

**REPORT
ON
DEVELOPMENT PROJECT OF MAIZE
IN CAMBODIA**

FEBRUARY 1965

OVERSEAS TECHNICAL COOPERATION AGENCY

国際協力事業団		
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FOREWARD

The Government of Japan, which, at the request of the Government of Cambodia, undertook the task of performing a basic survey of the development of the maize production in the country by means of the budget for 1963, has entrusted its execution to Overseas Technical Cooperation Agency. The survey team of the Agency, headed by Mr. Takeuchi and consisted of eight experts, conducted a field survey over a period of two months (December 17th 1963--February 14th 1964). The team hereby submits the present report.

The Agency, since its foundation in June 1962 as an executive organ, of the Government of Japan to conduct the government's overseas technical cooperation, has been steadily achieving such results on the government basis as the dispatch of experts to, cooperation in the basic investigation of development projects with and induction of technical trainees from developing countries.

Nothing would be more gratifying to the Agency, if the present report could be of any contribution to the development of the maize production of Cambodia, and, at the same time, to the promotion of economic relations as well as to the amity between the two countries.

The Agency takes this opportunity to express its deepest sense of gratitude to the members of the survey team as well as to the authorities concerned of the Government of Cambodia for the cooperation extended to it.

July 1964

Overseas Technical Cooperation Agency



Shin-ichi Shibusawa
Director-General

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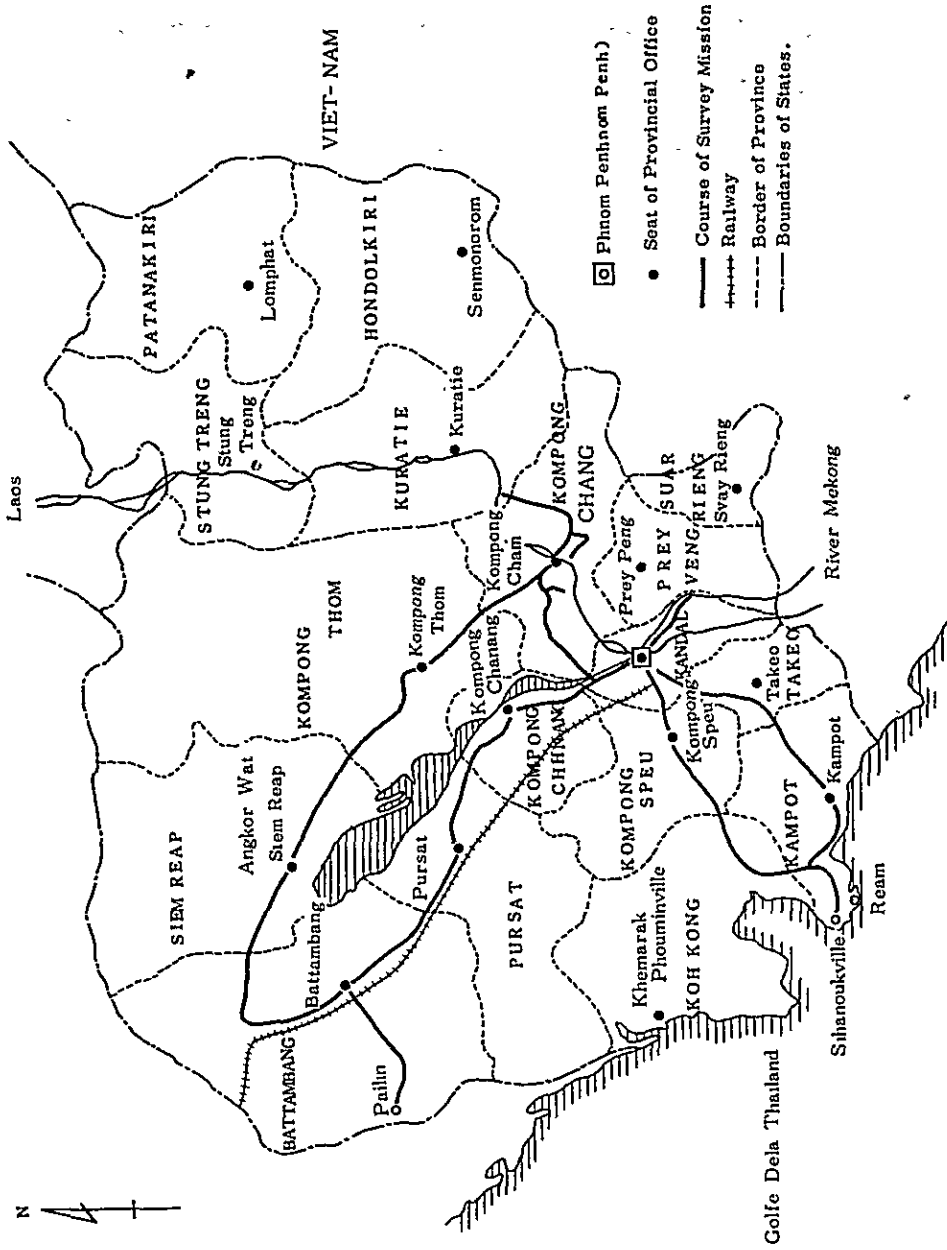
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Course of survey trip of Survey Mission



Chapter I . Objects in view and summary of investigation .

I Objects of investigation .

The objects of the survey mission consist in the investigation of the feasibility of correcting the existing trade unbalance between Cambodia and Japan by means of increasing the former's maize export which is expected by the latter. The following are the items to be investigated and considered:-

- a. Development of new place of production of maize.
- b. Prospects of increased produce in the existing land under cultivation.
- c. Measures of exporting to Japan .

II Items of investigation .

1. Survey of new places of production .

Notwithstanding that maize is the most promising article of export of Cambodia, its export direct to Japan, as things are, counts for little owing to its comparatively high CIF price and the special circumstances concerning its collection and circulation structure. If things remain the same, an increased production in the existing land under cultivation will not necessarily bring about an corresponding increase in direct export to Japan.

This is the reason why we have decided to search for new places of production for the purpose of collecting the produce through a new structure in order to increase the amount of its export to Japan.

We have attached importance to the search for a fertile land, as the majority of farm produce in Cambodia is cropped without manuring . Such land must be state-owned, uncultivated and of fertile soil; thus, we have selected the 'terre noire' and 'terre rouge' in accordance

with the chart of soil nature. Besides, according to Mr. Sum Chhum, Director of the Bureau of Agriculture, Ministry of Agriculture, the nature of soil is good in the Mekong basins, where, on the other hand, there is little room for new cultivation. In such other districts as Battambang, Mondal Kiri and Ratanak Kiri, although the soil is suitable, the road has not been constructed enough except in Battambang; moreover, their geographical positions are too distant from the distributing centers of the produce. Therefore, we have concluded that Battambang is best qualified for the new place of cultivation. We have also considered the reclamation of the waste land in the District of Kampot which lies in the hinterland of Port Sihanoukville where the export shipment of maize is being conducted. However, in the opinion of Mr. Sum Chhum, it is not advisable at the present moment to consider the matter, as the soil is arenaceous and needs much organic matter and manure. Thus we have decided to lay stress on the investigation of the District of Battambang, refraining from performing a detailed survey of Kampot where, we suppose, there are suitable lands to the north of Ream and in the vicinity of the U. S. stockbreeding centre. In order to ascertain the targets of our survey we asked for the suggestion of Mr. Cheng Hen, former Minister of Agriculture, and in deciding the actual spots of survey we relied on the opinions of Mr. Tim Naoun, Governor of the District, and Mr. Ho Ton Han, a timber merchant in the District.

2. Survey of land under cultivation.

It is presumed that the export of maize amounted to 300,000 tons at the time of its largest crop, but the statistics after the independence of the country show that the produce is decreasing. This may be due to the following facts:-

Price differentials between maize and its competitive crops have

been brought about by the encouragement by the Government of the increased culture of raw cotton and increased demand for sweet potatoes, leading to the decrease in the cultivated acreage of maize together with the extreme impoverishment of the soil in maize fields resulting in its diminished crop. The yield has been diminished also by the stagnated water at the harvest-time during the wet season as well as the drought at the earring time during the dry season. For the convenience of our investigation of the above factors in the Mekong basins we have selected the course of our survey in the region which is inundated by the muddy water of the river during the wet season and in the one where the rain-water stagnates instead of the inundation of the muddy river; the former consisted in several spots on the bank of the Mekong of Kompong Cham Province and the latter in those of Koki districts.

3. Export channel of maize to Japan.

Cambodia's export of maize amounted to 164,000 tons in 1960, 103,000 tons in 1961 and 134,000 tons in 1962 respectively, while the direct export to Japan were 74,000 tons in 1960, only 11,000 tons in 1961 and not more than 4,000 tons in 1962. We started our investigation regarding the channel of collection, transport, storage and shipment of maize mostly by means of interviewing the exporters of Phnom Penh; at the same time, we were interested in the organization, actual conditions and structure of the OROC (Office Royal de Cooperation) as well as the organization, management and structure of the state-managed export system announced in November 1963.

III Summary

A. Development of new places of production.

The district of Battambang, which we investigated as a prospective place of new cultivation, contains a considerable area, though a little

infertile, of the 'terre-noire' and 'terre-rouge' zones appearing in mosaic and being in some parts inhabited by cotton-growing settlers; in view of the various conditions it is a promising land of maize growing, although its crop is not much at present.

There are two export routes of the maize produced here: it is first gathered at Battambang City, from where it is transported by truck or railway to Phnom Penh, the port of export: from here it is again sent by truck as far as Sihanoukville, another port of export. Upon completion of the railway now planned between the two ports as well as of the national high way between Pailin and Sihanoukville the transport will be more facilitated and the direct distance will be considerably shortened, too.

Conceivable means of developing this district are as follows:-

1. An idea of establishing a company whose principal aim is production.
2. An idea of establishing a company whose principal aim is developing arable land.
3. An idea of establishing a company whose principal aim is to extend the technical guidance of maize farming.

1. Productive company,

- (1) A company is to be established jointly by Cambodia and Japan.
- (2) Farm land is to be produced by Cambodia.
- (3) Not less than one half of the capital is to be invested by Cambodia.
- (4) Farms are to be managed by the company itself in order to chiefly grow maize. (The company also purchases the maize produced in its vicinity.)
- (5) Products are to be exported direct to Japan.
- (6) The Cambodian Government will take special measures to

export the products to Japan at international prices.

- (7) Important posts of the company in connection with the production of maize shall be assigned to Japanese experts.

These points may constitute the basis of establishing the company.

At the same time, the following points must be considered when opening the farms:-

- (1) Survey of the land required for the farm.
- (2) Construction of roads leading to principal highways.
- (3) Clearing and construction of nursery farms; preparation of roads, irrigation waterways and drains.
- (4) Construction of farm sites.
- (5) Construction of offices, workshops, barns and processing space, storage equipments, etc.
- (6) Construction of lodgings for employees, etc.
- (7) Construction of waterworks and electric facilities.

When running the company the following must be considered:-

- (1) Securing of necessary employees in management department. Important posts of management must be assigned to Japanese experts.
- (2) Securing of necessary labour.
- (3) Complete equipment of farming and transport machinery and implements.
- (4) Equipment of furniture.
- (5) Procurement of such necessary means of production as corn-seeds, agricultural medicines, packing materials, etc.
- (6) Estimate of ordinary expenditure.
- (7) Estimate of income.
- (8) Estimate of incomings and outgoings.

However, it is doubtful whether an enterprise whose chief aim is to grow maize will be paying or not owing to the following reasons:-

- (1) Maize is a feed stuff whose price must be moderate enough.
- (2) As maize is grown with facility, it is an indispensable crop at the initial stage of land reclamation.
- (3) Repeated cultivation of maize on the same ground is impossible for a period extending over many years, that is, rotation of crops is necessary. Therefore, not whole of the field can be appropriated for maize-culture.
- (4) Shift crops are legumen which costs much labour in harvest.
- (5) Products are sold as they are and no processing work is needed.
- (6) It is an annual plant easily grown anywhere.

Such being the case maize is an unsuitable crop for plantations based on the long-term collection of investment.

In view of the composition of the land in Battambang district it is impossible to procure a group of large lots of farm land; besides, it is difficult to expropriate the necessary land, as farmers have already settle down. This means that the establishment of a company whose principal aim is production will be difficult. In other districts, although we had no time to investigate, of different soil nature, not to mention the 'terre noire' and 'terre rouge' such companies can hardly be operated with profits.

Note:

In our interview with the Minister of Agriculture it was made clear that the joint company shared by Cambodia and Japan might take any of the following forms of organization: between the nationals of the two countries, between the Japanese Government and Cambodian private persons, between the Cambodian Government and Japanese private persons or consisted solely of Japanese nationals; that the necessary farm land would be offered by the Cambodian Government; that a contract would be given to export the produce

to Japan at international prices.

2. Company of developing new arable land.

Generally speaking, Battambang district has much room for developing new arable land which will make useful farm fields, and the principal aim of this company is to perform a steady production, which is combined with the shift of crops, and collection of maize as well by means of inviting settling-in farmers.

- (1) The company is shared by Cambodia and Japan.
- (2) More than half of the capital is invested by Cambodia.
- (3) To invite applications for settlement from farmers.
- (4) To make an advance of settling funds which are raised on loan.
- (5) To open demonstration farms on the basis of which technical guidance will be given.
- (6) To furnish the farmers with seed-corns.
- (7) To purchase the farm produce of the settlers and the maize produced by neighbouring farmers as well.
- (8) Maize will be exported directly to Japan.
- (9) The Cambodian Government will take special measures to effect the export at international prices.

3. Company laying stress on the technical guidance of production.

Demonstration farms will be opened here in order to convince the immigrant farmers of the feasibility of cropping maize; at the same time technical guidance will be given to them. This will help expedite the settling-in of farmers. Their produce will be collected through the organization of OROC.

- (1) The shape of the demonstration farms are as follows:-
 - (a) The area of one demonstration farm is approximately two ha.
 - (b) The farm land will be offered by the Cambodian Government.

- (c) Technical guidance will be given by Japanese experts.
 - (d) Such methods of cultivation will be applied as aiming at the manuring, controlling the blight and maintenance of the fertility of the soil. These will be conducted in comparison with the conventional ones of farming.
 - (e) The expenses will be borne by Japan.
- (2) The Cambodian Government will be in charge of the invitation and placement of the settling-in farmers .
 - (3) Settling fund will be lent through the structure of OROC.
 - (4) Collection of maize produce will be conducted by cooperative associations to be established on the basis of financial aid by OROC.

B. Increase of maize produce in the existing land under cultivation.

At present almost 98% of maize produce come from the Mekong basins which may be divided into two zones. One is a region where, during the wet season, the muddy water of the Mekong flows in and stagnates, as a result of which mud and organic matter are deposited, which means the accumulation of nutrients, leading to a fairly good crop without manuring. However, when the rainfall is premature and heavy, the wet-season maize is submerged and damaged before ripening, while the dry-season one often suffers from a drought before ripening.

The maize, which is an early-ripening variety of plant, is the most suitable crop in such a zone. If such damages due to rain and drought can be controlled, the maize crop will be stabilized. This requires the facilities for drainage and irrigation.

If the mud is able to be deposited by means of letting in the muddy water after the harvest of the wet-season maize, which resembles the improvement of the soil nature by running water in Japan, the fertility of the soil will be maintained. On the other hand, the prevention of drought

disaster during the dry season will be made possible by means of digging creeks to serve as irrigation ponds or pumping up water direct from the Mekong. Realization of stabilized crop of maize by such measures will facilitate the introduction of manuring technik, as a result of which an immense increase in the crop can be expected.

In another zone, which is not inundated by the muddy water, drainage of the rain-water becomes impossible due to the rise of the Mekong, as the result of which the water has to stagnate there to the annual impoverishment of the soil fertility. Here, like the above case, the crop is damaged by water during the wet season and by drought during the dry season. If mechanized facilities for drainage and irrigation are installed, both the water and drought disasters can be avoided, and with the introduction of manuring technik a great increase in the crop can be easily expected.

It is a matter of fact, with the progress of experiment and research in future, such reformation of farming will realize the increase of crop as the popularization of improved varieties, reasonable manuring, control of blight, introduction of agricultural machinery and implements, etc. However, increased crop per unit area of the existing field under cultivation as well as that in enlarged fields can be easily expected by means of irrigation during the dry season and manuring (only a small quantity) during both seasons. For this purpose it is necessary to convince the farmers by means of demonstrating them of concrete facts. The demonstration farms are considered very appropriate means in this case, and their shape will be determined by such basic idea.

- (1) Items, which are limited to one or two in number, are to be selected in accordance with the special circumstances of each location.
- (2) To entrust the selected farmers with the task of comparing the two methods of farming: the conventional and improved.
- (3) To establish as many demonstration farms as possible in various

spots.

(4) Design and guidance will be assigned to Japanese experts.

(5) Management may be conducted either by Japanese or OROC.

C. Export to Japan.

Statistics show records of very little export of maize direct to Japan, which often imports it by way of Honkong, Singapore, etc. due to such factors of hampering the normal trade relations with Cambodia as the latter's double rates of exchange, trade by barter system with the Communist areas, etc.

There exist in the maize zone of Cambodia established gathering frameworks, which are impregnable, of the produce managed by the overseas Chinese merchants. This is the reason why we considered the development of new places of maize production and the establishment of new structures of business transaction, presupposing the special measures which might be taken by the Cambodian Government in favour of the new system. At the same time we placed our hope on the organization of OROC, but were disappointed to know that its foundation was not firm, controlling not more than eleven cooperative associations of maize, its handling amount of the produce being only 6,000 tons as against the total produce of 150,000 tons. Furthermore, we can hardly expect the export to Japan by OROC in view of the price even when its collection of maize increases in quantity.

However, it is reported that the Cambodian Government will take measures to adjust the maize price through Sonexim so that the produce may be exported at international prices, which will enable the Japanese traders to do unhandicapped business. During our stay in the country neither the organization of Sonexim was completed nor the detailed regulations concerning its business management were made public. We can expect that the Government controlled trade, if it is fully enforced,

will enable the export of maize to Japan. It is needless to say in this case that increased produce of maize is the prerequisite to increased export to Japan.

Chapter II Feasibility of developing new places of maize production in Battambang and prerequisites to it.

I Items of investigation.

1. Confirmation of location of the district concerned.
2. Natural conditions of the district concerned.
3. Conditions of developing the district concerned.
4. Technical guidance in the district concerned.
5. Situation of co-operative associations under OROC whose principal crop is cotton.

II Summary of investigation.

1. Objectives of precise investigation in Battambang.

The Embassy of Japan and the Ministry of Agriculture of Cambodia as well made a suggestion that there was in the district of Andoeuk Hep a prospective zone of the 'terre noire' soil which seemed favourable to the growth of maize. That is the reason why this investigation was performed, aiming at the confirmation of the location of the district concerned and the survey of the technical feasibility of growing maize there.

2. Preliminary investigation

(1) Opinion of Mr. Ho-Tong-Lip.

Maize was once grown in the 'terre noire' soil of Battambang, but its crop diminished, as the price was not guaranteed. (According to a French expert of the Raw Cotton Centre, maize used to be grown as a shift of crops).

In our opinion, repeated cultivation of maize, although it is possible in the Mekong basins because of the flood, extending over a period of ten years would be impossible in the 'terre noire' and 'terre rouge' zones due to the extreme impoverishment of the fertility of the soil after bringing

it under cultivation, the difficulty of irrigation and the scarcity of organic matter in the soil in spite of the application of chemical fertilizer accompanied with irrigation.

(2) Opinion of the Director of the Bureau of Agriculture .

It is possible in Battambang to crop an acreage of 30,000 ha. with maize, which will be more facilitated by the construction of roads.

(3) Opinion of the Governor of Battambang Province.

- a. The development plan of Battambang lays stress on the crop of raw cotton. Cultivation of land is being conducted by means of motor-tractors.
- b. Invitation of settling-in farmers is possible by the guidance and assistance of the Government, if the land is favourable to cultivation. Most of them come from districts other than Battambang.
- c. Up to 5 ha. of land is transferred to the farmers by the Government free of charge. Farm land upwards of this limit is obtainable for countervalue borne by farmers. The Governor can transfer the land of not more than 10 ha. in area. Most of the settlers are now cultivating 2 ha. or so.
- d. Production of maize in the newly opened-up land depends upon the crop price. There is no exemption from land tax, which ranges from 24 to 60 Riels per ha. according to the grade of land. (In the Mekong basins it is R 100 per ha.)

(4) Opinion of Mr. Ho-Tong- Han.

- a. The alluvial soil in the basin of the River Battambang may be favourable to the growth of maize. This part of the district is being cropped with tobacco now and there is no record of maize crop.
- b. The zone of land (cotton zone) suggested by the Governor is mainly composed of the 'terre rouge' or mixed soil of the 'terre rouge' and 'terre noire', which are cropped with tobacco, sugar

cane, banana, mandarin orange, etc.

- c. Andoeuk Hep district which was brought under cultivation by the Government now contains 500 immigrant farmers. Most of them came from Provinces other than Battambang such as Takeo, Kompong Speu, etc. The Government offered them nothing but land.

(5) Information which reached our ears while interviewing a settler in Andoeuk Hep.

- a. He sold his rice paddy in Takeo, which yielded poorly, to settle here. The Government transferred him free of charge 5 ha. of land, 3.5 ha. of which he cropped with cotton. The produce amounted to 3,600 kg., which he sold at R 8 per kilogram, resulting in a rough income of R. 28,800. However, his net income was nearly half the receipts, as the cost of labour and spraying of medicine amounted to much.
- b. He has grown red corn whose stalk height has amounted to 3 m., yielding 20 - 30 good pestillate ears per cornstalk. (Details of yield/ha., etc. are not available due to its small acreage.)

As a result of the preliminary investigations above, we decided to make an investigation into such districts as kindly suggested by the French expert, designated by the Governor and recommended by Mr. Ho Tong Han. These districts lie centering around Andoeuk Hep, which is in the cotton zone of Battambang Province.

3. Investigation of natural conditions .

Investigation of fertility, growth of crops and picking of soil sample .

(1) General view of the surveyed spots .

No. 1:- Bon Chu (Though we selected at first Tok - Pous with an acreage of 30 - 35 ha. under cultivation of cotton, we abandoned it on the advice of the French expert.) The soil is of the 'terre noire'. They were harvesting cottonseeds. The plants were of average height. The

cultivation technique was a little better than average: Breadth of ridge x distance between plants: 100 cm. x 20 cm. Unit of culture: 2 plants. Variety: Stoneville. Insect damage by aphides was observed; spray of insecticide had been applied. We could not find annual rings on the stumps of felled trees. We observed the soil to be highly fertile and containing moisture.

No. 2:- Beng-Kandal (acreage of 44 ha. of the 'terre noire' soil under cultivation of cotton)

Informations which reached our ears while interviewing a farmer (There are many malaria cases in the vicinity) were as follows:- He settled in the zone two years ago when wild elephants used to appear there. He is cultivating 2 ha. He is an earnest farmer.

Cotton: The harvest was 1,000 kg./ha.. It required the spray of Endrin on every 13 days, that is, nine times of spray before harvest. (His sprayer is of Lemman Tecalemit type.) Although the cottonseeds were sold at 8 R/kg., his net profit was 0.7 R/kg. Breadth of ridge x distance between plants: 100 x 25 cm. Unit of culture: 2 plants. Height of plant: 133 cm. Knots: 32 Sowing was early in July. We noticed some seeds on the lower stem gone rotten due to rain.

Maize:- Sweet corn Acreage of 0.5 ha. under cultivation. Variety: Hawaii (According to Mr. Sato who participated in the establishment of the Agricultural Centre in 1961, this variety was being grown in the Experimental Farm of the Battambang Province.) This variety, being of good quality and liked by people who eat 'on-the-cob', seems to have widespread as far as this district. Breadth of ridge x distance between plants: 70 x 55 - 60 cm. Unit of culture: 2 - 3 plants. Height of plant: 200 cm. Sowing was early in November and harvest late in December. Raw spikes were sold at 10 R/40 spikes and the income amounted to R. 3,000. Manner of crop: the first crop: sowing in May and harvest in June - July; the second crop: sowing in August and harvest in September - October;

the third crop: sowing in November and harvest in December. Variety: Hawaii

Mung bean:- Sowing in November and harvest in mid-February. However, harvest of 3 times a year may be possible if sown in March.

No. 3: Boribo-1

Cotton: grown in the demonstration farm belonging to OROC, whose exact date of establishment is unknown. The soil is seven years old after brought under cultivation. Breadth of ridge distance between plants: 110 - 100 cm x 20 cm. Height of plant: 123 cm. Knots: 32 Sowing was early in July. Damped raw cotton caused by rain were observed on the lower stems. Impoverishment of the soil is much more keenly felt than in the two districts above-mentioned.

No. 4: Boribo-2

Information was obtained by interviewing a settler from Takeo Province where he had cultivated 5 ha. of rice paddy.

Maize:- Variety: Hawaii (sweet variety) Breadth of ridge x distance between plants: 90 x 35 - 40 cm. Unit of culture: 3 stems Height of plant: 150 cm. Sowing: October Countervalue for land: R 500/ha.

At present 1 - 1.5 ha. have been brought under cultivation. It takes a month to open up a hectare, which means 3 ares a day Unit: 1 lai = 40 x 40 m. Sowing: in March Harvest: 750 kg./ha.

Mung bean:- Harvest: in May

Cotton:- Harvest: 24 sacks (cost of spraying insecticide: R 1,700)

No. 5: Ph. Phrauv Méas This is a zone recommended by Mr. Ho-Tong-Han, where we surveyed the mixed soil of the 'terre noire' and 'terre rouge'. We were directed through a light jungle by a guide. We went along the foot of Mt. Takéan (a lime hill) and reached Mr. Ho's lumber piling centre. They say that there are about 50 farm-houses in the neighbourhood. Although we mentioned 'mixed soil', the 'terre noire' and 'terre rouge' are distributed separately here and there. Accord-

ingly, there must be a heavy jungle zone with good aspects of forest in parts, where the so-called secondary forests are found, as most of the big trees seem to have been already felled.

Generally speaking, this zone is inferior to the newly cultivated land mentioned in No. 4, and the fertile area seemed small. On the way to the place concerned we saw thickly grown vegetation, showing the exhausted fertility of the soil.

No. 6: *Kompong Kol Stung* in the catchment-basin of the River Battambang. Here are about 200 farm-houses. We saw an old man, about sixty of age, burning about 200 ares of a plateau in order to bring it under cultivation. He said that he was going to crop mung beans. The soil was of 'terre rouge'.

No. 7: This is a zone recommended by Mr. Ho-Tong-Han as well as the Governor. Some parts have been abandoned after reclamation. We could know from the aspect of the forest that there was virgin soil, which must be fertile, lying waste.

In addition, a certain farmer of Andoeuk Hep who was much interested also in maize said that he would not grow it for a price of 2 R/kg., but later corrected himself after consultation with his friends.

(2) Appraisalment of the natural conditions. (Summary)

The synthesis of the above-mentioned natural conditions is: there is really a distribution of the 'terre noire' in the recommended zone in Battambang (details of the distribution of the area concerned can not be known until its regular photograph is prepared), but it seems impossible to construct a lot, amounting to thousands of hectares, of concentrated and collectivised arable land. As for the cotton crop, an increase in the acreage under cultivation will be difficult, though it seems profitable due to its price which is being propped up by the Government, in view of the cost of medicine spray and fertility of the soil. The ultimate acreage is

expected to be 1,000 ha. at most.

Farmer's economy will be able to pay its way to a certain extent by means of such combination of crops as maize - mung bean - cotton, according to the number of immigrant farmers.

We cannot place much hope, in spite of Mr. Ho-Tong-Han's recommendation, on the catchment-basin of the River Battambang, where, the chief crop being paddy rice, the arable area of maize is small, and the deposits of fertile soil, like that in the Mekong basin, cannot be expected during the wet season.

Mung beans, maize and especially watermelons are being grown in the downstream zone of the River Battambang (the River Sankai) flowing two kilometers distant from the City of Battambang which is inundated more than 1 - 2 m. deep by the rise of Lake Tonle Sap. As the soil nature of this zone approximates to that of the Mekong basin, a fair amount of increase in the crop can be expected. But it involves more or less problems; for instance, in case of cultivating this zone, the fields will be distant from villages or hamlets. At any rate, the area of this zone is so large that the feasibility of developing a new land of production needs future survey and research.

Part of the maize grown in the places we have mentioned above belongs to the sweet variety, the produce of which will be increased to some extent like those kinds of truck vegetables to be eaten raw and offered for sale in the market of Battambang City, but not so much as to affect the production of the other crops.

Source material for reference obtained while interviewing Pu Co-operative of OROC.

Cost of collection of produce (Bon-Chu Beng-Kandal): 6R/sack 1 sack : 30 - 40 kg.

(Boribo) : 2.5 R/sack (Private: 4R/sack)

Carriage to mill, from Andoeuk Hep to Kompong Cham: 0.5 R/kg.

(Private: 1 R/kg.)

Warehouse charges : 0.2 R / 1 kg.

Cottonseed : 3 R/kg.

Hire of sack : 0.5 R/sack

4. Investigation into prospective places of new production and review of reclamation process of neighbouring cotton farmers - Process of cultivation by immigrant farmers in cotton zone of Battambang Province.

(1) General situation of hamlets investigated.

Before commencing to crop cotton the hamlet of S'Dao in Andoeuk Hep contained a very small number of farmers, but the population has recently shown a rapid increase. The authorities of the Province are extending substantial aid to the settlers such as releasing free of charge not more than 10 ha. of uncultivated land for a farm-house on the Governor's own proper authority. The number of farmers who have settled in has amounted to 500. The authorities concerned are purchasing the raw cotton produced at R 8/kg. this year. They say that ginneries will be built in the zone concerned in future.

(2) Survey of individual farms.

a. Farm A. (the third year of settlement)

Total acreage under cultivation: 3.5 ha. Yield of cottonseeds: 2,000 kg./ha. Unit price of cottonseeds: R 8/kg. Total proceeds of cottonseeds: R 16,000 Yield of maize 2,000 - 3,000 kg./ha. Unit price of maize: R 2/kg. Total proceeds of maize: R 4,000 - 6,000

However, cotton crop needs agricultural medicine which costs much, and net profit amounts to not much. On the contrary, maize crop does not need agricultural medicine. If the unit price per kilogram of maize is more than R 3, maize growing may be con-

sidered.

(Technical guidance)

Frenchmen are giving direct technical guidance by means of establishing a demonstration farm in every hamlet. The farmer is in the opinion that the present distance between the plants, which are 20 cm. according to the guidance given by OROC, is too close to each other, that is, the plants are cropped excessively densely; that the proper distance is about 50 cm.

According to the farmers, every farmer is growing some maize, and 5 - 6 tons of maize can be collected in S'Dao hamlet alone, if Japan wants to purchase.

(Opening-up of land)

This farmer is bringing the land under cultivation all by hand. Farm hands are brought from Takeo Province by contract, traffic fare being borne by the farmer, finding them in tobacco, clothing and meals and paying monthly R 500/capita. That means that the farm hands are the farmer's fellows provincial who are going to settle in. The term of contract is two months. If such labour is to be hired in S'Dao, it will cost R 30 per day per head.

(Balance of cotton crop)

Gross proceeds: R 16,000/ha. (rough income) Cost of agricultural medicine: R 1,700/ha. If the cost of seeds and spray are deducted from the gross proceeds, the remainder is R 0.7/kg. which is not a good margin of profit.

(Use of land)

The farmer crops the land around his house with bananas and papayas, and newly cultivated fields with mung bean, maize, soya and cotton. The maize and soya which were sown during the wet season have been already harvested. The bananas and papayas are not more than for their own consumption. The mung bean will be

harvested in 10 - 20 days. There were traces of upland rice sown during the wet season.

b. Farmer B (the second year of settlement in Boribo hamlet)

This farmer seems to have just begun the opening-up of land, and all around his house is a thick jungle. There is only one farm-house nearby which has moved from Takeo Province. At the time of his settlement wild elephants used to appear in the jungle. It is still dangerous there, and his family lives separately in S'Dao.

He has been given 5 ha. of uncultivated land, the use of which is as follows:-

(Acreage under cultivation)

Cotton: 1.0 ha., half of which has been reaped.

Maize: 0.5 ha. already reaped and sold for R 3,000 (good yield)

Banana: 300 (trees) for food and under harvest.

Papaya: 20 (trees) for food and under harvest.

Paddy rice: 1.0 ha. for food (during the wet season) and already reaped.

Mung bean : 0.2 ha. not reaped yet.

His view on cotton and maize:-

There is only a small margin of profit in cotton culture, which costs agricultural medicine, while maize crop is profitable. In his case the acreage of maize cultivation is only 0.5 ha., which has brought him as much as R 3,000. The variety of his maize is not the native yellow one, but the white sweet corn.

c. Farmer C (the third year of settlement)

This is a large family consisting of man and wife with 7 children who have settled here from Takeo Province, where they used to cultivate paddy rice. The reason for their settlement is the impoverishment of his rice paddy, the yield of which becoming poor together with the bad crop due to flood damage; he has abandoned

the rice paddy. He had two buffaloes, which he sold to pay the settlement cost.

Fertility of the land he is cultivating:-

He is satisfied with the fertility of the land he is now cultivating. He has bought for R 500 a ha. of already cultivated land. There are still 4 ha. of uncultivated land which he expects to bring under cultivation in 2-3 years.

Means of opening-up land:-

All work is done by manpower. After having cleared and burnt jungle, leaving the stumps of felled large trees as they are, the crop of cotton is commenced. Tilling is conducted by means of hand hoes without manuring. He has not cash on hand enough to hire labourers who are necessary for opening-up work. While he himself is earning wages as a navy or a cotton-picker, he manages to find time to bring his land under cultivation. It is impossible for him to purchase already cultivated land which costs R 15,000 R/ha. now.

The acreage which can be opened up:-

The acreage which can be opened up a day is 16 ares/capita in the case of clearing the jungle only and 0.3 are/capita in the case of preparing the soil by a hand hoe. If the daily wages of a coolie is assumed to be R 40 (including the cost of meals), the opening-up cost per ha. will amount to R 13,580 in total, which consist of R 250/ha. This shows that a considerable amount of settlement fund is necessary at the time of settlement.

Economy of farmers:-

Concrete items of their living cost are not available. They have to purchase salted fish, rice, hand implements of farming, etc., but the others are self-supplied. They have no lamps. Clothing for cold weather is not necessary as they live in the tropics.

As for income, out of the cotton crop of 1,460 kg./ha. the farm-

er could get R 12,000, of which R 1,700 had to be paid for the agricultural medicine. Gross proceeds of mung beans were R 7,500 for 750 kg./ha. at R 10/kg. The mung bean, which is sown prior to the wet season which begins in May, and reaped in three months, that is in July, yields most.

Immediately following the harvest of mung bean cotton can be sown; it is harvested during the dry season which lasts from November to February of the next year. The yield is 2.5 - 3 tons/ha. On the basis of such estimate farmers come to settle in.

d. Farm D (the seventh year of settlement)

This farmer is the earliest of the settlers and has lived here these seven years.

At the time of his settlement the surroundings were a jungle all over. The soil, which was fertile at first, has impoverished; that is why he is moving to another place of virgin soil 5 kilometers westward. His land has been already sold to a merchant in Battambang City who is now building pigsties there for the purpose of conducting swine-raising. The farmer has been entrusted with taking charge of the pigsties.

Family: man and wife who are both about 35 of age and without children. Work beast: 2 yellow oxen Family implements: an ox-cart, ploughs, hand implements, etc. including 3 big pots and 2 small ones.

This family is not going to live in the virgin soil, but in S'Dao hamlet by building a new dwelling. Security of their living has been established. There is in S'Dao an experimental farm of cotton crop run by Frenchmen. The farmer's new house now under construction is in a low and damp place a kilometer to the south of the Frenchmen's farm.

We saw some farmers in the vicinity growing oranges, bananas,

Kapoks, etc. and some in the low and damp place growing vegetables.

Although the soil is the 'terre noire' mixed with the outcrops of limestone and lime brashes, it seems to have been greatly impoverished.

5. Types of developing new places of production laying stress on cotton crop. (Summary)

The captioned types in the 'terre noire', which are useful data for reference when developing new places of maize production in this zone, are summarized as follows:-

(1) Types of settlement.

There are two types of settlement in the virgin soil. Type No. 1:- In the case of a settler having a fairly large amount of settlement fund which is R 35,000 - 36,000 in total, consisting of R 15,000 for the yearly minimum living cost of a family of five, R 15,000 for the cultivation cost per ha. and R 5,000 - 6,000 for the travelling expenses. In this case he can be a stabilized settler from the outset.

Upon settling-in he opens up about 1 ha. by means of hired labour to crop cotton, maize, mung bean, etc. which he can reap once a year. However, he must settle in prior to the commencement of the wet season in order to open up the land. It is said that a settler who has prepared the necessary fund can reclaim about 5 ha. in a few years.

Most of the crops which are sown early in the wet season can be reaped in 3 months. However, cotton is sown late in July and the raw cotton can be plucked in November which belongs to the dry season.

Type No. 2:- Case of a settler without fund .

In the first year he builds a poor dwelling-hut in the jungle. He earns wages by felling trees, cultivating land in grass, repairing roads or working as a coolie of the lumber company, while women and children are hired

for picking raw cotton and reaping mung beans in order to support themselves. By so doing they manage to find time to open up their own land.

First of all the seedlings of banana and papaya are transplanted around his hut. They will bear fruits in 6 months and edible in 12 months.

Thus in a few years 1 - 2 ha. of land will have been cultivated with gradual establishment of the security of living. However, perfect security of living needs the foundation of 5 ha. of cultivated field, the completion of which will take 4 - 5 years.

Accordingly, in case that his cotton and mung bean yield well and sell at high prices, he can quickly obtain the necessary fund with which he can hire coolies to expedite the reclamation.

Therefore, the first condition for a fundless settler is the fertility of the soil, and the second is how to quickly raise the fund for employing coolies; it depends on the price of his produce in every way.

(2) Farming implements.

The farming depends entirely on hand tools. This is not because they like such hand tools, but because ploughs drawn by work beasts, which are available for rice paddies or in the dry fields of the Mekong banks, are unavailable for newly opened-up fields which are full of stumps of felled trees.

As for their farming tools, especially noteworthy is the complete absence of such ones as used for making ridges, covering crops with earth and thinning crops, when taking the future technology of farming into consideration. However, every cotton growing farm-house is equipped with a sprayer to be carried on the back purchased from OROC. Its trade mark is 'Leman Telegamit'.

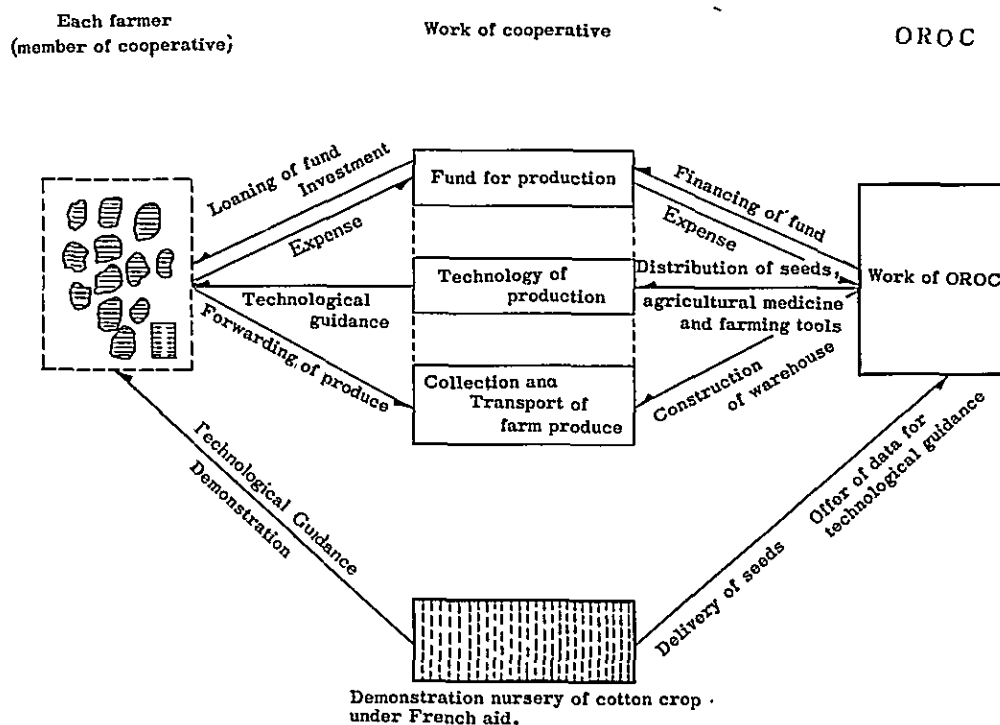
(3) Fund for farming

A settler can make a loan of farming fund from OROC in his capacity of a member of the cooperative association, provided that he crops cotton.

The amount of the loan is within the limits of R 3,000 at 10 per cent interest per month. Incidentally the loaning fund of the cooperative is financed by OROC at 5 per cent monthly and the balance of 5% is appropriated for the expenses of the cooperative (cost of personnel and business). The loan and interest on it together with the price of agricultural medicine, sprayer and seeds are deducted from the price of the produce delivered by the farmers to the co-operative.

The standard cost of agricultural medicine is R 1,216/ha. in total consisting of R 400 for 16 kg. of DDT (R 25/kg.) and R 816 for 12l. of Endrin (R 68/l.). However, according to the experience of farmers, the growth of injurious insects is so rapid and frequent that 8 times of insect control during one crop season is insufficient and 10 - 11 times of control is necessary, as a result the cost of the insecticide amounting to R 1,700.

Relation between OROC, cooperative and farmer



(4) Formation of zone of maize crop and its conditions viewed from farm management.

- a. Large scale farms are not always advantageous in this case in view of the examples of the formation of the cotton crop zone, but, on the contrary, collective settlement of groups of family farms cultivating 5-10 ha. per family is more effective.
- b. The maximum of the acreage per family is considered 5 ha., so far as the present farming technology is concerned. This is attributed to the absence of proper farming implements drawn by work beasts and those for opening up virgin soil, and imperfect hand tools as well. Accordingly, such technical guidance will have to be given, in addition to that of selecting seeds, spraying agricultural chemicals and manuring, as the use of farming implements and the rotation of crops to maintain the fertility of the soil. The establishment of special cultivation centres will be necessary, as the opening-up of virgin soil will be conducted by mechanical power.
- c. Mono-culture of maize cannot be hoped for, as the farming is based on family farms. Shift of crops such as mung bean, soya bean or cotton will be necessary. Therefore, even in the case that there are 6,000 ha. of land suitable for bringing under cultivation, the maximum acreage which can be appropriated for maize crop will be only 2,000 ha.
- d. It may be possible to invite necessary settlers from all over the country, but the absolute prerequisite consists in the high fertility of the soil. Accordingly, it is impossible to obtain a large collectivized acreage, but the maize crop zone will be made up of scattered fields in view of the actual circumstances of the cotton crop zone.
- e. Technical guidance, which principally aims at the popularization of technology, should be given in a manner based on the actual farming;

for instance, by making use of demonstration nurseries; it is considered necessary that Japanese experts will stay at the places concerned in order to give effective guidance.

Data for information.

6. Plantation as an enterprise and conditions of realizing family farms.

(1) The so-called plantation in Cambodia is not limited to such large enterprises as involving more than 1,000 ha. of cultivated fields, but it means also such small scale farms as containing 10 ha. or so.

Some of the general farms widely distributed either in the rice zone on the shore of Lake Tonle Sap or in the Mekong basins are cultivating more than 10 ha. of field, but they are not, of course, called plantations.

Thus the plantation in Cambodia does not mean a family farm but an agricultural enterprise on the basis of payability from the outset.

Some of the large farms, whose land often amounts to hundreds and thousands of ha., contain within themselves offices, dwellings of labourers, manufacturing and equipment mills, markets, schools, hospitals, etc., forming an independent social and economic unit and a sphere of civilization as well. On the contrary, however, there are such orchards, banana farms, pepper farm, pineapple farms, etc. as containing fields of 10 ha. or so and managed by a family with a few regular farmhands doing daily work. However, the types above-mentioned are both called plantations.

Therefore, the fundamental difference between a plantation and a family farm consists in the fact that the former is an enterprise on the basis of independent payability while the latter is a farm managed by a family whose aim is to support itself.

We have seen that Cambodia has two heterogeneous units of farming, each of which having its own history and reason of existence. Which of the two should be considered more advantageous will be determined by the purpose and substance of each. For instance, there is no plantation of rice

in the country. This is related to the fact that the foundation of the Cambodian social economy is firmly based on the family farming whose principal produce is rice. Rice crop and maize crop are the staple produce of the Cambodian agriculture which depends on the extremely intensive family farming. Ignoring this fact and choosing other types of farming may be possible, but cannot be facile. Such an attempt, we believe, is as difficult as that to set up large scale agricultural enterprises in the dry field farming zones of Japan. Especially the plantations in Cambodia are characteristic of the mono-culture of such perennial plants fitted to the tropical climate above-mentioned, while the family farming manages to get along by dint of the recovery of fertility brought about by the flood of Mother Mekong which literally makes it possible to grow such annual plants as paddy rice and maize which are early-ripening within a short period of 2.5 - 3.0 months. Such being the case, the establishment of large plantations whose prerequisites are the profit as enterprises will require exceptionally favourable conditions, natural, social and economic, if they are ever to be adopted, ignoring the basis and technology of farming which we have mentioned above.

For instance, in the case of a rubber plantation, which is a model of all large scale plantations, has not come into existence freely and non-conditionally. On the contrary it is being enabled to exist by virtue of the following conditions:- the agricultural technology, maintenance of fertility and management of the plantation which are conducted by Frenchmen; the location is in the 'terre rouge' zone whose fertility is highest; it is enjoying the privilege of low land price and tax together with the established market in France through special channels.

This is the reason why the cotton growing in Andoeuk Høp, which is given technical guidance on the spot by French experts as well as special encouragement by the Government for the purpose of developing new places of production, does not adopt the plantation type of farming, either large as

in the case of rubber or small as in the case of pepper. The means of development lies in the organization of productive units consisting of a number of intensive family farms, and land is not used for monoculture but for the combination of a number of crops such as mung bean, maize, banana, soya bean which are either sold or consumed.

As for the formation of new places of maize production, the leading persons in the districts concerned hardly agreed to the plantation type of development, but most of them were in the opinion that the semi-rotation of crops conducted by the families of settlers would be a better means of development. Such a view merits attention, and we should like to mention here.

(2) The conditions of establishing family farms are omitted here, as they have been already described.

We consider that the facilities of technical guidance will be necessary in view of the request for Japanese farming technology.

Chapter III - Survey of Mekong basins as base of maize produce.

I Mekong basins as base of maize production.

98% of the maize of Cambodia are produced in the Mekong basins (Provinces of Kratie, Kompong Cham, Kandal and Prey Veng): (Table)

As for the fertility of soil, that of the alluvial soil zone of Kompong Cham Province is considered highest.

The yearly cycle, maize in the dry season—maize in the wet season—flood, means that one of the three yearly crops of maize is indebted to the deposits of fertile soil carried down from the upstream of the Mekong accompanied with the flood and inundation; technically speaking, this period corresponds to that of green manure and fallow land which contributes to the recovery of fertility and the control of weeds and insect blight. Only the Mekong flood, being arbitrary and uncontrolled, is subject to variation in its aspects according to time and place.

In some parts of Kompong Cham Province where the fertility is highest, fertile soil impoverishes due to the deposits of sandy soil; in Kandal Province which is on the lower Mekong the fertility of the soil seems to diminish probably due to the decreased deposits of soil. In other words, the change of the soil nature by running water is going on naturally and uncontrolled, which means that there is room for establishing efficient counter-measures by means of a scientific and systematic analysis of the Mekong basins.

While gathering informations orally given in the collectivised zone of maize production, we asked, "What comes prior to maize?", and two farmers replied, "It is water".; this answer admirably put the dispensation of nature embodied in the Mekong flood.

In the fertile alluvial soil the growth of maize was quite brisk, and generally speaking, no deficiency of fertilizing elements was observed, although in some parts the maize of No. 14 variety showed the rolling of leaves immediately before its earing, indicating the inevitable damage by

drought caused by the insufficient soil moisture which was a problem of the dry season crop.

In the basins of the River Battambang and some small rivers near Siem Reap maize is also grown, although the acreage is not large. The plant height was often low, showing abnormal earing, and the lower leaves were turning yellow, which all clearly indicated the deficiency in nutrient elements. In these districts the only resource during the dry season is water, but farming without manuring is unwise.

As for the dry season crop in the Mekong basins, on the contrary, the degree of the deposits of fertile soil during the flood may be the chief factor of determining the fertility of soil, while the effect of fertilizer seems to be observable in Kandal Province above-mentioned. (refer to I.V.S. which will be described below.) This fact has established the system of two crops with one fallow a year, growing 'Flint corn' variety which is early ripening in 90 days.

As will be stated in detail later, the shift from dibbling to semi-drilling shows the progress of farming technology. Nearly all of the produce are merchandise, and the farmers of this zone are confident of the profitability of maize crop.

It is to be hoped that the control and use of the Mekong water will be conducted on the full grasp of the facts above-mentioned.

II Purpose of investigation in Mekong basins.

The situation of the Mekong basins as places of maize production is such as we have stated above. According to the rating of Mr. Martin J. Clish of I.V.S., Kompong Cham Province ranks first as a place of maize production, the other districts in the Mekong basins rank second and Battambang Province, third. 'Agriculture, forestry and livestock industries of Cambodia' compiled by the Bureau of Economics, Foreign Office, Japan also refers to the advantage of the zonal fertile soil called 'chamcar' in

the basins.

In our investigation we take up Kompong Cham Province first and then Kandal Province in order to perform the analysis of the actual farming technology of maize crop and the soil basis, and, if possible, inquire into the question "Why is the production of maize being continued in the Mekong basins?" for the purpose of contributing to the study of measures to develop new places of production.

1. Kompong Cham Province.

We could know the outline of this Province from the Governor. The principal produce of this Province consists of maize, cotton, sesame, tobacco and soya bean. Repeated cultivation of maize on the same fields is possible in this district. However, when it rains heavily the maize of the low land in the Mekong basins is damaged; in 1961 one-third of the maize crop was damaged by heavy rainfall.

The 'terre rouge' can be cropped with maize without manuring for a few years after it has been brought under cultivation, but after that the fertility of soil rapidly diminishes, when manuring becomes necessary. (According to Mr. Ho-Tong-Lip, the fertility will be exhausted in ten years in spite of the application of fertilizer.) Irrigation in the maize zone of the 'terre rouge' will be difficult, as the zone is situated on highland.

The total produce of maize, which was formerly over 400,000 tons, has now decreased to the level of 100,000 tons. This is mainly attributed to the price differentials. At present the acreage of the maize crop is subjected to its price; if the price falls, the acreage of sesame, various kinds of beans, tobacco, etc. tends to increase.

The acreage of a family farm under cultivation of maize is 2.0 - 2.5 ha. with 2 ha. of paddy rice on the average. In the maize zone semi-monoculture of maize is being conducted, resulting in the maintenance of 20,000 ha. of maize acreage in total without any decreasing tendency of it.

The acreage of maize crop during the wet season amounts to 20,000 ha. with yield of 2.0 t./ha., while that during the dry season is 500 ha. (3,000 ha. according to the statistics of 1962 - 63) with yield of 1.2 t./ha. The collection of the produce is conducted by overseas Chinese merchants who transport it to Phnom Penh by ship.

The Government is encouraging cotton growing, which involves problems of (1) injurious insects, (2) varieties and (3) the use of the 'terre rouge'. In Kompong Cham Province there is little land left which is lying waste and waiting to be cultivated. Although there are forests left in the 'terre rouge' zone, the Government does not seem to be active in clearing them. (In this connection we observed the afforestation of teak being conducted in the Afforestation Zone of the Bureau of Forestry continuing over a period of 20 years on the occasion of our precise survey which will be stated below.)

Technical guidance to farmers is given by the Agents of the Province as well as through radio broadcast. At present such guidance is given as encouraging the rotation of crops consisting of 2 ha. of maize and 2 ha. of soya bean. In reality, however, repeated cultivation of the same crop in the same fields is often conducted.

The data, which we obtained at the Provincial Office of Kompong Chang, consist of the following tables showing the efforts of the Province for the promotion of agriculture:-

Table 3.1 Yield per ha. and others classified by the kind of crops (The data were collected while interviewing the Section of Agriculture, Provincial Office of Kompong Cham).

Table 1: Yield and proceeds per ha. classified by
the kinds of crops

(The data were collected while interviewing the Section of Agriculture,
Provincial Office of Kompong Cham)

Name of crop,	Yield per ha.	Unit price per kg.	Rough income per ha.	Statistics of Bureau of Agriculture		Remarks
				Yield per ha.	Unit price per kg.	
rice	kg 1,000	R 3.0	R 3,000	kg 1,300	R 3.0 - 5.4	Wet season
Maize	2,000	2.5	5,000	1,500	2.3	Wet season Dry season
Soya beans	1,000	6.0	6,000	650	9.5	Wet season
Sesame	600	12.0	7,200	650-700	13.7	Same as a above
Raw cotton	700	8.0	5,600	1,200	5.9	Wet season Dry season
Tobacco	800 - 1,000	20.0	20,000 - 15,000	650	27.4	Dry season

Table 2 Seedtime and harvest time classified by crops and two seasons, dry and wet.

	Crop of wet season												Crop of dry season							
	4	5	6	7	8	9	10	11	12	1	2	9	10	11	12	1	2	3	4	5
Early-ripening variety of rice																				
Mean variety of rice																				
Late variety																				
Late variety of dry season																				
Late variety																				
Floating rice																				
Maize																				
Mung bean																				
Peanut																				
Peanut																				
Soya bean																				
Sesame																				
Raw cotton																				
Sugar-cane																				
Jute																				
Ramie																				
Tobacco																				
Castor beans																				
Dahaue bulleux																				
Sweet potato																				

2. *Kandal Province*

Kandal Province is a long-standing place of maize production, its yield being well over that of *Kompong Cham*; moreover, it belongs to the district where the 'Maize Demonstration Farm' by I.V.S. is working. Such were the reasons for our survey of this Province. Furthermore, we had, on the advice of Mr. Sum Chhum, Director of the Bureau of Agriculture, already surveyed the hamlet of Koki lying 15 kilometers from Phnom Penh the weekend of our arrival in this country. The hamlet merited attention in view of the characteristic terrace formed by rivers and the variety of the maize grown there.

III Outline of districts where detailed investigation was conducted

As we have mentioned above, after having reviewed the result of the general investigation, we made detailed surveys as follows:-

1. *Environs of Kompong Cham City in the Mekong basin*
 - a. *Right bank: Prek Andong*

Survey of soil nature: (No. 10); (No. 11); (No. 13)
 - b. *Left bank: Chhlong*

Survey of soil nature: (No. 14)
 - c. *Midstream island: Kas Satin*

Survey of soil nature: (No. 15)
2. *Basins of River Tonle Bassac and districts below Phnom Penh.*
 - d. *Right bank: Samrong Thom*

Survey of soil nature: (No. 12)

The outline of the above districts are as follows:-

(a) *District A*

This district which is situated on the right bank of the Mekong is inundated during the wet season by the rise of the Mekong through the small streams which are said to have been artificially dug, and in the elevated land in its interior, being of rich sandy loam, the production of maize is

said to amount to 3 t./ha. (No. 10; No. 13) Scattering in this interior land are found patches of highly sandy and rather sterile soil together with lowland.

Maize is grown here collectively in an acreage of about 500 ha. According to Mr. Sato, he saw nothing but maize in the fields on his last visit here, but this time sweet potato crop is especially conspicuous, and, in addition, tobacco, white gourd-melons, mung beans and peanut are cropped. Our subsequent investigation clarified the reason for the above change. That is, the dry season crops consist of maize and tobacco on the rich elevated soil and of sweet potato, white gourd-melon, mung beans and peanut in the rather impoverished soil; the wet season crop is nothing but maize. The crop of sweet potato, which is especially conspicuous, was increased by the demand of a starch mill recently built in Phnom Penh. Sweet potato as the material of the mill is being collected by Chinese merchants by bartering one ox-cartful of unhulled rice for the same quantity of sweet potato.

(b) District B.

While sandy loam is widely distributed in A District, the soil of this district is clayish and in some parts damaged by drought as in No. 14. The acreage of maize collectively grown in this district is larger than that of A district and presumed to amount to over 1,000 ha.; really we could see nothing but maize all over the fields except a small acreage of tobacco crop by the road. Although the clay loam is greatly affected by the soil moisture during the dry season, it can, we presume, yield well during the wet season.

(c) District C .

This district has been chosen for the purpose of surveying the maize crop on the midstream island of the Mekong.

A range of sandy ground about 1,000 m. from the river bank is cropped with tobacco, watermelon, etc. On a rather elevated part of the island hamlets are scattered in zonal shapes. Midway between the sandy ground and the hamlet are found fields favourable to the cultivation of maize. The

characteristic of this midstream island seems to lie in the wider range of seedtime than that of the above-mentioned two districts; the growth of the maize here was various, ranging from the stage of about twenty days after sowing to that of more than sixty days after it and earing; each of them was growing normally.

(d) District D

The districts we surveyed in Kandal Province differ in the fertility of soil from those of Kompong Cham Province which is situated upstream basins of the Mekong. This may be due to the gradual decrease in the rich soil brought by the river in the wet season resulting in the small quantity of deposited soil in the flooded districts. It will be of course necessary to review such questions as (1) the impoverishment of the soil due to long-standing cultivation, (2) fertility during the wet season, (2) comparison of the two districts by means of fertilizer experiment, etc. Furthermore, the districts may be lessening their will be grow maize, as they belong to the suburbs of Phnom Penh which makes the farmers in these districts shift to the crop of vegetable plants such as sweet potatoes, etc.

IV Farming technology in the surveyed districts.

While conducting an investigation on the spot we gathered informations by interviewing the village headman and some farmers. To summarize the farming technology, it is as follows:-

1. Preparation of nursery

Ploughing is conducted by means of the conventional plough drawn by two yellow oxen. The blade, which is of cast iron, and the shape of the plough indicate the intermediary one in course of shifting from the primitive to the modern one.

Ploughing for the dry season crop is conducted when the wet season is over, and the river begins to subside, and while the soil contains moisture. (middle of November) If it is too late, the soil gets hardened and it becomes

impossible; if it is premature, excessive moisture makes it impossible. After ploughing the soil it must be harrowed as soon as possible; especially in the case of fields of clay loam, they will turn to be the so-called clod fields. (No. 10-Ph. Banteai Dek) In certain farms of vegetables coolies were employed to conduct clod breaking.

Preparation of nurseries consists only of ploughing and harrowing. In watermelon fields weeding before sowing is also effected. (female coolie: R 15-20 per day also finding in meals). In case of quick ploughing hired work is also utilized.(male coolie with work oxen: R 50 per day.)

2. Seedtime.

As is illustrated in Table 3.2, the seedtime of the wet season crop is April, while that of the dry season one is November. The former has a fairly long range, for sowing is begun after the soil has got properly moistened. In fact, according to the information which reached our ears, it extends over a month. The latter is considered to have a short range for fear of the hardening of the soil, especially in those districts where there is the possibility of drought during the growth of the crop. Even in the case of the former, if the crop is sown excessively late, it is apprehended that it will be damaged by the flood of the Mekong before its harvest.

3. Variety.

The Bureau of Agriculture stated that the red variety was for grains and the white one for raw food. As for the white one, we made no investigation; according to the statistics, it is grown most in Prey Veng Province. As our investigation was limited to the fields of red Flint variety, we could not appraise the two varieties by comparison.

The crop of red Flint variety became popular when this country was a French colony. The variety 'Cam sym', which had been raised by means of breeding the red Flint variety, etc. as population in the nursery of the Bureau of Agriculture, seems to have been popularized through the efforts

of the Agents of each Province. This new variety, however, does not seem to have aroused much interest on the part of the farmers. Information which orally came to our knowledge from farmers are as follows:- "I have received some seeds of the new variety, but I do not know where I put them", "I heard of it, but did not get it, as I had my own seeds", etc. They pay little attention to the feature and general idea of 'Cam cham'. Although the result of another variety raised is unknown, it does not seem an excellent one of synthesis, according to I.V.S.

4. Manuring.

As we stated above, in such districts of Kompong Cham Province as we have surveyed, where there is rich alluvial soil which makes possible the cultivation without fertilizer, control of water (particulary for the dry season crop) has priority over manuring. However, in those fields of Kandal Province whose fertility is low manuring is naturally a question. As we have no data in connection with manuring, we hope that reference will be made to the description under separate title of "Records of experiments concerning the maize in Cambodia".

5. Seeding

Seeding is divided into dibbling and drilling. Although there are some past records of the former, in nearly all the maize fields is conducted seeding which is quite like the latter. Farmers classify seeding into two sorts: ridge cutting and boring holes. They point out two advantages of ridge cutting; firstly, it can finish the seeding work faster than boring holes; secondly, the loss of plants due to rodent attack is less than in the case of boring holes, even if it requires more seeds.

Ridge cutting is a method of seeding like the so-called drilling. After having sown seeds of 30 kg./ha. in the furrow, the plants are pulled out so as to arrange the distance between them to be some 90 cm. or so.

Boring holes has been practiced from of old; sometimes more than 7 -

8 seeds are sown for a unit group of plants probably for fear of the rodent attack. It resembles the 'check and row method', and requires seeds of 15 kg./ha., which are one half of the former.

6. Spacing

Almost all the fields we surveyed were arranged in order that the breadth of ridge was 90 - 100 cm., distance between plants 70 - 90 cm. and a unit group of plants consisted of 4 - 5. The proper spacing for red variety of maize in the Mekong basins may be arranged on the basis of 4,000 - 6,000 plants per ha. This spacing can not be considered so dense as that recorded in the past survey report.

7. Thinning .

As ridge cutting is a kind of drilling the number of maize at the time of sprout is considered more than 10,000/ha., part of which are pulled out to widen the distance between plants even in case that there was rodent attack. Then a unit consisting of 6 - 7 plants are thinned into that consisting of 4 - 5 plants. The time of thinning is generally after the period of the elongation of the stem parts between knots. (40 days or so after sprouting). The undergrowns are mowed with a sickle one by one and used as the green fodder for cattle. While conducting our survey, we often saw such green sheaves shouldered by farmers or carried on ox-carts. It is important that timely thinning is conducted.

8. Blight.

Contrary to our anticipation, damage by blight is slight in the fields where maize is cultivated repeatedly in the same soil in accordance with the recurring cycle of maize — maize — flood; we saw only a small number of cornstalks eaten into by corn-borers. This may be attributed, for one thing, to the submergence of the remaining leaves and stems as well as the nursery which contributes to the control of injurious insects. The early-

ripening character of maize which reaches its full growth within 90 days may be too fast for the blight to damage the crop.

In the opinion of Mr. Som-Khom who is in charge of the nursery, of the yearly three crops the crop of May — September and that of December — March grow normally, but that of September — December is often affected by blight, its pestillate ears being small in spite of the plant height which is above normal.

9. Rotation of crops

The Agricultural Section of the Kompong Cham Provincial Office is encouraging the farming in rotation of maize and soya beans. However, the repeated cultivation of maize in the same soil is reasonable in a way due to the fallow during the flood season. We hope to study this matter in future.

10. Relation to other crops

As for sweet potato, we have already stated above. Among the other crops, there are limits to cotton growing in view of the blight and the period of its growth; as for tobacco there are also limits to its cultivation in view of its intensive farming and consumption in connection of its self-sufficiency. Two crops a year of soya are impossible. (Among leguminous plants some varieties of mung beans can be grown twice a year.) The advantage of maize farming in comparison with the other crops above-mentioned together with the sense of security in selling the produce, which is brought about by the smooth operation of the collection structure operated by overseas Chinese merchants, are inducing the farmers to specialize in maize cultivation. (Farmers say that they have never been troubled with a slow market of maize.)

11. Harvest

At first we were afraid that the conventional variety, early-ripening and bearing many pestillate ears, on a plant, when cultivated over an

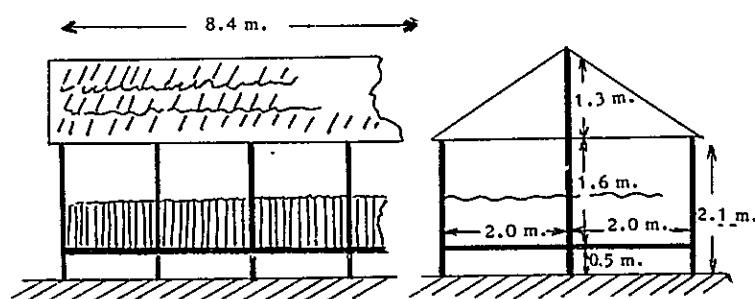
acreage of 2 - 4 ha. would cost much labour. But the farmers seemed to think little of it.

Farmers cultivating a large acreage are equipped with such corn cribs as illustrated in Figure 3.2 for the purpose of drying the pestillate ears. Farmers without such equipments store the produce in their houses. Shelling after drying is conducted by an efficient and movable sheller of their own device. The shelling work will be facile as its capacity is 40 tons a day, shelling charge being R 4/100 kg.

12. Amount of produce.

Statistic figures show that the amount of produce is 1.5 t./ha. According to the information which reached our ears from the farmers, the amount is 2.0 - 4.0 t./ha. in the collectivised maize fields and 3.0 t./ha. in the rich soil. We consider that the fertility of soil and farming technology are by no means low in the case of an early-ripening variety which reaches its full growth within 90 days. The produce of the dry season crop is smaller than that of the wet season one, according to the Agricultural Section of the Kompong Cham Provincial Office (although some farmers say that there is little difference between the two.) We are convinced of the above opinion in view of the result of our survey of the cultivation.

Figure 3. Corn crib in Cambodia



Reaped pestillate ears are stored in April and August;
Storage amount being generally 3 ha. of produce.

V. Investigation into the farm management in the maize zone on the banks of the Mekong.

1. Purpose of investigation.

This investigation was performed in the two Provinces of Kompong Cham and Kratie, which are both principal places of maize production, for the purpose of considering the relative importance of the maize crop to the farm economy, and, by means of clarifying the conditions of its production and the problems in relation to it, obtaining the data for establishing counter-measures to deal with them.

The spots surveyed are shown in the attached map, and the period of survey was January 27 - 30, 1964, which corresponded to the time of the dry season crop whose growth was in a stage of 20 - 40 days after seeding.

2. Actual cases of farm management

The maize farms which we took up for our investigation were two of those in Krabau hamlet, lying about 4 kilometers west of Chikang, Province of Kompong Cham and two other farms in Chhlong of Chhlong district, Province of Kratie. The method of our investigation was that of obtaining oral informations by means of interview, the result of which was as follows:-

(1) The hamlets of Krabau and Chhlong, which are similarly situated on both banks of the Mekong, are growing maize twice a year, in wet season as well as in dry season, the crop being the principal item of their farm economy.

(2) Means of production such as farming implements, tools and work cattle (conditions of soil are stated in another paragraph.)

As the dry field farming zone on the banks of the Mekong are often composed of sandy soil or sandy loam which are fitted for the use of work cattle, the principal type of farming, regardless of its scale, consists of two yellow oxen, a plough and a harrow which are both drawn by work beasts and an ox-cart.

As is shown in the photograph attached, the plough is a conventional one with a long and large sole and a beam which are made by their own hands, made of hard wood of the district, so heavy that its weight is presumed to be 2.5 t. and equipped with blades of cast iron.

Most of the harrows are also made at home, of hard wood, so heavy that it seems to weigh 1.5 t. composed of round-bar-shaped rotating teeth which are about 20 cm. long and fixed teeth of bent iron.

It is always drawn by a team of two oxen and so devised, while harrowing the top soil already ploughed with the rotating teeth, to chop it with the fixed teeth. (see photograph)

According to a farmer, the material of the plough has costed him R 500, and the harrow, which he bought, some R 25,000.

In addition to the above, ox-carts are utilized for all of such purposes as going to and from the fields and transport of farming implements and produce.

Hand tools are limited to 4 - 5 kinds such as very simple hoes, sickles for cutting stems, scythes for mowing bushes and weeds with big stems, wood sticks for seeding, pails for sprinkling water.

What merits attention is the thresher. A power-driven thresher (sheller) has come into use of late years and the conventional threshing by manpower has diminished.

Power-driven shellers are owned only by a small number of rich farmers who are entrusted with the shelling work by farmers in general.

The structure is a shelling apparatus mounted on the chassis of a medium-sized truck whose engine is utilized just as it is for the power source. It is movable freely.

The shelling is a contract work for R 4 - 5/100 kg. and it is a custom with the farmer who hires the machine to help the operation.

The price of the machine differs as the case may be. According to a farmer of Krabau hamlet, he bought a second-hand sheller for R 50,000

seven years ago; it has never got out of order; he was willing to sell it for R 70,000.

However, a farmer of Chhlong hamlet who owns it says that he bought it for R 20,000 three years ago from a dealer in farming implements of Phnom Penh.

Although the structure of both machines are the same, there is a wide difference between their prices. The surveyer feels that price mentioned by the farmer of Chhlong is reflecting the actual price more exactly.

The shelling capacity is 40 t./day and the charge R 4/100 kg., the incoming being R 1,600/day.

If we assume

Capacity of machine to be 40 t./d.,
operation days 30 per month which means 1,200 t./m., and
average produce to be 2.5 t./ha.,
480 ha. of maize per month and accordingly some 1,000 ha.
of produce will be shelled in two months.

This fact shows that a sheller is enough for a hamlet.

The owner of the machine we saw is a merchant of Chinese origin whose close connection with the broker belonging to the tip of the organization of the overseas Chinese merchants can be easily presumed.

3. Use of land viewed in the light of farm economy.

As compared with the right bank zone of the Province of Kompong Cham, where cash crops which require intensive farming are cultivated such as tobacco, melons, peanut, sweet potato, etc., in Chhlong of Kratie Province, which is on the left bank of the river, nothing but maize is cultivated, with only a small acreage of tobacco crop, and the culture of melon, peanut, sweet potato can hardly be found. That is to say, the use of land is more intensive on the right bank. Therefore, we may say that farmer's economy on the left bank depends on maize crop.

Ideally speaking, farmers will do well to cultivate a ha. of rice paddy for their own consumption, but such farmers are rarely found.

Accordingly the farmers on the right bank make it a rule to barter their sweet potatoes for the unhulled rice of overseas Chinese merchants, while those on the left bank sell their maize to purchase unhulled rice. This is the reason why the latter seem to be making great efforts for maize production..

Maize is cropped twice a year: once in the wet season which extends over May - July and again in the dry season extending over November - January of the following year.

These fields, whose top soil is washed away during the wet season, recovers the fertility by the deposits of the rich soil brought by the flood of the Mekong.

All of the fields we surveyed are submerged by the muddy water of the river for 2.5 - 3.0 months (70 - 90 days), that is, from the end of July to that of September, during which period deposits of mud, some 20 - 30 cm. thick, are said to be accumulated. However, the water level varies with the rainfall of the year and there is some change in the nature of the mud deposited. Farmers have said that the soil impoverishes where much sand is deposited.

Some of the fields we investigated are said to have impoverished, although they used to be fertile formerly.

Thus the maize fields on both banks of the Mekong are recovering the fertility, which is impoverishing every year, by virtue of the flood. However, not all of this fertility is used for the dry season crop of the year, but it is utilized also for the crop of the following wet season.

We may say that maize, which is highly absorbent of nutritious matter, is a quite suitable crop for such fields, where commercial fertilizers are beside the question.

The range of the seedtime of maize in the Mekong basins greatly differs, even¹ in the case of the same farmer, according to the season; it comes to

an end in a week during the wet season, but it extends over some 15 - 20 days during the dry season, the seeding beginning with the upland fields and coming down to the lowland ones. The seeding method differs accordingly.

The reasons for the comparatively stabilized crop of maize whose growth period extends over 2.5 - 3.0 months and for the yield which is usually higher than anticipation are as follows:-

The maize fields are immune from precipitate floods by dint of low river-bed of the Mekong, while the farming zone on both banks is located about 10 m. above the river-bed, and the rainfall in the initial stage of the wet season is comparatively small together with the regulating function of the flood by Lake Tonle Sap; the subsidence of water, on the other hand, begins early in the dry season.

In short, the banks of the Mekong are enjoying exceptionally favourable conditions in view of the use of land for farming purposes.

4. Scale of maize farmer.

Although we cannot make an exact statement from a statistical point of view, the following circumstances have been known from what we have heard from the farmers:-

The maximum scale of a maize farm in Krabau is 30 ha. This landowner, who corresponds to the so-called at-the-plough landowner of Japan is engaged in farming himself by making use of work cattle, while the surplus land is let out on lease.

According to other farmers, maize crop of an acreage of more than 4 ha. in one season is difficult in view of labour. The unit of acreage per farmer often seems to be 2 - 3 ha.

Petty farmers lease land from landowners, and the rent, which is R 2,000 per year on the average, is of wide range.

When we assume

Yearly rent per ha. to be R 2,000,
Yield of maize to be 5 t. (consisting of 2 t. of dry
season crop and 3 t. of wet season one), and
price ex-farmhouse to be R 2/100 kg.,
rough income will be R 10,000, 20% of which or R 2,000, accordingly,
corresponds to the amount of rent.

The minimum rent is R 600 - 700, while the maximum R 4,000; such a
wide difference due to the different fertility of the fields and danger of
stagnant water reflects the circumstances of this district.

5. Concurrence of crops: maize and other commercial crops.

- Tobacco, sweet potato, mung bean -

It seems that the acreage of maize crop has fairly decreased recently
in such principal maize zones as the Provinces of Kandal and Kompong Cham,
as a result of the increase in the land under cultivation of tobacco, sweet
potato and mung beans.

It is necessary to ascertain the reason for such decrease in the acreage
of maize crop; whether it is due to temporary circumstances or to pursuit of
increased income.

(1) The reason for the increased acreage of tobacco crop in the dry
season is the decision by the Government of the producer's price of tobacco.
As the price for this year is R 2,500/100 kg., and the yield of raw leaves
is said to be 600 kg./ha., the rough income per ha. amounts to R 6,000 -
7,000/ha., which is a net income about twice as that of maize. However,
according to farmer's cost accounting, the profit of tobacco cultivation is
comparatively small, as the cost of labour such as growing seedlings, trans-
planting, weeding, blight control, etc. and that of agricultural medicines
amount to much. That is why large scale farmers of maize will not crop
tobacco, although it is a fact that this is an important cash crop for small
scale farms cultivating an acreage less than 3 ha. This question is subject

to a great change according to the policy of the Government to maintain its purchasing price or not.

The fields to be cropped with tobacco must be located in slightly low land which is fertile and cannot be over-arid even in the dry season. Such soil is called 'Dai Kurom'.

Now we consider the question of sweet potato.

The reason for the recent increase in the acreage of sweet potato is the purchase as a commercial crop by merchants at a considerably high price; in this case the net income of farmers amounts to R 7,000/ha. In addition there is also barter of sweet potato for unhulled rice.

In the case of maize there is no barter for unhulled rice. Because maize farmers consume yearly 350 kg. of unhulled rice per adult, and a family of 5 consisting of a couple and 3 children requires yearly 1.9 - 2.0 t. of unhulled rice, which, if obtained by barter, will need a considerable acreage of sweet potato to be cropped.

A conceivable reason for the increased production of sweet potato is the sharp fall in the price of unhulled rice, that is, the decrease in its value as an article of commerce, together with the sudden increase in its domestic consumption. We also consider that the increased consumption of sweet potato may be attributed to its use as vegetable.

Accordingly, in case that the above-said factors are eliminated for instance, the price of unhulled rice advances, or increased production of sweet potato becomes well over its demand, the acreage of sweet potato will rapidly decrease.

As sweet potato is often grown as a catch-crop or a mixed crop of maize there may appear a concurrence of the use of land. However, the former is grown generally in comparatively high farm land (Dairu) only in the dry season when the yield of the latter is not much. Therefore, the concurrence of the use of fields may be considered beside the question.

The method of sweet potato crop is as follows: - the fields are first

ploughed and then harrowed carefully; next they are ploughed into ridges and planted with seedlings of 10,000/ha.; the bed is in a corner of the fields; long seedlings are planted fairly deep. Many farmers answered that the yield was unknown, but it seemed 1,500 - 2,000 kg./ha.

The varieties are native kinds whose colours are various, such as red, yellow, white, etc. and sometimes purple. Some are small-sized and strongly sweet.

Planting of seedlings is conducted over a period of November - December, and in three months, that is, during the two months of February and March most of the crop are reaped. As the second crop of sweet potato maize is sown.

6. Dealings of farm land.

Dealings of farm land are an index showing the stability of farm economy. As a result of our investigation it was known that there was considerable amount of this business, although details were not available.

There is a wide difference in land prices and one ha. in Krabau hamlet is said to cost about R 70,000.

To mention the land rent for reference, upland field (Dairu) costs R 2,500/ha., while lowland (Dai Kurom) R 7,500. In spite of such difference in the amount of rent, it can be said that the land price is low as compared with the rent.

7. Noteworthy points viewed from farm economy.

(1) It has been confirmed that on the banks of the Mekong maize is a principal crop which is highly profitable in view of the use of farm land. Statistically speaking, nearly 98% of the maize production in this country is concentrated on the banks of the Mekong, and maize crop can hardly be found in the zone around Lake Tonle Sap, where paddy-fields of rice are concentrated.

(2) It has been presumed that there is a number of farmers specializing

in maize crop in the maize zone along the banks of the Mekong, where the maize acreage undergoes little change in spite of some degree of fluctuations in prices.

(3) It has been confirmed that the level of farming technology of the maize farmers is fairly high by dint of various devices.

(4) As our collection of information by means of interview about farm economy was conducted in connection with only a few cases of farmers and centering around the maize crop, overall information of farm management could not be known. Fortunately, however, there is a source material concerning this prepared by the Bureau of Agriculture of the Government, which, we hope, will be made use of for reference.

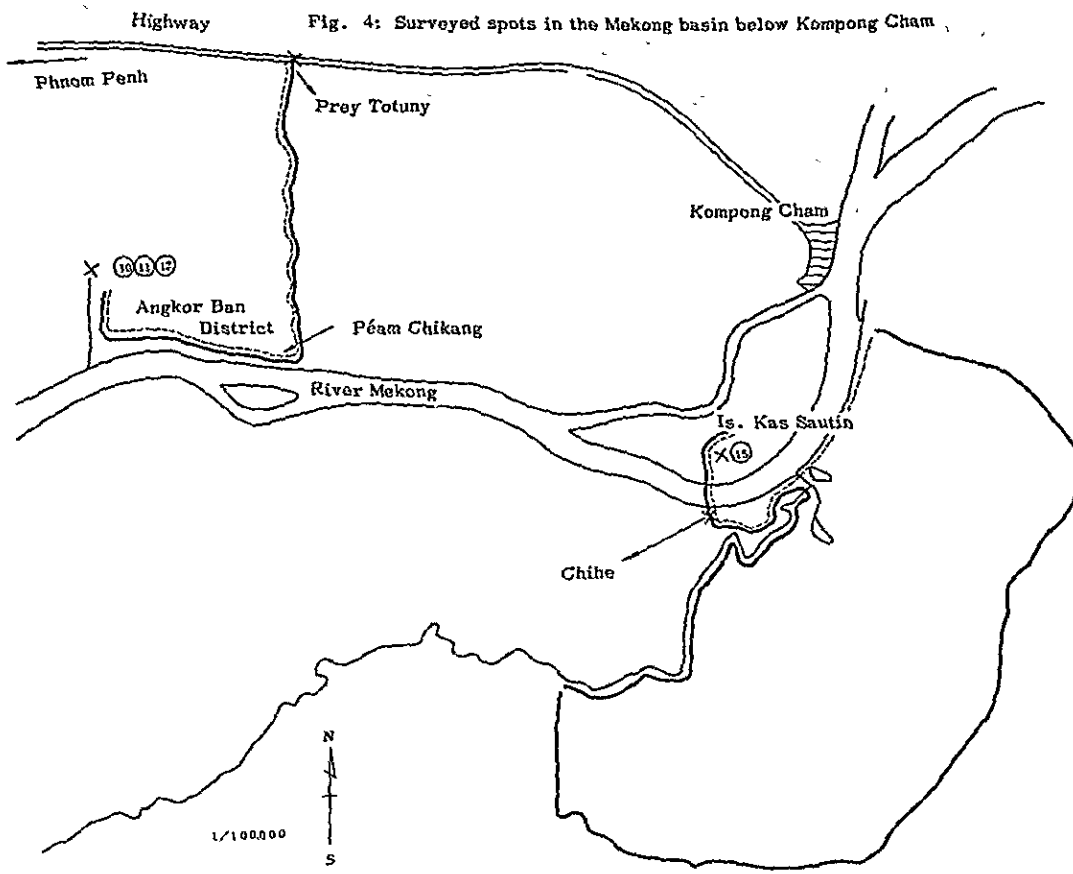


Fig. 4: Surveyed spots in the Mekong basin below Kompong Cham

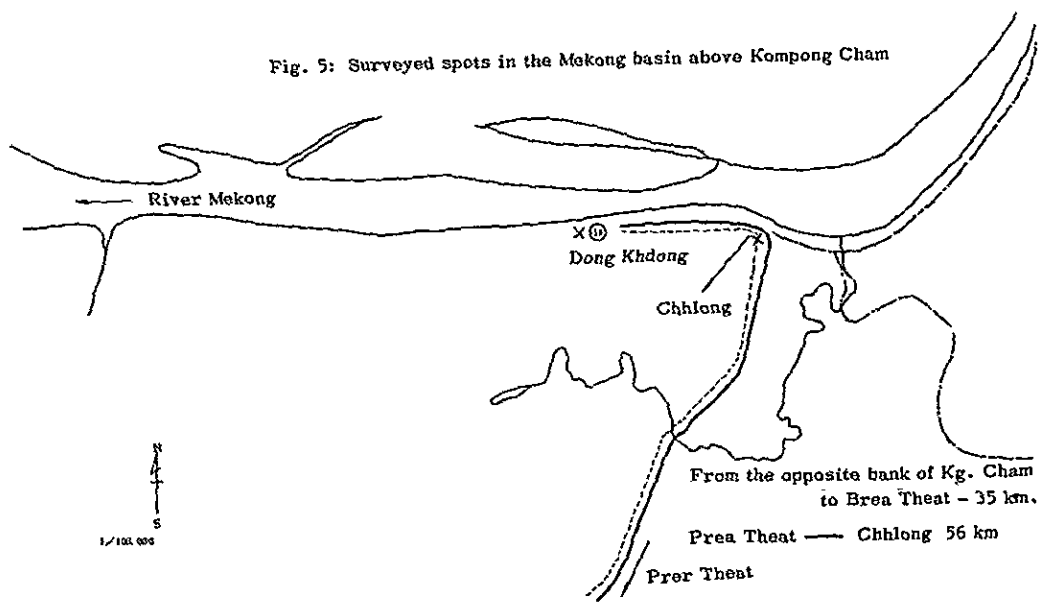
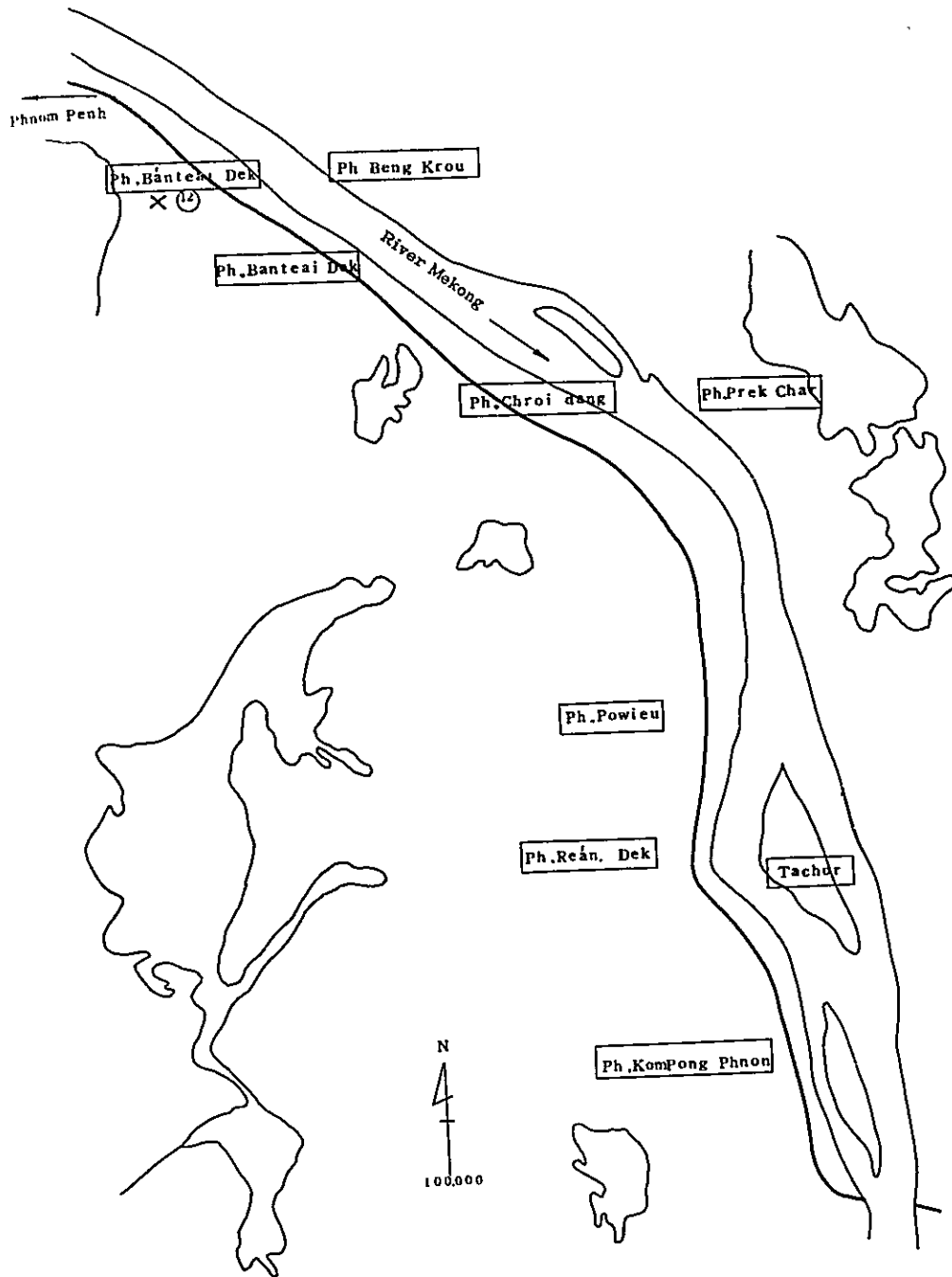


Fig. 5: Surveyed spots in the Mekong basin above Kompong Cham

Fig. 6: Surveyed spots in the Mekong basin below Phnom Penh
(Basin of River Tonle Bassac)



Appendix: Investigation of the "Livestock Centre" established by the
U. S. A. and its environs in Kampot Province.

This general investigation was conducted in accordance with the opinions of the Embassy of Japan and Mr. Isomura's suggestion that there was arable land suitable for maize and other crops in some districts of Kampot.

The outline of the spots where we collected samples of soil was as follows:-

No. 8 Pasture of the Livestock Centre

A lot of infertile land, whose PH value seemed low, is the pasture for the cattle, part of which was being turned to a grassland of pelargrass. The soil was arid where all grasses had lost their green colour except pelargrass which alone was fresh and green and seemed promising, as it was said to meet the taste of the cattle.

Generally speaking, the soil of the Livestock Centre is often of sandy nature, and it is advisable to build a 'Range' rather than a 'Grassland'.

Although the construction work of the Centre had been under way by the aid of the U. S. A., it was suspended by the Government which declined the aid.

When we surveyed the warehouse of farming machinery and implements, although details were unknown due to insufficient data, we saw large-sized ones left untouched except those of seeding. The important ones were as follows:- tractor, dump-trailer, disk plough, disk harrow, sprayer, manure spreader, tank car, harvester, hay mower, spray apparatus of medicine for cattle and sawing mill.

No. 9 Others: Basin of the small river in the vicinity.

A lot of land in the basin of a small river behind the Centre was being opened up. It was a proposed site of a banana plantation.

From the aspect of the forest the soil seemed fertile, but the area was not large in view of its width.

Guided by Mr. Isomura we inspected a spot in Stung Keo which had been given to him by the Government. The soil was rather good. The farmers of this spot were said to have settled there three years before.

Chapter IV. Soil survey.

For the purpose of obtaining the source material necessary for finding the farm land suitable for the new production or increased production in future of maize crop we investigated the existing important maize zones such as Kompong Cham and Kandal Provinces on the Mekong banks as well as the environs of Andoeuk Hep of Battambang Province and those of U. S. Livestock Centre of Kampot Province by means analysing the soil samples collected at the spots shown in Map 1 with a simple soil analyser of FHK No. 3 type which has given us a knowledge of the soil concerned.

1. Environs of Andoeuk Hep in Battambang Province

The result of analysis of the seven soil samples collected here is shown in Table 1.

This zone contains either the cultivated or uncultivated land in the environs of the experimental farm of cotton crop of Andoeuk Hep which lies along the highway from Battambang to Pailin. The soil consists principally of the so-called 'terre noire' which is the soft lime of the paleozoic strata and of weathered monadocks, around which is distributed the 'terre rouge' composed of alluvial soil and weathered igneous rocks.

As is shown in Table 1, the PH of the soil is generally neutral, except that of No. 5 and No. 6 which belong to the southern part, indicating a medium acidity, a rare case in this country where the soil is mostly acid. Available phosphoric acid is small in quantity, being 5 mg./100 g. even in the spot where the quantity is largest. Absorptivity of phosphoric acid is weak (500), in many spots being usually (700). It is rich in substituent lime in connection with the matrixes, but rather poor in magnesia in many spots. Available potassium is rich in spots of No. 1 and No. 6, but poor in other spots. It is devoid of nitrogen in the form of nitric acid in all cases except No. 1. The colour of soil is of black kind in all cases except No. 6 and

No. 7, which are red - brownish.

The maximum, minimum and mean values of the results of analyses conducted by Mr. Sato and others at 15 spots of the Provinces of Kg. Chhang, Pursat and Battambang are shown in Table 2. Many of the samples have been taken from paddy-fields, and PH, etc. indicate rather strong acidity than those of our investigation. Immediate comparison of lime and other three elements is impossible, as their indication method is different from ours. However, a considerable difference in the elements other than K_2O has been observed, according to the difference of the spots.

Table 3 is the result of Mr. Yasuo's analyses (conducted in 1963) of the soil in Battambang, showing that acidity is generally strong in paddy-fields, while neutral in the farm land of the 'terre noire'; that available phosphoric acid is often strong in some spots. According to him, the 'terre noire' is rich in available phosphoric acid, being supplied with phosphoric acid from the limestone; this is a singular existence in Cambodia whose soil is mostly poor in available phosphoric acid. We must take note of the fact that most of the soil we have recently surveyed have been found to be poor in phosphoric acid and the soil of various spots, although of the same black colour, differs in fertility according to their location. The distribution of the 'terre noire' is limited by the location of its matrix. Its cultivation is going on rapidly to turn it into new farm land where priority production of raw cotton is being conducted.

2. Kampot Province.

In this district there are many zones of sandy loam, which is most widely distributed in this country, consisting of the sedentary soil which originates in the sandstone of the Mesozoic Era and of alluvial soil (paddy-fields.)

Table 4 shows the results of the analysis of the soil in various spots of this district. Being sandy soil, the colour is brownish gray in most cases.

It is poor in nutrient elements except in some special cases. Its fertility is low. Many of the zones seem to be of acid soil. As for the farm land, even in the case of that in Bokor the soil shows strong acidity which is less than PH 4.0, and is in many cases poor in other nutrients.

At the spot No. 8 the soil seems to be of rather good nature, its PH being 7.0, rich in available phosphoric acid and potassium and containing lime. The cultivated land of No. E is a peculiar case, its soil being rich in lime. But this cannot be considered to indicate the general tendency of the zone, as the spot is located near the dwellings of people.

Table 5 shows the maximum, minimum and mean values of the results of Mr. Sato's and Mr. Saeki's analyses at ten spots. Like Table 4 it indicates the general acidity of the soil which is also poor in nutrients.

Table 6, which is the result of Mr. Yasuo's analysis of the orographic soil of Bokor, also indicates the same tendency as Table 4.

3. Zones along the banks of the Mekong (Provinces of Kompong Cham and Kandal)

This zone, being located along the banks of the Mekong, is yearly supplied with fresh mud by the flood when inundated in the wet season. It is said to be the most fertile district in Cambodia, being able to grow various crops without manuring, and in some places maize is cultivated twice a year, each time yielding 3 - 3.5 t./ha.

Table 7 shows the results of the analysis of soil at several spots of this zone. The soil is mostly brown in colour, rich in lime and magnesia, its PH being 7.0 which is slightly too acid. The average content of available phosphoric acid is richer than that of the other zones. The absorptivity is weak. In many cases it contains nitric acid and nitrogen in a slight degree. Generally speaking, it is a fertile soil.

This fertility of the soil may be attributed to the mud, rich in such nutrients as lime, phosphoric acid, etc., brought yearly by the Mekong from

its upstream.

Table 8 shows the maximum, minimum and mean values of Mr. Sato's analysis of the soil at 17 spots of Kompong Cham Province. As these spots consists not only of those along the Mekong banks but also those in Kompong Cham Province, the mean PH value of Table 8 indicates a fairly stronger tendency of acidity than that of our investigation. As for the other nutrients, similar tendency is also conceivable.

Table 10 shows the result of the analysis conducted by Mr. Martin G. Clish of I. V. S. in the zone near No. 12 spot of our investigation. According to this table the following fact can be observed:- The result of analysis of the soil on the banks of the Mekong shows the same soil nature irrespective of the difference in spots selected for sampling. However, the result greatly varies with such factors as the difference in the season, dry or wet, and the location of the farm land.

This is considered to be due to the fact that the soil of this zone has the drying effect as much as that of Japan; if it is kept warm in a state filled with water after it has got dry, $\text{NH}_4\text{-N}$ becomes available. This may be one of the grounds of the cultivation without manuring on the banks of the Mekong.

4. Synthetic review of soil analysis of the three zones

Synthetic review of the results of the soil analysis of the three zones is difficult for various reasons such as the difference and limited number of the spots surveyed in connection with sampling and the relative merits of the items of investigation having been disorderly appraised, and, furthermore, imperfect selection of the items, inadequate weighting of each item and the time of investigation which was limited to the wet season. Accordingly, it is necessary to conduct a more detailed and specialized investigation; to indicate the maximum and minimum values of each zone, they are tabulated as in Table 11.

The three zones are entirely different from each other in the composition

and nature of the soil; the zone on the Mekong banks consists of all cultivated land, while the other zones are often virgin soil or soil just opened up.

PH of the soil in Battambang Province and along the Mekong banks is of weak - neutral acidity, while it is of strong acidity in many places of Kampot Province. As for available phosphoric acid and absorptivity of phosphoric acid, the conditions of the Mekong banks are favourable, while those of the other zones are nearly equal to each other. As for substituent lime, Battambang and the Mekong banks are excellent.

As for the other items, the Mekong banks show a tendency of being rather poor in available potassium, so does Kampot zone in $\text{NO}_3\text{-N}$.

These tendencies are nearly the same as those of the analyses already conducted by Mr. Sato, Mr. Yasuo and other persons.

Judging from the above, of the three zones the conditions of the Mekong banks are most favourable to maize crop so far as soil nature is concerned. Next to them is Battambang Province followed by Kampot Province. However, Battambang is considered prospective, subject to the irrigation problem, while Kampot seems to be defective in view of its rather high acidity of the soil.

Fig. 7: Spots of soil sampling

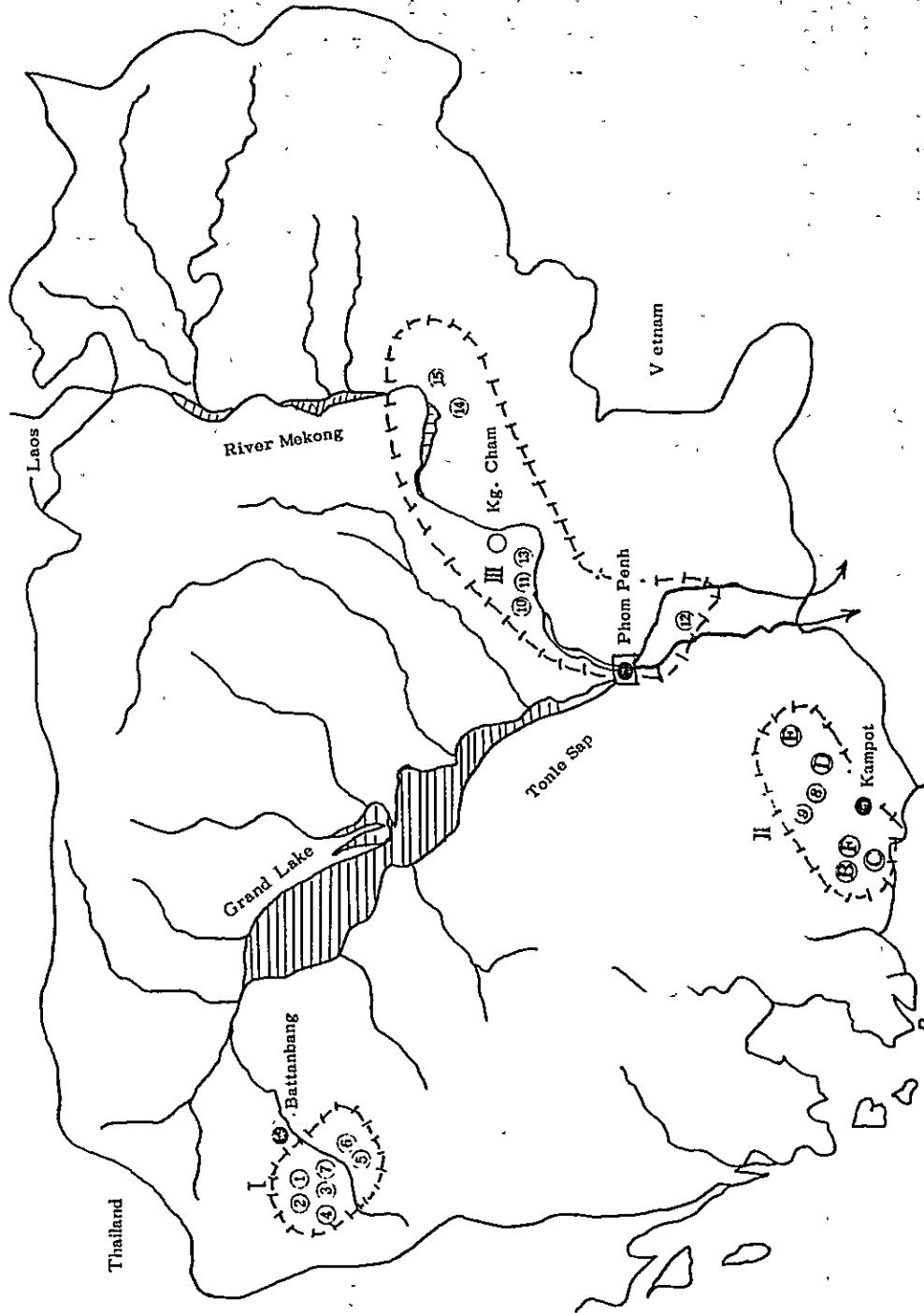


Table 3: Analysis of soil in environs of Andock Hép, Battambang Province

No.	Name of sampling spot	Soil	Existing condition	PH		Available phosphoric acid	Absorptivity of phosphoric acid	Substituent phosphoric acid	Substituent magnesium	Available potassium	NH ₄ -N	NO ₃ -N	Soil Colour
				H ₂ O	KCl								
1	Bonchu B. Bang	Clay loam	Immediately after cultivation, Cotton crop	7.0-7.5	7.0-7.5	0.1mg 100g	700	Very rich	5mg 100g	Rich	Devoid	Rich	Blackish brown 7.5YR 3/1
2	Ben Kandale B. Bang	"	Cultivated fields, Cotton crop	7.5	7.0	1mg 100mg	700	"	15mg 100g	Slight content	Rather devoid	Very rich	Blackish brown 7.5YR2/3
3	Boribo B. Bang	"	Cultivated fields, 7th year of cultivation	7.0	6.5-7.0	0.1mg 100g	700	"	15mg 100g	"	"	Rather devoid	Black-reddish brown 5YR 3/4
4	"	"	"	7.0-7.5	7.0-7.5	5mg 100g	700-1,000	"	5-15mg 100g	content	Devoid- Rather devoid	"	Dark brown 10YR 3/3
5	Meas B. Bang	"	Virgin soil (Jungle)	6.5	5.5-5.0	0.1mg 100g	700-1,000	"	5-15mg 100g	Nil	"	Devoid	Black 7.5 YR 2/1
6	Kg. Kol B. Bang	"	Deforestation, (Burnt fields)	6.0	5.5-5.0	"	Under 500	Rich	5-15mg 100g	Content	"	Rather devoid	Grey-yellowish brown 10YR 4/3
7	Phn. Doumery B. Bang	"	Virgin soil (Jungle)	7.0-7.5	7.0	1mg 100g	500	"	5-15mg 100g	Nil	Devoid	Devoid	Dark reddish-brown 5 YR 2/3

Table 4: Maximum, minimum and mean values of soil analyses at 15 spots in Provinces of Battambang, Pursat and Kg. Chhnang (By Mr. Sato & others)

Classification	PH		N (%)	Available nutrient (%)		
	H ₂ O	KCl		CaO	P ₂ O ₅	K ₂ O
Maximum	6.4	6.3	0.23	0.099	0.064	0.011
Minimum	4.7	4.0	0.05	0.001	tr	tr
Mean	5.4	4.9	0.10	0.027	0.08	0.006

Table 5: Soil analyses of districts in Battambang (By Mr. Yasuo)

Name of place	Soil	PH(KCl)	Available phosphoric acid	Substituent lime	Soluble aluminum
Battambang (Districts along River Battambang)	Alluvial clay loam	4.3	2 ppm	0.2%	100 ppm
Battambang (Manured paddy-fields in the same)	"	4.5	150	0.2	100
Tuol Samrong (Non-flooded districts)	"	4.3	0	0.1	150
Andoek Hep (Cultivated land of terre noire soil)	Terre noire	7.0	20 - 200	0.2	0
Andoek Hep (Same as above)	"	7.0	1	0.2	0

Table 6: Result of soil analysis in Kampot Province

No.	Name of place	Soil	Existing condition	PH		Available phosphoric acid	Absorbptivity of phosphoric acid	Substituent phosphoric acid	Substituent magnesia	Available potassium	NH ₄ -N	NO ₃ -N	Soil colour
				H ₂ O	KCl								
8	Phum Sroksia Kampot	Sandy soil	Virgin soil (Grassland)	7.0	6.5-7.0	10mg/100g	700-1,000	Content	15-25mg/100g	Rich	Devoid	Rather devoid	Gray-yellowish brown 10YR 4/3
9	" (River bank)	"	Virgin land (Deforestation)	6.5	5.5-6.0	1mg/100g	700	"	"	Slight content	Devoid	Devoid	Yellow-brownish gray 10YR 4/2
B	Bokor Jsom-URA Farm	"	Cultivated land (Vegetables)	5.0-5.5	40	5mg/100g	500 - 700	Devoid	5-15mg/100g	"	Rather devoid	Rather devoid	Brownish gray 5 YR 5/2
C	Bokor entrance Kampot	"	Cultivated land (Fields)	5.5	40	0.1mg/100g	700	"	"	"	Devoid	Devoid	Brownish gray 7.5 YR 5/1
D	Chhuk Kampot	"	" (Fields)	6.5-7.0	6.0-6.5	1mg/100g	500	Content	15mg/100g	"	"	"	Brownish gray 5 YR 4/2
E	Beng Kraph Takeo	"	" (Maize)	7.5	7.0	0.1mg/100g	700	Rich	5-15mg/100g	"	"	Rather devoid	Brownish gray 5 YR 5/3
F	Bokor Jsomo R/FARM	2	Virgin soil (Top soil)	4.5	4.0-5.0	5mg/100g	700	Devoid	15-25mg/100g	"	Rather devoid	Content	Brownish gray 5 YR 4/1

Table 7: Maximum, minimum and mean values of analysis result at 10 spots of Kampot Province (By Mr. Sato)

Classification	PH		N (%)	Available nutrient (%)		
	H ₂ O	KCl		CaO	P ₂ O ₅	K ₂ O
Maximum	6.3	5.7	0.18	0.140	0.018	0.008
Minimum	4.7	4.2	0.05	0.006	tr	tr
Mean	5.4	4.9	0.09	0.034	0.004	0.004

Table 8: Result of soil analysis in Kampot Province

(By Mr. Yasuo)

Name of place	Soil	PH(KCl)	Available phosphoric acid	Substituent lime	Soluble Aluminum
Bokor (Cultivated land)	Sandy soil of mountain	4.3	0 ppm	0 %	300 ppm

Table 9: Result of soil analysis in districts along the Mekong

No.	Name of place	Soil	Existing condition	PH		Available phosphoric acid	Absorptivity of phosphoric acid	Substituent phosphoric acid	Substituent magnesia	Available potassium	NH ₄ -N	NO ₃ -N	Soil colour
				H ₂ O	KCl								
10	Angkor Ban kg. Cham	New alluvial loam on Mekong banks	Cultivated fields (maize)	7.0-7.5	7.0	10mg/100g	500	Very rich	15mg/100g	Slight content	Devoid-Rather devoid	Content	Brown 7.5YR 4/4
11	Angkor Ban kg. Cham	"	"	7.0	7.0	5mg/100g	500	"	"	Nil'	Devoid	Rather devoid	Brown 7.5 YR 4/3
12	Ph. Banteai Dek. Kandal	"	"	6.0	5.5	"	500	Rich	"	"	"	Content	Black-reddish gray 5YR 3/3
13	Angkor Ban kg. Cham	"	"	6.5-7.0	5.5-6.0	1mg/100g	500	"	15-25mg/100g	Slight content	Devoid-Rather devoid	Rather devoid-content	Gray-reddish brown 5YR 5/3
14	Long Khdong kg. Cham	"	"	6.0-6.5	6.5	"	700	Very rich	"	"	"	Rich	"
15	Kas sautin kg. Cham	"	"	6.5-7.0	7.0	"	500	"	"	"	"	Rather devoid-content	"

Table 10. Maximum, minimum and mean values of result of soil analysis at 17 spots in Kompong Cham Province

Classification	PH		N (%)	Available nutrient	
	H ₂ O	KCl		CaO	P ₂ O ₅ K ₂ O
Maximum	6.0	5.8	0.33	0.074	0.011
Minimum	4.3	4.2	0.04	0.006	tr
Mean	5.2	4.8	0.14	0.022	0.005

Table 11: Analysis result of soil of zone along Mekong banks

Name of place	Soil	PH(KC1)	Available phosphoric acid	Substituent lime	Soluble aluminum
Samrong Thom Along banks of Mekong	New alluvial soil	6.3	100 ppm	0.2%	20ppm
Mengkor Borey Inundated districts of Tonle Sap	New alluvial loam	5.0	50	0.2	20

Table 12: Soil analysis of zone along Mekong banks of Kandal Province

Name of place	PH(KC1)	N	Available nutrient		Remarks
			P ₂ O ₅	K ₂ O	
Bentey Dek (Kandal)	4.8	tr	0	15 lbs/A	Dry season
Chong Prek Pol (Kandal)	5.0	tr	2 lbs/A	15	"
Pomies (Kandal)	4.9	2 lbs/A	0	15	"
Chroui Dang (Kandal)	5.1	4	2	15	"
Koh Tachor (Kandal)	4.4	tr	5	15	"
Mean	4.8	1.2	1.8	15	"
Prek Leap	6.7	2.3	7.2	158	Wet season

Table 13: Synthesis of soil analyses of the three zones

Item	Battambang	Kampot	Mekong banks
Soil	Clayish loam	Sandy soil	New alluvial soil
Existing condition	Immediately after opening-up - Virgin soil	Immediately after opening-up - Virgin soil	Cultivated land
PH (KC 1)	5.5 - 7.5	4.0 - 7.0	5.5 - 7.0
Available phosphoric acid	0.1 - 5mg/100g	0.1 - 10mg/100g	1 - 10mg/100g
Absorptivity of phosphoric acid	500 - 1,000	500 - 1,000	500 - 700
Substituent lime	Rich - Very rich	Devoid - Rich	Rich - Very rich
Substituent magnesia	5 - 15mg/100g	5 - 15mg/100g	15 - 25mg/100g
Available	Nil - Rich	Slight rich - content	Nil - Slight content
NH ₄ -N	Devoid - Rather devoid	Devoid - Rather devoid	Devoid - Rather devoid
NO ₃ -N	Devoid - Rich	Devoid - Content	Devoid - Rich

Chapter V. Circulation, export and Cambodian-Japanese joint concern of maize.

I. Situation of maize export to Japan and its problems.

Maize is an important article of export of Cambodia next to its rice and rubber.

The total exports to all destinations in 1962, as is indicated in Table 5.2, amounted to 134,440 t. in quantity and US\$7,875 (thousands) in value, showing a remarkable increase, as compared with the preceding year, of 29.7% in quantity and 43.5% in value.

This is due to the import by Communist China, amounting to three times as much as that of the previous year, together with the increased purchase by Yugoslavia, Singapore, France, etc.

The respective percentage in quantity of the export to the leading destinations in relation to the total export amount is 25.7% of Communist China, 24.1% of Singapore, 4.2 of Yugoslavia and 4.1% of SSSR, summing to 87.1% of the total export amount.

Export to Japan accounts for only 2.6% of the total. However, there was in 1960 a record of export to Japan amounting to 74,806 t. which were U.S.\$3,814 (thousands) in value.

As the total export of maize of this year was 163,952 t. or U.S.\$8,275 (thousands) in value, the export to Japan which was 45.6% in quantity and 46.1% in value accounted for nearly one half of the total export.

This may be attributed to various reasons, important ones of which are considered as follows:-

1. Communist China, which is the greatest purchaser of maize at present, did not import it at all in 1960.

As the import by Yugoslavia was also nil at that time, there was a great reserve of maize export in Cambodia.

2. Although part of the cost payable in foreign currency of Tonle Sap Bridge, now under construction, was covered by means of appropriating the Economic Aid Fund by the amount equivalent to ¥305,000,000, Japan purchased, for the purpose of raising the remaining deficit of U.S.\$1,100,000, 35,000 t. of Cambodian maize which amounted to U.S.\$1,830,000, 40% of which was deducted to deliver to the exporters of Cambodia as EFAC, and the remainder was appropriated for the purchase of the material for the construction of the bridge.

In short, Japan co-operated with Cambodia in raising the necessary foreign currency to meet the deficit of the construction cost of the bridge by means of purchasing the maize.

Tonle Sap Bridge is a road bridge over the River Tonle Sap to be built near the centre of Phnom Penh, upstream the river. It is 540 m. in length and 13 m. in width, total construction cost being ¥1,200,000,000, its completion expected in March 1964. The construction contract was made on March 3rd 1960 between the Ministry of Communication, Government of Cambodia and Japanese contractors.

In the absence of such special circumstances as stated above Japan cannot expect, at the present moment, to import a large quantity of maize from Cambodia except only a negligible quantity for pigeon feed.

The reasons are as follows:-

1. Demand for concentrated feedstuff in Japan is yearly increasing, and, above all, that for maize, which accounts for nearly 50% of the assorted feed, depends almost entirely on the supply from abroad, importing yearly 2,500,000 t. of maize principally from the U.S.A., Thailand, Republic of South Africa, Argentina, etc.

Japan's unit import price from these exporting countries is tabulated in Table 5.2, which indicates that the unit export price of Cambodia stands highest of all maize exporting countries.

Table 14: List of unit price of imported maize (for feedstuff) classified by exporting countries.

Source: Customs clearance statistics, Ministry of Finance, Government of Japan

Unit: U.S.\$, CIF Japan

Year	U.S.A.	Republic of South Africa	Thailand	Cambodia	Argentina	Average
1960	60.47	59.79	59.02	60.80	60.42	59.91
1961	57.07	59.09	57.26	60.85	60.01	58.15
1962	57.70	57.43	58.35	67.37	58.34	57.70
1963	61.18	60.19	58.11	67.26	59.97	60.27

2. Cambodia has entered into bilateral clearing agreements with Communist group countries, which seem to have a tendency of offsetting the balance of open account by purchasing maize which is a marketable article of international trade. Furthermore, even in the case of purchasing maize at a comparatively high price, these countries can offset the price margin by means of having the balance included in the price of collateral goods exported to Cambodia.

3. The greater part of the collection and export of maize is monopolized by overseas Chinese merchants, who are, by making use of the complicated export system and foreign exchange situation of Cambodia, exporting to the countries where the largest margin of profit is obtained through their own trade network spread over Hongkong, Singapore, etc.

The actual contract price of these Chinese seems to be FOB £22 (\$61.50) - £24 (\$67.20), but according to Table 1, the average export prices to Hongkong and Singapore are along the lines of \$54.50 - \$55.50 which are less than those to the other countries. This is considered to be an evidence of foreign currency being deposited in Hongkong and Singapore by means of

undervalued export of maize. Through this operation of foreign exchange a margin of profit amounting to \$4.00/t. is said to be estimated.

The following is an example of such operation of foreign exchange:-

This is an example of cost accounting based on the actual case of 400 t. of maize exported to Hongkong by a certain concern in January 1960.

(i) Substance of payability.

Unit price by contract of an exporter (overseas Chinese in Cambodia) with a buyer in Hongkong is @ £25-10-0 per metric ton C & F Hongkong with the freight to be borne by the buyer and payable in Hongkong, the rate of which being @ £ 2-0-0 on berth term. On the other hand, the unit price is written in the letter of credit as @ £19-10- 0 per metric ton FOB Phnom Penh, in accordance with the request of the buyer.

Calculation on the basis of the above is as follows:-

(A) @ £25-10-0	C & F Hongkong
(B) @ £19-10-0	FOB Phnom Penh
@ £ 2-0-0	Freight
<hr/>	
(A) - (B) = £4-0-0	Balance

This means that the difference of the contract price and the sum of L/C price and freight is £4-0-0.

(C) After shipment the exporter receives 70% of the L/C price by negotiating the shipping document at the official rate of R 98/1£: @ £19-10-0 x 70% x R98 = R 1,337.7

(D) @ £19-10-0 x 30% x R200 = R 1,170

The factor 30% is EFAC (Exportations Frais Accessoires) which is deposited in the exporter's account in exchange banks and cannot be appropriated for use other than import.

The factor R 200 is a premium, which is negotiable, the rate of which is always fluctuating between R180 and R 240.

(E) £4-0-0 x R 200 = R 800

£4-0-0 is payable to and reserved for the exporter in Hongkong dollars when the buyer in Hongkong have sold the cargo. The exchange rate of £ for R in the black market is R 200/£.

(F) Accordingly, exporter can receive, although the time and method are different, (C) + (D) + (E) = R 3,307.22 per metric ton.

(2) Cost accounting.

The current quotation for maize produced in Cambodia is R 180/60kg. (R 3,000 per metric ton) at the highest, while R 105/60kg. (R 1,750 per metric t.) at the lowest. Therefore, if we assume it to be R 160/60kg. (R 2,660 per metric t.), the cost accounting will be as follows:-

Maize per metric t.	R 2,666
Gunny bag (10 bags, each containing 100 kg.)	150
Putting into bags and loading aboard lighter	65
Lighterage (from place of production to riverside of Phnom Penh)	25
Allowance for shortage due to drying, etc.	43
Checking fee by Government organ	5
Charge of warehouse on bank	40
<hr/>	
Total	R 2,994

Loading charge on board steamer is not estimated, as the freight is on berth term.

As a result of cost accounting the exporter (overseas Chinese) to Hongkong and Singapore can get a margin of profit of R 313.70 per metric t. even when the collection of 1 t. costs him R 2,666: R 3,307.70 - R 2,994 = R 313.70.

(3) Comparison with export to Japan:

If we assume the export price of C & F Hongkong to be the same as C & F Japan; the former has the advantage of surplus margin of profit equivalent to the sum of £4-0-0 derived from the operation of foreign exchange in the black market.

4. The official exchange rate of franc in Cambodia is fixed at fr. 1.00 = R 10.00, while the IMF rate is fr. 1.00 = R 7.14, which means that fr. is given a special favour of about 40% by the official rate. That is to say, the official rate fixes U.S. \$1.00 = R 35.00, while the IMF rate U.S. \$ 1.00 = fr. 4.90, and, accordingly, $\frac{R\ 35.00}{fr.\ 4.90} = R\ 7.14$ or one franc which is the real rate. It follows that: $\frac{\text{official rate}}{\text{real rate}} = \frac{R\ 10.00}{R\ 7.14} = 140\%$, which means that fr. is enjoying a special favour of about 40%.

Therefore, in the case of export calculated in francs to the franc area, the exporter can receive R 10/fr., which makes it easy for him to do the business, and furthermore, he can also import by making use of the EFAC resulting from the franc he receives for the export. This makes all the more facile the trade with France.

However, the rate of the EFAC is 13% for the export of general merchandise destined for the U.S. dollar and pound sterling areas with the exception of 30% for maize export; as for the export to the franc area, the EFAC rate of general merchandise is 10% and that of maize 15%. Therefore, we cannot always conclude that trade with the franc areas is 100% advantageous.

Furthermore, we cannot grasp the reality of the trade whose value is calculated in Riel between Cambodia and France including its possessions until we take off 40% of the value.

5. The yearly consumption of maize for feed stuff and brewage in Japan amounts to 2,800,000 tons; it is mixed with various kinds of feed.

As it is desirable that the price of feed stuff, which is one of the great price factors of live-stock products, is not only stabilized but also low, the Government is taking various administrative measures for this purpose. As a result the feed-making industry is now close by the marginal payability, showing a tendency of high cost of material and low price of products. On the other hand, accelerated by the excessive competition in the home market, the importers of feed stuff, in order to be successful in the buyer's market, are canvassing for selling, going so far as to run the risk of speculative operation and at the cost of their own commission.

Such being the case Japanese trading companies dare not touch the Cambodian maize whose price is comparatively high.

Table 15: Record list of maize exports classified by destinations

Unit of quantity: metric ton Unit of value: U.S.\$ 1,000
 FOB: U.S. dollar
 R 35.00 = U.S.\$ 1.00

Calendar year 1963(Jan. - June) Destination	1960			1961			1962			1963 (January - June)		
	Quantity	Value	Unit price	Quantity	Value	Unit price	Quantity	Value	Unit price	Quantity	Value	Unit price
	Japan	74,806	3,814	50.99	11,378	493	43.33	3,584	200	55.80	198	11
France and possessions	8,687	595	68.49	8,655	615	71.06	16,712	1,343	80.36	6,543	641	96.49
Hongkong	35,007	1,694	48.40	24,875	1,207	48.52	22,439	1,219	54.33	7,660	425	55.48
Singapore	31,325	1,482	47.31	19,968	987	49.43	32,451	1,767	54.45	15,689	1,429	55.62
Indonesia	8,620	418	48.49	4,170	427	102.39	3,050	173	56.72	1,400	76	54.28
SSSR	2,300	111	48.26	3,310	164	49.55	5,549	263	47.40	-	-	-
Jugoslavia	-	-	-	-	-	-	5,680	319	56.16	-	-	-
Communist China	-	-	-	10,800	555	51.39	34,568	1,976	57.16	1,300	78	60.00
North Viet-Nam	-	-	-	17,350	893	51.47	3,000	171	57.00	3,000	164	54.55
South Viet-Nam	723	87	51.18	1,900	98	51.58	1,657	137	82.67	-	-	-
United Kingdom	646	32	49.54	-	-	-	-	-	-	-	-	-
Others	1,838	98	50.05	1,213	49	40.40	5,750	307	53.39	500	29	58.00
Total	163,952	8,275	50.47	50,47	5,488	52.96	134,440	7,875	58.58	46,390	2,853	61.50

Sj Source: Statistical Bulletin of the U.S. AID Mission to Cambodia.

Notes: In this list the Cambodian customs clearance statistics originally expressed in Riels have been calculated in U.S. dollars at the official rate of R35 = \$1.00.

As the exports to the franc areas listed herein are overvalued by about 40% for the reason stated below, reality cannot be grasped until they are calculated at a cut rate of 40%.

While the official rate of exchange in Cambodia is fixed at fr. 1.00 = R 10.00, the IMF rate is fr. 1.00 = R 7.14; therefore, $\frac{\text{official rate of U.S. \$1.00}}{\text{IMF rate of U.S. \$1.00} = \text{fr. 4.90}} = \text{R 7.14} = \text{fr. 1.00}$, and for one franc the calculation is:

$\frac{\text{official rate of R10.00}}{\text{IMF rate of R7.14}} = 140\%$

Table 16: List of Cambodia's trade balance classified by its important counterpart countries
 Unit of value: U.S.\$1,000
 Exchange rate: R 35.00 = \$1.00

Calendar year (Jan. -Dec.)	1961			1962			1963		
	Export	Import	Balance	Export	Import	Balance	Export	Import	Balance
Japan	1,316	15,739	-14,423	917	20,079	-19,162			
France and possessions	24,374	20,334	4,040	16,303	18,604	- 2,301			
U.S.A.	4,290	15,899	-11,609	5,176	15,861	-10,685			
West Germany	1,337	4,478	-3,141	1,727	4,495	-2,768			
United Kingdom	6,485	4,369	2,116	6,031	3,111	2,920			
Hongkong	10,615	3,444	7,171	7,095	4,302	2,793			
Singapore	6,356	903	5,453	5,669	550	5,119			
Indonesia	632	6,895	6,263	175	985	-5,810			
SSSR	1,591	5,422	-3,831	3,321	7,132	-3,811			
Jugoslavia	928	1,492	- 567	670	472	198			
Communist China	708	6,057	-5,349	3,452	8,307	-4,855			
North Viet-Nam	1,162	855	307	268	1,918	-1,650			
South Viet-Nam	1,754	1,558	196	1,495	1,140	355			
Others	1,878	9,549	-7,671	2,077	10,411	-8,334			
Total	63,426	96,997	-33,571	54,376	102,367	-47,991			

Remarks: This list has been made up on the basis of the Statistical Bulletin of the U.S. Aid Mission to Cambodia.

Cambodia's international trade has been showing a yearly excess of imports over exports, being U.S.\$ 33.57 thousand in 1961 and \$47.99 thousand in 1962, the balance of which has been covered by the foreign aid fund. Japan ranks first of its counterpart countries giving an adverse-trade-balance to it, recording in 1961 43% of the total amount of its unfavourable trade balance and in 1962 39.9% respectively.

Table 17: Cambodia's imports record classified
by items of commodities

Unit of value: U.S.\$1,000
Exchange rate: R35.00 = \$1.00.

Calendar year	1961		1962		1963 (January - June)	
Kind of commodities	Total imports	Imports from Japan	Total imports	Imports from Japan	Total imports	Imports from Japan
Midical supplies	3,666	37	5,905	97	2,660	43
Motorcar	6,410	367	5,602	857	2,212	105
Tyre	3,248	865	3,327	691	1,706	533
Petroleum	7,801	135	7,902	400	5,526	217
Paper-made products	1,318	433	1,571	796	740	445
Cement	2,441	1,320	3,760	1,492	1,754	451
Iron and steel materials	8,111	3,035	11,788	4,873	5,451	1,934
Iron and steel products	2,620	295	1,728	233	1,042	171
Industrial machinery	8,417	987	8,043	734	4,629	1,076
Electrical instruments	6,645	1,425	5,944	1,246	3,278	655
Chemicals	1,203	153	1,347	430	810	162
Paint	455	36	583	78	386	47
Earthenware and porcelain	1,545	440	1,599	434	897	161
Fabrics	2,644	1,278	3,247	1,918	2,453	1,591
Bicycle	2,803	366	1,411	5	953	78
Vehicles and parts	1,390	23	1,637	63	587	23
Cow's milk	2,000	-	2,197	-	901	-
Dairy products	167	-	272	-	123	-
Flour	1,727	5	1,582	165	565	196
Sugar	1,609	3	2,182	11	733	1
Cotton yarn	486	167	489	153	280	87
Cotton cloth	5,690	1,854	6,065	2,053	4,566	1,011
Tobacco	552	-	465	-	282	-
Jute bag	2,294	-	2,363	-	1,291	-
Agricultural machinery	267	-	247	-	111	-
Tractor	1,414	43	1,766	24	1,029	11
Fertilizer	254	19	201	50	170	19
Others	19,821	2,454	19,019	3,276	9,373	1,269
Total	96,998	15,740	102,367	20,079	54,508	10,286

Remarks: This record has been made up on the basis of Statistical Bulletin of the U.S.

Aid Mission to Cambodia. To cite the 'Big Five' commodities imported from Japan:

1961 1. Iron and steel materials 2. Cotton cloth 3. Electrical instruments
4. Cement 5. Fabrics

1962 1. Iron and steel materials 2. Cotton cloth 3. Fabrics 4. Cement
5. Electrical instruments

As for the two years of 1961 and 1962, only the ranking of electrical instruments was replaced by that of fabrics, and the other rankings remain the same.

Table 18: Record list of Cambodia's exports of important commodities classified by destinations (from January to December in 1961 and 1962)

Unit of value: U.S.\$1,000 FOB
 Rate of exchange: R35.00 = \$1.00
 Figures enclosed within parentheses indicate ton(s)

Destination	Item Year	Rubber	Rice	Maize	Kapok	Timber	Soya	Sesame	Fish	Livestock	Pepper	Others	Total
Japan	1961	301	26	493	22	438			1	14		21	1,316
	1962	304		200	86	267			2	2		56	917
France and possessions	1961	5,528	15,976	615	49	332	1		1		1,227	147	16,303
	1962	5,994	7,092	1,343	71	427	1		1		1,227	147	16,303
U.S.A.	1961	4,243				2						45	4,290
	1962	5,079				3						80	5,176
West Germany	1961	1,309			28								1,337
	1962	1,704	9			7						7	1,727
United Kingdom	1961	6,428	31				2	2		12			6,475
	1962	5,994				19				1		17	6,031
Hongkong	1961		3,411	1,207	111	23	96	255	111	4,303		1,098	10,615
	1962	4	2,375	1,219	115			432	158	852		1,940	7,095
Singapore	1961	1,187	2,810	987	47		125	16	617	9	15	537	6,350
	1962	510	1,966	1,767	48		53	23	700		6	596	5,669
Indonesia	1961		198	427	1							6	632
	1962		1	173	1								175
USSR	1961	761	479	164	2		26	89			8	62	1,591
	1962	87	1,726	263			36	95	12			102	3,321
Yugoslavia	1961		928										928
	1962	11	304	319				7				29	670
Communist China	1961			555		116						37	708
	1962		16	1,976		319				29		1,112	3,452
North Viet-Nsm	1961			893		231						38	1,162
	1962			171		80						3	268
South Viet-Nam	1961	9	110	98		650	89	26	13			754	1,749
	1962	4	50	137		123	171					1,010	1,495
Others	1961	627	358	49	711	5		1		1		126	1,878
	1962	704	162	307	696	16				1		191	2,077
Total	1961	(35,955)	(287,920)	(103,619)	(6,443)	(145,634)	(7,060)	(6,037)	(5,384)	(20,988)	(1,138)	(272,283)	63,405
	1962	20,393	24,43	5,488	971	1,797	339	389	742	4,339	1,648	2,972	54,376
		20,394	14,701	7,875	1,017	1,261	261	571	874	885	1,233	5,289	

Remarks: This record has been made up on the basis of Statistical Bulletin of the U.S. Aid Mission to Cambodia.

Notes: In this list the Cambodian customs clearance statistics originally expressed in Riels have been calculated in U.S. dollars at the rate of R35 = U.S.\$1,000. As the exports to the franc areas listed herein are overvalued by about 40% for the reason stated below, reality cannot be grasped until they are calculated at a cut rate of 40%.

While the official rate of exchange in Cambodia is fixed at fr.1.00 = R10.00, the IMF rate is fr. 1.00 = 7.14; therefore, $\frac{\text{official rate of U.S. \$ 1.00}}{\text{IMF rate of U.S. \$ 1.00} = \text{fr. 4.90}} = \text{R7.14} = \text{fr. 1.00}$, and for one franc; the calculation is: $\frac{\text{official rate of R10.00}}{\text{IMF rate of R7.14}} \uparrow 40\%$

Table 19: Record list of Cambodia's exports of important commodities
classified by destinations (from January to June 1963)

Unit of value: U.S.\$1,000 FOB
Rate of exchange: R35.00 = \$1.00
Figures enclosed within parentheses indicate ton(s)

Destination	Rubber	Rice	Maize	Kapok	Timber	Soya	Sesame	Fish	Livestock	Pepper	Others	Total
France and possessions	3,956	14,422	641	475	54	538	2				59	20,147
U.S.A.	3,381	23			3						2	3,409
West Germany	1,063	217										1,280
United Kingdom	885	46									1	932
Japan	125	390	11		85	194					131	936
Hongkong		2,648	425		18	3		139	120	900	1,230	5,483
Singapore	163	951	1,429	5	10		21		218		942	3,739
Indonesia		353	76								2	431
Poland		2,192										2,192
Czechoslovakia		4,894										4,894
USSR		378									38	416
East Germany		216										220
		1,519									5	1,524
Jugoslavia	337	1,178										1,515
Communist China			78		4	81					631	794
North Viet-Nam			164			72						236
South Viet-Nam		97				35	106				392	630
Others	637	189	29	6	524	21				18	24	1,348
Total	(18,150)	(262,294)	(46,390)	(499)	(3,363)	(57,743)	(1,725)	(1,145)	(2,138)	(16,498)	(20,265)	(430,210)
	10,547	29,714	2,853	486	698	948	129	139	338	935	3,457	50,243

Remarks: Based on the Statistical Bulletin of the U.S. Aid Mission to Cambodia

Table 20-1 Programme of export and import for 1964 Cambodia's programme of export and import for 1964 was made public on January 26th, 1964 in the paper as follows:-

(1) Programme of export

Item	Quantity (ton)	Value (Riel)
Rubber	45,000 t.	720,000,000 R
Polished rice	300,000	1,023,000,000
50% Broken rice	160,000	424,000,000
75% Broken rice	60,000	111,000,000
Glutinous rice	30,000	79,500,000
Brokwn glutinous rice	12,000	26,700,000
Rice bran	40,000	60,000,000
Raw cotton	Undecided	Undecided
Maize	160,000	272,000,000
Mung bean	12,000	48,000,000
Soya	4,000	10,000,000
Sesame	4,000	20,000,000
Pepper	1,000	10,000,000
Peanut	500	3,000,000
Tobacco	2,500	15,000,000
Lotus seed	300	3,000,000
Plywood	Undecided	Undecided
Timber	130,000	65,000,000
Buffalo	15,000	45,000,000
Cattle	30,000	69,000,000
Swine	50,000	36,000,000
Raw hide	1,200	6,000,000
Fresh fish of fresh water	1,000	5,000,000
Dried fish of fresh water	7,000	20,000,000
Fresh sea fish	5,000	10,000,000
Others		73,000,000
Total		3,154,900,000

(2) Programme of import

Item	Value (Riel)
Flour	Undecided
Sugar	Undecided
Cow's milk	Undecided
Tobacco leaves	10,000,000
Medicines	230,000,000
Chemicals	50,000,000
Fertilizer	50,000,000
Vegetable fibres	100,000,000
Textiles	250,000,000
Paper-made goods	60,000,000
Petroleum and fuel oil	280,000,000
Non-metallic minerals, cement	80,000,000
Iron and steel	100,000,000
Iron and steel products	25,000,000
Non-metallic products	10,000,000
Motor, engine and water-pump	80,000,000
Electrical instruments	70,000,000
Industrial machinery	100,000,000
Tools and machinery	10,000,000
Scientific machinery	10,000,000
Building machinery	15,000,000
Bulldozer and agricultural machinery	80,000,000
Rubber-made goods	80,000,000
Motorcars and special vehicles	70,000,000
Bicycle and motor-tricycle	15,000,000
Miscellaneous	350,000,000
Others	350,000,000
Total	2,475,000,000

Table 21: Retail prices at Central Market of Phnom Penh

Unit of value: Riel

	Unit	1960	1961	1962	1963
Bread	kg	12.00	12.50	13.00	
Rice of first grade	kg	4.8	5.30	5.70	
Rice of second grade	kg	4.4	4.70	5.10	
Beef	kg	47.00	49.00	51.00	
Pork	kg	42.00	39.00	41.00	
Fat of pork	kg	30.00	32.00	29.00	
Hen's egg	a piece	3.00	2.50	2.50	
Duck's egg	a piece	2.50	2.00	2.00	
Dried fish	kg	37.00	40.00	43.00	
Sugar of first grade	kg	14.00	16.30	17.00	
Potato	kg	16.00	19.00	19.00	
Condensed milk	1 can	15.00	16.00	17.00	
Ice	kg	0.70	0.80	0.90	
Beer	Small bottle	15.00	16.00	18.00	
Soap	kg	24.66	26.00	22.33	
Firewood	1m ³	136,58	166.33	179.10	
Charcoal	60 kg	172,50	183,00	190.00	
Banana	Bundle	18.00	20.00	21.00	
Electricity	KWh	4.00	3.82	4.36	
City-water	m ³	2.40	2.47	4.13	

II. Present situation of OROC (Office Royal de Cooperation)

1. Capital.

OROC was organized in accordance with the Royal Ordinance No. 253 NS dated June 15th 1956, having a capital of R 20,000,000 made up of 40,000 shares, the face-value of a share being R 5,000.

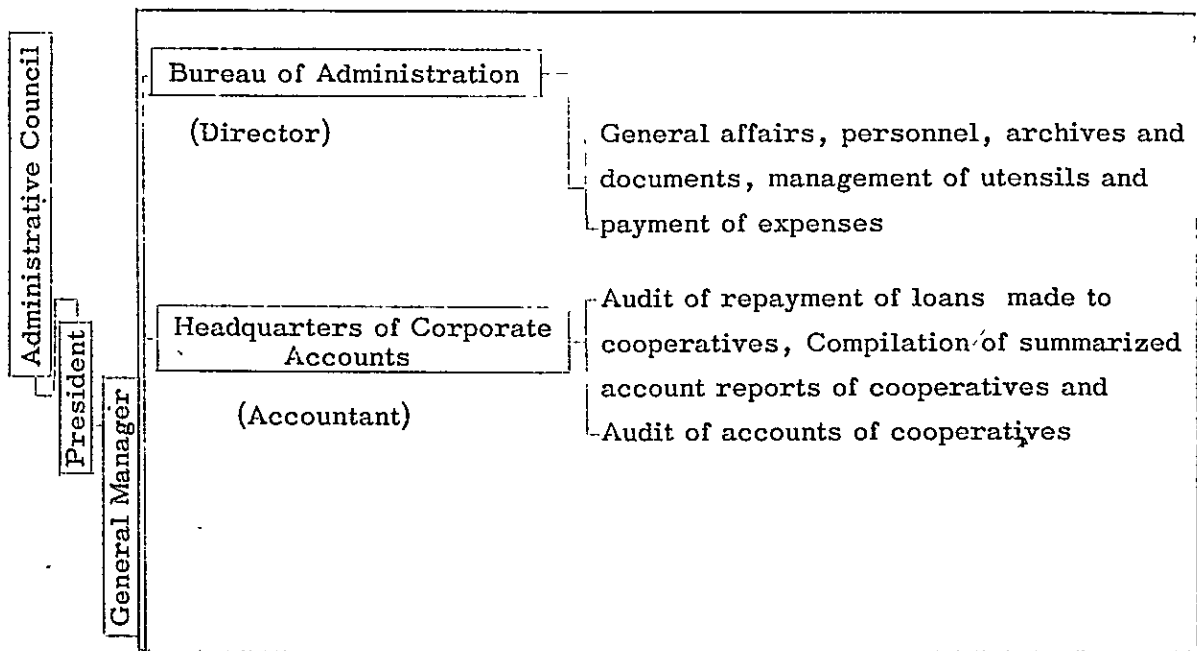
According to the Articles of Association, 50% of the capital are to be invested by the Government and the remainder by the cooperatives which are the members of the OROC. However, the latter have not paid up the shares, which, instead, have been financed by the OROC by means of a loan with the bank. The Administrative Council of the OROC seems to be in the opinion that the autonomy of the cooperatives should be thoroughly maintained, which seems to have led to the shelving of the latter's investment.

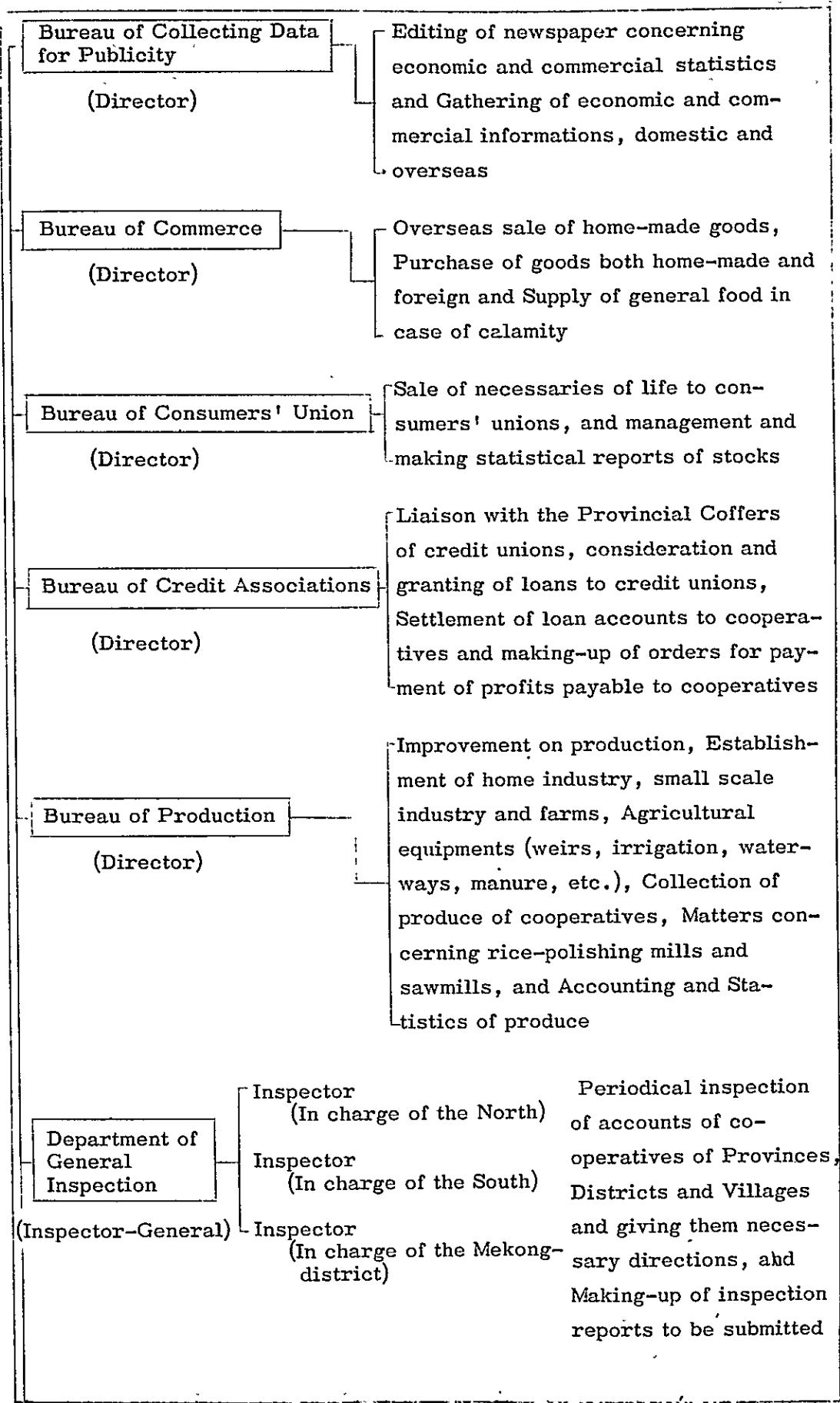
Capital increase of the OROC may be carried out in case that the Administrative Council finds it necessary.

The organization of OROC and management of its departments are regulated by its bylaws.

2. Organization.

Table 22:





to the Governor of
Province, Inspector-
General and General
Manager.

Personnel in service

The personnel in service consists of those public officials dispatched by the public cash-offices, agricultural associations and the Royal Administrative organs. The employment contract, remuneration, compensation, bonus and salary of officials (except those of petty officials) are decided by the Administrative Council of the OROC.

3. Division of budget

The budget of the OROC consists of four divisions.

The first division: The financial Bank of Agriculture.

The Financial Bank of Agriculture furnishes funds through two channels, the Provincial Cash-Office of Credit Cooperatives and producers' cooperatives. The former, which is financed by the OROC, is established in 13 Provinces. Their funds, in addition to the loan of the OROC, consist of the investment of the members, foreign aid funds, deposits and reserve of profits realized by loaning.

The second division: The Financial Bank of Settlers.

This bank furnishes settlement funds to the members of vigilance bodies, discharged soldiers and their families and refugees from South Viet-Nam.

The loan is usually free of charge, long-termed and repayable yearly at each harvest.

To each settler an acreage of about 5 ha. is given free of charge.

Settlement centres which have been established by means of the funds financed by this bank together with the U.S. AID Funds contain 128 family

farms in the village of Nikum Pneath Sihanouk, Battambang and 185 in the village of koh andeth in Takeo Province and Nikum Nimuth village of Battambang Province.

The third division: The Financial Bank of Manual Trades and Small Industries.

This bank furnishes funds to be appropriated for the equipment and running expenses of the union of private enterprises whose craftsmen and other employees are less than five in all such as goldsmiths and proprietors of small rice-cleaning mills, sawmills, brickyards, printeries, etc. It seems that it was possible formerly for even a separate private enterprise to be financed by this bank which considered the debtor's security to be reliable.

The fourth division: The Consumers' Financial Bank. Consumers' unions in each Province are financed by this bank.

The necessaries of life are either distributed directly to the consumers' unions by the Bureau of Consumers' Union of the OROC or put on the market through the OROC sales shops in Battambang and Kompong Cham.

4. Resources.

The resources are composed of the advance, extraordinary subsidy of and portion of expenses borne by the Government, foreign aid funds from the U.S.A., Communist China, etc., reserve of profits realized, etc., all of which are deposited either in the State Bank or in such banks as designated by the Administrative Council.

5. Items of incomings and outgoings.

Incomings are divided into general incomings and extraordinary incomings.

General incomings:

Free fund and interest on deposits

Interest on the loan made to manual trades, small industries, various associations, credit cooperative unions.

Subsidy from the State budget

Contribution and legacy

Profits realized by transfer of buildings

Extraordinary incomings:

Extraordinary subsidy of and portion of expenses borne by the State

All the other extraordinary profits

General outgoings:

Outgoings are divided into general and extraordinary ones, the items of which are:

Pay, extra allowance for personnel and expenses of traffic and business trip.

All expenses for personnel other than the above

Money advanced

Rent and purchase and maintenance cost of machinery and furniture

Interest on loan

Various purchase and construction cost of buildings

Extraordinary outgoings:

All outgoings, temporary or extraordinary

6. Establishment of cooperatives.

Applications for the establishment of Provincial credit cooperatives and producers' cooperatives, accompanied with the draft of their articles of association, are submitted to the president of the Administrative Council.

7. Term of and interest on loan.

The terms of the loan are short, medium and long.

Short-term loan:

The maximum period is 18 months.

Medium-term loan:

This kind of loan is made for the purchase of farm land, equipment and cattle, development or improvement of farm land and compensation of

damages caused by natural disasters. The maximum period is 8 years.

Long-term loan:

This kind of loan is made for important arrangements of farming, and the maximum period is 20 years.

The maximum amount of loan and interest rate on loan are decided every year by the Administrative Council.

8. Securing for repayment of loan.

Repayment of loans is secured by the following means: - warranty deeds given in security by the officials of cooperatives as warrantors, placing of valuable papers on deposit, property or land of cooperatives pledged in security or placing on deposit of warehouse bonds of produce stored by the members of cooperatives.

We can understand from the above that the main objects of the OROC consist in the financing and extending facilities for farmers, while giving guidance and encouragement to the spread of cooperatives in farming villages.

In line with such ideas there have been established various kinds of cooperatives which have amounted to 273 in number as the following:- 13 credit cooperatives; 11 cooperatives specializing in collection and circulation of maize; cooperatives of jute collection; salt cooperatives; silk fabrics cooperatives; industrial arts cooperatives; unhulled rice cooperatives; cleaned rice cooperatives; cotton producers' cooperatives; tobacco producers' cooperatives; consumers' cooperatives.

The cooperative movement in Cambodia is said to have been promoted by making reference to the agricultural cooperatives in Japan and Jugoslavia. Although it has not made a remarkable progress, it will be promoted steadily every year.

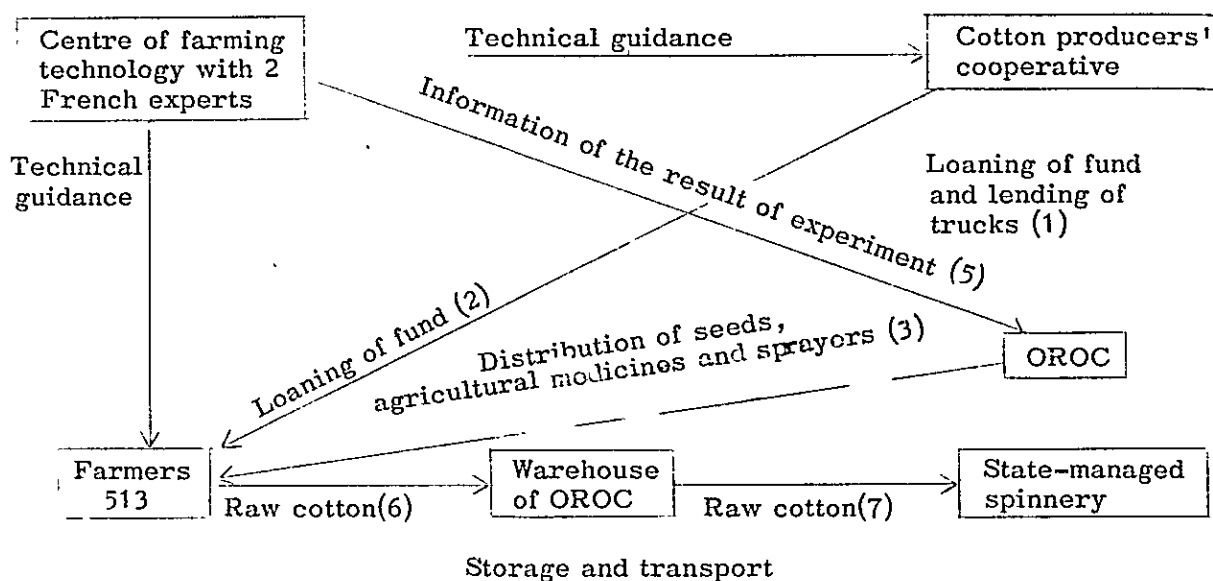
9. Activities of OROC.

The field of OROC's activity is fairly wide; it has done much in such

fields as the guidance of production, promotion of consumers' unions, settlement of migrant farmers and financing of farming and manual trades.

By way of example we cite the case of cotton producers' cooperative of Andoeuk Hep, Battambang and that of consumers' union in Kompong Cham.

(1) Cotton producers' cooperative

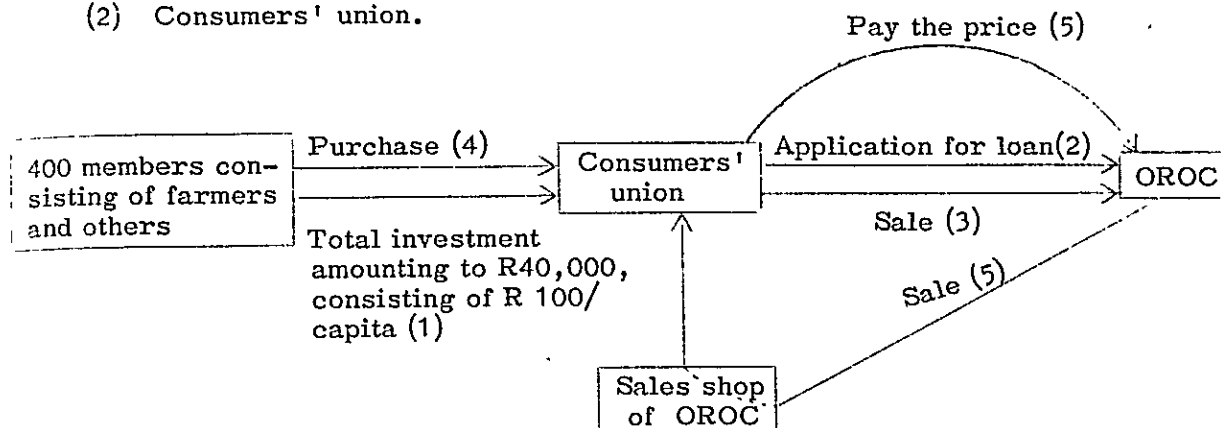


- (1) The OROC furnishes funds, the maximum of which is R 3,000 per ha., to the cotton producers' cooperatives.
- (2) The cooperatives finance the farmers.
- (3) The OROC distributes for pay and through cooperatives seeds, agricultural medicines (DDT and Endrin are sprayed for insect control about ten times during the wet season) and sprayers.
- (4) The French experts of the Technological Centre give direct technological guidance to farmers through cooperatives.
- (5) The Technological Centre informs the OROC of the results of experiments concerning the variety, manure and agricultural medicines.
- (6) Reaped raw cotton is stored in the warehouse built by the labour service of the cooperative members.

- (7) The raw cotton is transported from the warehouse to the state-managed spinning of Kompong Cham by the trucks lent by the OROC.; it is then sold at R 8/kg.

However, such raw cotton as inferior in quality is sent back; it is put on the market through brokers.

- (2) Consumers' union.



- (1) On the basis of the investment of the cooperative members who are farmers and others (mostly public officials) together with a portion of the funds furnished by the OROC the consumers' union was established in a house with a floor space of 66 squ. metres.
- (2) The cooperative sets up a committee to decide what kind of daily necessities are to be purchased. In this case application for the distribution is submitted to the Bureau of Consumers' Union, OROC, mostly of such articles, which are not in the line of overseas Chinese grocers, as clothing and bedding materials, cow's milk; sugar, washbasins, lunch boxes, scales, carpenter's kits, etc. If there is a sales shop of the OROC in the district concerned, the application is submitted through the shop.
- (3) The OROC (Bureau of Consumers' Union) sends out the necessities applied for by cooperatives either directly to the cooperatives or through OROC's sales shop if there is one.

The selling price of the OROC seems to be so arranged that it is not more than that of grocer's.

- (4) Cooperatives sell to their members at a profit of about 5%.
The members pay the bills within a week.
- (5) Cooperatives pay the price for sold articles, accompanied with the documents of final accounts, to the OROC, (Bureau of Consumers' Union). One half of the profits is appropriated for the expenses of business and personnel of the cooperatives, and the remainder for the repayment of the loan of the OROC.

In the case of consumers' unions OROC's business is the purchase and sale of necessaries, while in that of cotton producers' cooperatives OROC involves the process of manufacturing, for the purpose of which purchase of the produce is made at a certain price. This gives ample scope to OROC's function, resulting in its important rôle in the circulation of the produce.

(3) Maize producers' cooperative.

Although there are 11 cooperatives specializing in the collection and circulation of maize, their scale is very small. They are financed by the OROC as well as given technical guidance of production by two of OROC's experts, an American and a Cambodian.

In order to make sure the collection of its loans to cooperatives the OROC places them under an obligation not to sell their maize to others at a price lower than that of its designation.

The total quantity of maize produced by these 11 cooperatives amounts to 6,000 tons yearly which are said to be sold through the good offices of OROC.

However, this quantity is only 4% of the total produce of Maize in Cambodia which is yearly 150,000 tons, and the remaining 96% is brought to the market through brokers. (overseas Chinese).

This may be attributed to the fact that maize, different from cotton, involves no process of manufacture; that there is no room for the OROC to

interpose in the field of farming technology. Because maize is produced by making use of the extremely favourable natural conditions of the Mekong basin where fertile soil is brought and deposited 10 - 20 cm. thick by the flood during the wet season. In these districts farmers need not worry about the manure, agricultural medicines and weeding, but they have only to sow, and they can reap in about 90 days. Farming is conducted on the basis of their long experience and in conformity with the trend of the rise of the water during the wet season, while preventing the rodent attack. Thus it is not too much to say that there is little room for the OROC to give to the farmers technical guidance of maize production.

On the other hand farming funds of maize have been financed also by the overseas Chinese from old times. Exporters (overseas Chinese) advance a large sum of money on personal credit and mostly without instruments to the brokers (in most cases overseas Chinese grocers) of the place of maize production. Such smooth dealings on credit may be due to the fact that they have come from the same native place or that deep mutual trust exists between them as a result of their past relations.

The brokers are making the best of this advance fund in order to expand their sphere of influence by affording various services to the farmers. That is to say, they are always ready to furnish the necessary funds to the farmers, which is, different from the case of OROC, a very effective way of using funds. Generally speaking, it seems that the necessary funds are furnished to the farmers about two months before the harvest. In case that early reap is necessary in view of the weather or market conditions the brokers hire on their own account farm hands to help the reaping farmers.

The reaped maize, after having been dried in the sun, are usually shelled on the sheller, one or two shellers being equipped in a village, and sometimes the brokers bring the sheller in the farmyard and do the shelling for R 4 per 100kg., after which they put the grains in second-hand sacks.

Such services cannot be expected of officialism.

As the OROC has only one warehouse of large size in Koki district, farmers, wanting in storehouses while the wet season is approaching, have to sell the maize at the best price obtainable.

The exporters stock the maize collected through such brokers in their own warehouses on the banks of the rivers Tonle Sap and Bassac, waiting to seize the best business opportunity to export. In view of the existing circulation structure of maize which is perfectly controlled by the overseas Chinese increased production of maize will result in its decreased price; that is, the farmers will have to drink a bitter cup of rich crop accompanied with poverty; an increase in maize produce will not always contribute to the farm economy.

With the awakening of the farmers' ideas on their own interests they may someday try to increase their profits by organizing cooperatives, which is a means of their self-defense. As the case stands, however, they do not seem to be awake to such an idea.

This may be attributed to their national character which, under the influence of Buddhism, is obdient and indifferent to worldly gain as well as to the comfortable circumstances in which they can live a blessed life free from the trouble of getting the means of subsistence such as food, clothing and habitation.

10. Future of OROC.

The circulation structure of maize controlled by the overseas Chinese has been built on a long-standing basis and their human relationship which are highly invulnerable to any hasty alteration, the enforcement of which may encounter an unforeseen peril.

As a matter of fact, the OROC itself seems to be considering a gradual unification of the existing cooperatives which are small and weak, aiming at their synthetic reorganization. We can look forward to this move in

future. In view of the Government policy which, instead of letting the accumulation of national capital and profit of enterprises be monopolized only by the privileged classes which are only part of the nation, attaches importance to their socialization by means of distributing them equally among the nation, the organization of farming cooperatives is expected to be greatly promoted.

As for the export business of maize, the OROC has been a direct channel of export. However, no adjustment in this line of business has been realized yet between the OROC and Sonexim (Société Nationale d'Exportation et d'Importation = Sonexim) which was established on January 1st 1964 for the purpose of placing the foreign trade under state management. It is said that the OROC is applying the Government for the continuance of its export business instead of its being taken over by the Sonexim. In case that this application is approved by the Government the OROC will be able to remain a channel of export as formerly.

III. Collection, transport, export port and inspection of maize.

1. Collection of maize

The harvested and shelled maize is either collected by overseas Chinese or stored in the OROC warehouses, but the greater part is transacted by the former way.

(1) Collection by overseas Chinese.

The overseas Chinese advance to the farmers about 60% of the maize price at the seedtime, and at the harvest time they prepare gunny sacks, which they bring to the farm-houses to collect the produce, when they settle accounts with the farmers. In most of the cases a kind of vertical business, that is, from collection to export, is done by the Chinese exporters themselves.

(2) Collection by OROC :

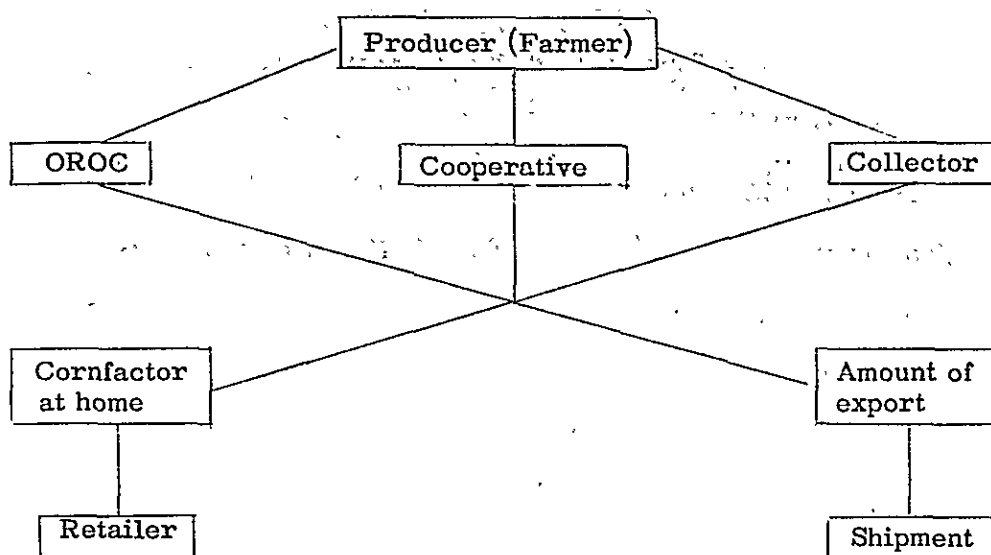
The member farmers of cooperatives can ask the OROC to take delivery of their maize after harvest. Although this delivery is an obligation in the case of small scale cooperatives, the greater part, in practice, seems to be delivered deirectly to the Chinese collectors, the OROC amounting to no more than designating the minimum selling price. In the case of the other cooperatives, which are under no such an obligation as stated above, either delivery to the OROC or direct sale to the Chinese will do; it is left to the farmers' option according to the terms and conditions of the business.

When the OROC takes delivery of the maize in its warehouse, it prepares gunny package sacks and trucks for transport. When the delivery in the warehouse has been completed, payment by rough estimate, amounting to 60 - 70% of the value, is made. The OROC uses its good offices in the sale, the price of which is determined by agreement between the OROC and farmers, when their accounts are settled. OROC's commission is 1%, its warehouse charges are R 1.00 for a term of one month per sack (100kg. in net weight).

In case that farmers are in need of money before delivery they can be financed by cooperatives. The only large scale warehouse of the OROC is that in Chroi Dang built by the U.S. and funds.

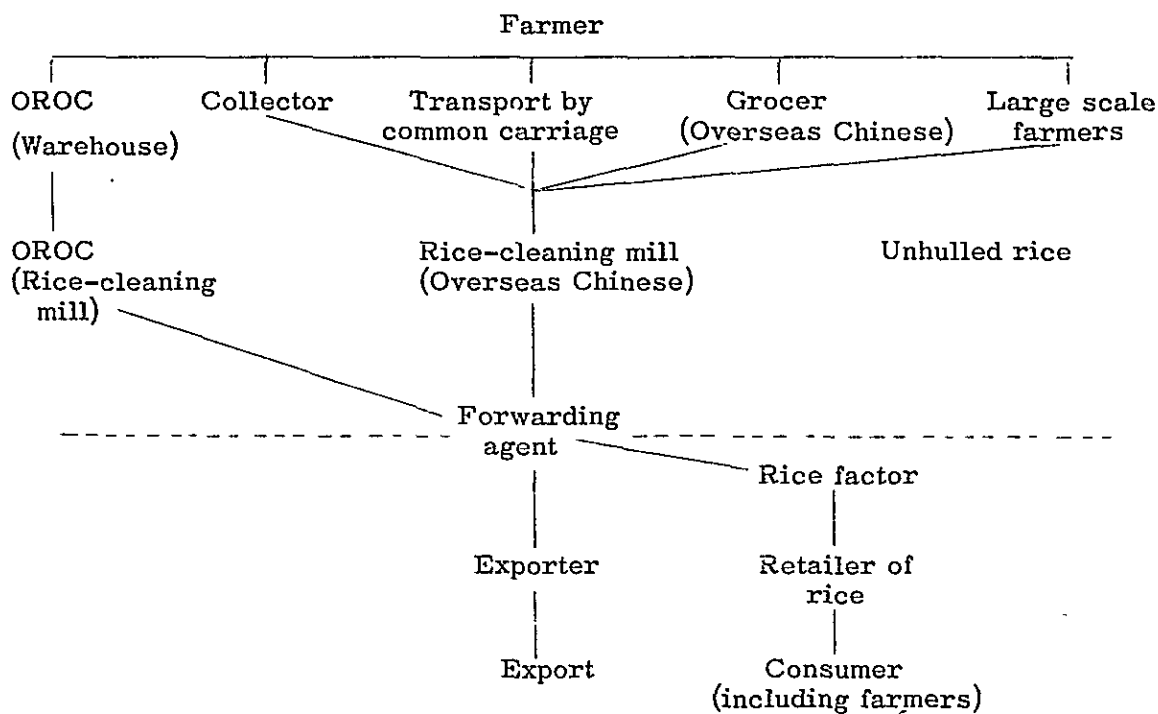
The circulation structure of maize is illustrated as follows:

Diagram of maize circulation



Note: In most of the export cases the exporter themselves are the collectors.

Appendix: Diagram of rice circulation



Note: Based on the investigation of Mr. Tsukano, Secretary of Japanese Embassy in Cambodia.

2. Transport of maize.

Transport of maize is roughly divided into: (1) transport by truck, (2) transport by river barge, (3) transport by railway and (4) transport by ox-cart of farmers.

(1) Transport by truck.

At present there is neither the so-called official rate fixed by the Government nor the rate agreed upon by forwarding agents; it is determined properly according to circumstances. Transport by truck is being conducted between Battambang and Phnom Penh, the distance being about 291 kilometres, and between Sihanoukville and Phnom Penh, the distance some 253 kilometres. In each case the rate is about R 30/sack (100kg. in net weight), including the loading charge but not the unloading one. Carrying capacity per truck is approximately ten tons.

(2) Transport by barge.

The maize produced either in the Mekong basins or districts along the shores of Lake Tonle Sap is transported by barge either to the riverside warehouse in Phnom Penh or directly to the cargo-boat. The rate is different according to the distance and quantity of cargo. It is usually R 15 - 20 per sack between Kompong Cham and Phnom Penh.

(3) Transport by railway.

The only railway in this country is that built between Phnom Penh and Poipet; it is state-managed. Transport by railway is conceivable in the case of forwarding from the districts near Battambang. (However, there are no large scale maize fields there.) The tariff of rice or maize (in sack) is as follows:-

<u>Kilometre</u>	<u>Rate per ton and kilometre (R)</u>
0 - 50	0.84
51 - 100	0.80
101 - 200	0.74
201 and upwards	0.67

As the distance between Battambang and Phnom Penh is 274 kilometres, the rate amounts to R 205.58.

This rate does not include the charges of loading and unloading, which are borne either by the consignor or consignee. The handling charge for a distance of about 20 m. in the compound of Phnom Penh station is R 0.7/sack.

The number of the rolling-stock, for your information, is as follows:-

locomotive		20
waggon	25 t.	150
	20 t.	100
	10 t.	30
open waggon		20

(4) Transport by ox-cart.

Transport by ox-cart is conducted in the case of several small farmers in cooperation. This is of small scale and inefficient.

3. Conditions of maize-export port.

(1) Port of Phnom Penh.

(a) Outlines of harbour facilities.

Five wharves (No. 1 - No. 5) are arranged along the riverbank of the Tonle Sap as shown in the attached map. Wharves No. 1 - No. 3 are floating ones which go up and down according to the water level of the river, while wharves No. 4 and No. 5 are fixed ones. No. 1 is said to be most convenient to cargo-working, while No. 2 rather inconvenient.

As only two gantry cranes, whose capacities are 15 t. and 10 t. respectively, are available, cargo-working has to depend on the winch of cargo-boats. As unloading of sundries is conducted by manpower, heavy cargoes have to be divided into sections. Wharves No. 1 - No. 3 are used mainly for cereals and sundries, and No.4 and No. 5 for heavy machinery. Although there are a few small-sized warehouses, almost all cargoes are stored in the open.

(b) Depth of water.

Being a river port, there is a wide difference in the flow of the river according to the season, dry or wet; the depth of water, as is shown in Table 23, varies with the month. As loading of about 2,000 t. is just possible during the wet season, and 1,200 t. during the dry season, larged-sized steamers cannot enter this port.

(c) Conditions of cargo-working.

Hours of cargo-working consist of three shifts; 7 - 11 a.m., 2 - 6 p.m. and 7 - 11 p.m.; there is no all-night work because of its inefficiency. Sacked cereals are transported by barge from the upstream. The steamer, having come alongside the wharf and moored the barge alongside of it, loads the cargo by means of its winches; or, having berthed in the midstream, does the same simultaneously from its both sides. The loading capacity of one gang of stevedores is said to be 10 t./hr., and in the case of sacked cargoes 1,000 t./day.

Terms of loading is usually on C.Q.D. (Customary Quick Dispatch), and in the case of running lay-days 500 t./day is considered appropriate.

In case that the contract of affreightment is based on F.I.O. (Free in and out), the tariff rate is R 40/metric ton for loading and stowing charges. (Note: R 38/metric ton in Port of Saigon)

Although the conditions of labour differ according to the season,

dry or wet, the loading charges are the same.

Incidentally, the number of barges in operation at present is said to be 30.

Fig. 8: Map of Port Phnom Penh

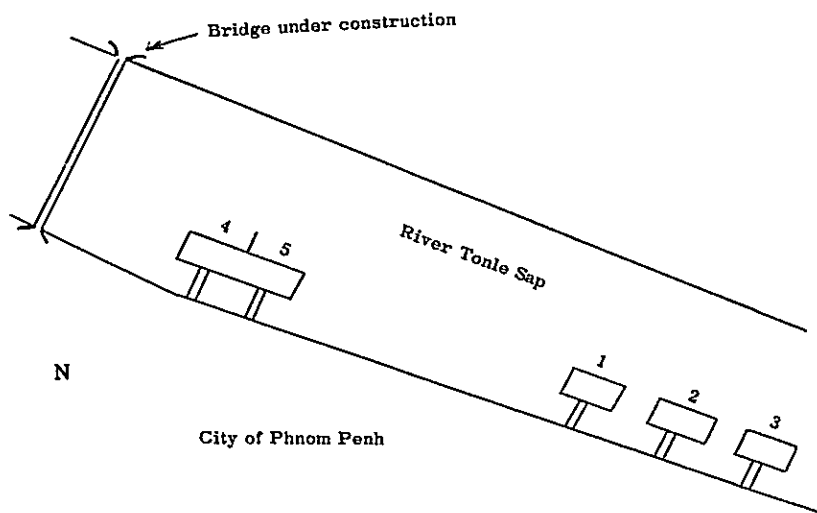
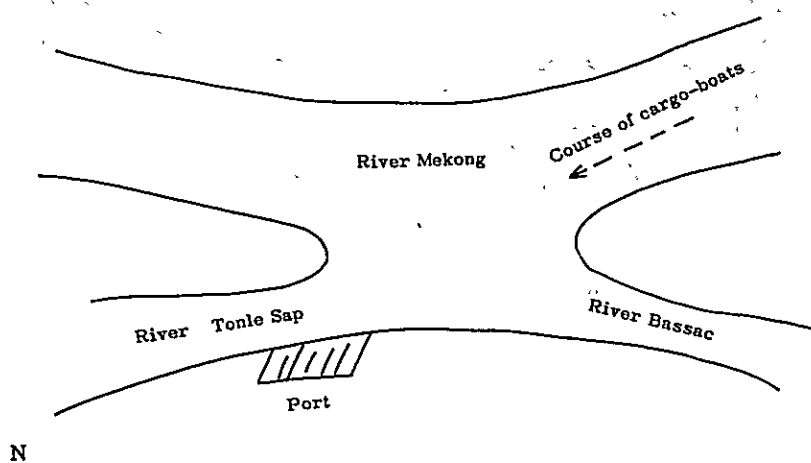


Table 23: Average water depth of rivermouth and shoal
between Phnom Penh and Saint Jacques

Month	Day	Metres	Feet
Jan.	1 - 15	4m 40	14' 06"
	16 - 31	4 30	14 02
Feb.	1 - 15	4 30	14 02
	16 - 28	4 20	13 10
Mar.	1 - 31	4 20	13 10
April	1 - 30	4 10	13 06
May	1 - 31	4 10	13 06
June	1 - 15	4 20	13 10
	16 - 30	4 40	14 06
July	1 - 15	4 50	14 10
	16 - 30	4 70	15 05
Aug.	1 - 15	4 80	15 09
	16 - 31	5 00	16 05
Sep.	1 - 30	5 20	17 00
Oct.	1 - 31	5 20	17 00
Nov.	1 - 15	5 00	16 05
	16 - 30	4 80	15 09
Dec.	1 - 31	4 60	15 00

(d) Liners

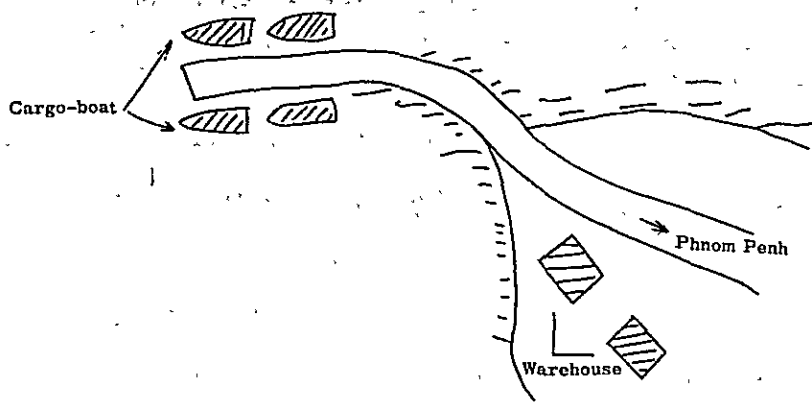
In accordance with the Japan Indo-China Freight Conference, the following steamship companies are operating liners: - Kawasaki Kisen Co., Daido Kaiun Co., Nitto Shosen Co., Kobe Sekiyu Senpaku Co., Shofuku Kisen Co. and Kyosei Kisen Co. In case that there is no homeward freight these liners often sail for Borneo for lumber.

(2) Port of Sihanoukville

(a) Outlines of harbour facilities

This port is situated 253 kilometres to the southwest of Phnom Penh and can be reached also via 'Friendship Highway' constructed by the U.S. aid.

Map No. 9: Port of Sihanoukville



As is illustrated in the map No. 9 this port has a wharf 8 m. wide and 290 m. long where four steamers of 10,000 - ton class can berth. There are three warehouses on the bank; one is for the exclusive use of exports, the size being 120 x 45 x 6.5 (height) m., and another for the similar use of imports, the size 6.5 x 15 x 6 (height) m. There are no such cargo-working facilities as cranes, etc. on the wharf, and loading and unloading are conducted by the winch of steamers. Water feed is available, but replenishment of bunker fuel is impossible.

(b) Depth of water and meteorological conditions

As the depth of water is 8.60 m. at high tide and 7.60 at low tide, ocean vessels can enter this port. However, during the monsoon season, that is, from June to October, the waves are high and the days are mostly rainy, which makes difficult normal cargo-working, sometimes waves are said to dash over the wharf.

(c) Terms of cargo-working.

The terms of cargo-working in this port are generally C.Q.D. There is no record of loading rice or maize bound for Japan. Stevedores seem to be brought here from Phnom Penh whenever a

loading steamer arrives. The charges for loading and stowing miscellaneous cereals are about R 40 - 50 per metric ton.

(d) Availability of port.

In the case of exporting the rice and maize produced in the environs of Sihanoukville this port is available, as the transport from the place of production does not cost much. However, the produce of the Mekong basin requires a large sum of truck cost, which will not be a paying business except in the case of a bulky cargo amounting to more than 5,000 tons in one lot.

Construction of a railway line to Phnom Penh is projected in future.

4. Inspection standards of maize export.

The inspection of commodities as to their conformity with the standards in Cambodia is executed by a Government organ by the name of "Service du Contrôle du Conditionnement et de la Répression du Fraudes".

To summarize the standards of this inspection, it is conducted in the presence of Government officials by means of taking samples from each lot and giving decision whether they are standard goods or off-grade ones. The inspection standards of maize are as follows:-

I. - Classification.

Appartient au genre *Zea Mays* Linné (Famille des Graminées)

II. - Conditions d'exportation

Couleur: Franche, non terne, sans indice d'échauffement ou de moisissure.

La proportion de grains de couleur autre que celle du type déclaré par l'expéditeur devra être inférieure à 5% pour les maïs colorés et à 2% pour les maïs blancs.

Volume, forme:

10 - Les "Maïs petits grains" doivent laisser passer 95% au moins

des grains à travers un tamis de 8 m/m de diamètre.

20 - Les "Maïs dent de cheval" ne peuvent contenir plus de 5% de grains de forme autre que celle du type.

Odeur: Absence de toute odeur trahissant un échauffement, une fermentation ou la moisissure du produit.

Humidité: Inférieure à 14%

Matières étrangères:

Tolérance maxima de 2% y compris les poussières, pellicules, germes, débris de rachis, panouilles, déchets dégrenage.

Charanconnage:

La proportion tolérée des grains charanconnés au moment du chargement, variable selon les saisons, est déterminée par les services qualifiés aussi souvent qu'il est nécessaire sous le contrôle du service compétent.

III. - Types de Maïs admis à l'exportation.

Les services de contrôle du conditionnement établis chaque année une série d'échantillons de référence qui est tenue à la disposition des exportateurs.

IV. - Emballage.

En sacs neufs ou usagés en bon état, type H.C., d'un poids uniforme pour un même lot.

V. - Marquage

Maïs colorés: La lettre M inscrite dans un carré.

Maïs blanc: La lettre M inscrite dans un cercle.

V.- Validité du bulletin de vérification. Soixante jours.

IV. State management of international trade and Sonexim.

1. State management of foreign trade.

The Government had been pursuing a comparatively mild policy of treating the overseas Chinese in the country, the concrete measures of which had been (1) discrimination against aliens concerning the security money for registration of import, (2) ordinance forbidding 18 trades to be followed by aliens and (3) reduction of transfer tax of stocks in the case of the transferee being a Cambodian national. And, accordingly, no drastic measure was anticipated by the general public concerning the treatment of the overseas Chinese. However, it was suddenly announced by the Government on November 11, 1963 that the bank would be managed by the State as of July 7th 1964 as well as the foreign trade as of January 1st 1964.

These measures were taken, it was presumed, to prevent the monopoly by alien merchants of various interests, which were accompanied with many corrupt practices, and the widening of the gulf between rich and poor; incidentally these evils were the targets of attack by the 'Free Khmer' broadcast. Although the above-said state management was considered the sole measure to meet such situation, its greatest aim seemed to consist in the policy of converting the accumulated commercial capital of the overseas Chinese to agricultural and industrial capital.

The Government established the Sonexim as a channel of promoting the state-managed international trade.

2. Sonexim.

Sonexim is an abridgment of Société Nationale d'Exportation et d'Importation, the inaugural meeting of which was held on December 12th 1963. Its capital composition is as follows:-

Investment of the Government: R 240 (million), 60%

Investment by private persons: R 96 (million), 40%

Subscription for shares were limited to Cambodian nationals, and aliens who had the nationality of the country were also qualified for subscription.

In spite of the short validity term of subscription, which was available for only a few days and expired on the last day of November, the stocks were soon sold out, resulting in the investment of R 90 (million) by overseas Chinese who had the nationality of Cambodia, while the sum total amount of the investment offered for subscription by private persons was R 96 (million).

Such sensational subscription for the shares of Sonexim is said to be an extraordinary matter unprecedented in the history of the country, as there has never been subscription by private persons in the case of joint investment project of the Government and people.

Such being the case, the capital of Sonexim, which had originally been expected to be R 120 (million), was doubled. This may be attributed to the anticipation on the part of the overseas Chinese who expected to take part in the corporation not only in the capacity as shareholders but as direct business partners of its foreign trade.

As the Sonexim has not completed its arrangements for state-managed foreign trade, the existing trade system by private persons will be continued until the end of February. However, it is not certain that the Sonexim will have been fully prepared for commencing its business from March.

3. Structure of Sonexim .

Although Mr. Meach Konn, the present President of the OROC, took office as the President of the Sonexim at the time of its inauguration, he was succeeded by Mr. Chhean Vam, ex-Premier.

It is reported that Mr. Meach Konn has resigned in order to devote himself to the management of the OROC, but it is also rumoured that he did so because of the standstill of rice export caused by the state-managed trade accompanied with the loss and anxiety on the part of farmers.

The conception of its executive offices:- such as vice-president, council of directors, secretariat, bureau of export and bureau of import- does not seem to have been materialized, and the staffs have not been appointed. So far as is known, such offices as bureaus, departments and sections will be set up as occasion demands.

It is anticipated that the Sonexim will cover the price differential loss, arising from the purchase at high prices of domestic products and their export at international prices, with the price differential profits from imports. Only a little profits will be realized from the import of implements and materials necessary for farming - such as tractors, etc., and some from the import of buses, motorcars, etc., while profits three times as much as the import prices are expected to be made from toilet articles, coolers, etc.

It is also reported that wholesale dealers will be replaced by the co-operatives of retailers which will purchase the imports of the Sonexim.

As for such cooperatives, ten groups of retailers are now making preparations for the organization in accordance with the notification dated January 17th, 1964 of the Combined Chamber of Commerce and Agriculture of Cambodia. The major points of the notification are as follows:-

On the instructions of the Minister of Commerce and within the framework of the economic reform merchants who wish to sell the undermentioned articles are requested to advise to the Archives and Documents Section of the Chamber of Commerce as to their names, addresses and trade licenses (accompanied with copies) before January 22nd 1964.

Only such persons as wish to enjoy the right of doing business with the Sonexim shall be invited to the inaugural meeting of the union of retailers.

1. Food, wines and alcoholics
2. Chemicals and fertilizer
3. Medicines
4. Vegetable fibre and fabrics
5. Paper, paper-made goods and others

- Office and printing machines
- Materials of scientific research, cinema and photograph
- 6. Petroleum and hydrocarbon goods.
- 7. Nonferrous minerals and nonferrous metals
 - Iron and steel products and metal handiworks
- 8. Generators, motors and turbines
- 9. Electrical and electronic machinery
- 10. Civil engineering, construction and industrial machinery
 - Agricultural machinery and tractors

V. Conditions of increasing Japan's import of maize.

The following three measures are conceivable in order to increase Japan's import of maize from Cambodia:-

- (1) To institute special exchange rate in order to facilitate the export to Japan.
- (2) Abolition of the bilateral liquidation agreements between Cambodia and the Communist area countries as well as the abnormal exchange rate between Cambodia and France.
- (3) Cutting-down of the existing official rate of U.S.\$1.00 = R 35.00 to the actual U.S.\$1.00 = R 80 - 90.

If any one of the above measures is taken, it is certain that Japan's import will be much more facilitated, as it will be removed of its handicap in trade terms and equalized with the countries, which are now purchasing more than 87% of the Cambodian maize with advantage such as Hongkong, Singapore, France and Communist area countries.

However, it may be difficult to expect such measures to be taken by Cambodia which is not troubled by the over-production of maize but exporting it on formally favourable terms to countries other than Japan.

However, we may place our future hope on the state-managed trade system of Cambodia.

We are told that the SONEXIM, which was established to conduct state-managed trade, is based on the idea that it purchases at high prices those native products which it exports at international prices, covering the resultant differential loss by the differential profits arising from its import business. If this system is put to work, Japan's import of maize produced in Cambodia will be facilitated, as the product will be sold at international prices. With the firm establishment of the Sonexim in future it is conceivable that Japanese importers will enter into an import agreement, such as now in practice with regard to the Thailand maize, with the Sonexim in order to realize the stabilized import of Cambodian maize.

In the case of entering into such an agreement yearly supply of more than 100,000 t. of Cambodian maize will be a necessary condition in view of the payability and share of the Japanese importers.

In case that the supply is less than the above quantity either import agreements with a small number of Japanese importers who are interested in the Cambodian maize or the rotation system in its import may be a technically possible measure, when the Government of Japan will find it extremely difficult to give an appropriate administrative guidance, as the import of maize is placed under the automatic approval system.

Therefore, an increased production of the Cambodian maize is a prerequisite to its increased import by Japan.

It is indeed a fact that Communist China as well as France are importing maize from Cambodia, but the question arises as to how much real necessity for the maize as consumer's goods there is in the countries. It seems that they are endeavouring to purchase the maize which, though comparatively high in price, is a marketable article of international trade. Under the circumstances the quantity of their purchase will be naturally limited, resulting in Cambodia's export at international prices of the surplus portion of

maize by its increased production.

In any case the sole measure to increase Japan's import of the Cambodian maize seems to consist in its increased production. The way to increase the production must be such as to attach importance to the increase in the field per ha. of the acreage already under cultivation. If, for instance, the existing yield of 1.5 - 2.0 metric tons per ha. is raised to 3 metric ton, cost reduction by that amount will be realized, which is enough to export it at international prices; technical feasibility of increasing the yeild per ha. to a certain extent is also conceivable.

Even in a case of the increased production realized the question is the way of deciding the check price of maize. Although the check price for 100 kg. and FOB Phnom Penh is announced every week, it is always fixed at a point a little higher than its international price, apparently motivated by the pride that the Cambodian maize is superior in quality.

For instance, the check prices of September and October 1963 are R 200/100kg. and FOB Phnom Penh, which are converted to \$57.14 and, if the freight to Japan is about \$8.00, Japan's import price amounts to \$65.14.

Moreover, this is the minimum export price, which means that Japan's import is impossible unless paying more than that. We cannot help considering that the decision itself of the check price is unreasonable.

Check price should be fixed either at the international level or at a point a little lower than that. Unless this is effected, it will be impossible to import the maize in spite of its increased production.

It is also rumoured that the Check Price Committee is composed of some overseas Chinese members for whose interest is the check price fixed, but so far as the recent price is concerned, it has shown little fluctuations, being R 200/100 kg.

However, it is obvious that Japan has always to run the risk of losing its import which is at the mercy of the check price operation. For the

promotion of Japan's import of maize such apprehension must be removed from the path.

VI. Outlook for the feasibility of establishing a joint concern of private capital. - viewed from the recent political and economic situation.

1. Present situation.

It is only ten years since the independence of Cambodia, which, being at present on the way to development, has not yet accomplished such conditions in all respects as enabling the establishment of a joint concern of the Cambodians and foreign nationals. For instance, (1) lack of national capital: although the country is making efforts to cultivate its national capital by means of the state management of the banking business and foreign trade as well as the restriction of 18 trades to be followed by aliens, the power of the overseas Chinese over the Cambodian economy is so overwhelming and the flight abroad of their capital in various forms is occurring so frequently that the accumulation of the national capital is making a tardy progress; (2) problem of transport: there is only one line of railway in the country, which constitutes a bottleneck of transport, making it inevitable to depend on trucks for long-distance transport; such a deadlock must be broken through especially in the case of maize which is the cheapest of all cereals.

Chapter VI. Other investigations.

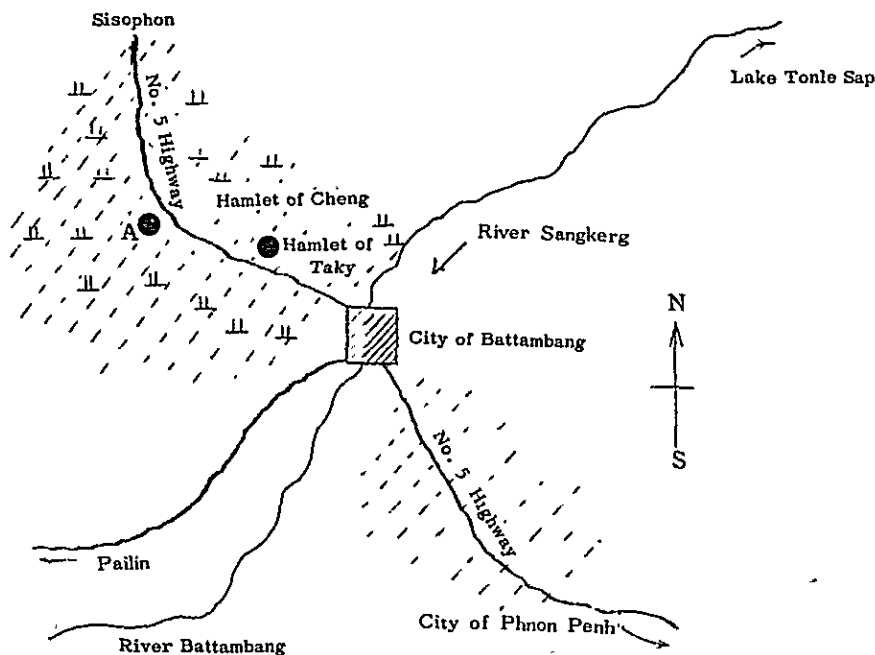
I. Investigation into farming system by large-sized motor-tractors introduced into Battambang Province.

(1) Purpose of investigation.

The technology of paddy rice farming in Cambodia is based on the combination of manpower and work cattle. It is said, however, that the introduction of motor-tractors by rich farmers in Battambang is rapidly modernizing the conventional farming technology accompanied with the widening of the technological differentials between the rich and poor farmers, promoting, on the other hand, their technological cooperation through hired cultivation by means of tractors. We consider it necessary to clarify the motive and grounds enabling such new farming, as we anticipate that the production and circulation of farm produce will undergo a change due to the above circumstances.

We have made this investigation, as we consider that the analysis of the circumstances will make a useful datum for the prospective programme of modernizing the farming technology centering around the maize crop.

(2) Location of surveyed farms.



The farms investigated are situated along No. 5 Highway leading to Sisophon. Farm A is 25 km. and Farm B 12 km. from Battambang City.

(3) Outline of family farms investigated.

We conducted our survey by means of extracting a family farm respectively from the two hamlets of Taky and Cheng. The two farms are both in the centre of the rice crop zone of Battambang. The time of our survey, January 17th and 18th 1964, was the midst of rice harvest. The acreage of A's rice paddy is 14 ha., while that of B's 100 ha., the former belonging to the middle class and the latter to the rich class. Incidentally the average acreage of rice paddy per family farm is 4 ha. in this Province. Five farmers own a tractor respectively in Cheng hamlet; their respective acreage of rice paddy is more than 12 ha. Only one family farm, which we investigated, owns a tractor in Cheng hamlet.

Fig. 1 : Sketch of surveyed spots in Battambang district

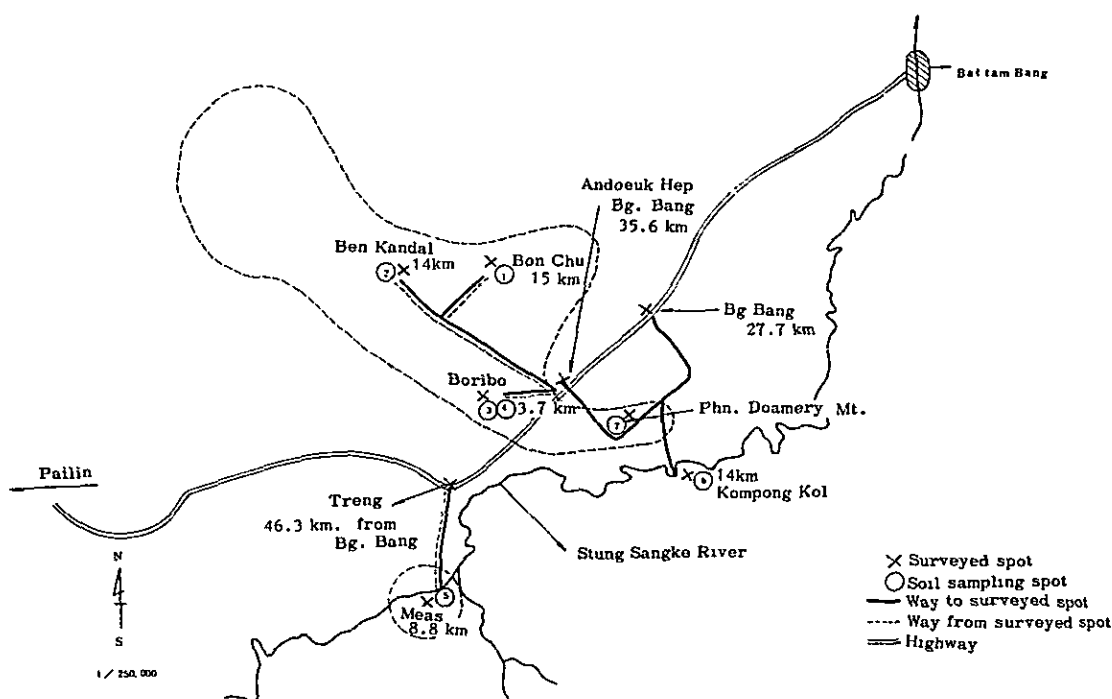
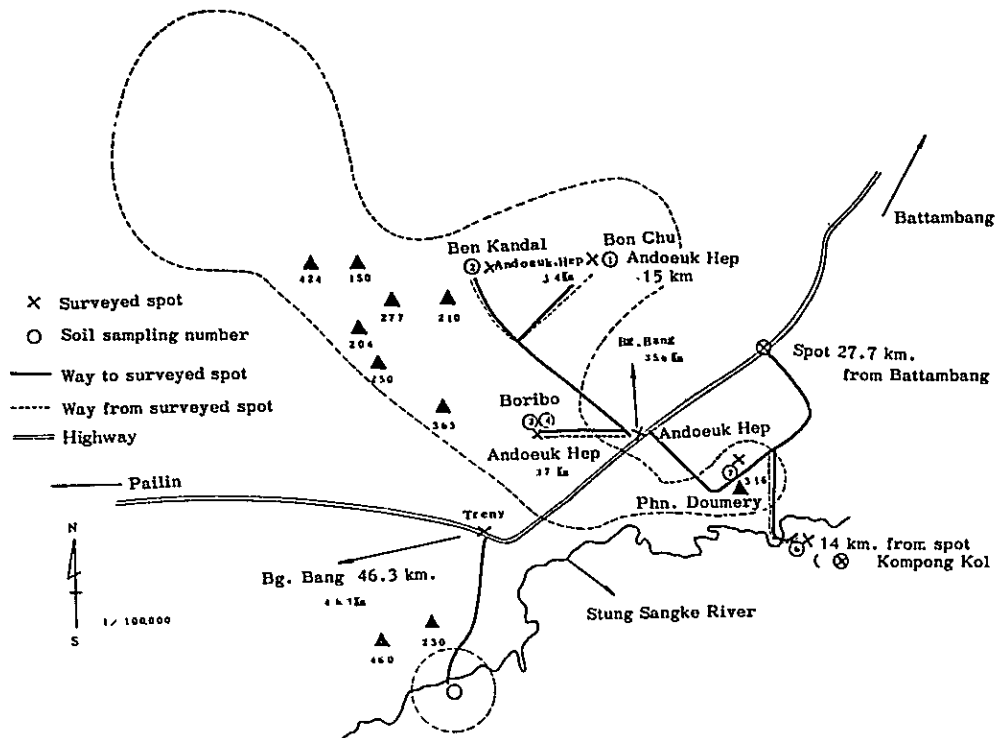


Fig. 2: Location of surveyed spots in Battambang district



Natural conditions of the hamlets which introduced motor-tractors.

The two hamlets belong to the submerged area along the shore of Lake Tonle Sap whose farm land is flooded with the rise of the lake, presenting an appearance of part of the lake during the wet season and becoming dry rice-field with the subsidence of the water during the dry season. Therefore, paddy-rice is either sown in drills or transplanted during May - June and reaped in the dry season during November and December.

In this northwestern district of Battambang Province there is a large acreage of newly opened-up farm land whose scale of farming is greater than those of Kompong Cham Province on the bank of the Mekong and Kandal Province where Phnom Penh City is situated and whose sowing is often characteristic of drilling.

Family farm A.

a. Composition of family: 5; husband of 55, wife of 51, eldest son of 21 (operator of tractor), eldest daughter of

... 18 and second daughter of 3 ...

- (b) Farming machinery: a wheel-plough, 50 HP, Ferguson; a disk-plough with three blades; - R 148,000
a trailer ... R 52,000;
an ox-cart and a plough; 4 work beasts.
- (c) Acreage: 14 ha. scattered in three locations.

Process of introducing tractors.

In the hamlet of Taky, which is about 25 kilometres from Battambang City in the paddy-rice zone along No. 5 highway, introduction of tractor is rapidly increasing. The farmer concerned is said to have bought the farming machines from a dealer (trader) in agricultural machinery. He has not employed the machines yet in cultivation, but is using it for transport of gravel, unhulled rice, etc. However, he has experienced those two years cultivation by tractor on hire. (R 300 per ha.)

(d) Effects of the use of tractors.

- i. His own tractor saves him the hire which he has had to pay.
- ii. He can expect a considerable amount of hire of his tractor by cultivating the farmed-out paddy-fields of other farmers. That is why he had bought his tractor before other farmers did.
- iii. Charge for tractor on hire is R 300/ha. for ordinary paddy-fields and R 600/ha. for paddy-fields where small trees still grow. Therefore, he can get R 1,500 - 2,000 of tractor charge for cultivating 5 - 6 ha.
- iv. Operation of tractor. - Four operators work double hours in five-hour shifts a day to cultivate 5 - 6/ha. per operator. In the case of a draft-ox eight oxen take 30 days to cultivate 14 ha., which means that two oxen plough 10 ares a day.
- v. Process of cultivation by tractor.

Before the wet season sets in rough ploughing-up is applied, and after having finished the ploughing and harrowing, which immediately precede the

sowing, seeds are sown in drills. When the paddy has grown about 50 cm. high the paddy-field is again dug with a plough drafted by draft-oxen. This is, according to farmers, meant for weeding, but in the opinion of Prof. Sato, University of Hyogo Prefecture, it serves not only to control the weeds but also to suppress the growth in early stage of rice paddy.

In most cases seeding is that of drilling, but transplantation was also conducted formerly. The variety grown is the same as the old one. He says that tractor farming does not require a new variety.

Quantity of seeds. - 10 kilograms of seeds are sown per ha., which is considered a little too dense. However, when the seedlings have grown 60 - 70 cm. high, the fields are ploughed by oxen for the purpose of weeding and thinning. In view of such farming the above-said quantity of seeds may be considered appropriate.

vi. Effects of use of a large-sized tractor.

The summary of information which has come to our knowledge is as follows:-

(i) The extension of ploughing and sowing period enabled by tractors has resulted in the timely farming.

Ploughing of a fairly large acreage before the seedtime (the first ploughing) and light ploughing along with the preparation of soil which are the second ploughing enable the efficient use of the seedtime.

(ii) The expansion of the farm land is facilitated.

In the case of ploughing by draft-ox the cultivation of an acreage of only 5 ha. was possible, but a tractor can plough 14 ha., which are about three times the former acreage, consisting of purchased paddy-fields and newly reclaimed ones.

The price of paddy-fields was R 500 per 40 m², but it has risen twofold now due to the increased number of those who seek for farm land.

The farmer concerned also wishes to purchase farm fields, but he has not the fund.

Data for reference: Comparison of the price of unhulled rice with the wages of a farm hand.

	1962	1963
Unhulled rice 60 kg.	R 240	R120
Wages (for mowing 40m ² of rice)	R 40	R 60 (inclusive of meals; in case of payment in unhulled rice it is 45 kg.)
Wages (for seeding 40m ² of rice)	R 30	R 30 (inclusive of meals)

This farmer employs a farm hand whose wages are yearly R 3,000 inclusive of meals and finding in clothing and tobacco.

Family farm B.

a. Composition of family: the farmer (proprietor) of 33, his wife of 32, farmer's mother of 56, eldest son of 11 (primary school boy in Battambang City), eldest daughter of 5, second daughter of 2, third daughter of 1 and the farmer's brother of 24 (studying at the Technical School opened by SSSR in Phnom Penh).

b. Farming machines (means of production): a Ferguson tractor; disk-harrow with 3 blades; a trailer; a harrow; a plough; 14 work oxen; an ox-cart; a cart; a motor-cycle; a garage.

c. Conditions of the farm fields concerned.

His farm fields are situated in the paddy-field zone along No. 5 Highway about 12 kilometres from Battambang City and seem to drain comparatively well.

It is naturally submerged during the wet season from July to October due to the rise of the water of Lake Tonle Sap.

The area of the paddy-fields amounts to 100 ha., scattered in several locations, consisting of 4 groups of about 16 ha. each, 2 groups of about 10 ha. each and a field of about 6 ha. The whole area which is made up of 7 groups of paddy-fields is divided into three classes: those which have been

under cultivation these 30 years, those purchased from other farmers and those which the farmer has recently opened up by himself by clearing a forest (sparse grove) owned by a private person.

Although the fields lie along the highway, 50% of them is about 5 kilometres from the highway and the rest more than 5 kilometres distant. The location of the former is rather high and that of the latter in a low and damp land which is ploughed only once a year and cropped with floating rice. The paddy-fields, having an average fertility, yield 1.8 - 2.0 t. of unhulled rice per ha. Although this year (1963) is called a lean year, his fields have yielded well, many of them having produced 2.5 - 3.0 t. per ha.

d. Process of cultivation by tractor.

During the period of rice mowing, that is, from December to February of next year, the fields are ploughed with a disk-plough. (the first ploughing). Then, during May - June when the soil has become soft by dint of a few times of rainfall the fields are again ploughed with the disk-plough and harrowed with a large wooden harrow and then sown with seeds. (hand sowing). With the advent of the rainy season the seeds germinate and rapidly grow. When they have grown to be 60 - 70 cm. high the fields are ploughed with an ox-draft plough. (dug with a conventional plough.) This is meant for the control of weeds and suppression of the growth of rice.

Ploughing is conducted by means of turning and turning about ovally. There is no manuring usually and in no case that of commercial fertilizer. However, this farmer has been applying cow-dung these years, which, according to him, has an effect on the maintenance of the soil fertility. Manuring is conducted by means of sprinkling the cow-dung over the paddy-fields prior to their ploughing. Not all of them are manured, but only those in the vicinity of his house.

There is no weeding at all. Reaping is conducted in November when the dry season sets in; it is done all by hand sickle. The reaping period ranges from November to the middle of February next year; that means, the paddy-

fields belong to the single crop district and the reaping extends over a long period. Incidentally in the transplantation zone of rice (principally the Provinces of Kandal, Kompong Cham and Takeo) harvest and transplantation of rice are going on all the year round; meteorologically speaking, there is no best season for farming rice in these districts, as the transplantation is conducted as soon as the stagnant water of low land begins to subside with the advent of the dry season.

In Battambang Province, however, the seasonal characteristic of rice crop is more conspicuous than in other Provinces, as the rice there is sown generally during May - June and reaped during November - February.

Reaping is conducted with a hand sickle by means of cutting the stem at a height of about 50 - 70 cm. above the ground. The reaped rice is made into sheaves which are either gathered by ox-carts in damp land or by trucks in dry land and then transported to be stacked in a place. Separation of grains is conducted either in the paddy-fields or in the farmyards by making use of oxen which tread on the sheaves.

The straw, stacked high in the open after having been freed of the grains makes an important fodder during the dry season when there is no green grass. However, it is so badly maintained that the greater part goes rotten and deteriorates as fodder. When the wet season sets in during May - June the physical strength of work oxen is extremely weakened due to insufficient fodder. At this time the farming season commences when ox-draft ploughing becomes necessary. Owing to their weakened physical strength a plough has to be drawn by a team of two oxen. It is necessary to notice the effects of tractors which can make up for the loss of farming caused by weakened work beasts.

e. Storage and transport.

The unhulled rice which has been separated is now winnowed to be stored in part. Some of the large farmers who have tractors transport it

to rice-cleaning mills (overseas Chinese) to sell.

The rice-cleaning mills are interspersed along No. 5 highway, many of which have a capacity of treating 20 tons a day. The farmer concerned also sells his unhulled rice to a certain rice-cleaning mill. According to him, he has already borrowed in advance a sum of money to pay wages of his farm hands.

e. Effects of the use of a tractor.

The effects of the use of a tractor in this case, much alike that of Farmer A, are summerized as follows:-

i. He has no need of waiting for the rainfall of April - May in order to plough the fields, but he can do it even directly after the rice harvest, which will lighten his labour in the farming season. So far as the farming efficiency is concerned, a tractor can plough about 6 ha. a day with 3 operators working double hours. In the case of an ox-draft plough two oxen do the work of about 12 ares a day, which means that the amount of the work of a tractor corresponds to that of 50 days of an ox-draft plough.

ii. It can lighten the burden of weak oxen which get tired terribly. The farmers feel pity for their work cattle in plough.

iii. Farmers can increase their income by making use of their tractors, doing hired ploughing and transporting unhulled rice or sand, etc. for road construction.

iv. Farmers can now cultivate even pretty distant fields, and the farmer concerned does his farming in a field more than 5 kilometres distant. This accounts for the recent rise in the land price which has advanced from R 7,000/ha. to R 13,000/ha.

v. Farmers who have tractors can do efficient transport in the harvest time. As they have abundant fund, which they have got from hired cultivation, etc., they can employ farm hands from distant districts where the wages are low, and as a result they save the labour cost.

(g) Data for reference.

The yield of unhulled rice was 3.0 - 3.5 t./ha. As its selling price to rice-cleaning mills is R 1.75/kg., the rough income per ha. amounts to R 5,250 - 6,125, which leave little margin of profit to the farmers who say that at least R 1.8/kg. are necessary. However, it was R 3.4/kg. in 1962.

Wages and rice price		
	1962	1963
Rice (unhulled) price per 68 kg.	R 230	R 120
Wages of a reaper per 40 m ²	R 30	R 40 (inclusive of meals)
Hired cultivation		
The first ploughing per ha.	R 300	
The second "	R 50	
Harrowing "	R 20	
Total	R 370	

In the case that this farmer ploughs by means of an ox-draft plough at the rate of 12 ares a day it will take 83 days to finish the work; therefore, 83d. - 6d. = 77 d., which means that he has 77 days to spare. If he employs these 77 days for hired ploughing at the rate of 6 ha. a day, the acreage is 6 ha. x 77 d. = 462 ha. and on the other hand his earnings, at the rate of R 300/ha., will amount to R 138,600.

While his outgoings are:

Wages R 3,080 @ R 40 per day for 4 operators ... R 40 x 77 d. =
R 3,080

Fuel oil.... R 51,900 @ R 35 per 10l. and 200l. per day R 700 x
77 d. = R 51,900.

The difference is:

R 138,600 - (R 3,080 + R 51,900) = R 83,621

Assuming the depreciation and repair cost of the tractor to be R 25,000,

his profit will be: R 83,621 - R 25,000 = R 58,621

(h) Data for reference.

Rice bran white R 60 - 70 for export

" brown R 10 farmer's purchase as fodder from rice-
cleaning mills.

Incomings from by-business of tractors.

Transport charge of unhulled rice from the hamlet to Battambang City
at R 5.0 per sack for 12 kilometres.

One lot of transport 50 sacks R 250

Fuel oil 5 l. @ R 35 per 10 l. R 17.5

Balance = R 250 - R 17.5 = R 132.5

II. Present situation of agricultural experiments in dry field crops.

We are going to report as far as possible on the situation of the
agricultural experiment stations which, we consider, are closely related
to our present survey.

1. The Agricultural Experiment Station of the Ministry of Agriculture.

Sélection d'Agriculture (Centre de Sélection de Maïs)

Here they are conducting special breeding experiments of maize,
besides those of fruit-trees and vegetables. It is taken charge of by two
chiefs, Contrôleur Som-KHom and Contrôleur Lim-Po, with eight Agents.

(1) Objective of breeding.

The objective is the breeding of such varieties as suitable for the
Mekong basin. (As a result of our fact-finding the principal place of maize
production seems to be the Mekong basin, and we consider this objective
appropriate.)

(2) Process of experiment.

Those in charge of the experiment began their work two years ago.

There is no previous record left before that time. We are told that during the time of French Indo-China a good deal of encouragement was given to the maize production such as the trial of interbreeding the first filial generation. However, there is no such record there, and there is no knowing the process of the experiment.

(3) Contents of breeding.

Although various foreign varieties, besides American and Thailand ones, have been introduced as test materials for breeding, it has been concluded that such ones cannot make the materials for breeding early-ripening varieties which are considered desirable in most cases. Accordingly, on the ground that such a gene as suitable for Cambodia cannot be obtained from other countries the rearing of a synthetic variety and a hybrid in future is being promoted by means of laying stress on the mass selection out of the native kinds. (As the rearing of a superior variety entirely out of the native kinds may involve a great deal of hardships and difficulty, we consider it necessary to make a study of materials which can easily produce heterosis such as 'North American type', 'Aegean type', etc. which are early-growing.

The new variety which has hitherto been made public has been named 'Synthetic 60' (Camsyn 60) with one or two other genealogies which are considered promising.

(4) Outline of the experimental farm.

An acreage of about 16 ha. is cropped with maize.

Seedtime: December 2nd

Mannure applied: Cow-dung 1kg./1m²

Spacing: 80 cm. x 60 cm. and one group consisting of 1 - 2 plants

(8,300 - 4,200 plants per 10 ha.)

The maize is now in the earing and blossom stage. Self-fertilization is being conducted by means of selection and 'paper bag method'.

The specimen mark is 'Ca-3-2-3-2' (Ca means Cambodia Aera).

Seed-raising farms are cropped with maize as follows:- 2 ha. of the Prey Lip Experiment Station during the dry season and 20 ha. of the Kompong Cham Experiment Station during the wet season. The yield of the latter last year was 2.0 - 2.

The breeding consists of the process of self-fertilizing generation and selection; it is efficient as the self-fertilization is conducted twice a year; December - March and June - September. However, how to proceed a step farther with this breeding experiment does not seem to have been decided yet.

(5) Propagation and gathering of seeds.

Seed-raising farms are cropped with maize as follows:- 2 ha. of the Prey Lip Experiment Station during the dry season and 20 ha. of the Kompong Cham Experiment Station during the wet season. The yield of the latter last year was 2.0 - 2.5 tons per ha., totalling 40 t., an amount sufficient for cropping 1,300 ha. of maize fields.

Although the seed-corn of this variety is distributed for value through the OROC, it does not seem to have spread so far and wide. On the contrary, there is such a large demand in the town for 'Hawaii' (a sweet variety introduced by Dr. Litzenberger) as a vegetable to be eaten 'on-the-cob' that its seed-raising is said to be beyond all success.

2. Cotton Crop Experiment Station of Battambang. (Andoeuk Hep)

The acreage of the experiment farm is about 2 ha., situated in the 'terre noire' zone. As it is several years since it was reclaimed, the fertility of the soil seems rather impoverished. (This Experiment Station is being given the guidance of French experts.)

(1) Items of test:-

- a. Quantitative ratio test of fertilizers P_2O_5 and N.
- b. Test of commercial fertilizer and organic matter.
- c. Rotation test of soya and cotton crops.
- d. Test of spacing of plant.
- e. Comparison of varieties.

Items a) and e) arouse interest in the effect of manure. Introduction and comparison were being conducted of the varieties which were short in

height with a high yielding rate of fibrous character. This is meant for the countermeasure to meet the spraying of agricultural medicines which costs the greatest labour in cotton farming.

(2) Management of experiment farm:-

Besides tractor-ploughing, some farm hands are employed (their day wages are R 30 - 32 for a male hand and R 25 for a female hand), amounting to 7 hands per ha.

In order to control the insect (aphid heliob) damage DDT, Endrin, etc. are sprayed 8 - 10 times all over the farm.

(3) Popularization and guidance of farming technology.

Guidance of cotton cropping in the fields extending over 530 ha., which are in the charge of the Andoeuk Hep Experiment Station, is given actively and positively, as the Station is equipped with tractors and jeeps (Unimok of German make) to overcome even the worst road conditions during the wet season.

The guidance is given through the OROC by means of establishing demonstration farms; besides such positive aids are given as the advance of seed-corns (R 3/kg.), fertilizer (R 40 - 45/kg.) and agricultural medicines (unit price unknown), and convenience of the collection of produce.

3. Agricultural Experiment Station of Siem Réap (Kouk Patry).

(1) Test crops:-

Rice and such vegetables as onions, pimientos, lettuces, etc.

(2) Contents of test:-

As for paddy rice importance is attached to 'Variété Chhutana' raised in the Station Génétique du Riz of Battambang Province; being prolific of 2.0 t./ha. as compared with 1.5 t./ha. of conventional varieties, efforts are being made for its popularization.

Comparison of onion varieties is being conducted by means of randomized block method under the guidance of Mr. Ho-Ton-Lip. It is a combined test of the three experiment stations of Battambang, Siem Reap and Phnom Penh.

At the time of our survey the experiment farm was being weeded. It had been transplanted with the seedling on December 18th, whose sowing had been made on October 26th.

(3) Management of farm and ox-shed.

Mung bean, which is used for green manure, is sown in March. After the seeds have been harvested in May the farm is ploughed to be transplanted with paddy rice (sown in the seed-bed in May), which is reaped in December. Colo Pogonium which is a fodder can also be used as green manure.

Crotalaria, which is not welcomed by cattle, is grown as green manure, aiming, at the same time, at the control of 'nematoda'.

In the ox-shed are chained 30 work oxen which are fed twice in daytime and once at night, the forage consisting of straw and Colo Pogonium (leguminous green fodder). The compost and dung which are produced here are applied to the experiment nursery, whose soil fertility is rather impoverished, at the rate of 5 t./ha.

Although no experiment of maize is conducted, they say that they are giving a guidance of the rotation of soya and maize crops.

4. Agriculture and Forestry Experiment Station of Kompong Cham.

(Châmka Kraach)

This experiment station is situated in the 'terre rouge' zone and is conducting the experiment of fruit-trees, coffee, Kapok and coconut palm trees; as for dry field crops the experiment of cotton, jute, castor-oil plant, peanut is being performed.

(1) Cotton:-

The greatest efforts are made on this item; comparison of varieties and the study of the control of insect damage are being conducted under the guidance of Mr. Ho-Ton-Lip.

(2) Maize:-

As we stated above, only the seed-raising which is entrusted by the

Bureau of Agriculture is being carried out. We could not find the pestillate ears, as they had already been forwarded to Phnom Penh.

III. Records of experiments on maize.

As we have vainly tried to collect the past records of experiments on maize for our reference from the proper authorities, we have summarized here those of Japanese and those of Americans belonging to I.V.S. (International Voluntary Service).

1. Records in relation to the reports on the preliminary work of construction of the Centre of Agricultural Technology.

- (1) Records of comparison test of maize varieties.

The following are the records of comparison test of varieties conducted by Prof. Sato of the Hyogo University at the Agricultural Experiment Station through the good offices of Mr. Tsukano, Japanese Embassy:-

Records of comparison test of maize varieties conducted at the Agricultural Experiment Station of Battambang.

No.	Name of variety or genealogy	Weight of pestillate ear (ratio to standard)			Remarks
		Weight of grains of an ear	Weight of core	Total	
1	Cambodian Yellow (Weight of hard grains)	g % 92 (100)	25	g % 117 (100)	Sown on May 5th (Standard)
2	No. 3 (Japanese specimen)	136 (148)	49	185 (158)	
3	No. 87 (")	147 (160)	76	223 (191)	
4	TC. No. 16 (")	122 (133)	33	155 (132)	
5	TC. No. 92 (")	128 (139)	37	165 (141)	
6	No. 209 (")	153 (166)	33	186 (159)	
7	No. 113 (")	16 (177)	42	205 (175)	
8	No. 2 (")	144 (157)	40	184 (157)	
9	TC. No. 36 (")	132 (143)	38	170 (145)	
10	Cambodian	145 (158)	31	176 (150)	Reference
11	White hard-grain variety	62 (67)	14	76 (65)	

* No. 11 was sown on August 25th at Tuol Samrong.

According to this summary, the variety of the first filial generation raised in the experiment farm of Kikyogahara, Nagano Prefecture, Japan, seems to be more prolific than the native one of Cambodia, but there is a possibility of further study concerning its ripening time, cultural method, etc.; especially as regards the place of culture the Mekong basin requires a variety which is as early-ripening as the native one, while in Battambang Province, the proposed site of new production of maize, a variety is expected whose ripening is as late as possible in order to be prolific. However, in the case of medium and late ripening varieties we must pay attention to the blight and insect damage.

(2) Demonstration of experimental effects of the three fertilizer elements on various dry field crops.

a) Purpose

The purpose of the experiment is to see the effects of the three fertilizer elements on various dry field crops cultured on the soil of Tuol Samrong.

b) Method of experiment: one lot of field: 3 x 3 m. repeated twice

Maize Seedtime: September 1st.

Date of growth survey: November 6th.

Space of culture: 1 x 0.2 m. (one plant)

Standard quantity of fertilizer applied: N20kg. - P20kg. -

K20kg. (per ha.) + (1 ton)

c) Growth quantity or yield

Classification of manuring	O-0-0	N-0-0	N-P-0	N-P-K
Height of maize plant m	39	39	118	136
" %	100	100	303	349
Average percentage of 10 crops	1000	134	242	309

Note:- The various crops consist of cotton, papaya, maize, castor-oil plant, turnip, mung bean, and jute.

d) When cultivating dry field crops in this soil their growth is very poor in the case of applying no manure or nitrogen only, which indicates the desirability of combined application of phosphatic fertilizer; potassium has more benefits than in the case of paddy rice.

As the specimen soil is of strong acidity, its neutralization by means of lime is considered effective on leguminous plants. In the case of graminaceous plants the soil was so sticky that troubles were liable to be caused unless the soil is mixed thoroughly with lime, which produced contrary effects on maize.

In the case of paddy rice the revelation of latent soil fertility can be expected with the reduction of the soil, but there is no such supply of nutrient in the case of dry field crops, which means that the crops cannot be expected to grow economically without manuring.

(3) Comparison test of fertility of representative soils.

a) Purpose

The purpose of this test consists in the comparison of the fertility of representative soils by means of the growth of crops.

b) Result of simple analysis of soil and growth of maize.

c) Results.

The results of the culture test of the soil fertility in connection with paddy rice and maize are arranged in the following order:-

Reclaimed land of Pailin > Battambang > Agricultural Experiment
Station of Pailin > Tuol Samrong > Siem Reap > Andoeuk Hép

The soil fertility of the reclaimed land of the 'terre rouge' is highest followed by that of Battambang where the content of available phosphoric acid is high because of the fertilizer applied in the past, while that of Siem Reap, where the soil is sandy, is low.

The poor growth of paddy rice in Andoeuk Hép is due to the excessive lime in the soil, while that of maize to the lack of phosphoric acid, which

Classification	Battam- bang	Tuol Samrong	Siem Reap	Andoeuk Hép	Agricultural Experiment Station of Pailin	Reclaimed land of Pailin
PH (Kce)	4.5	4.5	5.0	7.0	6.3	7.0
Available phosphoric acid P ₂ O ₅ mg/100g	10	0	0	0	0.5	1
Humus (%)	3	2.5	1.5	1.5	10	15
Lime %	0.15	0.1	0.05	0.3	0.2	0.2
Magnesia mg/100g	25	35	15	15	15	15
Manganese ppm	10	10	10	10	10	10
Potassium K ₂ O mg/100g	3	3	3	3	3	10
NH ₄ -N "	2	2	2	2	2	2
NO ₃ -N "	0.5	0.5	0.5	0.5	0.5	0.5
Soluble aluminum "	15	15	10	5	5	5
Phosphoric acid						
Absorption coefficient	1000	1000	400	400	600	400
Cambodian variety						
Maize Sept. 6th	cm 85	cm 60	cm 73	cm 71	cm 86	cm 102
Height of plant Sept. 19th (cm)	130	101	106	96	118	159
Oct. 6th	155	140	107	116	150	167
Percentage of Oct. 6th	111%	100%	77%	83%	107%	119%
Percentage of average	117	100	69	62	109	162

1963

Preliminary work of the construction of
the Centre of Agricultural Technology.

is a rare case in the 'terre noire' zone around Andoeuk Hép whose characteristic is its rich content of phosphoric acid.

(4) Comparison of fertility of soil on the Mekong bank.

a) Purpose.

As the soil of the inundated zone of the Mekong is famous for its high fertility,

a test of which, taking the soil gathered at Samrong Thom as the specimen, was conducted in comparison with those of Tuol Samrong and Battambang.

b) Method of test.

The method of this test was that of in which 1 gram each of the three fertilizer elements was applied to 15 kilograms of each kind of soil.

Variety: Maize of Cambodian native kind

Sowing : January 30th

Survey : February 26th

c) Result

Characteristic of soil and growth of maize

(height of plant: cm.)

(1963)

Place	FH (Kcl)	Available phosphoric acid	O	N	NP	NPK
Toul Samrong	4.3	0 ppm	29	-	-	55
Samrong Thom	6.3	50	46	69	87	80
Battambang Paddy fields	4.5	100	33	-	-	72
Battambang dry fields	6.3	200	43	-	-	93

Preliminary Work of Constructing the Centre of Agricultural Technology

d) Review.

The maize cultivated in the soil of Samrong Thom grew much better than in the paddy soil of Battambang which had been thoroughly fertilized; the degree of growth was equal to that in dry field soil of Battambang.

The reducing character of the paddy soil of Battambang may be unfavourable to the growth of maize which is a dry field crop. The growth in the Tuol Samrong soil which lacked in available phosphoric acid was poorest of the three; it was still poorer even in the case of applying N.P and K.

Generally speaking, the growth of crops cultivated without manure is proportional to the content of available phosphoric acid in the soil. However,

fertilizer per ha. at the mixing rate of
12N, 24P and 12K.

Check: nil.

d) Seedtime - harvest.

The seedtime is from May 1st - 15th, and the sowing is conducted preferably as early as possible. The crop is expected to ear on the 35th day and harvested in 87 - 90 days.

(3) Result.

The summary of the test result is tabulated as follows:- (the test in 'Chroui Dong' plot is said to have been disturbed by dogs.)

Yield, cost and income per ha. from test culture in Chroui Dong
district during wet season

Results from demonstration plots	Bentsy Dek	Chong Prek i'ol	Pomieo	Chroui Dang	Kok Tachor
Days to maturity	90 days	85 days	84 days	91 days	90 days
Fertilizer used (per ha.)	500kg	375kg	528kg	500kg	335kg
Fertilizer cost	2,000R	1,400R	2,112R	2,000R	1,340R
Insecticide cost	- R	90R	90R	90R	-R
Total cost	2,000R	1,490R	2,202R	2,090R	1,340R
Fertility yield					
(%)	210	162	141	137	-
kg/ha	2,120	2,120	2,685	1,840	2,814
kg/ha	1,010	1,310	1,900	1,340	-
Amount of increase kg/ha	1,110	800	785	500	-
Fertilized income (R)	6,995	6,990	8,860	6,072	9,286
Check income (R)	3,333	4,323	6,170	4,422	-
Income increase (R)	3,663	2,673	2,500	1,650	-
Total cost (R)	2,000	1,575	2,198	2,090	1,884
Profit due to fertilizer application	(50)	(25)	(6)	(-2)	(-)
	1,663	1,098	392	- 91	-

(4) Synthetic review.

As the result of this test has been satisfactory in outline, it is hoped that 400 - 500 farms will be the objects of next test. The synthetic review of the points is as follows:-

(a) Land preparation.

After the field has been ploughed at the time of its appropriate moisture content or when the soil is neither excessively humid nor arid, it is harrowed 2 - 3 times as early as possible; if it is harrowed a few days too late, the soil hardens.

(b) Fertilization.

Compound fertilizer of 12N-24P-12K which was applied in this test amounted to 500 kg./ha. However, if the soil is fertile in the inundated zone, 300 kg./ha. will be enough. Although the fertilizer was applied along the ridge, no damage was done to the seed-corn. Further study of fertilization including the question of side dressing is considered necessary.

(c) Variety.

As for the variety, separate comparison test was made according to the varieties: 'Cambodian Red Flint Corn' and 'Camsyn 60'. The test result of the latter was particularly poor. As the relation to the quantity of the fertilizer applied was neglected in this case, it will have to be studied in future. Prolific varieties of foreign countries, whose meteorological and soil conditions resemble those of Cambodia, should be introduced to this country.

(d) Green manure.

Application of 10 - 15 t./ha. of cow-dung is considered effective, while mung bean or cow pea as green manure is prospective; sesliana, which has water-resisting qualities, seems suitable to the flooding area.

(e) Weeding.

Cultivation combined with weeding is preferably conducted twice: once at the time when the plant height is 50 cm. and again when it is 100 cm.

(f) Spacing.

Although the spacing, in which the width of the ridge is 1m. and distance between the plants 16 - 17 cm. (6 plants per metre), involves various problems at the present moment, the adjustment may be best completed at the last cultivation.

(g) Spraying.

The suitable time of spraying Endrin is at the tasseling stage and 10 days after that; 1% solution of Endrin diluted at the rate of its 2 cc. per litre of water is sprayed. As for the granular Endrin, further study is considered necessary.

(h) Control of rat damage.

In view of the convenience of harvest rats are to be driven into a small area; the use of raticides should be also considered.

(i) Seed treatment. (Control of granary weevils)

Granary weevils are effectively controlled by means of spraying the seed-corns, before putting them in bags, with Marathon whose two spoonfuls are diluted in 10 litres of water; this will work for 3 months. The spraying of this medicine, whose 1/2 kilograms are diluted in 20 litres of water, over the bags containing the seeds is also effective.

(j) Moisture percentage at storage.

The seed-corn is to be stored when its moisture percentage is below 13 - 14; it must be dried for 3 - 4 days after shelling.

Notes:- This is the summary of Mr. M. Clish's report. Although he had left for Saigon due to Cambodia's refusal of U.S. aid, he happened to be on the spot to clear up the remaining business. His zeal for this study deserves respect; he does not mind putting up at cheap hotels and private houses.

When we asked Mr. Sum-Hou of the OROC whether the farmers would come to use fertilizer in case that its test proved a success, he replied that there were the prospects if the information came to their knowledge through demonstration farms.

IV. Situation of propagation and gathering of maize seeds.

As we stated above, the Maize Centre of the Bureau of Agriculture is conducting, parallel to the breeding test, the gathering of maize seeds by utilizing the nursery of the Prey Lip Experiment Station during the dry season and that of the Kompong Cham Experiment Station during the wet season. The seed-gathering has two purposes: one is for the self-crossing of the breeding genealogy and the other for the distribution of seeds to farmers. The latter seeds consist of 'Camsyn 60' and 'Hawaii', a sweet variety.

The Maize Centre commenced in December 1963 the seed gathering of maize on a large scale by reclaiming the Government-owned land (a midstream island of the Mekong within 3.5 hours' navigation by power-driven boat up the river from Phnom Penh) in Prek Chron and Roca Kong district. According to our survey, the story of selecting this district as the seed-gathering place is as follows:-

1. Story of selecting Prek Chron district as seed-gathering place.

(1) Although the Maize Centre had been long looking for a place of seed-gathering of maize, during the dry season, the lease of farmers' land, being liable to cause dispute, was difficult.

(2) This district, though belonging to the Government, had been neglected, as it used to be submerged during the wet season.

(3) The reclamation work, though commenced in the dry season of 1963, took a fairly long time as the clearing of the reeds and ploughing by tractor were necessary.

(4) The midstream island is a strip of land 1,700 m. long and 400 m. wide containing a farm land acreage of 53 ha., 43 ha. of which was cropped this year.

Judging from the above explanation the Maize Centre seems to be attaching considerable importance to the seed-gathering of maize.

2. Maize culture in the seed-gathering place.

(1) Seedtime: December 14th 1963 - January 2nd 1964 (In some parts the seedtime was still later, but details were unknown.)

(2) Spacing: Breadth of ridge 100 cm. x distance between plants 80 cm. and 4 grains are sown together to be made up into a unit group of 2 plants. (2,500 plants/ha.)

(3) Process of growth: Like the above-said midstream island of the Mekong which we investigated there is a wide range in the seedtime. The growth of the maize, from those 20 days after shooting to those in the earing stage, seemed generally good except those in the unfavourable sandy soil which had been drought-stricken.

(4) There is a great deal of insect pests mainly caused by cutworms which have not been satisfactorily controlled in spite of spraying Marathon and DDT during the period from sprouting to earing. This may be attributed to the fact that the field is in the first year stage of reclamation.

(5) Besides, a blight of spoiling roots (called 'Nematoda') which is of unknown etiology, damage by the attack of rats, etc. are often found, but the crops seemed well cared for.

3. Problems of seed-gathering.

It seems difficult for this country to set up and operate by subsidies such proto-germ and germ nurseries as found in Japan. We regard with respect the efforts made by the Bureau of Agriculture in making use of this midstream island as a farm under its direct management by means of two tractors, a disk harrow, a disk plough, etc.

However, there are some problems as to the technology of seed-gathering. In spite of the fact that the maize is an anemophilous and allogamous plant the rearing genealogy and the synthetic variety 'Camsyn 60' are cropped with a road between them; only the sweet variety is a little isolated (about 20 m.) across the reeds. Accordingly, the rearing genealogy and the synthetic variety are not isolated from each other due to the likeness of their characters, which, we doubt, will result in the same breeding as that by selection of ears

The advantages of selecting the midstream island are two: its isolation from the farmers' nurseries and the abundant moisture content of its soil which contributes to some extent to the widening of the range of seedtime even in the case of the dry season crop.

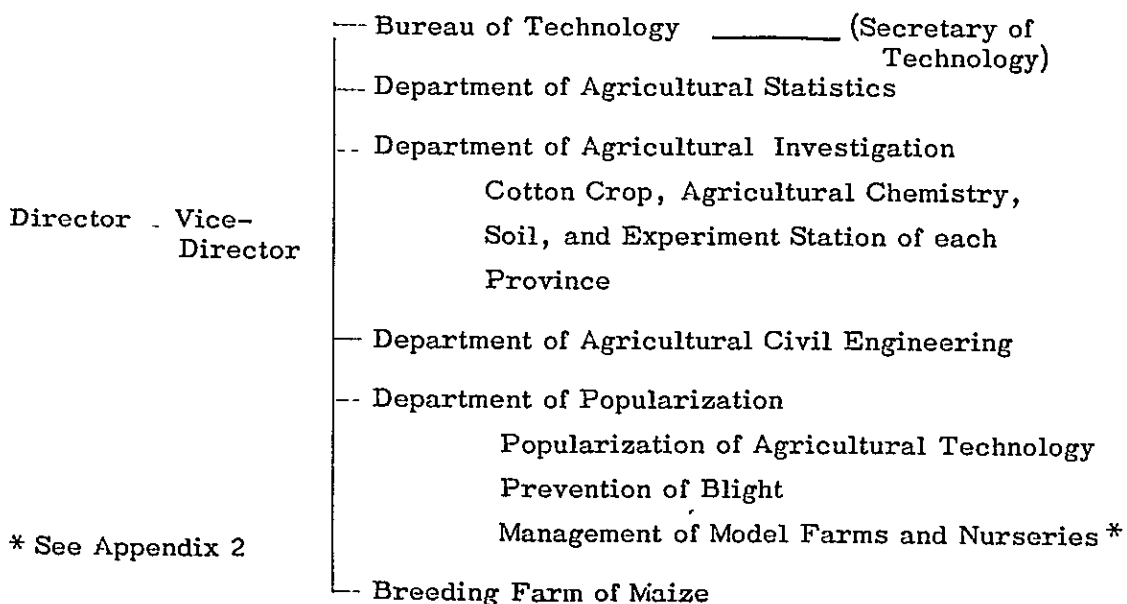
However, there still remain some questions which require a further study in future; the conditions of the farm fields on the midstream island are liable to change, while submerged during the wet season, according to the aspects of the deposited soil; the fertile soil which might have been deposited by the existence of the reeds could ever remain the same in spite of the reclamation work which have cleared them.

Furthermore, the outlook on the necessary increase of seed-raising places is not so bright when we consider the future popularization of superior varieties and renewal of seed-corns to meet the demand of the maize fields which will amount to 125,000 ha.

V. Organization to popularize agricultural technology.

1. Structure of the Bureau of Agriculture.

The popularization of agricultural technology is administered, as shown in the list below, by the Department of Popularization, Bureau of Agriculture.



The personnel of the Bureau of Agriculture, including the central and local offices, consists of 12 Ingénieurs, 62 Contrôleurs, 254 Agents and 14 Conducteurs (civil engineering).

In each Provincial Office is the Section of Agriculture, which is the outstation of the Bureau of Agriculture, in charge of the agricultural affairs of the Province.

2. Duties of the Department of Popularization .

Although the duties of the Department of Popularization are to promote the popularization of agricultural technology, there is not so much business to be done in this Central Office. The principal items are as follows:-

(1) Radio broadcasting: For 20 minutes once a week (from 20:00 every Wednesday) lectures on agricultural technology, reports on the activities of the Bureau of Agriculture, various news, etc. are broadcast.

(2) Making and distribution to each Province of printed matter such as pamphlets, posters, etc.

(3) Demonstration: Making of yearly plan of demonstration which is exhibited by the order of His Highness and State Ministers (Phnom Penh City). In each Province part of the permanent exhibition hall is utilized for the demonstration.

(4) Yearly 1 - 2 weeks' lectures, mainly on the fertilizer and variety of crops, are given to the graduates of the Agricultural School of Prek Leap.

(5) Publicity by means of motion picture.

(6) Investigation and decision on the application submitted by Provinces for the setup of model farms.

3. Duties of the Section of Agriculture, Provincial Office .

This section, as we stated above, is in charge of a wide scope of business as an outstation of the Central Office.

(1) Communication of the instructions and practice of the programmes of the Central Office.

(2) Submission of opinions regarding the popularization of agricultural technology.

(3) Application for the desirable setup of model farms, and, if approved, establishment and management of such model farms.

(4) Statistics and other agricultural administration in general.

4. Classification of public officials of Bureau of Agriculture.

The officials of the Bureau of Agriculture are variously classified as Ingénieur, Contrôleur, Agent, etc. This classification does not mean the type of their occupation, but, as stated below, a kind of difference in rank.

Yearly pay of each rank is divided into 10 - 11 classes. Each rank, being graded by school career, is independent of the other, which means that an official of a certain rank cannot be promoted to the upper one in spite of his ability, experience, etc. As the rank is given in accordance with the school career, promotion to the upper rank is decidedly subject to the grade of school education.

Ingénieur: Graduate of a foreign university.

Contrôleur: Graduate of a national agricultural, stock-breeding and forestry school. Starting salary at the time of graduation is monthly R 4,000, which is raised once in two years.

Agent: Graduate of the Agricultural School of Prek Leap. Starting salary is monthly R 2,000 with an allowance of R 1,000, totaling R 3,000. The rise in pay is the same as that of a Contrôleur, being once in two years.

Graduates of high schools and those officials who have had three years' experience as an Agent are eligible for the entrance examination of the national agricultural, forestry and stock breeding schools. Graduates of Junior high schools are eligible for the entrance examination of the Agricultural School of Prek Leap. The rate of the successful examinees in 1963 was 50/3,000.

Educational expenses (including expenses of boarding and lodging) are all borne by the Government, and the graduates are all appointed public officials. (refer to the paragraph 'Agricultural education')

Existing personnel of the Department of Popularization.

Department of Popularization, Central Office: 3 Contrôleurs and 8 Agents.

Section of Agriculture, Provincial Office: In many Provinces there are 1 - 2 Contrôleurs, but Kompong Cham Province alone has 3 Contrôleurs. The total number of Agents in all Provinces is 246 who are attached to their offices by the order of the Director of the Bureau and sometimes transferred to the other offices in a few years.

5. Agent.

As we stated above, the 'Agent' of Cambodia, different from the 'agent' of Japan, does not mean the kind of occupation but an official rank which resembles the former Japanese 'Assistant Engineer'. Accordingly, there is no such an agent in Cambodia as corresponding to the Japanese 'Improvement Agent' or 'Specialist Agent'. The Agent serves either in the Central or in the Provincial Office, and especially the Agent of the Provincial Office is in charge of the overall affairs of agriculture.

The number of the Contrôleur and Agent in service of the Section of Agriculture, Provincial Office has been stated above, and the greater part of the Agents are stationed in the 'Srok' of each Province at the rate of 1 - 2 Agents per Srok and sometimes an Agent per two Sroks.

6. Local administrative structure of Cambodia.

The local administrative structure is illustrated as follows:- Province - Srok (District) - Khum (Village) - Phum (Hamlet). In spite of the huge number of local bodies, which consist of 90 Sroks, 1,011 Khums and 10,787 Phums the number of Agents in service of the local offices below the Provincial Office is 246, and the number of those in service of the offices below the District

Office is naturally still less. In order to station an Agent in every Kum 1,000 more Agents will be necessary. This is a difficult matter in view of the situation of the agricultural schools and the national budget.

Although the Agents stationed in Sroks make the round, according to his assigned programme, of a fairly large number of villages by bicycle, motor-bike or boat, his chief object is to observe the crop and its growth in general and not to give technical guidance to farmers; the scope of the business assigned to him is so wide that he cannot afford to give direct guidance to the farmers. He is not doing the duty of the so-called agent in Japan; the Bureau of Agriculture does not require him of such duty, either.

Such attentive technological guidance to individual farmers as given in Japan by the Japanese agents is given by the Agents stationed in the Khums where model farms have been set up. There are 13 such Khums throughout the country. and a full-time Agent is attached to each Khum.

7. Model farm.

The model farm is an agricultural institution which specifies the whole area of a hamlet whose farmers are led to set up demonstration nurseries w which contain target lots (customary law) for the purpose of practicing the comparison of varieties, prevention of blight, use of fertilizer, etc.; the fertilization and management of crops are conducted under the guidance of an Agent, the effects of which are demonstrated to public inspection in order to be popularized and promoted. Such model farms have been established in the following 13 places.

- (1) Kompong Cham, Bung Nay
 - (1) Kg. Cham, Bung Nay
 - (2) Kg. Thom, Sautouk Krom
 - (3) Siemreap, Khmar
 - (4) Pursat, Bakau
 - (5) Kg. Chhnang, Avay Tong

- (6) Kandal, Ampesu Prey
- (7) Kg. Speu, Kork Rurulik
- (8) Kampot, Prey Noup
- (9) Takeo, Raray Viheapi
- (10) Stung Treng, Bachong
- (11) Kratie, Phoum Thom
- (12) Prey Veng, Choubak
- (13) Svay Rieng, Sawdack Oew Pratean

The Agents of model farms get in contact with and give their guidance to the farmers in the following manners:-

- (1) To give guidance regarding seedtime, etc. at night meetings.
- (2) To communicate the purports of various programmes formed by the Province.
- (3) Encouragement to crop superior varieties; arrangement for the use of agricultural means (fertilizer and machinery); programming and practice of demonstration. (in this case the seeds of the initial year are distributed free of charge).
- (4) Popularization and distribution of seeds of superior varieties are conducted through cooperatives aided by the OROC.
- (5) Submission of applications to the Central Office (Department of Popularization) for the encouragement by means of radio broadcasting, etc. of the farming technology, resulting from the practice in the model farm, which is considered worthy of popularization.

In case that farmers express their desire to set up model farms the Section of Agriculture of the Provincial Office, after having selected the suitable farmers and places, submit an application to the Bureau of Agriculture, which decides upon either approval or disapproval after investigation. Although there are now a number of farmers in a number of places who desire to set up model farms, it is difficult to establish as many model farms as desired in view of the number of Agents and national budget, etc.

A project is being formed to promote the agricultural education by means of establishing agricultural schools, in addition to the existing one of Prek Leap, in Battambang and Kompong Cham where the students will pay their own expenses of lodging and boarding so that the saved national expenses may be appropriated for increasing the number of students.

To sum up, Cambodia has neither a Government organ nor full-time officials for the popularization of agricultural technology; as a matter of fact, some of the officials who are in charge of the agricultural administration in general happen to take up a comparatively great amount of business somewhat related to the popularization and promotion of agricultural technology. For this reason it seems to take a considerable time and require great efforts for a new technology, etc. to be popularized among all farmers, making it difficult in a brief space of time to spread the use of new farming means as well as the latest technology over the country.

Appendix 1. A pamphlet, titled 'Maize' and published by the Bureau of Agriculture, is quoted here in full. (an example)

How to crop good maize (published in June 1962)

(1) If you hope for a high yield, advise well with the Bureau of Agriculture.

(2) If you hope for a high yield, select good fields; guidance will be given by the Bureau of Agriculture.

(3) Sow good seeds.

(4) Conduct sprout tests. Treat the seeds, one hundred grains in lots, with cloth or wet paper and repeat four times. Check the sprout on the 5th day of the treatment. It requires that more than 90% of the seeds sprout.

(5) Plough the field while the soil contains moisture. Plough the weeds and residual stems in.

(6) Harrow thoroughly.

(7) Make the width of the ridge 80 - 90 cm. and the distance of the plants 50 cm. Sow 3 - 5 seeds for a plant.

(8) When the plant is 80-90 cm. high, thin those plants whose growth is poor so that a unit group may consist of 2 - 3 plants. It is important not to damage other plants when thinning.

(9) Weed well while the plant is in the seedling stage.

(10) Fertilizer is necessary for a high yield in poor soil. Apply shallow fertilizer by boring a hole at every plant or apply it by digging the furrow.

(11) Spray DDT over the noxious insects which eat the leaves, Diyaldrin over those which creep into the cornstalks or eat the leaves and Cloredan over those larvae and imagines which cut the cornstalks.

(12) When the ripening stage comes, harvest quickly lest the plant should go rotten.

(13) Select the seed-corns from good ears. Seeds from bad ears will result in a poor crop. Apply chemical treatment to seeds before storing in order to prevent vermin damage. A high yield comes from good seeds. The Bureau of Agriculture has a stock of seeds of synthetic variety.

(14) Dry the harvested ears in the sun. Devise an appliance to cover them with a roof in case of rain.

(15) For prevention of insect damage and rot sprinkle the maize with Arasan before storing.

(16) Refer to the Bureau of Agriculture for other indistinct matters.

Appendix 2. Sites and acreage of the Agricultural Experiment Stations
and Nurseries belonging to the Bureau of Agriculture

Province	Agricultural Ex- periment Station	Acreage (ha.)	Nursery	Acreage (ha.)
(1) Battambang	Bék-Chan	14.37	Au-Sgnooth	3.500
	Tuol-Samrong	300.00	Pailin (E)	5.000
	Andoeuk-Hép	3.50		
	Veal-Trea	85.00		
(2) Kampot	Kép	4.00	Kép	12.00

Province	Agricultural Experiment Station	Acreage (ha.)	Nursery	Acreage (ha.)
	Bokor	26.00	Chakrey-Fing	4.00
	Tuk-Sep (E)	80.00	Kampot (E)	0.15
			Kampot (Field nursery)(E)	0.50
(3) Kandal	Takham (E)	1.67		
	Setbo (E)	2.00		
	Prék Tameak(E)	206.82		
(4) Kg-Cham	Chamcar-Krauch	273.00	Tuol-Sbau (E)	0.42
	Chup	10.00	Krauch-Chmar (E)	1.34
	Mémot (E)	30.00	Prék-Por	1.50
(5) Kg. Chhnang	Beng-Por (E)	3.48	Beng-Por (E)	2.89
(6) Kg. Speu				2.00
(7) Kg. Thom	Santuk (E)	5.00		
(8) Koh Kong	Lár Eth (E)	3.00		
(9) Kratie	Snuol (E)	6.00	Rocar Kandd (E)	1.7805
	O-Raing (E)	3.00	Chhlong (E)	0.8441
(10) Prey Veng	Takor (E)	1.00	Peam Chor (E)	1.35
			Prey Tung (E)	0.76
(11) Pursat	Dúp Bat (E)	35.00		
(12) Rattanakiri	O-Raing (E)	3.00	Ban Katieng	2.00
	Battanakiri	2.00		
(13) Simreap	Kauk Patry	15.00	Kg. Kdey	5.00
			Kauk Lahong	5.00
(14) Stung Treug			Sré Por (E)	2.50
			Chráp (E)	3.95
			O Trél	3.00
(15) Svay Rieng	Kauk Tráp	80.00	Svay Rieng (E)	1.00
			Prasauth (E)	1.00
(16) Takeo	Slakou (E)	8.972	Slakou	7.69

- | | |
|--------------------------------------|-------|
| (17) B. Vulgarisation Chamcar-Món(E) | 3.254 |
| (18) Ecole Prek Leap Prek Leap * | 43.00 |

Note: (E) indicates those under the jurisdiction of the Department of Popularization, Bureau of Agriculture, * those under that of the Ministry of Education and non-marked ones indicate that they belong to the Bureau of Investigation, Ministry of Agriculture.

VI. Agricultural Education.

For the purpose of getting a knowledge of the present situation of the agricultural education of Cambodia we have gathered some oral informations about the national schools of agriculture, stockbreeding and forestry.

- (1) Name of School: L'école National d'Agriculture, d'Élevage et de Sylviculture.
- (2) Director: Dr. Prom Tep Savang.
- (3) Course of study: 4 courses: Agriculture, Stockbreeding, Forestry and Fishery.
- (4) Term of study: three years.
- (5) Entrance requirements for the course: Cambodian nationals who have graduated from high schools or served as Agent more than three years.
- (6) Number limit of students: Fixed every year by the Bureau of Agriculture in accordance with the number of prospective graduates to be required by the Government and the sum of national budget appropriated.
- (7) Personnel: Regular personnel consists of 30 professors and lecturers. Especially many of those foreigners resident in Cambodia as specialists of Foreign Aid Works are asked to give special lectures as temporary lecturers. Officials of the Bureau of Agriculture often serve concurrently as professors.
- (8) Total number of students: Total number of students classified by

courses and grades is listed below:

	Agriculture course	Stockbreeding course	Forestry course	Fishery course	Total
First grade	36 ^{person}	18	14	7	75
Second grade	24	22	12	11	69
Third grade	14	24	10	5	53
Total	74	64	36	23	197

Remarks: 9 Laosians are included in the 75 students of the first grade; the total number of the students of 1 - 3 grades included 18 Laosians. Many of the students come from the provinces; they are the young people of men of rank related to Agriculture. A quarter of the students leaves school halfway to take up a new occupation.

(9) Education: Lessons are given in French. Education is based on the teaching of basic theories of agriculture as well as the cultivation of character. Subjects of study on popularization and investigation are taken charge of by the Bureau of Agriculture in order to bring up such specialists as required by the country. Yearly 50 units of study are taught in addition to practice, most of which are taken care of by the Bureau of Agriculture.

(10) School expenses: Free of charge; all expenses are borne by the Government.

(11) After graduation: All graduates are conferred with the title of 'Contrôleur' and become officials of the Bureau of Agriculture. In this case they are appointed to upper or lower posts according to their scholastic ranks.

Although the duty assigned to such graduates is determined in accordance with the structure of the Bureau of Agriculture, in the case of outstations in the provinces a Contrôleur all alone often has to concurrently take charge of the matters concerning administration, research and popularization, which makes it difficult for him to

devote all his energies to such specialized work as requiring an expert knowledge and experience.

While the graduates of the Agricultural School of Prek Leap (Ecole d'Agriculture de Prek Leap; term of study: two years; Director: Mr. Long Chhuong) are all Agents, the graduates of the schools above-said are appointed to posts above Agents.

- (12) Idea of Director: The Director hopes that this school will be raised to the status of university with 4 years' term of study which will confer the title of 'Ingénieur' to the graduates, constituting a perfect institution of embodying the three objects of education, popularization and research.
- (13) As the educational institution of agriculture we can only enumerate the above-said two schools: Ecole Nationale d'Agriculture, d'Elevage et de Sylviculture and Ecole d'Agriculture de Prek Leap. This makes it difficult to fill up the vacancy in the personnel necessary for the agricultural administration, experiment and research.

VI. Outline of maize production viewed in a statistical light.

To outline the maize production in Cambodia in view of the statistics during the past ten years the largest production of 180,000 t. was recorded in 1962 - '63, while the smallest one of 60,000 t. in 1958 - '59. Yearly production on the average has been about 120,000 t.

The place of maize production is concentrated on 4 of the 17 Provinces of the country; these four Provinces of Prey Veng, Kandal, Kompong Cham and Kratie are situated along the Mekong which flows through this country. (As for the produce classified by Provinces, refer to Table 24 - 26.) These Provinces, being situated in the Mekong basin, belong to the regularly inundated zone by the flood due to the rise of the Mekong during the yearly wet season. With the advent of the dry season the flood gradually subsides, leav-

ing behind it deposits of fertile drift soil, enabling as a result yearly two crops of maize, the dry season crop and the wet season one.

Thus, the places of maize production are limited to the Provinces along the Mekong bank. The situation of such principal places of production can be more clearly grasped by means of classifying the statistical data, which are compiled according to each Province, by the Mekong basin and other districts.

Tables 27 - 29 indicate such statistics as re-arranged by means of classifying as the 'Mekong basin' those 5 Provinces, consisting of the above-said 4 plus Stung Treng Province which is upstream, and the other Provinces as 'Districts other than Mekong basin'. According to these figures almost 98% of the Cambodian maize are produced in the Mekong basin; accordingly, what is meant by the Cambodian maize at the present moment is nothing but the one produced in the Mekong basin.

Next, let us see the ratio of the wet season crop to the dry season one, as maize is cropped twice a year. The former (middle of April - end of August) represents 70 - 80% of the total yearly produce, while the latter (middle of November - middle of March) only 20 - 30%. The former is called the large crop and the latter the minor crop; these terms may be attributed to the above-mentioned percentage, but, as for the yield per unit acreage of crop, the former is also well over the latter, the statistics indicating that the former is more or less than 1.5 t. on the average throughout the country and the latter about 1.2 t. on the same basis. Here the terms 'large crop' and 'minor crop' also hold good.

The maize cropped in this country is broadly divided into the red and the white varieties; the former constitutes the greatest majority, amounting to 80 - 90% of the total produce, although with some yearly difference.

During our field survey in the Provinces of Takeo, Battambang, etc. an oral information came to our ears that the white variety was either sold or consumed at home to be eaten 'on-the-cob' in both cases, which corresponded

with the story that the white variety was originally a food in this country.
Thus we consider that the greater part of this variety is appropriated for the
domestic use.

Table 24: Quantity of maize production classified by Provinces and varieties

(1960 - 1961)

	Red Maize		White maize		Total	
	Acreage of yield	Yield	Acreage of Yield	Yield	Acreage of yield	Yield
	ha	t	ha	t	ha	t
Battambang	-	-	-	-	-	-
Kampot	-	-	40	40	40	40
Kandal	23,100	32,340	1,200	1,400	24,300	33,780
	12,370	14,850	680	680	13,050	15,530
Kompong Cham	12,100	18,200	330	500	12,430	18,700
	3,500	5,250	50	80	3,550	5,330
Kompong Chhnang	-	-	660	860	660	860
	-	-	410	450	410	450
Kompong Speu	-	-	-	-	-	-
Kompong Thom	-	-	110	110	110	110
Kratie	6,200	8,680	1,100	1,430	7,300	10,110
	1,860	3,430	1,500	1,800	4,360	5,230
Prey Veng	11,000	15,400	1,100	1,320	12,100	16,720
	8,000	9,600	700	770	8,700	10,370
Pursat	-	-	450	450	450	450
Siem Reap	-	-	50	50	50	50
Stung Treng	-	-	-	-	-	-
Svay Rieng	-	-	20	20	20	20
Takeo	-	-	550	550	250	550
Total	52,400	74,620	5,610	6,770	58,010	81,390
	26,730	33,130	3,340	3,780	30,070	36,910
	79,130	107,750	8,950	10,550	88,080	118,300

Remarks: 1) Source material: Bureau of Agriculture.

2) In case a Province has two rows of figures the upper ones indicate the wet season crop and the lower ones the dry season crop. In case there is only one row of figures the Province produces the wet season crop only.

Table 25: Quantity of maize production classified by Provinces and varieties
(1961 - 1962)

	Red Maize			White maize			Total		
	Acreage of crop	Acreage of yield	Yield	Acreage of crop	Acreage of yield	Yield	Acreage of crop	Acreage of yield	Yield
	ha	ha	t	ha	ha	t	ha	ha	t
Battambang	-	-	-		100	120		100	120
Kampot	-	-	-		500	700		500	700
Kandal	32,306	25,591	38,374		2,320	3,016		27,911	41,390
		3,700	5,550		1,500	2,100		5,200	7,650
Kompong Cham	23,738	15,279	24,883		760	1,140		16,039	26,023
		3,000	4,800		350	525		3,350	5,325
Kompong Chhnang	125	125	163		910	1,183		1,035	1,346
		-	-		50	70		50	70
Kompong Speu	-	-	-		30	30		30	30
		-	-		15	15		15	15
Kompong Thom	-	-	-		300	330		300	330
		-	-		-	-		-	-
Kratie	8,441	8,081	9,565		1,000	1,430		9,081	10,995
		3,106	4,660		180	270		3,286	4,930
Prey Veng	25,810	17,113	26,000		9,230	11,080		26,343	37,080
		4,000	6,000		3,000	3,900		7,000	9,900
Pursat					450	450		450	450
Siem Reap					220	220		220	220
Stung Treng					94	94		94	94
Svay Rieng	5	5	5		10	10		15	15
Takeo					50	50		50	50
Total	90,425	66,194	98,990		15,974	19,853		82,168	118,843
	(13,806)	13,806	21,010		5,095	6,880		18,901	27,890
	104,231	80,000	120,000	24,229	21,069	26,733	128,480	101,069	146,733

Remarks: 1) Source material: Bureau of Agriculture.

2) In case a Province has two rows of figures the upper ones indicate the wet season crop and the lower ones the dry season crop. In case there is only one row of figures the Province produces the wet season crop only.

Table 26: Quantity of maize production classified by provinces and varieties
(1962 - 1963)

	Red maize			White maize			Total		
	Acreage of crop ⁸	Acreage of yield	Yield	Acreage of crop	Acreage of yield	Yield	Acreage of crop	Acreage of yield	Yield
	ha	ha	t	ha	ha	t	ha	ha	t
Battambang	-	-	-	-	-	-	-	-	-
Kampot	-	-	-	45	45	54	45	45	54
Kandal	25,814	25,200	38,798	2,230	2,230	2,899	28,044	27,430	41,697
	5,510	5,400	8,208	540	540	648	6,050	5,940	8,856
Kompong Cham	18,000	18,000	17,700	300	300	330	18,300	18,300	28,030
	2,800	2,800	4,170	300	300	360	3,100	3,100	4,530
Kompong Chhnang	300	300	420	1,606	1,606	2,007	1,906	1,906	2,427
	-	-	-	50	50	65	50	50	65
Kompong Speu	-	-	-	65	65	65	65	65	65
Kompong Thom	10	10	14	100	100	120	110	110	134
	-	-	-	4	4	4	4	4	4
Kratie	7,063	7,000	10,600	1,843	1,843	2,395	8,906	8,843	12,996
	4,340	4,300	6,473	280	280	336	4,620	4,580	6,809
Prey Veng	25,000	25,000	37,750	12,000	12,000	15,500	37,000	37,000	53,350
	10,800	10,800	15,860	5,200	5,200	6,240	16,000	16,000	22,100
Pursat	-	-	-	460	460	552	460	460	552
Siem Reap	-	-	-	5	5	6	5	5	6
	-	-	-	2	2	2	2	2	2
Stung Treng	-	-	-	7	7	8	7	7	8
Svay Rieng	-	-	-	20	20	24	20	20	24
Takeo	5	5	7	315	315	378	320	320	385
	-	-	-	11	11	13	11	11	13
Total	76,192	75,515	115,289	18,996	18,996	24,438	95,188	94,511	139,727
	23,450	23,300	34,711	6,387	6,387	7,668	29,837	29,687	42,379
	99,642	98,815	150,000	25,383	25,383	32,106	125,025	124,198	182,105

Remarks: 1) Source material: Bureau of Agriculture.

2) In case a Province has two rows of figures the upper ones indicate the wet season crop and the lower ones the dry season crop. In case there is only one row of figures the Province produces the wet season crop only.

Table 27: Maize produce classified by wet season, dry season, districts and varieties (1960 - 1961)

	Mekong basin				Districts other than Mekong basin				Total				Percentage of variety (Yield)
	Acreage of crop	Acreage of yield	Yield	Yield per ha.	Acreage of crop	Acreage of yield	Yield	Yield per ha.	Acreage of crop	Acreage of yield	Yield	Yield per ha.	
	ha	t	kg	kg	ha	t	kg	kg	ha	t	t	kg	%
Wet season	Red	52,400	74,620	1,424	-	-	-	-	52,400	76,620	1,424	1,424	91.7
	White	3,730	4,690	1,527	1,880	1,106	1,106	1,106	6,610	6,770	1,207	1,207	8.3
	Total	56,130	79,310	1,413	1,880	2,080	1,106	1,106	58,010	81,390	1,403	1,403	100
	Percentage of season	65.4%	68.5%		82.1%	82.2%			65.9%	68.8%			
Dry season	Red	26,730	33,130	1,239	-	-	-	-	26,730	33,130	1,239	1,239	89.8
	White	2,930	3,330	1,137	410	450	1,098	1,098	3,340	3,780	1,167	1,167	10.2
	Total	29,660	36,460	1,229	410	450	1,098	1,098	30,070	36,910	1,227	1,227	100
	Percentage of season	34.6%	31.5%		17.9%	17.8%			34.1%	31.2%			
Total	Red	79,130	107,750	1,362	-	-	-	-	79,130	107,750	1,362	1,362	91.1
	White	6,660	8,020	1,204	2,290	2,530	1,105	1,105	8,950	10,550	1,179	1,179	8.9
	Total	86,790	115,770	1,349	2,290	2,530	1,105	1,105	88,080	118,300	1,343	1,343	100
	Percentage of season	100%	100%		100%	100%			100%	100%			
Percentage of district		97.4%	97.9%	2.6%	2.1%			100%	100%				

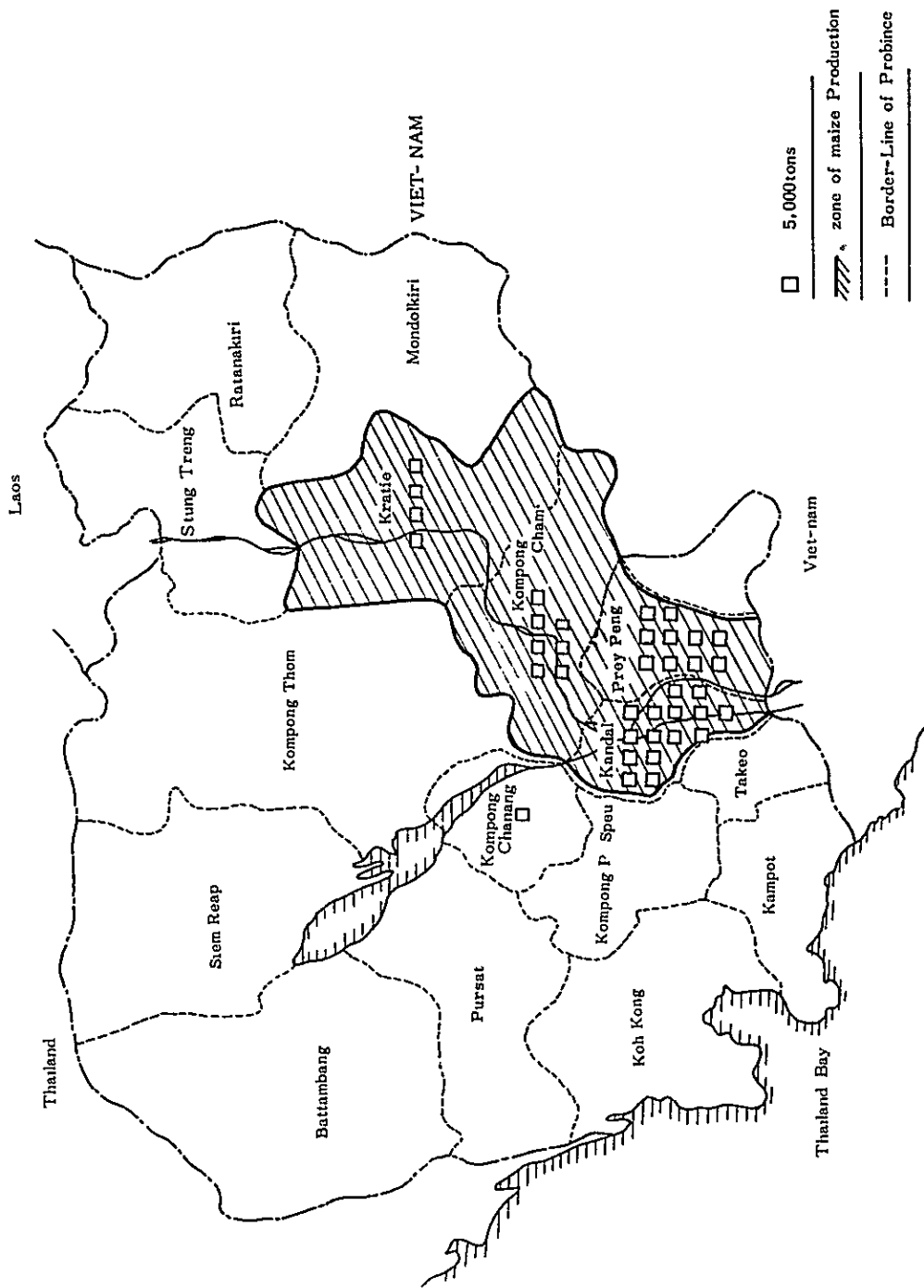
Table 28: Maize produce classified by wet season, dry season, districts and varieties (1961 - 1962)

	Mekong basin						Districts other than Mekong basin						Total				Percentage of variety (Yield)		
	Acreage of crop		Yield		Yield per ha.		Acreage of crop		Yield		Yield per ha.		Acreage of yield		Yield			Yield per ha.	
	ha	kg	t	kg	ha	kg	ha	kg	t	kg	ha	kg	ha	kg	t	kg		ha	kg
Wet season	Red	90,295	1,496	98,822	1,496	130	130	130	168	1,292	66,194	98,990	1,495	83.3					
	White	-	1,251	16,760	1,251	2,570	3,093	1,204	15,974	1,243	16.7								
	Total	79,468	1,454	115,582	1,454	2,700	3,261	1,208	82,168	118,843	1,446	100							
	Percentage of season	90.8%	80.6%	97.6%	97.5%	81.3%	81.0%												
Dry season	Red	13,806	1,522	21,010	1,522	-	-	-	-	13,806	21,000	1,522	75.3						
	White	5,030	1,351	6,795	1,351	65	85	1,308	5,095	6,880	1,351	24.7							
	Total	18,836	1,476	27,805	1,476	65	85	1,308	18,901	27,890	1,476	100							
	Percentage of season	9.2%	18.4%	2.4%	2.5%	18.7%	19.0%												
Total	Red	104,101	1,500	119,832	1,500	130	168	1,292	104,231	120,000	1,500	81.8							
	White	18,434	1,278	12,555	1,278	2,635	3,178	1,206	24,229	26,733	1,269	18.2							
	Total	98,304	1,459	143,387	1,459	2,765	3,346	1,210	128,460	146,733	1,452	100							
	Percentage of season	100%	100%	100%	100%	2.7%	2.3%	100%	100%										
Percentage of district	97.3%	97.7%	2.7%	2.3%	100%	100%													

Table 29: Maize produce classified by season, dry season, districts and varieties (1962 - 1963)

	Mekong basin										Districts other than Mekong basin					Total			Percentage of variety (Yield)
	Acreage of crop					Yield per ha.					Acreage of crop		Yield per ha.		Acreage of yield	Yield	Yield per ha.		
	ha	ha	t	kg	kg	ha	ha	t	kg	kg	ha	ha	t	kg					
Wet season	Red	75,877	75,200	114,848	1,527	315	315	441	1,400	76,192	75,515	115,289	1,527	82.5					
	White	16,380	16,380	21,232	1,296	2,616	3,206	1,226	18,996	18,996	24,438	1,286	17.5						
	Total	92,257	91,580	136,080	1,486	2,931	3,647	1,244	95,188	94,511	139,727	1,478	100						
	Percentage of season	75.6%	75.6%	76.3%		97.8%	97.8%	97.7%		76.1%	76.1%	76.7%							
Dry season	Red	23,450	23,300	34,711	1,490	-	-	-	-	23,450	23,300	34,711	1,490	81.9					
	White	6,320	6,327	7,584	1,199	67	67	84	1,254	6,387	6,387	7,668	1,200	18.1					
	Total	29,770	29,627	42,295	1,428	67	67	84	1,254	29,837	29,687	42,379	1,428	100					
	Percentage of season	24.4%	24.4%	23.7%		2.2%	2.2%	97.7%		23.9%	23.9%	23.3%							
Total	Red	99,327	98,500	149,559	1,518	315	315	441	1,400	99,642	98,815	150,000	1,518	82.4					
	White	22,700	22,707	28,816	1,269	2,683	3,290	1,226	1,226	25,383	25,383	32,106	1,265	17.6					
	Total	122,027	121,207	178,375	1,472	2,998	3,731	1,244	1,244	125,025	124,198	182,106	1,466	100					
	Percentage of season	100%	100%	100%		100%	100%	100%		100%	100%	100%							
Percentage of district	97.6%	98.4%	98.0%		2.4%	1.6%	2.0%		100%	100%	100%								

Fig. 9: Produce of maize classified by Provinces (1962 - 1963)



VIII. Correlation between maize produce and increase in its exports.

It is useless to try to increase the maize produce as farm products of export unless the increased portion can be an addition to its exports. There are of course a number of factors which concern the increase in its exports such as the increase in the acreage of maize crop (the increase in the acreage of maize crop as mentioned here involves all of the following cases:- the increase in the percentage of maize fields in the total farm land under cultivation; the introduction of maize crop to the fields where it has not yet been grown; the reclamation of land to open maize fields), improvement on farming technology, consolidation of maize collecting structure, convenience of foreign exchange, replenishment of cargo-working equipments and harbour facilities, etc.

Apart from such problems, here we will anticipate the increased production of maize in future and, further, the prospective effects of the various measures to increase its export by means of grasping the past situation and also the tendency of the statistical value obtained from the analysis of the statistical source material of this country.

Analysis of produce and exports of maize.

The annual statistics of the produce and exports of maize during the last ten years are shown in Table 30. On the basis of these data the production curve by linear equation obtained by means of the method of the least squares shows a tendency vale:

$$Y = 117 + (7.28x) \quad x_0 = 1958 - '59$$

which is a straight line drawn upward from left to right. This means, in short, that the annual increase on the average during the latest 9 years (the figures for 1963 - '64 have been excluded from calculation due to the lack of the final value.) is about 7,000 tons. We can draw a simple conclusion from the above fact that an increase of this extent will continue under similar conditions (all conditions centering around maize) to those in the past.

Next, turning to the exports (here we take up the total export amount whose classification by destinations is disregarded.), we find that it has been,

like the produce, on the increase every year. The tendency value by linear equation, as in the case of the produce, is

$$Y = 108.4 + (7.0x) \quad x_0 = 1958 - '59$$

which is a straight line drawn upward from left to right when illustrated in graph. That means, an yearly increase in export on the average is about 7,000 tons and proportionate to the increase in produce. In spite of the same tendency, appearing in the upward curve from left to right, shown both by the produce and exports, their correlation coefficient is $r \doteq 0.224$ which indicates not much correlation between them. This may be attributed to the time lag probably caused by the neglected calculation of the stock at the beginning and end of the so-called business term intervening between production and export; it may be also due to the difference of precision between the production statistics and export ones. For instance, in the two years of 1958 - '59 and 1960 - '61 the exports were well over the produce. If we calculate, excepting these two years which are full of such contradictions, the correlation coefficient is $r \doteq 0.67$, which shows a considerably close relation between them.

Now, if we find the correlation, excepting these two years, between the produce and exports by a tendency expression, we get

$$Y = 44.91 + (0.437x), \text{ where}$$

$$Y = \text{exports, } x = \text{produce, and unit} = 1,000 \text{ tons,}$$

which indicates that the exports increased by 44% of the increase in the produce.

To summarize the above relation, it is indicated that during the past nine years there has been a fairly close correlation between the produce and exports which has resulted in the export of nearly half the increased portion of the produce. Therefore, if we assume that such tendency continues in future and applies also to that maize whose increased production is to be positively promoted, we may conclude that the export will be increased also in future by the efforts to increase the produce.

However, the increased exports we mention here has no direct relation to the increased exports to Japan. This is a matter of course, as this statistical analysis has been made from a macroscopic viewpoint, both in export and production. Whether the exports to Japan out of the increased portion will increase or not is mainly a price problem - whether the check price of export can be fixed on the same level as the international price or not - which will have to be solved as a problem of international trade including the foreign exchange system.

Table 30. Produce and exports of maize

Year	Production	Export	Domestic consumption
1954 - '55	110,000 ^t	97,000 ^t	13,000 ^t
1955 - '56	120,000	66,000	54,000
1956 - '57	100,000	88,000	12,000
1957 - '58	90,000	99,000	0
1958 - '59	63,950	117,000	0
1959 - '60	122,200	107,000	15,200
1960 - '61	118,300	164,000	0
1961 - '62	146,733	104,000	42,733
1962 - '63	182,186	134,440	47,746
1963 - '64	60,000	80,237	

Notes:- 1) Source material of December 29th 1963 (Division de Statistique Agricole)

2) Figures of 1963 - '64 do not show the final value (totalled as of September 30th 1963)

3) Tendency value

Tendency value of produce $y = 117 + (7.28x)$ $x_0 = 1958 - '59$

Tendency value of exports $y = 108 + (7.0x)$

Table 31: Annual transition of produce and exports

Transition of production
 Transition of export
 Tendency curve of production
 Tendency curve of export

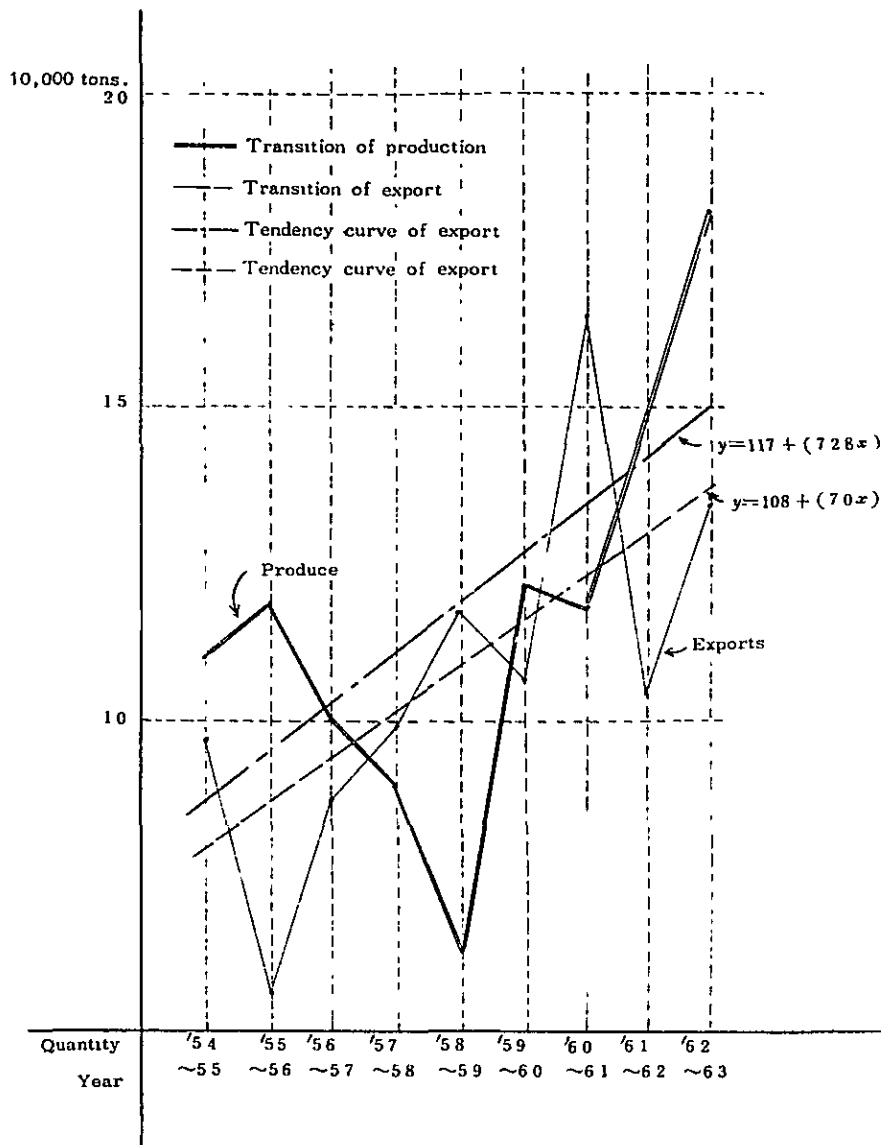
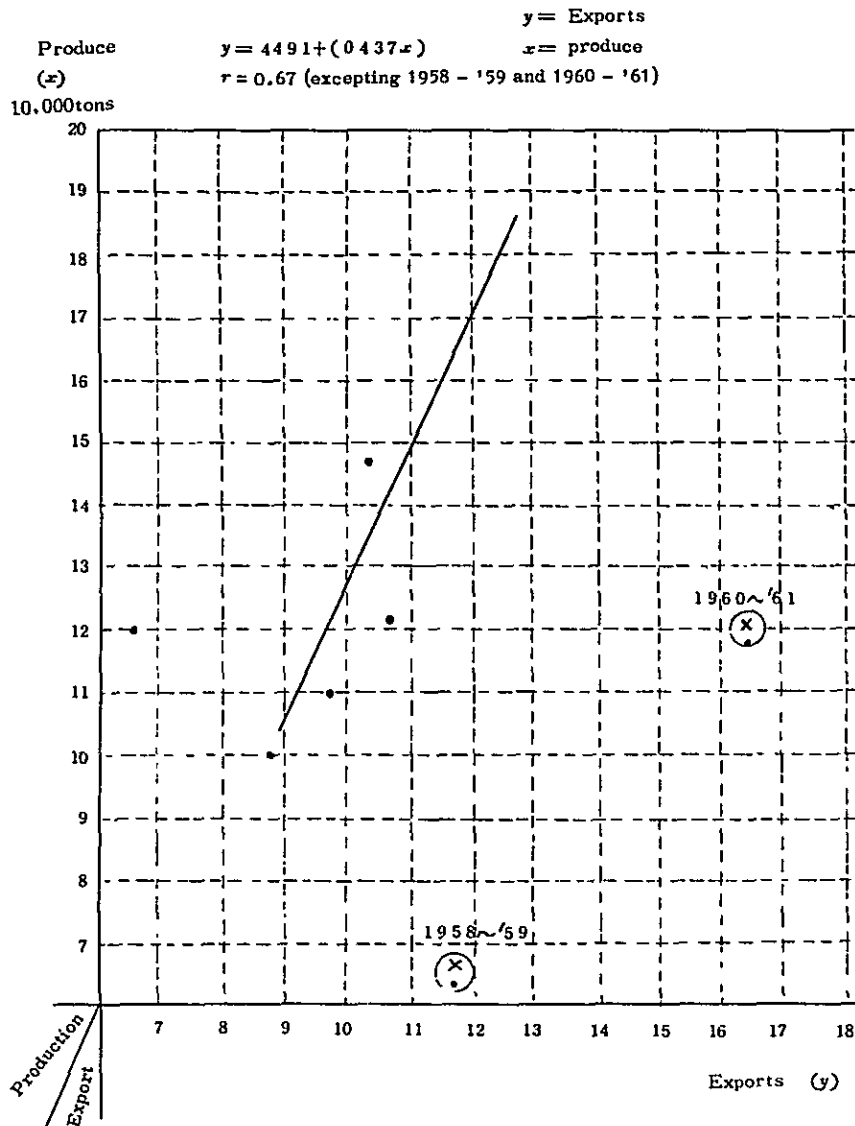


Table 32: Correlation between produce and exports]

(1 9 5 4 ~ 5 5) ~ (1 9 6 2 ~ 6 3)



IX Domestic consumption of maize as feed stuff

As we stated above, the Cambodian maize has two varieties: red (rouge) and white (blanc); the latter is not much in quantity and consumed mainly as food.

The domestic consumption quantity, which may be naturally considered the difference between the produce and exports, seems to contain, besides that of food, also some feed of domestic animals.

In practice, however, it is an extremely difficult problem to clearly distinguish the respective quantity of the domestic consumption as food and as feed. That is the reason why we are going to see what relation the total domestic consumption (presumed quantity) has to the stockbreeding of this country. Incidentally we find it necessary to mention why we are going to analyse a question of this kind. The importance of and demand for maize in Japan is on the steady increase as the importance of 'energy' has been duly recognized in view of the latest theory of dietetics. This can be seen from the fact that the maize represents about 25% of the concentrated feed, amounting to 1,070 tons, which is consumed as feed for domestic animals.

The number of the domestic animals which consume the above-mentioned quantity of maize amounts to 6,500,000, calculated in terms of large-sized domestic animals, the annual consumption per unit domestic animal being 400 kg. (according to the programme of demand and supply of feed stuff for fiscal 1963)

Cambodia is raising domestic animals which, consisting mainly of oxen, buffaloes and swine, amounts to 1,960,000 in total number calculated in terms of large animals. This necessitates, we consider, to clarify, also in the light of the stockbreeding of this country, the question whether the increased produce of maize can add to its exports or not.

As is clearly shown in the Table, the direct object of the Cambodian stockbreeding naturally lying in the production of livestock products (cow's milk, eggs, meat, etc.), the so-called animals raised for food are only swine and hens, while oxen and buffaloes are raised for work; as for milch cows,

they are rarely raised. Such animals raised for food represent less than 9% of all domestic animals. (In the case of Japan the record as of February 1st 1962 amounts to 49%).

Domestic animals which consume concentrated feed are hens, swine, milch cows, etc., which are raised for food, while work oxen and work buffaloes, which are originally graminivorous, do not require much concentrated feed.

As a result of our field survey we came to know that oxen and buffaloes were in most cases fed with wild plants, straw, stubbles of paddy (The Cambodian way of mowing is to cut the plants at a height of 20 - 30 cm. above the ground.), etc.; in the maize zone of the Mekong basin maize was mown before its earing for the purpose of making green fodder and thinning as well. In any case maize seeds do not seem to be consumed as feed. Our survey also made it clear that the swine were fed with rice bran, leaves and stems of banana, rice, etc. In the livestock breeding farm of Phnom Penh concentrated feed mixed with maize is being given. This is to be regarded as a special case, and we may consider that the general level of feed is not so high as that.

Here we have made a trial figuring as to the extent of the correlation between the variation in number of the domestic animals and the consumption of maize.

As we have naturally nothing but the statistics of this country to rely on as the source material, we assumed domestic consumption = produce - exports. As regards the years when the exports were over the produce, we considered the domestic consumption nil for the convenience of calculation. As to the number of the domestic animals, by means of assuming (ox + swine + hen) = total, we found the total number calculated in terms of large animals.

Note:- A unit calculated in terms of large animals is represented by an ox, a buffalo, 5 swine or 100 hens.

The correlation coefficient is so low, being $r = 0.245$, that not much

significance was found between them.

Although it is dangerous to draw a hasty conclusion from the above, at least we may consider that the development of the present stockbreeding of this country is not so closely related to the maize exports; that means, the stockbreeding cannot decrease the exports in view of the low value of the correlation coefficient above-mentioned,

Table 33: Example of concentrated feed of Livestock Breeding Farm of Phnom Penh.

Variety	Pregnant sow Sow with suckling Young pig under 40kg. in weight	Sow Swine over 40kg. in weight	Chicken	Egg-laying hen	Ox
Rice bran	4	4	4	4	4
Maize (red)	3	4	3	3	4
Broken rice	0.5	1	0.5	1	
Broken peanut	1	0.5	1	1	2
Fish meal	1.5	0.5	1.5	1	
Total	10	10	10	10	10
Additional substances to the above					
Molasses	1	1	-	-	
	2	2	3	5	
Salt	0.5	0.5	-	-	
Quantity fed (daily per head)	Daily 4kg. per adult swine		40g., 70g. or 100 g. Daily according to growth rate 5 - 6 kg.		

Table 34: Correlation between number of domestic animals and Quantity of domestic consumption of maize.

Year	Quantity of domestic consumption of maize (presumed)	Number of domestic animals				
		Cow	Buffalo	Swine	Poultry	Total
1954	1,000t. 13	Unit:1,000 894	1,000 294	1,000 382	Unit:1,000 1,760	1,000 unit 1,282
55	54	922	297	387	1,624	1,295
56	12	978	321	438	1,831	1,386
57	0	1,023	329	360	3,733	1,424
58	0	1,023	336	398	-	1,460
59	15	1,156	390	519	2,097	1,650
60	0	1,247	446	616	2,159	1,816
61	43	1,240	435	671	2,803	1,838
62	48	1,322	471	689	2,927	1,960

Notes: (1) Due to absence of statistics of then the number of poultry for 1958 those of 1959 have been utilized.

(2) Source of the number of domestic animals: Service Vétérinaire

X Production cost of staple farm products.

1. As we have been furnished by the Department of Agricultural Statistics, Bureau of Agriculture, Ministry of Agriculture with the source material of the production cost of paddy rice, maize, mung bean, soya, etc., we introduce them for your information.

2. We have also made a comparison of the production costs by means of analysing the above-mentioned source material.

3. We have to take it into consideration that the calculation of the production cost is widely different from that of Japan as it is based on the conventional farming, processing and storage of products which are quite common in the country.

Table 35: Production cost of unhulled rice

(per ha.)

Classification	Number of quantity	Unit price	Amount
The first ploughing	7 days	Riel 50	Riel 350
The second "	5 "	50	250
The first harrowing	4 "	50	200
The second "	3	50	150
Seed	80kg	3.50kg	280
Sowing	1 person	25 Riel	25
Weeding	4 days	50	200
Maintenance of ridge and furrow	5 persons	25	125
Reaping	1 lai (6 lais=1hg.)	90	540
Threshing	4 person	25	100
Arrangement	3 "	25	75
Forwarding to warehouse	3 "	25	75
Land tax			1 ha. 60
Management of warehouse			150
Total			2,655
Yield per ha.			1,200kg
Production cost per ton			2,210R

Table 36: Production cost of red maize.

(per ha.)

Classification	Number of quantity	Unit price	Amount
The first ploughing	7 days	50 Riel	350 Riel
The second "	5 "	50	250
The first harrowing	4 "	50	200
The second "	3 "	50	150
Seed	30kg	4kg	120
Sowing	8 persons	25	100
Weeding and clod breaking	12 "	25	300
Cost of harvest	10 "	25	250

Classification	Number of Quantity	Unit price	Amount
Loading and transport	5	one ox-cartful 50	250
Husking	5 persons	25	125
Shelling	100kg	5 1.5t.	75
Drying and storage	6 persons	25	150
Depreciation of drying equipment			60
Land tax			60
Total			2,540
Yield per ha.			1,500 kg
Production cost per ton			1,600 R

Table 37: Production cost of mung bean

Classification	Number of Quantity	Unit price	Amount
The first ploughing	7 days	50 Riel	350 Riel
The second "	5 days	50	250
The first harrowing	4 "	50	200
The second "	3 "	50	150
Seed	40kg	kg 8	320
Sowing	8 persons	25	200
Weeding and cultivation	12 persons	25	300
Cost of Agricultural medicine			225
Cost of blight control	8 persons	25	200
Harvest & forwarding	16 "	25	400
Drying & Arrangement	8 "	25	200
Depreciation			
Sprayer			400
Drying equipment			150
Land tax			60
Total			3,405
Yield per ha.			600 kg
Production cost per ton			5,670 R

Table 38: Production cost of soya

Classification	Number of Quantity	Unit price	Amount
The first ploughing	7 days	50 Riel	350 Riel
The second "	5 days	50	250
The first harrowing	4 "	50	200
The second "	3 "	50	150

Classification	Number of Quantity	Unit price	Amount
Seed	40kg	kg, 10	400 Riel
Sowing	8 persons	25	200
Weeding and cultivation	12 "	25	300
Cost of Agricultural medicine			225
Cost of blight control	8 "	25	200
Harvest & forwarding	20 "	25	500
Drying & Arrangement	10 "	25	250
Dopreciation			
Sprayer			400
Drying equipment			150
Land tax			60
Total			3,635
Yield per ha.			600 kg
Production cost per ton			5,590 R

Table 39: Production cost of sesame

Classification	Number of Quantity	Unit price	Amount
The first ploughing	7 days	50 Riel	350 Riel
The second "	5 "	50	250
The first harrowing	4 "	50	200
The second "	3 "	50	150
Seed	20 kg	12	240
Sowing	6 persons	25	150
Weeding & grading of earth	15 "	25	375
Mowing cost of sesame plant	12 "	25	300
Carriage of sesame plant	5 ox-carts	50	250
Drying	4 persons	25	100
Threshing	20 "	25	500
Arrangement	4 "	25	100
Depreciation of drying equipment			150
Land tax			100
Total			3,215
Yield per ha.			600 kg
Production cost per ton.			5,360 R

Table 40: Production Cost of Jute

(per ha.)

Classification	Number of Quantity	Unit price	Amount
The first ploughing	7 days	50 Riel	350 Riel
The second "	5 "	50	250
The first harrowing	4 "	50	200
The second "	3 "	50	150
Seed	11 kg	kg 10	110
Sowing	6 persons	25	150
The first weeding	12 "	25	300
Thinning	12 "	25	300
The second weeding	12 "	25	300
Mowing of plant	20 "	25	500
Preparation of soaking	10 "	25	250
Forwarding of stems	6 ox-cart	25	300
Cost of soaking	20 persons	25	500
Cost of peeling	100 "	25	2,500
Drying	10 "	25	250
Arrangement	6 "	25	150
Land tax			60
Total			6,620
Yield per ha.			1,200 kg.
Production cost per ton.			5,510 R

Table 41: Comparison of production cost per ha. classified by crops.

(Unit: Riel)

Classification	Paddy rice	Maize (red)	Mung bean	Soya	Sesame	Jute
Cost of man-power and work cattle	2,165	2,300	2,250	2,400	2,725	6,450
Cost of seed	280	120	320	400	240	110
Cost of fertilizer	-	-	-	-	-	-
Cost of Agricultural medicine	-	-	225	225	-	-
Cost of material	-	-	-	-	-	-
Depreciation	150	60	550	550	150	-
Land tax	60	60	60	60	100	60
Total	2,655	2,540	3,405	3,635	3,215	6,620

Note: Department of Agricultural Statistics, Bureau of Agriculture, Ministry of Agriculture.

Table 42: Comparison of production cost with producer's selling price

per ton

Unit: Riel

Classification	Production cost (A)	Producer's selling price (B)	Difference (B-A)	Comparison B/A
Unhulled rice	2,210	White 3,013	803	136.3 %
		Red 2,938	728	132.9
Maize (red)	1,690	2,256	566	133.4
Mung bean	5,670	10,443	4,773	184.1
Soya	5,590	9,518	3,928	170.2
Sesame	5,360	13,703	8,343	255.6
Jute	5,510	12,370	6,860	224.5

Note:- 1) Source material of production cost is based on the cost accounting 1964 of the Department of Agricultural Statistics, Bureau of Agriculture, Ministry of Agriculture.

2) Source material of the producer's selling price is the same as above. (however, the figures quoted pertain to the average price of the whole country.)

3) The producer's price of mung bean is the quotation of that of 'haricot vert' and the producer's selling price has been quoted from the column of haricot.

... Table 43: List of monthly price of farm produce in 1962 (Producer's price)

Source: Department of Agricultural Statistics, Bureau of Agriculture

Unit: Riel

No.	Kinds of products	Various conditions	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Mean
1	Unhulled rice(white hull)	100kg	278	307	299	293	303	308	336	347	331	303	273	238	3,616	301.33
2	Unhulled rice (red hull)	"	267	333	318	298	306	307	317	310	258	270	284	228	3,526	293.83
3	Polished rice (1st grade)	"	516	559	515	532	538	546	584	585	577	567	523	475	6,517	543.08
4	Polished rice (2nd grade)	"	481	522	489	507	512	510	556	554	546	535	492	427	6,131	510.91
5	Broken rice	"	292	320	315	312	330	290	338	346	332	324	279	262	3,740	311.66
6	Sond de riz	"	157	180	172	171	252	169	165	166	157	165	137	126	2,017	168.08
7	Maize (white)	"	347	348	470	490	300	386	375	433	398	425	370	450	4,792	399.33
8	Maize (red)	"	220	248	205	249	221	245	208	192	194	220	256	249	2,707	225.58
9	Cotton seed	"	-	662	565	675	575	575	555	575	575	831	738	728	7,064	588.66
10	Raw cotton	"	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Garlic	"	2,366	2,653	3,530	3,585	3,185	3,110	3,328	3,112	3,026	2,952	3,130	3,049	37,026	3,085.50
12	Anacarde	"	2,750	1,050	400	1,000	1,500	1,500	1,500	1,500	-	-	-	2,000	13,200	1,466.66
13	Pine-apple	Lofruit	17	11	13	11	1	11	11	13	14	15	14	18	159	13.25
14	Peanut	100kg	877	946	923	933	1,069	1,226	1,173	1,184	1,208	1,070	1,060	1,182	12,851	1,070.81
15	Meix daree	"	3,125	3,961	3,889	3,387	3,803	3,852	3,103	3,456	2,800	3,313	2,536	2,492	39,717	3,309.75
16	Banann (small fruit)	100 Mains	1,005	885	905	1,387	903	922	903	794	968	1,023	973	973	11,641	970.08
17	Banana (large fruit)	"	1,376	1,143	1,133	1,224	1,065	1,105	1,097	1,056	1,157	1,145	1,232	1,244	13,977	1,164.75
18	Coffee bean (green)	100kg	4,600	4,920	4,650	2,600	2,950	3,675	2,800	2,800	2,800	2,600	3,050	3,050	40,495	3,374.58
19	Coffee (flour)	"	8,150	8,311	9,212	8,028	8,457	8,528	7,316	8,029	8,171	7,000	7,614	8,043	96,859	8,071.58
20	Sugar cane	"	295	530	487	671	1,133	175	425	323	156	368	187	300	5,050	420.83
21	Cabbage	"	792	788	625	959	1,339	1,225	1,122	1,265	1,159	1,165	944	802	12,185	1,015.40
22	Ciboulette	"	1,787	1,335	1,350	1,566	1,471	1,485	1,010	1,545	1,300	1,229	1,461	1,683	17,222	1,435.16
23	Citron	"	1,018	1,047	1,287	975	1,109	1,080	1,044	772	810	932	1,042	972	12,088	1,007.33
24	Pumpkin	"	420	365	322	311	286	280	255	330	321	334	328	300	3,852	321.00
25	Cucumber	"	458	337	378	323	430	421	357	304	456	611	361	367	4,803	400.25
26	Courge	"	473	401	268	328	313	296	306	269	230	254	314	366	3,818	318.16
27	Diespiros mollis	"	305	172	145	145	145	322	272	222	224	187	219	150	2,508	205.00
28	Delique bulbaux	"	266	333	268	257	250	253	312	430	438	388	513	334	4,042	336.83
29	Durian	"	-	65	65	55	42	43	35	33	35	-	-	-	373	46.63
30	Ginger	"	1,029	1,005	837	978	1,054	1,087	1,110	1,212	1,120	998	1,032	1,017	12,479	1,039.91

No.	Kinds of products	Various conditions	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Mean
31	Coyave	100kg	650	656	427	417	517	425	365	431	364	417	400	400	5,669	472.41
32	Grain de pastèque	"	2,550	2,233	2,266	2,350	2,175	2,225	1,966	1,967	2,000	2,170	2,000	2,180	26,082	2,173.50
33	Lotus pip	"	2,000	2,337	2,100	2,000	1,600	1,212	1,720	1,231	1,553	1,475	1,700	2,200	21,138	1,761.50
34	Harcot	"	963	1,046	939	1,040	1,025	957	987	1,231	1,124	1,118	1,130	972	12,532	1,044.33
35	Igeame	"	452	479	502	482	407	493	494	419	433	478	525	483	5,647	470.58
36	Indige	"	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	Jambalse	"	-	1,150	925	1,150	1,150	650	-	-	-	-	-	-	5,025	1,005.00
38	Jute	"	1,566	1,533	1,523	1,325	1,275	1,331	1,081	1,065	1,045	1,075	997	1,028	14,844	1,237.00
39	Kapok	"	-	884	835	737	895	823	809	1,038	1,076	1,022	1,055	595	9,771	888.27
40	Lettuce	"	894	776	774	918	1,932	1,058	1,165	973	1,473	1,455	1,233	663	13,311	1,109.25
41	Longan	"	-	4,250	4,083	2,133	4,083	4,575	4,898	2,925	2,946	-	-	-	29,883	3,320.33
42	Mandarin	"	1,766	1,558	1,737	1,837	2,500	2,500	2,500	2,000	1,733	1,571	1,221	1,258	22,181	1,848.41
43	Mangosteen	"	-	-	-	-	3,500	3,000	2,000	2,000	2,500	-	-	1,600	13,000	2,166.66
44	Mango	"	8,500	455	600	805	832	-	-	-	-	-	-	-	5,737	1,434.25
45		"	212	455	210	80	140	215	190	188	178	203	167	308	2,546	212.16
46		"	300	-	-	-	-	-	-	-	-	-	500	-	800	400.00
47	Turnip	"	482	571	576	453	559	458	501	507	540	566	516	372	6,101	503.41
48	Coconut	100 meix	569	547	478	490	434	454	448	432	425	424	447	444	5,592	466.00
49	Orange	1 doucin	25	30	45	32	32	28	25	24	22	19	20	21	323	26.91
50	Sweet potato	100kg	335	342	328	423	426	417	425	446	350	327	358	321	4,848	404.01
51	Pimento	"	2,425	2,356	2,055	1,643	1,656	1,365	1,171	1,246	1,542	1,250	1,648	1,411	19,768	1,647.33
52	Cinnamon	"	-	-	-	-	-	433	588	1,650	808	-	-	-	2,479	619.75
53	Pepper (white)	"	13,937	14,200	15,250	12,266	13,955	14,500	14,666	13,667	13,667	10,667	11,875	14,333	163,383	13,615.25
54	Pepper (black)	"	7,914	7,965	8,026	7,532	7,617	7,578	7,532	7,546	7,518	7,404	7,000	6,971	90,605	7,550.41
55	Pepper	"	4,000	4,074	3,980	2,760	3,000	3,450	2,238	2,692	4,200	3,580	3,580	3,113	40,667	3,388.91
56	Rambutan	"	-	-	1,683	7,000	7,000	2,950	3,266	2,600	3,250	-	2,437	-	28,503	4,071.85
57	Ramie	"	1,683	1,683	1,683	3,050	2,325	2,325	2,425	2,650	2,650	2,803	2,625	2,469	28,371	2,364.25
58	Castor bean	"	-	-	575	575	575	562	612	596	619	588	583	498	5,783	481.91
59	Sapotille	"	665	765	641	691	803	822	743	719	60	783	725	717	8,934	744.50
60	Palm sugar(crude)	"	1,318	1,585	1,556	1,556	1,578	1,263	1,148	1,202	1,264	1,352	1,554	1,066	16,443	1,370.25
61	Soya bean	"	770	858	862	840	1,012	990	910	1,040	1,225	776	948	1,190	11,421	951.75
62	Palm sugar (brown)	"	548	649	563	537	624	573	582	694	718	684	742	717	7,551	629.25
63	Tobacco leaves	"	2,788	2,766	2,740	2,942	2,864	2,650	2,692	2,744	2,590	2,688	2,608	2,662	32,834	2,736.16
64	Taro	"	680	611	586	608	893	616	691	689	688	544	540	552	7,698	641.50
65	Tomato	"	627	410	329	420	532	500	650	683	900	1,014	880	614	7,559	629.91

Table 44: Prix Du Paddy et du Riz en 1963

Source : Statistics, Bureau of Agriculture

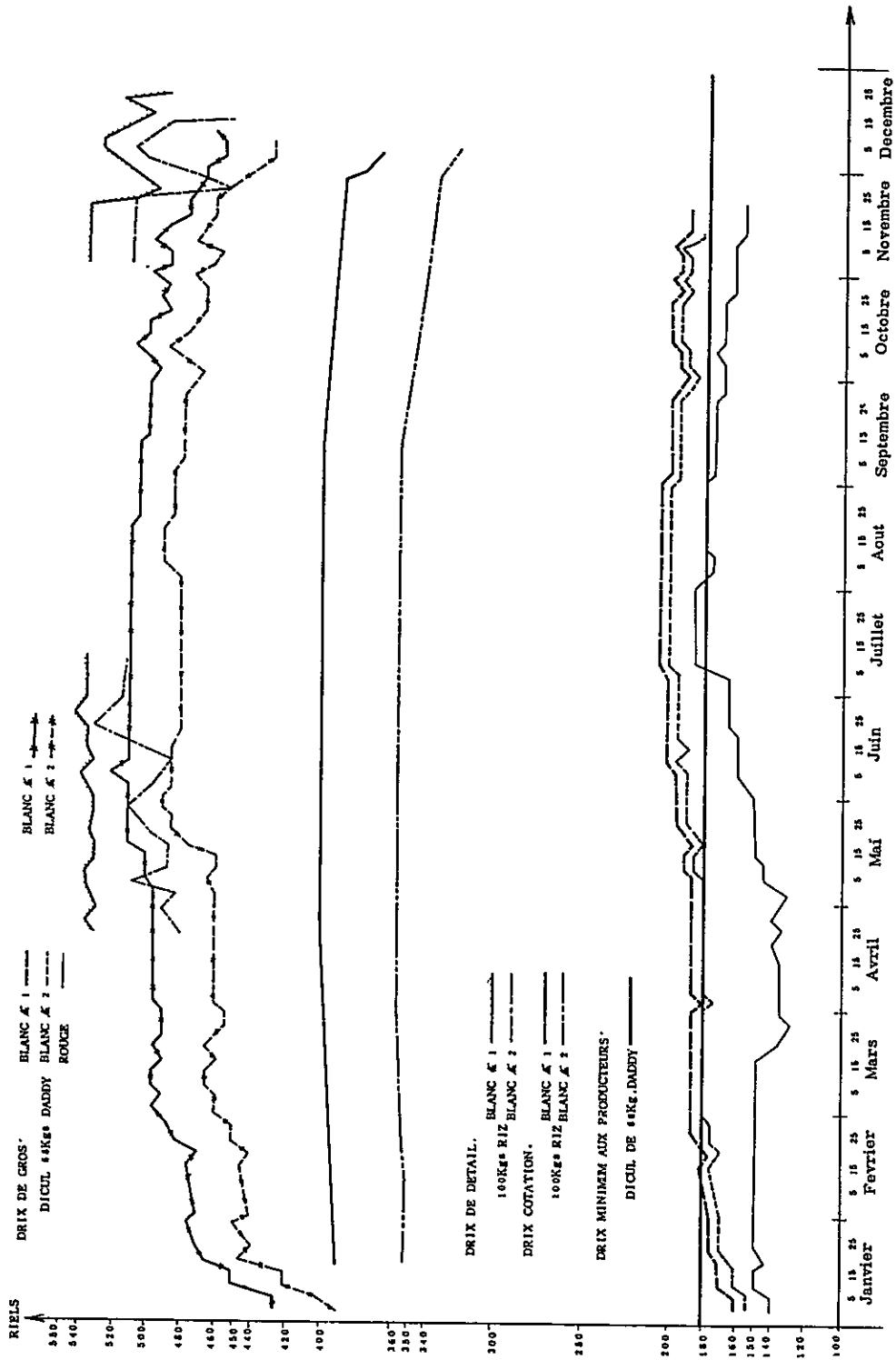


Table 45-1: Meteorological conditions in Cambodia

Record of Maximum and minimum temperatures, monthly and annual

Month	Phnom Penh		Kompong Cham		Battambang		Kampot	
	Year	C	Year	C	Year	C	Year	C
Jan.	'55	13.3	'55	12.4	'37	104	'37	147
	'47	36.3	'31	35.8	'37	37.7	'31	35.1
Feb.	'23	15.2	'33	16.9	'34	14.4	'33	18.3
	'38	36.7	'35	37.6	'59	38.2	'61	35.5
Mar.	'08	19.0	'34	18.2	'33	16.1	'50	19.0
	'37 '58	39.0	'35	39.1	'58	40.8	'36	17.2
Apr.	'55	17.9	'55	20.6	'39	19.8	'51	22.0
	'26	40.5	'35	39.3	'58	41.0	'52	35.9
May	'19	20.6	'31	21.6	'60	21.1	'30 '54	22.3
	'41	38.5	'30	37.5	'32	39.0	'58	36.0
June	'25 '55	21.2	'55	21.6	'30	21.7	'30	21.4
	'22	38.4	'57	36.1	'59	38.4	'33	36.1
July	'25	20.1	'32	21.1	'57	35.6	'58	19.1
	'34 '40	36.6	'34	35.6	'28	21.2	'50	34.1
Aug.	'56 '36	22.0	'55	21.3	'59	22.0	'32	21.6
	'33 '48	36.0	'35	35.2	'39	35.3	'31	35.5
Sept.	'55	21.9	'36	21.0	'39	21.7	'30	21.8
	'33	35.5	'33	34.2	'60	44.5	'32	34.1
Oct.	'61	19.2	'58	19.2	'37	19.6	'36	21.2
	'40	34.4	'34	34.2	'36	34.1	'35	33.5
Nov.	'56	16.8	'31	16.1	'28	13.1	'31	18.9
	'40	14.4	'31	34.1	'62	34.3	'35	33.7
Dec.	'34	14.4	'33	13.7	'34	10.7	'55 '56	17.9
	'36	34.8	'36	34.5	'58	34.8	'30 '51	23.6

Source: Weather Bureau: Résumé mensuel de Temps

Table 45-2: Monthly average temperature during the last 3 years. (1960 - 1962)

	Phnom Penh	Kompong Cham	Battambang	Kampot
Average of 1960	28.4	27.8	27.6	27.9
" 1961	28.4	27.6	27.6	27.1
" 1962	28.0	27.2	27.4	27.2
Jan. 1960	26.8	26.1	25.7	26.4
Feb.	27.5	27.0	26.8	27.2
March	30.1	29.3	30.2	28.3
April	31.4	31.5	30.5	28.9
May	29.7	28.8	29.2	28.7
June	28.9	28.1	29.2	27.6
July	29.0	28.1	28.8	27.9
Aug.	19.6	28.2	28.4	27.8
Sept.	28.3	27.5	28.0	27.6
Oct.	27.3	26.9	27.0	27.2
Nov.	26.8	26.9	26.6	27.3
Dec.	26.5	25.6	24.7	26.8
Jan. 1961	25.9	24.9	24.2	25.9
Feb.	28.7	27.6	27.8	27.2
March	30.1	29.1	29.2	28.2
April	30.4	29.5	29.9	28.8
May	29.8	28.9	28.7	24.4
June	28.6	27.9	28.7	27.9
July	28.5	28.1	28.1	27.4
Aug.	28.5	27.9	27.9	27.1
Sept.	28.1	27.6	27.9	27.1
Oct.	27.2	26.9	26.8	26.8
Nov.	27.6	27.0	26.5	27.3
Dec.	26.9	26.3	25.4	26.7
Jan. 1962	25.6	25.1	24.2	25.5
Feb.	26.9	26.2	26.1	26.1
March	29.6	28.7	29.1	27.8
April	30.7	29.5	30.0	28.3
May	29.9	28.9	30.0	28.7
June	29.3	28.1	28.9	27.9
July	28.4	27.4	28.3	27.2
Aug.	28.1	27.3	28.0	27.2
Sept.	27.7	27.2	27.7	27.1
Oct.	27.6	27.1	27.3	27.3
Nov.	27.0	26.6	25.9	27.3
Dec.	25.2	24.2	23.7	26.0

Source: Résumé mensuel de Temps

Table 45-3: Record of maximum and minimum rainfall, monthly and annual

Month	Phnom Penh		Kompong Cham		Battambang		Kampot	
	Year	mm	Year	mm	Year	mm	Year	mm
Jan.	'42	57	'49	65	'37	54	'22	61
Feb.	'20	127	'34	108	'29	113	'36	116
March	'10	193	'22	202	'22	204	'22	575
Apr.	'23	359	'47 '55	167	'37	266	'47	274
May	'12	30	'26	13	'20	41	'12 '18	21
	'46	395	'21	496	'27	340	'07	776
June	'13	27	'53	88	'26	23	'54	50
	'27	393	'21	987	'25	276	'47	520
July	'61	37	'55	68	'18	71	'52	42
	'16	359	'21	672	'22	284	'47	789
Aug.	'46	44	'22	33	'16	70	'32	43
	'17	380	'20	479	'29	289	'31	761
Sept.	'20	93	'48	74	'07	79	'27	67
	'17	443	'21	508	'15	609	'07	586
Oct.	'36	63	'30	24	'40	70		-
	'16	650	'52	549	'17	524	'52	537
Nov.	'11	2		0	'27 '29	1	'47	7
	'17	298	'21	340	'24	282	'13 '56	289
Dec.	'26	176	'22	126	'20	132	'30	210

Source: Résumé Mensuel Du Temps

Table 45-4

Monthly rainfall and its frequency during the last 3 years

	Phnom Penh		Kompong Cham		Battambang		Kampot	
	times	mm	times	mm	times	mm	times	mm
Total of 1960	142	1,039.5	130	1,579.9	153	1,964.0	174	1,915.3
" 1961	116	1,072.0	117	1,429.9	145	1,222.8	173	2,333.8
" 1962	106	1,412.7	123	1,345.4	117	1,518.5	170	1,884.8
1960								
Jan.	1	2.4	1	2.9		0	4	24.5
Feb.	3	4.2	1	0.6	2	6.5	1	0.2
Mar.	3	14.9	3	13.6	8	55.4	6	46.4
April	4	15.2	4	13.9	8	714.2	14	153.9
May	23	267.5	21	279.4	16	145.3	21	247.2
June	17	94.3	18	283.3	13	258.3	22	296.5
July	17	117.4	17	228.1	16	234.6	26	327.0
Aug.	23	128.4	21	186.1	24	175.0	25	219.9
Sept.	19	212.3	15	173.5	21	520.7	19	272.9
Oct.	16	102.2	11	153.8	25	160.0	16	142.5
Nov.	1	3.7		0	3	1.3		0
Dec.	1	3.7	11	0	3	1.3	16	0
1961								
Jan.	1	7.8	1	2.4	1	15.0	4	34.4
Feb.	3	15.8		0	2	33.7	2	10.3
Mar.	2	10.5	1	13.2	6	38.4	1	13.2
April	9	30.6	10	146.0	9	98.1	11	77.4
May	10	113.1	18	163.7	17	96.8	20	282.3
June	13	226.5	17	289.3	17	120.8	18	352.0
July	10	37.3	15	76.0	22	200.3	21	347.9
Aug.	17	71.2	20	324.0	27	277.8	24	633.0
Sept.	17	142.3	13	84.9	18	122.0	24	236.8
Oct.	19	271.6	15	198.3	17	156.0	26	204.2
Nov.	10	116.5	5	131.5	9	63.3	16	101.9
Dec.	5	28.8	2	0.6		0	6	40.4
1962								
Jan.	2	1.5		0		0	1	8.5
Feb.		0		0	1	1.8	2	1.2
Mar.	1	0.6	2	1.0	7	127.5	6	57.3
April	4	45.3	8	51.9	7	36.5	15	193.8
May	11	206.2	15	166.9	15	99.1	19	98.3
June	7	44.3	13	107.9	20	198.7	21	184.1
July	13	87.4	22	354.9	21	211.3	27	493.5
Aug.	15	102.1	19	249.4	20	215.6	22	222.5
Sep.	25	402.0	23	353.8	25	442.6	26	413.8
Oct.	21	428.0	14	1,129.2	16	119.9	21	188.3
Nov.	7	95.3	6	24.5	5	65.5	7	21.5
Dec.		0	1	6.4		0	3	2.0

Source: Resume Mensuel Du Temps

Table 45-5

Yearly rainfall

Province (Number of years of observation)	Yearly average rainfall	Record of maximum rainfall of the Province (mm)		Record of minimum rainfall of the Province (mm)		Yearly maximum rainfall (year)
		Observatory (Number of years of observation)	Yearly maximum rainfall (year)	Observatory (Number of years of observation)	Yearly minimum rainfall	
Kampot (17)	2,029	Kas Kong (6)	7,972 (1923)	Chunmeap (3)	487 ('34)	5,381
Kandal (23)	1,342	Po Chenteng (50)	2,310 ('16)	Tukkhleang (28)	312 ('40)	1,731
Kg. Cham (16)	1,679	Chalang (25)	4,270 ('33)	Stung Trang (23)	684 ('28)	2,989
Pursat (18)	1,510	Peamprous (3)	2,656 ('44)	Bamnak (11)	704 ('40)	1,950
Siem reap (21)	1,416	Samrong (19)	2,487 ('37)	Kralank (19)	123 ('40)	1,837
Svay Rieng (20)	1,813	Soc Noc (20)	2,298 ('26)		1,179	
B. Bang (13)	1,398	Phnom Srok (11)	2,731 ('30)	Pailin (23)	351 ('36)	1,891
Takeo (11)	1,392	Tram Kek (15)	3,482 ('39)	Angtasson (12)	470 ('43)	1,679
Ke. Speu (7)	1,169	Kg. Speu (28)	1,858 ('17)		269	
Kg. Thom (9)	1,412	Cheon Ksam (22)	2,376 ('17)	Stannng (16)	544 ('38)	1,819
Kratie (7)	1,780	Chhlong (21)	3,831 ('17)		953	
Prey Veng (6)	1,323	Kg. Trabek (26)	2,651 ('27)	Snoipoil (16)	416 ('41)	2,135
Stung Treng (19)	1,784	Voem (18)	3,413 ('18)	Siem Pang (13)	1,459 ('41)	2,336
Kg. Chhnang (3)	2,015	Kg. Chhnang (26)	2,732 ('27)	Ponley (10)	273 ('37)	1,664

Source: 'Report on the preliminary work for the establishment of the Technological Centre of Agriculture based on the Agreement on the Economic and Technical Cooperation between Japan and Cambodia', page 53.

Table 45-6: Table of the rise of the Mekong (1961 - 1963)

(Unit: metre)

	Phnom Penh			Kompong Cham		
	1961	1962	1963	1961	1962	1963
Jan.	3.78	4.01	3.48	4.23	4.35	3.62
Feb.	2.83	3.05	2.61	3.22	3.26	2.74
March	2.31	2.32	2.07	2.72	2.56	2.34
Apr.	1.93	1.99	1.91	2.38	2.34	2.14
May	2.27	2.16	1.76	2.87	2.80	2.01
June	4.63	4.52	3.29	7.50	6.93	4.89
July	7.25	6.51	5.74	11.10	19.72	9.17
Aug.	8.45	9.01	8.94	12.47	13.40	13.69
Sep.	10.37	9.63	9.44	14.80	13.41	13.31
Oct.	10.79	9.80	9.42	14.06	12.08	11.01
Nov.	8.31	7.39	7.47	9.10	8.11	8.46
Dec.	5.68	4.97	5.30	6.18	5.19	5.76

Source: Bureau of Agriculture

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