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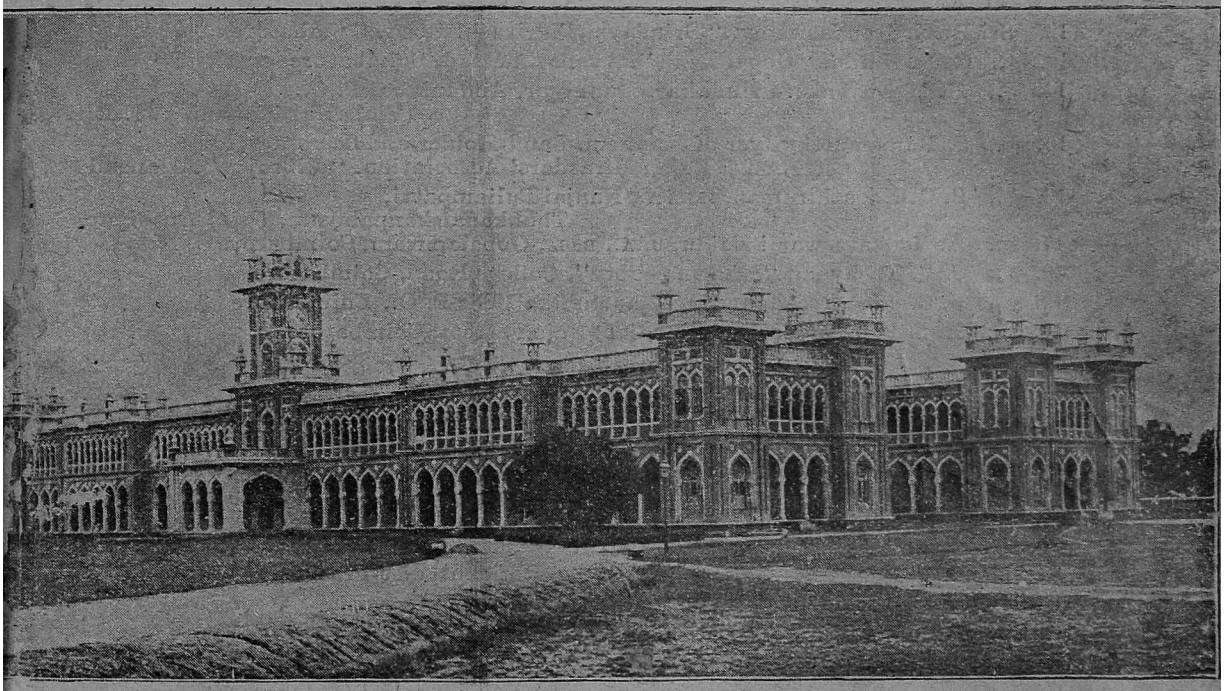

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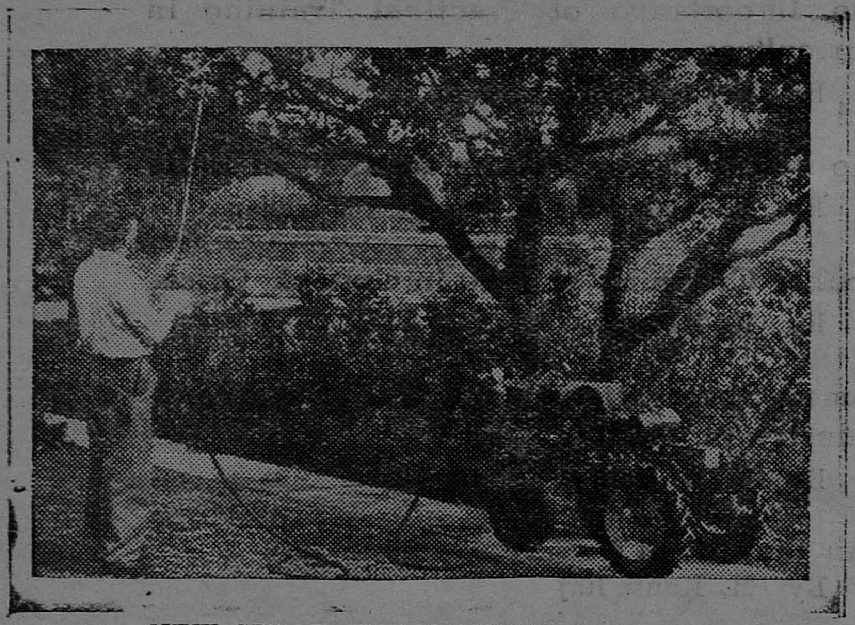

NEW SPRAY HELPS FRUIT FARMERS

(British Information Services)

CHIEF MINISTER OF MADRAS

FORT ST. GEORGE
MADRAS

December 3, 1952.

I send my blessings and good wishes to the Madras Agricultural Journal.

My complaint is that agricultural graduates mostly end only by seeking employment in the departments of Government. The present batch of students will of course not do it.

C. Rajagopalachari

Sir C. P. Ramaswami Iyer, Patron of the Madras Agricultural Students' Union, wishes the Madras Agricultural Journal all success.

The Madras Agricultural Journal

Vol. XL January 1953 No. 1

Editorial

The Editor and his colleagues on the Editorial Board gratefully acknowledge the ready response of the Hon'ble Chief Minister to the Government of Madras, Hon'ble Minister for Agriculture, Government of Madras and other gentlemen to their request to contribute blessings and articles for this special annual number of the Madras Agricultural Journal. This is the first time that the Madras Agricultural Students' Union is bringing out a special number. It is hoped that it will have its own bright future in the years to come.

Agriculture in the Five Year Plan: India has attained an outstanding land-mark in the history of nations by its bringing out the text of the five year plan. Any reader of the plan will really come to the conclusion that it is a planned progress in a democratic way.

The Planning Commission has brought out the five year plan after two and a half years' labour, contemplation and consultation. Parliament has put its seal and now is the time when we should put forth all our zeal to implement it.

The Plan attempts to integrate the various activities in agriculture, industry and social services. Agriculture, as it is dealt with in the plan, is discussed in this note. The Five Year Plan for agriculture aims at self-sufficiency of food requirements and the substantial reduction of excessive dependence on imports. The target of increase in food production is nearly eight million tons. To attain this high level of food production in actual practice it is proposed to bring more than seven million acres of additional land under cultivation of food crops. In addition, provision is also made for new irrigation, through major works to more than eight million acres and through minor works to eleven million acres. Greater stress is laid in the plan on the minor works of irrigation as they yield quicker and more widespread results all over the country. The importance of other means of augmenting food production like usage of improved seeds of dependable viability, application of certified manures and fertilisers, etc., has also been touched upon in the five year plan.

The interests of other human requirements, that are as important as food, have also been very efficiently and effectively sought to be safeguarded in the plan. It is proposed to raise the cotton production by over 12 lakh bales and jute by 20 lakh bales. Production of oil seeds will be increased by 0·375 million tons and sugar by 0·69 million tons. These are the particulars of the agricultural targets of the plan.

The pattern of reorganisation of the agricultural status of India, as conceived in the five year plan, is really marvellous. The Commission has taken into consideration the deep attachment of the peasant to his land, irrespective of its size and has judiciously rejected the proposal of nationalisation of land as an impractical proposition, with its innumberable financial and social impediments and implications. As an alternative solution the Commission confidently recommends the organisation of Co-operative Village Managements. Under this scheme the entire village becomes a single unit to be managed, protected and taken care of by the concerned Co-operative Village Management. The holdings of the inhabitants of the village are to be pooled without infringing on their ownership rights, but paying each owner compensation in the shape of ownership dividends to be paid at the time of each harvest. Thus it is envisaged in the plan that the entire cultivable land in the village is to be cultivated on the most scientific lines on a co-operative basis to the maximum advantage of the nation at large. In this scheme all workers, owners, and non-owners will be paid on the basis of the work turned out by them.

The Government in power will constitute Village Production Council and Co-operative Farming Societies, besides establishing registered farms. If the plan is to attain its targets within the prescribed period, the public, particularly the peasants must co-operate with the Government in the successful implementation of the various proposals contained in the text of the five year plan.

When once agriculturally our India attains these targets, the other aspects of industry and social services will naturally improve, though in the plan simultaneous consideration and action are recommended. It is hoped that the ambition of the Planning Commission and the Government in power will be realised and that a stage will be attained in India, when every tiller of the soil gives his helping hand to build up a healthy and self-contained Republic through the dynamic plan designed to build up a dynamic nation of 360 millions of souls.

The Importance of Practical Training in Agriculture

A Message from

DR. R. NAGAN GOWDA, M.Sc., Ph.D. (Iowa)
Minister for Agriculture

I am glad to be informed by the Secretary of the Madras Agricultural Students Union that they propose to bring out an Annual Number of the Madras Agricultural Journal. The journal is a useful medium for discussion of agricultural problems for the past and present students and the staff of the Agricultural Colleges in our State. I wish the journal many more years of useful existence.

On this occasion I would like to draw the attention of students and teachers of agriculture and the research workers to one important aspect of their training which unfortunately is being more and more neglected. I refer to the need for practical training in all farm operations which would enable one to observe with his own eyes and to do things with his own hands and thus verify and apply the knowledge that one gains through books or experiments in the laboratory. No graduate in agriculture or research worker or a member of the Department of Agriculture will be a true agriculturist without this practical knowledge. If you look back at the history of your own college you will find that in the early years agricultural education started with practical training. The Farm at Saidapet to train students preceded the School of Agriculture and was its fore-runner. Later on in 1902 on the report of Mr. J. Mollison, Inspector-General of Agriculture, it was decided to shift the venue of the college to a more suitable place 'in order to emphasise in the college course itself the practical aspects of agricultural studies.' The Royal Commission on Agriculture, 1928 again stressed the importance of practical training if graduates in agriculture were to have the confidence to give advice to cultivators. But the Commission were under no illusion that any arrangements during the academic course would entirely remove the cause of complaint that the training of graduates was not of a sufficiently practical character. They therefore suggested that further facilities for acquiring practical experience should be given outside the academic course. We in this State have lately realised the shortcomings of our agricultural recruits as practical agriculturists in connection with the Food Production Campaign. The Universities and the recently set up All-India Council of Agricultural Education are all agreed on the need for a practical grounding for our students. Certain proposals for intensifying practical training for students in this State are under consideration but I believe with the Royal Commission on Agriculture that no academic

device or Government compulsion could remedy the defect unless the agricultural graduates themselves develop a natural inclination to do all things from A to Z on a farm and learn to observe things with a scientific eye. Indeed this practical training is necessary not only to the students but also to the research scientists whose work will be unrelated to realities unless they go out to the field as frequently as possible and apply and test their experimental findings and continue intelligently follow-up observations instead of getting second hand reports. I have never been tired of suggesting that students of agriculture during their holidays and vacations should go to their own farms or other farms where their service will be accepted and do things with their own hands. Students who wish to do actual farm work on our Government farms or learn to handle agricultural machinery in Departmental workshops during their vacation would be accepted and be paid the usual wages. After graduation students who want to pursue their profession intelligently and with confidence would do well to work on a farm for a full crop season and do extension work in the neighbourhood. It is the only way to round off a useful education obtained at the colleges at considerable expense to themselves and to the State. By and by it may be necessary to have a compulsory apprenticeship in a farm before an agricultural candidate is recognised as a full-fledged agriculturist, but the time is not yet, as agriculture is not an organised industry and we have not got big farms which will receive apprentices. The practical training which I have pleaded for is the only way to make our college trained agricultural workers true devotees to the glorious science of Agriculture and true servants of the community.

The Future of Agricultural Science in India

By

RAO SAHEB SRI N. MURUGESA MUDALIAR

Deputy Secretary to Government, Food and Agriculture Department, Madras

The experience of the past few years during which the country passed through blight and hunger is a challenge for survival. There is no doubt that science can play a decisive part in solving this problem. More than any other, the responsibility of agricultural science in this respect is the greatest. The function of agricultural science is in content, form and purpose fundamentally social and collective and it could be a powerful instrument to help to disclose new productive forces in nature and new means of production to satisfy man's elementary needs of food and clothing and his commerce, trade and industry. Its development is also an indispensable condition for social progress in every epoch. If you look back at the history of scientific advance in agriculture in this country, it will be apparent that it received stimulus at important stages of political and social development. The present interest in agricultural science is born of a necessity to achieve freedom from foreign bread and freedom from hunger. The same problem is faced by many other countries. But yet the possibilities of agricultural science to transform the present situation have not been visualised. Many countries in the world have set up commissions for Atomic development but the same impelling force for the development of agricultural science is not manifest. Men with foresight like Lord Boyd Orr have drawn attention to the need for agricultural development. The two important branches which may be said to constitute agricultural science are Biology and Agronomy, but the work done in these branches is so little when compared to the attention paid to other sciences like physical and chemical sciences, which are supposed to advance the industrial development of a country. Even in England the work done on Biology is not one-tenth of that done in other branches and it is said that one Chemical Industries Corporation alone employs more chemists than the number of biologists in the whole of the United Kingdom. Great attention is now paid to antibiotics but E. B. Balfrow calls agriculture a medical necessity and food the best antibiotic. In India too the work on plant genetics and selection is meagre. Agriculture is going on, more or less on conventional lines except for episodic work of scientists, some of them very eminent, which Sir John Russel calls as only their 'personal achievement'. Such work is outside any conscious plan or social objective. The agriculture of tomorrow calls for limitless researches for the evolution of new crops both by vegetative and sexual hybridisation in order that natural deficiencies brought about by climatic shifts may be overcome. The new

biology will have to evolve crops which will be all the year-round crops and not bound by season. If, for example, paddy is planted in experimental plots at intervals of 10 days all the year round and watered by whatever irrigation commandable, it would reveal the phasic development of the crop not according to its calendar age but according to its physiological age and climatic complex. The agrobiological work of Krenke and Lysenko can be said to be attempts to train crops which will not depend upon the season, but their scientific theories are vitiated by dialecticism. The future of agriculture in India no less than in any other country, will depend upon the achievements in the sphere of plant and animal breeding and phyto-geography and these achievements will have to be made not only by the formal scientists but also by intelligent farmers. Michurin and Burbank were not conventional scientists but naturalists. Fabre did not work through the microscope but would lay on the ground for days at a time to watch the ways of ants and insects. The domestication of plants or animals to conditions which human ingenuity cannot alter will require intimate contact with Nature and patient observation. Agricultural science of tomorrow will not achieve anything if it withdraws from Nature and isolates itself behind academic walls. A re-approximation between Man and Nature will be a first condition to draw from Nature the succour which she can abundantly give. In other sciences, theories containing a little truth and many pre-conceived ideas can exist in laboratories or books for a long time but in agriculture millions of people work with the aid of those theories to test them on a large-scale. The agriculture of tomorrow in India might have to discover plants which would be immune to drought by atmospheric fixation of water and synthetic fixation of chlorophyll within the plant organism. The present incubus of water shortage may be removed to some extent if not wholly by the completion of giant irrigation projects, but assuredly the problems of the agricultural scientist will not be solved by them. In western countries biology was given a secondary importance and results were sought to be achieved by high dams, machines, artificial fertilisers and the like. In India the emphasis in future must be on biology and agronomy as in China and Japan and all else are only adjuvants.

Double Cropping of Rice in Cuttack, Orissa

By

K. RAMIAH

Former Director of Central Rice Research Institue, Cuttack

The practice of growing a medium or long duration crop of rice in the Kharif season, June-December in the wet land followed by a pulse crop of either Biri or Mung is the most common one in areas commanded by the Taldanda canal of Cuttack district. Water supply is available usually upto the middle of April every year. Though the Mung or Biri may be given one or two irrigations, the growing of these crops is often a gamble and even under most favourable circumstances an acre yield of 3 to 4 maunds may be the most expected.

The problem whether the available water supply between January to April cannot be put to better use has been engaging the attention of the Central Rice Research Institute for the last three years. Experiments at the Institute have shown that short duration rices can be very profitably grown between January to April. The most suitable varieties to grow in this season and the optimum time for planting them have also been determined. It has been found that two Madras varieties Co. 13 and Ptb. 10 and Chinese varieties CH. 45 and CH. 47 are the most suitable for growing in this season and the optimum time for planting them is from 15 to 25 January. Yields ranging from 15 to 25 maunds per acre have been obtained at the Institute with these varieties.

Cultivators Persuaded: It was proposed to actually test these results on a large scale in the cultivators' fields in the intensive cultivation area of the Sardar centre in 1950-51. Since the practice of growing a second crop of rice on the same land is practically unknown in Orissa, the cultivators needed considerable persuasion to adopt the practice. In fact the Institute had actually given a guarantee for 10 maunds of paddy per acre if the trial failed.

Suitable blocks of land were selected in the different villages for this trial as shown below :—

Village		Area under Second crop of rice
Nimaisapur	...	30 acres
Dighi	...	7 ,,
Kotuan	...	25 ,,
Hatsahi and Deosahi	...	20 ,,
Deopur and Biribati	...	10 ,,
Mantiri and Sompur	...	3 ,,

Since the trial had to be done on a compact block, often the land chosen for the trial had to be given up as some cultivators owning land inside the area refused to co-operate. Of the villages named above cultivators in the first three arranged to raise their own seed beds with seed supplied from the Institute, while to the remaining villages seedlings raised in the Institute were supplied. In fact in Nimaisapur village the whole trial was done on a co-operative basis, the owners of the land agreeing to share the cultivation expenses and the produce according to the area they owned. Due to the presence of a few enterprising cultivators in the first two villages, we did not have much trouble.

In the other villages however, though the cultivators first agreed to co-operate, they had no faith in it and showed their indifference at every stage. They would not prepare the land for planting in time, they would not irrigate the fields or drain the fields as and when necessary, they would not protect the fields against cattle trespass and so on. They were convinced that the experiment would fail and were only preparing themselves to collect the 10 maunds of paddy per acre from the Institute guaranteed to them.

The area under the trial can be divided into two groups: one in which the growers were willing to co-operate and follow our instructions and the other in which they were absolutely indifferent to the scheme. In the latter case the Institute had to take steps often to irrigate the field, to drain water off, or to check cattle trespass, etc.

Unqualified Success: The planting was spread over a period of six weeks from January 20 to the end of February. The plan was to finish the planting before the end of January but this could not be accomplished and often very old seedlings of over 60 days' age had to be used. Normally with the varieties recommended for growing and planting before the end of January, no watering of the crop would have been necessary after March. Actually however with considerable delay in planting the crop had to be given one or two irrigations in April too. The harvests which began in middle of April went on until the end of April. All the difficulties notwithstanding, the trial can be said to have proved an unqualified success. The area under the second crop included high level lands with good drainage where an early *aman* had been harvested before December, and also low level lands not so well drained and where the *aman* was harvested only towards the end of December.

Wherever the plantings had been done before the end of January in lands having drainage facilities irrespective of the levels, an acre-yield of 20 to 24 maunds of paddy has been harvested. Where the drainage was not good the yield had fluctuated between 15 to 18 maunds per acre. In fields where the crop was planted very late, say, end of February,

and with very old seedlings, the yield had varied from 8 to 12 maunds per acre. In one or two cases where the yield was less than 10 maunds, the guaranteed quantity, the cultivators concerned were convinced that such low yields were the result of their own fault and no claim for compensation could be made. The low yields in the late planted crop were mainly due to unsetting of the grain in the earheads, and also due to insect and cattle damage. The acre-yields mentioned above are those reported by the cultivators themselves and it could therefore be said most definitely that growing a second crop of rice is profitable to the cultivators.

Economics of a Second Crop: The economics of a second crop of rice under actual farmer's condition at Dighi where a block of seven acres was grown is given below :

		Rs.	A.
Preparing the land	...	30	0
Cost of raising nursery	...	10	0
Pulling and transplanting seedlings	...	15	0
Manure, 100 lb. of ammonium sulphate	...	16	8
Harvesting and threshing	...	16	8
Attending to irrigation	...	2	0
	Rs.	90	0

With an average yield of 17 maunds of paddy per acre in this area, the value of the grain would come to Rs. 128 at Rs. 7–8 a maund, leaving a net profit of Rs. 38 per acre. This does not take into consideration the value of over 20 maunds of paddy straw that had also been obtained. Even if the season was most favourable for a *mung* crop, the economics of the same could not advantageously be compared with those of rice. This block of land always used to lie fallow after *aman* rice being considered unfit even for *mung* cultivation.

While in the schedule of cost of cultivation given above all labour has been provided for, actually after the harvest of the rice crop in November-December there is not much work left for the cultivator, and the cattle he owns also remain idle. When he uses his cattle for the preparation of the field and works himself, the only extra expenditure he will have to incur will be for special labour connected with transplanting and harvesting the crop and also for buying the manure. Thus the return he will get will be very much more than is shown here, and the straw from the second crop provides fodder for his cattle at a time when there is general scarcity of fodder. Since the second crop of rice, if planted in time, will not require any irrigation after March, he will not

have to pay any additional water rate for the second crop. By adopting this practice the cultivator not only improves his condition by the extra return he gets for his labour but he also contributes his share to meet the great scarcity for rice existing in the country.

While this year the trial has been conducted by transplanting the crop, experiments at the Institute have shown that these short duration varieties will do just as well even if they are directly sown in the fields. Where there is any difficulty about raising a nursery in time, the fields can be puddled, properly levelled and the seed broadcast. This broadcasting can be adjusted anytime after December according to the variety he grows as first crop. Broadcasting will however not be a success if done later than the end of January.

Some Observations on the Sugarcane Industry in Madras State

By

N. L. DUTT, M. Sc., F. A. Sc.

Director, Sugarcane Breeding Institute, Coimbatore

I would like to extend the best wishes of the Coimbatore Institute to the success of the Sugar Industry in Madras on the occasion of the Special Number of the Madras Agricultural Journal. The research work on sugarcane in the Madras State and the welfare of its sugar industry are at the present moment under the best of auspices as the Hon'ble Minister in charge of Agriculture is no less a person than Dr. R. Nagan Gowda who was previously a distinguished member of the Indian Central Sugarcane Committee and the State Sugarcane Committee. Another unique advantage which the Madras State possesses is that the ripe counsel and unrivalled experience of Sir T. S. Venkataraman is available to it. The report of the Special Committee of which he was the Chairman, sets out in commendable detail and thoroughness the various aspects of the sugarcane industry in this State.

Though the sugar recovery in a few areas in Madras is relatively low and much development is still needed in the sugarcane crop, there is justification for taking on the whole an optimistic view of the future of the sugar industry in Madras. It is true that climatically Madras is favourably situated so far as the natural growth of the cane crop is concerned, but unless the various operations in the field and the factory are properly organized to reduce the cost of cultivation and to improve sugar recovery, sugar cannot be produced in Madras at competitive rates. There is no guarantee that the days of somewhat artificial and abnormally high price of Rs. 54/- a ton of cane will ever come again. The reduction in the price of cane is a step in the right direction and it behoves the cane grower to take a realistic view of things and to reduce the cost of production by taking the advice of the Cane Development staff at all stages from planting to harvest.

In the Planning Commission's National Plan for India due place has also been given to sugarcane in Madras and additional target for production for the five year period ending March 1956 has been fixed. This additional target has, of course, to come from existing area by way of increased acre yields and better juice quality.

Taking acre yields first, the position now is very much better as compared with the period when the older varieties were in cultivation about a decade and a half ago. The Mauritius, Java and Barbados varieties were holding the field, but suitable Coimbatore varieties became available for cultivation in 1934 soon after the work on the breeding of

canes for tropical India was taken up at the Coimbatore Institute. Co. 419 has gradually supplanted the older varieties and is now the premier variety in this State. The acre yields from this variety are very much better as compared to the older varieties and it may be said that so far as yield is concerned, the Madras State is being quite well served by Co. 419. The Sugarcane Research Stations at Anakapalle and Gudiyattam have at their disposal every year new batches of Co. canes on which they conduct detailed and careful trials. Co. 419 itself was released for cultivation as a result of such trials originally. While Co. 419 undoubtedly possesses qualities which render it eminently suited as an almost universal cane for tropical India, it would not be well to keep all the eggs in one basket and to depend on only one variety however good. The consideration of yield is important, but it need not be balanced to a nicety and at least the more progressive among the ryots should accept and grow other varieties also even if their yield is slightly less than Co. 419 provided the new varieties have the approval and backing of the Agricultural Department. The experiments at Anakapalle and Gudiyattam pointed to the usefulness of Co. 449 and Co. 467 and newer and better varieties will no doubt become available as time passes.

As for the juice quality, planned harvest would appear to be the solution though it may mean a certain amount of sacrifice on the part of ryots. There is no point in offering the plant crop of Co. 419 – which is a late ripener – in the early part of the season to the factory. If Co. 419 has necessity to be offered to the factory in the early part of season, let it at least be the ratoon crop and not the immature plant crop. The ryots near the gate areas of the factories should learn to develop liaison with the factories and adjust their time of planting and harvest as also put some portion of their land under varieties which can be crushed in the early part of the season. The position of sugar recovery in certain factories in Madras State is none too happy and though the supply of immature cane in the early part of the season may benefit certain individual ryots as the cane is sold by weight, the net result is national loss as it means less sugar recovery.

As regards recovery the sugar factories in Madras may be classified into three groups, viz., (1) those in which the recoveries are more than 10% – the factories at Seethanagaram and Bobbili fall in this category; (2) factories where the recoveries are at present low but which can easily be improved by introduction of suitable early varieties and changes in the crushing schedule. This group includes Anakapalle (Tummapala), Ettikoppaka, Samalkot, Hospet and Vuyyuru factories. And (3) factories where the position is rather serious and an improvement in sugar recoveries is a difficult problem. The factories at Nellikuppam and Pugalur fall under this last category. The recoveries of more than 10% which are being obtained at Seethanagaram and Bobbili are a result of the varietal position with suitable early, mid-season and late varieties and a

crushing schedule according to maturity of varieties. The varieties are Co. 527, Co. 421 and Co. 419. The crushing of Co. 419 is not taken up till March and in December only Co. 527 is crushed. In the second category, viz., Anakapalle (Tummapala), Ettikoppaka, Samalkot, Hospet and Vuyyuru factories where the recoveries are low there is a possibility of improvement by adoption of varieties for early, mid-season and late crushing. In the third category, viz., Nellikuppam and Pugalur, the recovery is low and improvement in sugar recovery is a difficult problem. It will need the ingenuity, co-operation and hard work on the part of all concerned.

The normal annual consumption of sugar in Madras State is about one lakh tons and the production of sugar during 1951—'52 was 99,026 tons. The total additional target in the National Plan is for 80,000 tons on the basis of gur. As the total production of gur and sugar in Madras is about five lakh tons, the additional target represents an increase of 16%. This calls for an increase of about 5 tons of cane per acre. With the Cane Development work that has now been taken in hand in the Madras State and the fairly high yields that can be achieved from the varieties that are under cultivation provided they are given the necessary conditions of cane growth, the target should be not at all difficult of achievement. As a matter of fact with proper cane development it should be easy to achieve an average of 40 tons as against 35 tons target of the National Plan and in another five year period by proper cane development an average of 45 tons may be reasonably expected.

The Cane Development work in Madras has been organised only recently and there is a special Cane Development staff in addition to the four Liaison Farms. Much hard work, however, awaits the Cane Development Department because there is scope for improvement from the time of planting to harvest with varying emphasis regarding different operations in different areas. In certain areas like the Hospet area advancement of the usual planting season by even 2 or 3 months has meant improvement in sugar recovery of the factory. In Vuyyuru tract the time of application of the manure used to be usually late. A change in the time of application to ensure that the manure is in any case applied not later than the 4th month should improve the sugar recoveries. The Cane Development staff will have to study the directions in which each area requires improvement and to effect the improvements so that the sugar recovery improves, but more than all that the cost of production is lowered. Whether it is the cane grower or the factory interest, both are merely the separate wings of one and the same industry. Given the good will, the co-operation and the organisation, the prospects of sugar industry in Mrdras are quite bright.

Can they do it?

By

M. KANTI RAJ

The general inferance one is able to draw from many speeches made and numerous articles written by various persons giving suggestions for increasing food production is that majority of our farmers, being illiterate, prefer to follow the traditional practices and are suspicious to adopt improved (otherwise termed scientific) methods advocated by the Agriculture Department. Another line of criticism usually levelled also is, that improved methods are not within the means of poor cultivators.

After effects of demonstrations: The few instances listed below will show how further these two charges are from truth :–

(a) Co. 419 sugarcane variety demonstrated by the Department about 1939 on a few cents of land, in a few important cane growing centres, now occupies about 80 per cent of the total area under cane in the State.

(b) Uganda cotton – an improved strain of long staple Cambodia cotton has practically replaced the old Cambodia variety.

(c) Synthetic chemicals demonstrated on a small-scale in 1949 to control grasshopper insect pest on paddy is now being sold in hundreds of tons to farmers who queue up in an orderly fashion in depots; and

(d) The area under paddy strains specially evolved for resisting "blast" – the dreadful fungus disease and also salinity, has increased far beyond expectations within five years after first demonstration.

It is possible to cite many such spectacular instances but the few typical examples furnished above are enough for the present argument, that the diagnosis by the critics is not correct. The causes have to be looked elsewhere.

Production facilitating factors: The factors facilitating increased production in any country in the world are :–

(a) Assured irrigation facility or adequate and well distributed rainfall,

(b) remunerative price for the produce produced,

(c) supply of "production" requisites such as seeds, manures, pesticides etc., within easy reach; and

(d) easy credit facilities.

To these must be added the help of well organised "trained" personnel who should guide the farmer in his day to day practice.

The removal of "price" control in our State allowing price to adjust itself according to demand and supply is undoubtedly a great incentive. High priority is given to this factor in western countries and "price support" policy is usually adopted whereby the farmer is informed the price he is to receive after the harvest even before sowing the crop.

If our farmers are given (a) easy credit facilities for cultivation expenses based on the present day labour charges and on the prevailing market price of their production requisites;

(b) facilities to purchase their production requisites within easy reach; and

(c) the help of power drills to go deeper into the bowels of the earth to tap subterranean water reservoir, they will certainly increase the production and wipe out the deficit now experienced in food supply.

Rotavation and Rice Cultivation

By

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Introduction: It is a known fact that the low yields of irrigated paddy are in a large measure traceable to late sowings and the same may also be said in the case of this State where predominantly rice growing areas exist and the vagaries of the monsoon do not allow the fields being got prepared for the timely sowings. The indigenous methods adopted also are very tardy in this respect and it is in regard to the gain in time and efficiency, mechanisation of agriculture plays one of its important roles.

The timely preparation of a seed bed for our crops is enabled now a days by the use of light weight tractors especially of the wheel types and this timely cultivation of the fields helps to increase soil fertility through improved nitrification and better incorporation of green manure and absorption of humus into the soil from the rural rubbish and compost added. Again, the timely sowing of the seed ensures a good start to the crops, saves them from diseases caused by unfavourable climatic factors.

Maximum yields can only be obtained if the seeding and planting of the crops are done at the proper depth and the seeds are distributed uniformly in the required quantities to suit the moisture and soil conditions. This can best be achieved by the employment of modern agricultural implements and machinery which otherwise is termed as mechanisation of agriculture.

Recent advances in mechanisation of agriculture: With regard to agricultural mechanisation, progress has been rapid in the U. S. A. and U. K. necessitated by conditions created by the recent world war. The most significant changes in modern rice growing in the western countries and Australia during recent years has been the rapid mechanisation under widely varying conditions and increased yields resulting therefrom.

In U. S. A. most of the operations in rice culture – seeding, manure spreading and plant pathological measures are mechanised. The combine is also rapidly displacing even the harvests. In Australia attempts have been successfully made to mechanise rice cultivation completely. In Malaya also attempts at mechanised rice growing on a large scale are afoot. In British Guinea again, rice cultivation is being largely mechanised. There seems to be ample ground to expect with confidence mechanisation of rice cultivation in India as well with

resultant efficiency of operation, timeliness and quick turnover. In a few years time rapid changes in this direction may be expected. For example, the cost trials of rice cultivation carried out by Nayanakkara (West Indies) at the Imperial College of Tropical Agriculture in 1950 showed that the typical rice farmer and his wife (growing perhaps ½ to 5 acres of paddy) used 236 man hours per acre to till the soil for their crop With the help of the rice land Rotary Hoe, the labour requirement was reduced to 50·3 man hours. For larger farmers or contractors, the wheeled tractor and Rotavator reduced the labour requirements to less than 10 man hours.

It is gratifying to mention that the preliminary investigations on puddling with tractor in the Madras State in 1949, 1950, and 1951, showed that puddling with tractors is a definitely feasible item and the triple objects of efficiency, timeliness with turnover and low costs can be secured by mechanisation of this vital operation in rice cultivation.

Rotary tillage and rotavation: In the field of agricultural implements and machinery the Disc plough which is otherwise known as Rotary ploughing is adopted in large wheat fields. This machinery is replacing the mould board ploughs of the West. These are also being used in the Madras State with very good advantage. Rotary ploughing gives more output and at a lesser cost as compared to mould board ploughing. The roto-tiller or Rotavator or a kind of rotary cultivation are being increasingly used now for vegetable and garden crops in preference to other methods of tillage.

Rotary tillage is the method of cultivation that is now commonly called "Rotavation" and the principles on which it is based can be summarised as below :–

According to Shawl (1946) the rotary plough was invented about 90 years ago. The rotary plough has been used in Europe, for many years but the American farmer has only recently become interested in this type of plough. They are divided into three types viz.

(i) The pull auxiliary engine – where the rotary plough is pulled forward by a tractor but has the cutting knives driven by an auxiliary engine mounted on the frame of the plough.

(ii) The pull power-take-off driven – where the Rotary plough is not only pulled forward by the tractor but has the cutting knives also driven by the tractor. The cutting knives or lines are generally mounted on a horizontal power driven shaft which operates at about 300 r. p. m.

(iii) The self propelled garden type rotary ploughs have one drive wheel, while others have two. Some garden type rotary ploughs can also be used for cultivating vegetable crops.

These rotary cultivators have proved to be extremely valuable in horticultural work and for the incorporation of organic matter in the top few inches of soil and for cultivation among crops and in plantations.

According to "World Crops", Rotavation, the modern means of cultivating rice, is a time and man power saving technique, which is fast superceding the slow and laborious traditional use of manual and animal drawn implements. Greater areas are worked in a fraction of the time with these. The recent efforts in Ceylon, Thailand, Malaya and Philipines in mechanising rice cultivation are of considerable value in this connection and all countries have been using more and more rotavation.

It is said that in 1951 alone five times as many power bladed Rotary hoes went into Indian farms as in 1950. The demand found in some 67 other countries particularly in those which till recently have relied on age old technique and are now striving for rapid mechanisation of their agriculture, to meet the growing food needs of their people.

The rotavator represents a new and revolutionary science of cultivation which has proved itself by demonstration, field test and practical farm work to be particularly suited to the needs of countries faced with the problems of this kind.

The working and advantage of rotavator: The rotavator produces not only the right sort of cultivation but also better tilth by being thorough and quicker and is thus so much more economical. It also adds benefits of inereased fertility. Rotavators are available in various sizes. The important aspect about the Rotavator is that it is a tool which puts the maximum amount of tractor power direct to the work of tillering the soil, the basic principle of the machine. The specially bladed rotavator which can now be power coupled direct to most leading makes of tractors provides a forward thrust which assists the tractor in its work and vigorous tests over years have proved that the wheel slip experienced with other cultivators is eliminated. The forward thrust of the hoes aid less soil compaction under the wheels. The cultivating job is done by the hoe shaped blades. They cut clearly through the weeds, green crops, trash, sugarcane stools, lifting the earth, breaking it up and putting it back with finer particles underneath. During this process the earth is shaken loose and thoroughly aerated.

In preparing seed bed, the chopping up and turning in action of the rotavator blades put trash and any green manure crops evenly through the soil, thus ensuring its rapid decomposition into rich humus contact. However, the basic soil crumb structure is preserved intact.

Since the Rotavator will cultivate even more quickly than the tractor powered plough and disc harrow, time is available for the planting

of such crops which can be turned in for soil improvement. It gives quick and thorough tillage where surface cultivation is the rule and can handle the entire cultivating processes efficiently. This is also true of the hand controlled models which is a blessing to small farmers. The rotavator has now become a valuable and much sought after implements for all kinds of cultivation.

Role of rotavation in rice fields: It is calculated that more than 60% of world's total rice production is by the wet paddy method. Faced with the rapidly rising population, the traditional crude indigenous cultivation methods gradually have begun to give place to mechanisation. As mechanisation remains a major step towards economy of labour and efficiency of tillage and the cultivation of much wider area, the need for a special wet paddy Rotavator resulted in small hand controlled 6 H. P. "Gem" which rapidly won favour on the small peasant holdings in Trinidad, Malaya and Spain. More recently tractor powered rotavators with a standard cut of 50" and a cultivating depth of 9" have been successfully employed in the various parts of India.

At Mankhand, in Bombay State, the Rotavator covered on an average $\frac{3}{4}$ of an acre per hour. The quality of the job done was excellent resulting in perfect mixture of soil. The soil was worked to a depth of 7" burying all weeds and the consistency of the puddle was uniform throughout.

In France in the Camargue, the largest number and sizes of rotavators are used in conjunction with 60 and 70 H. P. French tractors.

In South Africa, swamp and marshes have been reclaimed by Rotavators under the Rice Expert of the Colonial Development Corporation, Mr. Gaspar Snokolay.

The rotavator tractor attachment also has entered the wet paddy fields of Madras State. Equipped with the special swept back rice blades-it was successfully demonstrated in 1951 in Madras where it did the work of puddling, green manuring and levelling without any of the wheel slip experienced with other types of cultivators.

Other Use: The rotavator is now playing an important role in the growing of sugarcane. Here again there is immense saving of time and labour. Two operations with the rotavator are said to do the whole job of harrowing down the ridges, ploughing in trash equally distributed which otherwise would have been wastefully burnt requiring further discing and ridging. The increase in soil fertility by mixing the chopped up trash through the soil to form valuable humus is an important factor contributed directly by Rotavation.

They can also be worked in tea gardens, preparing seed beds and hoeing between young tea. These are eminently suited for vegetable and orchard cultivation and for the inter-row cultivation of such crops as cotton, tobacco, maize and millet.

In dry farming also they can do the complete cultivating. They are of robust build.

Conclusion: It is admitted on all hands that there can be no maximisation of food production without mechanisation of farming. Besides producing more food, more cheaply from our present cultivated lands with the aid of agricultural machinery, the best method by which our vast uncultivated land could be brought into production expeditiously and economically is by the use of mechanical equipment.

It is clearly established now that tractor power can produce wider and better cultivation only if it is applied to the proper implements. And many will admit that the pride of place among these implements for its speed, economy and thoroughness of tillage, goes to the "ROTAVATOR".

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Helping the Ryot

By

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To Agricultural workers in all walks of life whether in the field or in the laboratory, the most essential function is to help the ryot. The nature of the help and the capacity for help may vary with the position of the worker as well as the ryot. Help has to be rendered to the small illiterate ryot, the bigger land-lord, the manager of large Farms and on occasions to the ryots' community as a whole whether in any one locality or on wider field. Within the past decade partly due to the high prices following the war and partly due to the need for meeting shortages, there has been a greater intensity on the part of the ryots to take up agricultural improvements and this drive for better agriculture is likely to gain more and more opportunities in the five year plan for India, which is now finalised by the Prime Minister.

The great merit of the Five year plan is its large emphasis on agriculture. Agriculture provides the raw material for industry, the nucleus for expansion of Commerce and in a large measure the food for the common population. In the Five year plan, the allocation to agriculture and commodity development is of the order of 360 crores, to irrigation, 168 crores and to multipurpose irrigation and power 266 crores, or altogether about 37% of the total finance of 2,069 crores for the plan. Although the amount of 794 crores is by no means small its actual use spread over five years will depend on the proper utilisation to a country which is now producing annually about 5,000 crores of agricultural produce, besides a large standing wealth in the cattle populations.

Many agencies have their part to play in this work of agricultural expansion. There are social benefits as in the community programmes which should bring in a general expansion of living standards increasing amenities, better housing, better education and better purchasing power to ryot populations. These should be directed to meet the fundamental needs of the ryot as the freedom to cultivate his crops, freedom from exploitation and the freedom to market his produce without which agriculture can never have a stable existence. To a certain extent, Legislative enactments in the regulated markets will give freedom of markets to the ryots but the essential need of the plan is to work a proper price pattern, a pattern which should be able to produce by 1955–56, the increased target production of 6 million tons of food grains, 42 lakhs of bales of cotton, 54 lakhs of bales of Jute, 6·3 million tons of Sugarcane and 5·5 million tons of oilseeds. To a large extent, the irrigation programmes which are expected to cover 69 million acres, the power

programmes and the fertiliser programme of 4,50,000 tons of ammonium sulphate and 1,60,000 tons of super phosphate will provide the means to reach the targets of production but the actual realisation of the target will depend on the provision of facilities which will encourage the ryot to direct his cropping to reach the production goals.

The ryot can no longer be called conservative. He has grown millions of acres every year under improved seed and utilised lakhs of tons of fertilisers. Even in such large scale improvements involving heavy capital outlay like the Tractor schemes over seven lakhs of acres have been covered in India, which is by no means small. There has been also increasing use of green leaf and compost and a wider application of pesticides to valuables crops. All of this has been possible because the ryot has been profited by the endeavours and that he has been convinced of the utility thereof, over and above the costs. This should be the guiding principle in all agricultural improvements. Agricultural production should be related to agricultural costs, so that there should be a profit incentive to reach the targets through agricultural improvements. In other words, price patterns should work towards price support as well as agricultural stabilisation.

In the expansion of the agricultural plan, a necessary feature is the proper balance between large and small holdings, while the ultimate action should be an increase in the land cultivated by owners, there should be also facilities for agricultural enterprise through large farms which alone in the present state of agriculture can take up large commercial improvements. It may be said that the larger the farm, the greater its capacity for surplus food or production. Thus while hegemony in land ownership should be avoided, there should be scope for land management and enterprise, at any rate, till such time as production targets are more or less reached.

The five year plan following on an intensive drive for increased production will give to agricultural workers, opportunities for work and service to ryots which will cover an extensive field and on an intensive scale. To research workers there is great opportunity to enlarge their sphere of activity. Future Agriculture requires research work of a very high order as in the harnessing of waters to new crops and areas the provision against flood famines and cyclones, the remedies against pest invasions and, if possible, the creation of artificial rain or the utilisation of atomic energy in the service of the land. Research may even change the patterns of employment, providing for mechanical aids which will place lesser people on the land and more people in the industries. But whatever the method the aim of the research worker in helping ryots should be to place before their material and knowledge which will enable them in a comprehensive as well as extensive scale to utilise their land and crop resources to the greatest advantage.

To extension workers, the agricultural plan will provide, not only material for disseminating increased knowledge among ryots but also conditions which will give them better living standards and a greater utilisation of their resources. Apart from the social aspect which will be covered by the community schemes the aim of the agriculture worker should be to give a greater technical education in the application of improvements so that the ryot will not only be in a position to apply them, but will also get necessary endeavour to expand that knowledge in new lines and over wide areas. Opportunities there will be to help the individual ryots, as in providing cheap manure or seed or to help the larger community of ryots in providing amenities like pest control or crop improvement over a wide field; but in developing such opportunities there is great scope for technical workers to enrich the field and their contribution will have a very important place in not only improving the quality of work, but making it lasting to the large population of ryots and to the country at large.

Cotton Research in Madras — A Retrospect

By

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Cotton happened to be one of the few crops in which the East India Company was actively interested during the first half of the nineteenth century, more to feed and maintain the textile industry of England than to help in the development of the national resources of India. The aim though selfish, has been largely responsible for the subsequent establishment of a stable and efficient Indian industry in the twentieth century. Our dependancy on foreign cloth has not only ceased completely but our textile products are now in great demand in other countries. In the space of one hundred years, India has forged herself to a prominent place among the nations hitherto leading in the manufacture of cotton textiles.

As part of the general plan drawn up for the cultivation of American cotton in India, experiments were conducted during the nineteenth century at select centres of Madras State by the East India Company with varieties of *barbadense* and *hirsutum* cottons imported from countries in America. Their only objective was to explore the possibilities of large scale cultivation of long staple cotton races, then largely consumed by the mills in England. Although several attempts were made and hopes of successful acclimatisation were expressed during the pendancy of the trial, the venture proved a thorough failure in the end. The only surviving relic of the experiment is the *Bourbon* cotton now found admixed with indigenous *nadam* as a perennial crop in portions of Coimbatore and Salem districts. The interest in such large scale cultivation waned by about the year 18c0 but the observational plots of American types were continued to be studied at the Agricultural Farm at Saidapet upto the last decade of that century. The trends and results were no more promising or successful than those recorded by the East India Company.

The first signs of success in the cultivation of American cotton were obtained during the years 1907 to 1915 when the few seeds of *Cambodia* variety brought by Mr. Steele of Harvey and Company from Indo China, grown in the backyards of Virudupatti and tried as irrigated crop in Coimbatore district, gained great popularity with the farmers. The area increase was thereafter phenomenal and purely voluntary. Mr. H. C. Sampson, Deputy

Director of Agriculture selected pure lines from the new variety and distributed it as No. 15. Later in the year 1920, the breeding and agronomy of the crop were entrusted to a whole time officer styled as Cotton Specialist. Madras owes its pre-eminent position it holds today to the contribution of successive specialists in the evolution, multiplication and maintenance of sturdy long staple varieties like Cambodia 2, Madras Uganda 1 and 2. The discovery of the two last named strains made double cropping of tankfed wetlands in the south possible, reduced imports of high priced East African styles needed for fine and superfine yarns and helped in development of regions experiencing short water supply during critical periods of growth. Madras carved for herself a niche among the countries producing long staple cotton of 1-1/16 inch.

The lesson of East India Company and the work on exotic varieties at Saidapet farm opened the eyes of the then Government on the need for undertaking improvement work on indigenous races. Even as early as the year 1914, the efforts of the regional Deputy Directors in Agriculture met with good success. Northerns 14 which is still unbeaten today is acclaimed as one of the very best Indian Cottons; Westerns 25 and *Karunganni* C-7 held sway in the respective regions until the year 1929 when the newer types Westerns 1 and Karunganni 1 started replacing them; Karunganni 2—a bread and butter strain—has been ousting rapidly its erstwhile populpar type Karunganni 1; and newer races have been developed for *Mungari* and *Cocanadas* areas. Thus the cotton research in the State not only changed the picture in kapas yield per acre but also in ginning outturn, staple length and spinning performance. The farmers realised bigger monetary returns, the old and new mills drew regular supplies of specified qualities, trade prospered in regional market centres and the research workers took on hand newer problems for solution and for the betterment of the crop and the cultivator.

The cotton grower owes a great deal to the farsighted programmes drawn up and partly put into effect by the early workers in the State on the hybridisation within the indigenous races of India and between varieties in exotic American types. The big jumps in staple length, ginning outturn and adaptability made in Asiatic cottons were due to crosses effected with *indicum*, *bengalense* and *cernuum* races. In the Karunganni area, types exceeding one inch in staple have been isolated; in Northerns region, an eight percent increase in ginning has been registered; in

Westerns zone, drought evading and high ginning types have been evolved and in *Mungari* and *Cocanadas* tracts, quality has been stepped up without sacrificing any of the other good attributes, Similarly, the achievements in American cotton would not have been possible but for the imports of a large number of reputed types from all over the world and crossing them with local Cambodia cotton.

The work done on agronomy of cotton has likewise yielded valuable results applicable to Cambodia and Karunganni areas. The main recommendations were on sowing dates, seed rates, pre-cultivation practices and manures. Irrigated Cambodia in Coimbatore taluk and in South Arcot District registered increases ranging from forty to three hundred percent when planted early in September and in December months respectively; removal of Sorghum stubble immediately after harvest improved the Karunganni cotton yield by ten percent in Coimbatore district; a heavy seed rate sufficient to create a population of 40,000 plants per acre was the best for winter irrigated Madras Uganda 1. Mixed cropping of indigo with *irungu* sorghum in Tinnies area and clusterbeans with irrigated Sorghum in Coimbatore district advanced the yield of succeeding cotton by about sixteen percent; and application of 40 lb. nitrogen in the form of ammonium sulphate to irrigated Cambodia and 29 lb. nitrogen to unirrigated Karunganni proved to be very remunerative.

The division of India in the year 1947 and the paramount need for saving foreign exchange, created new problems in the supply and consumption of cotton by Indian mills which were steadily expanding their production and capturing external markets. Madras had to devise ways and means of stepping up production to meet the emergency. Her plans included among the other orthodox items, long range programme of intensive cultivation of fallows in canal and tank fed rice regions where supplementary irrigation from wells and other sources would be possible. The success achieved with the short duration Punjab cotton 216F was beyond question and the progressive increase in acreage registered in the Cauvery delta during the last two years angurs well. The behaviour of the Madyapradesh H. 420 cotton as mixture with bunch groundnut sown in June—July months in Ceded districts and select portions in Circars was likewise very encouraging and the practice contributed to the increased profits of the farmer. Similar mixed cropping with irrigated and raingrown crops advocated in other regions proved to be more remunerative than the cultivation of the component crops in an unmixed state. Sea Island cotton in

West Coast districts and perennial varieties like Moco in backyards of most districts appeared to offer great scope for expansion in the future. They are new ideas which need constant attention, pursuasion and review for being put into general practice.

Crop losses arising out of pests and diseases were cut down by plant protection measures, by breeding for resistance and by advocating changes in agronomy. Considerable work has been done on resistance to jassids, stem weevil and blackarm attacking American types. The problem of jassids in Tungabadhra project was got over by early planting in the middle of August and blackarm was partly minimised by pretreatment with organo-mercury compounds. Legislative enactments have been passed for controlling pests like stem weevil and boll worms which reduce yield and lower quality.

The growth of mill industry in the State especially in the southern districts owes a great deal to the fruits of cotton research obtained at Coimbatore and other attached centres. The wealth of the farmers in the Cambodia area is due to the introduction, evolution and spread of improved types by the Agricultural Department. In the larger interests of the cotton farmers, the Government have been forced to adopt legislative measures for safeguarding the reputation and quality of the *staple cottons grown in respective areas.* Their proper implementation with the whole-hearted co-operation of the traders would ensure continued prosperity for all concerned while any relaxation in vigilance might place the good name, quality and price in jeopardy. It is therefore incumbent on all growers and traders to help the State in everyone of her efforts to establish and maintain a reputation for her cotton varieties developed and released periodically by the research staff who are obliged to spend considerable time, labour and money. Madras State offers immense possibilities for expanding cotton cultivation without affecting food production. Great progress can be achieved in a decade or two, if the store of scientific knowledge accumulated on the study of cotton varieties is focussed on the new problems. There is every possibility of Madras producing eventually all her annual requirements of raw cotton which may be tentatively placed at 8·5 lakh bales in the years to come, when she will have expanded her mill industry to the full.

Grow More Cotton

By

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Introduction: The conditions after World War (II) brought about a sharp decline in the area and production of cotton in the Indian Union. The partition of the country aggravated the situation. The annual needs of the present mill industry in the country work to a minimum of forty lakh bales of cotton (of 400 lb. each). During the year 1949–'50, the production declined to the low level of 28 lakh bales. Import of foreign cotton at a very high cost of about one hundred crores of rupees and over per annum became inevitable for bridging the gap between the demand and supply in order to avert a crisis in the Indian Mill industry. There was a scramble for the purchase of the limited quantities of cotton produced in the country and this resulted in the unhealthy competition in trade with the result that prices for all varieties of cotton shot up and superior varieties began to be mixed up with inferior ones. The Government had to step in and fix a price structure for the different varieties of cotton grown in the Indian Union and allot quotas to the various mills in the country in order to assist the Mill industry from closing down and in order to keep the cost of the resulting yarns and cloth at reasonable levels so as not to hit the consumer. The price structure for the various cottons was also designed in such a way as to check wilful adulteration of superior with inferior cottons.

The Integrated Cotton Extension Plan: The Integrated Short term Cotton Extension Plan of the Government of India was launched during 1950 in order to make good the shortage of 12 lakhs of bales required by the Nation. The Scheme was originally planned for a period of two years, 1950–'51 and 1951–'52 for increasing the production in the country by six lakh bales in each year i. e., increasing the 1950–'51 production from 28 lakh bales to 34 lakh bales and taking it up to 40 lakh bales at the end of the 1951–'52 season. The co-operation of the various State Governments was sought for implementing the Scheme and financial assistance was assured by the Central Government. The Government of India and the State Governments gave various concessions for encouraging cotton cultivation without at the same time affecting the food production in the country. Additional staff for propaganda for the purpose was sanctioned for the important cotton growing States of India and targets for each State fixed.

Extension work in 1950–'51 & 1951–'52: This Cotton Extension work has been in progress in the Indian Union during the years 1950–'51 and 1951–'52. The seasonal conditions not only in Madras but in certain

other States also were very adverse for increased cotton production. The production at the end of 1951–'52 season has been estimated to be about 36 lakh bales as against the original target of 40 lakh bales. The Scheme was extended for a further period of one year (1952–'53) and the work has been in progrees once again in the face of adverse seasonal conditions in Madras and in certain other States of India.

Cotton Extension in the Five-year Plan: Population has been increasing at an alarming rate of 1·1% per annum and commensurate with the growing needs of the country a target of 45 lakhs of bales has been fixed in the Nation's Five Year Plan, besides the short-term Integrated Cotton Extension Plan. Targets and programme for 1953-54 have been called by the Government of India in furtherance of the increased targets fixed. It is, therefore, incumbent on every State to implement the plan energetically in order to realise annually the target of 45 lakh bales fixed for achievement at the end of the period of operation of the Five-year plan. The country has not only to achieve the total quantity of 45 lakhs of bales of cotton every year but the bulk of it must be transformed into up-graded qualities i. e., the Short-Staple to be converted as medium Staple and the medium Staple to be changed to Long-Staple, through extended cultivation of improved varieties of cotton seeds evolved through years of patient research by the various Departments of Agriculture in the Indian Union. Not only that, the country must be able to grow a certain quantity of extra-long Staple cottons like the Egyptians in order to check the drain of money from the country by the import of such superior styles. Besides, large cotton acreages must be brought under irrigation in order to step up yields through extended use of chemical manures.

Seasonal and other Conditions in Madras: The position of Madras is somewhat peculiar as compared to the other States. There are a number of Commercial Cotton regions in the State, each with its own sowing and harvesting seasons. Throughout the year, cotton sowing will be in progress in some part of the State or other. The cottons in the various Commercial regions are of diverse qualities. When the Cotton Extension Scheme started in 1950–'51, Madras was already experiencing the fourth year of drought in succession. The Season during 1951–'52 was the fifth year of drought in succession in Madras and eleven of the districts were in the grip of famine conditions either totally or partially. The year 1952–'53 has once again been disappointing, the conditions being much worse than during the previous five years as both the monsoons happened to fail. Under such very adverse conditions, Madras has been able to achieve a part of the target fixed. On account of the diversity of seasons of sowing and harvest, of cultivation practices and of quality of the various cottons grown in the State, the methods to be adopted in this State for stepping up cotton production are also many and varied.

Achievement in Madras: What was over 25 lakhs of acres under cotton in the Madras State producing over 5 lakh bales every year dwindled down to 13·6 lakhs of acres producing 2·7 lakhs of bales in 1947–'48, the partition year. The production of cotton in Madras during 1950–'51 and 1951–'52, was 3 48 lakh bales and 3·97 lakh bales respectively. The seasonal conditions during these two years were very adverse and on account of the intense propaganda work under the Cotton Extension Plans formulated for the State, it was possible to realise the production levels as mentioned above. It has been estimated that as a result of the Cotton Extension Plan in Madras during 1951–'52, about 50,000 extra bales of cotton have been achieved. The final forecast estimates of area and production during the year 1951–'52 are 17·95 lakhs of acres and 3·97 lakhs of bales respectively.

It has been possible to achieve the extra production of half a lakh of bales of cotton in spite of eleven districts in the State being in the grip of famine either in part or whole. A scrutiny of the expenditure shows that it has cost approximately Rs 2·7 to produce every bale of extra half a lakh of bales produced under the Scheme during 1951–'52 and the total value of the extra 50,000 bales works to between 2 and 2½ crores of rupees. It will, therefore, be seen that the amount spent on the Cotton Extension Scheme in the M dras State is quite a small sum when the value of the extra-production of raw cotton for meeting the serious cotton shortage in the Country is taken into consideration. It is also to be noted that had the season been either a normal or a good one for cotton, the cost of production of every additional bale would have been still less and the total value of the extra cotton produced would have been much more than the 2 to 2½ crores of rupees.

Items of Cotton Extension work in Madras: The more important items under the Cotton Extension Plan in Madras for stepping up cotton production of improved varieties of cotton are (1) reclamation of waste lands by tractor cultivation for growing cotton (2) diversion of area from oil-seeds and other non-food crops, (3) double-cropping i. e., cultivation of cotton in rice fallows, (4) mixed cropping with crops like groundnut, ragi and chillies both unirrigated and irrigated, (5) distribution of seeds of improved strains on an extended scale, (6) application of fertilizers like ammonium sulphate, (7) adoption of plant protection measur s and (8) adoption of improved cultivation methods. Under all these items, the extended use of improved seeds of cotton has an important place.

Cotton Control Bill in Madras: The Cotton Control Bill in Madras which has been recently passed into an Act aims at improving the quality of cottons grown in the State and at preventing wilful adulteration. The Act empowers the Government to fix the variety of cotton to be cultivated in any area and prohibit the mixing of the Standard cotton with any

other cotton. This measure, if properly worked, ought to create a good demand for improved cotton seeds and enable the Madras State to produce the pure strains of cotton evolved by the Department over large areas and increase the production of improved strains particularly of the type of Madras Cambodia Uganda–1, which has placed Madras prominently on the Cotton map of India.

Conclusion: It may be necessary to continue the Cotton Extension Plan in the Indian Union for some more years, at least till the completion of the Five-Year Plan period, so that the 45 lakes of bales of cotton required by the Nation could be achieved at the end of the period What is more important is to devise ways and means of retaining the areas and production of cotton required by the country on a permanent basis. A National Crop Planning enforcing by law definite areas for cotton cultivation every year in suitable places in the country with price guarantee for the cottons produced will ultimately become necessary as also for other essential crops required by the nation such as food crops, jute and sugar. At the present moment, *it is a National duty for every cultivator to become cotton-minded and help in increasing the area and production of cotton in the country without affecting the cultivation of food-crops.*