

INCREASING RICE AND FOOD PRODUCTION IN KERALA

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Some suggestions on the experiments that need
to be undertaken

By

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As desired by the Minister for Agriculture and Chairman of the Board, I discussed with the Members of the Board, questions relating to the building up of the scientific base necessary for initiating an Action Programme designed to enable Kerala to produce at least 2 million tonnes of rice during 1970-71 from the present area of about 800,000 hectares under this crop. I also discussed the steps necessary to achieve a better co-ordination between the Institute of the Indian Council of Agricultural Research in Kerala and the State Agricultural Research Stations. I give below the suggestions evolved on the basis of these discussions for the consideration of the Minister.

I. Creating the Scientific base necessary for achieving a production of about 2 million tonnes of rice by 1970-71 :

a) Need for the Scientific Base:

The Agricultural Action Programme initiated in the different parts of India since 1965 in wheat and rice have revealed two opposite patterns of response and achievement. In wheat a very substantial progress in production was achieved within 3 years and even official expectations were exceeded. Such progress was possible because of the accumulation of the requisite amount of research data on the performance of different dwarf varieties of Wheat and on the changes needed in the agronomic practices such as the depth of sowing, the time of first and last irrigation and the method of application of fertilizers. The reactions of the new varieties to the major diseases of wheat were carefully studied. Such data were gathered during the years 1963-65. A National Demonstration programme was initiated during 1965 to familiarise the farming community with the new vistas in yield opened up by the dwarf varieties combined with the altered agronomy. After generating their enthusiasm and acceptance, an import of 18,000 tonnes of seeds of dwarf varieties was made by the Government of India in 1966 from Mexico. Rapid progress was consequently made in making the seeds of new varieties available to farmers. The wheat programme was thus erected on the foundation of scientific knowledge and extension training and resulted in a spectacular success.

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In contrast, the rice programmes initiated in the different States including Kerala in 1965-66 did not yield the anticipated results because in this action plan, administrative action preceded the development of adequate knowledge concerning the Taiwan and Philippine varieties. Such hastily conceived programmes tend to make farmers sceptical of the new technology and would harm the prospect of agricultural transformation. I would therefore strongly emphasise the need for first creating as speedily as possible the scientific base necessary for formulating an Action Programme. Only through sound scientific research can the economic yield of our crops be continuously enhanced, without detriment to the long term productivity of the soil. The following decisions were taken at the meeting for achieving this aim.

b) Scientific programmes to be initiated during 1968:

The rice growing areas of Kerala fall into five broad groups based upon the type of cultivation and the number of crops taken.

1. Modan dry land cultivation.
2. Single crop wet land
3. Double crop wet land (Virippu and Mundakan)
4. Triple crop wet land (Virippu, Mundakan and Punja).
5. Special areas comprising the Punja lands of Kuttanad, Kole areas of Trichur and Pokkali lands of Ernakulam District.

Efforts have to be made to increase the yield in all these areas through the use of better varieties coupled with suitable alterations in the agronomic practices. It was agreed that the available data are not adequate to make concrete recommendations for achieving a major spurt in production. Hence, the following trials will be undertaken immediately to gather the data necessary for policy decision.

1. Modan cultivation:

Much progress has been made in Japan and Taiwan in increasing the yield of dry land paddy through the introduction of cultural practices conducive to the creation of reducing conditions in the soil, such as compaction. Suitable implements would have to be devised for this purpose. Trials will be organised at Pottambi (Palghat District), Ambalavayal (Calicut District) Konni (Quilon

District) and Pilicode (Cannanore District) in the State Research Stations to assess the performance of the varieties -Taichung Native I, Taichung Native II (which is about 10 days earlier than Taichung Native I), IR-8 and Blue Belle (a short duration American variety). Taichung Native I has a type of leaf senescence pattern which is suitable for upland conditions. The local varieties will be included as control and the agronomic treatments will include steps for the preservation of soil moisture and for the creation of reductive condition. Seed rate, pre-soaking of seeds and other useful agronomic variables will be included in the trial.

2. Single crop wet land:

The largest area under this class of cultivation is in Central Kerala. Here, trials will be laid out with PTB-10, Culture-28, IR-8, IR-532 and Indica type of Tainan-3 (from Indian Agricultural Research Institute) in maximisation-cum-varietal assessment trials at Ambalavayal, Neriamangalam and Vellayani. The proper sowing date will be determined on the basis of sowing date trials with these varieties.

In single crop wet lands, the possibility of raising two crops can be investigated, since short duration and quick-yielding varieties are now available. However, in order to select areas where an Action Programme on double cropping can be initiated, it would be necessary to analyse the rainfall and weather data of the last 30 years and determine precisely how cropping sequences can be altered without undue risk. The Meteorological Section of the Vellayani College can take up such a study immediately in order to help in preparing the experimental programme. The Indian Agricultural Research Institute, New Delhi, will be happy to help in interpreting the weather data.

3. Double crop wet land:

A major portion of the rice area of Kerala falls under this group. Usually, the first crop (Virippu) is dry sown by broadcasting with the onset of the first showers. The next crop (Mundakan) is transplanted. Certain risks are involved in dry sowing, particularly if there is a long interval between the onset of the first showers and the subsequent rainfall. Hence, the question of transplanting a short duration variety can also be examined. In the direct sown crop, two agronomic problems needing careful study are seed rate and method of application of fertilizer. Weeds are usually serious in the directly-sown crop and they may use up much of the nitrogen applied through soil. The effectiveness of foliar feeding of nitrogen should hence be investigated with reference to both the critical time and the dosage of application. In this connection, the possibility of applying high concentrations of Urea (about 30%) through the use of low volume of sprayers should be investigated. The I.A.R.I. can help in organising this experiment.

The varieties to be included in the trial for the first crop are: IR-8, PTB 9, PTB 26, PTB 2 and for the second crop PTB 4, IR-8,, IR 532 and other suitable varieties selected from the Uniform Varietal Trials organised at Pattambi under the All India Co-ordinated Rice Improvement Programme. These varieties should be grown in a maximisation-cum-varietal assessment trial at Pattambi, Kayankulam, Mannuthi and Karamanai.

4. Tripæ crop land:

In tripæ-crop areas a summer crop is raised with the help of lift irrigation. In such a crop foliar feeding of fertilizer may be both effective and economical. Trials can be laid out at Trichur, Palghat and Ernakulam on the performance of Culture-28, PTB 10, Taichung Native II and Blue Belle in the first crop. The importance of adding organic matter for the second and third crops should be carefully studied by the Soil Physics and Soil Chemistry Sections. The feasibility and economics of recommending sprinkler irrigation should also be studied.

5. Special areas:

i) Kuttanad: This concentrated area of paddy cultivation with an educated and enterprising farming community, offers an excellent opportunity for immediately stepping up rice production. The average yield in this area is now only about 2 tonnes per hectare, while several farmers harvested during the last season about 5 tonnes with IR-8. The major factors limiting yield in this area are (a) acidity which can be removed through the application of Calcium Carbonate or Dolomite (b) weak bunds which need protection and strengthening (c) severe bird damage for which efficient methods of control have to be evolved and (d) poor water management.

Although rice has a tissue which transfers oxygen from the leaves to roots and secretes transferred oxygen into the soil to offset the reductive condition prevailing in the soil, root rot occurs when there is continuous sub-mergence. The optimum submergence - drainage cycle needs to be investigated. Short periods of draining of soil during the tillering stage may be particularly important. It is also important to work out more precisely both the types of fertilizers to be used as well as the fertilizer doses which are economical. This has to be done in conjunction with a study of the extent of photosynthesis. Unless the seedlings contain both nitrogen and carbohydrates in a proper proportion, they may not give stable yield and there may be much sterility. This would probably explain the high incidence of sterility in IR-8 during the monsoon season in some parts of Kerala, such as Wynad. Foliar feeding may also be efficient and economic in this large area and if feasible, aerial spraying of urea can be done a little before the ear emergence stage. Agronomic maximisation cum varietal assessment trials should be laid out at Moncompu and at a few other places in Kuttanad

with the varieties IR-8, Taichung Native 1, PTB 20, PTB 10, A2, Culture 28 and the Indica type of Tainan-3. The use of foliar feeding of K should also be studied.

A separate experiment on the form of lime and the method of application which are the most effective should be conducted. Intensive steps are also needed for the eradication of Salvinia. Salvinia could probably be used for composting or converted into ash.

ii) Pokkali areas: Suitable varieties are not yet available for increasing yields in this area substantially. The work on breeding by crossing IR-8 and other varieties with SR-26-B and other salt-tolerant varieties should be intensified. The method of application of fertiliser has also to be standardised.

iii) Kole lands: A trial can be organised at Trichur with PTB-10, Culture 28 and IR-8 with a view to standardise the agronomic practices necessary for maximising yield.

c) Pattern of organisation and fixing of specific responsibilities ;

The above mentioned experiments should not be viewed as one other set of trials among the numerous activities of the research stations. If the experiments are to subserve the purpose of providing the data necessary for important policy decisions concerning the allocation of resources, they have to be organised on very sound scientific lines. The following steps are recommended:

i) A small Committee of Scientists including a Statistician and an Economist should be constituted immediately to draw up the experimental designs for the trials.

ii) In all places where trials are conducted, a Soil Physicist, a Soil Chemist and a Microbiologist should be associated intimately with the Breeder and Agronomist. This consortium of Scientists should work as a common team along with the Pathologist and the Entomologist. The credit or blame for the success or failure of these trials should go to all of them.

iii) A suitable pocket book should be devised by the agricultural Economist for the purpose of gathering data essential for an economic analysis of the data which would be necessary for farming an action plant. It should not be forgotten that the main purpose of agricultural research is to bring out a continuous rise

in the economic yield of crop plants without detriment to the long term productivity of the soil.

iv) The overall coordination of these trials could be entrusted with the Additional Director of Agriculture (Extension and Research) who should visit all the trials at least twice along with the other Specialists once during the early stage and once before harvest.

v) The additional staff and facilities needed for the successful organisation of these experiments should be provided. The technical programmes of the existing Stations are already too heavy in relation to the scientific staff available. A re-fixation of priorities could help in immediately assigning some good workers for conducting the experiments on which the 2 million tonnes Rice Plan has to be based. However, without additional funds the experiments may not be conducted properly and hence the necessary resources should be developed.

d) Formulation of the 2 million tonnes Rice Production Plan:

On the basis of the data of these trials, an action plan can be drawn up with confidence for doubling the rice production within the next three years. Along with the trials, a maximisation plot, about half acre to one acre in size, can be laid out in each farm with a view to estimating the maximum yield that can be obtained with the available know-how. The maximisation plot in the three crop areas should aim at producing about 20 tonnes per hectare per year. Since increased rice availability is the primary component of Kerala's Food Problem, the experiments and maximisation work outlined in this report should be undertaken with the seriousness and personal involvement they deserve. The senior staff should set an example by personally participating in all phases of the work. They should not remain content with providing occasional supervision.

II. Co-ordination with the Central Tuber Crop Research Institute:

Since members of the Board and the Minister himself had expressed disappointment at the lack of adequate co-ordination between State Research Institutions and the I.C.A.R. Institutes, I discussed the question of how this communication gap can be bridged. Dr. M.L. Magoon, Director, Central Tuber Crop Research Institute, indicated that he would be happy if the varieties evolved at the Central Tuber Crop Research Institute are tested by the Department and if the members of the Board and others interested visit the farm of the

Central Tuber Crop Research Institute. On the basis of the discussion, it was agreed that the following trials will be laid out this year, subject to the approval of the Director-General, I.C.A.R.

a) Tapioca:

Ten strains to be provided by the Central Tuber Crop Research Institute will be tested along with M⁴ and any other local strain at Vellayani, Peringamalai, Kariavattom (University farm), Mavelikara, Neriampalam, Kozha Pattambi, Mannuthi, Kayankulam, Taliparamba, Ambalavayal and Nelliampathi. Dr. Magoon will ensure that the material supplied is free of viruses, since Mr. C.M. John feared that such trials may get the virus disease spread, unless care is taken to ensure that only virus free stocks are used at the various locations. The data from these trials will be used for preparing the proposals for the Central Variety Release Committee. The Director of Agriculture gave the assurance that the material of any unreleased variety will not be supplied to farmers, before the variety is approved by the Central Variety Release Committee.

b) Sweet potato:

Dr. Magoon will supply four new varieties, which will be tested at suitable locations by the Department of Agriculture.

c) Coconut and Arecanut:

The Achievement Audit Committee nominated by the Indian Council of Agricultural Research in 1966 has already made suggestions about the procedures which would be of use in bringing about greater co-operation and co-ordination with the State Institutions. These suggestions could be implemented by the I.C.A.R.

III. New approaches to Input
Production and Supply :

I would stress the need for clearly defining the duties of different organisations with regard to the production of the nucleus, foundation and certified seeds of varieties and planting materials. A field of research which the Kerala Government ought to stimulate and foster, is work on the standardisation of techniques for the desalination of sea water. This would be great help in increasing

production in the coastal areas of Kerala, which suffer from the deficit of moisture during the period, November to May.

IV. New problems needing attention:

It is but natural that every new action may have several reactions - some favourable and others not. In a rapid survey of the Kuttanad rice area, I observed patches of yellow seedlings in the variety IR-8. Apparently, the Department of Agriculture has been recommending the application of nitrogen in such patches. I, however, suspect that virus diseases may also be involved. This should be investigated by the Plant Pathologists, since otherwise the disease may assume epidemic proportions in a year or two.

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