

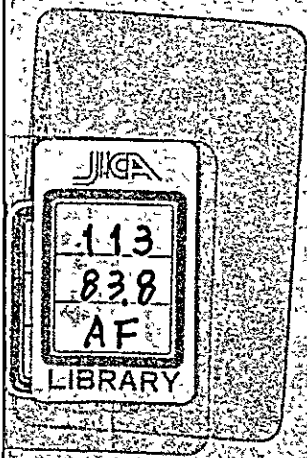
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THE PRELIMINARY REPORT
OF
AGRICULTURAL MECHANIZATION PROJECT
IN MALAYSIA

FEBRUARY 1968

OVERSEAS TECHNICAL COOPERATION AGENCY

TOKYO, JAPAN



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P R E F A C E

Since the Ministerial Conference for the Economic Development of South-east Asia in April 1966, there is a growing awareness among the countries in the region of the vital importance of agriculture for the economic development of the respective countries. This holds true also for Malaysia, although she has already attained the highest economic growth in the region.

In the five-year economic development plan of Malaysia, a great emphasis is placed on the production increase of rice in order to make the country self sufficient in food and also to allentiate the heavy dependence of her national economy on rubber. Programs for expanding double cropping areas for rice by means of irrigation and drainage are now vigorously carried out.

As a part of its technical cooperation to Malaysia, the Japanese Government dispatched a team, organized by our Agency, for making a feasibility survey on the drainage and reclamation of Prai River basin during the period of 1967 - 68. The feasibility report thereof has already been submitted to the Malaysian Government.

In connection with the above survey, the Malaysian Government had also requested to make a preliminary survey on the farm mechanization in the surrounding areas which will be brought under paddy cultivation or to be double cropped. Hence, Mr. Kōzō Saegusa, the farm mechanization specialist, and some other members of the Prai River Basin Survey Team concurrently conducted a study on the problems of farm mechanization and prepared this report for submission to the Malaysian Government.

In presenting this report, I sincerely hope that the observation and suggestions contained herein would be useful to the Malaysian Government in planning and implementing agricultural modernization not only in Prai River basin but also in other areas, such as Muda River basin, where land improvement programs are now underway.

May 1968



Shinichi Shibusawa
Director General

The Overseas Technical Cooperation Agency

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I. PREPARATIONS AND ARRANGEMENTS TAKEN BEFORE THE CONDUCT
OF THE PRELIMINARY SURVEY.

(1) The Government of the Federation of Malaysia appealed Japan to extend her aid to the installation of necessary machines and equipments into farm mechanic training sub-centers planned to be established newly at 12 locations, as well as her aid to introducing sprayers, duster and irrigation pumps, as indicated in "Outlines of the First Malaysian Economic Development Program and the Request Project of Aids by Foreign Countries (compiled by General Affairs Department, O. T. C. A. in Dec. 1966).

(2) Mr. Yasuo, Technical Councilor of O. T. C. A. , received a letter under date of April 14, 1967, written by Mr. Uehara, Chief of overseas agency stationed in Kuala Lumpur, informing of the establishment of the Farm Mechanic Training Center.

(3) The Foreign Minister received official telegram dated May 9, 1967, from the Ambassador to the Federation of Malaysia under the title " On the planning of establishment of the Farm Mechanic Training Center".

(4) The official letter dated May 18, 1967, reached the Foreign Minister under the title of " Re: Request of the establishment of the Farm mechanic Training Center" from the Ambassador to the Federation of Malaysia, which reads as follows ;

1) The Government of Malaysia wished to construct the Farm Mechanic Training Center at the same location of the agricultural experiment station newly established at Bumbong Lima in this current fiscal year, and E. P. U. sent a letter under date of May 4, 1967, asking Japan's intention whether she would join to the project.

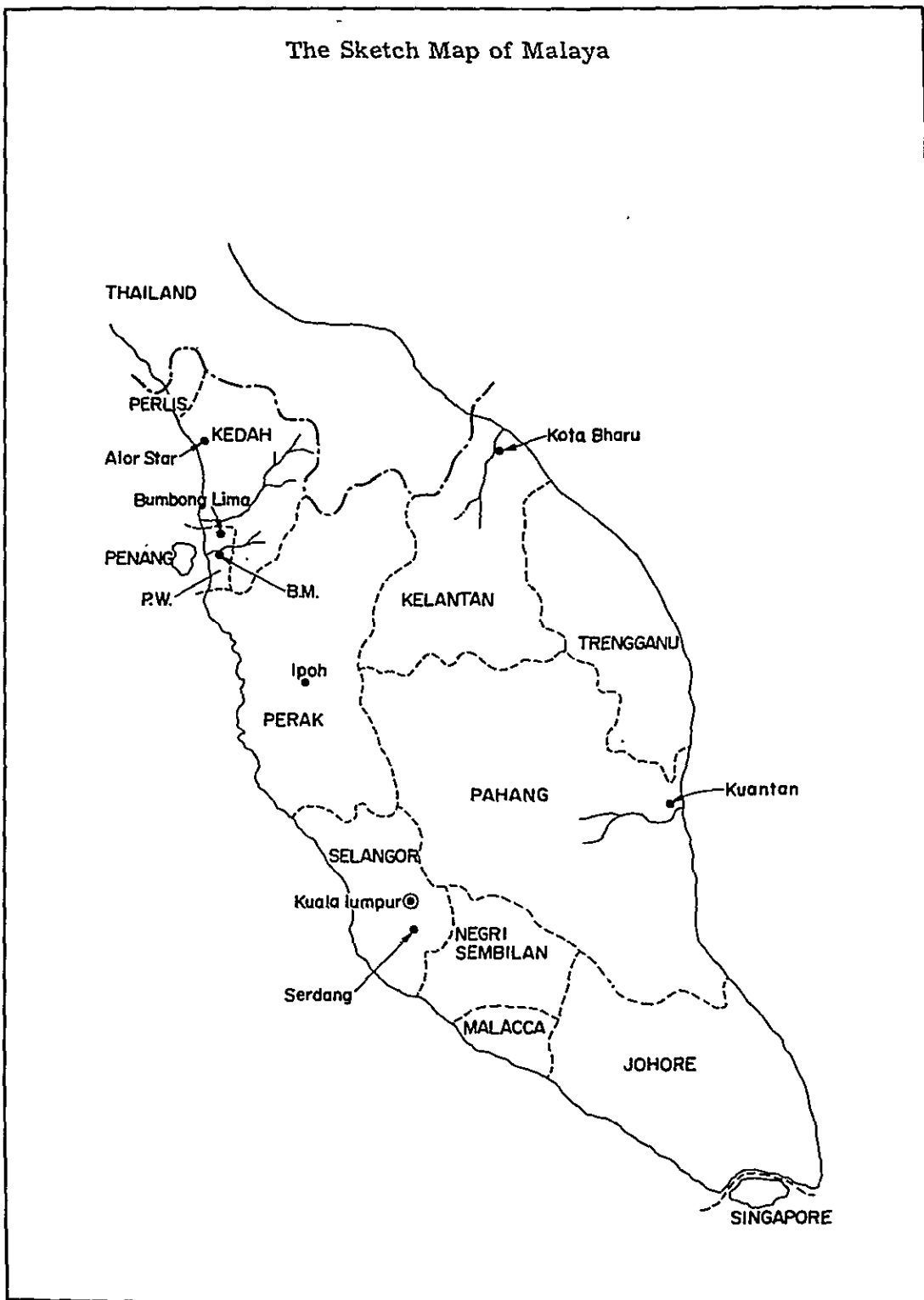
2) In April, this year E. P. U. had a talk on this matter with Director Ota of special United Nation's Fund for Economic Development (S. U. N. F. E. D.) and his team. The above letter is to officially request Japan's aid.

3) The total cost at a rough estimate requiring for the establishment of the Training Center will be \$126, 770 including structures, farm machinery, repairing machines etc.

(5) In October 1967, Mr. Saegusa, agricultural technical officer, was appointed as a member of the Cooperation Survey Mission ----- for agricultural development project for Prai River lower basin region (in charge of farm machinery) and he was expected to be dispatched to the Federation of Malaysia.

(6) Mr. Saegusa was ordered to conduct a preliminary survey on the Farm Mechanic Training Center in the Dederation of Malaysia, and Oct. 12th, 1967, the Foreign Ministry sent an official cable advising thereof to the Ambassador of the Federation of Malaysia.

The Sketch Map of Malaya



2. SURVEY SCHEDULES.

- Oct. 27 (Friday) Mr. Saegusa, arrived at Kuala Lumpur.
- Oct. 28 (Saturday) (1) Mr. Saegusa visited the Japanese Embassy at Kuala Lumpur to make necessary arrangements for survey schedules.
- (2) He visited E.P.U. and heard their explanations on the agricultural development in Malaysia.
explainer : Mr. Syed Hussin Wafa (Economic Planning Unit)
- (3) He joined the Agricultural Development Survey Mission for Prai River Basin Region at Bukit Mertagan.
- Oct. 29 (Sunday) (1) He visited the Federal Padi Research Station and the Agricultural School at Bumbong Lima for investigation.
- (2) He visited the State Agriculture Department of Kedah and heard its explanations on the present situation of rice culture therein.
Mr. Mohmed Tamin bin Yeop (State Agricultural Officer)
Mr. Khairi B. Hj. Mohamed (Deputy Agriculture Officer)
- (3) He visited Telok Chengai rice experiment station in Alor Star for investigation.
Mr. Goh Khek Boon
Mr. K. Sugimoto
- Oct. 30 (Monday) He visited State D.I.D. Office at B. M. and heard its explanations on agricultural development program for Prai River lower basin region.
Mr. Tay Lang Seng (Chief Engineer)
Mr. Joseph Yeoh Hoh Hoh (Engineer)

- Oct. 31 (Tuesday) (1) He conducted on-the-spot survey in the designated areas of Pray River agricultural development program accompanying Mr. Nakamura.
- (2) He visited State Agriculture Department of Penang / Province Wellesley at Butter Worth, and exchanged views with the undermentioned official on forms of mechanization of rice culture.
Mr. Chce Sek Pan (Senior Agronomist)
- (3) They visited Bukit Merak Rice Experiment Station.
Dr. K. Nagai.
- Nov. 1 (Wednday) holiday He arranged collected data at a residence in B. M.
- Nov. 2 (Thursday) Leaving Penang, he arrived at Kuala Lumpur.
(On and after Nov. 3rd. surveys were conducted in cooperation with Mr. Yaoi of O.T.C.A.)
- Nov. 3. (Friday) They visited the Agriculture Department of the Central Government and heard its views on mechanization of rice culture and on technical training.
Mr. Chew Hong Jung (Deputy Director of Agriculture Department)
- Nov. 4 (Saturday) They revisited the Agricultural Department and heard its explanation on the expansion project of farm mechanic training center.
Mr. Mohamad bin Jamil (Director of Agriculture Department)
Mr. Ahmad bin Amin (Assistant Director)
- Nov. 5 (Sunday) They made intermediary arrangement of data at the hotel in Kuala Lumpur.

- Nov. 6 (Monday) They visited E.P.U. accompanying Mr. Uehara of O.T.C.A. and Mr. Ahmad bin Amin of Agriculture Department of the Central Government, and exchanged opinions with E.P.U. Officers on the project for establishment of farm mechanic training center.
- Nov. 7 (Tuesday) A survey was conducted on the present state of activities of Farm Mechanic Training Center in Serdang.
Mr. Abdul Mutalib Ahmad (Chief Agricultural Engineer)
Mr. Mohd Isa bin Hpu (Instructor, Engineer)
Mr. K. Matsui (a member of the Technical Cooperation Mission)
- Nov. 8 (Wednesday) A survey for Kota Bharu region was prepared by the Agriculture Department but was suspended owing to the bad climate.
Mr. Ridzuan (State Agricultural Officer)
- Nov. 9 (Thursday) They paid the third visit to the Agriculture Department of the Central Government (the third time) to hear more detailed explanations and exchange views with its officials on technical problems.
Mr. Ani bin Arop (Senior Agronomist, Mechanization)
- Nov. 10 (Friday) At the Japanese Embassy, they reported the outline of the present survey to Ambassador Kojima and Councilor of the Embassy Mr. Asaba.
- Nov. 11 (Saturday) They put together the survey results.
- Nov. 14 (Thursday) Mr. Yaoi alone went to Alor Star district and a supplementary survey was conducted on some investigation matters.

Survey Officer in Charge

- Mr. Kozo Saegusa : Associate Research Coordinator for Farm
Mechanization. Forestry & Fishery Techno-
logy Council, Ministry of Agriculture & Forestry.
- Mr. Hidetoshi Yaii : Officer in charge of Training, Overseas Technical
Cooperation Agency (O. T. C. A.)

3. GENERAL SITUATION OF RICE CULTURE IN MALAYSIA

(1) Position of rice culture occupying in Agricultural Production:

Total cultivated acreage in Malaysia is 2,484,000 ha, showing 17% of the cultivation rate as against the whole land of Malaysia. Farming population is about 1,245,000 occupying about 58% of financial activity population of 2,165,000. The proportion of agricultural production to the gross national products indicates 31% (1962/1964), comparatively high rate showing great weight.

Cultivated acreage of main agricultural products (1964/65)

Agricultural products	Cultivated acreage	Agricultural products	Cultivated acreage
rice	498,000 ha	casaba *	20,000 ha
maize	9,000	banaba *	27,000
rubber *	1,695,000	pea-nut *	3,000
coconut *	206,000	tea	4,000 (harvest)
oil palm	76,000	pine apple	193,000 MT
Sweet potato	9,000		

Note : The above figures are taken from "Agricultural Development in South East Asia" issued by O. T. C. A.

* indicates figures of Malaya (West Malaysia) only.

In both cultivated acreage and production, rubber runs far ahead of any other products as shown in the above table. Rice and coconut are followed in cultivated acreage. In Malaysia, rice is a staple food like in other Asian countries. For recent several years, the Federation of Malaysia has been importing 450,000 - 1,000,000 tons of rice annually from foreign countries for domestic demand (F. A. O. Rice Information 1965/66) and coping with such unfavorable circumstances, the satisfactory increase in domestic rice production and securing continuous maintenance of self-support level are asked for as important goal in the First 5-year-Economic Development Plan (1966-1970).

Main livestock population in Malaysia at present is reported to be 4,000 horses, 327,000 cattles, 867,000 pigs, 333,000 goats and sheeps and 349,000 buffalos. (1962/1963-F. A. O. Year Book 1965) and it indicates that in the paddy area, buffalos are widely in use as drawn animals.

(2) Situation of rice culture and its yield level :

Planted acreage of paddy rice in West Malaysia in 1957 registered only about 292,000 ha but has been in the steady increase, and reached 321,000 ha in 1966. By the State in details, Kedah State has the planted acreage of 118,000 ha, Kedah State has the planted acreage of 118,000 ha, Kelantan State 49,140 ha and Perak State 44,530 ha and so on, and such planted acreage zone extents rather largely the northern part and the north-west part of the country.

Since the Second World War, study has been made for improvement of rice culture and management method, and the rice yield attained per unit area has been steadily increasing year after year, especially in 1957 and years thereafter, the yield has been in the considerable increase by the support of a continuous study concerning rice culture technique.

Changes by year in Yield of rice (Main Season)

Year	Yield gantangs/acre	Percent as against previous year
1941	275	
57	365	+31.6%
60	399	+45.1
63	420	+52.7
66	408	+48.4

(500 gantangs/acre = 1.3 koku/10a)

In around 1957, Double cropping of rice started and planted acreage of paddy rice at present (in 1966) reaches about 37,750 ha. At the beginning, rice planted acreage was developed only in Penang/P. W. district and in 1965 and thereafter, extention in both Selangor district and Kelantan district has been remarkably made.

At present, the Government of the Federation of Malaysia wishes to raise double cropping in paddy area of about 109,000 ha covering Kedah district and Perlis district by use of the dam constructed under Mudah River Development Project, and facilitation of irrigation and drainage are now under way.

Changes by year in yield of rice (off season)

1957	369 gantangs/acre	
60	419	+13.6%
63	414	+12.2
65	429	+16.3
66	447	+21.1

Area planted (in acres) with rice by State (1957-1966)

State	1957	1960	1962	1963	1965	1966
Perlis	42,070	47,010	47,010	47,010	47,010	47,100
Kedah	274,350	274,050	275,920	277,010	278,900	278,800
Penang & P. W.	35,740	36,040	36,040	36,060	36,110	36,100
Perak	94,730	97,730	102,870	106,340	106,340	106,000
Selangor	43,190	48,110	49,580	50,000	49,190	47,300
Negri Sembilan.	23,040	23,040	22,470	23,010	24,150	24,900
Malacca	16,110	17,210	15,430	16,970	19,350	20,900
Kelantan	96,010	107,970	110,580	114,210	115,660	116,800
Trengganu	31,680	38,890	37,390	40,840	43,730	43,900
Pahang	29,960	32,000	32,560	31,260	33,350	32,800
Johore	6,930	7,320	4,760	7,360	9,370	8,500
Total	693,810	729,850	734,170	747,600	763,160	763,100

Area planted (in acres) with off Season rice by State (1957-1966)

Province	1957	1960	1962	1963	1965	1966
Perlis	---	---	360	3,140	250	1,420
Kedah	620	730	820	2,245	6,690	8,390
Penang & P. W.	7,640	9,190	24,280	26,810	29,660	30,410
Perak	65	110	4,030	3,290	2,510	2,500
Selangor	---	---	1,090	1,760	10,060	32,540
Ngri Sembilan	---	---	---	---	200	1,100
Malacca	50	---	360	590	460	900
Kelantan	---	460	3,285	5,665	6,680	9,460
Trengganu	---	80	970	2,140	1,610	1,910
Pahang	10	---	10	260	---	80
Johore	---	---	260	620	300	1,130
Total	8,385	10,570	35,465	46,520	58,420	89,840

Notes : by Statistical Digest 1967

The following table shows the levels of paddy rice yields of various Asian countries. Malaysia has now been achieved a considerable level in yield of rice following Japan, the Republic of China and the Republic of Korea. In view of rice production, Japan and other foreign countries have a stabilized production type otherwise Malaysia is deemed as acreage increasing type basing upon the extension of double cropping.

In order to achieve the aims of development of the self-support rate in food and of increase in income for paddy farmers, mechanization of farming operations in accordance with improvement of rice breeding, improvement of irrigation and drainage and development of managenial technique for cultivation by fertilizer, is necessary. And the region chosen as object is the paddy rice zone where double cropping will be pushed forward.

Level of paddy rice yields of Asian countries and Extension Rate of its production.

	Yield (kg/10a)	Yield (% as for the world level)	Extension Rate of 1963-65/1945-53		
			Yield	acreage	harvest
Japan	522	(256)	123	109	134
R. O. C. (Taiwan)	349	(171)	158	101	159
R. O. K	311	(152)	113	125	141
Malaysia(malaya)	252	(124)	125	120	151
South Viet-Num	207	(101)	152	139	212
Burma	163	(80)	112	129	144
Philippines	125	(61)	106	134	142
Cambodia	113	(55)	122	141	162
India	151	(94)	136	118	161
Average of the World.	204	(100)	126	119	150

(3) Extension of Double Cropping and Development of Technique in rice culture:

Rice cropping seasons in Kedah district and Penang/P. W. district are as follows.

	seeding in nursery bed	(transplanting)	(harvesting)
(Main Season)	early September	— October	— early January
(Off Season)	early April	— May	— early August

On the other hand, weather conditions in this paddy area are heavy dried season in January to March, light rainy season in April to June, light dried season in July to September and heavy rainy season in October to December. The aim of the construction of Mudah River Dam by loans granted by the International Bank for Reconstruction and Development is to ensure irrigation for planting of rice. In case of double cropping, the space of time between harvest of the off season rice and transplanted of main-season rice is so short, and labor peak comes into this period. In order to avoid such concentration of labor in the period.

utilization of power tiller and other mechanical equipment, and mechanization of the rice culture have been gradually and steadily under way.

Under such circumstances, it has been difficult to breed in pasture buffalos which played the most important and greatest role in operation of land preparation because of no such pastures as the result of double cropping, and from the viewpoint of operational efficiency as well, power tiller and farm tractors have been replacing with buffalos in farm operation.

Present situation of waterfield rice in Off-Season are as follows :

	Period from seeding to harvesting	Extension rate	Year in which extension to farmers was made
Mahsuri	135 days	70 %	1965
Malinga	135	20	1964
I. R. 8	125	10	1966

Yields of new species I. R. 8 are expected 1,000 gantangs in case of good irrigation and management conditions. According to the fertilizing standard for promotion in 1967, fertilizer for rice nursery is set as 5.7 lbs per acre, fertilizer for rice field is 210 lbs (N - 5.9 lbs. P_2O_5 - 59 lbs. K_2O - 12.7 lbs) of an essential fertilizer and N - 28.5 lbs of a supplemental fertilizer. There is a tendency that UNDERWATER 2,4-D is used in weeding operations extensively among the farmers. Powdered B. H. C is popularly used in operations of weed prevention.

4. PRESENT SITUATION OF EXTENSION AND UTILIZATION OF FARM MACHINERY

Introduction and utilization of farm machinery in Malaysia are clearly divided to 2 types according to kind of farm products and form of agricultural management. One of utilization is the estate agriculture in which up-land farm products such as rubber, oil palm etc are cultivated. At present, 4-wheeled farm tractors of 40 - 60 horse power and the series of equipments bottom plough, disk harrow, cultivator etc. are in use in the estate agricultural form. Tractors now in use are almost occupied by those made in U.K. such as Massey Ferguson, Fordson, and Naffield etc.

Another one is paddyfield rice culture to which power tiller, water pumps, sprayer, duster and threshers are introduced and utilized. At present, 4-wheeled tractors have been popularly used more than expected, and many of these large tractors were introduced by contractors.

The number of 4-wheeled tractors extended and now in use all over the country is estimated at not less than 3,000 -- in 1960 1,534 tractors reported in use according to F.A.O. Statistics ----, of which about 2,000 tractors are extended and in use in upland fields. In recent few years, 4-wheeled tractors of made-in-japan and of comparatively small scale (15 - 25 horse power), power dusters, sprayers, and ventilating grain dryers are undertaken.

There is no accurate statistics about power tillers. But the present survey reveals as follows.

At present, there are about 1,500 power tillers and 2-wheeled tractors extended and in use all over the country. In recent few years, there is the indication that power tillers have been increasing with a considerable sharp pace. There are many power tillers with 6-8 horse power in use therein so as to be capable to tillage and leveling of paddy field even in dried season. There are many Kubota type power tillers and small 4-wheeled tractors in use. Several years ago, the Government of the Federation of Malaysia furnished funds to purchase power tillers and threshers.

Summary of Ownership of Agricultural Machineries

(1965, paddy area)

Owners	4-wheeled tractors	2-wheeled tractors (incl. tillers)	Motorised threshers	Water pumps	Motorised sprayers
Government (Dept. of Agri.)	127	48	58	89	137
Farmers	265	559	7	249	110
Contractors	569	21	1	32	18
Farmers' Associations & Co-operatives	30	28	1	5	-
Total	991	656	67	375	265

5. TENDENCY TOWARD MECHANIZATION OF RICE CULTURE AND THE RELATED PROBLEMS.

Since the extension of double cropping of rice, utilization of power tillers and farm tractors has been gradually increasing. Dependence, however, upon human power and livestock power in various farming operations including land preparation is considerably high still.

The necessary labor per acre in paddy area centering around Kedah district registers 30-40 days per person.

Labor peak over the rice crop period comes to land preparation and harvesting seasons, when 6,000 - 12,000 persons come into Kedah district from the Thailand and Kelantan district to meet with the required labor. However, acceptance of hired labor from other areas abovementioned, has been falling into difficulty year after year.

According to the Farm Economic Survey of the Mudah River Project (1966), labor situations in such a typical zone of waterfield rice as mentioned above and means of agricultural operation are as follows ;

Family labor only	30 %
Combined with hired labor	60-70 %
Hired labor only	2- 4 %

In the above figures, operations requiring hired labor are mainly operations of land preparation and transplantation.

Farmers who require hired labors in rice transplantation season reaches 40 per cent in all the farmers, and 40 - 45 per-cent farmers hire labors in harvest seasons, it might be added that in this case, many of such hired labors include labors from the outside of the region.

Next, means of land preparation are as undermentioned ;

man power	6.46 %
buffalos only	37.64
tractors power cultivators only	5.90
combined buffalos with man power	24.31
combined tractors with buffalos	14.03
combined tractors with man power	2.10
integrated by man power, buffalos and tractors	5.54

As explained above, the period after the cropping of off season rice till the time of land preparation and rice transplantation for main season rice become very short as a result of double cropping, and so it is quite natural to consider that ploughing by buffalos will be inevitably replaced to ploughing and tilling by far more efficient machines.

Problems are left to be examined in future about size of tractor which will be a mainstay equipment, utilization form of the tractor and its actual financiality.

To speak in detail, as annual acreage of operation (workable acreage), from the viewpoint of operational efficiency, shows as follows ; 2 - 4 ha in case of buffalo, 15 - 20 ha by 2-wheeled tractor and 60-80 ha in case of riding 4-wheeled tractor (40 - 60 horse power), comparing machinery utilization cost among them, riding tractors are most favorable theoretically. Especially in Malaysia, annual working hours are longer under its weather conditions as compared with Japan. So utilization of farm tractor in that country is further favorable.

In such senses, unless waterfield agronomical conditions disturb cultivation operations, there is a fair possibility for utilization of large scale tractor in utilization forms on wage basis with the object of cultivating broad acreage.

In these connections, considerably many riding 4- wheeled tractors are now in use in this country.

It has not been long since the establishment of Agricultural Cooperative Association Law in this country. Systematic use of farm tractor of large-scale by farmer's group within a certain region is in the state of extreme difficulty due to ineffective activities of agricultural cooperation association.

For realization of an effective use of large and high powered machines, systematic preparation of irrigation and drainage, division of rice fields and complete maintenance of agricultural roads are essential businesses to be done.

In addition, examination on the favorable size of tractor corresponding to the method of cultivation & land preparation and the precession of such operations should be called for.

On the other hand, for the purpose of dispensing with hired labors during the busiest farming seasons and of realizing standardization of the number of persons requiring the agricultural production in the future, it is necessary to pay the full consideration on not only mechanization of operations of cultivation & land preparation but also mechanization of operation of rice-transplantation and harvesting operation. In addition, the surveyers recommend that it is necessary to examine sizes of machines used in all the operations of rice cropping and their utilization forms.

The surveyers recommend that mechanization should gradually be carried out with the full consideration of setting up farming operation systems and machinery utilization structures mechanized by combination of a walking type tractor or a riding tractor of comparative small horse power with a reaper (binding type) or a small combine (harvester) for paddyfield use as a tentative mechanization target.

Up to now, rice production cost per acre (500 gantangs) is recorded as \$260 - \$300 in the lowest. If a mechanization by combination of a small riding tractor (15 - 20 horse power) with a reaper is materialized, the rice production cost is estimated to be reduced by up to 20 % - 30 %.

There is a problem on cultivation technique over rice transplantation operations such as extension of short stem rice species, etc. Utilization of rice transplanting machines which at present Japan has been sharply developing should be studied. Prevention operations of damages by blight and noxious insects is performed by 70% farmers in various ways and study for joint operations by farmers is required.

Two cropping methods : combined use of a reaper with an automatic thresher and application of a Japanese type combine, are considered to be put to practical

use in the future. However, it is conceivable that a further study on the relations between the drying method and quality of rice should be necessary.

Farmers who sell rice in this country reach 82.2 % of all the farmers. 75.9% of such farmers sell rice to their brokers and 5.7 % farmers sell rice to rice mills under private management and only 1.1 % farmers use rice mills under management of agricultural cooperative association.

And, 62.3 % of the farmers-dry rice before on sale and those who do not dry rice are reported 37.7 %. Examination is called for on facilities for rice - drying and rice-hulling operations as well as improvement of the selling circulation organization.

In short, at present, the technical system for mechanization of all the rice cropping operations has not been established yet in Malaysia. Under such circumstances, technical study on agricultural conditions in Malaysia must be advanced for future mechanization. The surveyers recommend that a full examination must be done even on forms of possession and of utilization of machines corresponding to the extension of such techniques.

6. ACTUAL TRAINING AND EDUCATION CONDITIONS FOR FARM MECHANIC

(1) Training and extension system :

At present, there is a farm mechanic training center owned by the federal Government in Serdang where training for technical guidance officers has been given. This center (hereinafter called simply "Serdang Center") is the sole training center in this country which started its service in 1965.

In Serdang Center, expert officials who received training in Japan under COLOMBO Plan have been giving trainees lectures of high degree on structures of various farm tractors and other farm machines, theories of machine operation, handling methods and repairing technique, and some practices.

Serdang Center has direct connections with Agricultural Engineering Division and has several functions to conduct a study on development and improvement of machines and to perform efficiency tests of farm machinery in its nature.

As Serdang Center is the only one center for the farm machinery in the Federation of Malaysia, the farm machines handled in this Center extend to both fields, machines for upland agricultural operations and machines for paddy field agricultural operations. Stress is placed on the former. When the training program on utilization technique of machines closely connected with cultivation technique over mechanization of paddyfield agriculture, will be conducted in this Center, various inconvenience will take place.

Agricultural schools have been generally playing a great role to produce extension workers by training and contributing to extension of technique concerning the utilization of farm machines.

At present, one of two agricultural schools stands close by Serdang Center. Both Serdang Center and Agricultural schools have close connections with one another regarding acceptance of trainees and administration etc.

The agricultural school located in Serdang is a college.

In 1967, another agricultural school was established in Bumbong Lima development region, and further schools of the same kind are expected to be constructed in 4 other regions in the new future.

Many mishaps has been taking place in power cultivators introduced to farm villages in recent few years and there is an unfarorable indication that farm machines are not adequately used nor acurately handled by farmers.

Coping with such circumstances, the Government of the Federation of the Malaysia intends to train directly farmers in the technique of machine handling through agricultural cooperative associations.

However, any system & organization to conduct such training has not been established yet, the Government is planning to establish a sub-center in each state to have trainees acquire knowledge on farm machinary.

(2) Present situation of Serdang Center :

Serdang Center accepts about 20 trainees annually (19 persons in 1967) for mainly producing assistant engineers of each State. Curricula consist of lectures 20 % and practices 80 %.

At present, 2 intructors who have profound technical knowledge train students the undermentioned contents of curriculum and the technical training in repair is handled by a Japanese instructor, being member of the Technical Cooperation Mission.

The Government of the Federation of Malaysia is now planning to expand and reinforce the stuffs of Serdang Center and 4 officials who graduated from collage are under training, who include a person already finished training courses at Uchihara Training Institute of O. T. C. A. (11 month course) and at Kansai repair training course (6 months) in Japan.

In Serdang Center, 20-30 mishaped power tillers and various other farm machines out of order which were introduced to farm villages are under repair, as well as training on theories of farm machines and their handling practices. So this Center is playing the important role just like a repair center.

In addition to the abovementioned activities, this Center is manufacturing some farm machines for trial and improvement. It is hoped for that this Center will have the same functions as National Institution of Agricultural Engineering (N. I. A. E.) of U. K.

1) Contents of curriculum

I. Structure of farm tractor and its engine, and its handling

- i) Structure, operational principles of machines and their efficiency
- ii) Control for maintenance and repair
- iii) Mishap and follow-up.

II. Structure of operational machines and its handling.

Plough, rotovator, harrow fertilizing & sowing machine, cultivator, harvester, thresher etc.

III. Practising at field.

driving operation of tractor, hitching of plough and other equipment
adjustment of plough.

IV. Using method of machine tools.

Using method of drill, tapping machine, and tool grinder, and management of repair shop.

V. Technique of casting, welding.

2. Agricultural Machines retained at the Center

4-wheeled tractor (made in U. K., U. S. A., Japan) 20 sets crawler tractor (including swamp tractor, made in foreign countries) 6 sets.

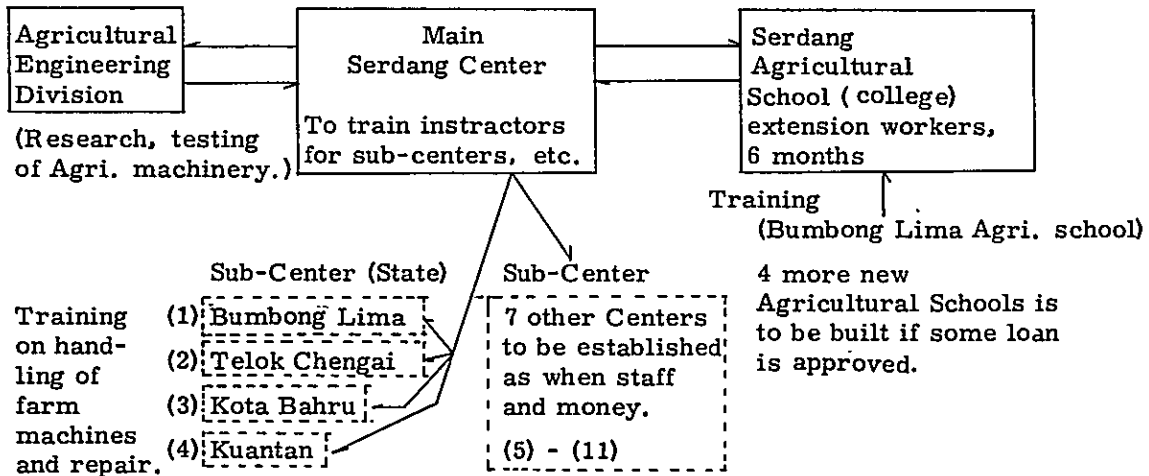
2-wheeled tractor, (including power tiller) 10 sets
 bottom plough
 disc plough
 rotavator (rotary tiller
 field cultivator (for sugar cane use, made in Australia)
 sugar cane planter (for sugar cane use)
 root cutter (for reclamation use)
 land leveler
 earth auger (for digging hole)
 thresher of large scale
 (made in Australia)
 rotary lawn tiller (made in England)
 irrigation pump
 fog machine
 stripper for rami
 self-propelled thresher
 (trial making.)
 orange cutter (" ")

7. EXTENSION PROGRAM OF THE FARM MECHANIC TRAINING CENTER
BY THE GOVERNMENT OF THE FEDERATION OF MALAYSIA.

As the time is getting for mechanization of agriculture in West Malaysia focusing on rice double cropping in the paddy field zones, the Federal Government have urgent intensions to introduce rationally various kinds of farm machines to farm villages through strengthening structure of the agricultural cooperative association and to let farmers acquire knowledge and technique on driving operation of farm machines, controlling for maintenance and light repair of such machines.

For these purposes abovementioned, the Federal Government is planning to establish a sub-center in each State placing under the Farm Mechanic Training Center located in Serdang as the Main Center.

According to the Government Plan, a sub-center performs the training on practice for no any other persons but farmers of about fifteen with 2-3 month training period. At the begining of this plan, 11 sub-centers were estimated corresponding to the 5 years Plan. However, since then, the Federal Government has been forced to change its initial plan and to reduce establishment of sub-centers to 4 by 1970 as undermentioned, due to the changes of financial situations thereafter.



Priority Centers,
expected to be 100%
operative by 1970.
Staffed by instructors
trained at Serdang Center

Such 4 sub-centers are considered to stand close by already established agricultural schools or agricultural schools expected to be constructed. Operations of sub-center will be done keeping close relations with field practices. The Government of the Federation of Malaysia strongly asks for financial aids from foreign countries including Japan for the establishment of sub-centers. The Government hopes for positive assistances by foreign countries to dispatch to her technical experts on mechanization of agriculture and to furnish her with various kinds of farm machines for exercise use and tool machines and equipments for repair.

The Government are considering to formulate the budget for residence and lodging for foreign technical experts dispatched to her.

According to opinions of E.P.U. and Agriculture Department of the Federal Government, the establishments of sub-centers at Bumbong Lima and at Telok Chengai out of 4 sub-centers abovementioned has a priority in establishment time.

The sub-center at Bumbong Lima is planned to be constructed on the same region of the Agricultural School which opened in May 1967, where the first-class paved road passes and parts of the necessary facilities such as electricity power facilities and fields for practice are already prepared. Agricultural School started the training course for 3 years with 80 trainees.

In the same region, the comprehensive Paddy Research station of the Federal Government is now under construction and the head-quarter building and experimental fields (about 20 ha) has been prepared well, and stuffs of Bukit Merah experimental region borrowing a part of Provincial experimental station will move to this comprehensive paddy Research Station which will soon be constructed. Sub-centers which are expected to be established at Bumbong Lima and Telok Chengai will have 5 instructing officials (2 for operation, 2 for maintenance and 1 for adaptation) and few clerk personnels and supports by officials of technical field engaging in the same region are called for. From the beginning of this project, Bumbong Lima Sub Center (sub center at Bumbong Lima, hereinafter called as above) is assumed to take charge of regions of Penang/P.W., South Kedah etc, covering 121,450 acres (including 129 agricultural cooperative associations and 7,485 farming families) and up to date, 136 4-wheeled tractors and 58 2-wheeled tractors has been introduced in these regions.

The establishment of Bumbong Lima Sub-Center is hoped for being done in time for opening around in June, 1968, in consideration of its connections with Muda River Project.

At the initial stage, a budget was formulated as undermentioned ;

Structures	\$59,883
Machines for training use	\$43,131
Implement, repair facilities	\$23,751
Total	\$126,770

(45,637 thousand yen in equivalence.)

Aids from especially Japan are eagerly hoped for in obtaining the amount of buadget and the Government of Malaysia asks for Japan to dispatch per experts, both agricultural engineers and mechanic engineers.

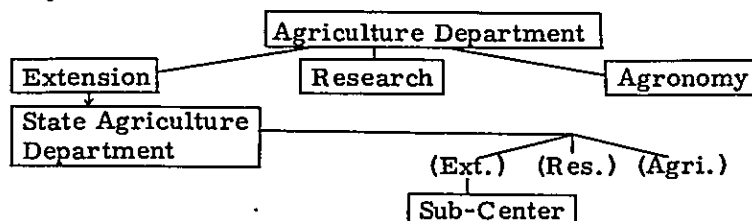
Organization of a center is now under study to be divided into machine section, blacksmith section, welding section, implement repair section and servicing section.

A sub center at Telok Chaingai region is expected to be built on the same region as of the experimental rice field.

The present situation of Kota Bahlh and Kuantan regions are nothing noteworthy but few facilities (wooden structures, repair facilities of small scale).

The Government of the Federation of Malaysia is hoping foriegn countries to dispatch their experts of mechanization to her for guidance to the mechanization of agriculture to the region of oil palm and Tapioka cultivation (covering about 23,000 acres).

(Systematic structure)



8. OPINIONS ON THE ESTABLISHMENT OF THE FARM MECHANIZATION TRAINING CENTER

(1) Development of mechanization of agriculture and necessity of extensive establishment of training centers :

It is natural that the aim of future target is laid on the promotion of labor productivity over the rice culture. And, in order to greatly increase rice production, a direction for rice double cropping has been pushed forward and the cultivated acreage for double cropping has been increasing year after year.

For the purpose of developing double cropping, such undertaking cannot possibly be carried out if land cannot be rapidly prepared during the short space of time between the harvest of the Off-season crop and the planting of the second crop. Double-cropping of rice cannot be successfully undertaken without mechanical equipment.

The need for increased mechanization is further desirable in view of the limited land available for grazing of draught animals in paddy areas.

However, at present, the general utilization of power tiller and other farm machines are not made accurately because farmers do not have sufficient knowledge and technique on characteristics of machines and their handling and workable years of such machines are considerably shortened because of frequent mishaps occurrence.

Under such situation, there is a trend that introduction and utilization of comparatively new kinds of machines such as small harvester have been progressing in accordance with the development of mechanization in future. At the conclusion, it is presumable that necessity of training farmers by practice and of producing leaders by training will steadily increase.

(2) On contents of training in utilization of farm machines :

Contents of training or education concerning utilization of farm machines are largely classified into two categories called "Farm Mechanic Training" and "Farm Mechanization Training."

The former is the training on structures of machines, theories of operation, driving operation, measures against mishaps, and repair. "Farm Mechanic Training" achieves its purpose by leveling down the training contents performed at Serdang Center so as to let farmers in fields understand such contents. Needless to say, a sub center in each district is necessary as a contacting organization with fields.

The latter is the training to teach on selection of machines in relation to land conditions, cultivation and tilling method, etc, and utilization methods of machines such as operation method, and further to let trainees acquire trial computation methods of cost required for mechanization.

In view of the present situation of Malaysia, the latter training would be hardly considered. However, promotion of experimental study covering all the rice crop technique and training on "Farm Mechanization" are essential for practical and effective promotion of mechanization in rice-cropping zone in future.

"Farm Mechanization Training" must be made in an integrated form with experimental study organs.

(3) Steps for training system and functional difference :

The existing Serdang Center will be sure to play an important role over various kinds of machines such as farm products, paddy field rice, fruit-trees and technical farm products. Technicians produced at Serdang Center by training will be attached to any one of sub centers which are expected to be established and train in basic handling of machines as instructor.

Farm Mechanization Training must presume the integration of technique basing upon double cropping of paddy field rice, and management of this training must be done in the closed connected form with experimental study organs. And a place where farm mechanization training is performed must be located at the center of a main paddy field rice cropping zone.

Systemization of 3 steps abovementioned obtains remarkable results in training for mechanization. Consideration must be made of extension worker's linking to management as extension workers trained at an agricultural school have their duties to be fulfilled.

(4) Conditions of location of Bumbong Lima Center and its role :

Bumbong Lima Center is situated in the main rice cropping region in West Malaysia and on the same location of comprehensive Paddy Research Station which has been supplemented and enlarging since 1967 owned by the Federal Government. And so this Sub-Center is very available and convenient to play an important role as the central Center of the whole country by letting trainees acquire extensive and basic technique concerning Mechanization.

It may be added that this Center can have peculiar functions different from other sub centers planned in other district due to abundant experts of concerned technical fields living in this State.

With regard to the functional link of this Center to the other sub center expected to be established at Telok Cengai (Alor Star) in the same North-West rice cropping zone, it is considered suitable that Telok Cengai Sub Center will take charge of training the technique adaptable in farm fields otherwise, Bumbong Lima Center will place points on training in the basic techniques.

Bumbong Lima Center will play an additional role on guidance and training of the technique available for the Prai River Project region.

(5) Cooperation of Japan to the establishment of training centers :

The Government of the Federation of Malaysia asks for Japan her positive cooperation concerning establishment and enlargement of training centers in Malaysia.

Stress must be laid on technique concerning mechanization of rice cropping.

In addition to the above, the points must be placed on integrated study and training in the technique connected with farm mechanization which seems difficult to be settled by only the Malaysians. Under such circumstances, aids from Japan, for the time being, should and had better be limited to the establishment of Bumbong Lima Center and systematization of training.

As the concrete methods, dispatch of experts having broad knowledge on all the high expert technics and the cultivation technique at the initial stage on which center's are established, furnishment of various kinds of farm machine for training use, implement and repair facilities must be considered.

Structures and other basic facilities should be constructed and installed by voluntary projects by the Government of the Federation of Malaysia.

Farm machines to be furnished with should be not only general farm machinery such as tractors and their equipments which has been asked for by Malaysians in the first stage, but also other machines for rice cropping of small and medium size developed well in Japan.

As it is naturally expected that the number and the kind of farm machines have been increasing in Malaysia, a full examination should be made that study and training in repair technique and handling of farm machines be able to be cooperated, supported and assisted on the private basis. It may be recommended that advices on adjustment of training project should be made by the dispatched experts abovementioned.

