REPORT

prepared by

The Technical Advisory Team to the Cooperation Project

for Maize Project East Java, Indonesia

October, 1970

OVERSEAS TECHNICAL COOPERATION AGENCY

PREFACE

In April, 1971, the Cooperation Project for Maize Project East Java is to accomplish one stage in its development program. This is the second round of the rotating advisor schedule. Now that the first stage of the project is nearing its end, our present advisory team not only actively cooperated with the local experts in the promotion of their activities but also especially tried to grasp the current situation, and simultaneously worked out concrete measures for locating and solving problems which are blocking the further development of this project.

The present report involves such essential items as the locating of various problemmatical points jointly by the technical advisory team and the local experts, the mapping out of definite measures to solve these problems, recent test results and the investigation of the current situation.

In doing research and drawing up this report we were very much assisted and supported by the experts stationed in the area investigated, and among other things, we would like to express our sincere thanks to those who were kind enough to provide us with necessary data or who participated in our discussions for finding concrete steps to overcome the bottlenecks.

We are equally obliged to those people connected with the cooperation project for maize Project East Java or with the community in the project areas.

The list of the Technical Advisory Team:

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I. Concrete Policies for Solving Problems

These concrete policies may, of course, be concerned with the promotion of the scheduled annual operations of the project, and developments after the end of the project will be taken over by the Indonesian side, which is expected to further and develop such results. The following descriptions will be given with respect to the concrete measures for the solution of the problems:

1. Guidelines for Production

a. Seed-raising

The seed-raising system now in practice in Indonesia is given below:

Classification	Raised at
Breeders' Seeds	Bogor
Foundation Seeds	"
Stock Seeds	Branch Station, Bogor
Extension Seeds	Prefectural Seed-raising Field

Recommended varieties handled by the Research Center at Bogor are Metro, Harapan, Bogor Synthetic 2 (Permadi), Bima, Pandu and Bosta Kuning, In addition, there are such recognized superior varieties as Bogor Composite 2 and Bogor Composite 4.

Metro, Harapan and Keretek are the varieties grown in the Maize project. Thus, depending upon the nature of the project area, seeds resistant to "downy mildew" must sometimes be chosen, and sometimes early ripening varieties are needed for rotation planting. The original seeds of these conventional varieties, however, are now not being handled by the Bogor Research Center. These varieties must therefore be grown by the Research Center for seed-raising. If this were impossible, our maize project itself would have to raise seeds. In such a case, we should start by tracing back to the sources of the original seeds concerned because even the conventional seeds so named are often found to have different characteristics.

Next, we note that the varieties now being planted in the maize project include Metro and Harapan; these seeds are raised as Extention Seeds in the same maize project. The stock seeds for this purpose, however, are available from the branch station of the Bogor Research Center. And the prefecture-owned seed farm also is engaged in seed-raising. Even if the varieties from these stations bear the same names, their characteristics are different. The reasons are that the seed-raising

grounds are not strictly isolated from one another, and an uniforme method is not being employed in the selection of ears of maize forming the source of seeds among the seed-raising stations or fields. Originally, either Metro or Harapan is a Composite, and each of them has a hereditarly composition that is complicated. As a result, the color of grains in the pistil ears and/or the quality of such grains are not uniform. Thus, the transition of their characteristic properties is believed to have been caused by the method by which is the pistil ears are selected for seed-raising. The Guatemala species of maize, the planting of which is now highly encouraged in Thailand, is also a composite, with problems similar to these. Because of this, the study of methods for proper selection of ears for seed-raising is under way, and guidance is given as to correct selection. In Indonesia as well, it is necessary to start such a study as soon as possible with regard to the seed-raising of composites. It must also be emphasized that some means should be sought to maintain their respective properties involving an estimation of the coming generation at the stage of either Breeder's seeds or Foundation seeds. The following diagram is given to show one of the best methods. This special technique is a way to prevent inbreeding propagation in parallel to eliminate hereditary inferiorities.

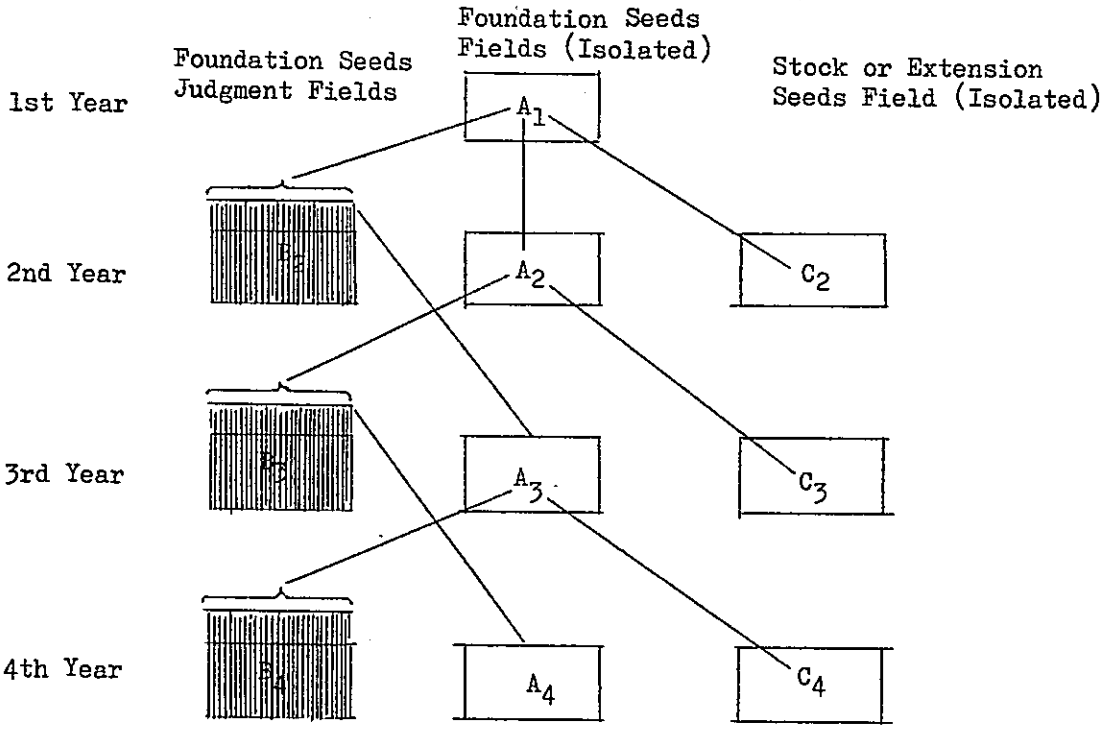

Diagram of Practical Method of Increasing Seeds of Maize Variety

The seed-raising fields for Foundation seeds, Stock seeds and Extension seeds had better be isolated by woodland or paddy fields. If these barriers are not available, the seed-raising grounds should be kept at a distance of about 300 meters from common maize fields.

b. Experiment program

Tests have so far been made by local experts with regard to planting density, proper quantity of fertilizer to be applied, and differences of resistance shown by varieties of maize to downy mildew, and also tests were made in order to protect against or to eliminate downy mildew by treating with chemicals.

With respect to the planting density and the quantity of fertilizers, it may be said that no difference is visible whether maize plants are grown densely or sparsely, if the quantity of fertilizers applied is small. But, where an ample quantity of fertilizer has been applied, an increased yield would usually result from dense planting. It has already been proved that a yield of 5 to 6 tons of maize per hectare was possible from 90,000 maize plants/ha in a field where Metro or Perta variety had been cultivated by applying 400kg/ ha of urea.

A tentative encouragement standard has been made in regard to the planting density classified by variety in the case where the application rate of fertilizer is set at 150 to 200 kg per ha.

Furthermore, in connection with downy mildew we were able to learn the differences of each variety and varietal cross in their resistance against this kind of fungi. Especially in Malang, we came to learn that it would be comparatively easy to grow a disease-resisting hybrid judging from the cultivation results of such a varietal cross. After experiments for the prevention of this disease by using chemical compounds, we found out that the outbreak of the disease could be controlled to a considerable extent by spraying the maize plant several times after germination with such medical compounds as M-Difer(maneb), antracol (propineb) and Sakigaren T_{15} (Cycloheximide-triphenyltinacetate) etc. But for the practical application of this method, there still remain some questions to be solved.

Besides, another prevention method has been established against Fly, which is likely to break out while the maize plant is still very young.

The main problems still remaining unsolved and requiring further study and experimentation are as follows:

1. Study concerning the infection course of downy mildew.
2. Study concerning the ecological conditions resulting in the

outbreak of downy mildew.

3. Study of the prevention of downy mildew.
4. Breeding varieties or hybrids resistant to downy mildew.
5. Selection of varieties suitable for each maize project area.
6. Tests on the relationship between plant population and the quantity of fertilizers to be applied per unit area.
7. Study regarding the drying methods for ears of maize.
8. Study of the variety, Milo, and its cultivation method (considering the period suitable for drying and the dry zone).

c. Extension

After the tentative fixing of the standard for maize culture methods recommendable to the average farmer, the next important thing to do is to find out a way to publish this standard to farmers quickly and correctly; especially to those farmers whose education is poor.

If we take Malang prefecture as an example to see the actual situation of the extension system now in practice, there are only 70 farm advisors throughout this prefecture consisting of 32 villages,415 kampong(hamlets), 400,000 farming households and 100,050 ha of arable land (of which 100,000 ha is farming fields). Each local farm advisor is in charge of about 5,700 farming households, while in Japan such a farm advisor usually takes charge of about 500 households. Thus the average Indonesian farm advisor must take care of 10 times as many households as his Japanese counterpart. Moreover, the so-called agricultural cooperative association system has not yet been developed well enough in Indonesia. Consequently extension work has been much delayed.

In general, the area of maize projects ranges from 400 ha at the least to 2,000 at most. The number of experts giving technical advice to such projects is only one or two. Hereafter the number of farm advisors or people concerned with extension projects must increase. Maize projects located both in Malang and Banjuwangi prefectures have either a "Kepala Desa" (hamlet chief) or "Kepala Kelompok" (head agent) responsible to an association leader, who is charged with giving project tenants necessary advice or guidance on production and collection of produce. If few farm advisors are available close at hand, the Kepala Kelompok system should be utilized. Furthermore, staff members stationed in each project area at various places will be charged with overseeing or giving advice to the hamlet chief or kepala kelompok, keeping in touch with the association leader concerned. A so-called extension center should be established at Malang, where educational training

will be given to Indonesian farm advisors, assistant staff-members and kepala kelompok, For this purpose, the number of Japanese experts despatched to the area must increase.

2. Quality Improvement

In widely scattered areas within East Java Province maize growers are accustomed to sell their crops as ear corn to brokers; therefore, they have no habit of drying, threshing and sorting out their harvests by their own hand. In most cases they are not equipped with drying facilities or threshing tools; even farmers in areas where they do dry and thresh their maize crops intended for sale themselves are not sufficiently provided with drying equipment, or do not devote the care and coordination necessary in the light of the urgency with which they have to get ready their fields for second crops or planting.

In order to cope with such situation, here are some points requiring improvement:

1. To provide farmers with materials for making simple drying devices (as bamboo-made dryers).
2. To establish a center for joint collection of produce.
3. To install large-size threshing machines as well as maize dryers.
4. To install large-scale sorting machines.
5. To practice fumigation.

3. Collection and Trasnport of produce.

To promote and assist the activities of agricultural cooperative associations, and to increase the number of trucks available for transportation.

4. Export

Basical consideration should be given to efforts to put Indonesian maize in a far better position in the world market in the future. As a matter of international concern, the type of packing for export maize, after the determination of the price on the basis FOB Indonesian ports, should be changed to bulk shipment from conventional bagging, to facilitate ocean transportation. For that purpose the number of "bulk boats" must be increased in an attempt to cut down the freightage by using super-sized boats, and also to reduce stevedoring charges.

Domestically, it is necessary to keep the F.O.B. price for export maize as low as possible so that it can easily compete with that of other sources in the international market. For that purpose, it is most desirable to reduce not only the producer's price for maize but also transport charge from production areas to shipping ports for export.

It is further desirable to simplify the coustoms clearance procedures and

to revise the tariff rates for maize stored in bonded ware houses as well as storage charges.

5. Strengthening of Organization

In order to carry out this increased production, improvement in quality, storage, transport and farming guidance,nurturing cooperative association, it is essential for each project area to read just its organization by employing sufficient personnel to increase its activities, and to provide adequate farm buildings land.

* Land and Buildings

At the Malang branch of the projected organization it is desirable to test and train in addition to other services performed by other branches. At present, tests are conducted in the seed-raising field rented from the Malang prefectural seed-raising farm. Therefore, fields assigned to its own use should be provided for isolation of varieties and accurate testing; (the area of the farming ground desired should be about 3 ha, while other fields for consigned seed-raising and on-the-spot tests are also required).

With regard to buildings, it must be mentioned that each branch should have its own office. The Malang branch especially needs to be furnished with a godown as well as an educational training center.

This center, of course, should to be furnished with training rooms, simple loading rooms and a dining hall.

II. Tests and Advice for Drying Maize

The maize harvesting period in East Java Province usually falls in the wet season. Therefore, it takes much time and space to dry all the maize harvested by exposing to the sun until its moisture content comes down as low as 14%. For this reason, sometimes there is no alternative but to store the harvest piled up with its high moisture content. It naturally becomes heated and molds begin to germinate, eventually resulting in the lowering of the quality in most cases.

For this fiscal year, it has been scheduled to dry at the first step the maize grains whose moisture contents have reached 18 to 20%, then to make possible by raising technical levels gradually the drying of maize kernels containing greater moisture (more than 25%). Drying machines therefore have not been concentrated in one place alone, but instead have been scattered in many places. In fact, if actual drying operations start, it is usually the the case to have to deal with maize kernels containing a ghigh moisture content, one of more than 25%, in any locality.

Advice is being given to cope with such a situation. As a first step by us technical advisors taken in this direction, a training course was held for the staff members of the agricultural machinery center at Walu (numbering 14 to 15).

In order to train and teach them on the spot, five of them were chosen and stationed one after another to get practical instruction at Kedeli. And then they were sent to places where drying machines have been installed on order to give practical advice to local farmers.

Originally, these drying machines ("Urica" TV-40 manufactured by the Oshima Agricultural Machinery Co,, Ltd.) have been designed to dry rice and wheat, so tests were made to gain the accurate knowledge as to the heating temperature, drying velocity and drying capacity for maize. Depending on the data from the test results, a reference standard has been made for drying maize kernels.