# Limitations In Rice Improvement Activities And How To Improve Them By Team Approach In Africa.

by

*Abifarin, A.O. & #Virmani, S.S.

A paper presented at the Rice Workshop, Rokupr, Sierra Leone.

September 28 - October 4, 1975.

Rice is gaining in importance as a food crop in many African countries. In recent years many new rice development projects and industries have been launched for its production and processing, which have contributed to its increased cultivation and consumption in Africa; from 3177,000 ha and 5541,000 tons in 1961-1965 to 3903,000 ha and 6945,000 tons in 1973. (FAO Production Year Book, Vol.27).

Rice can be grown under different ecological conditions which contributes to its importance in Africa. It is grown on irrigated lands, inundated riverine lands, upland and in fresh, saline or acid coastal lands.

In spite of the increased awareness of rice importance and its increased production, a large amount is still imported into Africa. Thus, national governments and institutions have developed rice improvement programs to eventually attain self sufficiency. These improvement programs differ in scope from one country to another and from one research or developmental organization to another within the same country.

## LIMITATIONS OF THE PRESENT APPROACH

The majority of these efforts have two common problems in logistics.

* Rice Breeder, IITA, Ibadan, Nigeria

# Rice Breeder, IITA/IDA, Liberia Rice Project, Monrovia, Liberia.

1. Insufficient contact between research and extension staff.

In many places the research and extension personnel are under different departments and little or no contact exist between the two. It is not uncommon to find an agronomist in a research station carrying out fertilizer trials that are not meaningful for the farmer. For instance, in an area where farmers are already applying 80 kg N/ha, we have trials trying nitrogen rates 0, 20, 40, and 60 kg of N per hectare. The reverse is also true; we have trials using 80, 120, 160 and 200 kg N/ha where the economic rate is about 40kg/ha. In many cases farmers are unable to obtain fertilizer to satisfy even the low rate recommended.

The contact between the plant breeders, extension personnel and the farmers is equally bad. Some breeders do not consider the requirement of farmers before deciding on the plant type of rice to develop. An example is a case where a high yielding upland variety less than one meter in height is rejected by the farmers in particular area.

The pathologists and entomologists sometimes pay too much attention to the problems existing in their stations without considering the major problems in areas where rice is grown. An example is paying too much attention on leaf blast resistance with total disregard to neck blast and/or Helminthosporium which are the main problems in the main rice growing areas.

The only contact in most cases is limited to when the extension worker wants to know the current best variety or the new herbicide available. Moreover, the researcher himself rarely visits the farms to view their problems, he only imparts his findings annually to the extension specialist. In many cases these recommendations fail since they are often non-reproducible outside the research station.

../3

Introduced technology has also made no big impact on our improvement effort. Some research stations introduce varieties, chemicals etc. that have proved successful in other countries. In some cases, these are given straight to the farmers and we are aware of many introduced varieties that have broken down to African pests and diseases. Some introduced reputed chemicals in other countries have failed to control the type of weeds and insects on many farms in Africa. Because of different climatic factors, soils, flora, fauna and the level of development of the majority of our farmers, the direct use of exotic technology will fail in many cases.

2. Limited or absense of contact between research staff.

Lack of coordination and cooperation between the different disciplines has contributed a lot to the relatively slow progress research has made to the farmers. There are many research stations in Africa today with three to six researchers in different disciplines working on rice. There are also some places where only one researcher tries his hand on all disciplines. Our attention is turned to the former case.

Several researchers on a station working on rice clearly provides a good opportunity for making rapid progress. However, due to lack of coordination, their progress is not as fast as one would expect. For example, the agronomist rarely knows what the breeder or the pathologist is doing, each being concerned only with their own discipline. Unfortunately most of the research work is publication oriented rather than practically useful to farmers, since in many cases, the researcher is assessed and promoted by the number of publications he produces with no regard to the applicability of the scientific papers.

../4

It is not uncommon to hear an entomologist telling the breeders "your varieties are very good, the insects like them very much!" The pathologists complain about the poor effect of the recommended herbicides of the agronomists. The physiologists complain about the lack of resistance to pests of cultivars supplied by the breeder for his greenhouse research.

In view of the above, we present some suggestions which if followed, we feel would strengthen our research and enhance the utility of our findings by the farming community whom we serve.

THE TEAM APPROACH.

The above unpleasantness and poor coordination will be done away with if a team approach is practised. This team approach is suggested for the researchers in a given organization on the one hand and the researchers and the extension staff on the other.

This approach is not new, but we endeavour to present some concrete suggestions to improve or bring about a good team approach. Hitherto, much lip service is paid to this so called team approach. Even the highly organised institutions practised this team approach little untill recently. There, individual disciplines are highlighted instead of regarding all efforts as facets of an integrated improvement program.

Research and extension staff.

The research and extension staff should have a very meaningful contact and joint program. The Massagana 99 and the National Accelerated Food Production of the Philippines and Nigeria, respectively are examples of the cooperation of researchers and extension workers to some extent. The contact here, although it could still be improved, is better than not having any. The researchers are requested to submit their proven packages for trials on the farmers' fields. The researchers meet with the extension

workers periodically and accompany them to the farmers' plots. This enables the researchers to know the farmers' problems on the spot. He is more stimulated to solve these problems by reorienting his research approach towards the problems.

In addition to the above method of researchers contacting the farmers, we recommend that extension staff be invited at least twice a year to the research plots. Farmers should also accompany them whenever possible. Farmers and extension workers should be asked the best treatment seen on the fields visited. We suggest also that some of our research should be done under the farmers conditions. This will mean carrying out our trials under his level of land preparation, soil fertility, water and weed control. This will afford us an opportunity to determine the repeatability or otherwise of our on-station trials. The final package given to the farmers will thus be more acceptable.

The new approach within the station.

The interdisciplinary or team approach has to start on the research station within the various research disciplines. We submit below how this can be achieved.

There should be an extensive collection of germplasm on the station, either through introduction and/or from local collection. Because of their training, breeders when available on the station, should be in charge of this exercise. Otherwise, any other scientist in any other discipline can take charge. Many good collections and selections have been made in many places by non breeders as long as there was the interest and understanding, and well laid down important criteria followed. The evaluation of the germplasm should be done by all the disciplines. It should not be left only for the plant breeder. Each of the problem area researchers should

visit the evaluation plots regularly and take notes. Often all concerned should go out together to the field and compare notes making an on the spot decision on what should be retained and what should be rejected. The retained materials would be donors of desirable traits for future hybridization.

The plant breeder or whoever is performing that role on the station would make extensive intercrossing of the selected donors in various cycles to generate optimum genetic variability. To maximize the volume of crossing we recommend the use of vacuum emasculator as done at the International Rice Research Institute at the Philippines and at the International Institute of Tropical Agriculture, in Nigeria. The other method which may be used is genetic male sterility and chemically-induced male sterility. High volume crossing will bring about the accumulation of favourable genes for traits of complex inheritance. This will also allow the breakages of undesirable linkages. A series of planned crosses will be done before selection begins. The pedigree method of selection will be used to identify the desired genotypes.

Coordinated selection will begin at the $F_1$ for the composite and back crosses and $F_2$ for the single, or two-way crosses. We suggest a joint effort by all specialists to screen the upgraded population and plants with desirable traits are then selected. Having chosen a given genotype, there could be special stresses imposed by the various disciplines in the team. These stresses for instance,may involve two or more specialists jointly designing the best way,to handle the segregating materials in each generation. The selected genotype in each generation may have to be divided into two or more parts,for various stresses,while concurrently the field nurseries are in progress.

We suggest the following:-

1. Rhyncosporium, Helminthosporium, etc. screening.
2. Screening against the most economic insect pests.
3. Screening in the greenhouse for the most important soil mineral deficiency or toxicity and response under low nitrogen application.
4. Screening under low soil moisture condition, deep flooding, cold air and/or cold water condition.
5. Screening for chemical and physical qualities.
6. Some seeds should be kept in the bank-file.

Well laid down criteria should be used to decide which plants or lines are selected by all disciplines involved.

The above scheme will be repeated every year until the lines are sufficiently uniform for the important characters and a nursery is jointly organised. The following season an observational yield nursery is run from which some are selected into yield trials in many locations on farmers' fields, as well as on research stations.

The advantages of this approach are many. All disciplines are involved and everyone knows what is happening in each area and we all follow the history of the variety being developed. It will not be the breeder's variety and the agronomist and physiologist will be able to pick non-segregating lines for their trials. The jointly recommended variety will have a better chance of success on the farmers' fields.

There should be a proper identification of priorities for the team approach to succeed. Objectives and criteria for achieving them should be well drawn out. Next in importance is the proper identification of screening methods. These should have acceptable agreement with the field results.

../8

The role of International Institute of Tropical Agriculture (IITA).

In closing, we like to consider briefly the role of an international institute such as the IITA in the above approach.

The IITA can provide sustenance for the integrated approach by proper leadership in the following areas:

a. Breeding of materials so generated that can be utilized by national programs to isolate genotype adaptable to their local requirements.

b. Help national programs to adapt the Institute's screening methods to their local conditions.

c. Making available all research findings to the national programs.

d. Encouraging and participating in the national programs.

e. Carrying out backup research in problem areas.

f. Where not already in existence, suggesting ways which national programs could be interdisciplinary in approach.

g. Undertaking various levels of training for research and rice development.

Conclusion.

To have an integrated rice improvement program in a given research station or in a country, there should be a reappraisal of our current methods and change to a team approach. With this integrated effort in a country, and liberal exchange of materials, information, and travel between and within African countries, we can achieve an integrated rice improvement program in each country, both specifically, and to a large extent in Africa as a whole.