University of Agriculture and Technology, Bhubaneswar.

46. Osmania University, Hyderabad.

47. Punjab University, Chandigarh.

48. Patna Univesity, Patna.

49. Poona University, Poona.

50. Punjab Agricultural University, Ludhiana.

51. Punjabi University, Patiala.

52 Rabindra Bharati, Calcutta.

53. Rajasthan University, Jaipur

54 Ranchi University, Ranchi.

55. Ravi Shankar University, Raipur.

56. Roorkee University, Roorkee.

57. University of Sambalpur, Sambalpur.

58. Sardar Patel University, Vallabh Vidyanagar (Gujarat).

59. Saugar University, Saugar.

60. Sourashtra University, Rajkot.

61. Shivaji University Kolhapur.

62. Shreemati Nathibai Domodar Thackersey Women's University, Bombay.

63. South Gujarat University, Surat.

64. Sri Venkateswara University, Tirupati, Andhra.

65. Udaipur University, Udaipur.

66. Utkal University, Vani Vihar, Post Office Utkal University, Bhubaneswar, District Puri, Orissa.

67. Uttar Pradesh Agricultural University, Pantnagar (Nainital).

68. Varanaseya Sanskrit Vishwavidyalaya, Varanasi.

69. Vikram University, Ujjain.

70. Viswa Bharati, Santiniketan.

71. Gujarat Ayurvedic University, Jamnagar.

72. Maharashtra Agricultural University, Bombay.

73. Awadesh Pratap Singh University of Rewa, Rewa.

INSTITUTIONS DEEMED TO BE UNIVERSITIES

1. Birla Institute of Technology & Science, Pilani.

2. Gujarat Vidyapith, Ahmedabad.

3. Gurukul Kangri Vishwa-vidyalaya, Hardwar.

4. Indian Agricultural Research Institute, Hill Side Road, New Delhi.

5. Indian Institute of Science, Bangalore.

6. Indian School of International Studies, Sapru House, New Delhi.

7. Indian School of Mines, Dhanbad.

8. Jamia Millia Islamia, New Delhi.

9. Kashi Vidyapith, Varanasi.

10. Tata Institute of Social Sciences, Bombay.

NAME AND LOCATION OF
NATIONAL LEVEL CO-OPERATIVE INSTITUTIONS FEDERATIONS

1. Vaikunth Mehta Institute of Co-operative Management,
   5-B, J. Road, Poona-1.
2. National Co-operative Union of India,
   72, Jorbagh, New Delhi-3.
3. All India State Co-operative Banks' Federation,
   9, Bakehouse Lane, Fort, Bombay.
4. National Agricultural Co-operative Marketing Federation Ltd.,
   E-11, Defence Colony, New Delhi
5. All India Handloom Fabrices Co-operative Marketing Society,
   G.P.O. Box No. 1530, Bombay.
6. All India Industrial Co-operative Banks Federation Ltd.,
   "New Hill View", 11, Bull Temple Road, Basavangudi,
   Bangalore-4.
7. National Federation of Co-operative Sugar Factories,
   34, South Patel Nagar, New Delhi.
8. National Co-operative Consumers Federation,
   25, Ring Road, Lajpat Nagar, New Delhi.
9. All India Central Land Development Banks Co-operative Union,
   Barkatpura, Hyderabad-23.
10. National Federation of Co-operative Spinning Mills,
    c/o Deccan Co-operative Spinning Mills, Ichalkaranji,
    Distt. Kolhapur, Maharashtra.
11. National Federation of Industrial Co-operatives,
    26-A, South Extension Part II, New Delhi.
12. National Co-operative Development Corporation,
    C-56, Part II, South Extension, New Delhi.
13. Indian Co-operative Union,
    ICCW Building, 4, Rouse Avenue, New Delhi-1.

LOCATION OF SOIL TESTING LABORATORIES

S. No.	State	Location
1.	Andhra Pradesh	Hyderabad
		Rajahmundry (for tobacco only)
		Bapatla
		Tadepalligudem
2.	Assam	Gauhati
		Jorhat
		Silchar
3.	Bihar	Hazaribagh
		Sabour
		Arrah
		Patna
		Pusa
4.	Delhi	I. A. R. I.
5.	Gujarat	Junagarh
		Bardoli
		Bhuj
6.	Haryana	Karnal
		Hissar
		Rohtak
7.	Himachal Pradesh	Simla
		Sundernagar
		Palampur
		Chamba
		Dhaula Kuan
8.	Jammu & Kashmir	Srinagar
		Jammu
9.	Kerala	Alleppy
		Vellayani
		Pattambi
10.	Madras	Coimbatore
		Koilpatti
		Madurai
		Aduthurai
		Cuddalore
		Gudiyatham
		Kancheepuram
		Nilgiris
11.	Madhya Pradesh	Jabalpur
		Raipur
		Indore
		Gwalior

LOCATION OF SOIL TESTING LABORATORIES-(Contd.)

S. No.	State	Location
12.	Maharashtra	Poona Nagpur Parbhani Akola Dhulia
13.	Mysore	Mysore (for coffee only) Bangalore Manipal Dhadesugur
14.	Orissa	Sambalpur Balasone Bhubneswar Berhampur
15.	Punjab	Ludhiana Gurdaspur
16.	Rajasthan	Jodhpur Kotah Durgapura Ganganagar
17.	W. Bengal	Calcutta Burdwan
I8.	Uttar Pradesh	Aligarh Kanpur Varanasi Jhansi Rudrapur Nainital Meerut Hardoi Nawabganj (Bareilly) Amurokh (Jhansi) Sahjahanpur Gorakhpur Muzzaffarnagar Saharanpur Basti Ghagraghat (Bahraich) Pitaura (Farrukhabad) Massauli (Barabanki) Ratsand (Ballia) Bacharawan (Rai-bareilly)
19.	Manipur	Imphal
20.	Tripura	Agartala

STATEWISE ALLOTMENT OF 34 MOBILE SOIL TESTING LABORATORIES

S. No.	State	Stationery Lab
1.	Assam	Silchar Jorhat
2.	Andhra Pradesh	Tadepalligudem Hyderabad Bapatla
3.	Bihar	Arrah Sabour Hazaribagh
4.	Gujarat	Junagarh Bardoli
5.	Haryana	Karnal
6.	Himachal Pradesh	Sundernagar Palampur
7.	Kerala	Trivandrum Alleppy Pattambi
8.	Madhya Pradesh	Gwalior Jabalpur Raipur
9.	Madras	Coimbatore Aduthurai Nilgiris
10.	Maharashtra	Nagpur Poona
11.	Mysore	Bangalore
12.	Orissa	Sambalpur
13.	Punjab	Ludhiana
14.	Rajasthan	Jodhpur
15.	Uttar Pradesh	Kanpur Aligarh
16.	West Bengal	Calcutta Burdwan
17.	Tripura	Agartala

One Unit will be alloted to Trombay Unit of F.C.I. In addition to this 34 Mobile Soil Testing Laboratories at present under fabrication, are also expected to be allotted during the Calendar year 1969 one each to the laboratories given in the list No. 2.

LIST OF SOIL TESTING LABORATORIES

State	S. No.	Location	Address	Sponsoring authority
(1)	(2)	(3)	(4)	(5)
Andhra Pradesh	1.	Bapatla	Department of Agriculture, Bapatla	Government of Andhra Pradesh.
	2.	Hyderabad	Main Farm, Rajendra Nagar, Hyderabad	do
	3.	Rajahmundry	Central Tobacco Research Institute, Rajahmundry	Central Tobacco Research. Institute.
	4.	Tadepalle	Andhra Fertilisers Ltd., Fertiliser Factory, Tadepalle P. O., Guntur Distt.	E. I. D. Parry Ltd., Madras.
	5.	Tadepalligudem	Soil Testing Laboratory, Tadepalligudem	Government of Andhra Pradesh.
	6.	Visakhapatnam	Essen & Co., 1st and 2nd Floor, Near Century Club Jn., Gokhale Road, Visakhapatnam (on commercial terms)	Essen & Co., Bangalore.
Assam	7.	Gauhati	Department of Agriculture, Gauhati	Government of Assam.
	8.	Jorhat	Department of Agriculture, Jorhat	do
	9.	Namrup	The Fertilizer Corporation of India, Ltd., Namrup Unit, Distt. Lakhimpur	The Fertilizer Corporation of India Ltd.
	10.	Silchar	I. A. D. P. Soil Testing Laboratory, Silchar	I. A. D. P.
Bihar	11.	Arrah	I. A. D. P. Soil Testing Laboratory, Arrah	I. A. D. P.
	12.	Hazaribagh	Soil Conservation Department, Damodar Valley Corporation, Hazaribagh	D. V. C., Hazaribagh.

Bihar (contd.)	13.	Patna	Agricultural Research Institute, Mithapur	Government of Bihar.
	14.	Pusa	Soil Testing Laboratory, Pusa, Distt. Dar. bhanga	do
	15.	Sabour	College of Agriculture, Sabour	do
	16.	Sindri	The Fertilizer Corporation of India Ltd., Sindri Unit, Sindri, Distt. Dhanbad	The Fertilizer Corporation of India Ltd.
Gujarat	17.	Bardoli	Assistant Soil Chemist-in-Charge, Soil Testing Laboratory, Bardoli, Distt. Surat	Government of Gujarat.
	18.	Baroda	Gujarat State Fertilizers Company Ltd., P. O. Fertilizer Nagar, Distt., Baroda	Gujarat State Fertilizers Co. Ltd., Baroda.
	19.	Bhuj	Officer-in-Charge, Soil and Water Analysis Laboratory, Bhuj	Government of Gujarat.
	20.	Junagarh	Agricultural Chemist & Soil Specialist, Sardar Bagh, Junagarh	do
Haryana	21.	Hissar	College of Agriculture, Hissar	Punjab Agricultural University.
	22.	Karnal	149-C, Model Town, Karnal	Government of Haryana.
	23.	Rohtak	Government Agricultural Farm, Rohtak	do
Jammu & Kashmir	24.	Jammu (Tawi)	Jammu Provincial Agricultural Experimental Farm, Talab, Tilloo	Government of Jammu & Kashmir.
	25.	Srinagar	Kashmir Agricultural Research Station, Lalmandi, Srinagar	do
Kerala	26.	Alleppy	I. A D. P. Soil Testing Laboratory, Alleppy	I. A. D. P.
	27.	Pattambi	I. A. D. P. Soil Testing Laboratory, Pattambi, Palghat Distt.	I. A. D. P.

LIST OF SOIL TESTING LABORATORIES-(Contd.)

(1)	(2)	(3)	(4)	(5)
Kerala (Contd.)	28.	Udyogamandal P. O.	Fertilizers & Chemicals, Travancore Ltd., (FACT) Alwaye, Udyogamandal P. O., Ernakulam Distt.	Fertilizers & Chemicals, Travancore Ltd., Udyogamandal P. O.
	29.	Vellayani	Soil Testing Laboratory, Vellayani, Trivandrum Distt.	Government of Kerala.
Madhya Pradesh	30.	Gwalior	College of Agriculture, Gwalior	J. N. K. V. Vidyalaya, Jabalpur.
	31.	Indore	Soil Testing Laboratory, Indore	do
	32.	Jabalpur	College of Agriculture, Adhartal, Jabalpur	do
	33.	Raipur	Soil Testing Laboratory, Raipur	do
Madras	34.	Aduthurai	Regional Research Institute, Aduthurai, Tanjore Distt.	I. A. D. P.
	35.	Avadi	Shaw Wallace & Co., Ltd., Fertilizers & Superphosphate Factory, Main Road, P. O. Avadi-Camp, Avadi	Shaw Wallace & Co., Ltd., Madras.
	36.	Coimbatore	Agricultural College and Research Institute, Coimbatore	Government of Madras.
	37.	Coimbatore	The Scientific Fertilizer Co., Private Ltd., 'Sudarsanam', Ponnurangam Road, R. S. Puram, Coimbatore-2	The Scientific Fertilizer Co., Ltd., Coimbatore.
	38.	Cuddalore	Central Sugarcane Research Station, Cuddalore	Government of Madras.

Madras Contd.)	39.	Ennore	E. I. D. Parry Ltd., Compound Fertilizers Factory, Kathiwakkam P. O., Ennore (Madras City)	E. I. D. Parry Ltd., Madras.
	40.	Gudiyatham	Soil Testing Laboratory, Gudiyatham, North Arcot Distt.	Government of Madras.
	41.	Kancheepuram	I. A. D. P. Soil Testing Laboratory, Kancheepuram, Chingleput Distt.	I. A. D. P.
	42.	Koilpatti	Regional Research Station, Kolipatti	Government of Madras.
	43.	Madurai	I. A. D. P. Soil Testing Laboratory, Madurai	I. A. D. P.
	44.	Madras	Essen & Co., Lattice Bridge Road, Adyar, Madras-20 (on commercial terms)	Essen & Co., Bangalore.
	45.	Madras	Rallis India Ltd., Fertilizers & Pesticides Division, 320, Lingi Chetty St., Madras-1	Rallis India Ltd., Madras,
	46.	Madras	The Mysore Fertilizer Co., 18, Vaidyantha Mudali Street, Tondiarpet, Madras-21	The Mysore Fertilizer Co., Madras.
	47.	Nellikuppam	E. I. D. Parry Ltd., Sugar Factory, Soil Testing Section, Nellikuppam P. O., North Arcot District	F. I. D. Parry Ltd., Madras.
	48.	Ranipet	E. I. D. Parry Ltd., Fertilizer Factory, Ranipet P. O., South Aroct Distt.	do
	49.	Salem	The Yercaud Coffee Curing Works Ltd., 3/22, Kondappa Naickenpatti, Kannankurichi P. O., Salem	The Yercaud Coffee Curing Works Ltd., Salem.
Maharashtra	50.	Akola	Agricultural College, Akola	Government of Maharashtra.

LIST OF SOIL TESTING LABORATORIES-(Contd.)

(1)	(2)	(3)	(4)	(5)
Maharashtra (Contd.)	51.	Ambernath	The Dharamsi Morarji Chemical Co., Ltd., Soil Testing Laboratories, Ambarnath, Distt. Thana	The Dharamsi Morarji Chemical Co. Ltd., Bombay.
	52.	Bombay	The Fertilizer Corporation of India Ltd., Trombay Unit, Chembur, Bombay-74	The Fertilizer Corporation of India Ltd.
	53.	Dhulia	Agricultural College, Dhulia.	Government of Maharashtra.
	54.	Kolhapur	Soil Testing Laboratory, Kolhapur	do
	55.	Majiwada-Thana	Bharat Fertilizer Industries Ltd., Majiwada-Thana	Bharat Fertilizer Industries Ltd. Majiwada-Thana.
	56.	Nagpur	Agricultural College, Nagpur	Government of Maharashtra.
	57.	Nagpur	Essen & Co., Amrut Building, Variety Square, Sitabuldi, Nagpur (on commercial terms)	Essen & Co., Bangalore.
	58.	Parbhani	Agricultural College, Parbhani	Government of Maharashtra.
	59.	Poona	Agricultural College, Poona	do
	60.	Poona	Sunrise Soil Testing Laboratory, Kondhawa, Budruk, District Poona	Sunrise Manures & Chemicals, Poona.
Mysore	61.	Bangalore	Asst. Soil Chemist, Soil Testing Laboratory, Hebbal, Bangalore	University of Agricultural Sciences, Bangalore.
	62.	Bangalore	Mobile Soil Testing Van, c/o Soil Chemist, Department of Agriculture, Bangalore	Government of Mysore.

Mysore (Contd.)	63.	Bangalore	Essen & Co., 550, 8th Main Road, Bangalore-12	Essen & Co. Bangalore (on commercial terms).
	64.	Belgaum	Essen & Co., 3128, Khrde Bazaar, Belgaum	do
	65.	Bellary	Essen & Co., Town Hall Building, Kolachalam Compound, Bellary	do
	66.	Devangere	Soil Testing Laboratory, Devangere	Government of Mysore.
	67.	Dhadesugar	Asst. Soil Chemist, Soil Testing Laboratory, Dhadesugar Post	do
	68.	Jamkhandi	Soil Testing Laboratory, Jamkhandi	do
	69.	Mandya	Office of the Deputy Director of Agriculture, Mandya	do
	70.	Manipal	Asst. Soil Chemist, Kasturba Medical College, Manipal, Distt. South Kanara	do
	71.	Mangalore	Soil Testing Laboratory, Mangalore	do
	72.	Mysore	Assistant Soil Chemist, 1st Floor, 2638–11, Main Road, V. V. Mohalla P O., Mysore-2	do
Orissa	73.	Balasore	Soil Testing Laboratory, Balasore	Government of Orissa
	74.	Berhampur	Soil Testing Laboratory, Berhampur	do
	75.	Bhubaneswar	Soil Testing Laboratory, Bhubaneswar	do
	76.	Sambalpur	Soil Testing Laboratory, Sambalpur	do
Punjab	77.	Gurdaspur	Government Agricultural Farm, Gurdaspur	Government of Punjab
	78.	Ludhiana	College of Agriculture, Ludhiana	Punjab Agricultural University

LIST OF SOIL TESTING LABORATORIES-(Contd.)

(1)	(2)	(3)	(4)	(5)
Rajasthan	79.	Durgapura	Soil Testing Laboratory, Durgapura (Jaipur)	Government of Rajasthan.
	80.	Sri Ganga Nagar	Soil Testing Laboratory, Sri Ganga Nagar	do
	81.	Jodhpur	Soil Testing Laboratory, Jodhpur	I. A. D. P.
	82.	Kota	Soil Testing Laboratory, Kota	Government of Rajasthan.
Uttar Pradesh	83.	Aligarh	Soil Testing Laboratory, Aligarh	Government of Uttar Pradesh.
	84.	Gorakhpur	The Fertilizer Corporation of India Ltd., Gorakhpur Unit. Gorakhpur	The Fertilizer Corporation of India Ltd.
	85.	Kanpur	Central Soil Testing Laboratory, Department of Agriculture, Kanpur	Government of Uttar Pradesh.
West Bengal	86.	Burdwan	Soil Testing Laboratory Distt. Seed Farm P. O., Burdwan Distt.	Government of West Bengal.
	87.	Calcutta	Department of Agriculture 230, Nethaji Subhas Road, Calcutta-1	do
	88.	Calcutta	Shaw Wallace & Co., Ltd., Block 'A', Hide Road, Kidderpore, Calcutta	Shaw Wallace & Co. Ltd., Calcutta.
	89.	Durgapur	The Fertilizer Corporation of India Ltd., Durgapur Division, Machipara, Durgapur-11	The Fertilizer Corporation of India Ltd.
	*89-A.	Rishra	Phosphate Co., Ltd., 45 Ramakrishna Road, Rishra (Distt. Hooghli)	The Phosphate Co. Ltd., Calcutta.

Delhi	90.	Delhi	Chemistry Division, Indian Agricultural Research Institute, Delhi-12	Indian Agricultural Research Institute, Delhi-12.
Goa	91.	Margoa	Essen & Co., Station Road, P. B. No. 237, Margoa (on commercial terms)	Essen & Co., Bangalore.
	92.	Panaji	Soil Testing Laboratory, Panaji	Government of India (Union Territory).
Himachal Pradesh	93 S.	Palampur	Soil Testing Laboratory, Palampur, Disstt. Kangra	do
	94.	Simla	Soil Testing Laboratory, Hawthern Villa, Simla-4	do
	95.	Sunder Nagar	Soil Testing Centre, Sundar Nagar, Distt. Mandi	I. A. D. P.
	96.	Chamba	Soil Testing Centre, Chamba, Distt. Chamba	Government of India (Union Territory).
	97.	Dhaulakuan	Soil Testing Centre-Cum-Soil Science Laboratory, Dhaulakuan, Distt. Sirmur	do
Manipur	98.	Imphal	Imphal Farm, P. O. Mantri Pukharai, Manipur	do
Pondicherry	99.	Pondicherry	Soil & Water Testing Laboratory, Botanical Gardens, Pondicherry	do
Tripura	100.	Agartala	Soil Testing Laboratory, Agartala	do

* Not included in the 'Soil Testing Laboratories Map'.

In addition to the Soil Testing Laboratories listed above, Regional Research Stations, Agricultural Educational Institutions and Vigyan Mandirs also undertake Soil Testing Work. Their addresses can be obtained from the Directors of Agriculture of the respective states.

Source : Fertilizer Statistics, 1967-68.

NITROGENOUS FERTILIZERS

MANUFACTURERS AND INSTALLED CAPACITY OF NITROGENOUS FERTILIZERS (as on 30th September, 1968)

Name of the factory (1)	Installed capacity (Metric tons) Material (2)	Nutrient (N) (3)	Likely date of production (4)
(I) IN PRODUCTION			
(a) Ammonium sulphate			
Assam			
1. Fertilizer Corporation of India Ltd., Unit: Namrup	100,000	20,600	
Bihar			
2. Bararee Coke Co. Ltd,, Loyabad *	600	120	
3. Burrakur Coal Co. Ltd , Bansjora *	1,320	270	
4. Fertilizer Corporation of India Ltd., Unit : Sindri†	355,000†	74,550	
5. Tata Iron and Steel Co. Ltd., Jamshedpur[1]	23,100	4,760	
Gujarat			
6. Gujarat State Fertilizers Co. Ltd., Baroda	148,000	30,490	
Kerala			
7. Fertilizers and Chemicals, Travancore Ltd., Alwaye	200,000†	42,000	
Madhya Pradesh			
8. Hindustan Steel Ltd., Bhilai *	32,600	6,720	
Madras			
9. E. I. D. Parry Ltd., Madras	38,610	7,950	
Mysore			
10. Mysore Chemicals & Fertilizers Ltd., Belagula	6,710	1,380	
Orrisa			
11. Hindustan Steel Ltd., Rourkela *	28,000	5,770	
West Bengal			
12. Hindustan Steel Ltd., Durgapur *	21,200	4,370	
13. Indian Iron and Steel & Co., Ltd., Burnpur-kulti*	23,000	4,740	
Total	9,78,140	2,03,720	

(1)	(2)	(3)	(4)
(b) Ammonium Sulphate Nitrate			
Bihar			
1. Fertilizers Corporation of India Ltd., Unit : Sindri ‡	121,920	31,700	
Total	121,920	31,700	
(c) Calcium Ammonium Nitrate			
Orissa			
1. Hindustan Steel Ltd., Rourkela (20·5%N)	585,370	120,000	
Punjab			
2. Fertilizer Corporation of India Ltd., Unit: Nangal (25·0% N)	3,20,000 ‖	80,000	
Total	—	200,000	
(d) Urea			
Andhra Pradesh			
1. Coromendal Fertilizers Ltd., Visakhapatnam §	16,500	7,260	
Assam			
2. Fertilizer Corporation of India Ltd., Unit: Namrup §	55,000	24,200	
Bihar			
3. Fertilizer Corporation of India Ltd., Unit: Sindri ‡	23,470†	10,750	
Gujarat			
4. Gujarat State Fertilizers Co. Ltd., Baroda §, ††	100,000	46,200	
Maharashtra			
5. Fertilizer Corporation of India Ltd., Unit: Trombay §	99,000†	45,000	
Madras			
6. Neyveli Lignite Corporation Ltd., Neyveli	154,000†	70,000	
Uttar Pradesh			
7. Fertilizer Corporation of India Ltd., Unit: Gorakhpur	179,320†	80,000	
Total	627,290	283,210	

(1)	(2)	(3)	(4)
(e) Ammonium Chloride			
Kerela			
1. Fertilizers and Chemicals, Travancore Ltd., Alwaye ¶	25,000	6,250	
Uttar Pradesh			
2. New Central Jute Mills Co., Ltd., Varanasi	40,640	10,160	
Total	65,640	16,410	
Grand Total for (i)	—	735,040	

(ii) UNDER IMPLEMENTATION

(1)	(2)	(3)	(4)
(a) Urea			
Assam			
1. Fertilizer Corporation of India Ltd., Unit : Namrup **	330,000†	152,000	1970-71
Bihar			
2. Fertilizer Corporation of India Ltd., Unit : Barauni	330,000†	152,000	1971-72
Gujarat			
3. Gujarat State Fertilizers Co , Ltd., Baroda **	264,000†	120,000	1969-70
4. Indian Farmers Fertilizer Co-op. Ltd., Kandla	382,000	168,000	1971-72
Kerala			
5. Cochin Fertilizer Project, Cochin §§	330,000	145,000	1969-70
Madras			
6. Madras Fertilizers Ltd., Madras (*a*)	210,000†	96,600	1970-71
Maharashtra			
7. Fertilizer Corporation of India Ltd., Unit : Trombay **, ‡‡	392,000†	180,320	1971-72
Rajasthan			
8. Shriram Fertilizers and Chemicals, Kota	240,000†	111,700	1968-69

MANUFACTURERS AND INSTALLED CAPACITY OF NITROGENOUS FERTILIZERS (as on 30th September, 1968)-(Contd)

(1)	(2)	(3)	(4)
Uttar Pradesh			
9. Indian Explosives Ltd., Kanpur	450,000†	200,000	1969-70
West Bengal			
10. Fertilizer Corporation of India Ltd., Unit: Durgapur ‖ ‖. (*b*)	305,000†	140,000	1969-70
Total	3,233,000	1,465,620	

(b) Ammonium Chloride

Rajasthan			
1. Shriram Fertilizers and Chemicals, Kota	30,000	7,500	1970-71
Total	30 000	7,500	
Grand Total for (ii)	—	1,473,120	

(III) APPROVED IN PRINCIPLE

(a) Urea

Mysore			
1. Mangalore Project, Mangalore	340,000†	160,000	1970-71
Goa			
2. Birla Gwalior Pvt., Ltd., Goa	340,000†	160,000	1971-72
Total	680,000	320,000	

(b) Ammonium Chloride

Maharashtra			
1. Maharashtra Co-op. Fertilizers & Chemicals, Thana	66,000	16,500	1971-72
Total	66,000	16,500	
Grand Total for (iii)	—	336,500	
Grand Total for (i), (ii) and (iii)	—	2,544,660	

(1)	(2)	(3)	(4)
(IV) PROPOSED FOR IMPLEMENTATION			
(a) Urea			
Andhra Pradesh			
1. Coromandel Fertilizers Ltd,, Visakhapatnam **, (c)	173,500†	79,810	1972-73
2. Fertilizer Corporation of India Ltd., Unit : Kothagudem/Ramagundam	495,000†	229,000	Before 1975-76
Madhya Pradesh			
3. Fertilizer Corporation of India Ltd., Unit : Korba	495,000†	229,000	Before 1975-76
Punjab			
4. Punjab State Fertilizer Project, Bhatinda (*b*)	300,000†	138,000	Before 1975-76
Uttar Pradesh			
5. Pilani Investment Corporation Ltd., Mirzapur	340,000†	160,000	1973-74
Total	1,803,500	835,810	
Grand Total for (iv)	1,803,500	835,810	
Grand Total for (i), (ii), (iii) and (iv)	—	3,380,470	

* By-product from steel plants.

† The analysis of the fertilizers given in Table 9·6 have been used to calculate the capacities in terms of the nutrient except those marked with an asterisk.

‡ With the proposed renovation and technological alterations at F.C.I. Ltd., Sindri, under "Rationalisation Scheme"—naphtha as feed stock, by—product gypsum for ammonium sulphate and pyrites for sulphuric acid—triple superphosphate to the tune of 156,450 tonnes of P 205 is envisaged for production. Likely date of commissioning is 1970-71.

§ Also for expansion, the programme of which is furnished separately.

‖ With effect from 20th August 1967, calcium ammonium nitrate produced at F. C. I. Ltd., Nangal carries 25 per cent N as against 20·5 per cent.

¶ Only part of this will be available for fertilizer use.

** Expansion.

†† In addition, it produces 35,000 tonnes of technical grade urea containing 46·5% N.

‡‡ In addition, it will produce 2,500 tonnes of technical grade urea.

§ § It will produce urea during 1st phase beginning 1969-70. During 2np phase, both urea and ammonium phosphate sulphate are likely to be manufactured.

|| || A programme is proposed for FCI Ltd., Durgapur, similar to the "Rationalisatian Scheme" envisaged for FCI Ltd., Sindri. (‡)

(*a*) Total capacity of the project is 190,000 tonnes of N, while Urea (Vide ii) and ammonium phosphate Table 3.1 (ii), taken together account for 168,600 *tonnes of N. It is understood that the* balance N will be available as ammonia (NH_3).

(*b*) In addition, 15,000 tonnes of ammonia (NH_3) would be available for industrial use.

(*c*) Expansion is proposed in two phases; first phase having a capacity of 20,000 tonnes of N and the second phase 135,000 tonnes of N. Phase I is *expected to be completed by* 1970-71.

Source: Fertilizer Statistics, 1967-68.

PHOSPHATIC FERTILIZERS AND PHOSPHATIC FERTILIZER MATERIALS

MANUFACTURERS AND INSTALLED CAPACITY OF PHOSPHATIC FERTILIZERS (as on 30th September, 1968)

Name of the factory	Installed capacity (metric tons)	
	Material	Nutsient P_2O_5
(1)	(2)	(3)
(i) IN PRODUCTION		
(a) Suprephosphate		
South	548,900	87,800
Andhra Pradesh	177,030	28,320
1. Andhra Fertilizers, Ltd., Tadepalle	50,800	8,130
2. Andhra Sugars Ltd., Tanuku	33,530	5,360
3. Hyderabad Chemicals & Fertilizers Ltd., Maula Ali	41,900	6,700
4. Krishna Industrial Corporation, Nidadavole	50,800	8,130
Kerala	44,710	7,150
5. Fertilizers & Chemicals, Travancore Ltd., Alwaye	44,710	7,150
Madras	252,990	40,470
6. Blue Mountain Estates & Industries Ltd., Ennore	44,710	7,150
7. Coimbatore Pioneer Fertilizers Ltd., Coimbatore	40,640	6,500
8. E. I. D.—Parry Ltd., Ranipet	50,800	8,130
9. Premier Fertilizers Ltd., Cuddalore	40,640	6,500
10. Shaw Wallace & Co., Ltd., Avadi[2]	76,200	12,190
Mysore	74,170	11,860
11. Chamundi Chemicals & Fertilizers Ltd., Munirabad	40,640	6,500
12. Mysore Chemicals & Fertilizers Ltd. Belagula	33,530	5,360
West	303,140	47,960
Gujarat	90,540	14,490
13. Adarsh Chemicals & Fertilizers Ltd., Udhna	33,530	5,360
14. Alembic Chemical Works Co., Ltd., Baroda [1]	23,480	3,760
15. Anil Starch Products Ltd.. Bhavanagar	33,530	5,360

MANUFACTURERS AND INSTALLED CAPACITY OF

PHOSPHATIC FERTILIZERS (as on 30th September 1968)-(contd.)

(1)	(2)	(3)
Madhya Pradesh	75,000	12,000
16. Dharamsi Morarji Chemical Co., Ltd., Kumhari	75,000	12,000
Maharashtra	137,600	21,480
17. Bharat Fertilizer Industries Ltd., Bombay*	22,500	3.600
18. Dharamsi Morarji Chemical Co., Ltd., Ambernath	73,160	11,170
19. Eastern Chemical Co., Ltd., Bombay	5,590	890
20. Western Chemical Industries Ltd., Bombay	3,350	540
21. West India Chemicals Ltd., Mundhwa	10,800	1,730
22. West India Chemicals Ltd., Loni Kalbhore	22,200	3,550
North	281,160	44,980
Rajasthan	76,200	12,190
23. Hindustan Zinc Ltd., Debari	76,200	12,190
Utter Pradesh	60,960	9,750
24. Ralli Chemicals Ltd., Magarwara	60,960	9,750
Delhi	144,000	23,040
25. D. C. M. Chemical Works Co., Delhi	144,000	23,040
East	194,610	31,140
Assam	33,530	5,360
26. Associated Industries (Assam) Ltd., Chandrapur	33,530	5,360
Bihar	23,480	3,760
27. Bihar State Superphosphate Factory, Sindri	23,480	3,760
West Bengal	137,600	22,020
28. Jay Shree Chemicals & Fertilizers Ltd., Khardah[2]	50,000	8,000
29. Phosphate Co., Ltd., Rishra[4]	87,600	14,020
Total	1,327,810	211,880

(b) Triple Superphosphate

Maharashtra	27,000	12,150
Dharamsi Morarji Chemical Co. Ltd., Ambernath	27,000**	12,150

MANUFACTURES AND INSTALLED CAPACITY OF PHOSPHATIC FERTILIZERS (as on 30th September 1968)-(contd.)

(1)	(2)	(3)
(c) Dicalcium Phosphate		
Gujarat	8,230	2,800
Atul Product Ltd., Bulsar +	8,230**	2,800
Grand Total for (i)	—	226,830
(ii) UNDER IMPLEMENTATION		
(a) Superphosphate		
Gujarat		
1. Alembic Chemical Works Co. Ltd., Baroda[5]	10,060	1,610
2. J. K. Cotton Spg. Wvg. Mills Co. Ltd., Kanpur	40,640	6,500
Total	51,700	8,110
(b) Triple Superphosphate		
Rajasthan		
Khetri Dist., Jhunjhunu	222,220**	100,000
(c) Dicalcium Phosphate		
Andhra Pradesh		
1. Andhra Sugars Ltd., Tanuku	6,000**	2,040
Maharashtra		
1. Chemico India Ltd.. Bombay	12,500**	4,250
2. Gwalior Rayon Ltd., Bombay	33,000**	11,000
Total	51,500	17,290
Grand Totai for (ii)	—	125,400
(iii) APPROVED IN PRINCIPLE		
Superphosphate		
Maharashtra		
Maharashtra Ago-Industries Corpn., Bombay	48,000	7,680
Grand Total (i), (ii) & (iii)	—	359,910

MANUFACTURES AND INSTALLED CAPACITY OF

PHOSPHATIC FERTILIZERS (as on 30th September 1968)-(concluded.)

(1)	(2)	(3)
(iv) PROPOSED FOR IMPLEMENTATION		
Triple Superphosphate		
Bihar		
Fertilizer Corporation of India Ltd., Sindri	347,650**	156,450
Grand Total for (i), (ii), (iii) & (iv)	—	516,360

1. Also for expansion, the programme of which is shown separately.
2. Three shift basis, licensed, for 33,530 metric tons of superphosphate
3. Three shift basis, licensed for 43,890 metric tons of superphosphate.
4. Licensed for 35,210 metric tons of superphosphate.
5. Expansion.

* Producing granulated superphosphate.

** The analysis of the fertilizers given in Table 9·6 have not been used to calculate the capacities in terms of nutrients in these cases.

+ This product is meant mainly for cattle feed purposes.

Note: A programme similar to that of FCI Ltd., Sindri is proposed for FCI Ltd.. Durgapur. After the completion of the project, 347,650 tonnes of triple superphosphate (i. e.) 156,450 tonnes of $P_2 O_8$ could be produced.

Source: Fertilizer Statistics, 1967-68.

COMPLEX FERTILIZERS

MANUFACTURERS & INSTALLED CAPACITY OF COMPLEX FERTILIZERS

(as on 30th September 1968)

Name of the factory	Installed capacity metric tons			Likely date of Production
	Material	Nutrient		
		N	P_2O_5	
(1)	(2)	(3)	(4)	(5)
(i) IN PRODUCTION				
(a) Ammonium Phosphate Sulphate				
Kerala				
1. Fertilizers and Chemicals Travancore Ltd., Alwaye[1]	135,000	21,600	27,000	
Madras				
2. E. I. D. Parry Ltd., Ennore	51,480	8,240	10,300	
Total	186,480	29,840	37,300	
(b) Diammonium Phosphate				
Gujarat				
Gujarat State Fertilizers Co., Ltd., Baroda	108,000	21,600	51,840	
(c) Nitro-phosphate				
Maharashtra				
Fertilizer Corporation of India Ltd., Unit: Trombay [1]*	270,000**	45,000	45,000	
(d) Urea Ammonium Phosphate				
Andhra Pradesh				
Coromandel Fertilizers Ltd., Visakhapatnam[1]	260,000	73,000	73,000	
Grand Total for (i)	—	169,440	207,140	

MANUFACTURERS & INSTALLED CAPACITY OF COMPLEX FERTILIZERS

(as on 30th September, 1968)-(contd.)

(1)	(2)	(3)	(4)	(5)
(ii) UNDER IMPLEMENTATION				
(a) Ammonium Phosphate				
Kerala				
1. Fertilizers & Chemicals Travancore Ltd., Alwaye [2]*	@	22,000	9,200	1969-70
Madras				
†2. Madras Fertilizers Ltd , Madras+	360,000@	@72,000	85,000	1970-71
Total	—	94,000	94,200	
(b) Diammonium Phosphate				
Gujarat				
†1. Indian Farmers Fertilizer Co-op. Ltd., Kandla*	255,000@	@ 47,000	127,000	1971-72
Maharashtra				
2. Fertilizer Corporation of India Ltd., Unit : Trombay[2]	270,000	48,600	124,200	1971-72
Rajasthan				
3. Shriram Fertilizers & Chemicals Kota	60,000	10,800	27,600	1970-71
Total	585,00	106,400	278,800	
Grand Total for (ii)	—	200,400	373,000	
(iii) APPROVED IN PRINCIPLE				
Diammonium Phosphate				
Maharashtra				
Dharamsi Morarji Chemical Co., Ltd., Bombay	500,000	90,000	230,000	1970-71
Grand Total for (i), (ii) & (iii)	—	459,840	810,140	

MANUFACTURERS & INSTALLED CAPACITY OF COMPLEX FERTILIZERS

(as on 30th September, 1968)-(Concluded.)

(1)	(2)	(3)	(4)	(5)
(iv) PROPOSED FOR IMPLEMENTATION				
Ammonium Phosphate				
† Coromandel Fertilizers Ltd., Visakhapatnam++2*	@@	75,000	55,000	1972-73
Grand Total for (i), (ii), (iii) & (iv)	—	534,840	865,140	

1. Also for expansion, the programme of which is furnished separately.

2. Expansion.

* The Analysis of the fertilizers given in table 9·6 have been used to calculate the capacities in terms of the nutrient except those marked with an asterisk.

** With effect from 20-7-1967, nitrophosphate produced at F. C. I. Ltd. Trombay carries 20 per cent N and 20 per cent P_2O_5 as against the grade 16·13-0,

@ It is envisaged that 22,000 tonnes of N and 9,200 tonnes of P_2O_5 would be available from—

46,000 tonnes of ammonium phosphate (20-20-0) additional 35,000 tonnes of ammonium sulphate, and 135,000 tonnes of existing ammonium phosphate sulphate (16-20-0) by up grading it to (20-20-0).

@@ Exact end-productwise capacity and the nature of end product is not yet determined. They have generally been termed as "complex fertilizers of different grades" in the project reports, However capacities in terms of nutrients, as given, are correct which do not seem to conform to well recognized grades & hence to end product capacities *.

+ Total capacity of the project is 190,000 tonnes of N, while urea vide table 1·1 (ii) and ammonium phosphate (vide ii) taken together account for 168,600 tonnes of N. It is understood that the balance N will be available as ammonia (NH_3).

++ Expansion is proposed in two phases; first phase having a capacity of 20,000 tonnes of N and the second phase 135,000 tonnes of N.

† These complex fertilizers would be containing the following quantities of K_2O, in addition to N and P_2O_5 :—

1. Madras Fertilisers Ltd. (not yet determined).
2. Indian Farmers Fertiliser Co-operative Ltd.-66,000 tons of K_2 O.
3. Coromandel Fertilisers Ltd. 60,000 tons of K_2O.

Source: Fertilizer Statistics, 1967-68.

ANNUAL DISTRIBUTION OF MURIATE OF POTASH 1965-66 TO 1967-68

(metric tons)

Distributed to	April — March				July — June			
	1965-66	1966-67	1967-68		1965-66	1966-67	1967-68	
			60% K_2O	50% K^2O			60% K_2O	50% K^2O
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
South	**77,261**	**104,407**	**115,344**	**12,411**	**82,953**	**108,267**	**115,760**	**12,829**
		(142)			**(142)**			
Andhra Pradesh	4,442	5,351	4,076	620	4,491	5,715	4,077	919
Kerala	34,079	33,820	31,471	5,567	35,587	32,409	28,566	5,739
		(122)			(122)			
Madras	27,227	44,846	53,973	4,186	30,283	48,169	51,294	4,155
		(20)			(20)			
Mysore	11,513	23,090	25,128	2,038	12,592	21,974	31,111	2,016
Pondicherry	—	—	696	—	—	—	712	—
West	**19,579**	**32,959**	**44,014**	**2,090**	**27,622**	**38,048**	**45,618**	**2,090**
Gujarat	3,804	3,878	3,692	96	3,948	3,360	4,929	96
Madhya Pradesh	1,010	3,200	3,100	—	4,210	1,550	5,941	—
Maharashtra	14,765	25,353	37,222	1,994	19,436	32,638	34,248	1,994
Goa	—	528	—	—	28	500	500	—

ANNUAL DISTRIBUTION OF MURIATE OF POTASH 1965-66 TO 1967-68-(concluded.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
North	**3,485**	**14,252**	**82,608**	**22**	**12,120**	**31,154**	**103,798**	**22**
Haryana	—	308	4,044	—	—	308	4,044	—
Jammu & Kashmir	1*	31	5,957	—	1*	2,531	16,536	—
Punjab	2,016†	3,785	17,752	—	2,016†	9,503	12,039	—
Rajasthan	139	2,781	2,236	—	1,847	1,153	2,156	—
Uttar Pradesh	1,303	7,347	52,259	22	8,230	17,659	68,663	22
Himachal Pradesh	26‡	—	360	—	26‡	—	360	—
East	**22,850**	**24,914**	**22,514**	**12,601**	**18,498**	**28,996**	**22,250**	**9,795**
Assam	1,123	1,708	821	—	571	1,652	1,199	—
Bihar	3,718	4,738	6,000	86	2,254	5,090	5,000	86
Orissa	1,474	2,780	3,630	—	1,606	2,780	3,652	—
West Bengal	16,535	15,673	12,053	12,515	14,067	19,449	12,255	9,709
Andamans	—	—	—	—	—	—	—	—
Nagaland	—	15	10	—	—	25	—	—
Dandakaranya	—	—	—	—	—	—	144	—
Total	**123,175**	**176,532 (142)**	**294,370**	**27,124**	**141,193 (142)**	**206,465**	**287,426**	**24,736**
Others	1,000	510	3,488	—	1,510	—	3,488	—
India	124,175	177,042 (142)	297,858	27,124	142,703 (142)	206,465	290,914	24,736

* See Himachal Pradesh.
† These figures are for composite State of Punjab.
‡ These figures are for Jammu & Kashmir and Himachal Pradesh.
Note: Figures in brackets are for Kamex containing 38-42% K_2O.
Source: Fertilizer Statistics, 1967-68.

ANNUAL DISTRIBUTION OF SULPHATE OF POTASH

1965-66 to 1967-68

(metric tons)

Distributed to	1965-66	1966-67	1967-68*
(1)	(2)	(3)	(4)
South	**6,469**	**14,263**	**371**
Andhra Pradesh	5,906	13,593	—
Kerala	17	—	—
Madras	69	646	—
Mysore	477	24	—
U. P. A. S. I.	—	—	48
Coffee Board	—	—	323
West	**916**	**4,492**	**—**
Gujarat	704	2,124	—
Maharashtra	212	2,368	—
North	**296**	**99**	**4,180**
Punjab	—	—	1,915
Rajasthan	200	96	—
Uttar Pradesh	96	—	2,265
Delhi	—	3	—
East	**223**	**—**	**—**
Assam	200	—	—
West Bengal	23	—	—
Total	**7,904**	**18,854**	**4,551**
Wastages	50	—	—
India	**7,954**	**18,854**	**4,551**

* Provisional.

Source: Fertilizer Statistics, 1967-68.

IMPORTS OF POTASSIC FERTILIZERS

1965-66 to 1967-68 (July - June)

Year/country from which imported	Muriate of potash 60% K_2O	Muriate of potash 50% K_2O	Kamex 38-42% K_2O	Sulphate of potash 50% K_2O
(1)	(2)	(3)	(4)	(5)
1965-66				
France	—	—	—	3,668
Germany East	70,274	4,280	200	—
Germany West	40,297	—	—	578
Italy	—	—	—	3,519
United Kingdom	35,327	—	—	—
Total 1965-66	**145,898**	**4,280**	**200**	**7,765**
1966-67				
Canada	10,736	—	—	—
France	—	—	—	4,877
Hungary	21,454	—	—	—
Germany East	102,837	29,597	—	5,000
Germany West	—	—	—	10,022
Italy	—	—	—	4,753
United Kingdom	46,920	—	—	—
U. S. S. R.	13,940	—	—	—
Total 1966-67	**195,887**	**29,597**	—	**24,652**

IMPORTS OF POTASSIC FERTILIZERS

1965-66 to 1967-68 (July - June)-(concluded.)

(1)	(2)	(3)	(4)	(5)
1967-68				
Canada	74,603	—	—	—
France	27,527	—	—	—
Germany East	104,296	17,617	—	—
Germany West	30,006	—	—	—
Norway	145	—	—	—
U. S. A.	78,757	—	—	—
U. S. S. R.	3,573	—	—	—
Potash Fertilizers Ltd., London	99,950	—	—	—
Total 1967-68	**418,857**	**17,617**	—	—

Source : 1. Indian Potash Supply Agency Ltd., Madras.

2. Established importers.

3. Ministry of Food, Agriculture, C. D. and Co-operation, New Delhi.

4. Fertilizer Statistics, 1967-68.

INSTALLED CAPACITY OF FERTILIZERS-

(as on 30th September,

Name of the factory	Ammonium sulphate (N)	Amonium sulphate nitrate (N)	Calcium ammonium nitrate (N)	Urea (N)	Ammonium chloride (N)	Superphosphate (P_2O_5)	Triple superphosphate (P_2O_5)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
In Production							
Fertilizer Corporation of India Ltd., Sindri	74,550	31,700	—	10,750	—	—	—
Fertilizer Corporation of India Ltd., Nangal	—	—	80,000[2]	—	—	—	—
Fertilizer Corporation of India Ltd., Trombay	—	—	—	45,000[4]	—	—	—
Fertilizer Corporation of India Ltd., Gorakhpur	—	—	—	80,000	—	—	—
Fertilizer Corporation of India Ltd., Namrup	20,600	—	—	24,200[4]	—	—	—
Fertilizers & Chemicals, Travancore Ltd., Alwaye	42,000	—	—	—	6,250[5]	[6]	—
Neyveli Lignite Corporation Ltd., Neyveli	—	—	—	70,000	—	—	—
Hindustan Steel Ltd., Rourkela	5,770[1]	—	120,000[3]	—	—	—	—
Hindustan Steel Ltd., Bhilai	6,720[1]	—	—	—	—	—	—
Hindustan Steel Ltd., Durgapur	4,370[1]	—	—	—	—	—	—
Mysore Chemicals & Fertilizers Ltd., Belagula	1,380	—	—	—	—	[6]	—
Gujarat State Fertilizers Co. Ltd., Baroda	30,490	—	—	46,000[4]	—	—	—
Coromandel Fertilizers Ltd., Visakhapatnam	—	—	—	7,260[4]	—	—	—

FACTORYWISE AND PRODUCTWISE

1968) (Metric tons of nutrient per annum)

Dicalcium phosphate	Ammonium phosphate		Nitrophosphate		Diammonium phosphate		Urea ammonium phosphate		Total	
(P_2O_5)	(N)	(P_2O_5)	(N)	(P_2O_5)	(N)	(P_2O_5)	(N)	(P_2O_5)	(N)	(P_2O_5)
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
—	—	—	—	—	—	—	—	—	117,000	—
—	—	—	—	—	—	—	—	—	80,000	—
—	—	—	45,000[8]	45,000[8]	—	—	—	—	90,000	45,000
—	—	—	—	—	—	—	—	—	80,000	—
—	—	—	—	—	—	—	—	—	44,800	—
—	21,600[7,4]	27,000[7,4]	—	—	—	—	—	—	69,850	27,000
—	—	—	—	—	—	—	—	—	70,000	—
—	—	—	—	—	—	—	—	—	125,770	—
—	—	—	—	—	—	—	—	—	6,720	—
—	—	—	—	—	—	—	—	—	4,370	—
—	—	—	—	—	—	—	—	—	1,380	—
—	—	—	—	—	21,600	51,840	—	—	98,090	51,840
—	—	—	—	—	—	—	73,000	73,000	80,206	73,000

(as on 30th September,

Name of the factory	Ammonium sulphate (N)	Ammonium sulphate nitrate (N)	Calcium ammonium nitrate (N)	Urea (N)	Ammonium chloride (N)	Superphos. phate (P_2O_5)	Triple superphosphate (P_2O_5)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
In Production—(contd.)							
E. I. D. Parry Ltd., Ennore	7,950	—	—	—	—	—	—
New Central Jute Mills Co. Ltd., Varanasi	—	—	—	—	10,160	—	—
Steel Factories - by-product	9,890[1]	—	—	—	—	—	—
Superphosphate Factories	—	—	—	—	—	211,880	—
Dharamsi Mororji Chemical Co. Ltd., Ambernath	—	—	—	—	—	—	12,150
Atul Products Ltd., Bulsar	—	—	—	—	—	—	—
Total	**203,720**	**31,700**	**200,000**	**283,210**	**16,410**	**211,880**	**12,150**
Under Implementation							
Fertilizer Corporation of India Ltd., Namrup	—	—	—	152,000[9]	—	—	—
Fertilizer Corporation of India Ltd., Barauni	—	—	—	152,000	—	—	—
Fertilizer Corporation of India Ltd., Durgapur	—	—	—	140,000[10]	—	—	—
Fertilizer Corporation of India Ltd., Trombay	—	—	—	180,320[9]	—	—	—
Madras Fertilizers Ltd., Madras	—	—	—	96,600[11]	—	—	—
Cochin Fertilizers Project, Cochin	—	—	—	145,000	—	—	—

FACTORYWISE AND PRODUCTWISE

1968) (contd.) (Metric tons of nutrient per annum)

Dicalcium phosphate	Ammonium phosphate		Nitrophosphate		Diammonium phosphate		Urea Ammonium phosphate		Total	
(P_2O_5)	(N)	(P_2O_5)	(N)	(P_2O_5)	(N)	(P_2O_5)	(N)	(P_2O_5)	(N)	(P_2O_5)
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
—	8,240[7]	10,300[7]	—	—	—	—	—	—	16,190	10,300
—	—	—	—	—	—	—	—	—	10,160	—
—	—	—	—	—	—	—	—	—	9,890	—
—	—	—	—	—	—	—	—	—	—	211,880
—	—	—	—	—	—	—	—	—	—	12,150
2,800	—	—	—	—	—	—	—	—	—	2,800
2,800	**29,840**	**37,300**	**45,000**	**45,000**	**21,600**	**51,840**	**73,000**	**73,000**	**904,480**	**433,970**
—	—	—	—	—	—	—	—	—	152,000	—
—	—	—	—	—	—	—	—	—	152,000	—
—	—	—	—	—	—	—	—	—	140,000	—
—	—	—	—	—	48,600	124,200	—	—	228,920	124,200
—	72,000[11]	85,000	—	—	—	—	—	—	168,600	85,000
—	—	—	—	—	—	—	—	—	145,000	—

(as on 30th September,

Name of the factory	Ammonium sulphate (N)	Ammonium sulphate nitrate (N)	Calcium Ammonium nitrate (N)	Urea (N)	Ammonium chloride (N)	Superphosphate (P_2O_5)	Triple superphosphate (P_2O_5)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Uuder Implementation-(contd.)							
Fertilizers & Chemicals, Travancore Ltd., Alwaye	—	—	—	—	—	—	—
Indian Farmers Fertilizer Co-Operative Ltd., Kandla	—	—	—	168,000	—	—	—
Gujarat State Fertilizers Co., Ltd., Baroda	—	—	—	120,000[9]	—	—	—
Indian Explosives Ltd., Kanpur	—	—	—	200,000	—	—	—
Shiriram Fertilizers & Chemicals, Kota	—	—	—	111,700	7,500	—	—
Superphosphate Factories	—	—	—	—	—	8,110	—
Khetri Project, Jhunjhunu	—	—	—	—	—	—	100,000
Dicalcium Phosphate Factories	—	—	—	—	—	—	—
Total	—	—	—	**1,465,620**	**7,500**	**8,110**	**100,000**
Approved in Principle							
Mangalore Project, Mangalore	—	—	—	160,000	—	—	—
Birla Gwalior Private Ltd., Goa	—	—	—	160,000	—	—	—
Maharashtra Co-operative Fertilizer & Chemicals Ltd., Thana	—	—	—	—	16,500	—	—
Dharamsi Morarji Chemical Co. Ltd., Bombay	—	—	—	—	—	—	—
Thana Distt. Co-operative Industrial Association, Thana	—	—	—	—	—	7,680	—
Total	—	—	—	**320,000**	**16,500**	**7,680**	—

FACTORYWISE AND PRODUCTWISE

1968) (contd.) (Metric tons of nutrient per annum)

Dicalcium phosphate	Ammonium phosphate		Nitrophosphate		Diammonium phosphate		Urea ammonium phosphate		Total	
(P_2O_5)	(N)	(P_2O_5)	(N)	(P_2O_5)	(N)	(P_2O_5)	(N)	(P_2O_5)	(N)	(P_2O_5)
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
—	22,000[9]	9,200[9]	—	—	—	—	—	—	22,000	9,200
—	—	—	—	—	47,000	127,000	—	—	215,000	127,000
—	—	—	—	—	—	—	—	—	120,000	—
—	—	—	—	—	—	—	—	—	200,000	—
—	—	—	—	—	10,800	27,600	—	—	130,000	27,600
—	—	—	—	—	—	—	—	—	—	8,110
—	—	—	—	—	—	—	—	—	—	100,000
17,290	—	—	—	—	—	—	—	—	—	17,290
17,290	**94,000**	**94,200**	—	—	**106,400**	**278,800**	—	—	**1,673,520**	**498,400**
—	—	—	—	—	—	—	—	—	160,000	—
—	—	—	—	—	—	—	—	—	160,000	—
—	—	—	—	—	—	—	—	—	16,500	—
—	—	—	—	—	90,000	230,000	—	—	90,000	230,000
—	—	—	—	—	—	—	—	—	—	7,680
—	—	—	—	—	**90,000**	**230,000**	—	—	**426,500**	**237,680**

INSTALLED CAPACITY OF FERTILIZERS–

(as on 30th September,

Name of the factory	Ammonium sulphate (N)	Ammonium sulphate nitrate (N)	Calcium ammonium nitrate (N)	Urea (N)	Ammonium chloride (N)	Super phosphate (P_2O_5)	Triple super phosphate (P_2O_5)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Proposed for Implementation							
Fertilizer Corporation of India Ltd., Kothagudam Ramagundam	—	—	—	229,000	—	—	—
Fertilizer Corporation of India Ltd., Korba	—	—	—	229,000	—	—	—
Fertilizer Corporation of India Ltd., Sindri	—	—	—	—	—	—	156,450
Punjab State Fertilizer Project, Bhatinda	—	—	—	138,000	—	—	—
Coromandel Fertilizers Ltd., Visakhapatnam	—	—	—	79,810[9]	—	—	—
Pilani Investment Corporation Ltd., Mirzapur	—	—	—	160,000	—	—	—
Total	—	—	—	**835,810**	—	—	**156,450**
Grand Total	**203,720**	**31,700**	**200,000**	**2,904,640**	**40,410**	**227,670**	**268,600**

1. By product from steel plants.

2. With effert from 20-8-1967, Calcium ammonium nitrate produced at FCI Ltd., Nangal carries 25 per cent N as against 20·5 per cent.

3. of grade 20·5% N.

4. For expansion

5. Only part of this will be available for agricultural purposes.

6. Taken into account under "Superphosphate factories."

7. of grade 16-20-0.

8. From July 1967, FCI Ltd., Trombay, started the production of (20-20-0) grade nitrophosphate.

9. Expansion.

10. In addition, 15,000 metric tons of ammonia would be available for industrial use.

11. Total capacity of the project is 190,000 metric tons of N, while urea and ammonium phosphate taken together account for 168,600 metric tons of N. It is understood that the balance N will be available as ammonia.

Source: Fertilizer Statistics, 1967-68.

FACTORYWISE AND PRODUCTWISE

1968) (concluded) (Metric tons of nutrient per annum)

Dicalcium phosphate	Ammonium phosphate		Nitrophosphate		Diammonium phosphate		Urea Ammonium phosphate		Total	
(P_2O_5)	(N)	(P_2O_5)	(N)	(P_2O_5)	(N)	(P_2O_5)	(N)	(P_5O_2)	(N)	(P_2O_5)
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
—	—	—	—	—	—	—	—	—	229,000	—
—	—	—	—	—	—	—	—	—	229,000	—
—	—	—	—	—	—	—	—	—	—	156,450
—	—	—	—	—	—	—	—	—	138,000	—
—	75,000	55,000	—	—	—	—	—	—	154,810	55,000
—	—	—	—	—	—	—	—	—	160,000	—
—	75,000	55,000	—	—	—	—	—	—	910,810	211,450
20,090	198,840	186,500	45,000	45,000	218,000	560,640	73,000	73,000	3,915,310	1,381,500

Year	Ammonium sulphate[1]	Urea[1,2]	Ammonium sulphate nitrate[1,2]	Calcium ammonium nitrate[1,2]	Ammonium chloride	Chilean natural nitrate of soda	Ammonium 16:20:0 Grade[1]
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1951	292·3	—	—	—	—	—	—
1952	276·2	—	—	—	—	—	—
1953	426·6	—	—	—	—	—	—
1954	453·0	—	—	—	—	—	—
1955	499·0	5·3	2·6	—	—	—	—
1956	488·1	7·2	8·3	0·9	—	—	—
1957	610·9	30·5	24·5	5·0	—	—	—
1958–59	563·1	63·3	65·4	46·6	—	9·7	—
1959–60	681·8	107·7	77·2	73·3	2·0	13·0	—
1960–61	708·9	55·3	79·4	78·5	6·7	14·7	2·5
1961–62	744·5	146·0	88·4	219·3	8·4	8·4	12·0
1962–63	936·3	184·6	55·0	294·7	6·7	12·6	9·6
1963-64	795·3	247·4	50·7	494·0	12·4	—	25·9
	(821·4)	(262·5).	(37·0)	(541·2)	(13·4)	(6·2)	(30·8)
1964–65	797·2	268·1	47·3	558·1	16·1	—	49·3
	(924·7)	(333·7)	(49·2)	(563·0)	(18·2)	(6·0)	(53·0)
1965–65	1,275·1	301·9	52·5	513·6	26·1	6·4	54·9
	(1,449·6)	(296·8)	(61·0)	(487·2)	(25·6)	(5·2)	(53·4)
1966–67	1,583·8	596·9	86·8	650·2[11]	34·8	0·1	76·0
	(1,386·9)	(643·5)	(82·1)	(623·8)[12]	(33·6)	(—)	(81·8)
1967–68	1,227·3	1,003·3	88·6	609·0[19]	51·0	—	88·8
	(1,376·1)	(1,079·3)	(84·0)	(643·5)[20]	(61·3)	(—)	(86·1)

1. Figures from 1958-59 onwards relate to financial years (April - March). In respect of 1963-64, 1964-65, 1965-66, 1966-67 and 1967-68 figures are furnished both on financial year as well as agricultural year (July - June) basis, the latter being in brackets.

2. Figures from 1951 to 1958-59 refer to "allotments", while the other figures are actual "despatches" under the "Central Fertilizer Pool."

3. Includes 3,073 metric tons of 18·5% P_2O_5 grade superphosphate.

4. Quantities imported are considered as distributed.

5. Includes 488 and 185 metric tons of 18% and 19%P_2O_5 grade superphosphate, respectively.

6. Includes, 1,163 metric tons of 18% grade superphosphate.

7. Includes 748 metric tons of 18% grade superphosphate.

8. Includes 35,383 metric tons of (16-13-0) grade material, 37,281 metric tons of (20-20-0) grade material and, 630 metric tons and 391 metric tons of experimental nitrophosphate of (15-15-7·5); & (18-18-9) grades, respectively.

9. Includes 142 metric tons of Kamex (38·42% K_2O).

10. Includes 903 and 185 metric tons of 18% and 19% P_2O_5 grade/superphosphate, respectively.

11. Includes 75,293; 22,711; and 507,261 metric tons of 26%N, 22%N, and 20·5% N, grade calcium ammonium nitrate, respectively.

12. Includes 80,653; 22,711; and 520,449 metric tons of 26%N, 22%N and 20·5%N, grade calcium ammonium nitrate respectively.

13. Includes 676,172; 4,962; and 1,449 metric tons of 16% P_2O_5 18% P_2O_5 and 18·5% P_2O_5 grade supherphosphate, respectively.

14. Includes 697,668; 5,710; 12,630 and 250 metric tons of 16% P_2O_5 18% P_2O_5, 18·5% P_2O_5 and 19% P_2O_5 grade superphosphate, respectively.

phos-phate 20:20:0 Grade[1]	Nitrophosphate 12-9-12-9.0	16-13-0	Super-phosphate	Triple super-phos-phate	Diam-monium phos-phate 18-46-0	N.P.K. mixture	Muriate of potash	Sulphate of potash[4]
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
—	—	—	43·0	—	—	—	—	—
—	—	—	28·0	—	—	—	—	—
—	—	—	50·0	—	—	—	—	—
—	—	—	80·0	—	—	—	—	—
—	—	—	80·0	—	—	—	—	—
—	—	—	97·6	—	—	—	—	—
—	—	—	134·8	—	—	—	—	—
—	—	—	184·3	—	—	—	—	—
11·8	11·3	—	313·2	—	—	—	29·2	7·6
—	1·0	—	328·2	—	—	—	38·0	12 6
—	5·0	—	380·5	—	—	—	41·5	6·1
21·4	13·3	—	512·7	—	—	—	57·9	3·5
45·4	17·6	—	625·9[5]	—	—	—	80·7	4·3
(44·5)	(19·0)	—	(647·1)[1,10]	—	—	—	(81·6)	(5·8)
42·3	32·9	—	781·8[6]	—	—	—	108·9	10·2
(43·6)	(29·5)	—	(775·8)[7]	—	—	—	(112·0)	(8·8)
74·0	1·2	10·2	655·8	—	—	—	124·2	6·5
(91·5)	(—)	(24·9)	(637·6)[8]	—	—	—	(142·8)[9]	(8·0)
194·6	—	61·2	696·4[13]	—	161·9	—	177·2[15]	N.A.
(186·1)	(—)	(70·4)	(716.3)[14]	—	(208·4)	—	(206·5)	18·6
207.2	—	74·2[8]	778·1[17]	—	463·3[21]	78·2	325·0[23]	N.A.
(202·8)	(—)	(70·3)[16]	(795·9)[18]	(0·2)	(484·2)[22]	(117·7)	(315·6)[24]	(4·6)

15. Includes a quantity of 142 metric tons of 38-42% K_2O grade of Kamex.

16. Includes 12,394 metric tons of (16-13-0) grade material; 56,874 metric tons of (20-20-0) grade material and 630 metric tons and 391 metric tons of experimental nitrophosphate of (15-15-7·5) & (18-18-9) grades, respectively.

17. Includes 772,315; 657; 3,441; 753 and 900 metric tons of 16%, 17·5% 18%, 18·5% and 19% P_2O_5 grade superphosphate, respectively.

18. Includes 791,374; 665; 2,993; 49; 662; and 115 metric tons of 16%, 17·5%, 18%, 18 5% 19% and 21% P_2O_5 grade superphosphate, respectively.

19. Includes 336,359; 192,008 and 80,653 metric tons of 20·5%, 25% and 26%N grade calcium ammonium nitrate.

20. Includes 247, 672, 265,530 and 130,271 metric tons of 20·5%, 25% and 26% N grade calcium ammonium nitrate.

21. Includes 441,328 and 22,026 metric tons of (18-46-0) grade (20-48-0) grade diammonium phosphate, respectively.

22. Includes 453,669 and 30,497 metric tons of (18-46-0) grade and (20-48-0) grade diammonium phosphate, respectively.

23. Includes 297,858 and 27,124 metric tons of 60% and 50% K_2O grade muriate of potash, respectively.

24. Includes 290,914 and 24,736 metric tons of 60% and 50%K_2O grade muriate of potash, respectively.

Note: A quantity of 9,595 metric tons of *basic slag* (16% P_2O_5) was distributed during 1967-68 (April - March).

N.A. Not available.

Source: Fertilizer Statistics, 1967-68.

Distributed to	Ammonium sulphate	Urea	Ammonium sulphate nitrate	Calcium ammonium nitrate 20·5%	Calcium ammonium nitrate 25%N	Calcium ammonium nitrate 26%N	Ammonium chloride	Ammonium phosphate 16-20-0	Ammonium phosphate 20-20-0
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
South	**537,441**	**447,004**	**35,605**	**40,555**	**704**	**58,150**	**19,720**	**84,554**	**98,235**
Andhra Pradesh	176,377	176,488	16,589	22,441	704	16,951	10,867	12,130	56,050
Kerala	43,397	26,690	120	1,902	—	—	—	13,345	—
Madras	166,691	158,529	4,611	275	—	20,608	2,208	45,023	12,735
Mysore	103,206	79,673	6,263	6,146	—	18,185	6,645	14,056	28,900
Pondicherry	4,250	1,430	—	—	—	—	—	—	550
U.P.A.S.I.	25,075	1,203	414	2,361	—	—	—	—	—
Coffee Board	11,002	2,918	7,201	7,430	—	2,406	—	—	—
Rubber Board	6,644	73	407	—	—	—	—	—	—
Cardamom Board	799	—	—	—	—	—	—	—	—
West	**223,910**	**220,944**	**9,700**	**14,284**	—	**11,457**	**9,790**	**1,330**	**46,777**
Gujarat	56,534	86,065	289	—	—	7,222	293	—	2,841
Madhya-Pradesh	39,332	30,038	—	—	—	—	9,497	—	1,597
Maharashtra	125,429	104,668	9,402	14,284	—	4,235	—	1,282	40,359
Goa	2,573	125	—	—	—	—	—	48	1,990
Dadra & Nagar Haveli	42	48	—	—	—	—	—	—	—
North	**333,277**	**309,506**	**35,522**	**93,120**	**264,672**	**46,409**	**15,728**	—	**49,948**
Haryana	20,277	26,827	—	16,532	61,947	5,039	—	—	423

(July - June)

Diammonium phosphate 18-46-0	Diammonium phosphate 20-48-0	Nitro phosphate 16-13-0	Nitro phosphate 22-20-0	N.P.K. mixtures 14-14-14	Single superphosphate 16%W.S. P_2O_5	Single superphosphate Higher grades	Triple super phosphate	Muriate of potash 60% K_2O	Muriate of potash 50% K_2O	Sulphate of potash (50%K_2O)
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
160,735	**—**	**8,759**	**38,159 630§ 115‖**	**106,352**	**259,969**	**2,284†**	**71**	**115,760**	**12,829**	**371**
22,378	—	7,750	34,516 630§ 115‖	8,591	109,567	—	—	4,077	919	—
12,857	—	—	23	—	19,745	—	—	28,566	5,739	—
68,879	—	710	1,219	85,159	63,022	2,284†	1	51,294	4,155	—
54,952	—	299	2,401	12,514	67,463	—	70	31,111	2,016	—
1,669	—	—	—	88	172	—	—	712	—	—
—	—	—	—	—	—	—	—	—	—	48
—	—	—	—	—	—	—	—	—	—	323
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—
71,316	**30,497**	**2,153**	**12,750**	**—**	**230,715**	**531† 49‡**	**99**	**45,618**	**2,090**	**—**
182	30,445	321	66	—	105,162	—	66	4,929	96	—
1,728	—	23	200	—	44,998	—	—	5,941	—	—
68,580	52	1,809	12,484	—	80,456	531†49‡	33	34,248	1,994	—
826	—	—	—	—	—	—	—	500	—	—
—	—	—	—	—	99	—	—	—	—	—
173,456	**—**	**1,457**	**4,916 276‖**	**11,329**	**159,276**	**—**	**—**	**103,798**	**22**	**4,180**
7,232	—	—	—	—	3,799	—	—	4,044	—	—

1967-68

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
North-(contd.)									
Jammu & Kashmir	23,919	2,784	—	3,463	4,457	408	—	—	—
Punjab	101,707	47,355	7,991	31,178	147,619	17,768	—	—	17,732
Rajasthan	17,762	27,936	—	3,162	15,796	5,779	—	—	2,247
Uttar Pradesh	167,418	203,107	27,531	37,381	22,294	13,827	15,728	—	28,106
Delhi	221	225	—	770	5,100	—	—	—	—
Himachal Pradesh	1,973	984	—	634	7,459	3,588	—	—	1,440
Chandi-gargh	—	288	—	—	—	—	—	—	—
East	**272,334**	**101,399**	**3,165**	**58,700**	**154**	**14,255**	**12,812**	**26**	**7,852**
Assam	—	869	—	—	—	—	—	24	—
Bihar	114,553	55,878	2,693	5,451	—	14,255	9,973	—	840
Orissa	132	626	—	49,867	154	—	—	—	—
West Bengal	75,093	42,447	472	2,419	—	—	2,839	2	6,604
Manipur	576	1,213	—	—	—	—	—	—	—
Tripura	—	94	—	479	—	—	—	—	—
Nagaland	—	—	—	—	—	—	—	—	—
Dandaka-ranya	96	96	—	484	—	—	—	—	408
Tea (N. E. India)	81,884	176	—	—	—	—	—	—	—
Used in mixtures	—	—	—	—	—	—	—	—	—
Others	6,252	443	2	—	—	—	3,255	175	—
All India	**1,373,214**	**1,079,296**	**83,994**	**247,672**	**265,530**	**130,271**	**61,305**	**86,085**	**202,812**

OF FERTILIZER MATERIALS

(July-June)-(contd.)

(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
25,236	—	—	—	—	6,524	—	—	16,536	—	—
41,604	—	1,457	—	—	64,867	—	—	12,039	—	1,915
9,053	—	—	—	—	19,081	—	—	2,156	—	—
86,705	—	—	276‖	11,329	62,343	—	—	68,663	22	2,265
—	—	—	4,915	—	212	—	—	—	—	—
3,626	—	—	1	—	2,450	—	—	360	—	—
—	—	—	—	—	—	—	—	—	—	—
48,162	—	—	23	—	99,886	662$	—	22,250	9,795	—
—	—	—	—	—	9,089	542$	—	1,199	—	—
43,089	—	—	—	—	39,986	—	—	5,000	86	—
3,335	—	—	23	—	988	—	—	3,652	—	—
1,414	—	—	—	—	48,309	120$	—	12,255	9,709	—
324	—	—	—	—	1,015	—	—	—	—	—
—	—	—	—	—	470	—	—	—	—	—
—	—	—	—	—	28	—	—	—	—	—
—	—	—	—	—	—	—	—	144	—	—
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	41,440	665*178† 115	115 14	¶	—	—
—	—	25	789	—	—	—	—	3,488	—	—
453,669	**30,497**	**12,394**	**56,637** **630 §**	**117,681** **391 ‖**	**791,286**	**4484 &**	**184**	**290,914**	**24,736**	**4,551**

STATEWISE DISTRIBUTION OF FERTILIZER MATERIALS

1967–68 (July-June) (Concluded)

* of 17·5% W. S. P_2O_5 grade saperphosphate·

† of 18% W. S. P_2O_5 grade superphosphate.

‡ of 18·5% W. S. P_2O_5 grade superphosphate.

$ of 19% W. S. P_2O_5 grade superphosphate.

¶ of 21% W. S. P_2O_5 grade superphosphate.

§ of 15-15-7·5 experimental grade nitrophosphate.

|| of 18-18-9 experimental grade nitrophosphate.

Note : (i) The difference between 'All India total and the sum of the zonal totals and others' is due to the non-availability of the statewise distribution of a part of one nitrogenous fertilizer.

(ii) Besides the All India distribution presented in the table, 2,905 metric tons of ammonium sulphate and 88 metric tons of superphosphate (16% W. S. P_2O_5) were exported to Nepal.

(iii) Statewise distribution data in respect of one factory are awaited and comprises 665*, 2993†, 49‡, 662$ and 115¶ higher grades superphosphate.

Source : Fertilizer Statistics, 1967–68.

CONSUMPTION OF FERTILIZERS PER UNIT CROPPED AREA 1967-68

Zone/State	Consumption in Kg. per hectare			
	N	P_2O_5	K_2O	Total
(1)	(2)	(3)	(4)	(5)
South	**13·18**	**5·30**	**2·74**	**21·22**
Andhra Pradesh	12·50	3·97	0·33	16·80
Kerala	10·48	4·72	8·04	23·24
Madras	20·71	9·19	6·24	36·14
Mysore	8·06	4·35	1·98	14·39
Pondicherry	41·62	19·53	9·36	70·51
West	**3·92**	**2·00**	**0·59**	**6·51**
Gujarat	5·97	3·20	0·30	9·47
Madhya Pradesh	1·32	0·44	0·19	1·95
Maharashtra	5·38	2·90	1·12	9·40
Goa	8·22	5·67	2·16	16·05
North	**7·49**	**2·43**	**1·36**	**11·28**
Jammu & Kashmir	15·04	15·01	11·77	41·82
Punjab *	14·00	3·68	1·05	18·73
Rajasthan	1·59	0·49	0·08	2·16
Uttar Pradesh	8·24	2·65	2·04	12·93
Delhi	25·15	9·97	—	35·12
Himachal Pradesh	10·65	5·29	0·49	16·43
East	**4·75**	**1·43**	**0·65**	**6·83**
Assam	0·15	0·57	0·26	0·98
Bihar	6·01	2·44	0·28	9·73
Orissa	1·50	0·23	0·29	2·02
West Bengal	5·93	1·52	1·91	9·36
Manipur	4·20	1·78	—	5·98
Tripura	0·44	0·23	—	0·67
Nagaland	—	0·08	—	0·08
Andamans	—	—	—	—
All India	**7·18**	**2·77**	**1·30**	**11·25**

* These figures are for the erstwhile State of Punjab.

Note : 1. Data on cropped area have been taken from Table 1·1 of Part II.

2. Calculated on the basis of distribution figures.

Source : Fertilizer Statistics, 1967-68.

LIST OF INDIAN PERIODICALS ON AGRICULTURAL SCIENCE, HORTICULTURE, ANIMAL HUSBANDRY AND CO-OPERATION

English

Andhra Pradesh, Andhra Agricultural Journal, Bapatla; *Bihar*, News Letter Animal Production, Patna; Proceedings of the Bihar Academy of Agricultural Sciences, Sabour; *Gujarat*, Journal of Animal Morphologysts and physiology, Baroda; Pavo - The Indian Journal of Ornithology, Baroda; *Kerala*, Coconut Bulletin, Ernakulam; Indian Sea Foods, Ernakulam; Kerala Farming, Trivandrum; Fishery Technology, Cochin; *Madhya Pradesh*, JNKVV News, Jabalpur; JNKVV Research Journal, Jabalpur; *Madras*, Farm and Factory, Madras; Indian Veterinary Journal, Madras; Madras Agricultural Journal, Madras; Animal Citizen, Madras; Farm Progress, Madras; Indian Tobacco Bulletin, Madras; Plantation Worker, Coonoor; South Indian Horticulture, Coimbatore; *Maharashtra*, Arya Swapatra, Bombay; Plant Food Review, Bombay; Agricultural Marketing. Nagpur; Good Earth, Bombay; Indian Bee Journal, Poona; Indian Journal of Agricultural Economics, Bombay; Vanashobha, Bombay; *Mysore*, Indian Coffee, Bangalore; Indian Dairyman, Bangalore; My Forest, Shimoga; *Orissa*, Information for Your Farm and Home, Bhubaneswar; *Punjab*, Horticultural Bulletin, Patiala; P.A.V. News, Ludhiana; Progressive Farming, Ludhiana; Journal of Research, Ludhiana; *Uttar Pradesh*, Journal of the Society of the Indian Foresters, Dehradun; Allahabad Farmer, Allahabad; Allahabad News, Allahabad; *West Bengal*, Planting Advice, Calcutta; West Bengal Journal of Agriculture, Calcutta; Indian Agriculturist, Calcutta; Farm Journal, Calcutta; Feather World, Calcutta; Planters' Journal and Agriculturists, Calcutta; *Delhi*, Agricultural Situation in India; Animal's Friend; Fertilizer News; Gosamvardhana; Indian Farming; Intensive Agriculture; Japan Urea Centre News; Krishak Samachar; Krishi Sansar; Poultry Guide; Rural Youth; Agricultural Marketing; Delhi Garden Magazine; Indian Horticulture; Indian Fisheries Bulletin; Indian Journal of Extension Journal; Indian Journal of Veterinary Science & Animal Husbandry; Phytomorphology; Darati Khad News; Coastal Khad News; Indian Journal of Agriculture Science; Indian Journal of Agricultural & Veterinary Education; Phykos; Poorna Khad News.

Hindi

Bihar, IKL Samachar, Pusa; Bagwan; Sabour; *Gujarat*, Ambar, Ahmedabad; *Madhya Pradesh*, Krishak Jagat, Bhopal; Kisani Samachar, Rewa; Krishi Upaj Mandi Samachar, Indore; *Madras*; Tambaku, Madras; *Mysore*, Khadya, Vigyan, Mysore; *Punjab*, Horticultural Bulletin, Patiala; Unat Kheti, Ludhiana; *Rajasthan*, Rajasthan Kisan Samachar, Jaipur; Lok Vigyan, Udaipur; Rajasthan Krishi Samachar, Jaipur; *Uttar Pradesh*, Krishi Aur Pashu Palan, Lucknow; Krishak Vani, Lucknow; Krishak Vichar, Meerut; Vaidehi Krishi Patrika, Ballia; Ganna, Lucknow; *Delhi,* Delhi Gram; Gosamvardhana; God-han; Khad Patrika; Kheti; Krishak Samachar; Unnat Krishi; *Himachal Pradesh,* Himachal Krishi Suchana, Simla.

Bengali

West Bengal, Saar Samachar, Calcutta; Basundhara, Calcutta; Chash-o Chashi, Calcutta; Krishi, Luxmi, Calcutta; Krishi Pragati, Calcutta.

Gujarati

Gujarat, Khedut Patrika, Rajkot; Krushigovidya, Anand; *Maharashtra,* Arya Swapatra, Bombay.

Kannada

Kerala, Thenginabulletin, Ernakulam; *Mysore,* Munnade, Sidda-pur; Indian Coffee, Bangalore; Krishiloka, Manipal; Mysore Vyvasaya Patrika, Bangalore; Vyavasayothpannagala Vanijya Varthe, Bangalore.

Malayalam

Kerala, Krishikkaran, Calicut; Karshakanod, Trivandrum; Kerala Karshakan, Tirvandrum; Kisan, Trivandrum; Nalikera Bulletin, Erna-kulam; Rubber, Kottayam; *Mysore,* Indian Coffee, Bangalore.

Marathi

Maharashtra, Vanashri, Nasik; Bajarachi Watchal, Barsi; Khatedar Patrika, Poona; Apli Sheti, Poona; Bahar, Poona; Govardhan, Poona; Jagrit Shetakari, Poona; Krishak Samachar, Jalgaon; Oosamala, Poona; Rayat, Kolhapur; Shetaki and Shetakari, Poona; Shetakari, Poona; Vishwakarma Vritta, Amravati; Khat Patrika, Bombay.

Punjabi

Punjab, Horticultural Bulletin, Patiala; Changi Kheti, Ludhiana; *Chandigarh,* Krishak Samachar, Chandigarh.

Tamil

Madras, Vattara Cheithi, Srivaikuntam; Ermunai, Madurai; Grama Iyakkam, Madras; Mezhichelvam, Madras; Vivasaya Ulagam, Madras; Vravazhi, Madras; Uramum Payirum, Madras; *Mysore,* Indian Coffee, Bangalore.

Telugu

Andhra Pradesh, Padi Pantalu, Hyderabad; *Madras,* Pogaku, Madras.

Bilingual

Andhra Pradesh, Coromandel 'Gromor' Newsletter, Secundrabad ; *Kerala,* Kerala Krashaka Mithram, Kottayam ; *Maharashtra,* Hangam, Bombay ; Kamdhanu, Poona ; Yantrik Kheti, Bombay ; *Mysore,* Young Farmer, Bangalore ; Lalbaugh, Bangalore ; *Punjab,* Punjab Vegetable Grower, Ludhiana ; *Delhi.* Farmer & Parliament ; Indian Farm Mechanization ; N.S.C. Bulletin ; Tonnage Club Farm News ; Delhi S.P.C.A Magazine ; *Himachal Pradesh,* Himachal Horticulture, Simla.

Multilingual

Kerala, Village India, Tavanur.

SCIENTIFIC SOCIETIES RELATED TO THE FIELDS OF AGRICULTURE, ANIMAL SCIENCES AND ALLIED FIELDS

Agriculture :

1. Agricultural Society of India, Calcutta.
2. Entomological Society of India, Indian Agricultural Research Institute, New Delhi.
3. Horticultural Society of India, Indian Agricultural Research Institute, New Delhi.
4. Indian Phyto-Pathological Society, Indian Agricultural Research Institute, New Delhi.
5. Botanical Society of India, Indian Agricultural Research Institute, New Delhi
6. Indian Society of Genetics & Plant Breeding, Indian Agricultural Research Institute, New Delhi.
7. Agronomical Society of India, Indian Agricultural Research Institute, New Delhi.
8. Indian Society of Plant Physiology, Indian Agricultural Research Institute, New Delhi.
9. Natural History Society, Bombay.
10. Indian Society of Soil Science, Indian Agricultural Research Institute, New Delhi.
11. Indian Academy of Science, Bangalore.
12. Bihar Academy of Agricultural Science, Sabour, Bhagalpur.
13. Madras Academy of Agricultural Science.
14. South Indian Horticultural Association.
15. Madras Agricultural Students Union.

Animal Sciences :

16. Indian Veterinary Association, Madras - 34.
17. Zoological Society of India.
18. Indian Dairy Science Association, Bangalore.
19. Indian Poultry Club, Indian Veterinary Research Institute, Izatnagar.

Miscellaneous :

20 Society of Indian Forester's Dehra-Dun.

21. Agricultural Engineering Society, Kharagpur.

22. Society of Agricultural Economics, Bombay - 1.

23. Society of Soil Conservation, Indian Agricultural Research Institute.

24. Indian Society of Agricultural Statistics, Indian Agricultural Research Statistics, New Delhi.

25. Indian Society of Extension Education, Indian Agricultural Research Institute.

26. Helminthological Society of India, Calcutta - 12.

27. Association of Microbiologists in India, St. Xavier, College, Bombay.

28. Mysore Horticultural Society, Lal Bagh, Bangalore.

PLANT NUTRIENTS REMOVED BY CROPS

(a) GENERAL CROPS

Crop	Yield in Kg./hectare			Nutrients removed in kg./hectare N	P_2O_5	K_2O
(1)	(2)			(3)	(4)	(5)
I. Grain Crops						
Paddy	Grain	2,802		37	13	9
	Straw	5,604		45	10	114
			Total	82	23	123
Wheat	Grain	2,242		35	22	11
	Straw	4,483		24	7	56
			Total	59	29	67
Jowar	Grain	1,121		17	10	8
	Straw	4,483		35	8	78
			Total	52	18	86
Bajra	Grain	897		17	7	10
	Straw	3,587		13	4	91
			Total	30	11	101
Maize	Grain	2,690		47	25	15
	Straw	10,760		67	22	90
			Total	114	47	105
Barley	Grain	2,466		37	21	11
	Straw	4,932		17	8	112
			Total	54	29	125
·I Oil Seeds						
Groundnut	Seeds	1,906		78	22	45
Mustard	Seeds	673		22	11	28
Castor §	Seeds	1,506		45	18	15
Linseed	Seeds	1,009		19	12	33
Coconut	Palms 70 (40 nuts/trees)			55·5	27·1	84·4

PLANT NUTRIENTS REMOVED BY CROPS (contd.)

(a) GENERAL CROPS (concluded)

Crop	Yield in kg./hectare	Nutrients removed in kg./hectare		
		N	P_2O_5	K_2O
(1)	(2)	(3)	(4)	(5)
III Sugarcane				
Bihar*	Cane 57,809	146	30	186
Uttar Pradesh †	Cane 87,109	120	89	288
Andhra Pradesh ‡	Cane 121,896	130	105	410
IV Fibre Crops				
Cotton	Lint 104 (rainfed)	26	20	84
Jute	1,121 to 1,681	112-280	112-123	168-224
V Plantations				
Rubber§	Latex 392	46	5·6	21·3
Coffee	Cherries 628	13·8	5·0	16·9
Tea	Made Tea 1,009	45·4	5·0	20·2
VI Miscellaneous				
Potato§	Tubers 17,575	85	30	140
Tobacco	1,121 to 1,345	87	19	53

* Average uptake by different varieties.

† Average uptake under application of 135 kg. N per hectare.

‡ Anakapalli Sugarcane Research Station.

Sources: § Fertilizer Use-Nutrition and Manuring of Tropical Crops by Dr. A. Jacob and H. von Uexkull.

Soil Fertility and How to Maintain it by Blume

J. M. and Raychaudhuri

S. P., I. C. A. R., New Delhi.

Other information obtained from various Indian sources.

Fertilizer Statistics, 1967-68.

PLANT NUTRIENTS REMOVED BY CROPS (Concluded)

(b) HIGH YIELDING CROPS

Variety	Season	Yield in kg. per hectare		Nutrients removed in kg. per hectare N	P_2O_5	K_2O
(1)	(2)	(3)		(4)	(5)	(6)
Taichung Native 1	Rabi	Grain	8,000			
		Straw	8,640			
		Total	16,640	152·0	84·7	322·3
	Kharif	Grain	5,020			
		Straw	5,420			
		Total	10,440	92·0	36·6	252·5
Tainan 3	Rabi	Grain	6,400			
		Straw	7,460			
		Total	13,860	113·0	59·6	268·2
	Kharif	Grain	4,210			
		Straw	3,990			
		Total	8,200	82·0	32·1	181·6
Chianung 242	Rabi	Grain	7,850			
		Straw	9,300			
		Total	17,150	162·0	73·3	312·6
	Kharif	Grain	3,190			
		Straw	3,870			
		Total	7,060	58·0	29·8	144·3

Sources: Central Rice Research Institute, Cuttack.

Fertilizer Statistics, 1967-68.

No.	Materials	Total nitrogen	Ammo-niacal nitrogen	Nitrate nitrogen	Amide nitrogen	Total phosphate (P_2O_5)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Nitrogenous materials						(Per cent)
1.	Ammonia anhydrous	82·0	82·0	...	...	...
2.	*Ammonium chloride	25.00*	25·0	...	...	...
3.	Ammonium nitrate	33·50	16·75	16·75	...	...
4.	*Ammonium sulphate	20·6†	20·6	...	...	...
5.	*Ammonium sulphate nitrate	26·0†	19·25	6·25	...	...
6.	*Calcium ammonium nitrate	20·5†	10·25	10·25	...	...
7.	*Calcium ammonium nitrate	25·0	21·50	12·50	...	...
8.	‡Sodium nitrate	16·0†	...	16·0	...	...
9.	*Urea	44·0†	...	...	44·0	...
10.	Urea formaldehyde compound	38·0	...	...	38·0	...
Phosphorus materials						
11.	Basic slag, Bessemer	...	...	...	...	15·0-18·0
12.	§Dicalcium phosphate	...	...	...	...	...
13.	Phosphoric acid	...	...	...	...	54·0
14.	*Single superphosphate					
	grade I	...	...	...	...	...
	grade II	...	...	...	...	...
	grade III	...	...	...	...	...
15.	*Triple superphosphate	...	...	...	...	...
16.	Calcium metaphosphate	...	...	...	...	64·0
17.	Kotka phosphate	...	...	...	...	25·0†
18.	Phosphate rock-magnesium silicate glass	...	...	...	...	20·0
19.	Rhenania phosphate	...	...	...	...	25·0
Potassium materials						
20.	Potash from cement kiln dust	...	...	...	...	...
21.	Potash from distillary waste	0·5	...	...	...	2·0
22.	Potassium magnesium sulphate	...	...	...	...	...
23.	Kainite including carnalite and sylvinite	...	...	...	...	...

Available phosphate (P_2O_5) (8)	Water soluble phosphate (P_2O_5) (9)	Water soluble potash (K_2O) (10)	Total lime (CaO) (11)	Total magnesia (MgO) (12)	Equivalent acidity (13)	Equivalent basicity (14)
...	...	...	...	...	148	...
...	...	...	...	...	148	...
...	...	...	...	...	60	...
...	...	...	...	...	110	...
...	...	...	...	...	93	...
...	...	...	10·0-20·0	0-7·5	0	...
...	...	...	...	...	...	...
...	...	...	...	...	...	29
...	...	...	...	...	80	...
...	...	...	...	...	68	...
13·5-16·5	...	...	45·0-50·0	2·0-5.0	...	Basic
34·0†	...	...	32·0	...	...	25
54·0	54·0	...	...	...	Acidic	...
20·5†	20·0†	...	25·0-30·0	0·5	...	...
18·5†	18·0†	...	...	...	...	...
16·5†	16·0†	...	...	...	...	...
...	40·0†	...	17·0-20·0	0·5	...	...
63·0	...	...	25·0	...	0	0
16·6†	8·0†	...	...	...	...	...
18·0	...	...	32·0	18·0	...	...
24·0	...	...	1·0	1·0	...	...
...	...	25·0	28·0	1·0	...	...
1·5	...	34·0	16·0	5·0	...	...
...	...	21·0-30·0	0·6-0·5	6·0-19·5	...	...
...	...	10·0-20·0	0·5-5·0	...	0	0

No.	Materials	Total nitrogen	Ammoniacal nitrogen	Nitrate nitrogen	Amide nitrogen	Total phosphate (P_2O_5)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
24.	Potash from wood ash	...	...	...	...	...
25.	‡ Potassium chloride (Muriate of potash)	...	...	...	...	...
26.	‡ ,,	...	...	...	...	...
27.	‡ Potassium sulphate (Sulphate of potash)	...	...	...	...	...
Nitrogen phosphorus materials						
28.	Ammoniated superphosphate (Ordinary)	2·0-5·0	2·0-5·0	...	...	14·0-20·0
29.	Ammoniated superphosphate (Double)	4·0-6·0	4·0-6·0	...	...	40·0-49·0
30.	Diammonium phosphate	21·0†	21·0	...	...	53·0
31.	‡ ,,	18·0	18·0	...	...	46·0
32.	* ,,	20·0	20·0	...	...	48·0
33.	Monoammonium phosphate	11·0†	11·0	...	...	...
34.	Ammonium phosphate sulphate	16·0†	16·0	...	...	20·0†
35.	‡ Ammonium phosphate	20·0	18·0	...	2·0	20·0
36.	* Urea-ammonium phosphate	28.0	9·1-10·5	...	18·2-19·6	28·0
37.	* Nitro phosphate (Ammonium phosphate nitrate)	20·0	10·6	9·4	...	20·0
Nitrogen potassium materials						
38.	Potassium nitrate	13·0	...	13·0	...	...
Phosphorus potassium materials						
39.	Monopotassium phosphate (pure)	...	...	...	...	52·2
40.	Potassium metaphosphate	...	...	...	...	55·0
41.	Ammonium potassium phosphate	5·5	5·5	...	...	54·0
42.	Nitrophoska	13·0	...	...	...	13·5

Source :
* Fertilizers manufactured in India.
(i) † Fertilizer Control (Order), 19‵7.
(ii) Efficient use of Fertilizers FAO Agricultural Studies No. 43.
‡ Fertilizers imported into India.
§ Fertilizer materials to be manufactured in India.

Available phosphate (P_2O_5)	Water soluble phosphate (P_2O_5)	Water soluble potash (K_2O)	Total lime (CaO)	Total magnesia (MgO)	Equivalent acidity	Equivalent basicity
(8)	(9)	(10)	(11)	(12)	(13)	(14)
...	...	51·0	...	...	...	Basic
...	...	60·0†	...	...	...	...
...	...	50·0	...	...	...	...
...	...	48·0†	..	...	...	...
13·0-19·0	...	...	23·0-29·0	0·5	4-7	...
38·0-48·0	...	...	16·5-22·5	0·5	11·14	...
53·0	53·0†	...	...	...	77	...
46·0	39·1	...	...	...	...	...
48·0	48·0	...	...	...	...	...
...	48·0†	...	...	...	...	...
20·0	19·5	...	...	...	...	...
20·0	17·0	...	...	...	...	...
28·0	26·6	...	...	...	...	...
20·0	6·0	...	...	...	...	...
...	...	44 0	0·5	0·5	...	...
52·2	...	34·6	...	...	0	0
55·0	...	38·0	0·5	...	0	0
54·0	...	18·0	...	...	...	Acidic
13·0	...	21·0	9·0	...	Acidic	...

(1) Equivalent acidity is the number of parts by weight of calcium carbonate ($CaCO_3$) required to neutralise the acidity resulting from the use of 100 parts of fertiliser material.

(2) Equivalent basicity is the number of parts by weight of calcium carbonate ($CaCO_3$) that correspond in acid nutralising power of 100 parts of the fertiliser material.

Source: Fertiliser Statistics, 1967-68.

AVERAGE CHEMICAL COMPOSITION OF SOME ORGANIC MANURES

(Per cent)

Material (1)	N (2)	P_2O_5 (3)	K_2O (4)
I Bulky organic manures			
Farm yard manure	0·5-1·5	0·4-0.8	0·5-1·9
Compost (urban)	1·2-2·0	1·0	1·5
Compost (rural)	0·4-0·8	0·3-0·6	0·7-1·0
Green manures (various average)	0·5-0 7	0·1-0·2	0·8-1·6
II Oil cakes			
(a) Non-edible cakes			
Castor cake	5·5-5·8	1·8-1·9	1·0-1·1
Cotton seed cake (undecorticated)	3·9-4·0	1 8-1.9	1·6-1·7
Mahua cake	2·5-2·6	0·8-0 9	1·8-1·9
Karanj cake	3·9-4·0	0·9-1·0	1·3-1.4
Neem cake	5·2-5.3	1·0-1·1	1·4-1·5
Safflower cake (undecorticated)	4·8-4·9	1·4-1·5	1·2-1·3
(b) Edible oil cakes			
Coconut cake	3·0-3·2	1·8-1·9	1·7-1·8
Cotton seed cake (decorticated)	6·4-6·5	2·8-2·9	2·1-2·2
Groundnut cake	7·0-7·2	1·5-1·6	1·3-1·4
Jambo cake	4·9-5·0	1·6-1·7	1·8-1·9
Linseed cake	5·5-5·6	1·4-1·5	1·2-1·3
Niger cake	4·7-4·8	1·8-1·9	1·3-1·4
Rapeseed cake	5·1-5·2	1·8-1·9	1·1-1·2
Safflower cake (decorticated)	7·8-7·9	2·2-2·3	1·9-2·0
Sesamum or til cake	6·2-6·3	2·0-2·1	1·2-1·3

AVERAGE CHEMICAL COMPOSITION OF SOME ORGANIC MANURES (Concluded)

(Per cent)

Material (1)	N (2)	P_2O_5 (3)	K_2O (4)
III Manures of animal origin			
Dried blood	10–12	1·0–1·5	0·6–0·8
Fish manure	4–10	3–9	0.3–1·5
Bird guano	7–8	11–14	2– 3
Bone meal (raw)	3–4	20–25	—
Bone meal (steamed)	1·0–2·0	25–30	—
Activated sludge (dry)	5–6	3–3·5	0·5–0·7
Settled sludge (dry)	2–2·5	1–1·2	0·4–0·5
Nightsoil	1·2–1·3	0·8–1·0	0·4–0·5
Human urine	1·0–1·2	0·1–0·2	0·2–0·3
Cattledung and urine mixed	0·60	0·15	0·45
Horsedung and urine mixed	0·70	0·25	0·55
Sheepdung and urine mixed	0·95	0·35	1·00

Sources: 1. Acharya, C. N. (1957), Organic Manures, I.C.A.R. Review Series No. 2.

2. Daji, J. A. (1955), Manures & Manuring, I.C.A.R. Farm Bulletin No. 7.

3. Van Slyke (1953), Fertilizer and Crop Production, published by Orange Jodd Publishing Co., New York.

Source : Fertilizer Statistics, 1967-68.

GUIDE FOR MIXING FERTILIZERS

	1. Muriate of potash	2. Sulphate of potash	3. Sulphate of ammonia	4. Calcium ammonium nitrate	5. Potassium and sodium nitrate	6. Calcium nitrate	7. Calcium cynamide	8. Urea	9. Superphosphate, Triple superphosphate	10. Ammonium phosphate	11. Basic slag	12. Rhenania phosphate	13. Hyperphosphate	14. Calcium carbonate
1. Muriate of potash	☐	☐	☐	☒	☒	☒	☒	☒	☐	☐	☐	☐	☐	☐
2. Sulphate of potash	☐	☐	☐	☒	☒	☒	☐	☒	☐	☐	☐	☐	☐	☐
3. Sulphate of ammonia	☐	☐	☐	☐	☒	☒	■	☒	☐	☐	■	■	☒	■
4. Calcium ammonium nitrate	☒	☒	☐	☐	☒	☒	■	☒	☒	☒	■	☒	☐	☐
5. Potassium and sodium nitrate	☒	☒	☒	☒	☐	☒	☒	☒	☒	☒	☐	☐	☐	☐
6. Calcium nitrate	☒	☒	☒	☒	☒	☐	☒	☒	■	■	☒	☒	☒	☒
7. Calcium cynamide	☒	☐	■	■	☒	☒	☐	☒	■	■	☐	☐	☐	☐
8. Urea	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
9. Superphosphate, Triple superphosphate	☐	☐	☐	☒	☒	■	■	☒	☐	☐	■	■	■	■
10. Ammonium phosphate	☐	☐	☐	☒	☒	■	■	☒	☐	☐	■	■	■	■
11. Basic slag	☐	☐	■	■	☐	☒	☐	☒	■	■	☐	☐	☐	☐
12. Rhenania phosphate	☐	☐	■	☒	☐	☒	☐	☒	■	■	☐	☐	☐	☐
13. Hyperphosphate	☐	☐	☒	☐	☐	☒	☐	☒	■	■	☐	☐	☐	☐
14. Calcium carbonate	☐	☐	■	☐	☐	☒	☐	☒	■	■	☐	☐	☐	☐

1., 2., 3. } Sulphate of potash magnesia

☐ Fertilizers which can be mixed.

☒ Fertilizers which may only be mixed shortly before use.

■ Fertilizers which cannot be mixed (for chemical reasons).

Bonemeal, which is often used as "drier" may be mixed with all other fertilizers.

Sources : "Fertilizer use", Jacob, A., and Von Uexkull, H.

Fertilizer Statistics, 1967-68.

ANNUAL DISTRIBUTION OF RAINFALL ACCORDING TO DIFFERENT SEASONS

Rainfall season	Duration	Approximate percentage to the annual rainfall
(1)	(2)	(3)
South-West Monsoon	June-Sept.	73·7
Post-Monsoon	Oct.-Dec.	13·3
Winter or North-East Monsoon	Jan-Feb.	2·6
Pre-Monsoon	Mar-May	10·4
	Total	**100·0**

Sources: Indian Agriculture in Brief, Sixth Edition ; Directorate of Economics & Statistics.

Fertilizer Statistics, 1967-68.

ASSURED RAINFALL, MEDIUM RAINFALL AND DRY REGIONS OF INDIA

Rainfall	Region	Percentage to the total area
(1)	(2)	(3)
Assured (45″ and above in a year)	Assam (incl. N.E.F.A.,) Bihar, Gujarat, Kerala, Madhya Pradesh, Madras, Maharashtra, Mysore, Orissa, Punjab, U. P., West Bengal, Himachal Pradesh, Andaman & Nicobar, Manipur, Laccadive & Minicoy and Tripura.	29·6
Medium (Between 30″ and 45″ in a year)	Andhra Pradesh, Bihar, Gujarat, Kerala, Madhya Pradesh, Madras, Maharashtra, Mysore, Punjab, Rajasthan, U. P., and West Bengal.	21·2
Dry (Below 30″ in a year)	Andhra Pradesh, Bihar, Gujarat, J. & K., Kerala, M. P., Madras, Maharashtra, Mysore, Orissa, Punjab, Rajasthan, U. P. and Delhi.	49·2

Sources: Indian Agriculture in Brief, Sixth Edition ; Directorate of Economics & Statistics.

Fertilizer Statistics, 1967-68.

IMPORTANT CROP ROTATIONS

Two-year rotation	Three-year rotation
(1)	(2)
1. Rice Pulses	1. Wheat Maize
2. Jowar or maize Wheat or gram	2. Sugarcane Wheat Cotton
3. Cotton or jowar Groundnut or jowar	3. Wheat Wheat Toria
	4. Rice Sugarcane (Plant) Sugarcane (Ratoon)
	5. Wheat Maize Sugarcane

Sources: Indian Crop Calendar.
Fertilizer Statistics, 1967-68

CROP YEARS

Crop season/Name of crop	Duration
(1)	(2)
Kharif	1st November to 31st October
Rabi	1st May to 30th April
Rice	1st November to 31st October
Wheat	1st May to 30th April
Sugarcane	1st November to 31st October
Cotton	1st September to 31st August
Jute	1st July to 30th June
Kharif oilseeds	1st November to 31st October
Rabi oilseeds	1st April to 31st March
Tea	1st January to 31st December
Coffee	1st July to 30th June
Tobacco	1st March to 28th February

Note: The beginning of the period denotes the time when generally the crops arrive in the market.

Sources: Indian Agriculture in Brief, Sixth Edition; Directorate of Economics and Statistics.
Fertilizer Statistics, 1967-68.

IMPORTANT CROP MIXTURES

State (1)	Crop mixtures (2)
1. Andhra Pradesh	Bajra-Redgram, Bajra-Jowar, Bajra, Redgram-Jowar, Groundnut-Redgram, Jowar-Redgram, Cotton-Groundnut, Cotton-Redgram, Cotton-Korra, Jowar, Blackgram, Jowar-Green-gram, Jowar-Korra.
2. Assam	Paddy and Maize, Paddy and Cotton.
3. Bihar	Jowar and Cotton, Wheat and Barley, Wheat and Gram, Barley and Gram, Cotton and Tur.
4. Gujarat	Jowar and Tur. Jowar and Urad, Bajra and Tur, Bajra and Moong, Paddy and Tur, Maize and Tur, Wheat and Gram, Cotton and Paddy.
5. Jammu & Kashmir	Wheat and Barley.
6. Kerala	Ragi and Cereals, Ragi and Leguminous Crops, Tapioca and Beans, Tapioca and Coconut, Banana and Yarm, Banana and Tapioca, Coconut and Cotton, Rubber and Cotton, Pineapple and Cotton, Coffee and Cotton, Betelnut and Banana, Coconut and Betelnut and Pepper and Mango or Jack.
7. Madhya Pradesh	Jowar-Tur, Jowar-Urad, Jowar-Mung, Jowar-Tur-Urad-Jowar, Tur Mung-Jowar-Tur-Urad-Mung, Bajra-Tur-Mung, Kodikuthi- Tur, Kodokuthi-Jowar-Tur, Sesamum-Tur-Cotton-Tur, Cotton-Maize, Wheat-Gram, Wheat-Linseed, Wheat-Gram-Linseed, Wheat-Gram-Rape and Mustard, Gram-Barley, Gram-Linseed, Gram-Barley-Rape and Mustard.
8. Madras	Jowar and Horsegram, Jowar and Pillipesara, Jowar and Indigo, Jowar and Wal, Bajra and Deccan Hemp, Bajra and Urad, Paddy long and short duration, Cotton and Chillies, Cotton and Millets, Cotton and Urad, Cotton and Ragi, Cotton and Groundnut, Groundnut and Tur, Groundnut and Castor, Groundnut and Bajra.
9. Maharashtra	Jowar-Tur, Jowar-Moth, Jowar-Urad, Jowar-Mung, Bajra-Moth, Bajra-Urad, Bajra-Moth-Mung, Bajra-Tur, Bajra-Moth-Nulga, Cotton-Tur, Cotton-Jowar, Cotton-Tur-Jowar, Cotton-Tur-Ambadi, Groundnut-Tur, Groundnut-Tur-Jowar, Groundnut-Jowar, Rabi-Jowar-Safflower, Rabi-Jowar-Gram, Rabi-Jowar-Mung, Wheat, Safflower-Jowar, Wheat, Jowar, Gram-Jowar, Gram-Safflower.

IMPORTANT CROP MIXTURES (Concluded)

State (1)	Crop mixtures (2)
10. Mysore	Ragi-Avare, Ragi-Jowar, Ragi-Jowar-Avare, Ragi-Horsegram, Jowar-Tur, Jowar-Bajra-Tur Jowar-Tur-Groundnut, Jowar-Tur-Horsegram, Bajra-Tur, Bajra-Jowar, Bajra-Horsegram, Groundnut-Tur, Groundnut-Cotton, Jowar-Saffiower, Jowar-Gram-Linseed, Jowar-Gram, Wheat-Safflower, Wheat-Safflower-Jowar, Gram-Jowar, Gram-Safflower, Linseed-Jowar-Cotton-Navane, Cotton-Chillies, Cotton-Jowar-Horsegram, Cotton-Groundnut.
11. Orissa	Mustard and Linseed, Mustard and Horsegram, Gram and Linseed, Ragi and Maize.
12. Punjab	Jowar and Guar, Jowar and Moth, Jowar and Cowpeas, Bajra and Mung. Bajra and Cowpeas, Bajra and Guar, Ragi and Maize, Maize and Urad, Maize and Velvet Bean, Maize and Senji, Wheat and Gram, Wheat and Barley, Wheat and Rapeseed, Wheat and Lentil, Barley and Gram, Gram and Toria, Cotton and Til, Cotton and Moth, Cotton and Melons, Cotton and Senji.
13. Rajasthan	Jowar and Mung, Bajra and Moth, Wheat and Gram, Wheat and Mustard, Wheat and Barley, Barley and Gram.
14. Uttar Pradesh	Jowar-Arhar, Jowar-Arhar-Urad, Jowar-Arhar-Mung, Jowar-Arhar-Til, Bajra-Arhar, Bajra-Arhar-Urad, Bajra-Arhar-Til, Maize-Urad, Groundnut-Arhar, Groundnut-Bajra, Groundnut-Arhar-Bajra, Kodon-Arhar, Wheat, Gram, Wheat-Mustard, Wheat-Gram-Mustard, Barley, Peas-Gram, Barley, Barley-Mustard, Gram-Linseed, Gram-Barley, Mustard-Gram-Mustard, Peas-Mustard.
15. West Bengal	Paddy and Khisari, Paddy and Jute, Wheat and Gram, Wheat and Linseed.
16. Delhi	Jowar and Mung-Jowar and Guar, Bajra and Tur, Wheat and Gram, Wheat and Barley, Wheat and Peas, Wheat and Mustard, Barley and Gram, Cotton and Tur, Maize and Pulses, Maize and Sesamum.
17. Himachal Pradesh	Wheat and Barley, Wheat and Gram, Wheat and Mustard, Barley and Gram, Maize and Sesamum, Maize and Pulses.
18. Tripura	Cotton. Sesamum and Autumn Paddy.
19. Manipur	Rice and Chillies. Wheat and Gram, Wheat and Peas.

Sources: 1. State Governments.
2. Indian Agricultural Research Institute, New Delhi.
Fertilizer Statistics, 1967–68.

SEASON, DURATION AND SEED RATES OF PRINCIPAL CROPS

Crop (1)	Season (2)	Duration * (3)	Seed rates † (kg. per hectare) (4)
Rice	Winter	5½—6 months	22—56 (Transplanted)
	Autumn	4—4½ months	45—90 (Broadcast)
	Summer	2—3 months	
Jowar	*Kharif*	4½—5 months	7—13
	Rabi	4½ months	
	Zaid Kharif	2½ months	
Bajra	*Kharif*	4—4½ months	7—11
Maize	*Kharif*	4—4½ months	11—22
Ragi	*Kharif*	3½ months	11—22
Wheat	*Rabi*	5—5½ months	45—90
Barley	*Rabi*	5—5½ months	45—90
Gram	*Rabi*	6 months	34—90
Groundnut	*Kharif*	Early 4½—5 months	45—90
		Late 4½—5 months	
Sesamum	*Kharif*	3½—4½ months	2—11
	Rabi	5 months	
Rape and Mustard	*Rabi*	4—5½ months	4—11
	Zaid Rabi	4 months	
Linseed	*Rabi*	5½ months	11—18
Castor	*Kharif*	Early-6 months	11—13
		Other-8 months	7—22
Cotton	*Kharif*	Early 6-7 months	
		Late 7-8 months	
Sugarcane	Perennial	10—12 months	
Tobacco	*Kharif*	7 months	
Jute	*Kharif*	6—7 months	

* Denotes the number of months for which the crop is on the land.

† Based on information supplied by I. C. A. R.

Sources: Indian Crop Calendar.
Fertilizer Statistics, 1967-68.

SUBSTITUTABLE CROP

	State (1)	Name of the crop (2)
1.	Andhra Pradesh	(Rice, Ragi, Mesta), (Jowar, Maize, Bajra), (Cotton, Groundnut, Sesamum), (Wheat, Gram).
2.	Assam	(Rice-Jute), (Mung, Gram, Urad, Cotton, Wheat).
3.	Bihar	(Ragi, Rice, Jute), (Wheat, Barley, Peas, Gram, Sugar-cane).
4.	Maharashtra	(Linseed, Wheat, Gram), (Sugarcane, Wheat, Gram), (Jowar, Bajra, Maize, Cotton).
5.	Madhya Pradesh	(Linseed, Wheat, Gram), (Jowar, Bajra, Maize, Cotton).
6.	Madras	(Rice, Ragi, Mesta), (Jowar, Maize, Bajra), (Cotton, Groundnut, Sesamum).
7.	Mysore	(Rice, Ragi), (Jowar, Sugarcane), (Cotton, Groundnut), (Bajra, Maize).
8.	Orissa	(Rice, Ragi, Jute).
9.	Punjab	(Wheat, Barley, Gram-Peas), (Jowar, Bajra, Maize, Cotton, Sugarcane).
10.	Rajasthan	(Jowar, Bajra, Maize), (Wheat, Barley, Gram, Peas).
11.	Uttar Pradesh	(Wheat, Barley, Gram, Peas), (Jowar, Bajra, Maize, Sugarcane).
12.	West Bengal	(Autumn Rice, Jute), (Sugarcane, Jute), (Sugarcane, Rice).
13.	Delhi	(Gram, Wheat) (Wheat, Barley), (Barley, Gram).
14.	Himachal Pradesh	(Wheat, Barley), (Wheat, Gram), (Barley, Gram), (Wheat, Mustard), (Maize, Sesamum), (Maize, Pulses).
15.	Manipur	(Wheat, Peas, Mustard), (Maize, Soyabean, Sugarcane).

Source : Fertilizer Statistics, 1967-68.

1. Rice followed by Rice.
2. Rice followed by Pulses.
3. Rice followed by Millets.
4. Rice followed by Wheat.
5. Rice followed by Linseed, Rape and Mustard or other Rabi oilseeds.
6. Jowar followed by Wheat.
7. Maize followed by Wheat.
8. Guar followed by Wheat.
9. Maize followed by Guar.
10. Cotton intercropped with Senji or Methi or Berseem.
11. Mung or Mattar followed by Jowar.
12. Jute followed by Rice.
13. Jute followed by Potato.

Sources: Indian Crop Calendar.
Fertilizer Statistics, 1967-68.

SOWING AND HARVESTING PERIODS OF CROPS

Season (1)	Period (2)	Sowing period (3)	Harvesting period (4)	Principal crops (5)
Kharif	May to middle of October	Generally at the beginning of the South-West monsoon May to July.	At the end of the South-West monsoon September to October (May continue till November in some cases).	Jowar, Bajra, Maize, Ragi, Tur, Mung, Urad, Sugarcane, Groundnut, Castor, Sesamum, Cotton, Jute and Tobacco.
Zaid Kharif	August to January.	August to September	December to January.	Rice, Jowar, Rapeseed, Mustard and Cotton.
Rabi	Middle of October to middle of April.	At the beginning of the cold weather-October to December.	February to April (May continue till May in some cases).	Wheat, Barley Gram, Linseed, Mustard, Masur, Peas and Potatoes.
Zaid Rabi	Beginning of February to beginning of May.	At the beginning of hot weather-February to March.	Middle of April to May (may continue upto June in some cases).	Water-melons, Summer Vegetables, Jowar and Maize for fodder.

Sources: Indian Crop Calendar.
Fertilizer Statistics, 1967-68.

CROP MARKETING YEARS

Name of Crop (1)	Duration of marketing year (2)	Duration of peak marketing periods (3)
Rice	October to September	November to February
Wheat	April to March	May to June
Sugarcane	November to October	December to March
Cotton	September to August	November to March
Jute	July to June	October to December
Kharif Oilseeds	November to October	November to February
Rabi Oilseeds	April to March	April to June
Tobacco	March to February	,, ,,

Note: The beginning of the period denotes the time when generally the crop arrives in the market.

Sources: Indian Crop Calendar.
Fertilizer Statistics, 1967-68.

UNIT WEIGHTS OF SELECTED COMMODITIES BY COUNTRIES

Commodity & Country	Unit	Approximate net weight kg.	Approximate net weight lb.
(1)	(2)	(3)	(4)
Wheat*			
Australia	bushel	27·215	60
Canada	bushel	27·215	60
New Zealand	bushel	27·215	60
United States	bushel	27·215	60
Barley			
Australia	bushel	22·680	50
Canada	bushel	21·772	48
New Zealand	bushel	22·680	50
United States	bushel	21·772	48
Oats			
Australia	bushel	18·144	40
Canada	bushel	15·422	34
New Zealand	bushel	18·144	40
United States	bushel	14·515	32
Maize			
Australia	bushel	25·401	56
Canada	bushel	25·401	56
Ceylon	bushel	26·308	58
New Zealand	bushel	25·401	56
United States	bushel	25·401	56
Sorghum			
Australia	bushel	27·215	60
United States	bushel	25·401	56

* The Indian bred wheats have a higher bushel weight. The N. P. wheats bred by the I. A. R. I. for instance weigh from 60-64 lb. per bushel.

UNIT WEIGHTS OF SELECTED COMMODITIES BY COUNTRIES-(contd.)

(1)	(2)	(3)	(4)
Paddy Rice			
Australia	bushel	19·051	42
Ceylon	bushel	20·865	46
United States	bushel	20·412	45
Milled Rice			
Ceylon	bushel	29·030	64
Potato			
Canada	bushel	27·215	60
United States	bushel	27·215	60
Linseed			
Australia	bushel	25·401	56
Canada	bushel	25·401	56
United States	bushel	25·401	56
Cotton			
India (raw)	maund	37·324	82·286
India (raw)	bale	177·807	392
India (raw)	candy	355·615	784
Pakistan (raw)	bale	177·807	392
United States (net)	bale	217·723	480
Jute			
India	bale	181·436	400
Pakistan	bale	181·436	400

CONVERSION FACTORS AND TABLES

CONVERSION FACTORS

Handy equivalents

Area			*Weight*
(1)	(2)	(3)	(4)
1. Hectare	= 2.47109 acres	1 metric ton	= 2,204·7 pounds
1. Acre	= 0.40468 hectare	1 long ton	= 0·98421 long tons
	= 4,840 sq. yd.		= 1·10231 short tons
	= 43,560 sq. ft.		= 1,000 kilograms
	$= \frac{1,563}{1,000}$ sq. miles		= 26,792 maunds
		1 long ton	= 2,240 pounds
1. Sq. mile	= 640 acres		= 1·01605 metric ton
	= 259 hectares		= 27·22 maunds
	= 259 sq. kilometres	1 short ton	= 2,000 pounds
1. Sq. kilometre	= 0·3861 sq mile		= 0·90718 metric ton
	= 100 hectares	1 kilogram	= 2·20462 pounds
		1 pound	= 0·45359 kilogram
		1 maund	= 82·2857 pounds
			= 37·324210 kg.

Yield

(1)	(2)
100 kg. per hectare	= 1·4869 bushels (60 lb.) per acre
1 bushel (60 lb.) per acre	= 67·253 kg. per hectare
1 kg. per hectare	= 0·892169 lb. per acre
1 lb. per acre	= 1·120864 kg. per hectare

Distance

1 mile	= 8 furlongs or 1760 yards
	= 1·609 kilometres
1 league	= 3 miles
1 kilometre	= $\frac{5}{8}$ mile (3280·89 ft.)
1 metre	= 1·0936 yards
1 inch	= 25·4 millimetres
1 foot	= 30·48 centimetres
1 yard	= 91·44 centimetres

Source: Fertilizer Statistics, 1967-68.

CONVERSION TABLES
(Existing Units to Metric Units)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1. **Weights**										
Tons to metric tons										
Tons	1	2	3	4	5	6	7	8	9	10
Metric tons	1.02	2·03	3·05	4·06	5·8	6·10	7·11	8·13	9·14	10·16
Pounds (av) to Kilogrammes										
Pounds	1	2	3	4	5	6	7	8	9	10
Kilogrammes	0·45	0·91	1·36	1·81	2·27	2·72	3·18	3·63	4·18	4·54
Tolas to Grams										
Tolas	1	2	3	4	5	6	7	8	9	10
Grams	11·66	23·33	34·99	46·66	58·32	69·98	81·65	93·31	104·97	116·64
Seers to Kilogrammes										
	1	2	3	4	5	6	7	8	9	10
Kilogrammes	0·93	1·87	3·80	3·73	4·67	5·60	6·53	7·46	8·40	9·53
Maunds to quintals										
Maunds	1	2	3	4	5	6	7	8	9	10
Quintals	0·37	0·75	1·12	1·49	1·87	2·24	2·61	2·99	3·36	3·73
2. **Length**										
Miles to Kilometre										
Miles	1	2	3	4	5	6	7	8	9	10
Kilometres	1·61	3·22	4·83	6·44	8·05	9·66	11·27	12·87	14·48	16·09
Yards to metres										
Yards	1	2	3	4	5	6	7	8	9	10
Metres	0·91	1·83	2·74	3·66	4·57	5·49	6·40	7·32	8·23	9·14

CONVERSION TABLES-(Contd.)

Existing Units to Metric Units

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Inches to Millimetres												
Inches	1	2	3	4	5	6	7	8	9	10	11	12
Millimetres	25·40	50·80	76·20	101·60	127·00	152·40	177·80	203·60	228·60	254·00	279·40	304·80
3. Area												
Acres to hectares												
Acres	1	2	3	4	5	6	7	8	9	10	...	...
Square yards to square metres	0·40	0·81	1·21	1·62	2·02	2·43	2·83	3·24	3·64	4·05	...	...
Square yards	1	2	3	4	5	6	7	8	9	10	...	...
Square metres	0·84	1·67	2·51	2·34	4·18	5·02	5·85	6·69	7·53	8·36	...	...
4. Capacity												
Gallon (Imp) to litres												
Gallons	1	2	3	4	5	6	7	8	9	10	...	...
Litres	4·55	9·09	13·64	18·18	22·23	27·28	31·82	36·37	40·92	45·46	...	...

CONVERSION TABLES-(Concluded)

Existing Units to Metric Units

1 Kg. per hectare = 0·892169 *lb. per acre*

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Kg. per hectare	0	1	2	3	4	5	6	7	8	9
					Pounds per acre					
0	0	0·892	1·784	2·667	3·569	4·461	5·353	6·245	7·137	8·030
10	8·922	9·814	10·706	11-598	12·490	13·384	14·275	15·167	16·059	16·951
20	17·843	18·736	19·618	20·520	21·421	22·304	23·196	24·089	24·981	25·873
30	26·765	27·657	28·549	29·442	30·334	31.226	32·118	33·010	33·902	33·795
40	35·687	36·579	37·471	38·363	39·255	40.148	41·040	41·932	42·814	43·716
50	44 608	45·501	46·393	47·285	47·285	49:069	59·961	50·854	51·746	52·638
60	55·530	54·422	55·314	56·207	57·099	57·991	48·883	59·775	60·667	61·500
70	62·452	63·344	64·236	65·128	66·020	66·913	67·805	68·697	69·589	70·481
80	71·274	71·226	72·158	74·050	74·942	74·834	76·727	77·619	78·511	79·403
90	80·295	81·187	82·080	82·972	83·864	84·756	85·648	86·540	87·433	88·325

Source: Fertilizer Statistics, 1967–68.

CONVERSION RATIOS BETWEEN RAW MATERIALS AND PROCESSED PRODUCTS

Rice:

Rice (cleaned) production	= 2/3 of paddy production

Cotton:

Cotton lint production	= 1/3 of kapas production
Cotton seed production	= 2/3 of kapas production
	= 2 times of cotton lint production

Jute:

100 yards of hessian	= 54 lb. of raw jute
4,148 yards of hessian	= 1 ton of raw jute
	= 5·6 bales of raw jute (of 400 lb. each)
1 ton of sacking	= 1·11 tons of raw jute
	= 6·22 bales of raw jute (of 400 lb. each)
1 ton of hessian, sacking etc.	= 1·05 tons of raw jute
	= 5·9 bales of raw jute (of 400 lb. each)

Groundnut:

Kernel to nuts in shell	= 70 per cent
Oil to nuts in shell	= 28 per cent
Oil to kernels crushed	= 40 per cent
Cake to kernels	= 60 per cent

Sesamum:

Oil to seeds crushed	= 40 per cent
Cake to seeds crushed	= 60 per cent

Rape and mustard:

Oil to seeds crushed	= 33 per cent
Cake to seeds crushed	= 67 per cent

Linseed:

Oil to seeds crushed	= 33 per cent
Cake to seeds crushed	= 67 per cent

Castor seed:

Oil to seeds crushed	= 37 per cent
Cake to seeds crushed	= 63 per cent

Cotton seed:

Oil to seeds crushed	= 14 to 18 per cent
Cake to seeds crushed	= 82 to 86 per cent

Coconut: = One ton of copra

Copra to nuts	= 6,773 nuts
Oil to copra crushed	= 62 per cent
Cake to copra crushed	= 38 per cent

CONVERSION RATIOS BETWEEN RAW MATERIALS AND PROCESSED PRODUCTS-(Concluded)

Niger seed :

Oil to seeds crushed	= 28 per cent
Cake to seeds crushed	= 72 per cent

Kardi seed :

Oil to seeds crushed	= 40 per cent
Cake to seeds crushed	= 60 per cent

Mahawa seed :

Oil to seeds crushed	= 36 per cent
Cake to seeds crushed	= 64 per cent

Neem seed :

Oil to kernels crushed	= 45 to 50 per cent
Cake to kernels crushed	= 50 to 55 per cent

Sugar :

Gur from cane crushed	= 10 per cent
Crystal sugar from gur Refined (Gur refineries)	= 62·4 per cent
Crystal sugar from cane Crushed (Cane factories)	= 9·97 per cent
Khandsari sugar from gur refined	= 37·5 per cent
Molasses from cane crushed	= 3·5 per cent
Cane trash* from cane harvested	= 10·0 per cent

Lac :

Seed lac	= 66·0 per cent of stick lac
Shel lac	= 57·4 per cent of stick lac or 87·0 per cent of seed lac

Cashewnuts :

Cashew kernels	= 25 per cent of cashewnuts

Butter and Ghee :

Butter from mixed milk	= 6·9 per cent
Ghee from mixed milk	= 5·5 per cent

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* This consists of leaves and portion of the top or the stalk which are removed from the cane stalk, while harvesting and before sending cane to milling.

Sources: Indian Agriculture in Brief, Sixth Edition, Directorate of Economics and Statistics.

Fertilizer Statistics, 1967–68.

FOREIGN EXCHANGE RATES PAR VALUES AFTER E-VALUATION

(As on 6th June 1966)

Country	Currency unit	Indian rupees per currency unit	Currency units per Indian rupee
(1)	(2)	(3)	(4)
Afghanistan	Afghani	0·1667	6·0000
Australia	Dollar	8·4000	0·1191
Austria	Schilling	0·2885	3·4667
Belgium	Franc	0·1500	6·6667
Burma	Kyat	1·5750	0·6349
Canada	Dollar	6·9375	0·1441
Ceylon	Rupee	1·5750	0·06349
Denmark	Krone	1·0858	0·9210
Ethiopia	Dollar	3·0000	0·3333
France	Franc	1·5198	0·6583
West Germany	Deutshe Mark	1·8750	0·5333
Ghana	Cedi	8·7500	0·1143
Iran	Rial	0·0990	10·1000
Iraq	Dinar	21·0000	0·0476
Israel	Pound	2·5000	0·4000
Italy	Lira	0·0120	83·3333
Japan	Yen	0·0208	48·0000
Jordan	Dinar	21·0000	0.04776
Malaysia	Dollar	2·4500	0·4082
Mexico	Peso	0·6000	1·6667
Morocco	Dirham	1·4821	0·6747
Netherlands	Guilder	2.0718	0·4827
New Zealand	Pound	20·8568	0·0480
Norway	Krone	1·0500	0·9524
Pakistan	Rupee	1·5750	0·6349
Philippines	Peso	1·9231	0·5200
Sudan	Pound	21·5369	0·464
Sweden	Krone	1·448	0·6898
Switzerland	Franc	1·7151	0·5831
Syrian Arab Republic	Pound	3·4223	0·2922
Tunisia	Dinar	14·2858	0·0700
U. A. R. (Egypt)	Pound	21·5369	0·0464
U. K.	Pound	18·0000*	0·0556*
U. S. S. R.	Rouble	8·3334	0·1200
Yugoslavia	Dinar	0·6000	1·6667

* Effective from November, 1967.

Sources : Reserve Bank of India.
Fertilizer Statistics, 1967-68.

Year	Name & address of the winner	Crop	Yield in kgs/hect.
(1)	(2)	(3)	(4)
Kharif 1964-65	Shri A. K. Nirgudkar Village Mandhal, District Nagpur, Maharashtra.	Paddy	9056
Kharif 1965-66	Shri M. Gonganna (M. G. Brothers). P. O. Yemmignar, Distt. Kurnool, Andhra Pradesh.	Paddy	9476
Rabi 1965-66	Shri Pundlik Maharu Rajput, Village Sawelde, Tehsil & Distt. Dhulia, Maharashtra.	Wheat	6618·27
Kharif 1966-67	Shri S. D. Borker At Sindpuri, P. O. Sihora, Tehsil & Distt. Bhandara, Maharashtra.	Paddy	10633·38
Rabi 1966-67	Shri Puran Lal Batra Vill. Bahu Akbar, Distt. Rohtak, Haryana.	Wheat	9285·79

APPENDIX I

H. V. P. NUMBER OF DISTRICTS AND BLOCKS SELECTED

S. No.	State	Number of districts selected	Number of blocks selected
(1)	(2)	(3)	(4)
1.	Andhra Pradesh	16	255
2.	Assam	11	63
3.	Bihar	9	157
4.	Gujarat	19	113
5.	Haryana	8	54
6.	Jammu & Kashmir	4	37
7.	Kerala	9	140
8.	Madras	13	333
9.	Madhya Pradesh	37	299
10.	Maharashtra	25	225
11.	Mysore	19	243
12.	Orissa	15	55
13.	Punjab	11	113
14.	Rajasthan	24	205
15.	Uttar Pradesh	47	467
16.	West Bengal	14	134
17.	Delhi	1	5
18.	Goa	1	10
19.	Himachal Pradesh	8	10
20.	Pondicherry	2	2
	Total	293	2,920

APPENDIX II

H. V. P. NAMES OF DISTRICTS COVERED UNDER THE PROGRAMME

State (1)	Districts (2)	
1. Andhra Pradesh	1. West Godavari	9. Warangal
	2. East Godavari	10. Karimnagar
	3. Krishna	11. Srikakulam
	4. Nellore	12. Cuddapah
	5. Kurnool	13. Medak
	6. Chittoor	14. Nalgonda
	7. Nizamabad	15. Anantapur
	8. Mehboobnagar	16. Guntur
2. Assam	. Kamrup	7. Cachar
	2. Goalpara	8. K & J Hills
	3. Nowgong	9. Mikir Hills
	4. Sibsagar	10. Garo Hills
	5. Darrang	11. Mazo Hills
	6. Lakhimpur	
3. Bihar	1. Shahabad	6. Purnea
	2. Patna	7. Saharsa
	3. Gaya	8. Ranchi
	4. Saran	9. Santhal Parganas
	5. Champaran	
4. Gujarat	1. Rajkot	11. Junagadh
	2. Jamnagar	12. Bhavnagar
	3. Amreli	13. Broach
	4. Surendranagar	14. Banskantha
	5. Baroda	15. Mehsana
	6. Ahmedabad	16. Panchmahals
	7. Sabarkantha	17. Gandhinagar
	8. Surat	18. Dang
	9. Bulsar	19. Kutch
	10. Kaira	
5. Haryana	1. Karnal	5. Jind
	2. Rohtak	6. Ambala
	3. Gurgaon	7. Sirsa
	4. Hissar	8. Mohindergarh
6. Jammu & Kashmir	1. Jammu	3. Srinagar
	2. Anantnag	4. Kathua

APPENDIX II

H. V. P. NAMES OF DISTRICTS COVERED UNDER THE PROGRAMME-(Contd.)

State (1)	Districts (2)	
7. Kerala	1. Trivandrum	6. Trichur
	2. Quilon	7. Palghat
	3. Alleppey	8. Calicut
	4. Kottayam	9. Cannanore
	5. Ernakulam	
8. Madhya Pradesh	1. Sehore	20. Dhar
	2. Betul	21. Raipur
	3. Hoshangabad	22. Durg
	4. Bilaspur	23. Bastar
	5. Raigarh	24. Jabalpur
	6. Surguja	25. Sagar
	7. Gwalior	26. Narsinghpur
	8. Datia	27. Seoni
	9. Morena	28. Chhindwara
	10. Guaa	29. Mandla
	11. Shivpuri	30. Balaghat
	12. Khandwa	31. Rewa
	13. Jhabua	32. Chhatarpur
	14. Ujjain	33. Sidhi
	15. Ratlam	34. Shandol
	16. Indore	35. Satra
	17. Dewas	36. Panna
	18. Mandsaur	37. Tikamgarh
	19. Khargone	
9. Madras	1. Thanjavur	8. Tirunelveli
	2. Trichy	9. Coimbatore
	3. Chingleput	10. Salem
	4. North Arcot	11. Krishnagiri
	5. South Arcot	12. Kanyakumari
	6. Madurai	13. Nilgiri
	7. Ramanathapuram	
10. Maharashtra	1. Poona	8. Kolaba
	2. Ahmednagar	9. Ratnagiri
	3. Sholapur	10. Dulia
	4. Satara	11. Jalgaon
	5. Sangli	12. Nasik
	6. Kolhapur	13. Auraugabad
	7. Thana	14. Parbhani

APPENDIX II

H. V. P. NAMES OF DISTRICTS COVERED UNDER THE PROGRAMME-(Contd.)

State (1)	Districts (2)	
Maharashtra-(contd.)	15. Nanded	21. Yeotmal
	16. Bhir	22. Wardha
	17. Osmanabad	23. Nagpur
	18. Buldana	24. Chanda
	19. Akola	25. Bhandara
	20. Amravati	
11. Mysore	1. Shimoga	11. Dharwar
	2. Raichur	12. Coorg
	3. Bellary	13. Chikmagalur
	4. South Kanara	14. Hasam
	5. Mysore	15. Tumkur
	6. North Kanara	16. Mandya
	7. Belgaum	17. Karwar
	8. Gulbarga	18. Bangalore
	9. Bidapur	19. Chitradurga
	10. Bidar	
12. Orissa	1. Sambalpur	9. Berhampur
	2. Cuttack	10. Aska
	3. Bolangir	11. Puri
	4. Koraput	12. Parlakhemedi
	5. Kendrapura	13. Phulbaui
	6. Jajapur	14. Khurdher
	7. Athgarh	15. Angul
	8. Bargarh	
13. Punjab	1. Gurdaspur	7. Ferozepur
	2. Amritsar	8. Patiala
	3. Hoshiarpur	9. Bhatinda
	4. Kapurthala	10. Sangrur
	5. Jullundur	11. Rupar
	6. Ludhiana	
14. Rajasthan	1. Ajmer	8. Tonk
	2. Alwar	9. Sri-Ganganagar
	3. Bharatpur	10. Churu
	4. Jaipur	11. Barmer
	5. Jhunjhunu	12. Jalore
	6. Sawai Modhopur	13. Jodhpur
	7. Sikar	14. Nagour

APPENDIX II

H. V. P. NAMES OF DISTRICTS COVERED UNDER THE PROGRAMME-(Contd.)

State (1)	Districts (2)	
Rajasthan-(Contd.)	15. Pali	20. Banswara
	16. Sirohi	21. Bhilwara
	17. Bundi	22. Chittorgarh
	18. Jhalawar	23. Dungarpur
	19. Kota	24. Udaipur
15. Uttar Pradesh	1. Gorakhpur	25. Hardoi
	2. Deoria	26. Kheri
	3. Basti	27. Bareilly
	4. Azamgarh	28. Badaun
	5. Varanasi	29. Bijnor
	6. Mirzapur	30. Moradabad
	7. Jaunpur	31. Pilibhit
	8. Ghazipur	32. Rampur
	9. Ballia	33. Shahjahananpur
	10. Faizabad	34. Agra
	11. Gonda	35. Mathura
	12. Bahraich	36. Mainpuri
	13. Sultanpur	37. Etah
	14. Pratapgarh	38. Nainital
	15. Barabanki	39. Jhansi
	16. Allahabad	40. Jalaun
	17. Fatehpur	41. Hamirpur
	18. Kanpur	42. Banda
	19. Etawah	43. Aligarh
	20. Farrukhabad	44. Saharanpur
	21. Lucknow	45. Mazaffarnagar
	22. Unnao	46. Meerut
	23. Rae-Bareli	47. Bulandshahr
	24. Sitapur	
16. West Bengal	1. Burdwan	8. Malda
	2. 24-Parganas North	9. Midnapur-East
	3. Birbhum	10. Murshidabad
	4. Midnapur-West	11. West Dinajpur
	5. Bankura	12. Howrah
	6. Hooghly	13. 24-Parganas South
	7. Nadia	14. Purulia
17. Delhi	1. Delhi	

APPENDIX II

H. V. P. NAMES OF DISTRICTS COVERED UNDER THE PROGRAMME-(Concluded)

State (1)	Districts (2)	
18. Goa	1. Goa	
19. Himachal Pradesh	1. Mahasu	5. Bilaspur
	2. Mandi	6. Kangra
	3. Sirmur	7. Kulu
	4. Chamba	8. Simla
20. Pondicherry	1. Pondicherry	2. Karikal

ANNEXURE I

LIST OF PESTICIDES AVAILABLE FOR CONSUMPTION FORMULATED QUANTITY PRODUCED / SOLD IN AGRICULTURE

(Quantity in Metric tonnes)

Name of Pesticides	1964	1965	1966	Use
(1)	(2)	(3)	(4)	(5)
Aldrin	601·0	528·0	3203·0	Insect Control
BHC (including lindane)	21228·0	136439·0	79400·0	,,
Chlordane	29·0	45·0	1445·0	,,
DDT	2665·0	6140·1	8908·0	,,
Dieldrin	171·0	107·0	85·0	,,
Endrin	2232·0	717·0	3525·0	,,
Heptachlor	5·5	110·0	1020·0	,,
Isobenzene	9·0	18·0	Not available	,,
Toxaphene	1·2	Not available	150·0	,,
Malathion	147·0	535·0	1874·0	,,
Parathion	2506·0	3161·0	1714·0	,,
Others (Dimethoate, diazinon, dimecron, dichlorovos, dimeton-O-methyl, phorate and thiometon)	185·6	144·25	1311·80	,,
Nicotine sulphate	42·0	Not available	5·0	,,
Pyrethrum	37·0	710·0	1787·0	,,
Mineral spray arts	620·0	246·6	Not available	,,
Calcium arsenate	17·0	10·0	,,	,,
Chlorobenzelate	Not available	18·0	22·0	,,
Carbaryl	4066·0	900·0	10400·0	,,
Sulphur	3222·25	1243·0	393·20	,,
Lime sulphur/Barium polysulphide	5·0	5·0	Not available	Plant disease control
Copper sulphate	5985·0	2467·0	,,	,,
Copper oxychloride	2724·0	1376·0	2688·0	,,
Dithiocarbates	333·4	240·0	755·0	,,

ANNEHURE I

LIST OF PESTICIDES AVAILABLE FOR CONSUMPTION

FORMULATED QUANTITY PRODUCED/SOLD IN AGRICULTURE-(Concluded)

(Quantity in Metric tonnes)

Name of Pesticides	1964	1965	1966	Use
(1)	(2)	(3)	(4)	(5)
Organo-mercurials	475·0	453·0	254·0	Plant disease control
Captan	6·7	9·5	125·0	„
2, 4-D			12·50	
M.C.P.A.	319·0	50·3	12·50	Control of weeds
2, 4, 5-T			3·50	
Dalapon	Not available	Not available	6·00	„
PCP	„	„	59·0	„
Paraquat	„	„	10·0	„
Ethylene dibromide	„	„	21·0	Fumigation against storage pests
Methyl bromide	24·0	19·0	8·0	„
DD Soil fumigant/Nemagon	10·0	12·25	Not available	Control of soil nematode control of rodents
Cyanides	Not available	Not available	80·0	Fumigation against storage pest
Aluminium phosphide	0·2	3·0	Not available	„
EDCT Mixture	17·0	200·0	„	„
Zinc phosphide	233·0	2304·0	239·0	Rodent control
	47,956·85	**1,58,211·00**	**1,20,194·00**	

ANNEXURE V

DIRECTORATE OF PLANT PROTECTION, QUARANTINE AND STORAGE

Cost benefit ratio with plant protection measures in different crops

Crop	Pest/ disease	Insecticide/ fungicide	Cost of chemical treatment in Rs.	Benefit per acre in Rs.	Cost/ benefit ratio	Reference
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Cotton	Jassids	DDT+BHC mixture	6·50 (1 spraying)	125·00	1:19	Plant Protection Bulletin, IX (3-4) : 30-35, 1957
,,	All pests	Carbaryl	36·00 (6 sprayings)	1634·00	1:45	Indian Farming, 14:18, 1964
Sugarcane	Early shoot borer	Endrin	20·37 (3 sprayings)	279·31	1:14	Indian Farming, 8 : 11-16, 1958
,,	,,	DDT	34·12 (3 sprayings)	220·11	1:6	Ibid
,,	Top borer	Endrin	97·50 (3 sprayings)	327·75	1:3·4	Indian Journal of Sugarcane, Research & Development 1 (1) : 36-47, 1956
Paddy	Blast	Copper oxychloride	10·00 (2 sprayings)	30·25	1:3	Indian Phytopathology, IX (1) : 15-22, 1956
,,	Weeds	2, 4-D	6·00 (1 spraying)	27·93	1:4·6	Indian Farm- XIV (5) : 12-13, 1964
Brinjal	Fruit borer	Carbaryl	70·00 (3 sprayings)	240·00	1:3·4	Indian Journal Entomology, XXV(4) : 275-291, 1963
		DDT+BHC	84·00 (3 sprayings)	237·00	1:2·8	Ibid
Potato	Late blight	Bordeaux mixture	60·00	460·00	1:7·6	Indian Potato Journal, IV(1): 27-33, 1962

ANNEXURE V

DIRECTORATE OF PLANT PROTECTION, QUARANTINE AND STORAGE

Cost benefit ratio with plant protection measures in different crops-(Concluded)

Crop	Pest/ disease	Insecticide / fungicide	Cost of chemical treatment in Rs.	Benefit per acre in Rs.	Cost/ benefit ratio	Reference
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mustard	Aphids	Parathion	36·00 (3 sprayings)	114·00	1:3	Indian Oil Seed Journal II (3) : 24-31, 1958
		BHC	39·78 (3 sprayings)	114·00	1:2	Ibid
		Malathion	63·30 (3 sprayings)	128·00	1:2	Ibid
Groundnut	Soil pests	Phorate	87·00 (1 treatment)	120·00	1:1·4	Indian Farming, XIV (6):11, 27, 1964
	White grubs	BHC	23·20 (1 treatment)	124·21	1:5	Ibid
	Foot rot	Captan	5·50 (Seed treatment)	220·09	1:44	Ibid
Coconut	Leaf rot, bud rot stem bleeding, *mahali* leaf blight	Bordeaux mixture	27·00 (3 sprayings)	50·00	1:2	Indian Farming XII(12) : 19, 24, 1963

A LIST OF TRADE NAMES OF VARIOUS PESTICIDES ARRANGED ALPHABETICALLY ALONGWITH THEIR CHEMICAL & COMMON NAMES

S.No. (1)	Brand/Trade name (2)	Chemical name (3)	Common name (4)
1.	Acrolien	Acrylaldehyde	Acrolein
2.	Agallol	MEMC (Metnoxy ethyl mercury chloride)	Organo mercurial
3.	Agricop	Copper oxychloride	Copper oxychloride
4.	Agrimycin	Streptomycin sulphate	Antibiotic
5.	Agritox	2-methyl-4-chlorophenoxy acetic acid	MCPA
6.	Agrocide	1, 2, 3, 4, 5, 6 hexachlorocyclohexane	BHC
7.	Agrosan GN	TMA & EMC (Tolyl mercury acetate) & Ethyl mercury chloride	Organo mercurial
8.	Agroxone	2-methyl-4-chlorophenoxy acetic acid	MCPA
9.	Akar	Ethyl 4, 4, dichlorobenzilate	Chlorobenzilate
10.	Akar 338	Ethyl 4, 4, dichlorobenzilate	„
11.	Albolineum	—	—
12.	Aldrex	1, 2, 3, 4, 10, 10 hexachloro 1, 4, 4a, 5, 8, 8a hexahydro 1, 4 endoexo 5, 8 dimethanonaphthalene	Aldrin
13.	Aldrin	1, 2, 3, 4, 10, 10 hexachloro 1, 4, 4a, 5, 8, 8a hexahydro 1, 4 endoexa 5, 8 dimethanonaphthalene	„
14.	Altavar	Sodium chlorate & 2, 4-dichlorophenoxy acetic acid & N (3 chlorophenyl 'N' 'N' dimethylurea	CMU
15.	Anthio	0, 0 dimethyl S (N-methyl N-formoyl-carbamoyl-methyl)-dithiophosphate	Formothion
16.	Antu	1-(1 Naphthyl)-2-thiourea	Antu
17.	Aramite	2-(p-tert-butylphenoxy) isopropyl 2 chloroethyl sulphite	—
18.	Arasan	Tetra methyl thiuram disulphide	Thiram
19.	Arathane	2, 4 dinitro 6 (2 octyl) phenyl chrotonate	Zinocap

(1)	(2)	(3)	(4)
20.	Aretan	EEMC (Ethoxy ethyl mercury chloride)	Organo mercurial
21.	Asuntol	Chlorocoumarinthiophosphoric acid ester	—
22.	Atrazine	2-chloro-4-ethyl amino-6-isopropyl amino-5-triazine	Atrazine
23.	Banvel D	2-methoxy-3, 6-dichlorobenzoic acid	Dicamba
24.	Banvel T	2-methoxy-3, 5, 6-trichlorobenzoic acid	Tr!camba
25.	Basudin	0, 0-diethyl-0-(2 isopropyl-6-methyl 4 pyrimidinyl, phosphorothioate	Diazinon
26.	Bayer 22/190	0, 0-dimethyl-0, 3-chloro-4-nitro-phenyl phosphorothioate	—
27.	Baytex	0, 0-dimethyl-0-(3-methyl-4-methyl mercapto-phenyl) thiophosphate	Fenthion
28.	Benzen (105, 110, 150)	1, 2, 3, 4, 5, 6 hexachlorocy-clohexane	BHC
29.	Benziebler	1, 2, 3, 4, 5, 6 hexachlorocyclohexane	,,
30.	Benzichlor	1, 2, 3, 4, 5, 6 hexachlorocyclohexane	,,
31.	BHC	1, 2, 3, 4, 5, 6 hexachlorocyclohexane	,,
32.	Bi-Hedonal	2, 4-dichlorophenoxy accetic acid and 2-methyl-4-chlorophenoxy acetic acid	2, 4-D (amine) and MCPA
33.	Bladex 'A'	2, 4-dichlorophenoxy acetic acid	2, 4-D
34.	Bladex 'B'	2, 4-dichlorophenoxy acetic acid	2, 4-D
35.	Bladex 'C'	2, 4-dichlorophenoxy acetic acid	2, 4-D
36.	Bladex 'F'	2, 4-dichlorophenoxy acetic acid	2, 4-D
37.	Bladex 'G'	2, 4-dichlorophenoxy acetic acid	2, 4 D
38.	Bladex 'H'	2, 4, 5-Trichlorophenoxy acetic acid	2, 4, 5-T
39.	Bladex 'I'	2, 4, 5-Trichlorophenoxy acetic acid and 2, 4-dichlorophonenoxy acetic acid	2, 4, 5, T and 2, 4-D
40.	Bladex 'K'	2, 4, 5-Trichlorophenoxy acetic acid and 2, 4-dichlorophenoxy acetic acid	2, 4, 5 T and 2, 4-D
41.	Bladex 'O'	3-amino-1, 2, 4-triazol	Aminotriazele or Amitrole

(1)	(2)	(3)	(4)
42.	Bladex 'P'	Aminotriazel & 2, 2-dichloropropionic acid	—
43.	Bladex 'R'	?-amino-2, 5-dichlorobenzoic acid	Amiben
44.	Blasticidin	Benzylaminobenze ne sulphonate	Antibiotic
45.	Blimix	Copper oxychloride	Copper oxychloride
46.	Blitane	Copper and Zineb	—
47.	Blitox	Copper oxychloride	Copper oxychloride
48.	Blizene	Zinc ethylene bis dithiocarbamate	Zineb
49.	Blue copper	Copper oxychloride	Copper oxychloride
50.	Bordeaux mixture	Copper sulphate & Calcium hydrate	Bordeaux mixture
51.	Bordeaux paste	Copper sulphate & Caicium hydrate	Bordeaux paste
52.	Brassicol	1, 2, 3, 4, 5 petachloronitrobenzene	PCNB
53.	Brestan	Triphenyl tin acetate	—
54.	Bromomethane	Methyl bromide	Methyl bromide
55.	Bugmar	O, O-diethyl-O-(2 isopropyl-6-methyl-4-pyrimidinyl phosphorothioate	Diazinon
56.	Burgundy mixture	Copper sulphate & sodium carbonate	Burgundy mixture
57.	Bushkiller 64	2, 4, 5-trichlorophenoxy acetic acid and 2, 4-dichlorophenoxy acetic acid	2, 4, 5 T & 2. 4-D
58.	Calcium arsenate	Calcium arsenate	Calcium arsenate
59.	Calcyan	Calcium cyanide	Calcium cyanide
60.	Captan	N-trichloromethyl marcapto-4-cyclohexane-1, 2-dicarboximide	Captan
61.	Carbavin	1-naphthyl-N-methylcarbamate	Carbaryl
62.	Ceresan 2%	EMC (Ethyl mercury chloride)	Organo mercurial
63.	Ceresan dry	PMA (Phenyl mercury acetate)	Organo mercurial
64.	Ceresan dust	MEMC (Methoxy ethyl mercury chloride)	Organo mercurial
65.	Ceresan M dust	N-ethyl mercuri-p-toulene sulphonanilide	Organo mercurial

(1)	(2)	(3)	(4)
66.	Ceresan Wet	MEMC (Methoxy ethyl mercury chloride)	Organo mercurial
67.	Chaubattia paste	Lead oxide and Copper carbonate	Chaubattia paste
68.	Cheshunt compound	Copper sulphate & ammonium carbonate	Cheshunt compound
69.	Chlorea	Sodium chlorate & 2, 4 dichlorophenoxy acetic acid & borate	—
70.	Chlorocide	P-chlorobenzyl-P-chlorophenyl sulphide	Chlorobenside
71.	Chlorosel	1, 2, 3, 4, 5, 6 hexachlorocyclohexane	BHC
72.	Chlorparacide	P-chlorobenzyl-P-chlorophenyl sulphide	Chlorobenside
73.	Chlorothion	0, 0-dimethyl-0-3-chloro-4-nitrophenyl phosphorothioate	—
74.	Chlorsulphacide	P-chlorobenzyl-P-chlorophenyl sulphide	Chlorobenside
75.	Chloroxene	2, 4-dichlorophenoxy acetic acid	2, 4-D
76.	Chloroxene	2, 4-dichlorophenoxy acetic acid	2, 4-D
77.	Colloidal copper	Cuprous oxide	Cuprous oxide
78.	Colloidal sulphur	Sulphur	Wettable sulphur
79.	Conditioned sulphur	Sulphur	Wettable sulphur
80.	Copper sandoz	Cuprous oxide	Cuprous oxide
81.	Copper sulphate	Copper sulphate	Copper sulphate
82.	Coppesan	Copper oxychloride/Cuprous oxide	Copper oxychloride/ Cuprous oxide
83.	Cornex	2, 4-dichlorophenoxy acetic acid	2, 4-D
84.	Cornex M	2-methyl-4-chlorophenoxy acetic acid	MCPA
85.	Cosan	Wettable sulphur	Wettable sulphur
86.	Crag herbicide	2, 4-dichlorophenoxy ethyl sulphate	2, 4-DES
87.	Crag herbicide I	2, 4-dichlorophenoxy acetic acid	2, 4-D
88.	Crag fungicide 341	2-heptadecyl glyoxalidine acetate	Glyodin
89.	Cupramat	Copper and Ziram	—

(1)	(2)	(3)	(4)
90.	Crown brand Wettable sulphur	Sulphur	Wettable sulphur
91.	Cuman	Zinc dimethyl dithiocarbamate	Ziram
92.	Cupramar	Copper oxychloride	Copper oxychloride
93.	Cuprantel	Copper oxychloride	,,
94.	Cuprasan	Copper oxychloride	,,
95.	Cupravit	Copper oxychloride	,,
96.	Cuprekylt	Copper oxychloride	,,
97.	Cuproxel	Cuprous oxide/Copper oxychloride	Cuprous oxide/Copper oxychloride
98.	Cyanogas	Calcium cyanide	Calcium cyanide
99.	Cymag	Sodium cyanide	Sodium cyanide
100.	Cyprex	Dodacylguanidine acetate	Dodine
101.	Dalapon	2, 2-dichloropropionic acid	Dalapon
102.	DDT	1, 1, 1-Trichloro-2, 2-bis (p-chlorophenyl) ethane	DDT
103.	DDVP	0, 0-dimethyl-2, 2-dichlorovinyl-phosphate	Dichlorvas
104.	DEF	s, s, s-tributyl phosphorotrithioate	—
105.	Demecron	2-chlore-2-diethyl carbamoyl-1-methyl-vinyl-dimethyl phosphate	Phosphamidon
106.	Derrimac	Derris	Rotinone
107.	Derrin	Derris	Rotinone
108.	Derriphytan	Derris	Rotinone
109.	Dibrem	Dimethyl-1, 2-dibromo-2, 2-dichloroethyl phosphate	Naled
110.	Dicotex	2, 4-dichlorophenoxy acetic acid	2, 4-D
111.	Didimac	1, 1, 1-trichloro-2, 2-bis (p-chlorophenyl)-ethane	DDT
112.	Dielmoth	1, 2, 3, 4, 10, 10-hexachlore-6, 7-epoxy 1, 4, 4a, 5, 6, 7, 8, 8a Octahydro 1, 4 endoexo 5, 8 dimethanonaphthalene	Dieldrin

(1)	(2)	(3)	(4)
113.	Dieldrex	1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy 1, 4, 4a, 5, 6, 7, 8, 8a-Octa-hydro-1, 4-endoexo-5, 8-dimethanonaphthalene	Dieldrin
114.	Dieldrin	1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy 1, 4, 4a, 5, 6, 7. 8, 8a-Octa-hydro-1, 4-endoexo-5, 8-dimethano-naphthalene	Dieldrin
115.	Denocate	Dinitro orthocresol	DNOC
116.	Dimanin	Alkyl-dimethyl-benzyl-ammonium chloride	—
117.	Dipterex	Dimethyl trichlorohydroxyethyl phosphonate	Trichlorphon
118.	Dithane D-14	Disodium ethylene-bis-dithiocarba-mate	Nabam
119.	Dithane M-22	Manganese ethylene-bis-thiocarba-mate	Maneb
120.	Dithane M-45	Zineb & Maneb	—
121.	Dithane Z-78	Zinc ethylene-bis-dithiocarba-mate	Zineb
122.	Dowfume	Methly bromide	Methyl bromide
123.	Dowfume 75	Ethylene dichloride+Carbon tetrachloride	ED/CT
124.	Dowpon	2, 2 dichloropropionic acid	Dalapon
125.	Drymac 2	Derris	Rotinone
126.	DTMC	1, 1-di (p-chlorophenyl)-2, 2, 2-tri-chloroethanel	Dicofel
127.	Duter	Triphenyl tinacetate	—
128.	Dylex	Dimethyl trichlorohydroxyethyl phosphonate	Trichlorphon
129.	ED/CT mixture	Ethylene dichloride carbon tetra-chloride	ED/CT
130.	Ekatin	O, O-dimethyl-S-ethyl-mercapto-ethyl dithiophosphate	Thiometen
131.	Ekatox	O, O-diethyl O-p-nitrophenyl phos-phorothiate	Parathion

(1)	(2)	(3)	(4)
132.	Elasel	Sulphur	Wettable sulphur
133.	Elimite	P-chlorobenzyl-p-chlorophenyl sulphide	Chlorbenside
134.	Embafume	Methyl bromide	Methyl bromide
135.	Embutox	2, 4-dichlorophenoxy butyric acid	2, 4-DB
136.	Endothal	di-sodium 3, 6 endoxohexahydro-phthalate	Endothal
137.	Endrex	1, 2, 3, 4, 10, 10 hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a, Octahydro-1, 4-endo, endo-5, 6-dimethanonaphthalene	Endrin
138.	Endrin	1, 2, 3, 4, 10 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endo, endo-5, 6-dimethanonaphthalene	Endrin
139.	EPN	Ethyl p-nitrophenyl benzenethio-phosphonate or O-ethyl O-p-nitro-phenyl phenyl phosphonothioate	—
140.	Eptam	Ethyl-N, N-di-n-propylthiolcarba-mate	EPTC
141.	Esso fungicide 407	N-trichloromethylthiophthal-mide	Folpet
142.	Ethion	O, O, O, O-tetraethyl-S, S-methy-lene-bis phosphorothioate	Ethion
143.	Extar/Extar A	Dinitro orthro cresol	DNOC
144.	Extar A	Dinitro ortho cresol	DNOC
145.	FAC	Isopropylamide of 0, 0 diethyldithio phosphoryl acetic acid	—
146.	Ferbam	Ferric dimethyl dithiocarbamate	Ferbam
147.	Fermate	Ferric dimethyl dithiocarbamate	,,
148.	Fernoxone	2, 4-dichlorophenoxy acetic acid	2, 4-D
149.	Flit 406	N-trichloromethyl marcapto-4-cyclohexane-1, 2-carboximide	Captan
150.	Folbex	Ethyl 4, 4-dichlorobenzilate	Chlorobenzilate
151.	Folidol Dust	0, 0-dimethyl 0-p-nitrophenyl phosphorothioate	Methyl parathion

(1)	(2)	(3)	(4)
152.	Folidol E-605	0, 0-diethyl-0-p-nitrophenyl phosphorothioate	Parathion
153.	Folithion	0, 0-dimethyl-0-(3-methyl-4-nitrophenyl) phosphorothioate	—
154.	Folosan	1, 2, 3, 4, 5-pentachlorobenzene	PCNB
155.	Formaldehyde	Formalin	Formalin
156.	Fosferno	0, 0-diethyl-0-p-nitrophenyl phosphorothioate	Parathion
157.	Fumazone	1, 2-dibromo-3-chloropropane	—
158.	Fungi copper	Cuprous oxide	Cuprous oxide
159.	Fungimar	Cuprous oxide	,,
160.	Fusariol	Ethyl mercuric cyanide	Organo mercurial
161.	Fyool	Copper oxychloride	Copper oxychloride
162.	Fytolan	Copper oxychloride	,,
163.	Fytomix	Copper oxychloride/Cuprous oxide	Copper oxychloride/ Cuprous oxide
164.	G 23992	Ethyl-4, 4-dichlorobenzilate	Chlorobenzilate
165.	Gammexane	1, 2, 3, 4, 5, 6 hexachlorocyclohexane	BHC
166.	Geigy Fungi copper	Cuprous oxide	Cuprous oxide
167.	Geigy-33	1, 1, 1 trichloro-2, 2-bis-(p-chlorophenyl) ethane	DDT
168.	Geigy 33 A-5	1, 1, 1 trichloro-2, 2-bis-(p-chlorophenyl) ethane	,,
169.	Geigy 338	Ethyl 4, 4-dichlorobenziate	Chlorobenzilate
170.	Geigy toxaphene	Chlorinated camphene (having chlorin content of 67-69%)	Toxaphene
171.	Geigy Veg Dust	1, 2, 3, 4, 5, 6-hexachlorocyclohexane	Lindane
172.	Gramoxone	1, 1-dimethyl-4, 4-dipyridylium dichloride	Paraquart
173.	Guesarol	1, 1, 1-trichloro-2, 2-bis-(p-chlorophenyl) ethane	DDT
174.	Gusathion	Benzotriazine derivative of Dithiophosphoric dimethylester	Azinophos methyl

(1)	(2)	(3)	(4)
175.	Guthion	Benzotriazine derivative of Dithiophosphoric dimethyl ester	Azinophos methyl
176.	Hasochol	1, 1, 1-trichloro 2, 2-bis-(p-chlorophenyl) ethane	DDT
177.	Hedonal	2, 4-dichlorophenoxy acetic acid	2, 4-D
178.	Hedonal Liquid	2, 4 dichlorophenoxy acetic acid	2, 4-D
179.	Hedonal 'M'	2-methyl-4-chlorophenoxy acetic acid	MCPA
180.	Heptaf	1, 4, 5, 6, 7, 8, 8-heptachloro 3a, 4, 7, 7a tetrahydro-4, 7-methanoindane	Heptachlor
181.	Hexachlor	Sulphur	Wettable sulphur
182.	Hexamar 2, 4-D	2, 4-dichlorophenoxy acetic acid	2, 4-1
183.	Hexamar Aldrin	1, 2, 3, 4, 10, 10-hexachloro-1, 4, 4a, 5, 8, 8a hexahydro-1, 4-endoexo-5, 8-dimethanonaphthalene	Aldrin
184.	Hexamar BHC	1, 2, 3, 4, 5, 6 hexachlorocyclohexane	BHC
185.	Hexamar chlordane	1, 2, 4, 5, 6, 7, 8, 8-Octachloro-3a, 4, 7, 7a tetrahydro, 7-methanoindane	Chlordane
186.	Hexamar DDT	1, 1, 1-trichloro-2, 2-bis (p-chlorophenyl) ethane	DDT
187.	Hexamar dieldrin	1, 2, 3, 4, 10, O-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-(Octahydro-1, 4-endoexo-5, 8-dimethanonaphthalene	Dieldrin
188.	Hexamar endrin	1. 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endo, endo-5, 6 dimethanonaphthalene	Endrin
189.	Hexamar heptachlor	1, 4, 5, 6, 7, 8, 8-heptachloro-3a, 4, 7, 7a-tetrahydro-4, 7-methanoindane	Heptachlor
190.	Hexamar lindane	1, 2, 3, 4, 5, 6-hexachlorocyclohexane	Lindane
191.	Hexamar ryania	Ryanodine	Ryania
192.	Hexamar toxaphene	Chlorinated camphene (having chlorin content of 67–69%)	Toxaphene

(1)	(2)	(3)	(4)
193.	Hexasan	EMC (Ethyl mercury chloride) and PMC (Phenyl mercury chloride)	Organo mercurial
194.	Hexasul	Sulphur	Wettable sulphur
195.	Hexathane	Zinc ethylene-bis-dithiocarbamate	Zineb
196.	Hexatin	O, O-dimethyl-S-ethyl mercaptoe-thyl dithiophosphate	Thiameton
197.	Hexavin	1, 4, 5, 6, 7, 8, 8 heptachloro 3a, 4, 7, 7a-tetrahydro-4, 7-methanoindane	Heptachlor
198.	Hexidol	1, 2, 3, 4, 5, 6-hexachlorocyclohexane	BHC
199.	Hydram (Ord-ram)	ethyl, 1 hexamethlene imine carbothio-late	—
200.	Imidan	Phthalimidomethyl-O, O-dimethyl-phosphorodithioate	—
201.	Intox BHC	1, 2, 3, 4, 5, 6-hexachlorocyclohexane	BHC
202.	Intox DDT	1, 1, 1 trichloro-2, 2-bis (p-chloro-phenyl)-ethane	DDT
203.	Intox M	0, 0-dimethyl-S (1, 2 dicarbethoxy-ethyl) phosphorodithioate	Malathion
204.	Intox '8'	1, 2, 3, 4, 5, 6, 7, 8, 8-Octachloro-3a, 4, 7, 7a-tetrahydro-4, 7-methanoindane	Chlordane
205.	Isopestox	Bis-(monoisopropylamine) fluoro-phosphine oxide	Mipafox/Dimefox
206.	Karathane	2, 4-dinitro-6-(2-octyl) phenyl crotonate	Dinocap
207.	Karmex	3-(3, 4-dichlorophenyl)-1, 1-dimethyl urea	Diuron
208.	Katakilla	Derris	Rotenone
209.	Kathon	2, 4-dichlorophenoxy acetic acid	2, 4-D
210.	Kelthane	1, 1-di (p-chlorophenyl)-2, 2, 2 trichloroethanol	Dicofol
211.	Killoptera	Ethylene dichloride + carbon tetra-chloride	ED/CT
212.	Kirti copper	Cuprous oxide	Cuprous oxide
213.	Knox weed 42	Ethyl-di-n-propylthiolcarbamate & iso-octyl ester of 2, 4-dichloro-phenoxy acetic acid	—

(1)	(2)	(3)	(4)
214.	Kryocide	Sodium fluoaluminate	Cryolite
215.	Lead arsenate	Lead arsenate	Lead arsenate
216.	Lebaycide	0, 0-dimethyl-0-(4-methyl-mercapto 3-methyl) phenylthiophosphate	Fenthion
217.	Lethalrock chlordane	1, 2, 3, 4, 5, 6, 7, 8, 8-Octachloro-3a, 4, 7, 7a-tetrahydro-4, 7-methanoindane	Chlordane
218.	Lethalrock aldrin	1, 2, 3, 4, 10, 10-hexachloro-1, 4, 4a, 5, 8, 8a-hexahydro-1, 4-endoexo-5, 8-dimethanonaphthalene	Aldrin
219.	Lethalrock BHC	1, 2, 3, 4, 5, 6 hexachlorocyclohexane	BHC
220.	Lethalrock DDT	1, 1, 1-trichloro-2, 2-bis (p-chlorophenyl)-ethane	DDT
221.	Lethalrock dieldrin	1, 2, 3, 4, 10, 10-hexachloro-6, 7 -epoxy-1, 4, 4a, 5, 6, 7, 8, 8a -Octahydro-1, 4-endoexeo-5, 8-dimethanonapbthalene	Dieldrin
222.	Lethalrock malathion	0, 0-dimethyl-S (1, 2-dicarbethoxy-ethyl) phosphorodithioate	Malathion
223.	Lethalrock toxaphene	Chlorinated camphene (having chlorin content of 67-69%)	Toxaphene
224.	Lime sulphur	Calcium polysulphide	Lime sulphur
225.	Lindane	1, 2, 3, 4, 5, 6 hexachlorocyclohexane	Lindane
226.	Lintaf	1, 2, 3, 4, 5, 6 hexachlorocyclohexane	Lindane
227.	Lonacol	Zinc ethylene dithiocarbamate	Zineb
228.	Lonacol M	Manganese ethylene dithiocarbamate	Maneb
229.	Lotendi	1, 1, 1-trichloro-2, 2-bis (p-chlorophenyl) ethane	DDT
230.	Lunasan	EMU (Ethyl mercury thiourea)	Organo mercurial
231.	Magnetic Wettable sulphur	Sulphur	Wettable sulphur
232.	Mala 50	0, 0-di ethyl-S-(1, 2-dicarbethoxyethyl) phosphorodithioate	Malathion
233.	Malamar	0, 0-dimethyl-S-(1, 2-dicarbethoxyethyl) phosphorodithioate	Malathion

(1)	(2)	(3)	(4)
234.	Malathion	0, 0-dimethyl-S-(1, 2-dicarbethoxyethyl) phosphorodithioate	Malathion
235.	Marvex	0, 0-dimethyl-2, 2-dichlorovinyl phosphate	Dichlorvos
236.	Maximac	Nicotine sulphate	Nicotine sulphate
237.	Melprex	Dodecylguanidine acetate	Dodine
238.	Meltex 50	0, 0-dimethyl-S (1,2-dicarbethoxyethyl) phosphorodithioate	Malathion
239.	Menno	3-amino-1, 2, 4-triazol	Aminotriazol or Amitre
240.	Menzate	Manganese ethylene dithiocarbamate	Maneb
241.	Merculine	PMS (Phenyl mercury salicylate)	Organo mercurial
242.	Metacid	0, 0-dimethyl-0-p-nitrophenyl phosphorothioate	Methyl parathion
243.	Metasystox	Dimethyl-ethyl-mercapto-ethyl thiophosphate	Methyl 0-demeton
244.	Methaxone	2-methyl-4-chlorophenoxy acetic acid	MCPA
245.	Methyl bromide	Methyl bromide	Methyl bromide
246.	MH	Maloic hydrazide	MH
247.	Micoaldrin	1, 2, 3, 4, 10, 10-hexachloro-1, 4, 4a, 5, 8, 8a-hexahydro-1, 4-endoexo-5, 8-dimethanonaphthalene	Aldrin
248.	Micochlordane	1, 2, 4, 5, 6, 7, 8, 8-Octachloro-3a, 4, 7, 7a-tetrahydro-4, 7-methanoindane	Chlordane
249.	Micodieldrin	1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endoexo-5, 8,-dimethanonaphthalene	Dieldrin
250.	Micoendrin	1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endo, endo-5, 6 dimethanonaphthalene	Endrin
251.	Micoheptachlor	1, 4, 5, 6, 7, 8, 8-heptachloro-3a, 4, 7, 7a-totrahydro-4, 7-methanoindane	Heptachlor

(1)	(2)	(3)	(4)
252.	Micolindane	1, 2, 3, 4, 5, 6 hexachlorocyclohexane	Lindane
253.	Micomalathion	0, 0-dimethyl-S-(1, 2-dicarbethoxy-ethyl) phosphorodithioate	Malathion
254.	Micop	Copper oxychloride	Copper oxychloride
255.	Micoparathion	0, 0-diethyl-0-p-nitrophenyl phosphorothioate	Parathion
256.	Micosano	1, 2, 3, 4, 5, 6-hexachlorocyclohexane	BHC
257.	Miltox	Zinc ethylene-bis-dithiocarbamate	Zineb
258.	Mitex	2-(p-tert-butylphenoxy) isopropyl-2-chloroethyl sulphite	—
259.	Mitox	P-chlorobenzyl p-chlorophenyl sulphide	Chlorbenside
260.	Monax	N-(3-chlorophenyl)-' N ', ' N '-dimethylurea & Borate	—
261.	Marocide	Dinitro-alkyl-phenyl-a-crylate	Chlorbensiae Binapacryl
262.	Mylone	3, 5-dimethyl tetrahydro-1, 3, 5-2H-thiadiazine-2-thione	DMTT
263.	Nata	Trichloro acetic acid	TCA
264.	Neguvon	0, 0-dimethyl-2, 2, 2-trichloro-hydroxy-ethyl-phosphonic acid ester	—
265.	Nemagon	1, 2-dibromo-3-chloropropane	—
266,	Nematox	Ethylene dibromide	EDB
267.	Neocid	1, 1, 1-trichloro-2, 2-bis-(p-chloro-phenyl)-ethane	DDT
268.	New improved ceresan	EMP (Ethyl mercury phosphate)	Organo mercurial
269.	Nickle chloride	Nickle chloride hexahydrate	Nickle chloride
270.	Nicophytan	Nicotine sulphate	Nicotine sulphate
271.	Nicouline	Derris	Rotenone
272.	Nicospray	Nicotine sulphate	Nicotine sulphate
273.	Nicotox 20	Nicotine sulphate	,,
274.	Nicotine sulphate	Nicotine sulphate	,,
275.	Nitrochloroform	Trichloronitromethane	Chloropicrin

(1)	(2)	(3)	(4)
276.	Nogos	0, 0-dimethyl-2, 2-dichlorovinyl phosphate	Dichlorvos
277.	Nomersan	Tetra methyl thiuram disulphide	Thiram
278.	Nuvan	0, 0-dimethyl-2, 2-dichlorovinyl phosphate	Dichlorvos
279.	OMPA	Bis-(dimethyl-amino) phosphonous anhydride	Somradan
280.	Ostico	—	—
281.	Ovex	P-chlorophenyl-p-chlorobenzene sulphonate	Chlorfenson
282.	Ovicide	P-chlorophenyl p-chlorobenzene sulphonate	Chlorfenson
283.	Ovotran	P-chlorophenyl-p-chlorobenzene sulphonate	Chlorfenson
284.	Owl Brand sulphur	Sulphur	Dusting sulphur
285.	Palormone	2, 4-dichlorophenoxy acetic acid	2, 4-D
286.	Paracide	Paradichlorobenzene	PDCB
287.	Paramar	0, 0-diethyl-0-p-nitrophenyl phosphorothioate	Parathion
288.	Parry 5	1, 1, 1-trichloro-2, 2-bis (p-chlorophenyl) ethane	DDT
289.	Parrycop	Copper oxychloride	Copper oxychioride
290.	Parzate	Zinc ethylene-bis-dithiocarbamate	Zineb
291.	Parzate Liquid	Disodium ethylene-bis-dithiocarbamate	Nabam
292.	PDB	Paradichlorobenzene	PDCB
293.	Peratex	0, 0-diethyl-0-p-nitrophenyl phosphorothioate	Parathion
294.	Perecloud	Copper oxychloride	Copper oxychloride
295.	Perfection dusting sulphur	Sulphur	Dusting sulphur
296.	Perenox	Cuprous oxide	Cuprous oxide
297.	Pestox III	Bis-(dimethylamino) phosphonous anhydride	Schradan

(1)	(2)	(3)	(4)
298.	Pestox XV	Bis-(mono isopropylamine) fluorophosphin eoxide	Mipafox/Dimefox
299.	Phaltan	N-trichloromethyl thiophthalimide	Folpet
300.	Phenoxylene	2-methyl-4-chlorophenoxy acetic acid	MCPA
301.	Phosdrin	2-carbomethcxy-1-methylvinyl dimethyl phosphate	Mevinphos
302.	Phostoxin or Phostox	Aluminium phosphide	Aluminium phosphide
303.	Phygon	2, 3-dichloro-1, 4-nephthaquinone	Dichlone
304.	Picfume	Trichloronitromethane	Chloropicrin
305.	Pip	—	Pyrethrum
306.	Planotox	2, 4-dichlorophenoxy acetic acid	2, 4-D
307.	Polvosol	Derris	Rotenone
308.	Pomasal	Tetra methyl thiuram disulphide	Thiram
309.	Puraturf	Phenyl mercury triethanol ammonium lactate & acetate	Puratized
310.	Puratized	Phenyl mercury triethanol ammonium lactate & acetate	Puratized
311.	Pyrocide	—	Pyrethrum
312.	Pyrocolloid	—	Pyrethrum
313.	Pyrocone	—	Pyrethrum
314.	Pyrodust	—	Pyrethrum
315.	Pyrotaf	—	Pyrethrum
316.	Quinone	Tetrachloro-p-benzaquinone	Chloranil
317.	Racumin	3-(a-acetonyl-4-chlorobenzyl)-4-hydroxy-coumarin	Coumachlor
318.	Rada	abietyl amine acetate (rosin amino-d-acetate)	—
319.	Ratafin	3-(a-acetonyl-4-chlorobenzyl)-4-hydroxy coumarin	Coumachlor
320.	Ratox	Zinc phosphide	Zinc phosphide
321.	Refined sulphur	Sulphur	Dusting sulphur
322.	Reglon	1, 1-ethylene-2, 2-dipyridylium dibromide	Diquat

(1)	(2)	(3)	(4)
323.	Rod-X	Zinc phosphide	Zinc phosphide
324.	Rogor	0, 0-dimethyl-S-(N-methyl carbamyl-methyl) phosphorodithioate	Dimethoate
325.	Saltosan	Curprous oxide	Cuprous oxide
326.	Sandolin A	dinitro orthocresol	DNOC
327.	Sandotox	Derris	Rotenone
328.	Sayfos	Triazinyl phosphate	Menazon
329.	Selinon	dinitro orthocresol	DNOC
330.	Sesone	2, 4-dichlorophenoxyethyl sulphate	2, 4-DES
331.	Sevin	1-naphthyl N-methylcarbamate	Carbaryl
332.	Shell 2, 4-D	2, 4-dichlorophenoxy acetic acid	2, 4-D
333.	Shell copper	Copper oxychloride	Copper oxychloride
334.	Shell DD	Dichloropropane dichloropropene	DD
335.	Shell dusting sulphur	Sulphur	Dusting sulphur
336.	Shell EDB	Ethylene dibromide	EDB
337.	Shell MCPB	2-methyl-4-chlorophenoxy butyric acid	MCPB
338.	Shell PCP	Pentachlorphenol	PCP
339.	Silvex	2-(2, 4, 5-trichlorophenoxy) propionic acid	Silvex
340.	Sim	2-chloro-4, 6-bis-(ethylamino) 1, 3, 5-triazine	Simazine
341.	Simazine	2-chloro-4, 6-bis-(ethylamino) 1, 3, 5-triazine	Simazine
342.	Sluggit	Metacitaldehyde	Metaldehyde
343.	Slug pellets	Metacetaldehyde	Metaldehyde
344.	Smopest	1, 2, 3, 4, 5, 6 hexachlorocyclohexane	Lindane
345.	Sodium cyanide	Sodium cyanide	Sodium cyanide
346.	Sofril	Sulphur	Wettable sulphur
347.	Solbar	Barium polysulphide	Barium polysulphide
348.	Spergon	Tetrachloro-p-benzoquinone	Chloranil
349.	Spersul	Sulphur	Wettable sulphur

(1)	(2)	(3)	(4)
350.	Spontox	2, 4-dichlorophenoxy acetic acid and 2, 4, 5-trichlorophenoxy acetic acid	2, 4-D & 2, 4, 5-T
351.	Stam F 34	3, 4 dichloropionanilide	3, 4-DPA
352.	Stimulant latex	2, 4, 5-trichlorophenoxy acetic acid	2, 4, 5-T
353.	Streptachlor	Streptomycin & chlortetra cycline hydrochloride	Antibiotic
354.	Strobane	Terpenepolychlorinate (66% chlorin)	—
355.	Strychnine hydrochloride	Strychnine hydrochloride	Strychnine hydrochloride
356.	Sulkol	Sulphur	Wettable sulphur
357.	Sulphur dust	Sulphur	Dusting sulphur
358.	Sultaf	Sulphur	Wettable sulphr
359.	Sumithion	0, 0-Dimethyl-0-(3-methtyl-4-nitrophenyl) phosphorothioate	—
360.	Systox	0, 0-diethyl-0-2-(ethylthio) ethyl phosphoro-dithioate	Demeton
361.	Tafadrin	1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endo, endo 5,-6,-dimethanonaphthalene	Endrin
362.	Tafapon	2, 2-dichloropropionic acid	Dalapon
363.	Tafasan	(MEMC) Methoxy ethyl mercury chloride	Organo mercurial
364.	Tafazine	2-chloro-4, 6-bis-(ethyl amino)-1, 3, 5 -triazine	Simazine
365.	Tafacide	2, 4-dichlorophenoxy acetic acid	2, 4-D
366.	Talvar	3-(4-chlorophenyl-1, 1-dimethylurea	Monuron
367.	Tedion	2,4, 4, 5-tetrachlorodiphenyl sulphone	Tetradifon
368.	Telodrin	1, 3, 4, 5, 6, 7, 8, 8-Octachloro-3a, 4, 7, 7a tetrahydro-4, 7methanophthalan	Isobenzan
369.	Tersen	Tetra methyl thiuram disulphide	Thiram
370.	Thimet	0, 0-diethyl-S-(ethylthic methyl) phosphorodithioate	Phorate

(1)	(2)	(3)	(4)
371.	Thiodan	6, 7, 8, 9, 10, 10-hexachloro-1, 5, 5a, 6, 9, 9a, hexahydro-6, 9-methano-2, 4, 3-benzodioxathiepin 3 oxide	Endosulfan
372.	Thiotox	Tetra methyl thiuram disulphide	Thiram
373.	Thiovit	Sulphur	Wettable sulphur
374.	Thiram	Tetra methyl thiuram disulphide	Thiran
375.	Thuricide	Bacillus thuringiensis	—
376.	Tik 20	0, 0-diethyl-0-2-isopropyl-6-methyl-4-pyrimidinyl) phosphorothioate	Diazinon
377.	Tick powder	1, 2, 4, 5, 6, 7, 8, 8-Octachloro-3a, 4, 7, 7a-tetrahydro-4, 7-methanoindane	Chlordane
378.	Tillam	n-propyl N-ethyl-N (n-butyl) thiolcarbamate	—
379.	Tillex	EMC (Ethyl mercury chloride)	Organo mercurial
380.	TMTD	Tetra methyl thiuram disulphide	Thiram
381.	Tok E-20	2, 4-dichlorophenyl-4-nitro-phenyl ether	—
382.	Tok E-25	2, 4-dichlorophenyl-4-nitro-phenyl ether	—
383.	Tok granular	2, 4-dichlorophenyl-4-nitro-phenyl ether	—
384.	Tomorin	3-(a-acetonyl-4-chlorobenzyl)-4 hydroxy-coumarin	Coumachlor
385.	Toxaphene	Chlorinated camphene (having chlorin content of 67–69%)	Toxaphene
386.	Triacide	Dinitro orthocresol	DNOC
387.	Tribasic copper sulphate	Copper sulphate	Copper sulphate
388.	Tributen	2, 4-dichlorophenoxy acetic acid and 2, 4, 5-trichlorophenoxy acetic acid	2, 4-D & 2, 4, 5-T
389.	Triherlude	Isopropyl-N-(3-chlorophenyl) carbamate	CIPC
390.	Trithion	0, 0-diethyl-S-p-chlorophenyl-thiomethyl phosphoro-dithioate	Carbophenothion

(1)	(2)	(3)	(4)
391.	Tritisan	1, 2, 3, 4, 5-pentachloronitrobenzene	PCNB
392.	Trioxone	2, 4, 5-trichlorophenoxy acetic acid	2, 4, 5-T
393.	Tropotox	2-methyl-4-chlorophenoxy butyric acid	MCPB
394.	Tubatoxin	Derris	Rotenone
395.	Tugon	Dimethyl trichlorohydroxyethyl phosphonate	Trichlorphon
396.	Tuzet	Tetramethyl thiuram disulphide & Zinc dithiocarbamate	—
397.	Ultra sulphur	Sulphur	Wettable sulphur
398.	Vapam	Sodium-n-methyl-dithiocarbamate dihydrate	—
399.	Vapona	0, 0-dimethyl-2, 2-dichlorovinyl phosphate	Dichlorvos
400.	Varitox	Trichloroacetic acid	TCA
401.	VC-13	0, 2, 4-dichlorophenyl 0, 0-diethyl phosphorothioate	—
402.	Vernam	N-propyl-di-n-propyl thiolcarbamate	—
403.	Vitigran	Copper oxychloride	Copper oxychloride
404.	Warfarin	3-(a-acetonyl-4-chlorobenzyl) 4-hydroxy coumarin	Coumachlor
405.	Weedar	2, 4-dichlorophenoxy acetic acid	2, 4-D
406.	Weedar	2, 4, 5-trichlorophenoxy acetic acid	2, 4, 5-T
407.	Weedazol TL	3-amino-1, 2, 4-triazol	Aminotriazole or Amitrole
408.	Weedone 2, 4, 5-T	2, 4, 5-trichlorophenoxy acetic acid	2, 4, 5-T
409.	Weedone	2, 4-dichlorophenoxy acetic acid and 2, 4, 5-trichlorophenoxy acetic acid	2, 4-D & 2, 4, 5-T
410.	Weedone LV 4	2, 4-dichlorophenoxy acetic acid	2, 4-D
411.	Weedone Conc. 48	2, 4-dichlorophenoxy acetic acid	2, 4-D
412.	Weedox	2, 4-dichlorophenoxy acetic acid	2, 4-D
413.	Wetcol	Copper sulphate & Calcium hydrate	Bordeaux mixture
414.	YF 2581	2, 3, 4, 5, 6-pentachlorophenol	PCP

(1)	(2)	(3)	(4)
415.	YF 2631	2, 4-dichlorophenoxy acetic acid and 2, 4, 5-trichlorophenoxy acetic acid	2, 4-D and 2, 4, 5-T
416.	Yellow cuprocide	Cuprous oxide	Cuprous oxide
417.	Zerlate	Zinc dimethyl dithiocarbamate	Ziram
418.	Zincop	Copper oxychloride & Zinc ethylene dithiocarbamate	—
419.	Zinc phosphide	Zinc phosphide	Zinc phosphide
420.	Ziram	Zinc dimethyl dithiocarbamate	Ziram
421.	Zyklon	Calcium cyanide	Calcium cyanide

LIST OF CHEMICAL NAMES OF VARIOUS PESTICIDES ARRANGED ALPHABETICALLY ALONG WITH THEIR COMMON AND BRAND NAMES

S.No. (1)	Chemical Name (2)	Common Name (3)	Brand or Trade Name (4)
1.	3 (a-acetonyl-4-chlorobenzyl) 4-hydroxycoumarin	Coumachlore	Tomorin, Warferin, Racumin, Ratafin
2.	Aluminium phosphide	Aluminium phosphide	Phostoxin, phostox
3.	Bacillus thuringensis (Bacterial)	—	Thuricide
4.	Benzotriazine derivatives of Dithio Phosphoric dimethyl ester	Azinophos-methyl	Gusathion, Guthion
5.	Bis (dimethylamine) phosphonous anhydride	Schradan	Pestox III, OMPA
6.	Bis (monoisopropylamine) fluoro-phosphine oxide	Mipafox/Dimefox	Isopestox, Pestox XV
7.	Calcium arsenate	Calcium arsenate	Calcium arsenate
8.	Calcium cyanide	Calcium cyanide	Cyanogas, Calcyan, Zyklon
9.	2-carbomethoxy-1-methyl vinyl dimethyl phosphate	Mevinphos	Phosdrin
10.	Chlorinated camphene (having chlorin content of 67-69%)	Toxaphene	Hexamar, Toxaphene, Toxaphene, Lethalrock Toxaphene, Geigy Toxaphene
11.	Chlorocoumarinthiophosphoric acid ester	—	Asuntol
12.	2-chloro-2-diethylcarbanoyl-1-methyl vinyl-dimethyl phosphate	Phosphamidon	Demecron
13.	Derris	Rotenone	Derriphytan, Derrin, Nicouline, Tubatoxin, Derrimac, Drymac 2, Katakilla, Polvosol, Sandotox
14.	1, 2-dibromo-3-chloropropane	—	Nemagon, Fumazone
15.	Dichloropropane dichloropropene	D. D.	Shell D. D.
16.	Dimethyl 1, 2-dibromo-2, 2-dichloroethyl phosphate	Naled	Dibrom
17.	Dimethyl ethylmercapto-ethyl thiophosphate	Methyl-0-demeton	Metasystox

(1)	(2)	(3)	(4)
18.	Dimethyl trichlorohydroxyethyl phosphonate	Trichlorphon	Dipterex, Tugon, Dylox
19.	Dinitro-alkyl-phenyl-acrylate	Binapacryl	Morocide
20.	Dinitro-Orthro-cresol	DNOC	Sandolin A, Extar, Extar A
21.	1, 1-di (p-chlorophenyl)-2, 2, 2 trichloroethanol	Dicofol	Kelthane, DTMC
22.	Ethyl 4, 4-dichlorobenzilate	Chlorobenzilate	Geigy 338, G-23992, Folbex, Akar
23.	Ethylene dibromide	EDB	Shell EDB, Nematox
24.	Ethylene dichloride+Carben-tetrachloride	LD/CT	Killoptera, ED/CT mixture, Dowfume 75
25.	Ethyl p-nitrophenyl benzenethio-phosphonate or 0-ethyl 0-p-nitrophenyl phenyl phosphono-thioate	—	EPN
26.	1, 4, 5, 6, 7, 8, 8-heptachloro-3a, 4, 7, 7a-tetrahydro 4, 7 metha-noindane	Heptachlor	Heptaf, Hexavin, Hexa-mar Heptachlor, Micoheptachlor
27.	1, 2, 3, 4, 5, 6-hexachloro-cyclohexane	B. H. C.	Hexidole, Hexamar, Gammexane, Agrocide-Oke spray, Micosane, Lethalrock, Benzichlor, Chlorosol, Intox, Benzi-ebler, B. H. C.
28.	Gamma-1, 2, 3, 4, 5, 6 hexa-chlorocyclohexane	Lindane	Lindane, Hexamar, Lin-dane, Geigy Veg. Dust, Lintaf, Smopest, Mico-lindane
29.	1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endo, endo-5, 6-dimethanonaphthalene	Endrin	Endrex, Micoendrin, Hexamar, Endrin, Tafdrin, Endrin
30.	1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endoexo-5, 8-dimethanonaphthalene	Dieldrin	Dieldrex, Hexamar (dieldrin), Lethalrock (dieldrin), Dieldrin, Dielmoth, Micodieldrin
31.	1, 2, 3, 4, 10, 10-hexachloro-1, 4, 4a, 5, 8, 8a-hexahydro-1, 4-endoexo-5, 8-dimethanonaphthalene	Aldrin	Aldrex, Hexamar Aldrin Micoaldrin Lethalrock aldrin, Aldrin

(1)	(2)	(3)	(4)
32.	6, 7, 8, 9, 0, 10-hexachloro-1, 5, 5a, 6, 9, 9a-hexahydro-6-9-matha-no-2, 4, 3-benzodioxathiepin-3-oxide	Endosulfan	Thiodan
33.	Isopropylamide of 0, 0-diethyl-dithio-phosphoryl acetic acid	—	FAC
34.	Lead arsenate	Lead arsenate	Lead arsenate
35.	Metacetaldehyde	Metaldehyde	Slug Pellets, Sluggit
36.	Methyl bromide	Methyl bromide	Embafume, Methylbromide, Bromo, methan Dowfume
37.	1-naphthyl N-methyl-carbamate	Carbaryl	Sevin
38.	1-(1-Naphthyl) 2-thiourea	Antu	Antu
39.	Nicotine sulphate	Nicotine sulphate	Nicotox 20, Nicophytan, Nicotine sulphate, Nicospray, Maximac
40.	1, 2, 4, 5, 6, 7, 8, 8-Octachloro-3a, 4, 7, 7a-tetrahydro-4, 7-methano-indane	Chlordane	Indox 8, chlorexe, Tik Powder, chlordane, Hexamar chlordane, Micochlordane, Lethal-rock chlordane
41.	1, 3, 4, 5, 6, 7, 8, 8-Octachloro-3a, 4, 7, 7a-tetrahydro 4, 7-methano-phthalan	Isobenzan	Telodrin
42.	0, 2, 4-dichlorophenyl 0, 0-diethyl phosphorothioate	—	VC-13
43.	0, 0-diethyl 0-2 (ethylthio) ethyl-phosphorodithioate	Demeton	Systox
44.	0, 0-diethyl-0-(2-isoprophyl-6-methyl-4 pyrimidinyl) phosphorothioate	Diazinon	Basudin, Bugmar, Tik 20
45.	0, 0-Diethyl-0-p-nitrophenyl phosphorothioate	Parathion	Ekatox, Paramar, Folidol E 605, Micoparathion, Fosferno, Peratex
46.	0, 0-diethyl-S-(ethylthio) methyl phosphorodithioate	Phorate	Thimet
47.	0, 0-diethyl-S-p-chlorophenyl-thiomethyl phosphoro-dithioate	Carbophenothion	Trithion

(1)	(2)	(3)	(4)
48.	0, 0-dimethyl-2, 2-dichlorovinyl phosphate	Dichlorvos	Nuvan, Nogos, Marvex, Vapona
49.	0, 0-dimethyl-0-3-chloro-4-nitrophenyl phosphorothioate	—	Bayer 22/190, chlorothion, chlorthion
50.	0, 0-dimethyl-0-(3 methyl-4-methyl mercaptophenyl) Thiophosphate	Fenthion	Baytex, Lebaycid
51.	0, 0-dimethyl-0-(3-methyl-4-nitrophenyl) phosphorothioate	—	Sumithion, Folithion
52.	0, 0-dimethyl-p-nitrophenyl phosphorothioate	Methyl parathion	Metacid, Folidol dust
53.	0, 0-Dimethyl-S-(1, 2-dlcarbetrhomethyl) Phosphorodithioate	Malathion	Malamar, Lethalrock malathion, Micomalathion, Intox M., Mala 50, Malathion, maltex
54.	0, 0-dimethyl-S-ethyl-mercaptoethyl dithiophosphate	Thiometon	Ekatin, Hexatin
55.	0, 0-dimethyl-S-(N-methylcarbamylmethyl) phosphorodithioate	Dimethoate	Rogor
56.	0, 0-dimethyl-S-(N-methyl-N formoyl-Carbamoyl-methyl) dithiophosphate	Formothon	Anthio
57.	0, 0-dimethyl-2, 2, 2-trichloro-hydroxy-ethyl-phosphonic acid ester	—	Neguvon
58.	0, 0, 0, 0-tetraethyl-S-S-methylene bis phosphorothioate	Ethion	Ethion
59.	Paradichlorobenzene	PDCB	PDB, Paracide
60.	p-chlorobenzyl p-chlorophenyl sulphide	Chlorbenside	Chlorparacide, chlorsulphacid Elimite, Mitox, chlorocide
61.	p-chlorophenyl p-chlorobenzenesulphonate	Chlorofenson	Ovotran, Ovex, Ovicide
62.	Phthalimidomethyl 0, O-dimethyl-phosphorodithioate	—	Imidon
63.	2 (p-tert-butylphenoxy) isopropyl 2 chloroethyl sulphate	—	Aramite, Akar, Mitex
64.	—	Pyrethrum	Pyrodust, Pyrocolloid, Pip, Pyrocone, Pyrotaf, Pyrocide

LIST OF CHEMICAL NAMES OF

VARIOUS PESTICIDES ARRANGED-(Concluded.)

(1)	(2)	(3)	(4)
65.	Ryanodine	Ryania	Hexamar, Ryania
66.	Sodium Cyanide	Sodium cyanide	Cymag, Sodium cyanide
67.	Sodium fluoaluminate	Cryolite	Kryocide
68.	Sodium n-methyl-dithiocarbamate-dihydrate	—	Vapam
69.	Strychnine hydrochloride	Strychnine hydrochloride	Strychnine hydrochloride
70.	Terpenepolychlorinate (66% Chlorin)	—	Strobane
71.	2, 4, 4a, 5-tetrachlorodiphenyl sulfone	Tetradifon	Tedion
72.	1, 1, 1-trichloro-2, 2-bis (p-chlorophenyl)-ethane	DDT	Guesaral, Geigy 33, Geigy, Lotexdit, Intox, Hexamar, Didimac, Hasochol, Neocid, DDT
73.	Trichloronitromethane	Chlorophicrin	Nitrochloroform, Picfume
74.	Triazinyl phosphate	Menazon	Sayfos
75.	Zinc Phosphide	Zinc Phosphide	Zinc Phosphide, Ratox-Rod-x

A LIST OF COMMON NAMES OF VARI US PESTICIDES ARRANGED ALPHABETICALLY ALONG WITH THEIR CHEMICAL & BRAND NAMES

S. No.	Common Name	Chemical Name	Brand/Trade Name
(1)	(2)	(3)	(4)
1.	Aldrin	1, 2, 3, 4, 10, 10-hexachloro-1-4-4a, 5, 8, 8a-hexahydro-1-4-endoexo 5, 8-dimethanonapthalene	Aldrex, Hexamar aldrin, Micoaldrin, Lethal-rock aldrin, Aldrin
2.	Aluminium phosphide	Aluminium phosphide	Phostoxin, Phostox
3.	Antu	1 (1-Naphthyl)-2-Thiourea	Antu
4.	Azinophos-methyl	Benzotriazine derivative of Dithio-phosphoric dimethyl ester	Gusathion; Guthion
5.	B. H. C.	1, 2, 3, 4, 5, 6-hexachlorocyclohexane	Hexidole, Hexamar, Gammexane, Agrocide, Oke Spray, Micosane Lethalrock, Benzi-chlor, Chlorosol, Intox, Benziebler, BHC.
6.	Binapacryl	Dinitro-alkyl-phenyl-acrylate	Morocide
7.	Calcium arse-nate	Calcium arsenate	Calcium arsenate
8.	Calcium cya-nide	Calcium Cyanide	Cyanogas, Calcyan, Zyklon
9.	Carbaryl	1-naphtyl N-methylcarbamate	Sevin, Carbavin
10.	Carbopheno-thion	0, 0-diethyl S-p-chlorophenyl-Thiomethyl phosphoro-dithioate	Trithion
11.	Chlorbenside	P-chlorobenzyl p-chlorophenyl sulphide	Chlorparacide, chlor-sulphacide, Elimite Mitox, chlorocide
12.	Chlordane	1, 2, 4, 5, 6, 7, 8, 8-octachloro-3a, 4, 7, 7a-Tetrahydro-4, 7-metha-noindane	Intox 8, chlorexe, Tik-powder, Chlordane, Hexamar chlordane, Mico chlordane, Le-thalrock
13.	Chlorfenson	P-chlorophenyl p-chlorobenzene sulphonate	Ovotran, Ovex, ovicide
14.	Chlorobenzi-late	Ethyl-4, 4-dichlorobenzilate	Geigy 338, G 23992, Folbex

(1)	(2)	(3)	(4)
15.	Chloropicrin	Trichloronitromethane	Nitrochloroform, Picfume
16.	Coumachlor	3-(a-acetenyl-4-chlorobenzyl)-4--hydroxy coumarin	Tomorin, Warferin, Racumin, Ratafin
17.	Cryolite	Sodium fluoaluminate	Kryocide
18.	DD	Dichloropropane dichloropropene	Shell DD
19.	DDT	1, 1, 1-trichloro 2, 2-bis (p-chlorophenyl) ethene	Guesarel, Geigy 33, Geigy 33A-5, Lotexdit. Intox, Hexamar, Lethalrock.
20.	Demeton	0, 0-Diethyl 0-2-(ethylthio) ethyl phosphorodithioate	Didimac, masochol, Neocid, Parry 5. Systox
21.	Diazinon	0, 0-diethyl 0-(2-isopropyl-6-methyl -4-pyrimidinyl) phosphorothioate	Basudin, Bugmar, Tik 20
22.	Dichlorvos	0, 0-dimethyl-2, 2-dichlorovinyl phosphate	Nuvan, Nogos, Marvex, Vapona, DDVP.
23.	Dicofol	1, 1-di (p-chlorophenyl)-2, 2, 2-trichloroethanol	Kelthane, DTMC
24.	Dieldrin	1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endoexo-5, 8-dimethano-naphthalene	Dieldrex, Hexamer, Lethalrock, Dieldrin, Dielmoth, Micodieldrin
25.	Dimethoate	0, 0-dimethyl S-(N-methylcarbamylmethyl) phosphorodithioate	Rogor
26.	DNOC	Dinitro orthro cresol	Extar-A, Extar, Sandolin A
27.	EDB	Ethylene dibromide	Shell EDB, Nematox
28.	ED/CT	Ethylene dichloride + carbon tetrachloride (3 : 1)	Killoptera: ED/CT mixture, Dowfume 75
29.	Endosulfan	6, 7, 8, 9, 10, 10-hexachloro-1, 5, 5a, 6, 9, 9a-hexahydro-6, 9-methane-2, 4, 3-*benzodioxathiopin*-3 oxide	Thiodan
30.	Endrin	1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endo, endo-5, 6-dimethano-naphthalene	Endrex, Micoendrin, Hexamar, endrin, Tafdrin, Endrin

(1)	(2)	(3)	(4)
31.	Ethion	0, 0, 0, 0-tetraethyl S. S-methylene-bis-phosporothioate	Ethion
32.	Fenthion	0, 0-dimethyl, 0-(3 methyl-4-methyl-mercaptophenyl) thiophosphate	Baytex, Lebaycid
33.	Formothion	0, 0-dimethyl-S (N-methyl- N-for-moylcarbamoyl-methyl)-dithio-phosphate	Anthio
34.	Heptachlor	1, 4, 5, 6, 7, 8, 8-heptachloro-3a, 4, 7, 7a-tetrahydro-4, 7 metha-noindane	Heptaf, Hexavin, Hexa-mar, Micoheptachlor
35.	Isobenzan	1, 3, 4, 5, 6, 7, 8, 8-Octachloro-3a, 4, 7, 7a-tetrahydro-4, 7-methanophthalan	Telodrin
36.	Lead arsenate	Lead arsenate	Lead arsenate
37.	Lindane	Gamma-1, 2, 3, 4, 5, 6-hexachloro-cyclohexane	Lindane, Hexamar, Geigy Veg-dust, Lintaf, Smopest
38.	Malathion	0, 0-dimethyl S-(1, 2-dicarbethexy-ethyl) phosphorodithioate	Malamar, Lethalrock, Micomalathion, Intox M, Mala-50, Meltex-50
39.	Menazon	Triazinyl phosphate	Sayfos
40.	Metaldehyde	Metacetaldehyde	Slug Pellets, Sluggit
41.	Methyl bromide	Methyl bromide	Embafume, Methyl bromide Promomethane
42.	Methyl-o-demeton	Dimethyl-ethylmercapto-ethyl thiophosphate	Metasystox
43.	Methyl para-thion	0, 0-dimethyl 0-p-nitrophenyl phosphorothioate	Metacid, Folidol dust
44.	Mevinphos	2-carbomethoxy-1-methylvinyl dimethyl phosphate	Phosdrin
45.	Mipafox/ Dimefox	Phosphorodi (isopropylamidic) fluoride or Bis (monoisopropyla-mine) flurophosphine oxide	Isopestox, Pestox IV
46.	Naled	Dimethyl 1, 2-dibromo-2, 2-dichlo-roethyl phosphate	Dibrom
47.	Nicotine sulphate	Nicotine sulphate	Nicotox 20, Nicophytan, Nicotine sulphate, Nicospray, Maximac

(1)	(2)	(3)	(4)
48.	Parathion	0, 0-diethyl 0-p-nitrophenyl phosphorothioate	Ekatex, Paramar, Folidol E 605, Micoparathion, Fosferno, Peratex
49.	PDCB	Paradichlorobenzene	PDB, Paracide
50.	Phosphamidon	2-chloro-2-diethylcarbamoyl-1-methylvinyl-dimethyl phosphate	Demicron
51.	Phorate	0, 0-diethyl S-(ethylthio) methyl-4 phosphorodithioate	Thimet
52.	Pyrethrum	—	Pyrodust, Pyrocolloid, Pyrocone, Pip Pyrotaf, Pyrocide
53.	Rotenone	Derris	Derriphytan, Derrin, Nicouline, Tubatoxin, Derrimac, Drymac 2, Katakilla, Polvesol, Sandotox
54.	Ryania	Ryanodine	Ryania
55.	Schradan	Bis (dimethylamino) Phosphonous anhydride	Pestox 3, OMPA
56.	Sodium Cyanide	Sodium cyanide	Sodium cyanide, Cymag
57.	Strychnine hydrochloride	Strychnine hydrochloride	Strvchnine hydrochloride
58.	Tetradifon	2, 4, 4, 5-tetrachlorodiphenyl sulfone	Tedion
59.	Thiometon	0, 0-dimethyl-S-ethyl-mercapto-ethyl-dithiophosphate	Ekatin, Mexatin
60.	Toxaphene	Chlorinated camphene (having chlorine content of 67–69%)	Hexamar, Toxaphene, Toxaphene, Lethalrock, Toxaphene, Geigy, Toxaphene
61.	Triehlorphon	Dimethyl trichlorohydroxyethyl phosphonate	Dipterex, Tugon, Dylox
62.	Zinc phosphide	Zinc phosphide	Zinc phosphide, Ratox, Rod-x.

A LIST OF BRAND TRADE NAMES OF VARIOUS PESTICIDES ARRANGED ALPHABETICALLY ALONG WITH THEIR COMMON & CHEMICAL NAMES

S.No.	Brand/ Trade Name	Common Name	Chemical Name
(1)	(2)	(3)	(4)
1.	Agrocide	BHC	1, 2, 3, 4, 5, 6-hexachlorocyclohexane
2.	Akar	Chlorobenzilate	Ethyl 4, 4-dichlorobenzilate
3.	Akar 338	Chlorobenzilate	Ethyl 4, 4-dichlorobenzilate
4.	Albolineum		
5.	Aldrez	Aldrin	1, 2, 3, 4, 10, 10-hexachloro-1, 4, 4a, 5, 8, 8a-hexahydro-1, 4-endoexo-5, 8 dimethanonaphthalene
6.	Aldrin	Aldrin	1, 2, 3, 4, 10, 10-hexachloro 1, 4, 4a, 5, 8, 8a-hexhahydro-1, 4-endoexo-5, dimethanonaphthalene
7.	Anthio	Formothion	0, C-dimethyl-S-(N-methyl-N-formocarbamoyl-methyl)-dithiophosphate
8.	Antu	Antu	1-(1-Naphthyl)-2-thiourea
9.	Aramite	—	2-(p-tert-butylphenoxy) isopropyl 2-chloroethyl sulphite
10.	Asuntol	—	Chlorocoumarinthiophosphoric acid ester
11.	Basudin	Diazinon	0, 0-di-ethyl 0-(2-isopropyl-6-methyl 4-phyrimidinyl) phosphorothioate
12.	Bayer 22/199	—	0, 0-dimethyl 0-3-chloric-4-nitrophenyl phosphorothioate
13.	Baytex	Fenthion	0, 0-dimethyl-0-(3-methyl-4-methyl mercapto-phenyl) thiophosphate
14.	Benzex (105, 110, 150)	BHC	1, 2, 3, 4, 5, 6-hexachlorocyclohexane
15.	Benzichlor	BHC	1, 2, 3, 4, 5, 6-hexachlorocyclohexane
16.	Benziebler	BHC	1, 2, 3, 4, 5, 6-hexachlorocyclohexane
17.	BHC	BHC	1, 2, 3, 4, 5, 6-hexachlorocyclohexane
18.	Bromomethane	Methyl bromide	Methyl bromide
19.	Bugmar	Diazinon	0, 0-diethyl-0-(2-isoprophyl-6-methyl-4-pyrimidinyl) phosphorothioate

(1)	(2)	(3)	(4)
20.	Calcium arsenate	Calcium arsenate	Calcium arsenate
21.	Calcyan	Calcium cyanide	Calcium cyanide
22.	Carbavin	Carbaryl	1-Naphthyl N-methylcarbamate
23.	Chlorocide	Chlorb·r.side	P-chlorobenzyl-p-chlorophenyl sulphide
24.	Chlorosol	BHC	1, 2, 3, 4, 5, 6-hexachlorocyclohexane
25.	Chlorothion	—	0, 0-dimethyl 0-3-chloro-4-nitrophenyl phosphorothioate
26.	Chlorparacide	Chlorbenside	P-chlorobenzyl p-chlorophenyl sulphide
27.	Chlorsulpha-cide	Chlorbenside	P-chlorobenzyl p-chlorophenyl sulphide
28.	Cyanogas	Calcium cyanide	Calcium cyanide
29.	Cymag	Sodium cyanide	Sodium cyanide
30.	DDT	DDT	1, 1, 1-trichloro-2, 2-bis (p-chlorophenyl)-ethane
31.	DDVP	Dichlorvos	0, 0-dimethyl-2, 2-Dichlorovinyl phosphate
32.	Demecron	Phosphamidon	2-chloro-2-diethyl carbamoyl-1, methyl-vinyl-dimethyl phosphate
33.	Derrimac	Rotenon	Derris
34.	Derrin	Rotenone	Derris
35.	Derriphytan	Rotenone	Derris
36.	Dibrom	Naled	Dimethyl 1, 2-dibromo-2, 2-dichloroethyl phosphate
37.	Didimac	DDT	1, 1, 1-trichloro-2, 2-bis (p-chlorophenyl) -ethane
38.	Dieldrex	Dieldrin	1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy 1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endoexo-5, 8-dimethanonaphthalene
39.	Dieldrin	Dieldrin	1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endoexo-5, 8-dimethanonaphthalene
40.	Dielmoth	Dieldrin	1, 2, 3, 4, 10, 10-hexachloro-6, 7 epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endoexo-5, 8-dimethanonaphthalene
41.	Dipterex	Trichlorphon	Dimethyl trichlorohydroxyethyl phosphonate

(1)	(2)	(3)	(4)
42.	Dowfume	Methyl bromide	Methyl bromide
43.	Dowfume 75	ED/CT	Ethylene dichloride+Carbon tetrachloride
44.	Drymac 2	Rotenone	Derris
45	DEMC	Dicofol	1, 1-di (p-chlorophenyl)-2, 2, 2-Trichloro-ethanol
46.	Dylox	Trichlorphon	Dimethyl trichlorohydroxyethyl phosphonate
47.	ED/CT mixture	ED/CT	Ethylene dichloride carbon tetrachloride
48.	Ekatin	Thiometon	0, 0-dimethyl-S-ethyl-mercaptoethyl dithiophosphate
49.	Ekatox	Parathion	0, 0-diethyl 0-p-nitrophenyl phosphoro-thioate
50.	Elimite	Chlorbenside	P-chlorobenyl p-chlorophenyl sulphide
51.	Endrex	Endrin	1, 2, 3, 4, 10, 10-hexachloro-6 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endo, endo 5, 6-dimethanonaphthalene
52.	Endrin	Endrin	1, 2, 3, 4, 10, 10-hexachloro 6, 7 epoxy-1. 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endo, endo-5, 6-dimethanonaphthalene
53.	Embafume	Methyl bromide	Methyl bromide
54.	EPN	—	Ethyl p-nitrophenyl benzenethiophos-phonate or 0-ethyl 0-p-nitrophenyl-phenyl phosphorothioate
55.	Ethion	Ethion	0, 0, 0, 0-tetraethyl S. S-methylene bis phosphorothioate
56.	Extar / Extar-A	DNOC	Dinitro-orthro-cresel
57.	DAC	—	Isopropylamide of 0, 0-diethyl-dithiopos-phoryl acetic acid
58.	Folbex	Chlorobenzilate	Ethyl 4, 4-dichlorobenzilate
59.	Folidol Dust	Methyl parathion	0, 0-dimethyl 0-p-nitrophenyl - phosphoro-thioate
60.	Folidol E-605	Parathion	0, 0-Diethyl 0-p-nitrophenyl phosphoro-thioate
61.	Folathion	—	0, 0 Dimethyl-0-(3 methyl-4-Nytrophenyl phosphorothioate

(1)	(2)	(3)	(4)
62.	Fosferno	Parathion	0, 0-Diethyl 0-p-nitrophenyl phosphorothioate
63.	Fumazone	—	1, 2-dibromo-3-chloropropane
64.	G. 23992	Chlorobenzilate	Ethyl 4. 4-dichlorobenziate
65.	Gammexene	BHG	1, 2, 3, 4, 5, 6-hexaehlorocyclohexane
66.	Geigy-33	DDT	1, 1, 1 trichloro-2, 2-bis (p-chlorophenyl) ethane
67.	Geigy 33-A-5	DDT	1, 1, 1-trichloro-2, 2-bis (p-chloraphenyl) ethane
68.	Geigy 338	Chlorobenzilate	Ethyl 4, 41-dichlorobenzilate
69.	Geigy Toxaphene	Toxaphene	Chlorinated camphene (having chlorin content of 67-69%)
70.	Geigy Veg Dust	Lindane	1, 2, 3, 4, 5-6-hexachlorocyclohexane
71.	Guesarol	DDT	1, 1, 1-trichloro-2, 2-bis (p-chlorophenyl) ethane
72.	Gusathion	Azinophos methyl	Benzotriazine derivative of dithiophosphoric dimethyl ester
73.	Guthion	Azinophos methyl	Benzotriaxine derivative of Dithiophosphoric dimethyl ester
74.	Hasochol	DDT	1, 1, 1-trichloro-2, 2-bis (p-chlorophenyl)-ethane
75.	Heptaf	Heptachlor	1, 4, 5, 6, 7, 8, 8-heptachloro-3a, 4, 7, 7a-tetrahydro-4, 7-methanoindane
76.	Hexamar Aldrin	Aldrin	1, 2, 3, 4, 10, 10-hexachloro-1, 4, 4a, 5, 8, 8a-hexahydro-1, 4-endoexo-5, 6-dimethanonaphthalene
77.	Hexamar BHC	BHC	1, 2, 3, 4, 5, 6-hexachlorocyclohexane
78.	Hexamar chlordane	Chlordane	1, 2, 4, 5, 6, 7, 8, 8-Octaehloro-3a, 4, 7, 7a-tetrahydro-4, 7-methanoindane
79.	Hexamar DDT	DDT	1, 1, 1-trichloro-2, 2-bis (p-chlorophenyl)-ethane
80.	Hexamar Dieldrin	Dieldrin	1, 2, 3, 4, 10, 10-hexachlore-5, 7- epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octanydro-1, 4-endoexo-5, 8-dimethanonaphthalene

(1)	(2)	(3)	(4)
81.	Hexamar endrin	Endrin	1. 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endo, endo-5,'6-dimethnnona-phthalene
82.	Hexamar heptachlor	Heptachlor	1, 4, 5, 6, 7, 8, 8-heptachloro-3a, 4, 7, 7a-tetrahydro-4, 7-methanondane
83.	Hexamar lindane	Lindane	1, 2, 3, 4, 5, 6-hexachlorocyclohexane
84.	Hexamar ryania	Ryania	Ryanodine
85.	Hexamar Toxaphene	Toxaphene	Chlorinated camphene (having chlorine content of 67-69%)
86.	Hexatin	Thichoton	0, 0-dimethyl-S-ethyl-mercaptoethyl dithiophosphate
87.	Hexavin	Heptachlor	1, 4, 5, 6, 7, 8, 8-heptachloro-3a, 4, 7, 7a-tetrahydro-4, 7-methanoindane
88.	Hexidol	BHC	1, 2, 3, 4, 5, 6-hexachlorocyolohexane
89.	Imidan	—	Pathalimidomethyl-0-0-dimethyl phosphorodithioate
90.	Intox BHC	BHC	1, 2, 3, 4, 5, 6-hexachlorocyclohexane
91.	Intox 'S'	Chlordane	1, 2, 3, 4, 5, 6, 7, 8, 8a-Octachloro-3, 4, 7, 7a-tetrahydro-4, 7-methanoindane
92.	Intox BHC	BHC	1, 2, 3, 4, 5, 6-hexachlorocyclohexane
93.	Intox DDT	DDT	1, 1, 1-trichloro-2, 2-bis (p-chlorophenyl)-ethane
94.	Intox 'M'	Malathion	0, 0-dimethyl-S-(1, 2-dicarbethoxy-ethyl)-phosphorodithiote
95.	Isopestox	Mipafox/Dinefox	Bis-(monoisopropylamine) fluorophosphine exide
96.	Katakilla	Rotenone	Derris
97.	Kelthane	Dicofol	1, 1-di-(p-chlorophenyl)-2, 2, 2-Trichloro-ethanol
98.	Killoptera	ED/CT	Ethylene dichloride+carbontetrachloride
99.	Kryocide	Cryolite	Sodium fluoaluminate
100.	Lead arsenate	Lead arsenate	Lead arsenate

(1)	(2)	(3)	(4)
101.	Lebaycid	Fenthion	0, 0-dimethyl-0-(4-methyl-mercapto-3-methyl)-phenylthiophosphate
102.	Lethalrock aldrin	Aldrin	1, 2, 3, 4, 10, 10-hexachloro-1, 4, 4a, 5, 8, 8a-hexahydro-1, 4-endoexo-5, 8-dimethanonaphthalene
103.	Lethalrock BHC	BHC	1, 2, 3, 4, 5, 6-hexachlorocyclohexane
104.	Lethalrock chlordane	Chlordane	1, 2, 3, 4, 5, 6, 7, 8, 8-Octachloro-3a, 4, 7, 7a-tetrahydro-4, 7-methanoindane
105.	Lethalrock DDT	DDT	1, 1, 1-trichloro-2, 2-bis (p-chlorophenyl)-ethane
106.	Letalrock dieldrin	Dieldrin	1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endoexo-5, 8-dimethanonaphthalene
107.	Lethalrock malathion	Malathion	0, 0-dimethyl S-(1, 2-dicarbethoxy-ethyl)-phosphorodithioate
108.	Lethalrock toxaphene	Toxaphene	Chlorinated camphene (having chlorin content of 67-69%)
109.	Lindane	Lindane	V, 1, 2, 3, 4, 5, 6-hexachlorocyclohexane
110.	Lintaf	Lindane	V, 1, 2, 3, 4, 5, 6-hexachlorocyclohexane
111.	Lotexdit	DDT	1, 1, 1-trichloro-2, 2-bis (p-chlorophenyl)-ethane
112.	Mala 50	Malathion	0, 0-dimethyl S-(1, 2-dicarbethoxy-ethyl) phosphorodithioate
113.	Malamar	Malathion	0, 0-dimethyl S-(1, 2-dicarbethoxy-ethyl)-phosphorodithioate
114.	Malathion	Malathion	0, 0-dimethyl S-(1, 2-dicarbethoxy-ethyl) phosphorodithioate
115.	Marvex	Dichlorvos	0, 0-dimethyl-2, 2-dichlorovinyl phosphate
116.	Maximac	Nicotine sulphate	Nicotine sulphate
117.	Meltex 50	Malathion	0, 0-dimethyl S-(1, 2-dicarbethoxy-ethyl)-phosphorodithioate
118.	Metacid	Methyl parathion	0, 0-dimethyl 0-p-nitrophenyl phosphorothioate
119.	Metasystox	Methyl-0-demeton	Dimethyl-ethyl-mercapto-ethyl-triophosphate
120.	Methyl bromide	Methyl bromide	Methyl bromide

(1)	(2)	(3)	(4)
121.	Micoaldrin	Aldrin	1, 2, 3, 4, 10, 10-hexachloro-1, 4, 4a, 5, 8, 8a-hexahydro-1, 4-endoexo-5, 8-dimethanonaphthalene
122.	Micochlor-dane	Chlordane	1, 2, 4, 5, 6, 7, 8, 8-Octachloro-3a, 4, 7, 7a-tetrahydro-4, 7-methanoindane
123.	Micodieldrin	Dieldrin	1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endoexo-5, 8-dimethanonaphthalene
124.	Micoendrin	Endrin	1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-Octahydro-1, 4-endo, endo-5, 6-dimethanonaphthalene
125.	Micohepta-chlor	Heptachlor	1, 4, 5, 6, 7, 8, 8-heptachloro-3a, 4, 7, 7a-tetrahydro-4, 7-methanondane
126.	Micolindane	Lindane	V-1, 2, 3, 4, 5, 6-hexachlorocyclohexane
127.	Micomala-thion	Malathion	0, 0-dimethyl S-(1, 2-dicarbethoxy-ethyl)-phosphorodithioate
128.	Micopara-thion	Parathion	0, 0-diethyl 0-p-nitrophenyl phosphoro-thioate
129.	Micosano	BHC	1, 2, 3, 4, 5, 6-hexachlorocyclohexane
130.	Mitex	—	2-(p-tert-butylphenoxy) Isopropyl-2-chlo-roethyl sulphite
131.	Mitox	Chlorobenside	P-chlorobenzyl p-chlorophenyl sulphide
132.	Morocide	Binapacryl	Dinitro-alkyl-phenyl-a crylate
133.	Neguvon	—	0, 0-dimethyl-2, 2, 2-trichlorohydroxy-ethyl-phosphonic acid ester
134.	Nemagon	—	1, 2-dibromo-3-chloropropane
135.	Nematox	EDB	Ethylene dibromide
136.	Neocid	DDT	1, 1, 1-trichloro-2, 2-bis (p-chlorophenyl)-ethane
137.	Nicophytan	Nicotine sulphate	Nicotine sulphate
138.	Nicospray	Nicotine sulphate	Nicotine sulphate
139.	Nicotine sulphate	Nicotine sulphate	Nicotine sulphate
140.	Nicotex 20	Nicotine sulphate	Nicotine sulphate
141.	Nicouline	Rotenone	Derris

(1)	(2)	(3)	(4)
142.	Nitrochloro-form	Chloropicrin	Trichloronitromethane
143.	Nogos	Dichlorvos	0, 0-dimethyl-2, 2-dichlorovlnyl phosphate
144.	Nuvan	Dichlorvos	0, 0-dimethyl-2, 2-dichlorovinyl phosphate
145.	OMPA	Schradan	Bis-(dimethylamino) phosphonous anhydride
146.	Ostice	—	—
147.	Ovex	Chlorfenson	P-chlorophenyl p-chlorobenzene sulphonate
148.	Ovicide	Chlorfenson	P-chlorophenyl p-chlorobenzene sulphonate
149.	Ovotran	Chlorfenson	P-chlorophenyl p-chlorobenzene sulphonate
150.	Paracide	PDCB	Paradichlorobenzene
151.	Paramar	Parathion	0, 0-diethyl 0-p-nitrophenyl phosphoro-thioate
152.	Parry 5	DDT	1, 1, 1-trichloro-2, 2-bis (p chlorophenyl) ethane
153.	PDB	PDCB	Paradichlorobenzene
154.	Peratex	Parathion	0, 0-diethyl 0-p-nitrophenyl phosphoro-thioate
155.	Postox III	Schradan	Bis (dimethylamino) phosphonous anhydride
156.	Pestox XV	Nipafox/Dimefox	Bis (mono isopropylamino) fluoro-phosphine oxide
157.	Phosdrin	Mevinphos	2-carbomethoxy-1-methylvinyl dimethyl phosphate
158.	Phostoxin or Phostox	Aluminium phosphide	Aluminium phosphide
159.	Picfume	Chloropicrin	Trichloronitromethane
160.	Pip	Pyrethrum	—
161.	Polvosol	Rotenone	Derris
162.	Pyrocide	Pyrethrum	—
163.	Pyrocolloid	Pyrethrum	—
164.	Pyrocone	Pyrethrum	—

(1)	(2)	(3)	(4)
165.	Pyrodust	Pyrethrum	—
166.	Pyrotaf	Pyrethrum	—
167.	Racumin	Coumachlor	3-(a-acetonyl-4-chlorobenzyl)-4-hydroxy-coumarin
168.	Ratafin	Coumachlor	3-(a-acetonyl-4-chlorobenzyl)-4-hydroxy coumarin
169.	Ratox	Zinc phosphide	Zinc phosphide
170.	Rod-X	Zinc phosphide	Zinc phosphide
171.	Rogor	Dimethoate	0, 0-dimethyl S-(N-methyl carbamyl-methyl) phosphorodithioate
172.	Sandolin A	DNCC	Dinitro-orthrocresol
173.	Sandotox	Rotenone	Derris
174.	Sayfos	Menazon	Triazinyl phosphate
175.	Sevin	Carbaryl	1-naphthyl N-methylcarbamate
176.	Shell DD	DD	Dichloropropane dichloropropene
177.	Shell EDB	EDB	Ethylene dibromide
178.	Sluggit	Metaldehyde	Metacitaldehyde
179.	Slug Pellets	Metaldehyde	Metacitaldehyde
180.	Smopest	Lindane	V. 1, 2, 3, 4, 5, 6-hexachlorocy-clohexane
181.	Sodium cyanide	Sodium cyanide	Sodium cyanide
182.	Strobane	—	Triphenepolychlorinate (66% chlorin)
183.	Strychnine hydrochloride	Strychnine hydrochloride	Strychnine hydrochloride
184.	Sumithion		0, 0-dimethyl-0 (3-methyl-1-4-nitrophenyl, phosphorothiate
185.	Systox	Demeton	0, 0-diethyl-0-2-2 (ethylthio) ethyl phosphoro-dithioate
186.	Tafadrian	Endrin	1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8 8a-Octahydro 1, 4 endo, endo 5, 6-dimethanonaphthalene
187.	Tedion	Tetradifon	2, 4, 4 5 tetrachlorodiphenyl sulphone

(1)	(2)	(3)	(4)
188.	Telodrin	Isobenzan	1, 3, 4, 5, 6, 7, 8, 8a-Octachloro 3a, 4, 7, 7a-tetrahydro-4, 7-methanophthalan
189.	Thimet	Phorate	0, 0-diethyl s (Methylthio) methyl-phosphorodithioate
190.	Thiodan	Endosulfan	6, 7, 8, 9, 10, 10-hexachloro 1, 5, 5a, 6, 9, 9a-hexahydro-6, 9-methano-2, 4, 3, benzodioxathiopin-3-oxide
191.	Thuricide	—	Bacillus thuringionsis
192.	Tick powder	Chlordane	1, 2, 4, 5, 6, 7, 8, 8-Oct achloro-3a, 4, 7, 7a tetrahydro-4, 7-methanoindane
193.	Tic 20	Diazinon	0, 0-diethyl 0-(2-isopropyl-6-methyl-4-pyrimidinyl phosphorothioate
194.	Tomorin	Coumachlor	3-(a-accetonyl-4-(chlorobenzyl)-4-hydroxy coumarin
195.	Toxaphene	Toxaphene	Chlorinated camphene (having chlorin content of 67-69%)
196.	Trithion	Carbophenothion	0, 0-diethyl S-p-chlorophenyl-thiomethyl-phosphoro-dithioate
197.	Tubatoxin	Rotenone	Derris
198.	Tugon	Trichlorphon	Dimethyl tricholrohydroxyethyl phosphonate
199.	Vapam	—	Sodium-n-methyl-dithiocarbamate dihydrate
200.	Vapona	Dichlorvos	0, 0-dimethyl-2, 2-dichlorovinyl phosphate
201.	VC-13	—	0, 2, 4-dichlorophenyl 0, 0-diethyl phosphorothioate
202.	Warferin	Coumachlor	3-(a-acetonyl-4-chlorobenzyl)-4-hydroxy coumarin
203.	Zinc phosphide	Zinc phosphide	Zinc phosphide
204.	Zyklon	Calcium Cyanide	Calcium Cyanide.

A LIST OF COMMON NAMES OF VARIOUS FUNGICIDES ARRANGED ALPHABETICALLY ALONG WITH THEIR CHEMICAL & TRADE NAMES

S. No. (1)	Common (2)	Chemical Name (3)	Trade Name (4)
1.	Antibiotics	Streptomycin and chlortetra-eyeline hydrochloride Benzylaminobenzene sulfonate Streptomycin sulphate	Streptachlor Blasticidin Agrimycin
2.	Barium polysulphide	Barium polysulphide	Solbar
3.	Bordeaux mixture	Copper sulphate & Calcium hydrate	Bordeaux mixture, Wetcol
4.	Bordeaux paste	Copper sulphate & Calcium hydrate	Bordeaux paste
5.	Burgundy mixture	Copper sulphate & sodium carbonate	Burgundy mixture
6.	Captan	N-trichloromethyl marcapto-4-Cyclohexane-1, 2-dicarboximide	Flit 406, Captan
7.	Cheshunt compound	Copper sulphate & ammonium carbonate	Cheshunt compound
8.	Chaubattia paste	Leadoxide and copper carbonate	Chaubattia paste
9.	Chloranil	Tetrachloro-p-benzoquinone	Spergon, quinone
10.	Copper oxychloride	Copper oxychloride	Vitigran, Geigy Fungi Copper Perecloud, Parrycop, Cuprantol, Fytolan, Blitox, Blimix, Shell copper, Cupramar, Agricop, Coppesan Cupravit, Cuprokylt, Cuprazol, Cuprasan, Fytomix, Micop, Fycol, Blue copper
11.	Copper sulphate	Copper sulphate	Tribasic copper sulphate, copper sulphate
12.	Cuprous oxide	Cuprous oxide	Geigy copper, Colloidal copper, Copper sandoz, Fungimar, Perenox, Saltosan, Coppesan, Kirti copper, Yellow cuprocide, fungi copper, Fytomix, Cuproxol
13.	Dichlone	2, 3-dichloro-1, 4-nephtha-quinone	Phygon

(1)	(2)	(3)	(4)
14.	Dinocap	2, 4-dinitre-6-(2-octyl) phenyl crotonate	Karathane, Arathane
15.	DMTT	3, 5-dimethyl tetrahydro-1, 3, 5-2H-thiadiazine-2-thione	Mylone
16.	Dodine	Dodecylguanidine acetate	Helprex, Cyprex
17.	Dusting sulphur	Sulphur	Sulphur dust, Shell dusting sulphur, Perfecion dusting sulphur, Refined sulphur, Owl brand sulphur
18.	Formalin	Formalin	Formaldehyde
19.	Ferbam	Ferric-dimethyl dithiocarbamate	Ferbam, Fermate
20.	Folpet	N-trichloromethyl thiophthlimide	ESSO fungicids 407, Phaltan
21.	Glyodin	2-heptadecyl glyoxalidine acetate	Crag fungicide 341
22.	Lime sulphur	Calcium polysulphide	Lime sulphur
23.	Maneb	Manganese ethylene-bis-thiocarbamate	Dithane M-22, Manzate, Lonaeol-M
24.	Nabam	Disodium ethylene-bis-dithiocarbamate	Dithane D-14, Parzate liquid
25.	Nickle chloride	Nickle chloride hydrate	Nickle chloride
26.	Organo-mercurials	EMC (Ethyl mercury chloride)	Tillex, Hexasan
		PMC (Phenyl mercury chloride)	Ceresan 2%
		PMS (Phenyl mercury salicylate)	Merculine
		PMA (Phenyl mercury acetate)	Ceresan dry
		EEMC (Ethoxy ethyl mercury chloride)	Aretan
		MEMC (Methoxy ethyl mercury chloride)	Agallol, Tafasan, Ceresan (Wet. & dust)
		TMA (Tolyl mercury acetate) & (Ethyl mercury chloride)	Agrosan GN
		EMP (Ethyl mercury phosphate-N-ethyl mercurial-p-toulene sulphonanilide	New improved Ceresan, Ceresan 'M' dust
		EMC (Ethyl mercury cyanide)	Fusariol
		EMU Ethyl mercury thioureate	Lunasan
27.	PCNB	1, 2, 3, 4, 5-pentachloronitro-benzene	Brassicol, Tritisan, Felosar

(1)	(2)	(3)	(4)
28.	Puratized	Phenyl mercury triethanol ammonium lactate and acetate	Puratized, Puraturf
29.	Thiram	Tetramethylthiuram disulfide	TMTD, Arasan, Tersan, Nomersan, Pomasal, Thiotox, Thiram
30.	Wettable sulphur	Sulphur	Thiovit, Cosan, Spersul, Elosal, Hexasul, Magnetic sulphur, Sofril, Sultaf, Colloidal sulphur, Conditioned sulphur, Ultra sulphur, Hexachlor, Sulkol, Crown brand wettable sulphur
31.	Zineb	Zinc ethylene-bis-dithiocarbamate	Hexathane, Blizene, Dithane Z-78 Parzats, Lonacol, Miltox
32.	Ziram	Zinc dimethyl dithiocarbamate	Cuman, Zerlate, Ziram
33.	,,	Copper and Zineb	Zincop, Blitane
34.	,,	Copper and Ziram	Copramat
35.	,,	TMTD & Zinc dithiocarbamate	Tuzet
36.	,,	Triphenyl-tinacetate	Brestan, Duter
37.	,,	Zineb & Maneb	Dithane M-45.

A LIST OF TRADE NAMES OF VARIOUS FUNGICIDES ARRANGED ALPHABETICALLY ALONG WITH THEIR CHEMICAL & TRADE NAMES AND COMMON NAMES

S.No. (1)	Trade Name (2)	Chemical Name (3)	Common Name (4)
1.	Agallol	MEMC (Methoxy ethyl mercury chloride)	Organo mercurial
2.	Agricop	Copper oxychloride	Copper oxychloride
3.	Agrimycin	Streptomycin sulphate	Antlbiotic
4.	Agrosan GN	TMA & EMC (Tolyl mercury acetate) & Ethyl mercury chloride	Organo mercurial
5.	Arasan	Tetra methyl thiuram disulphide	Thiraam
6.	Arathane	2, 4-dinitro-6-(2-octyl) phenyl chrotenate	Zinocap
7.	Aretan	EEMC (Ethoxy ethyl mercury chloride)	Organo mercurial
8.	Blasticidin	Benzylaminobenzone sulphonate	Antibiotic
9.	Blimix	Copper oxychloride	Copper oxychloride
10.	Blitane	Copper & Zineb	—
11.	Blitox	Copper oxychloride	Copper oxychloride
12.	Blizene	Zinc ethylene bis dithiocarbamate	Zineb
13.	Blue copper	Copper oxychloride	Copper oxychloride
14.	Bordeaux mixture	Copper sulphate & Calcium hydrate	Bordeaux mixture
15.	Bordeaux-paste	,,	,,
16.	Brassicol	1, 2, 3, 4, 5-pentachloronitrobenzene	PCNB
17.	Brestan	Triphenyl tin acetate	—
18.	Burgundy mixture	Copper sulphate & Sodium carbonate	Burgundy mixture
19.	Captan	N-trichloromethyl marcapto-4-cyclo-hexane-1, 2-dicarboximide	Captan
20.	Ceresan 2%	EMC (Ethyl mercury chloride)	Organo mercurial
21.	Ceresan dry	PMA (Phenyl mercury acetate)	,,
22.	Ceresan dust	MEMC (Methoxy ethyl mercury chloride)	,,
23.	Ceresan M dust	N-ethyl mercury-p-toulene sulphonanilide	,,

(1)	(2)	(3)	(4)
24.	Ceresan Wet	MEMC (Methoxyethyl mercury chloride)	Organo mercurial
25.	Chaubattia paste	Lead oxide & Copper carbonate	Chaubattia paste
26.	Cheshunt compound	Copper sulphate & ammonium carbonate	Cheshunt compound
27.	Colloidal copper	Cuprous oxide	Cuprous oxide
28.	Colloidal sulphur	Sulphur	Wettable sulphur
29.	Conditioned sulphur	Sulphur	,,
30.	Copper sandoz	Cuprous oxide	Cuprous oxide
31.	Copper sulphate	Copper sulphate	Copper sulphate
32.	Coppesan	Copper oxychloride/Cuprous oxide	Copper oxychloride/ Cuprous oxide
33.	Cosan	Wettable sulphur	Wettable sulphur
34.	Cupramat	Copper and Ziram	—
35.	Crag fungicide 341	2-heptadecyl glyoxalidine acetate	Glyodin
36.	Crown brand Wettable sulphnr	Sulphur	Wettable sulphur.
37.	Cuman	Zinc dimethyl dithiocarbamate	Ziram
38.	Cupramar	Copper oxychloride	Copper oxychloride
39.	Cuprantol	Copper oxychloride	Copper oxychloride
40.	Cuprasan	Copper oxychloride	Copper oxychloride
41.	Cupravit	Copper oxychloride	Copper oxychloride
42.	Cuprokylt	Copper oxychloride	Copper oxychloride
43	Cuproxol	Cnprous oxide/Copper oxychloride	Cuprous oxide/copper oxychloride
44.	Cyprex	Dedecylguanidine acetate	Dodine
45.	Dithane D 14	Disodium ethlylene bis dithiocarbamate	Nabam

(1)	(2)	(3)	(4)
46.	Dithane M-22	Manganese ethylene bis thio-carbamate	Maneb
47.	Dithane M-45	Zineb & Maneb	—
48.	Dithane Z-78	Zinc ethylene bis dithiocarbamate	Zineb
49.	Duter	Ttiphenyl tin acetate	—
50.	Elasol	Sulphur	Wettable sulphur
51.	Esso fungi-cide 407	N-trichloromethylthiophthalmide	Folpet
52.	Ferbam	Ferric dimethyl dithiocarbamate	Ferbam
53.	Fermate	Ferric dimethyl dithiocarbamate	Ferbam
54.	Flit 4C5	N trichloromethyl marcapto- 4-Cyclo-hexane-1, 2-carboximide	Captan
55.	Folosan	1, 2, 3, 4, 5 pentachlorobenzene	PCNB
56.	Formal-dehyde	Formalin	Formalin
57.	Fungi copper	Cuprous oxide	Cuprous oxide
58.	Fungimar	Cuprous oxide	Cuprous oxide
59.	Fusariol	Ethyl mercuric cyanide	Organo mercurial
60.	Fycol	Copper oxychloride	Copper oxychloride
61.	Fytolan	Copper oxychloride	Copper oxychloride
62.	Fytomix	Copper oxychloride/Cuprous oxide	Copper oxychloride/ Cuprous oxide
63.	Geigy copper	Cuprous oxide	Cuprous oxide
64.	Geigy fungi Copper	Copper oxychloride	Copper oxychoride
65.	Hexachlor	Sulphur	Wetteble sulphur
66.	Hexasan	EMC (Ethyl mercury chloride), PMC (Phenyl mercury chloride)	Organo mercurial
67.	Hexasul	Sulphur	Wettable sulphur
68.	Hexathane	Zinc ethylene bis dithiocarbamate	Zineb
69.	Karathane-	2, 4-dinitro-6-(2-octyl) phenyl crotonate	Dinocap
70.	Kirti copper	Cuprous oxide	Cuprous oxide
71.	Lime sulphur	Calcium polysulphide	Lime sulphur

(1)	(2)	(3)	(4)
72.	Lonacol	Zinc ethylene dithiocarbamate	Zineb
73.	Lonacol M	Manganese ethylene dithiocarbamate	Maneb
74.	Lunasan	EMC (Ethyl mercury thiourea)	Organo mercurial
75.	Magnetic Wettable sulphur	Sulphur	Wettable sulphur
76.	Melprex	Dodecylguanidine acetate	Dodine
77.	Menzate	Manganese ethylene dithiocarbamate	Maneb
78.	Merculine	PMS (Phenyl mercury salicylate	Organo mercurial
79.	Micop	Copper oxychloride	Copper oxychloride
80.	Miltox	Zinc ethylene bis dithiocarbamate	Zineb
81.	Mylone	3, 5-dimethyl tetrahydro-1, 3, 5-2H-thiadiazine-2-thione	DMTT
82.	New improved ceresan	EMP (Ethyl mercury phosphate)	Organo mercurial
83.	Nickle chloride	Nickle chloride hexahydrate	Nickle chloride
84.	Nomersan	Tetra methyl thiuram disulphide	Thiram
85.	Owl Brand Dusting sulphur	Sulphur	Dusting sulphur
86.	Parrycop	Copper oxychloride	Copper oxychloride
87.	Parzate	Zinc ethylene bis-dithiocarbamate	Zineb
88.	Parzate liquid	Disodium ethylene bis-dithiocarbomate	Nabam
89.	Perecloud	Copper oxychloride	Copper oxychloride
90.	Perfection dusting sulphur	Sulphur	Dusting sulphur
91.	Perenox	Cuprous oxide	Cuprous oxide
92.	Phaltan	N-trichloromethyl thiophthalimide	Folpet
93.	Phygon	2, 3-dichlore-1, 4-nephthaquinone	Dichlone
94.	Pomasal	Tetra methyl thiuram disulphide	Thiram

(1)	(2)	(3)	(4)
95.	Puraturf	Phenyl mercury triethanol ammonium lactate & acetate	Puratized
96.	Puratized	Phenyl mercury triethanol ammonium lactate & acetate	Puratized
97.	Quinone	Tetrachloro-p-benzaquinone	Chloranil
98.	Refined sulphur	Sulphur	Dusting sulphur
99.	Saltosan	Cuprous oxide	Cuprous oxide
100.	Shell copper	Copper oxychloride	Copper oxychloride
101.	Shell dusting sulphur	Sulphur	Dusting sulphur
102.	Spergon	Tetrachloro-p-benzoquinone	Chloranil
103.	Spersul	Sulphur	Wettable sulphur
104.	Sofril	Sulphur	Wettable sulphur
105.	Solbar	Barium polysulphide	Barium polysulphide
106.	Strepta-chlor	Streptomycin & chlortetra cycline hydrochloride	Antibiotic
107.	Sulkol	Sulphur	Wettable sulphur
108.	Sulphur dust	Sulphur	Dusting sulphur
109.	Sultaf	Sulphur	Wettable sulphur
110.	Tafasan	(MEMC) Methoxy ethyl mercury chloride	Organo mercurial
111.	Tersan	Tetra methyl thiuram disulphide	Thiram
112.	Thiotox	Tetra methyl thiuram disulphide	,,
113.	Thiovit	Sulphur	Wettable sulphur
114.	Thiram	Tetra methyl thiuram disulphide	Thiram
115.	Tillex	EMC (Ethyl mercury chloride)	Organo mercurial
116.	TMTD	Tetra methyl thiuram disulphide	Thiram
117.	Tribasic copper sulphate	Copper sulphate	Copper sulphate
118.	Tritisan	1, 2, 3, 4, 5-pentachloronitrobenzene	PCNB
119.	Tuzet	Tetramethyl thiuram disulphide & Zinc dithiocarbamate	—
120.	Ultra sulphur	Sulphur	Wettable sulphur

(1)	(2)	(3)	(4)
121.	Vitigran	Copper oxychloride	Copper oxychloride
122.	Wetcol	Copper sulphate & Calcium hydrate	Bordeaux mixture
123.	Yellow cuprocide	Cuprous oxide	Cuprous oxide
124.	Zerlate	Zinc dimethyl dithiocarbamate	Ziram
125.	Zincop	Copper oxychloride & Zinc ethylene dithiocarbamate	—
126.	Ziram	Zinc ethylene dithiocarbamate	Ziram

A LIST OF CHEMICAL NAMES OF VARIOUS FUNGICIDES ARRANGED ALPHABETICALLY ALONG WITH THEIR COMMON & TRADE NAMES

S.No. (1)	Chemical Name (2)	Common Name (3)	Trade Name (4)
1.	Barium polysulphide	Barium polysulphide	Solbar
2.	Benzylaminobenzene sulfonate	Antibiotics	Blasticidin
3.	Calcium polysulphide	Lime sulphur	Lime sulphur
4.	Copper oxychloride	Copper oxychloride	Vitigran, Geigy Fungi Copper, Perecloud, Parrycop, Cuprantol, Fytolan, Blitox, Blimix, Shell copper, Cupramar, Agricop, Coppesan, Cupravit, Cuprokylt, Cuprazol, Cuprasan, Fytomix, Micop, Fycol, Blue copper
5.	Copper sulphate	Copper sulphtae	Tribasic copper sulphate, copper sulphate
6.	Copper sulphate and ammonium carbonate	Cheshunt compound	Cheshunt compound
7.	Copper sulphate and Calcium hydrate	Bordeaux mixture	Bordeaux mixture, Wetcol
8.	Copper sulphate and Calcium hydrate	Bordeaux paste	Bordeaux paste
9.	Copper sulphate and Sodium carbonate	Burgundy mixture	Burgundy mixture
10.	Copper and Zineb	—	Zincop, Blitane
11.	Copper and Ziram	—	Copramate
12.	Cuprous oxide	Cuprous oxide	Geigy copper, Colloidal copper, Copper sandoz, Fungimar, Perenox, Saltosan, Coppesan, Kirti copper, Yellow cuprocide, fungi copper, Fytomix, Cuproxol
13.	2. 3-dichloro-1, 4-nephthaquinone	Dichlone	Phygon
14.	3, 5-dimethyl tetrahydro-1, 3, 5-2H-thiadiazine 2-thione	DMIT	Mylone

A LIST OF CHEMICAL NAMES OF VARIOUS FUNGICIDES .. . (Contd.)

(1)	(2)	(3)	(4)
15.	2, 4-dinitro-6-(2-octyl) phenyl crotonate	Dinocap	Karathane, Arathane
16.	Disodium ethylene-bis-dithiocarbamate	Nabam	Dithane D-14, Parzate liquid
17.	Dodecylguanidine acetate	Dodine	Melprex, Cyprex
18.	MEMC (Methoxy ethyl mercury chloride)	Organo mercurial	Aretan
19.	EMC (Ethyl mercury chloride) EMC (Ethyl mercury chloride and PMC (Phenyl mercury chloride)	„	Tillex, Hexasan
20.	EMC (Ethyl mercury cyanide)	„	Fusariol
21.	EMP (Ethyl mercury phosphate-N-ethyl mercurial-p-toulene sulphonanilide	„	New improved Ceresan, Ceresan 'M' dust
22.	Ferric-dimethyl dithio-carbamate	Ferbam	Ferbam, Fermate
23.	Formalin	Formalin	Formaldehyde
24.	2-heptadecyl glyoxa-lidine acetate	Glyodin	Crag fungicide 341
25.	Leadoxide and copper carbonate	Chaubattia paste	Chaubattia paste
26.	Manganese ethylene-bis-dithiocarbamate	Maneb	Dithane M-22, Manzate, Lonacol-M
27.	MEMC (Methoxy ethyl mercury chloride)	Organo mercurial	Agallol, Tafasan, Ceresan (Wet. & dust)
28.	Mercuric thiourea (ethyl)	—	Lunasan
29.	Nickle chloride hydrate	Nickle chloride	Nickle chloride
30.	1, 2, 3, 4, 5-penta-chloronitrobenzene	PCNB	Brassicol, Tritisan, Folosan
31.	PMA (Phenyl mercury acetate)	Organo mercurial	Ceresan dry
32.	PMC (Phenyl mercury chloride)	„	Ceresan 2%

(1)	(2)	(3)	(4)
33.	PMS (Phenyl mercury salicylate)	Organoimercurial	Merculine
34.	Phenyl mercury triethanol ammonium lactate & acetate	Puratized	Puratized, Puraturf
35.	Streptomycin & chlortetracycline hydrochloride	Antibiotic	Streptachlor
36.	Streptomycin sulphate	Antibiotic	Agrimycin
37.	Sulphur	Dusting sulphur	Sulphur dust, Shell dusting sulphur, Perfecion dusting sulphur, Refined sulphur, Owl brand sulphur
38.	Sulphur	Wettable sulphur	Thiovit, Cosan, Spersul, Elosal, Hexasul, Magnetic sulphur, Sofril, Sultaf, Colloidal sulphur, Conditioned sulphur, Ultra sulphur, Hexachlor, Sulkol, Crown brand wettable sulphur
39.	Tetrochloro-p-benzoquinone	Chloranil	Spergon, Quinone
40.	Tetramethylthiuram disulphide	Thiram	TMTD, Arasan, Tersan, Nomersan, Pomasal, Thiotox, Thiram
41.	TMTD & Zinc dithiocarbamate	—	Tuzet
42.	N-trichloromethyl marcapto-4-Cyclohexane-1, 2-dicarboximide	Captan	Flit 406, Cáptan
43.	N-Trichloromethyl thiophthalimide	Folpet	ESSO fungicide 407, Phaltan
44.	TMA (Tolyl mercury acetate) & EMC (Ethyl mercury chloride)	Organic mercurial	Agrosan GN
45.	Triphenyl-tinacetate	—	Brestan, Duter
46.	Zinc ethylene-bis-dithiocarbamate	Zineb	Hexathane, Blizene, Dithane Z-78, Parzate, Lonacol, Miltox
47.	Zineb & Maneb	—	Dithane M-45
48.	Zinc dimethyl dithiocarbamate	—	Cuman, Zerlate, Ziram

A LIST OF COMMON NAMES OF VARIOUS WEEDICIDES ARRANGED ALPHABETICALLY ALONG WITH THEIR CHEMICAL AND TRADE NAMES

S.No. (1)	Common Name (2)	Chemical Name (3)	Trade/Brand Names (4)
1.	Acrolein	Acrylaldehyde	—
2.	Amiben	3-amino-2, 5-dichlorobenzoic acid	Bladex 'R'
3.	Aminotriazole or Amino-trole	3-amino-1, 2, 4-triazol	Weedazol TL, Meeno, Bladex 'O'
4.	Atrazine	2-chloro-4-ethylamino-6-isopropyl-amino-5-triazine	—
5.	CIPC	Isoprophyl N-(3-chloro-phenyl) carbamate	Triherlude
6.	2, 4-D	2, 4-dichlorophenoxy acetic acid	Hedonal, Weedox, Hexamar, 2, 4-D, Chloroxene, Dicotox, Crag Herbicide-1, Fernoxone, Palormone, Weedar, Kathon, Cornox, Hedonal liquid- Bladex 'A', 'C', 'F', 'B', 'G', Shell 2, 4-D, Planotox, Chloroxone, Weedone LV4, Weedone Conc. 48, Taficide
7.	2, 4-D (Amine) +HCPA	2, 4-dichlorophenoxy acetic acid+2-methyl-4-chloro-phenoxy acetic acid	Bi-Hedonal
8.	2, 4-D+2, 4, 5-T	2, 4-dichlorophenoxy acetic acid+2, 4-5-trichlorophenoxy acetic acid	YF 2631, Weedone, Tributon, Spontox' Bladex I, 'K', Bush-killer 64
9.	2, 4-DB	2, 4-dichlorophenoxy butyric acid	Embutox
10.	2, 4-DES	2, 4-dichlorophenoxyethyl sulphate (Sodium)	Crag Herbicide, Sesone
11.	Dalapon	2, 2-dichloropropionic acid	Dowpon, Tafapon, Dalapon
12.	Dicamba	2-methoxy-3, 6-dichloro-benzoic acid	Banvel D
13.	Diquat	1, 1-ethylene-2, 2-dipyridy-lium dibromide	Reglon
14.	Diuron	3-(3, 4-dichlorophenyl)-1, 1-dimethyl Urea	Karmex

(1)	(2)	(3)	(4)
15.	DNOC	Dinitro orthocresol	Sandolin 'A', Extar 'A', Triacide, Selinon, Denocate
16.	3, 4-DPA	3, 4-dichloropionanilide	Stam F 34
17.	Endothal	Disodium 3, 6-endoxohexahydrophthalate	—
18.	EPTC	Ethyl N, N-di-n-propylthiocarbamate	Eptam
19.	MCPA	2-methyl-4-chlorophenoxyacetic acid	Agritox, Hedonal M, Methaxone Agroxone, Phenoxylene, Cornox 'M'
20.	MCPB	2-methyl-4-chlorophenoxy butyrie acid	Tropotox, Shell MCPB
21.	MH	Maleic hydrazide	MH
22.	Monuron	3-(4-chlorophenyl)-1, 1-dimethylurea	Talvar
23.	Paraquat	1, 1-dimethyl-4, 5-dipyridylium dichloride	Gramoxone
24.	PCP	2, 3, 4, 5, 6-pentachlorophenol	A, YF 2581, Shell PCP
25.	Silvex	2-(2 4, 5-trichlorophenoxy) propionic acid	—
26.	Simazine	2-chloro-4, 6-bis (ethylamino)-1, 3, 5-triazine	SIM, Simazine, Tafazine
27.	2, 4, 5-T	2, 4, 5-trichlorophenoxy acetic acid	Trioxone, Bladex H, Weedone 2, 4, 5-T, Weedar
28.	TCA	Trichloroacetic acid	Nata, Varitox
29.	Tricamba	2-methoxy-3, 5, 6-trichlorobenzoic acid	Banvel T
30.	—	Abietyl amine acetate (rosin amino-d-acetate)	RADA
31.	—	Alkyl-dimethyl-benzyl-ammonium chloride	Dimanin
32.	—	Ammotriazol+2, 2-dichloropropionic acid	Bladex 'P'
33.	—	3-(4-chlorophenyl)-1, 1-dimethylurea+borate	Monax

(1)	(2)	(3)	(4)
34.	—	2, 4-dichlorophenyl 4-nitrophenyl ether	Tok E20, 25 & Granular
35.	—	Ethyl-1-hexamethylene imine carbothiolate	Hydram
36.	—	Ethyl-di-n-propylthiolcarbamate & Iso-octyl ester of 2, 4-dichlorophenoxy acetic acid	Knoxweed 42
37.	—	N-propyl-N-ethyl--N- (n butyl) thiolcarbamate	Tillam
38.	—	n-propyl-di-n-propyl thiolcarbamate	Vernam
39.	—	S, s, s-tributyl phosphorotrithioate	DEF
40.	—	Sodium chlorate	Atlacide
41.	—	Sodium chlorate+2, 4-dichlorophenoxy acetic acid +3 (4-chlorophenyl)-1, 1-dimethylurea+	Altavar
42.	—	Sodium chlorate+2, 4-dichlorophenoxy acetic acid +3-(4-chlorophenyl)-1, 1-dimethylurea+Borate	Chlorea

A LIST OF TRADE NAMES OF VARIOUS WEEDICIDES ARRANGED ALPHABETICALLY ALONG WITH THEIR CHEMICAL & COMMON NAMES

S.No. (1)	Trade name (2)	Chemical name (3)	Common name (4)
1.	Agritox	2-methyl-4-chlorophenoxy acetic acid	MCPA
2.	Agroxone	2-methyl-4-chlorophenoxy acetic acid	MCPA
3.	Altavar	Sodium chlorate & 2, 4-dichloro-phenoxy acetic acid & N-(3-chloro-phenyl)-'N'-'N'-dimethylurea	CMU
4.	Banvel D	2-methoxy-3, 6-dichlorobenzoic acid	Dicamba
5.	Banvel T	2-methoxy 3, 5, 6-trichlorobenzoic acid	Tricamba
6.	Bi-Hedonal	2, 4-dichlorophenoxy acetic acid and 2-methyl-4-chlorophenoxy acetic acid	2, 4-D(amine) & MCPA
7.	Bladex 'A'	2, 4-dichlorophenoxy acetic acid	2, 4-D
8.	Bladex 'B'	2, 4-dichlorophenoxy acetic acid	2, 4-D
9.	Bladex 'C'	2, 4-dichlorophenoxy acetic acid	2, 4-D
10.	Bladex 'F'	2, 4-dichlorophenoxy acetic acid	2, 4-D
11.	Bladex 'G'	2, 4-dichlorophenoxy acetic acid	2, 4-D
12.	Bladex 'H'	2, 4, 5-Trichlorophenoxy acetic acid	2, 4, 5-T
13.	Bladex 'I'	2, 4, 5-Trichlorophenoxy acetic acid & 2, 4-dichlorophenoxy acetic acid	2, 4, 5-T & 2, 4-D
14.	Bladex 'K'	2, 4, 5-Trichlorophenoxy acetic acid & 2, 4-dichlorophenoxy acetic acid	2, 4, 5-T & 2, 4-D
15.	Bladex 'O'	3-amino-1, 2, 4-triazol	Aminotriazole or Amitrole
16.	Bladex 'P'	Aminotriazol & 2, 2-dichloropropionic acid	—
17.	Bladex 'R'	3-amino-2, 5-dichlorobenzoic acid	Amiben
18.	Bushkiller 64	2, 4, 5-Trichlorophenoxy acetic acid & 2, 4-dichlorophenoxy acetic acid	2, 4, 5-T & 2, 4-D
19.	Chlorea	Sodium chlorate & 2, 4-dichloro-phenoxy acetic acid & borate	—
20.	Chloroxene	2, 4-dichlorophenoxy acetic acid	2, 4-D
21.	Chloroxone	2, 4-dichlorophenoxy acetic acid	2, 4-D
22.	Cornox	2, 4-dichlorophenoxy acetic acid	2, 4-D
23.	Cornox 'M'	2-methyl-4-chlorophenoxy acetic acid	MCPA

(1)	(2)	(3)	(4)
24.	Crag herbicide	2, 4-dichlorophenoxy ethyl sulphate	2, 4-DES
25.	Crag herbicide I	2, 4-dichlorophenoxy accetic acid	2, 4-D
26.	Dalapon	2, 2-dichloropropionic acid	Dalapon
27.	DEF	s, s, s tributyl phosphorotrithioate	—
28.	Dicotox	2, 4-dichlorophenoxy acetic acid	2, 4-D
29.	Dimanin	Alkyl-dimethyl-benzyl-ammonium chloride	—
30.	Denocate	Dinitro orthocresol	DNOC
31.	Dowpon	2, 2-dichloropropionic acid	Dalapon
32.	Embutox	2, 4-dichlorophenoxy butyric acid	2, 4-DB
33.	Eptam	ethyl-N-N-di-n-propylthiocarbamate	EPTC
34.	Extar A	dinitro orthocresol	DNOC
35.	Fernoxone	2, 4-dichlorophenoxy acetic aeid	2, 4-D
36.	Gramoxone	1, 1-dimethyl-4, 4-dipyridylium dichloride	Paraqua
37.	Hedonal	2, 4-dichlorophenoxy acetic acid	2, 4-D
38.	Hedonal Liquid	2, 4-dichlorophenoxy acetic acid	2, 4-D
39.	Hedonal 'M'	2-methyl-4-chlorophenoxy acetic acid	MCPA
40.	Hexamar 2, 4-D	2, 4-dichlorophenoxy acetic acid	2, 4-D
41.	Hydram (Ordram)	ethyl, 1-hexamethlene imine carbothiolate	—
42.	Karmex	3 (3, 4-dichlorophenyl)-1, 1-dimethyl-urea	Diuron
43.	Kathon	2, 4-dichlorophenoxy acetic acid	2, 4-D
44.	Knox weed 42	ethyl-di-n-propylthiolcarbamate & iso-octyl ester of 2, 4-dichlorophenoxy acetic acid	—
45.	Menno	3-amino 1, 2, 4-triazol	Aminotriazol or Amitrole
46.	Methaxone	2-methyl-4-chlorophenoxy acetic acid	MCPA
47.	MH	Maleic hydrazide	MH

(1)	(2)	(3)	(4)
48.	Monax	(CMH)-N-(3-chlorophenyl)-'N', 'N'-dimethylurea & Borate	
49.	Nata	Trichloro acetic acid	TCA
50.	Palormone	2, 4-dichlorophenoxy acetic acid	2, 4-D
51.	Phenoxylene	2-methyl-4-chlorophenoxy acetic acid	MCPA
52.	Planotox	2, 4-dichlorophenoxy acetic acid	2, 4-D
53.	Rada	abietyl amine acetate (rosin amino-d-acetate)	
54.	Reglon	1, 1-ethylene 2, 2-dipyridylium dibromide	Diquat
55.	Sandolin A	dinitro orthocresol	DNOC
56.	Selinon	dinitro orthocresol	DNOC
57.	Sesone	2, 4-dichlorophenoxyethyl sulphate	2, 4-DES
58.	Shell 2, 4-D	2, 4-dichlorophenoxy acetic acid	2, 4-D
59.	Shell MCPB	2-methyl-4-chlorophenoxy butyric acid	MCPB
60.	Shell PCP	2, 3, 4, 5, 6-pentachlorophenol	PCP
61.	Sim	2-chloro-4, 6-bis (ethylamino)-1, 3, 5-triazine	Simazine
62.	Simazine	2-chloro-4, 6-bis (ethylamino)-1, 3, 5-triazine	Simazine
63.	Spontox	2, 4-dichlorophenoxy acetic acid & 2, 4, 5-trichlorophenoxy acetic acid	2, 4-D & 2, 4, 5-T
64.	Stam F 33	3, 4-dichloropionanilide	2. 4-DPA
65.	Stimulant latex	2, 4, 5-trichlorophenoxy acetic acid	2, 4, 5-T
66.	Taficide	2, 4-dichlorophenoxy acetic acid	2, 4-1-D
67.	Tafapon	2, 2-dichloropropionic acid	Dalapon
68.	Tafazine	2-chloro-4, 6-bis (ethyl amino)-1, 3, 5-triazine	Simaxine
69.	Talvar	3 (4-chlorophenyl-1, 1-dimethylurea	Monuron
70.	Tillam	n-propyl N-ethyl-N-(n-butyl) thiol-carbamate	
71.	Tok E-20	2, 4-dichlorophenyl 4-nitro-phenyl ether	
72.	Tok E-25	2, 4-dichlorophenyl 4-nitro-phenyl ether	

(1)	(2)	(3)	(4)
73.	Tok granular	2, 4-dichlorophenyl 4-nitro-phenyl ether	—
74.	Triacide	dinitro orthocresol	DNOC
75.	Tributon	2, 4 dichlorophenoxy acetic acid & 2, 4, 5-trichlorophenoxy acetic acid	2, 4-D & 2, 4, 5-T
76.	Triherlude	Isopropyl N-(3-chlorophenyl) carbamate	CIPC
77.	Tropotox	2-methyl-4-chlorophenoxy butyric acid	MCPB
78.	Trioxone	2, 4, 5-trichlorophenoxy acetic acid	2, 4, 5-T
79.	Varitox	Trichloroacetic acid	TCA
80.	Vernam	N-propyl-di-n-propyl thiolcarbamate	—
81.	Weedar	2, 4-dichlorophenoxy acetic acid	2, 4-D
82.	Weedar	2, 4, 5-trichlorophenoxy acetic acid	2, 4, 5-T
83.	Weedazol TL	3-amino-1, 2, 4-triazol	Aminotriazole or Amitrole
84.	Weedone 2, 4, 5-T	2, 4, 5-trichlorophenoxy acetic acid	2, 4, 5-T
85.	Weedone	2, 4-dichlorophenoxy acetic acid & 2, 4, 5-trichlorophenoxy acetic acid	2, 4-D & 2, 4, 5-T
86.	Weedone LV-4	2, 4-dichlorophenoxy acetic acid	2, 4-D
87.	Weedone Conc. 48	2, 4-dichlorophenoxy acetic acid	2, 4-D
88.	Weedox	2, 4-dichlorophenoxy acetic acid	2, 4-D
89.	YF 2581	2, 3, 4, 5, 6-pentachlorophenol	PCP
90.	YF 2631	2, 4-dichlorophenoxy acetic acid & 2, 4, 5-trichlorophenoxy acetic acid	2, 4-D & 2, 4, 5-T
91.	—	2-chloro-4-ethyl amino-6-isopropyl-amino-5-triazine	Atrzine
92.	—	Acrylaldehyde	Acrolein
93.	—	Di-sodium 3, 6-endoxohexahydrophthalate	Endothal
94.	—	2-(2, 4, 5-trichlorophenoxy) propionic acid	Silvex

A LIST OF CHEMICAL NAMES OF VARIOUS WEEDICIDES ARRANGED ALPHABETICALLY ALONG WITH THEIR COMMON AND TRADE NAMES

S.No. (1)	Chemical Name (2)	Common Name (3)	Trade Name (4)
1.	Abietyl amino acetate (rosin-amino-d-acetate	—	Rada
2.	Acrylaldehyde	Acrolein	—
3.	Alkyl-dimethyl benzyl ammonium chloride	—	Dimanin
4.	3-amino-2, 5-dichloro-benzoic acid	Amiben	Bladex 'R'
5.	3-amino-1, 2, 4-triazol	Aminothiazole or Amitrole	Weedazol TL, Meeno, Bladex 'O'
6.	Aminotriazol+2, 2-dichloropropionic acid	—	Bladex 'P'
7.	2-chloro-4, 6-bis (ethyl-amino)-1, 3, 5-triazine	Simazine	SIM, Simazione, Tafazine
8.	2-chloro-4-ethylamino-6-isopropyl-amino-5-triazine	Triazine	—
9.	3-(4-chlorophenyl)-1, 1-dimethyl urea	Monuron	Talvar
10.	3-(4-chlorophenyl)-1, 1-dimethyl urea+Borate	—	Monax
11.	2, 4-dichlorophenoxy acetic acid	2, 4-D	Hedonal, Weedox, Hexamar 2, 4-D, Chloroxone, Dicotox, Crag herbicide-1, Fernoxone, Palormone, Weedar, Kathon, Cornox, Hedonal liquid, Bladex 'A', 'B', 'C', 'G', 'F', Shell 2, 4-D, Planotox, Chloroxone, Weedone LV4, Weedone Conc. 48, Taficide
12.	2, 4-dichlorophenoxy butyric acid	2, 4-DB	Embutox
13.	2, 4-dichlorophenoxy ethyl sulphate (sodium)	2, 4-DES	Crag herbicide, Sesone
14.	3-(3, 4-dichlorophenyl)-1, 1-dimethyl urea	Diuron	Karmex

(1)	(2)	(3)	(4)
15.	2, 4-dichlorophenoxy acetic acid+2, methyl-4-chlorophenoxy acetic acid	2, 4-D+MCPA	Bi-Hedonal
16.	2, 4-dichlorophenyl 4-nitro-phenyl ether	—	Tok 20, 25 & granular
17.	3, 4-dichlore pionanilide	3, 4-DPA	Stam F-34
18.	2, 4-dichlorophenoxy acetic acid+2, 4, 5-trichlorophenoxy acetic acid	2, 4-D+2, 4, 5-T	YF 2631, Weedone, Tributon, Spontox, Bladex 'I', 'K', Bushkiller 64
19.	2, 2-dichloropropionic acid	Dalapon	Dowpon, Tafapon, Dalapon
20.	1, 1-dimethyl-4, 4-dipyridylium dichloride	Paraquat	Gramoxone
21.	Dinitro orthocresol	DNOC	Sandolin 'A', Extar 'A', Triacide, Selinon, Denocate
22.	Disodium-3, 6-endoxo-hexahydrophthalate	Endothal	—
23.	Ethyl di-n-propyl thiolcarbamate+iso-octyl ester or 2, 4-dichlorophenoxy acetic acid	—	Knoxweed 42
24.	1, 1-ethylene-2, 2-dypyridylium dibromide	Diquat	Reglon
25.	Ethyl, 1-hexamethylene amine carbothiolate	—	Hydram
26.	Ethyl-n, n-di-n-propythiolcarbamate	EPTC	Eptam
27.	Isopropyl-1, N-(3-chlorophenyl) carbamate	CIPC	Triherlude
28.	Maleic hydrazide	MH	MH
29.	2-methoxy-3, 6-dichlorobenzoic acid	Dicamba	Banvel D
30.	2 methoxy-3, 5, 6-trichlorobenzoic acid	Tricamba	Banvel T

(1)	(2)	(3)	(4)
31.	2-methyl-4-chlorophenoxy acetic acid	MCPA	Agritox, Hedonal 'M', Methaxone, Agroxone, Phenoxylene, Cornox 'M'
32.	2-methyl-4-chlorophenoxy butyric acid	MCPB	Tropotox, Shell MCPB
33.	n-propyl-di-n-propyl thiocarbamate	—	Vernam
34.	n-propyl N-ethyl-N-(n-butyl) thiocarbamate	—	Tillam
35.	2, 3, 4, 5, 6-pentachlorophenol	PCP	YF 2581, Shell PCP
36.	Sodium chlorate	—	Atlacide
37.	Sodium chlorate + 2, 4-dichlorophenoxy acetic acid + 3-(4-chlorophenyl)-1, 1-dimethyl urea	—	Altavar
38.	Sodium chlorate + 2, 4-dichlorophenoxy acetic acid + 3-(4-chlorophenyl)-1, 1-dimethyl urea + borate	—	Chlorea
39.	S, s, s-tributyl phosphorotrithioate	—	DEF
40.	Trichloroacetic acid	TCA	NATA, Varitox
41.	2, 4, 5-trichlorophenoxy acetic acid	2, 4, 5-T	Trioxone, Bladex 'H', Weedone, 2, 4, 5-T, Weedan
42.	2, (2, 4, 5-trichlorophenoxy) propionic acid	Silvex	—

INSTRUCTIONS FOR THE SAFE USE OF PESTICIDES

EXPLANATORY NOTE

The instructions for the safe use of pesticides, which follow this note, have been approved by the Inter-Ministerial Technical Committee, constituted by the Ministry of Health, Government of India, in connection with the implementation of the recommendations of the Kerala and Madras Food Poisoning Cases Enquiry Commission, 1958.

This note is meant to supplement the information contained in the instructions and to clarify doubts, if any, which may arise when some of the recommended First Aid measures have to be carried out. The points covered in this note follow the same sequence as in the instructions.

FIRST AID PRECAUTIONS

Some of the First Aid measures, mentioned in the instructions, can only be undertaken by a doctor or by someone who is specially trained for the purpose while others are simple and can be carried out by anybody who can understand and follow the instructions carefully.

Prevention of Collapse

Hypodermic injection of stimulants, such as caffeine and epinephrine, may be done if some one who knows how to give the injection properly, is available. Otherwise, wait for the doctor. Fluid administration of dextrose 5% intravenously and blood or plasma transfusion should be done by the doctor.

ANTIDOTES

A. General Antidotes

The 'Universal Antidote'

Activated charcoal, magnesium oxide and tannic acid are sold in medical shops and should be stocked in the First Aid Box. If tannic acid is not readily available for making the 'Universal Antidote', the next best thing to do would be to give the patient orally half a glass of warm, strong tea decoction in which the activated charcoal and magnesium oxide have been mixed.

B. Specific Antidotes for some Pesticides

The emergency treatment for some specific pesticides include the administration of oxygen or carbon dioxide, blood transfusion, intravenous injections of certain antidotes and some other measures, which cannot safely be done by a layman and, in some cases, even by a doctor without special equipment. These measures are included in the instructions for general information. While it may not be possible for plant protection workers and others to do every thing that is prescribed, pending the arrival of the doctor, they should read the instructions carefully and ensure that the antidotes and other substances, that are required, are kept in readiness and made available to the doctor, when the need arises. Moreover, they can adopt such of those measures as do not require a doctor. The antidotes and other required substances should be stocked in the First Aid Box.

Carbon tetrachloride and Chlorinated hydrocarbons

The doctor may be asked to prescribe suitable carbohydrate and calcuim diets.

INSTRUCTIONS FOR THE SAFE USE OF PESTICIDES

Pesticides may be conveniently divided into three categories, depending upon their toxicity to animal and man. These are:

1. *Non - hazardous Pesticides*, such as Pyrethrum products, Copper fungicides, Sulphur and Nicotine preparations.

2. *Hazardous Pesticides, such as* BHC, DDT Methoxychlor. Chlordane, Malathion, ED/CT and Cumarin derivatives.

3. *Dangerous Pesticides*, such as Dinitro compounds, Mercury compounds, Parathion, TEPP, HETP, Aldrin, Dieldrin, Endrin, Carbamates, Cyanides (including HCN), Methyl Bromide, Zinc phosphide and Strychnine.

Pesticides are usually safe if properly transported, stored, handled and used with necessary precautions.

GENERAL PRECAUTIONS

1. Read the label carefully and follow the manufacturer's instructions.

2. Keep pesticides in labelled containers only.

3. Store pesticides in a safe and locked place out of reach of children, irresponsibile persons and pets.

4. Never store pesticides near foodstuff or medicines.

5. Do not use the empty containers of dangerous pesticides for any alternative purpose except for pesticides.

6. In the handling of dangerous pesticides necessary protective clothings and devices must be used.

7. Do not tear open the pesticide bags but cut them with a knife.

8. The preparation of spray solutions from concentrated, dangerous pesticides should be done in deep mixing vessels with long-handled mixers to protect the operator from splashings and to permit stirring from a standing position.

9. Wash hands thoroughly with soap and water (i) every time the sprayer/duster is filled with pesticides, (ii) before eating drinking or smoking and (iii) at the end of the days' work.

10. Contaminated effluents from washing the equipment and mixing vessels must be disposed of by scattering over barren land or burying in the ground.

11. Do not blow, suck or apply the mouth to any sprinkler, nozzle or other spraying equipment.

12. Operators should not work for more than 8 hours a day. Operators engaged in handling dangerous pesticides should be checked by a physician periodically.

13. Separate, working clothes should be used. They should be washed and changed as frequently as possible.

14. All pesticide containers should be adequately labelled to identify the contents and to show, in a form comprehensible to the operators, the nature of the material and the precautions to be observed.

FIRST AID PRECAUTIONS

In case of pesticide poisoning CALL A PHYSICIAN *IMMEDIATELY*. Awaiting the physician's arrival, apply FIRST AID.

1 *Swallowed Poisons*

Remove poison from the patient's stomach immediately by inducing vomiting. Give common salt ½ oz. in a glass of warm water and repeat until the vomit fluid is clear. Gently stroking or touching the throat with the finger or placing the blunt end of a spoon will aid in inducing vomiting when the stomach is full of fluid.

If the patient is already vomiting do not give emetic or vomiting substance (common salt ½ oz. in a glass *of warm water) but give large amounts of warm water and then follow the specific directions suggested.*

Do not induce vomiting of the patient if the patient is in coma, unconscious, in convulsion and when the patient has swallowed petroleum products-kerosene, gasoline, etc., and corrosive acids or caustic alkalies (symptoms: severe pain, burning sensation in mouth and throat and vomiting).

2. *Inhaled poisons*

(a) Carry the patient (do not let him walk) to fresh air immediately.

(b) Open all doors and windows,

(c) Loosen all tight clothing.

(d) Apply artificial respiration if breathing has stopped or is irregular. Avoid vigorous application of pressure to the chest.

(e) Prevent chilling.

(f) Wrap the patient in a blanket.

(g) Keep the patient as quiet as possible.

(h) If the patient is convulsing, keep him in bed in some dark room. Avoid jarring or noise.

(i) Do not give alcohol in any form.

3. *Skin contamination*

(a) Drench the skin with water (showers, hose or pump).

(b) Apply a stream of water on the skin while removing clothing.

(c) Cleanse the skin thoroughly with water.

(d) Rapid washing is most important for reducing the extent of injury.

4. *Eye contamination*

(a) Hold eye lids open.

(b) Wash the eyes gently with a stream of running water immediately. Delay of even a few seconds greately increases the extent of injury.

(c) Continue washing until physician arrives.

(d) Do not use chemicals. They may increase the extent of injury.

5. *Prevention of Collapse*

(a) Cover the patient with a light blanket.

(b) Do not use a hot water bottle.

(c) Raise foot of bed.

(d) Apply elastic bands to arms and legs.

(e) Give strong tea or coffee.

(f) Hypordermic injection of stimulants, such as, caffeine and epinephrine

(g) Fluid administration of dextrose 5% intravenously.

(h) Blood or plasma transfusion.

(i Do not exhaust the patient by too much or too vigrous treatment.

ANTIDOTES

Administer antidotes immediately and properly.

A. General Antidotes

1. *Removal of Poison*—Remove poisons by inducing vomiting

2. *The 'Universal Antidote'*—Half an ounce of a mixture of activated charcoal two parts, magnesium oxide one part and tannic acid one part in half a glass of warm water may be used to absorb or neutralise poisons. This mixture is useful in poisoning by acids, liquid glycosides and heavy metals. Except in cases of poisoning by corrosive substances, it should be followed by gastric lavage.

3. *Gastric Lavage* (Removal of Stomach contents) *,*

Lavage is the most important method for removing poison from the stomach. Ordinarily, gastric lavage is not indicated unless the patient is seen within the first four hours after the poison has been swallowed. Serious injury may result from the improper use of the stomach tube and this procedure should be carried out by a physician.

The 'Universal Antidote' or a specific antidote should be administered orally with water before the tube is passed.

The stomach tube should not be used after poisoning by corrosive acids or caustic alkalies.

4. *Demulcents* (Substances having soothing effect)—After the stomach has been emptied as completly as possible, give one of the following :-

Raw egg white mixed with water.

Gelatine 1/3 to 2/3 oz., dissolved in 1/8 gallon of warm water.

Butter
Cream
Milk
Mashed potato
Flour and water

B. Specific Antidotes for some Pesticides

The following emergency treatments are prescribed for poisoning by some specific pesticides :

1. *Arsenic compounds and preparations*—(Lead arsenate, Calcium arsenate, Paris green, certain rodent poisons, etc): Give the 'Universal Antidote', followed by gastric lavage with 8 ounces of 5% sodium bicarbonate solution diluted to 1 quart with warm water, containing one ounce of magnesium sulphate (Epsom salts). Have the patient lie down and keep quiet.

2. *Barium carbonate*—Give emetic if the patient has taken the poison within 24 hours. If 24 hours have elapsed, give him one tablespoonful of magnesium sulphate (Epsom salts) in a glass of water and repeat until the vomit fluid is clear. Follow with milk or white of egg with water.

3. *Carbon disulphide* — Remove the patient promptly to open air and administer 5% carbon dioxide in oxygen. If liquid is swallowed, give four ounces of petrolatum (liquid paraffin) then gastric lavage with large quantities of warm water. Give hot tea or coffee. Inject caffeine sodium benzoate 0.5 gm. subcutaneously or intravenously.

4. *Carbon tetrachloride*—Same as for Carbon disulphide. Besides, inject 5 to 10 gm. of calcium gluconate. Feed the patient with high carbohydrate diet every two hours when the patient has gained consciousness.

5. *Chlorinated hydrocarbons*

(a) *BHC, Chlordane, DDT Toxaphene, Methoxychlor, etc.*—If swallowed, give 'Universal Antidote', following by gastric lavage. Then give one ounce of magnesium sulphate (Epsom salts) in a glass of water, followed by hot tea or coffee. Inject 10 c c. of 0%calcium gluconate intravenously. If necessary, inject phenobarbital 0.1 gm. intraveneously. Feed the patient with rich carbohydrate and calcium diet to prevent liver damage.

(b) *Aldrin and Dieldrin*—If skin is contaminated, wash immediately with soap and water. If swallowed, give emetic and repeat until the vomit fluid is clear. The physician may administer phenobarbital or barbiturates as for convulsion therapy. Have the patient lie down and keep quiet.

6. *Carbamates*—(Sevin, carbaryl, etc.) : If swallowed give emetic. If skin is contaminated, wash immediately with soap and water. If the symptoms are severe and the patient has abdominal cramps, tightness in the chest and blurred vision, give 2 tablets of atropine sulphate (each 1/100 gm.) and in serious cases intravenously (1/ 30 to 1/15 gm.). Repeat at intervals until signs of atropinization appear. Apply artificial respiration in case of respiratory failure. *DO NOT GIVE MORPHINE, or 2-PAM.*

7. *Copper compounds*—Gastric lavage with large quantities of water containing one ounce of milk of magnesia. When the vomit fluid is clear, give milk as demulcent. Give potassium ferrocyanide 0.5 gm. in water.

8. *Cyanides*—(Calcium cyanide, Sodium cyanide, etc., including Hydrogen cyanide); Carry the patient to fresh air immediately. Break an amyl nitrite ampule in a clean cloth and hold it at the nose of the patient for five seconds at intervals of 15 seconds. Inject intravenously 10 c.c. of 3% sodium nitrite solution at 2.5 c c. per minute followed by 50 c.c. of 25% sodium thiosulphate solution. If breathing has stopped, administer artificial respiration.

If the poison is swallowed, gastric lavage with 5% sodium thiosulphate solution should be given along with the injections mentioned above.

9. *Dinitro Compounds*—If swallowed, give gastric lavage with 5% sodium bicarbonate solution Administer two tablespoonfuls of magnesium sulphate (Epsom salts) in a glass of water. Immerse the patient in cold bath to reduce body temperature. Inject one quart of saline solution intravenously. Give hot tea or coffee. In case of Cynosis, give oxygen therapy.

10. *Ethylene dichloride*—Same as for Carbon tetrachloride.

11. *Mercury compounds*—(Inorganic salts except calomel and metalic mercury) : Give milk or white of egg beaten with water, then a tablespoonful of salt in a glass of warm water and repeat till the vomit fluid is clear. Repeat milk or white of egg beaten with water.

Organic mercury compounds vary so widely in their properties that only a physican should consider them individually.

12. *Metaldehyde*—Give emetic and repeat until the vomit fluid is clear. Give magnesium sulphate (Epsom salts) one ounce in a glass of water Then give strong tea or coffee.

13. *Methyl bromide*—Remove the patient to fresh air immediately and keep him warm. Administer oxygen therapy. Inject caffeine sodium benzoate 0.5 gm. If necessary, inject epinephrine 0 5 c.c 1 : 1000 subcutaneously. Keep the mouth rinsed always with 10% solution of sodium thiosulphate. When revived, give hot tea or coffee.

14. *Naphthalene*—Give emetic and repeat until the vomit fluid is clear. Then give milk and hot tea or coffee.

15. *Nicotine compounds*—Give 'Universal Antidote', followed by gastric lavage with 8 ounces of 1 : 1000 Potassium permanganate solution. Give hot tea or coffee after the stomach wash (gastric lavage)

16. *Kerosene*—Same as for Carbon disulphide.

17. *Organophosphorous compounds*—Parathion, Folidol, HETP, TEPP, Phosdrin, D DVP etc).

The treatment recommended for carbamate poisioning should be carried out. In addition 2-PAM (2-Pyridine aldoxime methiodide or Paralidoxime iodide) should be given slowly intravenously if the patient fails to respond to atropine sulphate at a dosage of 1.0 gm. for adults and 0.25 gm. for infants.

18. *Phenols*—Give gastric lavage with 10% alcohol, followed by large quantities of warm water. Inject one quart of normal saline solution intrvenously. Give milk, hot tea or coffee.

19. *Thallium sulphate*—Give 5 drops of tincture of iodine in a glass of water, followed by an emetic. Repeat until the vomit fluid is clear. Have the patient lie down and keep him warm.

20.. *Strychnine*—Give 'Universal Antidote' followed by an emetic. Repeat emetic until the vomit fluid is clear. Keep the patient warm.

21. *Warfarin*—If the poision has been taken once, keep the patient under observation, feeding with milk only, for 24 hours. If known to have taken several times, inject large doses of vitamin 'K' intravenously. Administer orally vitamin 'K' and water soluble forms of Menadione. If large quantites have been taken for many days, fresh, whole blood transfusion is necessary along with administration of large doses of vitamin 'K2'.

22. *Zinc phosphide*—It the patient has taken the poison within 24 hours, proceed as follows: (1) Stir one teaspoonful of mustard powder into a glass of warm water and make the patient drink it; (2) After vomiting from treatment (1) has stopped, give the patient 5 gm. of Potassium permanganate dissolved in a glass of warm water; (3) ten minutes after the above treatment (2), have the patient drink a solution made of ½ teaspoonful of copper sulphate in a glass of water; and (4) fifteen minutes after treatment (3), give the patient a solution made by dissolving one tablespoonful of magnesium sulphate (Epsom salts) in a glass of water. If the poision has been taken earlier than 24 hours, omit treatment (1) above and give the others in order.

ANNEXURE I

Some Antidotes and other substances to be stocked for use in Emergency Treatments

Activated charcoal
Alcohol, Ethyl
Amyl nitrite
Atropine tablets
Caffeine sodium benzoate
Calcium gluconate
Common salt (Sodium chloride)
Copper sulphate
Dextrose
Distilled water
Epinephrine
Gelatine
Magnesium oxide
Magnesium sulphate (Epsom salt)
Menadione
Milk of magnesia
Mustard powder
Normal saline solution
2-PAM (2-Pyridine aldoxime methiodide)
Petrolatum (Liquid paraffin)
Phenobarbital
Potassium ferrocyanide
Potassium permanganate
Sodium benzoate
Sodium bicarbonate
Sodium nitrite
Sodium thousulphate
Tannic acid
Tincture of iodine
Vitamins K and K-2

ANNEXURE II

Some Useful Canversion Factors

Measures

3 teaspoonfuls	=	1 tablespoonful
2 tablespoonfuls	=	1 fluid ounce
16 fluid ounces	=	1 pint
2 pints	=	1 quart
4 quarts	=	1 gallon

Weights

1 ounce	=	28.35 grams
1 pound	=	16 ounces—453·59 grams
1 gram	=	100 miligrams—0·0353 ounce

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Maharashtra Krishi Vidyapeeth,
Khanna Construction House,
44, Abdul Gaffarkhan Road,
Worli, Bombay-18.

6. Shri M. V Rajasekharan, M.P.,
6, Janpath,
New Delhi-1.

LIST OF MIXED FERTILIZER MANUFACTURERS

(a) Private Manufacturers

Andhra Pradesh

1. Ambika Fertilizer Co., Hyderabad.
2. Andhra Agricultural Industries (P) Ltd., Ongole.
3. Andhra Bonemeal Fertilizer & Glue Manufacturers, Nellore.
4. Andhra Fertilizer Co., Nandyal.
5. Andhra Fertilizers & Chemical Industries, Hyderabad.
6. Andhra Seeds, Stores, Hyderabad.
7. Arrow Brand Manurial Mixtures Co., Samalkot.
8. Asoka Fertilizer Co., Tenali.
9. Asoka Pulverisers, Vijayawada.
10. Associated Allied Agencies, Kurnool.
11. Associated Fertilizers, Vijayawada.
12. Sri Attada Janardhana Rao, Nandigam.
13. Sri Bailuri Sreenivasa Rao, Kakinada.
14. Sri Balaj Fertilizers, Cuddapah.
15. Balaji Industries, Gudur.
16. Balkishan Gopikishan, Nizamabad.
17. Bharath Fertilizers, Guntur.
18. Bharat Manures Development Co., Chirala.
19. Bhaskara Fertilizers & Co., Tapeswaram.
20. Blue Mountain Estates & Industries Ltd.
21. Bingusaria Chemicals & Fertilizers, Hyderabad.
22. Boda Satyanarayana Murthy, Kakinada.
23. Boda Subramaniyan & Co., Tapeswaram.
24. Circar Fertilizers, Vijayawada.
25. Chamundi Chemicals & Fertilizers Ltd., Kurnool.
26. Chennakesava Fertilizers (P) Ltd., Hyderabad.
27. Deccan Fertilizers & Glue Products Co., Warangal.
28. Dechiraju Ramrao & Co., Guntur.
29. D. V. M. & Co., Narasapur

(a) Private Manufacturers-(Contd.)

30. Eastern Trades and Industrial Corporation, Samalkot.
31. Fertilizers & Industrial Corporation, Nidadavole.
32. Foods, Fats and Fertilizers, Tadepalligudem.
33. Gokina Brothers, Peddapuram.
34. Gopala Krishna Fertilizers Co., Tenali.
35. Gopal Manures & Bone Mills, Pentapadu.
36. K. R. Gopalreddy & Co., Proddatur.
37. Hind Agricultural Corporation, Guntur.
38. Hindustan Fertilizers & Bone Mills, Vijayawada.
39. Hyderabad Chemicals & Fertilizers Ltd., Hyderabad.
40. Hyderabad Manures, Vijayawada.
41. Inturi Abbayya, Moon Brand Manure Mixing Dept., Chilakalurpet.
42. Jawahar Industries, Hyderabad.
43. Jaya Lakshmi Fertilizers, Tanuku.
44. Jyoti & Co., Hyderabad.
45. Kancharala China Satyanarayana Murthy, Alamuru.
46. Kisan Fertilizers Co., Ongole.
47. Kisan Fertilizers, Tenali.
48. Sri Krishna Fertilizer Co., Tenali.
49. Krishna Industrial Corporation Ltd., Nidadavole.
50. Lakshmana Rao & Co., Adoni.
51. Lakshmi Agencies, Kakinada.
52. T. G. Lakshmiah Chetty & Sons, Adoni.
53. Sri Lakshmi Fertilizer Co., Vedireswaram.
54. Mopuri Chinna Subbareddy, Proddatur.
55. Mysore Fertilizer Co., Vijayawada.
56. Sri Namburi Pitchaiah Choudhary, Bapatla.
57. Nava Bharat Fertilizers, Vijayawada.
58. Neeta Enterprises (P) Ltd., Hyderabad.
59. Nimala Rao & Co., Vijayawada.
60. Nimmagadda Parnachandra Rao, Macherla.

(a) Private Manufacturers-(Contd.)

61. Nizamabad Chemicals & Fertilizers, Hyderabad.
62. Parameshwara Fertilizer, Tenali.
63. E. I. D.-Parry Ltd., Tadepalli.
64. Parthasarathy and Co., Nandyal.
65. Sri Patti Venkataswamy Chetty & Co., Chittoor.
66. Sri Peda Veera Reddy Sathi, Hyderabad.
67. The Peninsular Bone Mill, Renigunta.
68. Pioneer Fertilizers Co., Vijayawada.
69. Potini Venkaiah & Co., Karamchedu.
70. Prabhat Fertilizers Co., Tenali.
71. Praja Corporation Rice Mill, Armoor.
72. Premier Fertilizers Ltd.
73. Raghu Fertilizer Co., Tadikonda.
74. Rallis India Ltd., Vijayawada.
75. Sri R. P. Rama Reddy, Adoni.
76. Ratna Fertilizer, Kurnool.
77. Rayalaseema Insecticides Corporation, Kallaru R. S.
78. S. Sangisetty Ramaswamy, B. Kothur.
79. Sri Sangita Venkata Reddy, Pipapalla.
80. C. Satyanarayana Murthy & Co., Kakinada.
81. Satyanarayana Srinivas Bang, Nizamabad.
82. Scientific Fertilizers Co., (P) Ltd., Guntur.
83. Shankar Fertilizer Stores, Ananthapur.
84. Shaw Wallace & Co., Tadepalli.
85. Shree Agencies, Hyderabad.
86. Sitarama Fertilizers, Nandapet.
87. Sun Fertilizers Co., Tenali.
88. Surappa Reddy Rama Rao, Sandhipudi.
89. Swadesh Fertilizers, Nizamabad.
90. Vani Fertilizers, Narasaraopet.
91. Sri Varigina Satyanarayana Murthy, Eluru.

(a) Private Manufacturers-(Contd.)

92. Varuna Fertilizers Distributing Co., Hyderabad.
93. C. Venkataramana, Kurnool.
94. B. Venkata Reddy & Co., Tenali.
95. Sri Venkateshwara Agencies, Anaparathy.
96. Sri Venkateshwara Fertilizers, Guntur.
97. Sri Venkateshwara Fertilizers, Tenali.
98. Sri Venkateshwara Fertilizers Co., Puttur.
99. Sri Venkateshwara Fertilizers, Kodad.
100. Victory Fertilizers, Vijayawada.
101. Yelkur Fertilizers, Kurnool.

Assam

1. Assam Bone Mill Factory, Dibrugarh.
2. Associated Industries (Assam) Ltd., Chandrapur.
3. Bhimraj Choutamall, Dibrugarh.
4. Hanumanbux Sitaram, Tinsukia.
5. Jardine Henderson Ltd.

Bihar

1. Balsund Co., Ltd., Riga.
2. Shri Hanuman Sugar & Industries Ltd., Motihari.
3. Jardine Henderson Ltd.
4. Rallis India Ltd.
5. Shaw Wallace & Co., Ltd.
6. The New Swadeshi Sugar Mill Ltd., Narkatia Ganj.

Goa

1. Shri Adarsh Fertilizers, Diu.
2. Agencia Commercial International, Panaji.
3. Caxiram Ragunath Swar, Margao.
4. Gopinath H. Kessarkar, Margao.
5. Govinda V. N. Penvelkar, Panaji.
6. Maneklal Danait, Margao.

(a) Private Manufacturers-(Contd.)

7. Morarbhai C. Tangal, Daman.
8. Namnallal Dayalji Saglani, Savordem.
9. Vinayak P. Kamat Dhaconkar Verla, Mapusa.

Gujarat

1. Adarsh Chemicals & Fertilizers Ltd., Navasari and Udhna.
2. Agri-India Fertilizers, Navasari.
3. Agri-Union Service, Ahmedabad and Mehmedabad.
4. Alembic Chemical Works Co., Ltd., Baroda.
5. Anil Starch Products Ltd., Ahmedabad.
6. Shri Anjini Fertilizers Manufacturing Co., Bhavnagar.
7. Asha Trading Agency, Chalala, Jamnagar, Junagadh and Bhavnagar.
8. Asian Commercial Co., Ltd , Ahmedabad.
9. Bharat Fertilizer Industry Ltd., Anand.
10. Bharat Pulverising Mills Private Ltd., Bhavnagar.
11. Chembur Bone & Fertllizer, Bhavnagar.
12. Chemfert Traders, Baroda.
13. Deccan Sales Corporation (Pvt)., Ltd., Rajkot.
14. C. Dhanvantrai & Co., Anand.
15. Dilip Kumar & Co., Bhuj.
16. Feeds & Fertilizers, Mehmedabad.
17. Gujarat Fertilizer, Bhavnagar, Rajkot and Baroda.
18. Granulated Fertilizers, Bhavnagar.
19. Halar Fertilizers, Rajkot.
20. Hind Fertillzer, Bhavnagar and Kusumba.
21. Hirji Vithal, Hatrad.
22. International Trading Agency, Bhavnagar.
23. Jagjivan Haribhai Patel, Moti-Paneli.
24. Kaira Dist. Fertilizer Merchants Association, Nadiad.
25. Kalidas Shamaldas, Nadiad.
26. Krishna Fertilizers, Jam-Jodhpur.

(a) Private Manufacturers-(Contd.)

27. Laxmi Trading Corporation Ltd., Bajwa (Baroda).
28. Laxmi Sales Corporation, Bhavnagar.
29. Mohanlal Khimji Bhai & Sons, Amreli.
30. E.I.D.-Parry Ltd., Baroda.
31. V. Parshuram & Co., Borsad.
32. Rallis India Ltd., Bhavnagar.
33. Anil B. Thakker, Surat.
34. Urvakunj By-Products, Dharmaj.

Kerala

1. Bhawani Oils & Fertilizers, Cochin.
2. Chamundi Fertilizers, Cochin.
3 B.N. Elias & Co., (P) Ltd., Cochin.
4. Fertilizers and Chemicals, Travancore Ltd., Alwaye.
5. Kerala Chemicals & Fertllizers, Calicut.
6. Mysore Fertilizer Co., Palghat.
7. E.I.D. Parry Ltd., Kottayam.
8. Pierce Leslie & Co., Ltd., Cochin.
9. Rallis India Ltd., Cochin.
10. Scientific Fertilizes Co., Kottayam.
11. Scientific Fertilizer Co., Ltd., Cochin.
12. Shaw Wallace & Co., Ltd., Cochin.
13. South India Chemicals & Fertilizers Ltd., Kottayam.
14. T. Stanes & Co., Ltd., Ettumanoor.

Madhya Pradesh

1. Dharamsi Morarji Chemical Co., Ltd., Raipur.
2. Gondwana Chemicals, Raigarh.
3. The Jyati Agency, Sendhwa.
4. The Kaushal Chemical Corporation, Katni.
5. The Narbada Fertilizers & Chemicals Industries, Ghaspara Khandwa.
6. The Narbada Fertilizer & Chemical Industry, Bhopal.
7. The Vyas & Brothers, Petlavad.

(a) Private Manufacturers-(Contd.)

Madras

1. Thiru M. M. Abdul Gaffoor Sahib, Pernampet.
2. Agnor Effort, Srivil iputhur.
3. Agricultural Trading Corporation, Coimbatore.
4. Sri V. N. P. R. Aiyasami Nadar & Sons, Tuticorin.
5. Anandha Krishnan, Palani.
6. Amaratvathi Fertilizer Co., Karur.
7. Anil Fertilizer and Allied Products, Madurai.
8. A. P. V. & Sons, Madurai.
9. Arasan Fertilizers (Pvt.), Ltd , Tirunelveli.
10. Associated Pharmaceutical Industries, Madras.
11. Babji Sahib & Co., Panruti.
12. Blue Mountain Estates & Industries Ltd., Madras.
13. A. Bose & Co., Madras.
14. Chemicals & Fertilizers (Pvt.), Ltd., Mettupalayam.
15. C. T. Chidambaram Nagarathnam (Balmurugon Fertilizers), Salem.
16. Coimbatore Chemicals & Fertilizers Ltd., Coimbatore.
17. Coimbatore Fertilizer, Coimbatore.
18. Coimbatore Pioneer Fertilizers Ltd., Coimbatore.
19. Deccan Fertilizers Co., Coimbatore.
20. V. V. Dhanuskodi Nadar & Sons, Tuticorin.
21. M. Edison & Co., Tuticorin.
22. E. I D. Parry Ltd., Madras.
23. B. N. Elias, Coimbatore.
24. The Fertilizers & Chemicals, Travancore Ltd., Ramnagar, Coimbatore.
25. Gee Industries & Insecticides (India) Ltd., Madras.
26. Govindarajulu, Kallakurichi.
27. Sri D Hariharan, Tirunelveli.
28. Hindustan Fertilizers and Bone Mills, Madras.
29. Hussain Baig, Coimbatore.
30. Imperial Fertilizers Co., Madras.

(a) Private Manufacturers-(Contd.)

31. Indian Commercial Syndicate, Coimbatore.
32. A. M. S. Jamal, Udumalpet.
33. Jaya Bharath Fertilizers, Coimbatore.
34. A. Jayarama Reddiar, Thiruvanamalai.
35. P. K. Jaypee & Co., Madras.
36. T. Kaliappa Chettiar, Coimbatore.
37. Kamadhenu Fertilizers, Tiruppur.
38. Kanniappan & Co., Udumalpet.
39. Karur Fertilizers Co., Karur.
40. Krishna Trading (Fertilizer) Co., Tirunelveli.
41. Kumar Manure Mixing Works, Cuddalore, O. T.
42. Mahalakshmi Trading Co., Madras.
43. Mettur Fertilizer Co., Coimbatore.
44. A. K. Murthy & Co., Udumalpet.
45. Murugan Manure Works, Palayapettai.
46. Mysore Fertilizer Co., Madras.
47. The Mysore Scientific Fertilizer Co., Salem.
48. New Premier Chemical Industries Ltd., Madras.
49. Nilgiri Fertilizers Ltd., Coonoor.
50. Nilgiris Gowder Corporation Ltd., Coonoor.
51. O. K. Oil Industries, Tindivanam.
52. K. Pachiappan, Kamaresanpet.
53. Panrutti Fertilizers, Panrutti.
54. Palladam Fertilizer Co., Palladam.
55. Pandiyan Fertilizer Co., Madurai.
56. Parambikkulam Fertilizers, Pollachi.
57. Sri R. Parasmal Jain, Poonamallee.
58. Peninsular Bone Mills, Madras.
59. Pierce Leslie & Co., Ltd., Coimbatore.
60. Peveke Scientific Fertilizers, Salem.
61. Premier Fertilizers, Coimbatore.

(a) Private Manufacturers-(Contd.)

62. Premier Fertilizers Ltd., Madras.
63. Sri V. D. Radhakrishnan, Tanjavore.
64. Rajam Trading Fertilizers, Tirunelveli.
65. R. T. Rajan Bros., Virudhunagar.
66. Rallis India Ltd., Madras.
67. C. R. Ranganathan, Udumalpet.
68. Ramlingam & Sons, Cuddalore.
69. A. Ramasamy, Tuticorin.
70. Rengaswamy Mudaliar Sons, Karamadai.
71. Sakthi Sugar Mills Ltd., Coimbatore.
72. Scientific Fertilizer Co., (P) Ltd., Madras.
73. Selvan Industries, Arupukottai.
74. Shah Gulam Dastagir, Pollachi.
75. Thiru Shanmuga Manure Mixing Firm, Pollachi.
76. Shaw Wallace & Co., Madras.
77. Sivam & Co., Tiruvarur.
78. Sivasakthi Fertilizers Co., Coimbatore.
79. Soundararajan & Co., Madras.
80. South India Steel & Sugars Ltd., Madras.
81. T. Stanes & Co., Coimbatore.
82. S. G. R. Subramaniam Melacheval, Tirunelveli.
83. S. R. Swamy & Sons, Erode.
84. Suriya Fertilizers, Madras.
85. The Tamilnadu Fertilizers, Coimbatore.
86. S. V. M. R. Thiravinantha Nadar & Sons, Virudhunagar.
87. Thiruppur Fertilizer Corporation, Thiruppur.
88. Trichy Fertilizers, Trichy.
89. Truthful Fertilizers, Thiruppur.
90. V. Vairavava Thevar, Peravurni.
91. Venkatachalapati Manure Mixing Works; Akhanur P. O. Rasipuram.
92. V. Venugopal Pillai & Co., Madras.

(a) Private Manufacturers-(Contd.)

93. R. Vidyasaliar, Tiruchendur.

94. Yercaud Coffee Curing Works Ltd., Kannankurichi.

Maharashtra

1. Agro Allied Fertilizers (Pvt.), Ltd., Bombay.
2. Agro Chemin Corporation, Bombay-1.
3. Agro Feeders, Bombay-1.
4. Agri-India Fertilizers, Bombay.
5. Asian Commercial Co., Bombay.
6. Asha Sales Corporation, Bombay-1.
7. Ambica Fertilizers, Nanded.
8. Aurangabad Chemical Industries, Poona.
9. Bharat Fertilizer Industries (Pvt.), Ltd., Bombay.
10. Bharat Pulversing Mills (Pvt.), Ltd., Bombay.
11. Chamundi Fertilizers, Bombay.
12. K. C. Chedda & Co., Bombay-1.
13. Chembur Bone & Fertilizer Co., (Pvt.), Ltd., Bombay.
14. Chemfert Traders, Bombay.
15. Chitale Foods & Fertilizers & Allied Products Ltd., Chitalenagar.
16. Dayal Fertilizers, Bombay.
17. Deccan Sales Corporation (Pvt.), Ltd., Bombay.
18. C. Dhanvantrai & Co., Ltd., Bombay.
19. Dharamsi Morarji Chemical Co., Ltd., Bombay.
20. Farmers Fertilizers Co., Kalyan.
21. Feeds & Fertilizers, Nanded.
22. Fertilizers & Manures Corporation, Poona.
23. India Fertilizers Industries, Bombay.
24. R. K. Industries, Poona.
25. International Trading Agencies, Bombay.
26. Jamnadas Adukia, Bombay.
27. Jaysingpur Oil Mills, Jayasingpur.

(a) Private Manufacturers-(Contd.)

28. Kachardas Nansukh, Junnar.
29. Kamdhenu Industries, Poona.
30. Kolhapur Sugar Mills Ltd., Kolhapur.
31. Konkan Insecticides & Fertilizers, Panval.
32. Kora Gramodyog Kendra, Bombay.
33. Laxmi Sales Corporation, Bombay.
34. Laxmi Trading Corporation, Latur.
35. Leela H. Jain, Thana.
36. Mahavir Bhupal Desai, Kolhapur.
37. Marsons Fertilizers & Pesticides, Poona-2.
38. Mulchand M. Choksey & Co., Bombay.
39. Manmal Hirachand Kothari, Poona.
40. Y. G. Pangavane, Lasalgaon,
41. Paras Fertilizers & Co., Vijapur.
42. Parek Modi & Co., Poona.
43. Parry & Co., Ltd., Bombay.
44. V. Parshuram & Co., Bombay.
45. Poornima Agricultural & Industrial Corporation, Kolhapur.
46. Prakash Vegetable Oil Products, Wardha.
47. Rajesh Chemical & Fertilizer Works, Bombay.
48. Rallis India Ltd., Bombay.
49. M. K. Raval Oil Mills & Ginning Factory, Pachera.
50. Sedruddin M. Somaji Pen.
51. Shah Moteejee Meghajee, Poona.
52. V. R. Shah, Phaltan.
53. Shamsundar Maniyar & Co., Moram.
54. Shaw Wallace & Co., Ltd., Poona.
55. B. S. Shete, Akluj.
56. Sunrise Manures & Chemicals, Poona.
57. Talokdar Chemical & Fertilizers, Bombay-1.
58. H. M. Waghare, Satara.

(a) Private Manufacturers-(Contd.)

59. West India Chemical Co., Ltd., Kharadi, Mundhva.
60. Western Chemical Industries, Bombay.
61. Yawalkar Insecticides & Chemicals, Nagpur.

Mysore

1. Abdul Rahiman, M. Kittur, Karwar.
2. Agrochemicals & Fertilizers, Bangalore.
3. Ashoka Chemicals & Fertilizers, Bangalore.
4. Associated Chemicals & Fertilizers, Bangalore.
5. Bala Fertilizers & Chemicals, Hospet.
6. Balaji Fertilizers, Bangalore.
7. Bangalore Industries & Agencies, Bangalore.
8. B. Basalingappa & Sons, Kamadhenu Fertilizers, Devanagere.
9. Bharat Chemicals & Fertilizers, Makali.
10. Blue Mountain Estates & Industries Ltd., Bangalore.
11. Bongala Namadev, Harihara.
12. C. Bore Gowda, Mandya Fertilizers, Mandya.
13. G. R. Balannarar, Karnatak Fertilizers Co., Hubli.
14. H. Basavalingappa, Davanagere.
15. K. Bakkaiah, Davanagere.
16. S. B. Kailwad, Bailhongal.
17. Sree Beeralingeswara Mixture Works, Devanagere.
18. Bharath Kantilal Parikh, Bangalore.
19. B. S. Channabasappa & Sons, Devanagere.
20. Chamundi Agencies, Navelihal.
21. Chamundi Chemicals & Fertilizers Ltd., Munirabad.
22. Commercial Sales Corporation, Kolhapur and Akol.
23. The Coorg & Mysore Coffee Co., Mysore.
24. K. Channabasappa Sons, Devanagere.
25. B. J. Desai & Sons, Belgaum.
26. Deccan Sales Corporation Ltd., Tamumotry.

(a) Private Manufacturers-(Contd.)

27. B. N. Elias & Co., (P) Ltd., Mysore.
28. Farm Fertilizers, Chickmagalur.
29. Feeds & Fertilizers, Bangalore.
30. Fertilizers and Chemicals, Travancore Ltd., Bangalore.
31. Fortune Fertilizers, Bangalore.
32. Gadag Industries Syndicate, Gadag.
33. Geetha Fertilizer Co., Tumkur.
34. Gowri Fertilizer, Bangalore.
35. P. G. Gupta and B. N. Channagoudar, Ranibennur.
36. B. P. Hanumantha Gowda, Budihal.
37. Halli Mahadevappa, Syabanur.
38. H. D. Hanumanthappa, Kakkaragolla.
39. Hindustan Agricultural Implements, Devanagere.
40. Hindustan Fertilizers & Bone Mills (P) Ltd., Mysore.
41. K. Huchappa, Chikkabudihal.
42. International Chemical Co., Hubli.
43. Iyyanahalli Gurusangappa, Devangere.
44. Jai Bharat Fertilizers & Chemical Industries, Gulbarga.
45. Jayalakshmi Enterprises, Bangalore.
46. Jay Shree Agencies, Bangalore.
47. S. I. Jayashankar, Devanagere.
48. S. R. Jadhav, Belgaum.
49. S. S. Jayanna, Devanagere.
50. B. Kulkarni, Nidagundi.
51. G. G. Kalyani, Prop., Kalyani Oil Mills, Hole, Alur.
52. K. R. Kannan, Bangalore.
53. Kanaka Fertilizer Co., Belgaum.
54. Karnataka Fertilizers, Bangalore.
55. Karnatak Agricultural Products, Bijapur.
56. Kisan Chemicals & Fertilizers, Rajendraganj.
57. Kota Srinivasa Murthy & Sons, Bangalore.

(a) Private Manufacturers-(Contd.)

58. Kothari Coffee Curing Works, Hassan.

59. P. H. Krishnamurthy, Fair Price & Manure Dealers, Koratagere.

60. Sree Kottureswara Fertilizers, Shikaripur.

61. S. T. Katti, Mudhol.

62. Sree Lakshmi Fertilizer Co., Belgaum.

63. Lakshmi Venkateswara Traders, Bangalore.

64. Sri Lingeswara Industries & Co., Davangere.

65. V. Lingappa J. Basararajappa, Hospet.

66. A. M. Mukuthianatha Swamy Gurukula Traders, Hospet.

67. Mahesh Farm Aids, Bellary.

68. Mallikarjuna Mixture Works, Shyagale.

69. Manchal Narayanappa Krishnamurthy, Raichur.

70. Manjunnatha Chemicals & Fertilizers, Bangalore.

71. M. Mallappa, Syagale.

72. Marulasiddeshwara Mixture Works, Sirigere.

73. M. Mudegowadappa, Davangere.

74. M. S. F. & Industries (Pvt.), Ltd., Kolar.

75. Mysore Estates Supply Agencies, Yadavagiri.

76. The Mysore Chemicals & Fertilizers, Mysore.

77. The Mysore Coffee Curing Works, Chickmagalur.

78. The Mysore Fertilizer Co., Bangalore.

79. A. R. Naryanan, Sagar Chemicals & Fertilizers, Sagar.

80. Sree Neelakanteshwara Trading Co., Gangavathy.

81. B. Ningappa, Devarabelekere.

82. K. Nagarajan, B. Sc., Ananda Bhavan, Santhepet, Chitradurga.

83. Nitro-mix (Pvt.), Ltd., Bangalore.

84. The New Premier Chemical Industries, Yadavagiri.

85. D. M. Onkarappa, Shivaparavathi Mixture Works, Tholaunse.

86. A. B. Patil, Kagwad.

87. E. I. D. Parry Ltd., Bangalore.

88. N. C. Patil, B. Sc. (Agri.), Anaji.

(a) Private Manufacturers-(Contd.)

89. Pierce Leslie & Co., Ltd., Mangalore,
90. Prakash & Co., Bangalore.
91. Prakash Cottage Industries, Basavanagudi.
92. Prakash Fertilizers, Siruguppa.
93. Premier Fertilizer Ltd., Bangalore.
94. Sri Padma Metul Industries, Davanagere.
95. T. A. Patil, Halaga.
96. Pestop (Pvt.), Ltd., Bangalore.
97. B. Ramaiah, Begur.
98. C. P. Rudrappa, Davanagere.
99. M. C. Ramaswamy, B. Sc., The Mysore Bone-meals & Fertilizers, Mysore.
100. Radhakrishna Industries, Bellary.
101. Rajanahalli Industries Enterprises, Devanagere,
102. Rallis India Ltd., Bangalore.
103. Ramachandra Pulverisers & Industries, Bangalore.
104. S. V. Rangaswamy & Co., Pvt., Ltd., Bangalore.
105. Renuka Fertilizers, Chikkaballapur.
106. Salar Jung Sugar Mills Ltd., Munirabad.
107. A. M. Shaik Gulam Dastagir, Bangalore.
108. C. V. Srinivas, Chickoallapur.
109. G. N. Sumathi Kumar, Bharathi Traders, Mysore.
110. H. K. Shatter, Masus Village.
111. K. G. Shivanandappa, Merchant, Shikaripur.
112. N. Sidaramanna, Tyavangi.
113. Sha Auraj, Vijaya Trading Company, Ranibennur.
114. Shaw Wallace & Co., Ltd., Bangalore.
115. Shamanur Kalleshappa, Davanagere.
116. Shamanur Shivashankarappa, Merchant, Davanagere.
117. Shanker Shet Oil Mills, Chandargi.
118. Shivakumar Mixture Works, Kenchenahalli.
119. Siva Mixture Works, Sirigere.

(a) Private Manufacturers-(Contd.)

120. S. K. Sekharappa, Prabhakata Manure Mixture Works, Gopanal.
121. S. N. G. Sirigeri, Merchant, Gangavathi.
122 Sree Siddalingeswara & Co., Honnali.
123. Srinivasa Chemicals & Fertilizers, Davanagere.
124. Sri Sangumeswara & Co., Davanagere.
125. Sri Srinivasa Chemicals & Fertilizers, Bangalore.
126. S. Siddaramanna & Sons., Merchants & Commission Agents, Hiriyur,
127. Sundatta Foods & Fibres Ltd., Hubli.
128. The Scientific Fertilizer Co., (Pvt.), Ltd., Mysore.
129. The Shankar Fertilizers & Chemicals Co. (Pvt.), Ltd., Hole-Alur.
130. T. Shanumukhaia, Davanagere.
131. T. Stanes & Co., Mysore & Mangalore.
132. T. V. Sundaresan, Ramakrishna & Co., Bangalore.
133. S. P. Syed Salar, Chikhabalapur.
134. Sree Suryanarayana & Co., Kampli.
135. Thippanna, Kotavagere.
136. K. Thippanna, Davanagere.
137. Thipperudrappa, Santhebennur.
138. Tungabhadra Chemicals & Fertilizers, Bellary.
139. Tungabhadra Sugar Works (Pvt.), Ltd., Shimoga.
140. The United Enterprises, Bangalore.
141. B. K. Veerabhadrappa, Taralabalu Mixture Co., Basavapura.
142. G. A. Veerendra Kumar, Tumkur.
143. K. G. Virupakshappa, Dhulehole.
144. M. Veerbardrappa, Shimoga.
145. Shri Vijayalakshmi Traders, Bangalore.
146. Sree Veerabhadreswara Krupa, Prop., K. G. Kotrappa & Sons, Syabanur.
147. Sree Veerabhadreswara Mixture Works, Bethur.
148. Sree Veerabhadreswara Swamy & Co., Davanagere.
149. S. N. Venkatappa, Bangalore.
150. Sree Venkateswar Company, Vadagiri.

(a) Private Manufacturers-(Contd.)

151. Venkateshwara Fertilizers, Bangalore.
152. S. R. Veerappa, Davanagere.
153. Vani Vilas & Co., Davanagere.
154. Vijaya Fertilizer Co., Hubli.
155. Vijayalaxmi Fertilizers, Bangalore.
156. Vinayaka Traders & Fertilizers, Bangalore.
157. Virupakashagond, Unchangidurga.
158. Yajaman Mixture Works, Davanagere.

Orissa

1. Jaypore Sugar Co., Managing Agents: Krishna Industrial Corporation, Rayagada, Koraput.

Pondicherry

1. P. V. R. Chandran, Pondicherry.
2. Jothi Trading Corporation, Pondicherry.
3. Royal Trading Corporation, Pondicherry.
4. V. Sundararaman & Co., Villianur.

Rajasthan

1. Shri Lachmandas Agarwal, Sri Ganganagar.
2. Oriental Fertilizers & Chemicals Ltd., Sri Ganganagar.
3. The Rajasthan Sales Corporation, Jaipur.
4. Rallis India Ltd., Sri Ganganagar.

*Uttar Pradesh**

1. Govind & Co., Kanpur.
2. Hindustan Bone Mills (Pvt.) Ltd., Moradabad.
3 Khatauli Manure Mills, Khatauli.
4. New Central Jute Mills Co., Ltd., Varanasi.
5. J. K. Oil Mills Co., Ltd., Cooperaganj, Kanpur.

* Besides these private agencies, 24 Co-operative Unions and 37 Agriculture Stores are engaged in preparing mixtures of fertilizers.

(a) Private Manufacturers-(Contd.)

6. Omrao Industrial Corporation (Pvt.) Ltd., Kanpur.
7. Rallis India Ltd., Kanpur.
8. Shaw Wallace & Co., Ltd., Kanpur.
9. Universal Traders, Kanpur.
10. Upper India Bone Mills, Hapur.

West Bengal

1. Assam Bengal Fertilizers Syndicate, Calcutta.
2. Bhagirathi Fertilizers Distributors, Calcutta.
3. Bhagirathi Fertilizers Co., Calcutta.
4. R. N. Chatterjee & Co., Calcutta.
5. Damodar Fertilizer, Calcutta.
6. Dewan Brothers, Calcutta.
7. Dibakar Das & Bros., Sanithia.
8. Dum Dum Fertilizers, Calcutta.
9. B. N. Elias & Co., (Pvt.) Ltd., Calcutta.
10. Fertilizers Corporation of India Ltd., Calcutta.
11. Giridharilal Shankarlal, Calcutta.
12. Jardine Henderson Ltd., Calcutta.
13. Jay Shree Chemicals & Fertilizers, Calcutta.
14. Kailash Ch. Paul & Sons (Pvt.) Ltd., Calcutta.
15. Khaitan Sons & Co., (Manure) Pvt. Ltd., Calcutta.
16. Kashinath Paul, Debra.
17. Kashiram Ramkhelwan, Coochbehar.
18. T. N. Kundu & Son, Purunlia.
19. Macneill & Barry Ltd., Calcutta.
20. Manna, Mullick & Co., Calcutta.
21. R. C. Mitter & Sons, Calcutta.
22. Nandy Dey (Private) Ltd., Calcutta.
23. National Supply Agency, Calcutta.
24. Pallishree (Pvt.,) Ltd. Calcutta.

(a) Private Manufacturers-(Concluded)

25. B. C. Paul & Co., Calcutta.
26. Phosphate Co., Ltd., Calcutta.
27. Rallis India Ltd., Calcutta.
28. K. P. Saha, Dhaniakhali.
29. Shalimar Fertilizers Industries, Calcutta.
30. Shaw Wallace & Co., Ltd., Calcutta.
31. Suresh Chandra Nag & Sons, Berhampore.
32. Surendranath Nundry (Pvt.) Ltd., Calcutta.
33. A. Talukdar & Co., (Fertilizers) Pvt., Ltd., Calcutta.
34. Universal Fertilizer Co., Private Ltd., Calcutta.
35. Urban Fertilizers Distributors, Calcutta.
36. Western Fertilizers Syndicate, Howrah.
37. West Bengal State Warehousing Corporation, Calcutta.

Delhi

1. D. C. M. Chemical Works, Delhi.
2. Rallis India Ltd., Delhi.

Note: In Jammu & Kashmir, Punjab, Himachal Pradesh, Manipur, Nagaland, Andamans and Tripura, there are no private dealers who manufacture mixed fertilizers.

(b) Co-operative Manufacturers

Andhra Pradesh

1. The East Godavari Co-operative Marketing Society Ltd., Kakinada.
2. The Krishna District Co-operative Marketing Society, Vijayawada.
3. The West Godavari District Co-operative Marketing Federation Ltd., Eluru.
4. Ongole Tobacco Processing and Marketing Co-operative Society, Ongole.

Assam

1. Assam Agro-Industries Development Corporation Ltd., Ulubari, Gauhati.

Bihar

1. The Bihar State Co-operative Marketing Union Ltd., Patna.

Gujarat

1. Amreli District Co-operative Sangh, Amreli.
2. Anavada Co-operative Society, Patna.
3. Banskantha District Co-operative Purchase and Sales Society, Palanpur.
4. The Baroda District Co-operative Purchase and Sale Union Ltd., Baroda.
5. Baroda District Tobacco Manufacturer Khedut Co-operative Sangh, Baroda.
6. Bhavnagar Juth Co-operative Society, Bhavnagar.
7. Bhavnagar Zilla Sakahari Kharedi Vechan Sangh Ltd., Bhavnagar.
8. Chotila Taluka Co-operative Sangh Ltd., Chotila.
9. Damnagar Taluka Sahakari Kharid Vechan Sangh, Damnagar.
10. Derdi Juth Co-operative Society Ltd., Derdi.
11. Dholka Gunipur Khatar Utpadak Co-operative Manufacturers, Dholka.
12. Dhoraji Taluka Sahakari Kharedi Vechan Sangh, Dhoraji, Distt. Rajkot.
13. Gariyadhar Taluka Co-operative Sales & Purchase Sangh Ltd., Gariyadhar.
14. Gondal Juth Vividh Karyakari Sahakari Mandali, Gondal.
15. Gondal Kotda Co-operative Society Ltd., Gondal.
16. Gujarat Rajya Sahakari Marketing Society, Ahmedabad.
17. Gujarat State Co-operative Fruit Vegetable Federation Ltd., Bardoli.
18. Haldar Group Vividh Karyakari Sahakari Mandali Ltd., Haldar.
19. Jam-Jodhpur Taluka Co-operative Sales & Purchase, Jam-Jodhpur.

(b) Co-operative Manufacturers-(Contd.)

20. Jamnagar Taluka Co-operative, Purchase & Sales Union, Ltd., Jamnagar.
21. Kaira District Co-operative Fruit and Vegetable Growers' Association, Nadiad.
22. Kaira District Co-operative Purchase and Sale Sangh, Nadiad.
23. Kandala Taluka Co-operative Sales and Purchase Society, Savarkandala.
24. Kolki Juth Co-operative Society, Kolki.
25. Kotada Sanghni - Sahakari Kharedi Vechan Sangh, Kotada-Sanghani.
26. Lalpur Seva Sahakari Mandli Ltd., Lalpur, Dist. Jamnagar.
27. Manavadar Bantva Taluka Sales and Purchase Society, Manavadar.
28. Morvi Malia Co-operative Sales Sangh, Morvi.
29. Morvi Taluka Co-operative Sales Sangh Ltd., Morvi.
30. Moti Panel Group Multipurpose Co-operative Society Ltd., Moti Paneli.
31. Moti-Marad Group Multi-purpose Co-operative Society, Ltd , Moti-Marad.
32. Movia Juth Vechan Kharedi Sahakari Mandali Ltd., Movia.
33. Nahiyar Vechan Kharedi Sahakari Mandali, Nahiyar, Taluka Anand.
34. Nawali Sahakari Mandli Ltd., Nawali.
35. Padhadari Mahal Sahakar Kharedi Vechan Sangh, Padhadari.
36. Potatoes Grower Co-operative Fertilizers Ltd., Ahmedabad.
37. Rajkot, Pardhari Lodhika, Co-op. Sales and Purchase Society, Rajkot.
38. Rajkot Zilla Sahakari Kharedi Vechan Sangh, Rajkot.
39. Ruparel Co-operative Bhandar, Aliwada.
40. Upleta Taluka Sahakari Kharedi Vechan Sangh, Upleta.
41. Valiar Taluka Sahakari Kharedi Vechan Sangh Ltd., Valiar.

Kerala

1. The Kuttanad Agricultural Co-operative Society Ltd., Alleppy.
2. Munnam Sugar Mills Co-operative Society Ltd,, Pandalam.

Madhya Pradesh

1. Madhya Pradesh State Co-operative Marketing Society Ltd., Jabalpur.

(b) Co-operative Manufacturers-(Contd.)

Madras

1. Amaravathi Co-operative Sugar Mills, Coimbatore.
2. The Chingleput District Co-operative Supply and Marketing Society, Madras.
3. The Coimbatore District Central Co-operative Supply and Marketing Society, Coimbatore.
4. The Gobichettipalayam Co-operative Marketing Society, Gobichettipalayam.
5. The Madras State Co-operative Supply and Marketing Society, Madras.
6. The Madurai District Co-operative Supply and Marketing Society, Madurai.
7. The Madurantakam Co-operative Sugar Mills, Padalam.
8. The Melur Co-operative Marketing Society Ltd., Melur.
9. The Mettupalayam Co-operative Marketing Soeiety, Mettupalayam.
10. The Nilgiris District Co-operative Supply and Marketing Society, Ooty.
11. The Nilgiris Potato Growers Co-operative Marketing Society Ltd., Ootacamand.
12. The North Arcot District Co-operative Sugar Mills, Ambur.
13. The North Arcot District Co-operative Supply and Marketing Society, Vellore.
14. The Perundurai Co-operative Merketing Society Ltd., Perundurai
15. Pollachi Co-operative Marketing Society Ltd., Pollachi.
16. The Ramnad Dist. Co-operative Supply Marketing Society Ltd., Madurai.
17. The Saidapet Taluk Co-operative Marketing Society, Madras.
18. The Salem Co-operative Marketing Society, Salem.
19. The Salem Co-operative Sugar Mills, Mohanur.
20. The Salem District Co-operative Supply and Marketing Society, Salem.
21. The South Arcot District Co-operative Supply and Marketing Society, Cuddalore.
22. The Srivilliputhur Uganda Cotton Growers Co-operative Society, Srivilliputhur.
23. The Sulur Co-operative Marketing Society Ltd., Sulur.
24. The Thanjavur Co-operative Marketing Federation, Tiruvarur.

(b) Co-operative Manufacturerers-(Contd.)

25. The Thanjavur Dist. Co-operative Supply and Marketing Society Ltd., Tiruvarur.
26. Thiruchirapalli District Co-operative Marketing Society, Tiruchirapalli.
27. The Tirunelveli Dist. Co-operative Supply and Marketing Society Ltd., Tuticorin.
28. The Tiruppur Co-operative Sale Society, Tiruppur.
29. The Tiruvannamalai Co-operative Marketing Society Ltd., Tiruvannamalai.
30. The Tiruvannainallur Co-operative Rural Bank Ltd., Tiruvennainallur.
31. The Tudiyalur Co-operative Rural Bank, Tudiyalur.
32. The Turaiyur Co-operative Marketing Society, Turaiyur.
33. The Udumalpet Co-operative Marketing Society Ltd., Udumalpet.

Maharashtra

1. Ahmednagar District Co-operative Purchase & Sale Union Ltd., Ahmednagar.
2. Ambegaon Taluka Sahakari Kharedi Vikri Sangh Ltd., Manchar.
3. Bassien Agricultural Multipurpose Society Ltd., Tarkhed.
4. The Bassein Pan Marketing Shakari Society Ltd., Holi.
5. The Bhudargad Taluk Shetkari Sahakari Karedi Vikri Sangh Ltd., Gargoti
6. The Bhusawal Group Cotton Sale Society Ltd., Bhusawal.
7. Canal Bagaitdar Sahakari Sangh Ltd., Ozar.
8. The Chandgad Taluk Shetkari Sahakari Kharedi Vikri Sangh Ltd., Turukwadi.
9. The Chakan Vividh Karyakari Sahakari Society Ltd., Chakan
10. The Chopda Taluka Shetkari Sahakari Kharedi Vikri Sangh Ltd . Chopda.
11. Dhulia Dist. Central Co-operative Purchase & Sale Sangh Ltd., Dhulia.
12. Dhulia Dist. Co-operative Purchase & Sale Society Ltd., Dhulia.
13. Erandal Taluka Co-operative Purchase & Sale Society Ltd., Sahahada.
14. The Gadhinglaj Taluka Kharedi Vikari Sang Ltd., Gadhinglaj
15. Ganapati Jilla Co-operative Kharedi Vikri Society Ltd., Sangli.
16. Godavari Pravara Canal Co-operative Purchase & Sale Union Ltd., Kopergaon.

(b) Co-operative Manufacturers-(Contd.)

17. Hatkalangle Taluka Shetkari Sahakari Kharedi Vikri Sangh Ltd., Vadgaon.

18. The Hol No. 2 Vividha Karyakari Sahakari Society Ltd., Dist. Hol. Poona.

19. Janata Consumers Co-operative Society Ltd., Sangli.

20. Kagal Taluka Sahakari Kharedi Vikri Sangh Ltd., Kolhapur.

21. The Karad Co-operative Purchase & Sale Union Society Ltd., Kardad.

22. The Karvir Taluka Shetkari Sahekari Sangh Ltd., Shahupuri, Kolhapur.

23. Khed Taluka Shetkari Mal Kharedi Vikari Karyakari Society Ltd., Khed.

24. The Kolhapur Co-operative Wholesale Society Ltd., Kolhapur.

25. The Maharashtra Rajya Machimar Sahakari Sanstha Ltd., Bombay.

26. Maharashtra State Co-operative Marketing Society Ltd., Bombay.

27. Malshiras Taluka Societies Co-operative Purchase & Sale Union Ltd., Akluj.

28. Malegaon Asiq Bagayadar Co-operative Credit Association, Malegaon.

29. Man Taluka Sahakari Kharedi Vikri Sangh Ltd., Dahiwadi.

30. The Nanded Dist. Sahakari Kharedi Vikri Sangh Ltd., Nanded.

31. The Nosik Dist. Co-operative Purchase & Sale Union Ltd., Nasik.

32. Nasik District Potato & Onion Growers Co-operative Association Ltd., Nasik.

33. Nira Canal Societies Co-operative Purchase & Sale Union Ltd., Baramati.

34. The Paisa Fund Shetkari Bank Ltd., Hupri.

35. The Panhala Bavda Shetkari Sahakari Sangah Ltd., Panhala.

36. The Parner Taluka Sahakari Purchase & Sale Society Ltd., Parner.

37. The Phalton Taluka Co-operative Purchase & Sale Union Ltd., Phalton.

38. The Poona District Co-operative Purchase & Sale Union Ltd., Poona.

39. The Radhanagari Taluqa Shetkari Sahakari Sangh Ltd., Radhanagari.

40. The Rahuri Taluka Sahakari Kharedi Vikri Sangh Ltd., Rahuri.

41. The Rayat Seva Shetupyogi Mal Utpadak Mandli Ltd.. Shahupuri.

42. The Saddli Khalsa Vividh Karyakari Sahakari Society Ltd., Sadoli.

43. The Sangamner Shetkari Sahakari Sangh Ltd., Sangamner.

(b) Co-operative Manufacturers-(Contd.)

44. The Satara Jilla Sahakari Kharedi Vikari Sangh Ltd., Satra.
45. The Sahakari Agro-Industrial Society Ltd., Kolhapur.
46. The Shahada Taluka Co-operative Purchase Sale Union Ltd., Shahada.
47. The Shahuwadi Taluka Shetakari Kharedi Vikri Sangh Ltd., Malkapur.
48. Shetkari Sahakari Sangh Ltd., Bhadgaon.
49. Shetkari Sahakari Sangh Ltd., Chalisgaon.
50. Shetkari Sahakari Sangh Ltd., Kolhapur.
51. Shetkari Sahakari Sangh Ltd., Malegaon.
52. Shetkari Sahakari Sangh Ltd., Pachora.
53. The Shirol Taluka Sahakari Kharedi Vikri Sangh Ltd., Jayasingpur.
54. The Shrirampur Taluka Co-operative Purchase & Sale Union Ltd., Srirampur.
55. Shriram Vivid Karyakari Sahakari (Vikas) Seva Society Ltd., Kasaba Bawada.
56. The Solankur Shri Vithal Gram Vividh Karyakari Sahakari Society Ltd., Solankur.
57. Sugarcane Producers Vividh Karyakari Sahakari Society Ltd., Malinagar.
58. Taluka Development Board, Koperagaon.
59. The Varang Valley Co-operative Purchase & Sale Union Ltd., Islampur.
60. Vidharbha Co-operative Marketing Society Ltd., Nagpur.
61. The Yawal Taluka Co-operative Purchase, Sale & Ginning Pressing Society Ltd., Yawal.

Mysore

1. Agriculturists Industrial & Commercial Co-operative Society Ltd., Davanagere.
2. The Bangalore Grape Growers Marketing & Processing Co-operative Society Ltd., Bangalore.
3. Belgaum District Co-operative Manure Production & Supply Society Ltd., Belgaum.
4. Bellary Central Co-operative Store Ltd., Bellary.
5. Bidar Taluk Agricultural Produce Co-operative Marketing Society Ltd., Bidar.
6. Chickodi Taluk Agricultural Produce Co-operative Marketing Society Ltd., Nippani.

(b) Co-operative Manufacturers-(Contd.)

7. Chickmagalur Taluk Agricultural Produce Co-operative Marketing Society Ltd., Chickmagalur.

8. Chitradurg District Harijan Arthikabhivridhi Co-operative Society Ltd., Chitradurg.

9. Coorg Provincial Co-operative Marketing Federation Ltd., Virajpet Coorg.

10. Davanagere Taluk Agricultural Produce Co-operative Marketing Society Ltd., Davanagere.

11. Gadag Co-operative Cotton Sale Society Ltd., Gadag.

12. Hagari Bommanahalli Agricultural Produce, Co-operative Marketing Society Ltd., Hagaribommanhalli.

13. Hangal Taluk Agricultural Produce Co-operative Marketing Society Ltd., Akki-Alur.

14. Haveri Taluk Agricultural Produce Co-operative Marketing Society Ltd., Haveri.

15. Hiranyakeshi Sakkare Karkhanna Niyamit, Sankeshwar.

16. Hirekerur Taluk Agricultural Produce Co-operative Marketing Society Ltd., Hirekerur.

17. Hosakote Taluk Agricultural Produce Co-operative Marketing Society Ltd., Hosakote.

18. Hubli Co-operative Cotton Sale Society Ltd., Hubli.

19. Kampli Agricultural Produce Co-operative Marketing Society Ltd., Kampli.

20. Koppal Taluk Agricultural Produce Co-operative Marketing Society Ltd., Koppal.

21. The Large-sized Multipurpose Co-operative Society Ltd., Khanapur.

22. Maddur Taluk Agricultural Produce Co-operative Marketing Society Ltd., Maddur.

23. Mangalore Taluk Agricultural Produce Co-operative Marketing Society Ltd., Mangalore.

*24. Mysore State Co-operative Marketing Society Ltd., Bangalore.

25. The Naregal Agricultural Produce Co-operative Marketing Society Ltd., Naregal.

26. Raibag Taluk Agricultural Produce Co-operative Marketing Society Ltd., Kudehi.

27. Ryots Agricultural Produce Co-operative Marketing Society Ltd., Mandya.

(b) Co-operative Manufacturers-(Concluded)

28. Ryots Produce Marketing & Processing Co-op. Society Ltd., Davanagere.
29. Sankeswar Agriculture Produce Co-operative Marketing Society Ltd., Sankeswar.
30. Shikaripur Agriculturist Large Sized Co-operative Society Ltd., Shikaripur.
31. The Siruguppa Sugarcane Processing Co-operative Society Ltd., Siruguppa.

Orissa

1. Orissa State Co-operative Manufacturing Society Ltd., Bhubaneshwar.

Punjab

1. The Punjab State Co-operative Supply and Marketing Federation Ltd., Chandigarh.

Pondicherry

1. The Karaikal Co-operative Supply and Marketing Society Ltd., Karaikovilpattu, Karaikal.
2. The Pondicherry Co-operative Processing, Supply and Marketing Society Ltd., Pillaithottam, Pondicherry.

West Bengal

1. Burdwan Central Co-operative Agriculturul Production and Marketing Society Ltd., Memari.
2. Burdwan Zonal Co-operative Multipurpose & Marketing Society Ltd., Burdwan.
3. West Bengal Apex Co-operative Agricultural Marketing Society Ltd., Calcutta.

Delhi

1. The Delhi State Co-operative Federation, Delhi.

Note: In Jammu & Kashmir, Rajasthan, Himachal Pradesh, Tripura, Nagaland, Goa and Manipur, there are no co-operatives who manufacture mixed fertilizers.

Source: Fertilizer Statistics, 1967-68.

ADDRESSES OF IMPORTANT FIRMS MANUFACTURING/SUPPLYING AGRICULTURAL IMPLEMENTS AND MACHINES

1. A. D. Wil's Rowat (India) Private Limited, 4, Mahatma Gandhi Road, Post Box No. 375, Bombay-1 (Maharashtra)
2. A. Jeet Trading Corporation, Agricultural Engineers, Ambala Road, Saharanpur (U. P.)
3. A. Kay Industries, Old Railway Road, Jullundur City (Punjab)
4. A. S. B. Precision Too's (Regd.), 10-A, Industrial Area, Ludhiana (Punjab)
5. Addison & Company (Private) Limited, 158, Mount Road, Madras-2 (Madras)
6. Aggarwal Fabrications, 3, Wilson Garden, Poona-3 (Maharashtra)
7. Agricultural Development Society, P. O. Naini, District Allahabad (U. P.)
8. Agricultural Equipment Centre, P-34, Mission Row Extension, Calcutta-1 (West Bengal)
9. Agricultural Implements Company, Sati Mandir Lane, Ranchi (Bihar)
10. Akkala Venkataramaiah & Company, Cottage Industries, 1/6, Main Road, Tenali (S. India) (A. P.)
11. American Spring & Pressing Works, Marve Road, Malad, 64, Bombay (Maharashtra)
12. Amin Chand & Sons, Phillaur (N. Railway), District Jullundur (Punjab)
13. Anantrao Jadhav & Company, Laxmipuri, Kolhapur (Maharashtra)
14. Andhra Iron & Steel Industries, 21/153, Trunk Road, Cuddapah (Andhra Pradesh)
15. Arthur Butler & Co. (Muzaffarpur) Ltd., Muzaffarpur (Bihar)
16. Aswini Kumar Mondal, 146, Belilious Road, Howrah (West Bengal)
17. August Engineering Works, Shivaji Udyamnagar, Kolhapur (Maharashtra)
18. Awtar Industries, Beant Rai Buildings, Gandhi Nagar, Delhi-31
19. Bali & Company, 168, Chandni Chowk, Delhi-6
20. Bankipur Iron Works (Private) Limited, Mithapur, Patna (Bihar)
21. Batala Engineering Company Limited, G. T. Road, Batala (Punjab)
22. Bhagwan Dass & Company, Kashmiri Gate, Delhi-6
23. Bhagwan Singh Namdhari & Sons, 2, Motia Khan, New Delhi-1
24. Bharat Agricultural Industries, 224, Industriel Area, A, Ludhiana (Punjab)
25. Bharat Agricultural & Mechanical Engineering Company, Alamganj, Patna (Bihar)

26. Bharat Industries & Commercial Corporation, 'Tower House' Chowringhee Square, Calcutta-1 (West Bengal)
27. Bharat Iron Works, Bilmora, District Surat (Maharashtra)
28. Bharat Tractor Works, Kotkapura (Punjab)
29. Bird & Company (Private) Limited, 74, Janpath, P. O. Box No. 65, New Delhi-1
30. Borewells, 25-B, Noble Chambers, 3rd Floor, Parsee Bazar Street, Fort, Bombay-1 (Maharashtra)
31. Carl Ohmes & Company (India) (Private) Ltd., 28, Waterloo Street, Calcutta-1 (West Bengal)
32. Central India Engineering Corporation, Mechanical Engineers, Iron & Brass Founders, Hamidia Road, Bhopal (Madhya Pradesh)
33. Central Iron Works, Shivaji Udyamnagar, Kolhapur-1 (Maharashtra)
34. Civil Engineering Company, Arya Samaj Road, Karol Bagh, New Delhi-5
35. Component Manufacturers Corporation (Private) Limited, 9-15, Swinhoe Lane, Calcutta-42 (West Bengal)
36. Cooper Engineering Limited, Satara Road (District Satara) (Maharashtra)
37. Cossul & Company (Private) Limited, Agricultural Engineers, 14/78, The Mall, Kanpur (Uttar Pradesh)
38. Crop Protection Corporation, Niranjan, 6th Floor, 99, Marine Drive, Opposite Marine Lines Station (P. B. No. 10042) Bombay-2 B. R. (Maharashtra)
39. Dandekar Brothers, Engineers, Sangli (S. Rly), Maharashtra
40. Dass Motors (Private) Limited, Pearey Lal Building, Kashmere Gate, Delhi-6
41. Dharam Engineering Company, G. T. Road, Batala (Punjab)
42. Dattatraya Industries (Private) Limited, 148, Kasba Peth, Poona-2 (Maharashtra)
43. Diamond Engineering Works, Shivaji Udyam Nagar, Kolhapur (Maharashtra)
44. District Co-operative Federation Limited, Sardhana Road, Kanker Khera, Meerut Cantt (Uttar Pradesh)
45. Drewet Chowna & Company, 123, Medows Street, Fort, Bombay-1 (Maharashtra)

45a. Eicher Tractors India Limited, New Industrial Township, Faridabad (Haryana)

46. EL SEE TEE Industries, 661, Trichy Road (Opp. Central Studios), P. O. Box No. 864, Singanallur P. O., Coimbatore-5 (Madras)

47. Escorts Limited, 18/4, Mathura Road, Faridabad (Haryana)

48. Friends Own Foundary & Workshop, Millerganj, Gill Road, Ludhiana-3 (Punjab)

49. G. S. Engineering Company, Pathankot Road, V. & P. O. Nurpur, District Jullundur (Punjab)

50. Ganda Singh, Kachahri Road, Ambala City (Punjab)

51. Garlick & Company (Private) Limited, G-4, Nizamudin West, New Delhi-13

52. Ghaziabad Engineering Company (Private) Limited, 42, Janpath, New Delhi

53. Godbole & Sons, New Ramdaspeth, Nagpur-1 (Maharashtra)

54. Goldstein Engineering & Trading Company (Private) Limited Latif Building, Revdi Bazar, Ahmedabad-2 (Gujarat)

55. Good Earth Company, Sunderson Court, 16-A, Ajmeri Gate, Extension, P. Box No. 672, New Delhi

56. Government Agricultural Workshop, Talkatora Road, Lucknow (Uttar Pradesh)

57. Government Central Workshop & Stores, Sadar, Nagpur (Maharashtra)

58. Government Farm Implements Unit, Trichirapalli-1 (Madras)

59. Greaves Cotton & Company Limited, 1, Forbes Street, Bombay-1 (Maharashtra)

60. Hans Engineering Works, Suraj Kund, Meerut City (Uttar Pradesh)

61. Heavy Engineering Corporation Limited, Ranchi-4 (Bihar)

62. Hindsons Patiala (Private) Limited, The Lower Mall, Patiala (Punjab)

63. Hindustan Tractors Limited, Vishwamitri, Baroda-1 (Gujarat)

64. Indian Landsberg Implements Corporation (Private) Limited, New Industrial Township, Faridabad (Haryana)

65. Indo-German Industries, 1, Young Road, Asansol (West Bengal)

66. Industrial Service & Engineers Limited, 57, Shyamaprasad Mukherji Road, Calcutta-26 (West Bengal)

67. International Manufacturing Company, Hospital Road, Jagraon (Ludhiana) Punjab

68. International Tractor Campany of India, Akurli Road, Kandivli East, Bombay-67 (NB) (Maharashtra)

69. Jai Industrial Corporation, 118/25, Kausahpuri, Kanpur (U. P.)

70. Jai Singh Sukhdev Singh, Chandigarh Road, Samrala, District Ludhiana (Punjab)

71. Jyoti Limited, Baroda-3 (Gujarat)

72. K. N. & Sons, No. 1, Virupaksheeswarar Koil Street, Mylapore, Madras-4 (Madras)

73. Kapoor & Company, Faridkot (Punjab)

74. Katariya Products, Doogar Building, Mirza Ismail Road, Jaipur City (Rajasthan)

75. Kirloskar Brothers Limited, Kirloskarvadi, District Sangli (Maharashtra)

76. Kirloskar Electric Company Limited, Bangalore-3 (Mysore)

77. Kirloskar Oil Engines Limited, Elphinstone Road, Kirkee, Poona-3 (Maharashtra)

78. Kirloskar Pneumatic Company Limited, Handapsar Industrial Estate, Poona-1 (Maharashtra)

79. Krishi Engines (Private) Limited, A-7, Unit Industrial Estate, Sanatnagar, Hyderabad (Andhra Pradesh)

80. Krishi Yantra Utpadik Sahkari Samiti Limited, Chowra Rasta, Jaipur (Rajasthan)

81. Krishiseva, Shed No. 25, Plot No. 76, Naroda Industrial Township Post Naroda, District Ahmedabad (Gujarat)

82. Krushi Sadhan Kendra, Mahadev Nagar, Billimora, District Surat (Gujarat)

83. Kumaon Agriculture Horticultural Stores, Railway Road, Kashipur (Nainital)

84. Kumaon Nursery, Ramnagar (Nainital), Uttar Pradesh

85. Kumar Industries, P. O. Edathara, District Palghat (Kerala)

86. Laldee (Private) Limited, Vijay Press Building, Naya Bazar, Delhi

87. Landra Engineering Foundry Works, Phillaur (N. Rly.), District Jullundur (Punjab)

88. Lands-berg India (Private) Limited, New Faridabad (Haryana)

89. Larsen & Toubro Limited, G-4, Nizamudin, New Delhi

90. Light Carts (Private) Limited, Chandar Nagar, P. O. Rithani, Meerut Cantt (U. P.)

91. M. G. Karajgar Engineering Works, 33, Shivaji Udyamnagar, Kolhapur (Maharashtra)

92. Maharashtra Token Yantra, Industrial Area, Market Yard, Karad, District Satara (Maharashtra)

93. Malwa Engineering Company, Court Road, Moga (Punjab)

94. Marshall Sons & Company (India) Limited, Marshall House, Hanuman Road, Post Box 97, New Delhi

95. Menon & Menon, Vikram Nagar, Kolhapur (Maharashtra)

96. Metal Industries, 84/14, Factory Area, Fazalganj, Kanpur (Uttar Pradesh)

97. Mittal Engineering Works, Baghpat Road, P. O. Box 3, Meerut City (Uttar Pradesh)

98. Modern Foundry & Machine Works Limited, Near Railway Station, Post Box No. 5, Ahmednagar (Maharashtra)

99. Mohan Singh Harbhajan Singh Iron Foundry Works, Station Road, Goraya (Punjab)

100. Mount Mechanical Works (Private) Limited, Madras (Madras)

101. Mudhar Allied Traders, Karol Bagh, New Delhi-5

102. Mukond Lal Gaba, Agricultural Fabricators & District Distributor, Subzi Mandi, Karnal (Haryana)

103. Mysore Government Implements Factory, Hassan (Mysore)

104. Nahan Foundry Limited, Nahan (Himachal Pradesh)

105. National Engineering Company, Near Subzi Mandi, Ambala City (Punjab)

106. National Engineering Corporation, Sunami Gate, Sangrur (Punjab)

107. National Manufacturers & Traders, Kaithal (Haryana)

108. New India Equipment Company (Private) Limited, Ajmeri Gate, Delhi

109. New Maharashtra Engineering, Maharashtra Mandal Compound, Tilak Road, Poona (Maharashtra)

110. New United Engineering Works, Shivaji Udyam Nagar, Kolhapur (Maharashtra)

111. New Vijay Industries Limited, Vishrambag, Sangli (Maharashtra)

112. P. S. G. Industrial Institute, Coimbatore-4 (Madras)

113. P. S. T. & Company, 3939, Roshanpura, Egerton Road (Nai Sarak), Post Box 1250, Delhi-6

114. Packo Engineering (Private) Limited, Shivaji Udyam Nagar, Post Box No. 195, Kolhapur-1 (Maharashtra)

115. Panch Udyog (Private) Limited, 56-57 Kahoo Kothi, Kanpur (Uttar Pradesh)

116. Patiala Industries, Sirhindi Gate, Patiala (Punjab)

117. Peepul Iron & Steel Industries Limited, Managing Agents, D. H. Brothers (Private) Limited, La-Touche Road, Kanpur (Uttar Pradesh)

118. Plastic & Precision Machinefabric, 58, Hindu Colony, Dadar, Bombay (Maharashtra)

119. Prakash Cottage Industries, 5, Sri Ramamandiram Road, Basavangudi, Bangalore-4 (Mysore)

120. Punjab Agriculture Syndicate, G. T. Road, Batala (Punjab)

121. Qualitax Machinery (Private) Limited, 11/6-B, Pusa Road, Opp. Telephone Exchange, New Delhi

122. R. Raikhy Enterprises, Raikhy Building, G. T. Road, Ludhiana (Punjab)

123. Raj Engineering Works, (Private) Limited, Station Road, Sitapur (Uttar Pradesh)

124. Rajasthan Agricultural Workshop, Jhotwara, Jaipur (West Rajasthan)

125. Raman's Engineering Works, 15, Teynampet Ramaswamy Mudali Street, Kondithope, Madras-1 (Madras)

126. Roopa Engineering Works, 141, Shivaji Udyam Nagar, Kolhapur-1 (Maharashtra)

127. Rocket Engineering Corporation, 84, Shivaji Udyam Nagar, Kolhapur (Maharashtra)

128. S. B. Arvade & Company, Shivaji Udyam Nagar, Kolhapur-1 (Maharashtra)

129. Sawant Oil Engine Works, 1325/7, Shivaji Udyam Nagar, Kolhapur (Maharashtra)

130. Shankson Agrico, 105, Civil Lines, Bareilly (Uttar Pradesh)

131. Shaw Wallace & Company Limited, 9-A, Cannaught Place, New Delhi

132. Sharda Engineering Works, Fahimabad (Deputy-Ka-Parao), Kanpur (Uttar Pradesh)

133. Shiva Agricultural Polytechnique Manufacturers of Improved Agricultural Implements, Tumkur (Mysore)

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135. Southern Engineering Works, 134, Shivaji Udyam Nagar, Kolhapur (Maharashtra)

136. Standard Agricultural Engineering Company, 825, Industrial Area B, Miller Ganj, Ludhiana (Punjab)

137. Superbuilt Machineries, 4 & 224, Picnic Garden Road, Calcutta-39 (West Bengal)

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139. Surjeet Engineering Works, Kotkapura (Punjab)

140. Swadeshi Krishi Yantra Udyog, 80/71, Kopergaj, Kanpur (Uttar Pradesh)

141. Swastik Engineering & Manufacturing Company (Private) Limited, Bahucharaji Road, Post Box No. 117, Baroda (Gujarat)

142. Swastik Manufacturers Limited, 128, Mahatma Gandhi Road North, Post Box No. 39, Secunderabad (Andhra Pradesh)

143. T. E. Thomson & Company Limited, 9-A, Esplanade East, Post Box No. 193, Calcutta-1 (West Bengal)

144. Tata Iron & Steel Company Limited, 23-B, Netaji Subhas Road, Calcutta-1 (West Bengal)

145. Texland Engineering Manufacturers, Sowripalayam, Coimbatore-4 (Madras)

146. Thakur Dass & Sons, G. T. Road, Khanna, District Ludhiana (Punjab)

147. Tilak Engineering Works, Bharthana (N. R.) (Uttar Pradesh)

148. Tractors & Farm Equipment Limited, Post Box No. 3302 Madras-34 (Madras)

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151. Upadrasta & Sons, Baennet House, 48/50, Forbest Street, Fort, Bombay-1 (Maharashtra)

152. V. G. Deodhar, In front of Commercial Bank, Madhoganj Vidisha, (Madhya Pradesh)

153. V. M. Thevar & Sons, Post Box No. 3, Melur, District Madurai (Madras)

154. Vaidya Industries, 32/1, Karve Road, Poona-4 (Maharashtra)

155. Veegal Engines & Engineering Limited, 31, Chittaranjan Avenue, Calcutta-12 (West Bengal)

156. Vijay Foundary, Pappanaickenpalayam, Coimbatore-13 (Madras)

157. Vishwakarma Engineering Works, Majestic Cinema Road, Moga (Punjab)

158. Voltas Limited, Agro-Industrial Division, 19, Graham Road, Ballard Estate, P. O. Box 900, Bombay (Maharashtra)

159. Waterfield Engineering Corporation, 30, Shivaji Udyamnagar, Kolhapur (Maharashtra)

160. Water Supply Specialists (Private) Limited, Post Box No. 684, 8, Hamam Street, Bombay-1 (Maharashtra)

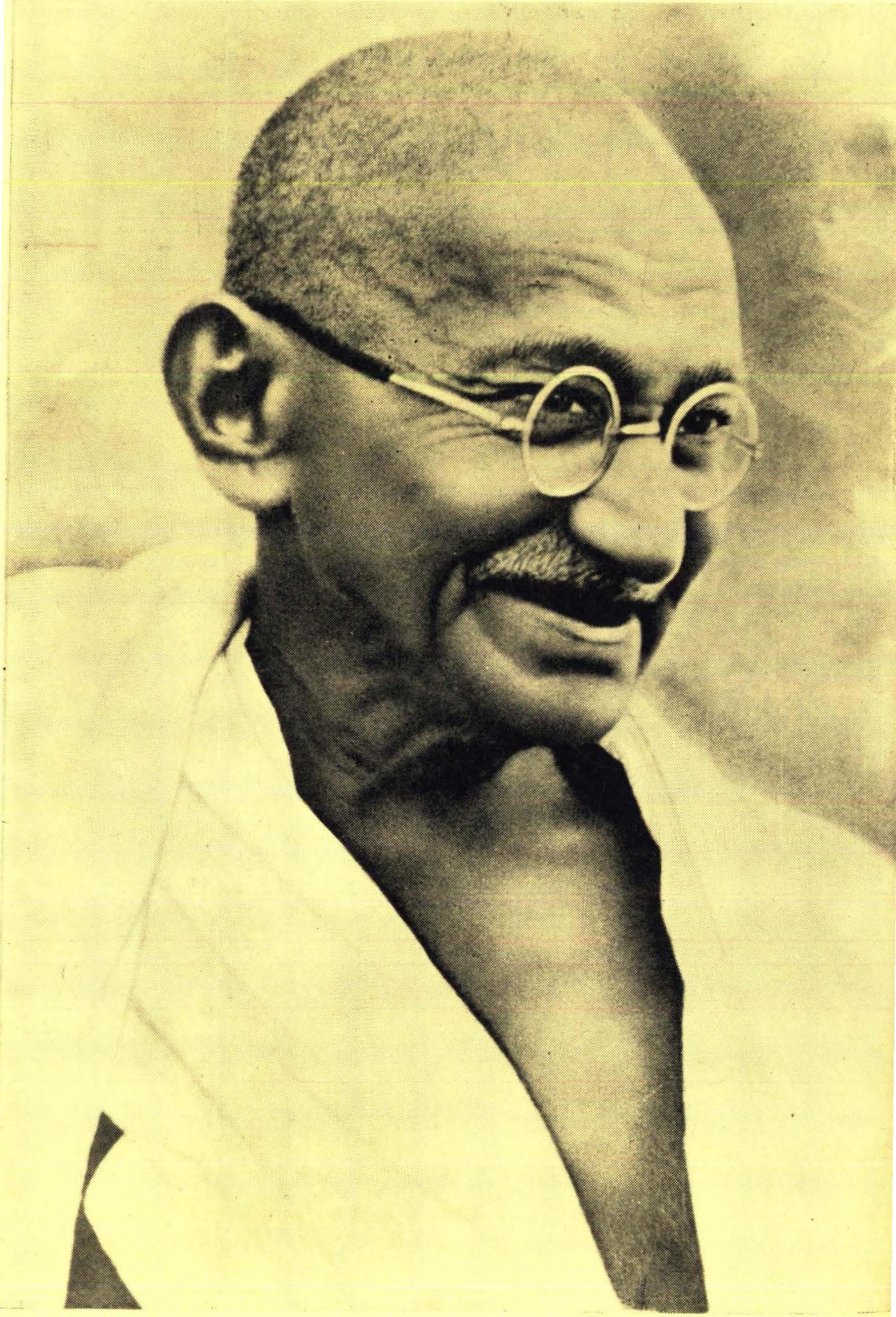
161. Watkins Mayor & Company, Ladowali Road, Jullundur City (Punjab)

162. William Jacks & Company Limited, 16, Netaji Subhas Road, Post Box No. 369, Calcutta-1 (West Bengal)

LIST OF JOINT DIRECTORS (AGRICULTURAL ENGINEERING)/ AGRICULTURAL ENGINEERS IN THE STATES

1. Agricultural Engineer, Department of Agriculture, Government of Andhra Pradesh, Hyderabad (Andhra Pradesh)
2. Joint Director of Agriculture (Engineering), Directorate of Agriculture, Government of Assam, Shillong (Assam)
3. Agricultural Engineer, Government of Bihar, Department of Agriculture, Patna (Bihar)
4. Joint Director of Agriculture (Engineering), Government of Gujarat, Krishi Bhavan, Ahmedabad (Gujarat)
5. Agricultural Engineer, Government of Haryana, Kothi No. 1019, Sector No. 21-B, Chandigarh
6. The Agricultural Engineer to Jammu & Kashmir Government, Government Agricultural Workshop, Talab Tillo, Jammu (J & K)
7. Research Engineer, Research Testing & Training Centre, Vellayan, Trivandrum (Kerala)
8. Joint Director of Agriculture (Engineering), Department of Agriculture, Government of Madhya Pradesh, Bhopal (Madhya Pradesh)
9. Joint Director of Agriculture (Engineering), Government of Madras, Directorate of Agriculture, Chepauk, Madras-5 (Madras)
10. Agriculture Engineer, Agriculture Department, Government of Maharashtra, Poona-5 (Maharashtra)
11. Joint Director of Agriculture (Agricultural Department of Agriculture Engineering), Government of Mysore, Hebbal, Bangalore-24 (Mysore)
12. Joint Director of Agriculture (Engineering), Government of Orissa, Department of Agriculture, Bhubaneswar (Orissa)
13. Agricultural Engineer (Implements), Government of Punjab, 1594, Sector 18-D, Chandigarh
14. Agricultural Engineer-cum-Secretary, Rajasthan Agriculture Engineering Board, Government of Rajasthan, Jhotwara, Jaipur (Rajasthan)
15. Agricultural Engineer (Headquarters), Directorate of Agriculture, Krishi Bhavan, Madan Mohan Malviya Road, Lucknow (Uttar Pradesh)
16. Chief Engineer (Agri.) & Ex-officio, Director of Agriculture, Writer's Building, Block 6, 5th Floor, Calcutta (West Bengal)
17. Research Engineer, Research Testing & Training Centre, Government of Himachal Pradesh, Mandi (Himachal Pradesh)

Gandhiji's
Birth Centenary
Supplement



Gandhiji & Agriculture

JAYA ARUNACHALAM

This being the centenary year of Mahatma Gandhiji's Birth it has been thought fit to include a special supplement in this Year Book drawing the attention of the concerned to the views he has expressed from time to time on Farmers and Farming as a calling. The real India according to him lives in the villages. Of all the social problems Food problem was the most important problem to Gandhiji, food being the most important human need. So Gandhiji felt production of food in all its varieties at an accelerated pace therefore holds the key to the solution of the many many serious social problems facing the country. In fact he felt that it is the only way we can achieve a general increase in living standards and national prosperity in every sector.

The following pages of supplement will throw ample light on the fact that Gandhiji was a rare combination of a visionary and a realist in the sense that many of his prophecies came true. It reveals Gandhiji in a new light as a Social Scientist analysing the ills of society and finding a solution according to context.

On Growing More Food

We are a country of the mighty rivers and a rich variety of agricultural land, with inexhaustible cattle wealth. That our cattle give us much less milk than we need, is entirely our own fault. Our cattle wealth is any day capable of giving us all the milk we need. Our country, if she had not been neglected during the past few centuries, should today, not only be providing herself with sufficient food, she would also be playing a useful role in supplying the outside world with much-needed foodstuffs, of which the late war has unfortunately left practically the whole world in want. This does not exclude India. The distress is growing instead of showing signs of decreasing. My suggestion does not include ungrateful rejection of free supply that any foreign country may wish to offer us. All I say is that we must not go a begging. It demoralises. Add to this the difficulty of internal transport of foodstuffs from one place to another. We have not the requisite facility for rapid movement of grains and other foodstuffs. Further add not the remote possibility of delivery of uneatable stuff. We dare not lose sight of the fact that we have to deal with human nature. In no part of the world it is to be found perfect or even very nearly so.

The slightest dependence on outside help is likely to deflect us from trying to the fullest extent our immense internal possibilities, in the shape of utilizing every inch of arable land for growing crops for our daily food in the place of growing money crops. We must reclaim the waste land which is capable of being placed under immediate cultivation.

"Centralization of the foodstuffs is ruinous. Decentralization easily deals a blow to black-marketing, saves time and money in transport, to and fro. Moreover, the villager, who grows India's cereals and pulses, knows how to save his crops against the rodents. The movement of grain from station to station, makes it liable to be eaten by the rodents. This costs the country many millions and deprives it of tons of grain, every ounce of which we need badly. If every Indian were to realise the necessity of growing food, wherever food can be grown, we should most probably forget that there was scarcity of the foodstuffs in the land. Not that there is not enough land to feed our thirty-five crores It is absurd to say that India is overpopulated and that the surplus population must die. I am sure that if all the land that is available was properly utilized and made to yield up to its capacity, it would surely maintain the whole population. Only we have got to be industrious and to make two blades of grass grow where one grows today.

The remedy is to identify ourselves with the poor villager and to help him make the land yield its plenty, help him produce what we need, confine ourselves to use what he produces, live as he lives, and persuade him to take to more rational ways of diet and living.

I have by no means dealt fully with the fascinating and absorbing subject of growing more food but, I hope, I have said enough to stimulate interest and turn the wise towards the thought of how every individual can help in the laudable enterprise.

On Controls

There are enough cereals and pulses and the oil-seeds in the villages of India. The artificial control of the prices, indeed the growers do not, cannot, understand. They, therefore, refuse willingly to part with their stock at a price much lower than they can command in the open market. This naked fact needs no demonstration. It does not require statistics or the desk-work civilians, buried in the red-tape files, to produce elaborate reports and essays to prove that there is scarcity. It is to be hoped that no one will frighten us by trotting out before us the bogey of over-population. Our ministers are of the people, from the people. Let the ministers not arrogate to themselves a greater knowledge than those experienced men who do not happen to occupy the ministerial chairs but who hold the view strongly that the sooner the control is removed the better. A physician writes to say that the food control has made it impossible for those who depend upon the rationed food to procure eatable cereals and pulses and, therefore, he says, the people needlessly suffer from ailments caused by rotten stuff.

In the place of the controlled food, the Government can easily run the very stores for selling good grains which they will buy in the open market. They will thus bring about automatic regulation of prices and set free the hoarded cereals, pulses and oil-seeds. Will they not trust the grain dealers and the growers? Democracy will break under the strain of apron-strings. It can exist only on trust.

When this control is removed, the nation will breathe free, it will have the right to make mistakes. This ancient method of progressing by making mistakes and correcting them, is the proper way. Keep a child in cotton wools and stunt it or kill it. If you will let it develop into a robust man, you will expose its body to all weathers, teaching him how to defy them Precisely in the same manner, a Government worth the name, has to show the nation how to face deficits, bad weathers and other handicaps of life through its collective effort, instead of its being effortlessly helped to live anyhow.

And thus considered, decontrol means that the business of foresight is transferred from the few members of the Government to the millions composing the nation. The Government will have new tasks to perform towards the nation so as to enable it to discharge the duty devolved up on it. The methods of transport have to be put in order and the methods of growing more food have to be brought home to the people in general and to that end the agricultural department has to learn how to serve the small grower rather than the capitalist grower. The Government have on the one hand to trust all arms of the nation, as well as to watch and check their movement, the regard being had always to the interest, hitherto neglected, of the small grower, who represents the largest majority of the millions. He is the consumer of his own crops, reserving a small percentage for the mere consumer who, in exchange for the foodstuffs he gets, gives cash for buying the other necessaries of life. The control has meant less payment to the grower than he would otherwise command from the open market. Hence, to the extent that he gets a higher price, the prices of food must rise. These, the consumer will not grudge. The Government have to see that in the new set-up, the whole of the percentage in the rise of prices goes to the grower.

This has to be made clear to the public from day to day, or week to week, as the case may be. The wealthy factory owners or the middlemen have to work in co-operation with and in subordination of the Government. I understand that the process is going on. There should be perfect co-ordination among these few men or the corporations, who have hitherto exploited the poor for their selfish purpose, and have not hesitated to enter into an unhealthy rivalry among themselves. This has to go especially in the case of food and cloth, where the profit motive is to be wholly absent. Any successful attempt at adding to their profit, owing to decontrol, will defeat its purpose Let us hope that these monied interests will rise to the occasion.

Agricultural Education

It has been suggested that agriculture should be the medium of instruction in the village schools. But the shame of it is that we have not the necessary means. Agriculture as it is taught at present in the schools and the colleges is useless for our villages because it is not intimately related to the rural conditions. But if you accept my scheme and are able to find suitable teachers, I am sure it would be very useful for the village folk. The students also will go with their teachers to the fields and learn many subjects while ploughing, sowing, irrigating and weeding the fields. They will also have sufficient physical exercise and the artificial exercises, therefore, would be unnecessary.

On Rural Reconstruction

Practically all "Rural reconstruction schemes" that one hears of these days devised by Governments, whether Capitalist or Socialist, have one thing in common. They are all dominated by commercial considerations and therefore by money values. They provide palliatives; they do not touch the root of the problem. Take for instance, "marketing schemes". They operate as "concealed subsidies"; sometimes they become schemes for the restriction of production. Then there are "price fixing machinery" and schemes for providing rural credit. Price fixing inevitably leads to similar demands from powerful industrial interests and gives rise to a sort of a "political price war" in which the peasant finds himself up against, what a writer has called, anti-rural solidarity of urban elements—industry, commerce and the town proletariat—"at war with each other but at one against the non-organised or poorly organised peasants". Their common slogan of "cheap bread" and low cost of living, puts them in the same cry against the farmers with the result that in the struggle for higher wages between capital and labour it is the peasant and the rural population that suffers. Price-fixing policy can, besides, put the farmer at the mercy of the price-fixing authority which may "in effect become an agricultural dictatorship". Nationalisation of land PER SE only enables the State or the regional authority to appropriate to itself the profits accruing from private ownership of land, and rural credit machinery substitutes an impersonal and therefore "inhuman and probably inefficient landlord (or banker) for one who is usually human and often efficient". The same about rural credit facilities. While helping the rural community to keep its head above water financially they provide no immunity from exploitation In fact they can be used, as they have been in the past, to further the exploitation of the villages. They cannot restore to the village community its springs of inner strength and vitality.

The essential distinction between the urban and the agrarian is that the urban has not that "inner linkage with the soil". He regards the soil and the commodities he handles as something that has to be turned into cash. They have only an indirect bearing on his life's upkeep. His thinking is in terms of money The agrarian, on the other hand, is a producer in the primary sense, a "partner in the recreative power of the earth" Farming with him is a way of life, a medium for the expression of life's values.

The peasantry derives vitality from the soil to the extent to which it lives out of and with the land it cultivates, with the minimum of intervention of money economy. A farmer, when he has to buy his food and feed for his cattle and for his crops from the townsman, loses the essential advantage of his way of life. He becomes cut off from the springs of his vitality. Though he may still be living and working on the land, nutritionally he becomes an appendage of the town. And since he has less money to spend than the townsman, he may fare even worse. The townsman can anyway with his money still provide himself in some measure with what nature used to provide to the farmer free.

So long as the rural community is not effectively insulated from an economic system in which money rules, life is governed by false values and production is subordinated to commercial and business considerations, the agrarian cannot come into his own. Land must cease to be a commodity. Similarly labour and money must cease to be commodities, and the rural community must become biologically whole self-contained and largely independent of money economy. In short, each regional unit should be able to produce for itself all the food supplies it needs for men, animals and crops.

The secret of the strength, stability and vitality of India's village communities was their independence of the modern monetary system. Direct exchange of products and services among themselves, and the fact that from within the borders of the village (or a group of villages) came most of the products on which its existence depended—its food, its clothing, its tools, even its currency encouraged sharing and forged a living bond of unity and cohesion among the various sections. It made each village community a stronghold of democracy. This was undermined when the system of collection of dues *In cash by government officials was* substituted for the traditional method of *Payment in kind by the village through its own functionaries.*

When the payment of land dues was in the form of a fixed share of the produce it gave to the farmer automatic relief when his harvest was poor or when it failed. If production from the land fell the State's share of the receipts was reduced. The State was, therefore directly interested in the yield from the land, year after year. That lessened the temptation on its part to put burdens upon the peasantry which could be met only by drawing upon soil capital. Payment in kind depended upon things which the peasant himself cultivated and which therefore he could understand and control. But when he was made to pay in a substance which he himself did not produce, he became subject to " the unknown forces of unseen masters, who themselves controlled that substance." Anything that takes the peasants away from the goods into the orbit of "variable, uncertain, and unfathomable abstraction, money, particularly money that is not of their own making" weakens them. It exposes them to the fluctuations of the money market and undermines their security which is their main asset in the struggle for survival.

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भरघोस पीक भरपूर उत्पन्नाकरितां

अधिकांश प्रमाणांत पोषकतत्त्वें असलेली

यशोधन ग्रॅन्युलेटेड मिश्रखतें वापरा

एकरीं अधिक उपज देत असलेल्या तायचुंग नेटिव्ह वन भात, मेक्सीकन गहूं व हायब्रीड ज्वारी, बाजरी तसेच मका या पिकांना नायट्रोजन, फॉस्फोरस व पोटॅश या पोषकतत्त्वांचा पुरवठा भरपूर प्रमाणांत लागतो आणि म्हणूनच.

१८ ना : १८ फॉ : १० पो

अशा अधिकांश प्रमाणांत पोषकतत्त्वें असलेल्या **यशोधन** ग्रॅन्युलेटेड मिश्रखतांचा वापर सोयीस्कर तसेच फायदेशीर आहे.

यशोधन

उत्पादक :

डेक्कन सेल्स कॉर्पोरेशन लि.

मुंबई ५० AS

एकमेव वितरक :

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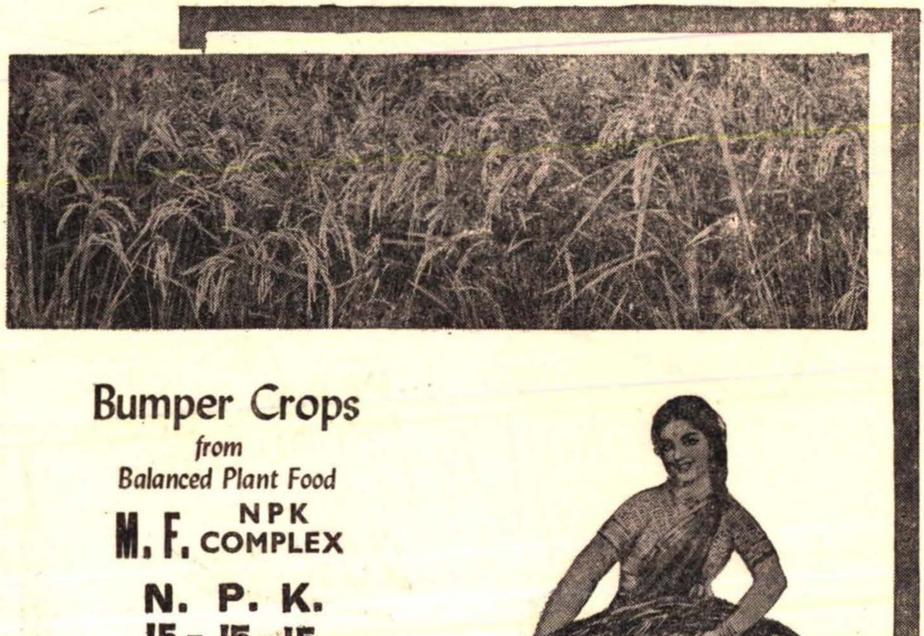

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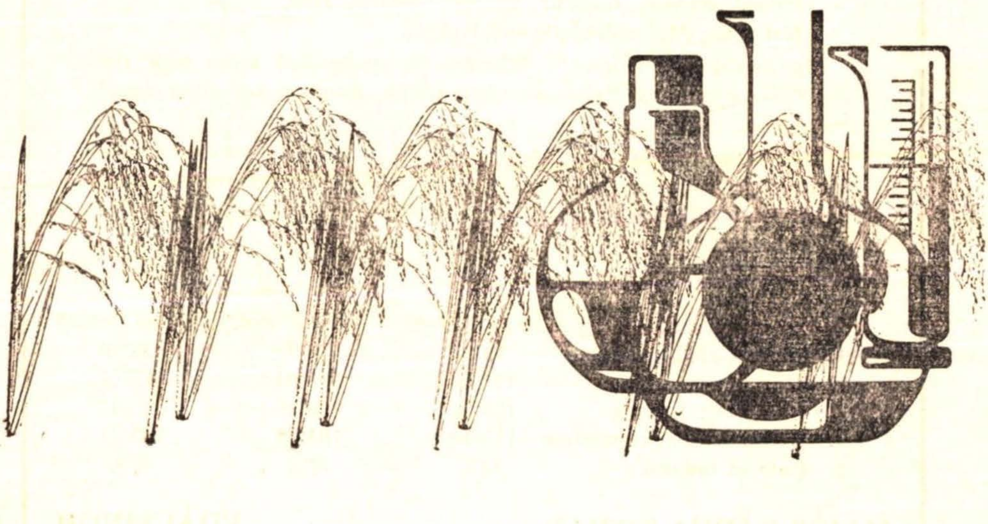

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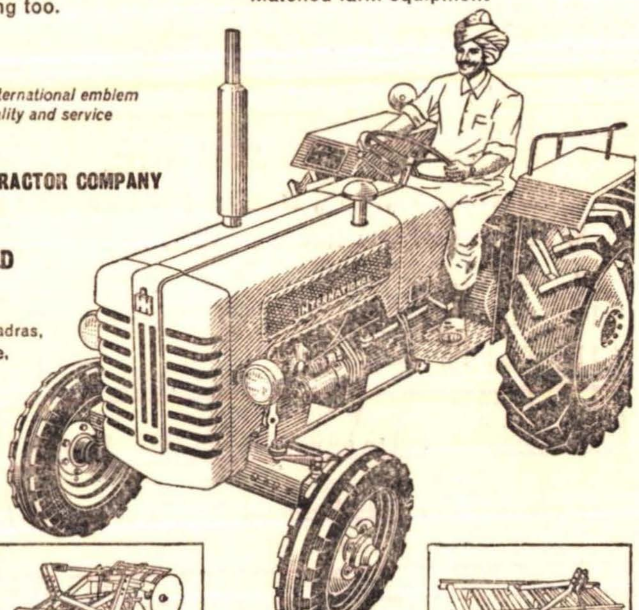

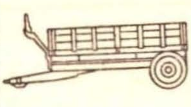

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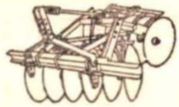

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Help yourself and help your family to have a richer and fuller life.

Limit your family to two or three children to ensure health, wealth, happiness and contentment for yourself. Do your duty to your Motherland and limit the size of your family.

For details for limiting the size of the family, contact the nearest Hospital or Dispensary run by the Government or local body.

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