

REPORT ON TECHNICAL GUIDANCE  
FOR  
LAMPUNG AGRICULTURAL DEVELOPMENT PROJECT

May, 1975

Japan International Cooperation Agency



国際協力事業団	
受入 月日 '84 5.24	108
登録No. 07498	80.7
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## Introduction

With two years past since the start, this project seems now to be making a satisfactory progress on the whole though there is some delay in certain aspects due to the so-called "Oil Shock" and other matters.

The rice field demonstration farms are showing successful results, better than expected, with a crop as good as that in Western Java, but at newly developed paddy field where basic ground improvement has been finished the growth of lowland rice is not sufficient and conspicuous nonuniformity is observed in the growth. Since the Lampung Province has a wide area of land capable of being developed, this problem should be solved through farm tests.

Dry field demonstration farms are getting a crop more than twice as large as that before starting this project. Many farmers are still in the stage of seeking self-supply of food, and farm tests are being carried out with respect not only to techniques for increasing the yield and selection of proper varieties but also to the cropping system of various kinds of plants to be cultivated as a measure for helping the farmers in growing beyond the level of self-sufficiency and for increasing their income. These tests seems to be quite adequate activities.

The training for the extension workers and leading farmers is not yet sufficient probably due to shortage of fund, and satisfactory progress has not been seen in the organization of farming people. With A. D. C. and R. E. C. planned to be started shortly, a striding progress is expected in the extension of agricultural knowledge and techniques and in bringing farming people into organization. Accordingly the training of A. D. C. - and R. E. C. personnel must be carried out.

To promote such trainings, the counter part and Japanese experts are required to make detailed training plans and make preparation for the budget, equipment and texts for the training. In order to make the training efficient and appropriate for the actual circumstances of Lampung, the persons in charge of cultivation, extension, agricultural machines and management should maintain close contact with each other so as to coordinate

their views and opinions and further should try to make original ideas and contrivances.

The basic land improvement work at Totokaton is reported to be impracticable because of too high costs. In this matter it is necessary to review the land improvement plan as soon as possible, showing a practicable cost plan.

With the first half of the agreed period already past, the project must be promoted by making every possible effort for the second half. For this purpose our technical guidance team investigated into the actual state on the spot and discussed with experts about difficulties in promoting the project, principal items and method of cooperation to be extended by individual expert, etc. We summarize our views and opinions in the following, which we hope to be of use in promoting the project in future.

1. Paddy Field Cultivation

(1) Establishment of techniques for preventing abnormal growth at newly prepared paddy field

In the rice cultivation test at the Center, the ground preparation of 3-ha paddy field out of the planned 5 ha was completed and planting was started in February 1974, with the second planting being made at present. In spite of application of 200 kg of nitrogenous fertilizer and 200 kg of phosphatic fertilizer per hectare, the growing conditions of rice plant at the newly prepared paddy field are unsatisfactory, with conspicuous non-uniformity of growth and reddish-browning at the tip of leaf at the offshooting period being observed. Such phenomena are also seen at paddy fields where basic land improvement was carried out at Totokaton demonstration farm. In order to bring the rice plant cultivation at Totokaton demonstration farm to success and to promote the paddy field developing work now in progress in the Province of Lampung and the planned developing work at various other provinces, it is necessary to establish at an earliest possible time the technical measures for preventing abnormal growth at new paddy fields including the selection of suitable varieties, and the Center is required to accelerate its tests powerfully.

(2) Improvement in cultivation techniques at paddy demonstration farms

The rice crop at paddy field demonstration farms is considered satisfactory and is expected to exceed 5 t/ha which is the target for this project. In general, however, the crop is still at a level of 3.5 t/ha, so that efforts should be made to raise the overall level of crop. Important measures for this purpose include improvement in fertilization techniques and establishment of preventive techniques against diseases and harmful insects by efficient use of chemicals based on forecast system. In addition, it is necessary to review weeding techniques and water management techniques by and extension in these respects are urgently required.

## 2. Upland Cultivation

### (1) Improvement in traditional cultivation techniques and future trend

In the upland cultivation tests at the Center, the target for the present was set at improving the traditional cultivation techniques in this district, and technical improvement is being carried out in mixed cropping of upland rice, cassaba and maize. The effect of improved fertilization on this system, especially that of increased application of nitrogeneous and phosphate fertilizers, is remarkable, and in view of increased farmer profits based on increased crop of upland rice and maize, there seems a large possibility of extension of this system. Further intensification on this system requires introduction of legume in addition to sorgum. Now tests are being conducted for the introduction of ground nuts, green peas and cowpeas and study is being made on labor distribution as well as plant combination system. As it is expected that the mixed cropping is replaced by single cropping with a view to the improvement of cultivation techniques and labor saving in future, tests are being conducted with emphasis placed on fertilization techniques for upland rice plant and cassaba. The mixed cropping system is considered to be highly reasonable for the farming in this district, and therefore it is of great significance to further improve this system for the present agricultural cooperation, and extension of the improved system is much desired. On the other hand it is necessary to prepare techniques for the next stage of agricultural development. Accordingly the abovementioned various tests should further be promoted.

### (2) Tests at demonstration farms and trial plots

Improved techniques for traditional mixed cropping are being applied at the demonstration farm with as good increased fertilization effect as at the Center. In order to estimate the local applicability of cultivation improvement tests conducted at the Center, cultivation improvement tests are being carried out at trial plots of each demonstration farm with the same design as at the Center. This seems to

be of much significance for gathering basic materials and data for the extension of techniques. Strongly desired is a prompt extension of the improved techniques under still closer cooperation between the Center and the trial plots of demonstration farms.

(3) Preventive measures against downy mildew of maize

As the measures for preventing downy mildew of maize that was virulent at the end of the year before last, the attacked plants were removed and cultivation of maize was prohibited for the time being, with temporary success. But fundamentally it is urgently required to select varieties of maize capable of resisting downy mildew and to extend it. At the Center, tests are being conducted for the selection of resistant family based on the variety "DMR-3" in addition to propagation work of variety "DMR-5" chiefly at LP3. Upon request from LP3, experts are extending cooperation as advisers for these tests and extension work, with satisfactory results. The prevention of downy mildew of maize is a problem to be urgently solved for the advance of maize cropping at this locality, and establishment of preventive techniques is desired under closer cooperation within possible range.

(4) Soybean cultivation test

In the soybean cultivation tests conducted at the Center most of the bean plants were attacked by virus. Further bean plants were greatly damaged by soybean-stem miner, resulting in very poor growth. With the present varieties and techniques it seems to be difficult to extend soybean cultivation in locality other than special district. For the promotion of soybean cultivation in future, it is urgently required to set up measures for the prevention of these troubles. Particularly the investigation of ecology of soybean-stem miner, for example, and other tests and investigations including certain basic study should be carried out promptly.



(5) Promotion of use of domestic animal power

In view of the present living standard, economic strength, and technical level of farming people, it would be realistic to take a course of proceeding from extension of small improved farming tools toward gradual mechanization. For this progress, it is necessary for the time being to promote the utilization of domestic animal power by introducing cattle into farming work. This requires improvements in tools for using animal power and a study of technical system for utilization of animal power. Introduction of large domestic animals into farmer operation brings about at the same time many advantages in farming economy such as improved soil fertility as a result of barnyard manure application and increased cash income due to breeding and growing of calves.

(6) Extension of simple drying and conditioning facility and storage facility

For cultivation, farmers mostly select mainly cassaba, upland rice plant and maize for both self-supply and sale. Excess crop after making reservation for the farmers' own needs is offered for sale. The harvest of cassaba and maize is in rainy season when the weather is very changeable and the quality of farm produce is apt to be deteriorated by insufficient drying due to rainfall. If improvement in productivity makes it easier for farmers to secure food for their own consumption in the future, cultivation area of cloves, peppers, tobaccos, palms and other plants for commercial production would be increased. For quality improvement of these crops as commercial produce and for better trading position, it is necessary to construct and use many drying and conditioning facilities and storage facilities. Desirable these facilities should be constructed at lowest possible cost. For example, at the initial stage the facility should be a very simple one equipped with only roofs as a shelter against rainfall during the harvest and blowers for normal temperature ventilation. A task to be undertaken in the future would be the designing of simple drying-conditioning facilities and storage facilities as well as a study on how

to use such facilities. In the production of commercial products, it would be necessary to promote the grouping and organization of cultivation by forming special production localities and the joint collection and marketing of produce by production associations and agricultural cooperatives, and these facilities would function as a core, around which farming people would be organized and special production localities would be formed.

### 3. Training

With Tegineneng Center being under construction, training is not conducted there so actively, probably also for reason of shortage of fund. The improvement of techniques, knowledge and will of extension workers and leading farmers is one of the most important prerequisites for increasing the income of farming people. Therefore, the counterparts along with specialists must make detailed plans for efficient training of those people, according to which they should make various preparations with respect to budget, training equipment, texts, facilities, training farms (for cultivation of plants at various stages), technical display farms (for display of varieties and cultivation techniques), etc. Reference should be made to the texts (draft) prepared according to respective specialities in Western Java. The training in Western Java was conducted for a period of only one week because of limited fund. But this is not sufficient, so we made out plans for two-week training respectively for rice plant cultivation and agricultural machines and tools and reported them in our final report. In Japan, practical training covering from seeding through harvest requires a period of five months. But in Indonesia where atmospheric temperature undergoes no marked change all through the year, it is possible to carry out training from seeding to harvesting within two weeks if plants at various stages of growth are prepared as mentioned above. Advantage should be taken of this favorable circumstance. Of these training farms, however, that of rice plant at harvesting stage is required to be prepared about five months in advance. Therefore, the training schedule must be decided at least about half a year in advance and the schedule should not be changed. To achieve the highest possible effect of training, the trainees should be given an opportunity to state their impressions and opinions after completion of each training on one hand, and the trainers on the other hand must give themselves an opportunity to examine themselves and review the completed training to find out points to be improved in the future training.

Demonstration farm people are trained at R. E. C. and in addition undergo on-the-spot training with emphasis placed on practical skill for various works. For illiterate people, special contrivance should be made such as preparation of illustrated texts. The leading farmers of demonstration farm should be given desirably a training of the same level as the dissemination advisers. But if circumstances of the farmers do not allow so long a period of training, emphasis should be placed on the management of demonstration farms and the facilitation of farmers' organization.

4. Demonstration Farm, A. D. C., R. E. C.

Failure in the demonstration farming operation will result in not only losing confidence of farming people in extension workers and new agricultural techniques but also bringing about troubles in the future extension work and promotion of farmer organization. Therefore, efforts should be made to achieve 100% success. Especially at the initial stage, emphasis should be placed on the quality of project achievement rather than on the quantity. We hear that the demonstration farming is making a satisfactory progress, with farms being rapidly increased in number. The number of extension workers and other personnel concerned should be increased in accordance with this plan, and in addition efforts must be made for the improvement of quality as well. Importance should also be given to the aftercare of demonstration farms, and efforts should be made for the study on efficient extension techniques to farming people around the demonstration farms as well as for forming farmers' organization.

In Western Java, one demonstration farm per seven prefectures was established as a youth demonstration farm that is operated exclusively by young people of agricultural districts, and the earnestness of such young people brought about wonderful results. This seems to be a hopeful experiment giving hopes and dreams to young people as successors of farmers. In the initial stage of demonstration farming operation in Western Java, there were marked differences in the results among individual demonstration farms. In demonstration farms where the extension workers and leading farmers are earnest, farming was conducted in accordance with the given instructions, achieving excellent results without exception. The demonstrated farming techniques and systems were extended to surrounding farmers, and production organization was expanded. In other demonstration farms where people were not so earnest, use and application of fertilizers and agricultural chemicals were problematic and instructions were not followed strictly. In such cases there were big differences

in the crop among individual farmers, and the average yield was low. Of such inferior demonstration farms, those farms that were unable even to carry out joint collection of unhulled rice covering the prices of fertilizers and agricultural chemicals returned to the original state, adversely affecting the surrounding farming people. In view of this, in the selection of demonstration farms importance should be attached to the earnestness and character of extension workers and leading farmers as well as to the conditions of location. Observation of advanced land by farmers would be of much use not only for the dissemination of new techniques but also for the enlightenment of people. Before starting demonstration farming, therefore, participating farmers should be given opportunities to visit and study farms of agriculturally advanced localities, which would be of great help for smooth progress of the project. In Indonesia, too, as in Japan, stories of farming people's experiences are expected to be of much use for extension of improved agricultural techniques. Therefore, it is desirable to make the most of the demonstration farming participants for the dissemination activities.

The Tegineneng Center becomes in A. D. C. where study and training are conducted in the farming of paddy-rice plant, dry field crops, perennials and various other plants, so that a highly efficient operation is possible.

Reportedly it is planned to increase the number of R. E. C. to fifteen in future. When these R. E. C.s are completed with the project getting under way, the agriculture of Lampung will make rapid progress.

We hope and expect that the facilities of A. D. C. and R. E. C. will be completed at an early date with sufficient and improved equipment and materials for training and study. Not less important is the improvement in the technical, planning and managing abilities of the personnel in charge of such centers.

The Counterpart is the core in the promotion of this project and much is expected from them as leaders for continued advance of this

operation after the termination of the agreement. They are all young, and though they are learned, they do not have much experience and are not expected to have sufficient planning and managing ability. Therefore, Japanese specialists should cooperate for the improvement of not only technical ability but also planning and managing abilities. On the other hand, it is hoped that the Counterpart will take every opportunity to develop their such abilities. Considering that mutual understanding is a basic prerequisite for the success of a joint project, we hope that a closer mutual communication and understanding will be established.

## 5. Agricultural Machinery

At present most of the farming people are carrying out farm work with only hoes and sickles. With these tools they are unable to expand the farming scale of upland field and so cannot bring themselves up beyond the level of self-supply of food. Since the Lampung Province is rich in land and grass resources, it would be advisable to introduce draft cows aiming at increased income through the expansion of farming scale. One method of introducing draft cows would be a cow-lending system under which cows are lent to farming people under the assistance of the nation and province and calves born from those lent cows are returned. Until about 20 years ago in Japan, cows were used as draft cows up to 4 - 6 of age and thereafter were sold as beef cattle. This system was useful in increasing the income of farmers and the supply of meat as well.

In Japan with rapid advance of industries after the War, labor force moved from agricultural districts into cities, resulting in labor shortage in agricultural villages. To cope with this situation, motor-powered farm machines and implements have been improved and spread throughout agricultural localities in the past 20 years with a miraculous speed. Animal-powered agricultural machines and foot-operated threshers and hand-operated-weeders cannot be seen any more in Japan. Before the War, Japanese agriculture was carried out by man-power and animal-power and emphasis was placed on the improvement of animal-powered farming implements and threshing-conditioning tools.

In the present state of things in Indonesia, there is a possibility that rice-cleaning machines and pumps among motor-powered agricultural machines will be accepted from economic viewpoint, but there is not much possibility of other motor-powered farm implements to be widely disseminated in the near future. For still some years to come, agriculture is expected to have to depend on man power and animal power, so that it is urgently required to improve and disseminate animal-powered plows, harrows, cultivators, man-powered threshers



and hoes. It is hoped that these farm implements will be introduced from foreign countries, improved jointly by Indonesian people and Japanese specialists and manufactured and disseminated in Indonesia. If use immediately after fertilizer application, the paddy field weeders will also prevent loss of fertilizer due to its outflow, and many farmers wish to use them. Therefore, paddy field weeder should be manufactured in Lampung.

Tilling and clearing work by use of hoes are very hard and inefficient, so that demand for tractors will become stronger with expansion of farming scale. However, common use of tractors is apt to cause troubles and many failures have been experienced in Japan. It would be necessary to study a method of training tractor operators and lending them tractors for use in contract work as well as a method of having R. E. C. contract for tractor operation (large tractors).

In disseminating farm implements, parts for repair and replacement must always be readily available.

The Teginenan Center is not equipped with any repair shop and the management of parts is not satisfactory. Urgently needed, therefore, are the construction of repair shops and parts warehouses, perfection of repairing equipment and training of repair workers.

We have heard that total capacity of rice cleaning machines exceeds total rice crop in the Lampung Province and therefore there is no need of additional rice cleaning machines for the time being. In view of the following, however, small rice cleaning machines are considered necessary:

- (1) New rice cleaning facilities are needed in localities far from the existing rice cleaning mills or in localities to be developed hereafter.
- (2) To have agricultural cooperatives undertake the distribution of rice, it would be necessary for farmer groups to have experience in the management of rice cleaning mills from now on.
- (3) In case of training Himpunan Tani, small rice cleaning machines are very suited for having them experience the advantage of joint operation.

## 6. Farmers' Organization

Everyone recognizes the importance of forming agricultural cooperative associations for the rationalization of distribution and for the protection of farmer interests, but unfortunately no one knows clearly how to form and establish agricultural cooperatives adapted for the actual circumstances in Indonesia. Establishment of organizations of farming people who are mostly illiterate and poor will require special originality, ingenuity and perseverance.

Demonstration farms are not only the core for dissemination of yield-increasing techniques but also the base for upbringing of farmers' organizations. Therefore, one or two farms for lowland and upland respectively should be selected out of good demonstration farms and intensive guidance should be given there to bring up model Himpunan Tanis. The number of Himpunan Tani should be increased gradually making use of this experience, and then agricultural cooperatives should be organized by such Himpunan Tanis, the cooperatives being developed in the future to Ketjamatan agricultural cooperatives. In other words agricultural cooperatives should be brought up with great patience step by step by a formula of 'demonstration farms --- Himpunan Tanis--- koporasi pertanian (agricultural cooperatives)'. Use should be made of this experience and of such Himpunan Tani koporasi as teaching aids in extension work. Then failures would be few and the organization would greatly contribute to the prosperity of farming people.

In bringing up Himpunan Tani, public officials are required to extend advices and cooperation as desired, but plans should not be forced on them. For the success in organizing farming people, it is essential to cooperate with them so that they may have will, self-confidence and hope. Confidence in the executive staff of the cooperative associations and experience of advantages of cooperative or joint activities are the foundation upon which to bring up the cooperative associations. Therefore, special attention should be paid to the following matters:

- (1) Utilizing fine customs of gotongroyong, advantages of joint operation should be experienced through joint seedling culture, joint prevention of blight and harmful insects, joint purchase of fertilizers, agricultural chemicals and seeds, joint management of rice cleaning mills and warehouses, etc.
- (2) We hear that failures in agricultural cooperative associations are attributable mostly to wrongdoings of executive staff and people's distrust of unfair executive staff. In view of this, persons of character who will give priority to the interests of all the members over his own interest should be selected as leaders of cooperative associations.
- (3) Accounting of agricultural cooperative associations should be opened and accounting data and statements should be published to members of association at least 3 - 4 times a year.

The government should give assistance by offering low interest funds for investment in buildings and machines by Himpunan Tani and agricultural cooperative associations and for purchase of agricultural products.

With respect to the funds now being raised at demonstration farms, prompt study should be made to find out significant way of using such funds including the investment to warehouse construction for storage of food for emergency and for lending it to farming people suffering from shortage of food at off-crop season and loaning to farmers who are compelled to sell their land to meet unexpected need of money.

7. **Guidance in Farming Management**

It is necessary to select 20 - 30 demonstration farmers in paddy field farming and upland farming respectively for investigation of their management for five consecutive years. During this period of investigation, advices should be given them while analyzing their management to find out the best method of guiding farming operation. Further it would be necessary to investigate into the management of general farmers in order to design standard farming of the future.

8. Farmland Improvement Plan at Totokaton D. F.

The primary object of farmland improvement would be generally to increase the area of paddy field by improving the irrigation channels. The second object would be to put farm roads in better condition for improving the efficiency of farming work, and the third would be to make overall fundamental condition more perfect including better-shaping of farmland. In carrying out farmland improvement plan in newly developed paddy field and flat farmland where exchange and consolidation of lands are easy and the volume of soil to be moved is small, construction of irrigation canals and roads should be done in conformity to future plans. But in fields having a large inclination, it would be necessary to construct main irrigation canals and farm roads so as to facilitate contour farming and especially to have a higher density of farm road net than in flat land. The scale and shape of farmland should be such that leveling work can be done by farming people themselves.

In case of existing paddy field, the ownership and distribution of land is usually complicated so that exchange and consolidation of lands are very difficult. On the other hand, however, existing irrigation canals are in most cases historically and technically located at appropriate positions. For the time being, therefore, work should be limited to only such repair as is necessary to make the location and size of irrigation canals more efficient and more suitable in view of future plan and water management and to improvement in the density of irrigation canals. As to farm roads, it is desirable first to maintain minimum irrigation canals and to increase the density of farm road by constructing roads for management and by widening footpaths between rice fields as farming road.

The improvement and consolidation of farmland being carried out at demonstration farms in Totokaton are of such precision as will be adaptable to future farming systems and technical progress and improvements, and accordingly can provide the foundation for demon-

stration of modern agriculture. However, if we consider only the improvement of farmland and its extension to surrounding farming people in a short time, the work would be difficult with the same precision as in the past because the land to be improved is not always flat. In addition, handling of surface soil and delay in farmland improvement work are problems still to be solved. Thus in land planned for work hereafter, the 8-ha land carried over to this year should be improved with the same precision as in the past, and the rest should desirably be handled according to the following system:

- (1) The land that has been improved should function as ideal demonstration farm of modern agriculture, and the precision of the farmland improvement should be able to serve as a model farmland for extension in flat land even at present.
- (2) For land that has not been improved, farmland improvement should be conducted in two different degree of precision. In the first case, irrigation canals and farm roads are constructed in accordance with the original plan, but the size and shape of farmland remain unchanged as a general rule except such farmland as will be divided or separated by the construction of irrigation canals and farm roads, and the expansion of farmland should be conducted in future gradually through leveling work by the farming people themselves. In the second case, attempts are made to improve the density of irrigation canals and to construct farm roads by utilizing existing footpaths between paddy fields without changing the present state as far as possible. These farmlands should function respectively as demonstration farm of modern improved agriculture suited to them.

If the land planned for improvement in future is improved in the methods described in section (2) above, the cost and time of construction work are estimated as follows:

- (2)-(i) In case of constructing irrigation canals and farm roads according to the original plan:

<b>Breakdown of construction cost (per ha)</b>	
Cost for operating construction machines (direct operation cost)	10,000 RP
Other construction work (contract cost)	73,000
Subtotal (local currency)	83,000
Cost for depreciation of construction machines	72,000
Total	155,000 RP
Time required for construction	2 days/ha

(2)-(ii) In case of improving the density of irrigation canals and constructing farm roads (e. g. , in case of improving the density by 20 m/ha)

Breakdown of construction cost (/ha)

Construction cost by contract	39,000 RP
Time required for construction	1.5 days/ha
* In case of constructing only farm roads	24,000 RP. ha

If the systems of items (2)-(i) and -(ii) are employed for the improvement of half the remaining area of 492 ha each, the cost and time of construction are estimated as follows:

Construction cost:

Cost by contract (i)	$73,000 \text{ RP/ha} \times 24.6 \text{ ha} =$	1,795,800 RP
(ii)	$39,000 \text{ RP/ha} \times 24.6 \text{ ha} =$	959,400 RP
Cost by direct operation	$10,000 \text{ RP/ha} \times 24.6 \text{ ha} =$	246,000 RP
Subtotal		3,001,200 RP
Rent of machines	$72,000 \text{ RP/ha} \times 24.6 \text{ ha} =$	1,771,200 RP
Total		4,772,000 RP

Time required for construction:

(i)	$2 \times 24.6$	2 months
(ii)	$1.5 \times 24.6$	1.5 months
		3.5 months

If the farmland improvement plan is changed definitely like this, it would be necessary to make calculation and construction plan giving consideration to detailed local conditions of the field.

One of the reasons for making large demonstration farms in Totokaton was the desire to bring up and strengthen the farmers having demonstration farms (community) as a model of farmers' organization. But if farmlands are improved as described above, the difference in farm conditions would result in the difference even in farming techniques, thus making the farmland exchange problem more complicated for farming people having their farmlands at separate places. Further the differences in farmland conditions would become a great obstacle in establishing organization of people possessing such different farmlands. This is the first problem expected to be encountered in case of carrying out the improvement of farmland in the abovementioned system. Next, it would be necessary to establish and demonstrate as soon as possible a farming system adapted to farmland conditions. There would also be dry field land where irrigation becomes physically impossible.

To solve these problems, when organization of farming people has been established, it should give assistance to farmers having farms of unsatisfactory condition by undertaking the improvement of farmland condition actively, and the government should also extend indirect aid. Further to solve such problems as establishment of farming system adapted to farmland condition and dry field farming in paddy region, further efforts would be required of persons concerned with the project.



