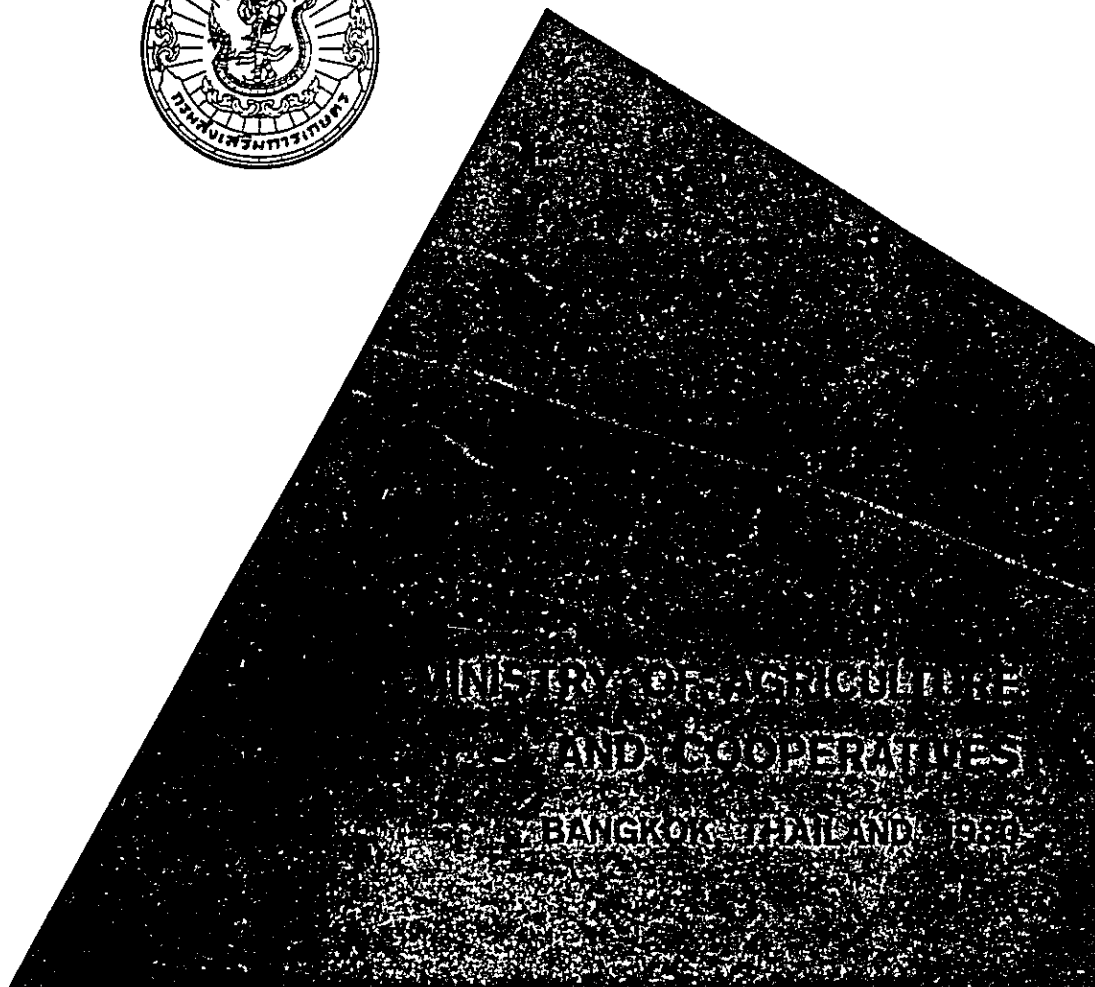


DEPARTMENT
OF
AGRICULTURAL EXTENSION



Foreward

This publication has been prepared to provide factual information to all who are interested in knowing about the newly created Department of Agricultural Extension in the Ministry of Agriculture and Cooperatives, Thailand. It describes the origin and historic background, objectives, responsibilities, plan of operation and organization of the Department.

The Department of Agricultural Extension brings together under one administration many separate extension activities previously carried out by several Departments of the Ministry of Agriculture and Cooperatives. Thus, it adds a new unifying force to the continuing efforts of the Government of Thailand to improve the welfare of 5,000,000 farm families throughout the Kingdom. The Department is also in charged with the responsibility of increasing the productivity of the country's most important industry, agriculture. This is particularly important at this time to meet growing domestic needs for food and for export which is essential to the country's economy and balance of international trade.

To carry out these important tasks, in 1979, the Department of Agricultural Extension has a staff of nearly 9,000 civil service officials and other employees. More qualified agriculturally trained employees are being added but many more are needed to achieve a ratio of officials in direct contact with farmers closer to 1 per 1,000 instead of 1 to more than 4,000 that now exists in most of the areas.

1. Historical Background

July 1, 1955, might best be recorded as the beginning of the Department of Agricultural Extension in Thailand. The Director-Generals of the Departments in the Ministry of Agriculture and Cooperatives, on that day, came to the conclusion that a single consolidated extension department could better meet the needs of the people than the many independent extension services, then organized within several Departments. Following this agreement many steps had to be taken. First, a functional unit had to be formed that would be responsible for planning and coordinating the existing extension services in different Departments. This unit was initially set up as a Division in the Office of the Under-Secretary of State for Agriculture. Later it was given Departmental status.

Then came the stage of preparing an operational plan. The first draft of this plan was reviewed by the Ministry of Agriculture and Cooperatives on April 12, 1957. It was sent back for revision and further discussions with the many offices involved. At the same time working plans were being developed within several Departments designed to implement the proposed consolidation. Also, the services of consultants from the United States in agricultural research, extension and education were asked to analyse the proposed reorganization of the Ministry of Agriculture and Cooperatives.

On December 19, 1960, the U.S. Ambassador presented the consultants report to the late Field Marshal Sarit Thanarat, then Prime Minister. He favored, in principle, recommendations in this report, which among other things, recommended the creation of a single Department of Agricultural Extension and ordered the report sent to the Council of Ministers for final decision. The Minister of Agriculture and Cooperatives presented this proposal to the Council of Ministers at their January 10, 1961 session.

January 12, 1961. The Ministry received a letter from the Council of Ministers informing that the proposed scheme had the Cabinet's concurrence in principle, and that the Ministry of Agriculture and Cooperatives was authorized to take the necessary action in order to work out a design of the tasks to suit the needs of Thai farmers and their environment. In this connection the Ministry of Agriculture and Cooperatives was also to coordinate with the Ministry of Interior. A publication of the Public Relations Department, Vittaya Sarn Daily News, of January 10, 1961 reported, "Finally the Council of Ministers

had a resolution that the Ministry of Agriculture and Cooperatives should set up a department or an office of agricultural extension service having administrative status as a central unit in the Ministry of Agriculture and Cooperatives."

March 20, 1961. The Ministry of Agriculture and Cooperatives submitted a blueprint for establishing a Department of Agricultural Extension Service to the Council of Ministers. The project was deliberately divided into two phases. Phase I was to establish the Office of Agricultural Extension Administration to lay groundwork for the build-up of a department. This phase called for developing a detailed plan of operation, including; the informing of personnel about the proposed changes, the reasons for consolidation, operational procedures, methods to be used and an organizational structure. Phase II was the legal creation of a Department of Agricultural Extension which required an amendment of the Act establishing the organizational structure of the Ministry of Agriculture and Cooperatives.

September 27, 1961. The Council of Ministers approved the proposed plan in principle.

January 12, 1962. The Ministry of Agriculture and Cooperatives announced the establishment of Office of Agricultural Extension Administration. The work of the Office was planned according to outlines in the new scheme. The progress of its operation had been reported to the Council of Ministers from time to time.

November 7, 1962. The Prime Minister issued the following executive order, "It (the Office) could be reorganized to become a department. And the Cabinet should be informed of the development." Thus began the work to set up a new department. Director-Generals of the Ministry of Agriculture and Cooperatives had a series of meetings to draw up the design of the forthcoming institution so that its lines of work and machinery for operation would be consistent with the national setting. Meanwhile officials from the Office of the Civil Service Commission, Budget Bureau, Ministry of Finance, Office of the National Economic Development Board, including those from the Advisory Board on Executive Affairs and its sub-committee requested descriptions needed for their analyses. The process of reviewing the proposed plan advanced gradually as there had to be continual adjustment and readjustment. The formation of the department came to a standstill at times because of differences of opinion on certain details,

even regarding the name of the department.

July 1, 1966. The proposed plan passed the Advisory Board on Executive Affairs. The new department was called "~~Agricultural Extension Service Department~~". It was to take over all of the existing extension services of several departments in the Ministry of Agriculture and Cooperatives. For provincial administration, there were to be agricultural extension officers at the province (Changwat) and district (Amphoe) levels.

April 20, 1967. Chairman of the Advisory Board on Executive Affairs submitted the proposal to the Prime Minister. It should be noted that the department was referred to as the Agricultural Service Department which was slightly changed (for unknown reasons). Its provincial officers were called Province Agricultural Officers and District Agricultural Officers.

May 25, 1967. The Cabinet approved the proposal in principle.

July 6, 1967. The Ministry of Agriculture and Cooperatives sent the draft act for Reorganizing the Ministry, Agency and Department to the Advisory Board on Legislation for their final reading before submission to the Constituent Assembly, which then served also as the national legislature. At the same time it also requested that the name "Agricultural Service Department" be changed to "Department of the Agricultural Extension".

July 25, 1967. The Cabinet approved the draft Act in principle, and accepted the name "Department of the Agricultural Extension".

September 14, 1967. The draft Act went into the session of the Constituent Assembly at 9:45 a.m. It was passed to the Assembly committee for final comments within 7 days.

October 21, 1967. The Department of Agricultural Extension was established according to the Act that came into force following the day of its publication in the Government Gazette, special issue, Volume 84, Number 101 of October 20, 1967, page 1.

Section 14 of the Act reads:

"The administration units of the Ministry of Agriculture and Cooperatives comprise:

1. Office of the Secretary to the Minister
2. Office of the Under-Secretary of State
3. Department of Agriculture
4. Land Development
5. Cooperative Promotion
6. Cooperative Auditing
7. Department of Fisheries
8. Department of Livestock Development
9. Royal Forest Department
10. Department of the Agricultural Extension.

In 1968 there was another Act reorganizing the administration pattern of the Ministry of Agriculture and Cooperatives. It was published in the Government Gazette, Volume 85, Number 54, of June 18, 1968, page 379. Part of it reads:

"Section 3. The activities, assets, liabilities, officials, employees and national budget appropriation in relation to agricultural extension service of the Office of the Under-Secretary of State for Agriculture shall be transferred to the Department of the Agricultural Extension. (C)

Section 4. The activities, assets, liabilities, officials, employees and national budget appropriation in relation to agricultural extension service and plant protection program of the Department of Agriculture, and those concerned with Province Agricultural officers and District Agricultural Officers shall be transferred to the Department of the Agricultural Extension. (C)

Section 5. The activities, assets, liabilities, officials, employees and national budget appropriation in relation to agricultural promotion and extension service of Rice Department, and those concerned with Province Rice Officers and District Rice Officers shall be transferred to the Department of the Agricultural Extension. (C)

Thus, on June 19, 1968 the new Department of Agricultural Extension was established, taking over the operation of the several separate extension services previously administered by other Departments of the Ministry of Agriculture.

2 Objectives

The establishment of the Department of the Agricultural Extension was not only the conclusion of continuous efforts to fulfill the legislative requirements for setting up an office of department status, but also the beginning of a much more comprehensive agricultural extension program in Thailand. To accomplish its expanded responsibilities the new Department outlined its objectives as follows:

- 2.1 To work in the best interest of the total agricultural development in the Kingdom;
- 2.2 To develop a cooperative, multi-purpose extension educational system;
- 2.3 To provide a more convenient source of technical agricultural knowledge to farmers;
- 2.4 To organize an in-service training program for all agricultural extension officers to improve their technical knowledge and skill in working with people;
- 2.5 To provide wide-ranging technical services to farmers as a means of implementing the agricultural development program;
- 2.6 To participate in the accelerated agricultural development program planned to cope with dynamic changes in international and domestic agricultural economics.

To carry out these broad objectives the Department of Agricultural Extension seeks to develop a single administrative organization capable of meeting the many needs of a highly diversified agriculture in each area. While there are major regional differences within the Kingdom in almost every area farmers grow a variety of crops such as: rice, corn, other grain crops, fruit, vegetable, livestock and fish. Thus, an organization that can offer farmers a wide-range of technical and educational services should prove most efficient and better serve the needs of farmers and the development of the agricultural economy. However, it is recognized that in the transition period from the old organizational system a step by step procedure should be followed involving the close cooperation of other Departments in the Ministry, Colleges of Agriculture and others to achieve the best results.

3. Responsibilities

The new Department is charged with the following responsibilities:

- 3.1 To promote the production of food crops to cope with local and national consumption, and to provide substitution of certain foods need to be imported.
- 3.2 To promote the production of industrial crops to serve internal consumption quantitatively and qualitatively. Such crops are jute, cotton, sugar cane, pine apple, groundnut, soybean and kapok. During the past five years there has been a major need to increase the production of vegetable oils, livestock forage and product for the developing canning industry.
- 3.3 To promote crop production and other agricultural commodities for export. Besides rice and rubber, the key crops are corn, cassava, jute, beans, cotton, kapok, castor-oil plant, sesame, tamarind, red pepper; and some selected fruit: pomalo, rambutan, mangosteen and sapodilla plum. Costs and prices will be the main consideration in planning this promotion campaign.
- 3.4 To advise and help farmers concerning their future plan of increasing products aimed at gaining the maximum output per rai and also attaining a rising income as high as possible.
- 3.5 To support the organization of farmers. Because such groups can be an essential force in expanding : — production by cooperatively providing needed supplies and marketing services.
- 3.6 Participate in and coordinate with the tasks of both government and non-government institutions dealing with rural and community development as well as other development programs in relation to agriculture: irrigation, roads, soil conservation, and the management of forested lands and water resources.

4. Functions and Methods

- 4.1 To disseminate technical knowledge and farming skills to farmers. This will be supplemented by the introduction of fertilizers modern chemical pest control, improved irrigation suitable mechanization, crop diversification and rotation practices, farm management, and marketing training, home economics education and other

things needed to raise the income of farmers and improve rural community life.

- 4.2 To train farmers and rural youth towards leadership in agricultural development. As a result, they will be self-sufficient and able to help each other. The training will be planned also for orientation of the concept of self-organization to assure the stabilization and advancement of their subsistence.
- 4.3 To work jointly with technical institutions in finding probable solution of problems facing farm people. The results will be communicated back to farmers by means of individual instruction, demonstration, group meeting, mass media, and other channels able to reach the farmers.
- 4.4 To organize pre-service and in-service training programs on such fields as: agricultural field services, the role of administrative personnel, techniques of coordination, and effective ways to deal face to face with local people. The training is to provide improvement of technological knowledge and working ability of field workers and administrative officials so that they can exercise their duties with higher degree of efficiency.
- 4.5 To work in cooperation with other governmental and non-governmental agencies in support of rural community development, cooperatives, agri-industry, education, health, sanitation, etc.

5. Plan of Operation

The Department of Agricultural Extension, in order to carry out its responsibilities in harmony and consistent with the National plan for economic and social development organized its work under three main categories with subdivisions as follows:

5.① Plan of General Operation

- 5.1.1 General Operation. To regulate and supervise the performance of duties of the total three thousand officials, employees and other workers.

- 5.1.2 Administration. To provide general services in administration and see that all correspondence, filing and other clerical works have been done in accordance with the Government rules and procedures.
- 5.1.3 Personnel. To take charge in recruitment, appointment, promotion, social welfare and training to raise the efficiency of all officials in the Department.
- 5.1.4 Records. To provide systematic collection of statistics, data and other relevant information for references and for studies of problems and their practical solution.
- 5.1.5 Planning. To be responsible for measures to ensure that all activities are carried out in accordance with plans and projects of the Ministry of Agriculture and Cooperatives, and to coordinate with other ministries, agencies, departments, provinces, organizations or foreign aid institutions whose works are closely related to the activities or projects of the units under the Department.
- 5.1.6 Finance. To control the financing, accounting, receipt, payment and keeping of the money of the Department in accordance with the laws, rules and procedures laid down by the Government; and to administer the earning and spending of the money from the budgetary appropriation and from other sources.
- 5.1.7 Services. To be responsible for securing supplies, material, facilities needed for the operation, and see that the following services are economically provided in accordance with rules and procedures laid down by the Government: hiring other persons to do things for the Department's purposes; provision of supplies, material and facilities for the use of offices; the upkeep of premises, houses, land, supplies, vehicles, equipment, machines and fuel.
- 5.1.8 To supervise and check the activities carried out under foreign aid projects; take charge in the process of releasing officials to attend conference, study, or take study-tour abroad.

Budget

5.2/ Plan for Promotion of Agricultural Production

5.2.1 Promotion Campaign. Field officers will go out to the farm and introduce methods to get higher and better production. Farmers will learn how to get good varieties and upgraded stock for increased crop and animal production, proper methods of cultivation, soil conservation measures and so on. The officers will also provide information on prices and markets as this is considered one of farmers' incentives for taking an active interest in the development of their farm. At the same time field officers will act as a medium through which farm people can send their problems to authorities concerned for an analysis of factors that might be useful in finding a workable solution. Another function of agricultural extension officers is to collect statistics, data for the purpose of agricultural planning in conformity with the national plan for economic and social development.

5.2.2 Demonstration. The main purpose is to disseminate to farmers the results of all studies and experimentation to enable them to learn the know-how by their own trial. The officers will work in the field together with the farmers. The pattern of work is varied according to geographic location and the existing resources of farmers in that area, i.e., knowledge, facilities, capital, labor, etc. Demonstration work will be evenly distributed throughout the country. Each locality will be served according to its significant environmental factors such as, soil conditions, types of crops, rainfall and others.

5.2.3 Orientation of Farm Management. Provincial agricultural officers and technical personnel of the Department of the Agricultural Extension together with farmers and volunteers will apply modern methods of farm management to work out a proper pattern for raising crops and animals. This includes planning the layout of the farm to orderly prepare certain blocks for growing rice, crops, fruit orchards, setting

combined animal farming, building premises; rotation; uses of agricultural by-products; keeping a notebook for recording receipt and payment.

5.2.4 Pest Control. Provide mobile technical advisory units on pest control measures so that farmers can help themselves protect their crops. In cases when they cannot help themselves or the infested area is widely spread, the mobile unit will be at their disposal.

5.2.5 Training for Field Officers. Field officers are given pre-service training before being assigned to cover any area. Then they will receive occasional in-service training for it is important that they have to keep up on current advanced technology. The training is geared to build up their ability and skill so that they are able to render efficient service amidst the changing conditions of the world.

5.3 Plan for Increased Efficiency of Production

At present one field officer has to cover not less than 4,000 farm families. This is obviously too low a ratio of officers to farmers. Thus, it is unrealistic to expect "efficient work" out of the field staff. The training of leading farmers is, therefore, an answer to the question of how to improve the efficiency of agricultural production. The Plan has two main objectives: to train farmers for leadership in their local field, to provide a center of technological knowledge extended to farmers by technical personnel. The working program is generally divided as follows:

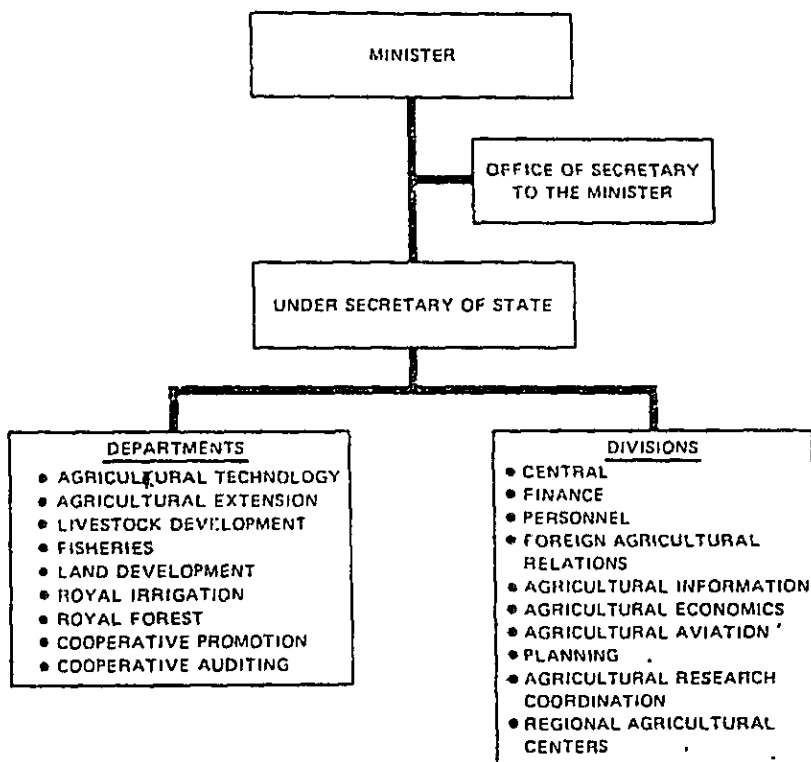
5.3.1 To train farmers in the development of farmers organization or institution. Then introduce ways and means for them to render mutual help in their field, for instances, agro-business, marketing, drawing up a joint working plan with the Bank for Agriculture and Agricultural Cooperatives and other commercial banks that offer agriculture credit.

5.3.2 To train rural youth, both in-school and out-of-school groups, along the pattern practised in other countries or following the existing program called Yuva Kasetkorn (Young Farmer). The training will provide both theoretical

knowledge and practical experiences. Primarily the youth will learn the know-how of certain agricultural activities or those related to agriculture. A further step in this program is to establish an institution offering comprehensive programs for those who decide to continue farming. The youth thus trained will be better able to provide local leadership in the future.

5.3.3 To train members of farm families in home economics as to nutrition, preparation of preserved food, home decoration, uses of agricultural by-products and so on. This is to boost their economy since their home-made products can help them not only to spend less but also to earn more.

THAILAND
 NATIONAL AGRICULTURAL EXTENSION PROJECT
 Organization Ministry of Agriculture and Cooperatives (MOAC)



World Bank-15659

Jan. 16, 1981

14:00 p.m.

Department of the Agri. Extension

1. Outline of Agri. Ex. Service in Thailand

2. History and Progress of Ext. Service

3. Central

Provincial Changwat 71

 Ampere 632

 Tanbor

4. Budget

5. Extension Worker

(1) Classified Number

 Supervisor - Technical supervisor

(2) Qualification for Ext. Worker or Education Level

1. Subject Matter Specialist - Backel or degree

2. Fixed Ex. worker - Technical Agr. College
 former - Vacation School 80%

 Tarban Ex. Officer - Technical Agri. College

6. Extension Activities

Principle Technical knowhow

 former - Collect problem → Agr. Dep.

 Demonstration plot in the field

 original trial plot with researcher

 Subject matter specialist to work



FACTS

Kasetsart University

October, 1980

Agricultural Science

Kasetsart University

Bangkok 9, Thailand

Tel. 5790113 (300 Line ext.), Rector's Office: 5792291/3

Historical Highlights

Created as College of Agriculture under the Ministry of Agriculture, Kasetsart University became a state university on February 2, 1943, comprising Faculties of Agriculture, Fisheries, Forestry, Economics and Cooperative Science. In 1955 came the inclusion of Faculties of Veterinary Science, and Engineering. Faculty of Science and Arts, and Graduate School were established in 1966. In 1969, 1974 and 1980 Faculties of Education, Social Sciences, and Agro-Industry came into existence respectively. A new agriculture-based campus at Kamphaengsaen, Nakorn Pathom constructed under the World Bank Loan Project began instruction in 1979. Though it was the pioneer of the country in establishing agricultural studies on the degree level, its programs are now broad-based with special responsibility in science and technology, and complemented with programs in humanities.

Admission

Admission to the University for new undergraduates is by entrance examination. All applicants must be secondary school graduates. Successful applicants will be placed according to their capability, choice and available quota. Admission to the Graduate School is decided by the Sub-Committee on Admission appointed by the Graduate School to screen individual applications.

Expenses

Tuition 800 Baht, room and board 5,000 Baht, miscellaneous fees 2,200 Baht, totaling 8,000 Baht.

Enrollment

Total	9,660
Agriculture	1,752
Fisheries	273
Forestry	547
Science and Arts	1,200
Engineering	915
Economics & Business Administration	1,580
Education	1,015
Social Sciences	521
Veterinary Science	256
Graduate School	1,601

Student Residences

Twenty units of dormitory capable of housing some 2,400 students on Bangkok Campus, and 16 units capable of housing some 1,550 students on Kamphaengsaen Campus.

Extension Services

University Office of Extension and Training offers vocational training programs for public in the fields of agriculture, engineering, languages, etc., and cooperates with other agencies in arranging training programs for local and foreign officers.

Research

Research is an integral part of the educational program at Kasetsart University. Faculty members in nearly every department work with both undergraduate and graduate students to generate new knowledge, the ultimate goal of research with Kasetsart University Research and Development Institute (KURDI) as the coordinating body. The Institute of Food Research and Product Development (IFRPD) is charged with specific projects aimed at correcting the malnutrition problems development of new products and training of technicians. In addition other affiliated institutions as the National Corn and Sorghum Research Center, the National Swine Research and Training Center, the National Biological Control Research Center, are active with their specific responsibilities. Support comes from government budget, private sectors, foundations and international organizations. There are Central Laboratories to serve research projects at both Bangkok and Kamphaengsaen Campuses.

Library

Total volumes of 100,000 and current periodicals and serials of 1440. It also serves as agricultural library and information center.

University Officers

Phaitoon Ingkasuwan, Rector

Vice-Rectors:

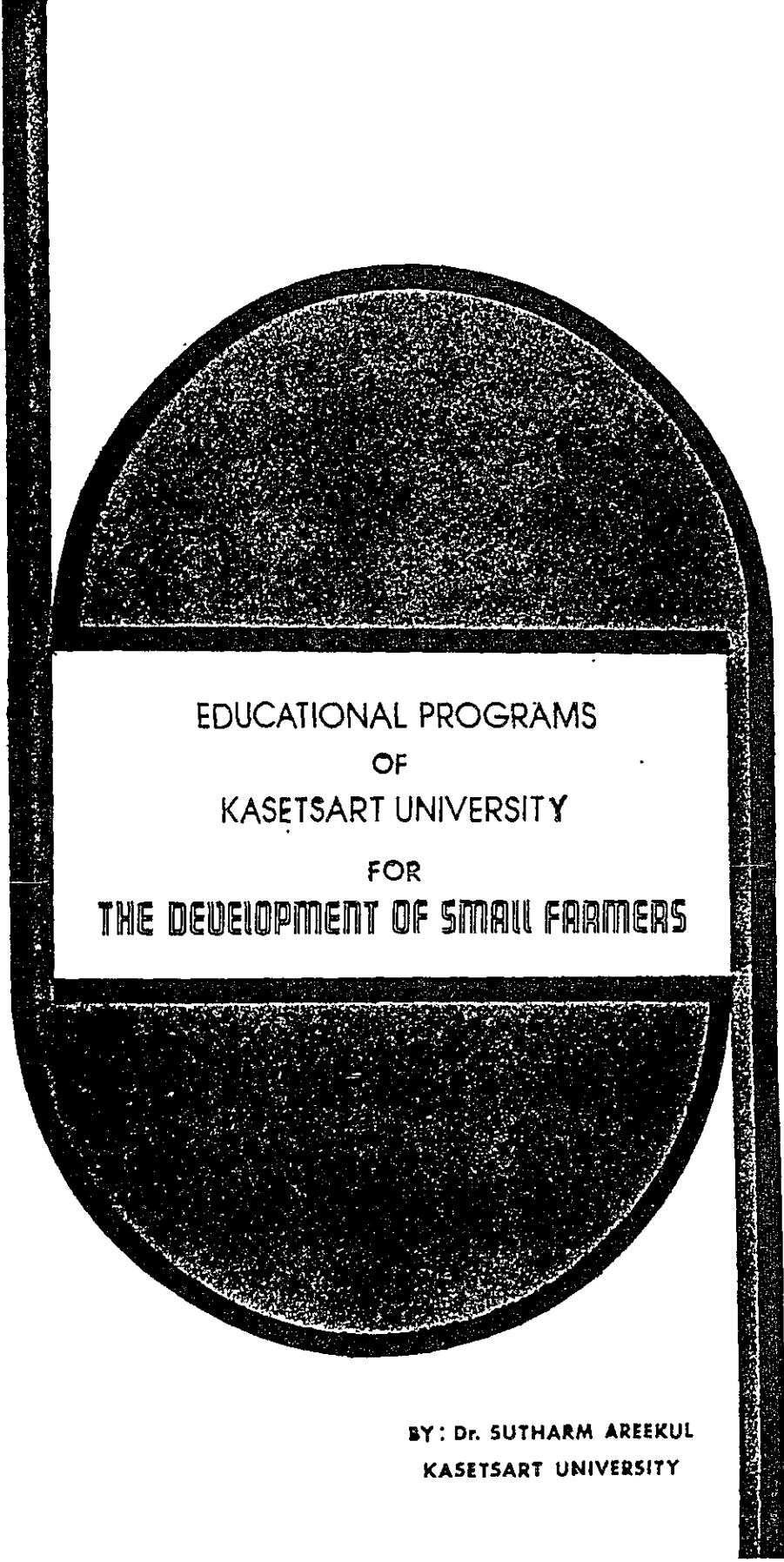
Krisna Chutima, Academic Affairs

Chongrak Prichananda, Business Affairs

Bhinyo Kalayanamitr, Student Affairs

Academic Programs

- B.S. : Agriculture, Home Economics, Agricultural Economics, Cooperatives Marketing, Fisheries, Biology, Mathematics, Science, Psychology, Food Science and Technology, Accounting, Business Administration, Economics, Physical Education, Forestry, Chemistry, Physics, Statistics, Agricultural Education
- B.A. : Home Economics Education, Languages, Geography, History, Sociology and Anthropology, Physical Education, Mathematics, Government, Philosophy and Religion
- B.Eng. : Agricultural Engineering, Electrical Engineering, Mechanical Engineering, Civil Engineering, Irrigation Engineering
- M.S. : Agriculture, Biology, Cooperative Economics, Environmental Science, Food Science, Genetics, Silviculture, Zoology, Agricultural Economics, Botany, Economics, Fishery Science, Forest Biology, Microbiology, Watershed Management
- M.A. : Psychology and Guidance, Teaching, Social Development
- M.Eng. : Civil Engineering, Electrical Engineering, Irrigation Engineering
- Ph.D. : Agronomy, Entomology, Soil Science



EDUCATIONAL PROGRAMS
OF
KASETSART UNIVERSITY
FOR
THE DEVELOPMENT OF SMALL FARMERS

BY: Dr. SUTHARM AREEKUL
KASETSART UNIVERSITY

Educational Programs of Kasetsart University For the Development of Small Farmers

by

Sutharm Areekul

Kasetsart University, Bangkok 9, Thailand

Introduction

Institutions of higher learning in Thailand have been established for different purposes and for performing varied functions. Some institutions are assigned to concentrate their work to a single field, or a small number of tasks, while others are involved in a wider range of assignment. Kasetsart University, as the name in Thai implies, has carried out its function of building up high level manpower in agriculture and played a major role on agricultural development for the nation since its establishment. It has been, and will remain, the major source of teachers and guidance in the development of new agricultural colleges and schools throughout the Kingdom. Today, more than 10,000 graduates in agriculture have been employed in key positions in various organizations, both government and private.

Kasetsart University, however, has long recognized the need to educate small farmers, with small land-holdings, who presently constitute the major part of our agricultural system in Thailand. Their lack of education is admitted to be one of the main factors which prevent them from increasing successfully their agricultural productivity. In general, Thai farmers are highly intelligent and quite efficient in their utilization of scarce resources. By educating them, even with some limitation, farmers will adopt new technical knowledge and practices which will assist them in making agriculture more productive and profitable on their farms, and ultimately raising the nation's economy. In performing this function, Kasetsart University has formulated both formal and non-formal education programs among which several have had either direct or indirect impact on the development of small farmers. Some of these programs will be discussed here in this paper.

Development of Educational Programs in Agriculture at Kasetsart University

The development of educational programs in agriculture at Kasetsart University can best be understood by examining the past history of the university. The predecessor to the Faculty of Agriculture was established back in 1904, as a school of Sericulture, responsible to the Ministry of Agriculture, which at the time put emphasis on this work for occupational improvement. The school was succeeded by the School of Agriculture, and the School of the Ministry of Agriculture, chronologically. In 1928, the

1

College of Agriculture, with the status of a junior college, was set up in place of the former "school", still administered by the Ministry of Agriculture. It offered three-year training programs in agricultural sciences for high school graduates. After being amalgamated into Kasetsart University as the Faculty of Agriculture in 1943, its curriculum was expanded to five-year programs leading to the degree of Bachelor of Science in Agriculture. In the early 1964, the National Education Council redirected new guidelines, in higher education in all universities, to adopt a uniform four-year requirement for all curricula leading to the Bachelor's degree, except certain professional curricula such as Veterinary Medicine which still require six years. The first of the four-year graduates from Kasetsart were granted their degree in 1968. Graduate courses leading to Master Degrees in agriculture have been offered since 1956, and the first group successfully completed their requirement and were conferred their degrees in 1958.

The impetus for the formation of the university thus originated from the Ministry of Agriculture. Its teaching program was tailored to train personnel for the Departments of Agriculture, Forestry, Fisheries, Cooperatives, Livestock, and Irrigation. Over the intervening years more faculties have been added and the program of education has shifted from that of a series of narrow professional schools to a modern university concept. Nevertheless, the idea of "service to agriculture" is still retained in the development of both teaching and research programs.

Degree Programs in Agriculture and Their Impact on Small Farmers:

During its early years, Kasetsart University started with certain three-year curricula leading to a diploma. During this period, the emphasis of the courses was aimed more on practical work, which of course focused tremendously on small farms. The university was mobilized to teach students the ability to upgrade the efficiency of local agriculture. It was concerned mostly with the agricultural practices which were suitable for operation with simple equipment on small farms. Most students, upon their graduation, during that period, worked, mostly, close to the farms. As the number of trained staff and demand for high level manpower increased, five-year curricula leading to the Bachelor's degree were approved. Courses offered for degrees in agriculture, during that period, were orientated toward greater scientific approach. In addition, parts of the curricula of colleges and universities in the Philippines, the United States, Australia and Europe were selected and integrated wherever the university felt they could provide students with wider a scope and appropriate background. It was able, however, to fulfill the requirement of many government organizations that needed agricultural scientists in their work. But, at the same time, it tended to create a shortage of trained manpower that could work effectively on small farms or become good farmers. After the curriculum was changed to a four year

program, more students, resulting from more enrollment, have been graduated which then tended to overflow the scientific manpower demand of government organizations. In recognition of the problem, which the country will face in the near future, Kasetsart University, during the Fourth Educational Development Plan to be effective beginning from 1977–1982, has its plan of changing curriculum content in agriculture including teaching and learning styles so that it can produce graduates with much more practical knowledge and skills. It is expected that the program will have a great impact on the building up of well trained manpower to serve small farms for the country, in the near future.

Development of Educational Programs in Agriculture for Small Farmers

Education programs in agriculture for small farmers at Kasetsart University were initiated, when the late rector of the university, Dr. Luang Suwan Vajokasikij, launched an extensive adaptive research program in poultry production on the university campus in 1947, and concluded his findings in 1950. His success, and lessons from it, were broadcast almost daily by radio, and published in many newspapers and journals. A campaign for profitable poultry production was made through a mass farmer education program, which was then developed along the lines of a large demonstration plot which was installed within the university campus. These activities resulted in rapid development of egg and broiler production in the country. The nation moved rapidly from being a net importer of poultry products to self sufficiency, and an exporter, to a certain extent. The Rector's success brought to the university a new task,—the task of providing technical services to meet the needs of less educated farmers, and interested public. The university started to perform this task on a broader scale in 1953, and the work has been carried on by a group of staff members, recruited mostly from the Faculty of Agriculture. Subsequently, the Office of Extension and Training was officially established in 1970. This Office has similar status to that of a faculty, and its main functions are to pass on new technical knowledge to farmers and the public, to serve as the public relation and communication unit of the university, and to coordinate extension training programs of various subject matter fields, as our service to the community.

Many non-degree programs, and non-formal education, in agriculture and its related fields, have been developed since 1953. These programs are aimed at developing simple vocational and training courses in which any interested individual can attend without regular requirements of a higher educational background. A certificate is granted to each individual upon his completion of each course. Some of these programs will be described and discussed in this paper.

Summer Vocational Courses in Agriculture and Its Related Fields

Summer vocational courses in agriculture, and many related fields were begun in 1953. At the beginning, they had as their purpose to educate

strictly farmers with simple agricultural techniques so that, upon their return home, they could make a good progress in their Farm careers. The courses have been offered during the summer period, when the season is dry, and farmers can leave their farms. Only five courses, poultry production; dairy farming; apiculture; vegetable production; and food preservation were tried the first year, with 404 farmers attending. Later on, however, admission had to be expanded to include the general public because of interest and demand, and to expand the nature of courses including professions other than agriculture (see Appendix 1).

The courses given were intensified and were scheduled to conclude within four to five weeks beginning the first week of April, annually. Participants are required to attend at least a minimum of 30 total contact hours before they can complete, satisfactorily, each course, and become eligible for the course certificate. We permit each individual to take not more than any two courses each summer. Many of them, however, return regularly to enrol in quite a number of courses, some up to 14, within a number of years.

From its beginning in 1953 to the present time, a total of 9,848 have passed, and received their certificates through this program. It is considered to be one of the most successful program for educating farmers and the general public. Many small farms, particularly vegetable, flower, poultry, and swine farms, have been developed successfully by those who have completed one or more courses from this program. It should be noted here, from the data in Appendix 2, that the number of courses and participants increased markedly during the period from 1972-1976. The increase resulted from the enlarging of the program by the university to serve the demands of farmers who came in groups to attend classes, which had been designed to meet their requirements and purposes.

Program of Training Courses in Specific Areas of Agriculture

Kasetsart University has developed many training programs in specific areas in agriculture for small farmers and the public. These have been done through the cooperation with governmental units, societies, farmer groups, and private organizations. Some of the program are regular in that they are offered every year, while many others are non-regular, depending on the requests and needs of cooperative units. One program, which is a good example of having a great impact to the nation's economy, is described below.

The Orchid Culture Training Program

The Orchid Culture Training Program was developed through cooperation between Kasetsart University and the Orchid Society of Thailand. It depicts an excellent cooperation between a private society and the university. The program was initiated in 1963, by the present Rector of Kasetsart

University, Professor Rapee Sagarik, who at that time worked actively in the Horticulture Department, and at the same time, was appointed the President of the Bangkok Orchid Society. It was aimed to promote orchid growing in Thailand, for pleasure, and for profit. The training program has covered a wide area of orchid cultivation, ranging from general topics of growing, to new sophisticated techniques of tissue culture (see Appendix 3). It takes at least 70 hours to complete the course. Staff members teaching in this program are recruited from many departments, including Horticulture, Soils, Entomology and Plant Pathology. Lectures are given off campus where the participants can reach the class easily, and are held after office hours from 5.00–7.00 p.m. Laboratory work is given on holiday, which may be either Saturday or Sunday. Field trips to orchid farms to study various problems in each farm are often organized during the course. Since the beginning of the program in 1963 to the present date, there have been 2625 participants, and 2403 have received their certificates.

The program has had a great impact on orchid cultivation and production in Thailand. Many orchid farms, ranging in size from one-sixth of a hectare to ten hectares or larger, were established, by individuals after they completed the course. Consequently, the production of cut-flower orchids has increased, and put Thailand to the forefront of the world market, in orchid production. One of the most important features, in this training program, is the establishment of a cooperative and communication unit in each class. Upon the completion of the course, a chairman and his executive committee are elected and they serve as an administrative and cooperative committee for each class. They disseminate information and establish communication among classmates. This activity has resulted in the creation of the Orchid Society of Thailand, and was followed by the development of its satellites, which comprised more than thirty local orchid societies and clubs at the present time.

The enrollment in this program has increased, year by year, from a beginning of 37 in 1963, to more than five hundred participants in 1973. In order to serve the enormous demand of growers, Kasetsart University in cooperation with the Ministry of Education launched a similar program at the ministry in 1972. The contact hours required in this course are 38, and since its opening, 656 persons have completed this course.

Extension of Training Programs to Rural Areas:

In its attempt to educate farmers in the rural and remote areas, Kasetsart University has developed a number of training programs in crop and animal production for farmers wherever it has sufficient facility and feasibility for increasing their production and raising their living standard in each area. In order to avoid a lengthy discussion, only three of the programs which exemplify some different approaches, and nature, will be discussed here.

Mushroom Cultivation and Production Training Program:

This program was tried in 1975 through cooperation between Kasetsart University, the Department of Agricultural Extension of the Ministry of Agriculture, and the Office of the Provincial Administrative Board of the Ministry of Interior. Four representative locations, in the northern, northeastern, southern and central parts of the country, were selected as centers of this training program. It is a campaign to promote mushroom production in the Kingdom. It has its aim to encourage farmers and public in the areas to utilize agricultural wastes available commonly for mushroom production. It is hoped to help farmers earn extra income, raising their standard of living, and ultimately helping the nation to increase its economy through the export of mushrooms.

Announcement of the course was made through radio, and T.V., and attendants were drawn on voluntary basis. It is a ten-day training course (see Appendix 4) which, according to the results concluded from evaluation sheets, showed a high degree of success (see Appendix 5). Five hundred and fifty six persons were trained, and farmers constituted a high percentage in each class. More than 50% of the attendants showed their interest in developing mushroom production as a profession. It is interesting to note, here, that on our latest visit, we found that some farmers who received training from the course have produced even better looking stock culture, and spawn than the staff themselves. Some even get better production. They have combined their newly gained technical knowledge with their existing experience to make quite rapid progress in their work.

It should be mentioned here also that undergraduate students have participated extensively in the mushroom training program. The Mushroom Club was organized and established in 1973, by a group of 20 to 30 students. Under the advice and guidance of staff members of the Faculties of Science, Agriculture, and the Office of Extension and Training, they began to offer practical training to farmers, and the public from areas around Bangkok since 1974. Up to the present, a total number of 1946 individuals have been trained by the Mushroom Club. Because of this excellent activity, the Club won the award of "Distinguished Extension Service to Community for the Year" in 1975.

Corn and Sorghum Training Program

The National Corn and Sorghum Research Center, established in 1966, through cooperation between Kasetsart University, the Ministry of Agriculture and the Rockefeller Foundation, has long been used as the center of corn and sorghum research and training of scientists both within, and outside the country. It is used in training extension service personnel of the Ministry of Agriculture and other government agencies. Starting this year, it opens its door for training to farmers directly. Recognizing the many problems that farmers have faced in growing corn and sorghum,

particularly the increasing problem of downy mildew disease in corn in many areas of the country, Kasetsart University has taken a further step in utilizing the Center. That is to directly educate farmers and familiarize these people with new techniques of growing corn and sorghum, the disease and insect pest problems, and the means and ways to control them.

Farmers who are potential leaders of the farmer groups in each district were selected from various provinces of each part of the country. They comprised 40–50 people attending the ten–day course at a time. This year a total number of 134 persons has completed the course. The training program has been so designed that it is orientated toward solving of common problems which farmers must face in the region, and these vary from region to region. Since each group comes from the same region, it also permits the farmers to get know each other and some cooperative organizations among these farmers have been developed, after the course completion.

Swine Production Training Program

One of the main purposes in establishing the National Swine Research and Training Center in 1972 at Kamphaengsaen, Nakorn Pathom Province, is to educate farmers throughout the country in swine production. The Center has been operated by Kasetsart University in cooperation with the Department of Livestock Development, Ministry of Agriculture and Cooperatives. Rockefeller Foundation has given some assistance to this program enabling the University and the Department to accelerate the center development so that in 1975 it was able to start the training programs for farmers. It began with the training of a teen–age group, selected from farm families in the surrounding areas near the center who had some experience in raising swine. It is a 160–hour training course which is divided into 60 hours for attending lectures and 100 hours for practical training. The first group comprised forty–five young men and women who, upon the completion of the program, have further helped the Center by establishing demonstration plots on their own farms. In this way they help greatly in extending new techniques and knowledge among their neighbors.

Direct training for farmers was begun last April when 30 of these young people attended the course. They were selected from Nakorn Pathom province, and neighbouring areas. The program was extended to farmers, from other parts of the country, when the second course was held later on in June. It is expected that up to 300 farmers will come under this training program, each year, during the next five–year period.

Radio and T.V. Programs:

Kasetsart University, at present, operates four radio broadcasting stations, located in four different parts of the country. This broadcasting system pretty well covers the Kingdom. Since the establishment of the first

station, agricultural education directed towards farmers in rural areas has occupied 15% of the total hours of operation. It is planned to increase this allotment to 20% in the near future (not including education in other fields). It should be mentioned here that the majority of farmers in Thailand can now afford to own, one or two regular, radios, or transistor sets. The K.U. radio stations are quite well accepted by our farmers and have become the focal point for farmers to make a contact with, whenever they have problems. A section of questions and answers to various problems in agriculture has been added and broadcasted daily by every station.

Kasetsart University has also cooperated with a T.V. station to organize an agricultural education program for farmers and public since 1970. The regular program is one hour per week, but in many cases, special arrangements have been made, whenever a new discovery of science and technology in agriculture has been announced by the University.

Agricultural Fair and Conference:

Kasetsart University, in cooperation with the Ministry of Agriculture and Cooperatives has organized the "Kaset Fair" (Agricultural Fair) as a means of education for farmers and the public since 1948. It is held on the University Campus once a year, now in the first week of February. Earlier, the Fair took five to seven days, but later on seven days has become standard. With the cooperation of the Ministry of Agriculture and Cooperatives and other government organizations, farmers gain much more knowledge and experience by visiting and participating in the fair. Some of the activities included are, exhibition of new plant and animal materials, agricultural equipment and machinery, and newly developed techniques of agriculture and its related sciences. The Agricultural Science Conference has been incorporated into the Fair in 1956. It welcomes not only scientists, as participants in this meeting, but also farmers as well. In every conference held during the Fair, there are always discussions on the immediate problems of agriculture. It usually attracts a large group of farmers leading to a lively and valuable discussion between farmers and scientists.

National Education Development Plan and the Future Role of Kasetsart University for the Development of Small Farmers.

The Fourth National Education Development Plan which will become effective between 1977 to 1981 has placed its emphasis, among the ten-point major policy, that the role of non-formal education to benefit the community should be enlarged by all institutions of higher learning. It is also recognized that small farms will continue to constitute one of the most important components of the agricultural system of the country. The majority of farm land holdings lies between 2-5 hectares (see Appendix 6) as of 1974. With increasing population, it can be only expected that the size of farm landholdings will become less in the future. It is unavoidable, then, that farmers

need more and more to improve their agricultural productivity in order to survive, and to increase their standard of living. They cannot do this without learning and adapting new techniques to operate their farms. National economic development still depends heavily on farm productivity, and hence on how well small farmers have been educated. Realizing the importance of this task, Kasetsart University has taken a further step in strengthening non-formal education programs for small farmers through the establishment of a new institution, namely the Institute of Agricultural Research and Development. Under this new organization, all student training stations will be improved and developed to incorporate the task of educating and training small farmers. It is an outreach program of the University to improve the standard of living of small farmers in rural and remote areas where our stations are located. Each station will have adaptive research programs, with crops and animals, orientated toward those that can be produced and provide greater sources of income to the region. The stations will have all essential facilities to meet the needs of appropriate training programs for farmers, within the regions, in various fields. Besides, the University will hopefully play a major role in educating farmers in specific areas under the National Land Reform and Forestry Villages Programs, which have recently been launched by the Government. This will be a great task, and provides a greater for the University in the near future.

APPENDIX 1

Vocational Courses Offered by Kasetsart University to Farmers and Public from 1953 to 1976.

Courses	Year Initiated	Total Year Offered	Total Participants Completed
Plant Propagation	1957	16	700
Orchid Culture & Production	1957	17	1318
Olericulture	1976	12	210
Rose Gardening	1973	2	40
Soil for Home Gardening	1976	1	17
Vegetable Gardening	1953	7	163
Cocount Palm Cultivation	1954	5	44
Principles of Agronomy	1958	1	8
Fertilizer and Its Application	1961	13	289
Apiculture	1953	3	161
Animal Preservation & Stuffing	1964	3	51
Insect Pests and Their Control	1961	6	117
Principles of Plant Pest Control	1975	1	21
Sericulture	1974	1	13

Courses	Year Initiated	Total Year Offered	Total Participants Completed
Dairy Production	1953	5	87
Swine Production	1958	8	144
Poultry Production	1953	22	1297
Poultry Breeding	1958	1	18
Meat Products	1958	8	241
Artificial Insemination	1958	3	34
Beef Production	1957	2	40
Diseases of Poultry & Swine	1971	1	45
Principle of Fish Culture	1958	9	361
Mushroom Culture & Production	1972	5	524
Food Technology	1976	1	26
Home Canning	1953	11	398
Home Bakery	1958	4	134
Home Cooking	1958	4	199
Snack Cooking	1960	8	567
Handicrafts	1957	10	244
Flat Pattern & Clothing Const.	1957	12	269
Flower Arrangements	1963	12	282
Home Dyeing & Hand Printing	1973	4	75
Artificial Flower Making	1973	1	20
Waste Materials for Craftworks	1966	4	67
Preservation of Agr. Products	1972	5	178
Writing Agricultural Information	1957	1	12
Extension Works	1957	1	10
Public Speaking	1973	3	84
Thai Astrology	1975	2	78
Photography	1999	5	92
Rural Development	1973	1	12
Industrial Media Production	1960	2	17
Cooperative Management	1960	2	16
Principles of Statistics	1959	2	16
Farm Management	1970	1	33
Principles of Accounting	1959	2	19
Economic Insurance	1959	5	156
Typing	1959	6	163
Business Communication	1974	1	36
Labour Relations	1975	1	30
Introduction to Law	1975	2	31
Principles of Irrigation	1958	5	85
Reinforced Concrete	1966	1	24

Courses	Year Initiated	Total Year Offered	Total Participants Completed
Home Electricity	1958	2	41
Home Water Systems	1963	2	56
Welding	1958	2	27
Design of Timber Structures	1965	2	49
Auto Mechanics	1974	3	61
Drawing and Building Construction	1974	2	42
Radio Repair and Maintenance	1975	2	50
Engine Maintenance	1976	1	40
T.V. Installation & Maintenance	1976	1	33
Modern Dance	1975	1	34
Basic Dance	1976	1	36
Child Psychology	1976	1	12
English Conversation	1976	1	44
French Conversation	1976	1	7
Total 68 courses	24 years	—	9848

APPENDIX 2

Number of vocational courses offered, and participants attended from 1953 to 1976

Years	Number of Courses Offered	Number of Participants Completed
1953	5	404
1954	4	92
1955	5	165
1956	4	207
1957	11	403
1958	16	353
1959	16	509
1960	13	354
1961	15	299

Years	Number of Courses Offered	Number of Participants Completed
1962	12	246
1963	10	293
1964	12	226
1965	12	200
1966	13	329
1967	9	249
1968	9	232
1969	11	278
1970	9	399
1971	9	386
1972	12	581
1973	15	856
1974	17	929
1975	22	873
1976	30	985

APPENDIX 3

Outline of Training Course Orchid Cultivation & Production

<u>Title</u>	<u>Contact Hours</u>
History & Importance	2
Classification	2
Origin	2
Nomenclature	2
Orchid Genera	2
Anatomy	2
Pollination	2
Seed Germination	2
Seedling Transference	2
Vegetative Propagation	2
Tissue Culture	2
Factors Affecting Growth	2
Water Quality and Watering Method	2

12

<u>Title</u>	<u>Contact Hours</u>
Nutrition	2
Animal Pests	2
Diseases	2
Nursery Construction	2
Caring of Orchids at Different Stages	2
Caring of Orchids at Different Seasons	2
Growing of Paphiopedelum	2
Growing of Dendrobium	2
Growing of Cattleya, Cymbidium, and Oncidium	2
Growing of Vanda	2
Growing of Rhynchostylis, Aerides, and Ascocentrum	2
Growing of Phalaenopsis	2
Growing of Arachnis and Renanthera	2
Growing of Orchids of the Minor Group	2
Orchid Exhibition and Contest	2
Laboratory Exercise	20
Study Tours to Orchid Farms	

APPENDIX 4

Outline of Training Course Mushroom Cultivation & Production

1. History & Biology	2 hours
2. Preparation of Agar Media for Stock Culture	3 hours
3. Tissues Isolation	3 hours
4. Composed Media & Methods of Preparation	3 hours
5. Methods of Producing Straw Mushroom Spawn	3 hours
6. Growing of Straw Mushroom	3 hours
7. Methods of Producing Oyster Mushroom Spawn	3 hours
8. Growing of Oyster Mushroom	3 hours
9. Methods of Producing Tricholoma Mushroom Spawn and Its Cultivation	3 hours
10. Methods of Producing Auricularia Mushroom Spawn and Its Cultivation	3 hours
11. Methods of Producing Spawns of Coprinus and Champignon and Their Cultivation	3 hours
12. Methods of Making Wine and Vinegar	3 hours
13. Poisonous Mushrooms	3 hours
14. Study Tours to Mushroom Farms	—

APPENDIX 5

Professions of Participants in the Mushroom Culture Training Courses, 1975.

Professions	North %	North East %	South %	Central %
Farmers	25.95	27.38	21.61	78.80
Merchants	14.50	17.86	11.56	2.77
Students	19.08	9.52	7.03	0.92
Government Employee	32.06	33.33	46.73	16.59
Labour	2.29	5.95	4.02	0.92
Others	6.11	5.95	9.05	0.00

Evaluation on the Usefulness of Courses Given by Participants

Degree of Usefulness	North	North East	South	Central
Excellent	17.19	20.99	11.06	10.00
Good	39.06	39.27	40.20	37.23
Fair	42.19	38.27	44.22	45.33
Poor	0.00	1.23	0.50	3.19
Very Poor	0.00	0.00	0.50	0.00
Not Response	1.56	0.00	3.52	4.26

APPENDIX 6

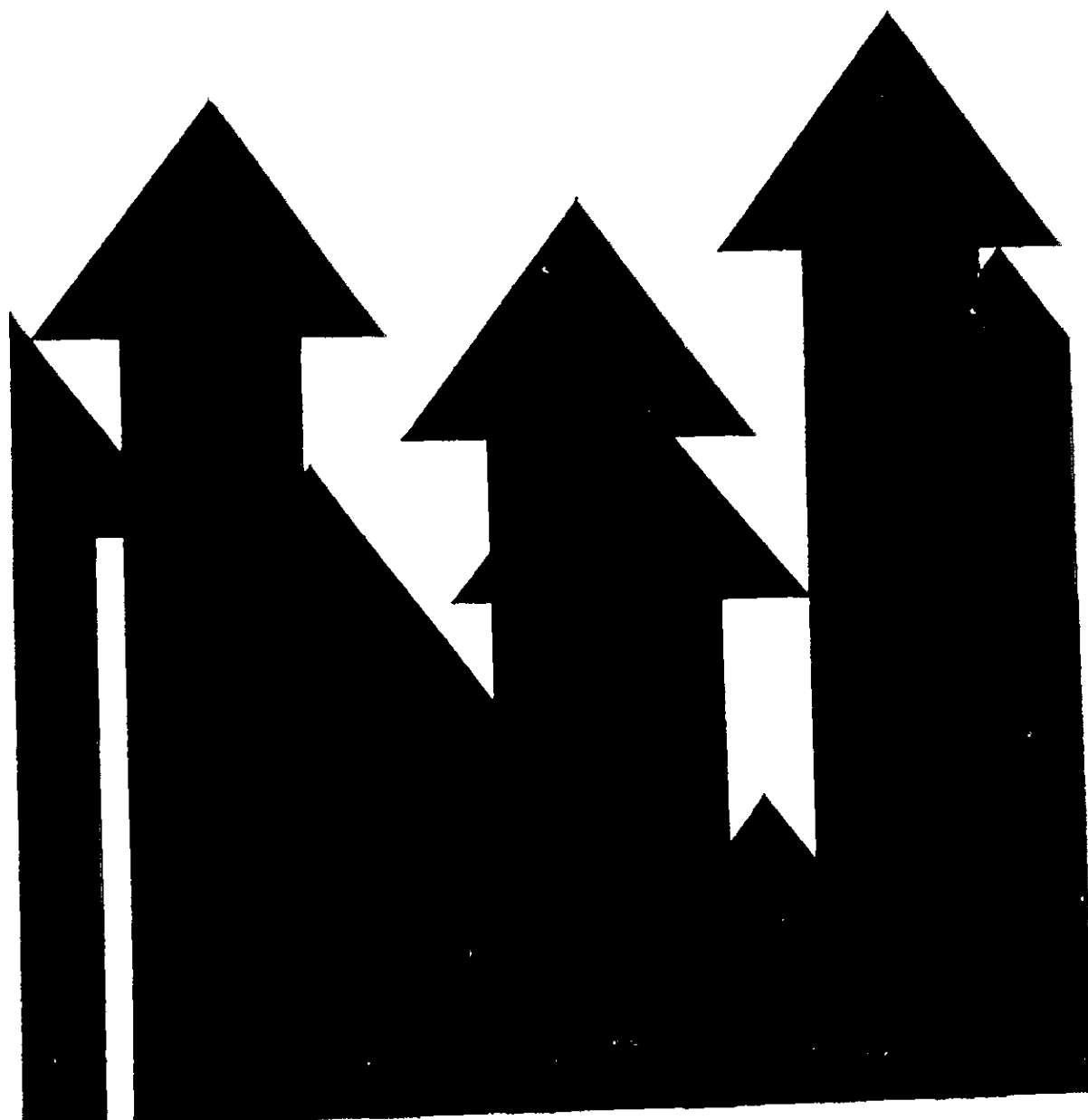
Farm Land Holdings in Thailand, 1974

Size of Farm Land Holdings (in hectares)	Number of Farm %	Farm Size %	Aver. Area Per Farm (in hectares)
>0.30	1.60	0.05	0.14
0.30-0.94	6.33	0.83	0.65
0.95-2.39	22.48	7.49	1.65
2.40-4.79	30.16	20.97	3.45
4.80-7.19	18.01	21.02	5.78
7.20-9.59	9.88	16.40	8.20
9.60-22.39	10.77	27.87	12.89
>22.40	0.82	5.37	32.82

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POST-GRADUATE STUDY AND RESEARCH IN THE EDUCATIONAL SYSTEM IN THAILAND

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Introduction

Educational organizations in Thailand are governed by three ministries. Primary schools are under the control of the Ministry of Interior while secondary schools, high schools, and technical or vocational colleges are under the jurisdiction of the Ministry of Education. Universities and institutes of higher learning, both state and private, are under the supervision of the Bureau of University Affairs. This does not include some specialized or professional training institutions which are under the responsibility of ministries and other government organizations. The Office of the National Education Commission has been established to make a policy guidance and cooperation among organizations within the national education system.

Universities and institutes of higher learning in Thailand have been established traditionally for different purposes to perform different functions. Some institutions have been assigned to limit their responsibility to certain academic areas while others have a wider range of responsibility. Today the institutions which used to be oriented toward certain specialized fields of study are moving toward the concept of multiversity; nevertheless, they still maintain their identity in their former specialization.

Under the above context, post-graduate education which is operated solely by universities or institutes of higher learning may have different emphasis depending on the policy-makers in each institution. On the other hand, the direction of research which is a part of the post-graduate programs is influenced by staff members whose past academic training is indicated in the quality of research and the quality of graduates. All of these and other factors within the educational system will effect the building of qualified manpower and the social and economic development of the nation. This report is intended to summarize the trend of post-graduate education in Thailand and to reflect on research in higher learning institutions which will be undoubtedly vital to the social and economic development of the country in the future.

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Post-Graduate Study in Thailand Educational System

Development

Post-graduate study was developed in Thailand before 1960. During that period it was organized independently within one or two universities where advanced training of personnel in certain academic fields was very much in need. It was not until 1962, when the first graduate school was established in a university and successively followed by others. At present, there are ten universities and institutes which have post-graduate programs in operation. Nine of them are under the Bureau of University Affairs, while the rest is organized under the international organization (see Table I). Of these ten universities and institutes, only six have set up their graduate schools or centers, while the others depend mainly on their faculties in each specialized area. Among these, only five offer doctoral degree programs. The trend of post-graduate study for doctoral degrees in Thailand is increasing. The number will be increased to six in the near future.

Post-Graduate Education System

Degrees granted at the post-graduate level include higher certificates, master's and doctoral degrees in various specialized academic fields of study. The minimum requirement for residence is 1 year, and 3 years respectively but usually for a student it takes more than 1, 2 and 5 years respectively to complete the program of study. The credit system has been practiced in all universities and institutes which offer post-graduate programs. The credit-hour requirement in course work for graduation may vary from institution to institution and from field of study to field of study. Generally, education, social sciences require more credit hours than pure and applied sciences. However, minimum requirements excluded thesis are 20, 30, and 60 credit hours beyond the bachelor's degree for higher certificates, master's and doctoral degrees respectively. A thesis or research paper is required for the fulfillment of master's and doctoral degrees. The number of candidates may vary. In some instances the credit requirement for a thesis is flexible according to the approval of the thesis committee appointed by the graduate schools or responsible faculties. At present, there are 44, 174, and 16 subjects from which students may choose to study for their higher certificates, master's and doctoral degrees respectively.

All of post-graduate programs must be approved by the Bureau of University Affairs. The Bureau appoints committees which consist of members specialized in related academic areas from other universities and institutions. The committee will review each program so that standardization could be reached. Accreditation has been practically conducted not only by the Bureau but also by the Civil Service Commission. Some of the graduate programs have been developed under the inter-university cooperation. Transferring of credits is practiced among state universities and institutes. Interchange of lecturers and students are also common at the post-graduate level.

Post Graduate Enrolment and Fields of Study

The number of post-graduate enrolment from 1973-1977 and that of graduates from 1972-1976 in all universities and institutions in Thailand, except AIT, are presented in Table 2. It is evident that there has been an increase in number of post-graduate enrolment while the number of graduates is declining. On the average, the total post-graduate enrolment is 7537 per year and the number of graduates is 1425.4 per year. The analysis of this data which appears in Table 3 indicates that the number of graduates is highest in the field of education, that is, 32.10% of the total number, and in the social sciences, which is 28.96% of the total number. The number of graduates in fields of study is decreasing in the following order: medical sciences, natural sciences, humanities, agriculture, engineering, law, and fine arts. On the enrolment side the highest is social sciences, which is 42.42% of the total number. The second highest is education which is 19.87%. The enrolment in other areas ranges from high to low consecutively as follows: natural sciences, engineering, humanities, law, medical sciences, agriculture, and fine arts.

From this figure, it can be seen that the output of post-graduate education in many areas which are vital to the development of the country's economy such as natural sciences, engineering, and agriculture, is considerably low.

Future Plan

Recognizing the need of the country for highly qualified manpower, the Bureau of University Affairs has set up, in the Fourth Five-Year National Education Development Plan, a nine-point policy,

one point of which is that all state universities and institutes should strengthen their post-graduate programs and stabilize the undergraduate programs. This policy has been well accepted by the National Education Committee and the National Economic and Social Development Council. As a result, the enrolment target for post-graduate education was set in the Fourth Five-Year National Education Development Plan of 1977-1981. According to the plan, from which the data are summarized in Table 4, it is indicated that the post-graduate enrolment will be increased up to 12,506.6 per year. Although there is not much change in the basic distribution pattern occurring in the past five years, there is an increase of enrolment in such areas as agriculture, natural sciences and medical sciences. However, whether this target of enrolment could be accomplished is doubtful. There is an indication, at least in the first year of the plan, i. e. in 1977, that the post-graduate enrolment in all state universities and institutes was far below the set-up target, especially in the fields of social sciences, agricultural and medical sciences.

Research in Universities and Institutes of Higher Learning

Historical Background

Research is defined by law as one of the four functions of the universities and institutions of higher learning. However, prior to 1940, most universities were unable to perform functions other than instruction. After 1940, some universities began to put emphasis on research by incorporating research study in the instructional programs. This resulted in a thesis requirement for students enrolling in the five-year undergraduate programs in agricultural sciences. The practice was abandoned when the Bureau of University Affairs was established and called for standardizing of four-year baccalaureate programs for all universities in 1964. However, there are some professional areas such as architecture, pharmaceutical sciences and fine arts which maintain their five-year programs and, in almost all cases, the special problem course is required for all fifth year students. A submission of a research paper is also required as a fulfillment of the course and the program.

Starting in 1950, many faculty members in areas of agricultural, medical, and natural sciences were sent, under the support of the Thai

government and foreign aid, to study in the developed countries, particularly in the United States. They brought back advanced knowledge in their own content areas as well as research methodology. Later, assistance was broadened to other such fields as education, economics, and social sciences. Following the establishment of the post-graduate programs, faculty members increased active participation in research. During this period, the government did not fully realize the importance of highly qualified manpower in universities and institutes of higher learning. As a consequence, it did not utilize what these faculty staff had to contribute to the development of the country through their research. It happened in some cases, for example, that an institute had to acquire loan for research. Most universities during that period relied heavily on foreign aid funds for their research. Since most foreign aid not only demanded as much as half of the counterpart fund from the Thai government but most importantly required that it be committed to hiring experts from the donor countries, it became a tradition then to ask for foreign aid in order to get research grants as well as to build up their highly qualified manpower through the scholarships or fellowships.

The recognition of the Thai Government that the university has an important mission, that of researching, began in the year 1964, in which a certain amount of budget was allocated to some universities under a separate item and not included in the operational and development funds. Since then the budget for research allocated by the Thai government has been increased and not limited to research but also to the development of institutes supporting research as well as graduate student scholarships and fellowships. At present there are a number of institutes established within the state universities to conduct research. The list of these institutes is shown in Table 5. All of these institutes possess faculty status and play active roles in research in their specialized areas. It should also be mentioned here that universities that are highly specialized in agriculture have experiment stations which are located in various areas of the country. These experiment stations perform research tasks and are laboratory grounds of research for post-graduate students. They are as important as hospitals are to medical students.

Research Fund and Allocation

Allocation of the research budget to universities by the Thai government has been comparatively low. The data in Table 6 show that in the past 3 years, the Bureau of University Affairs received research budget ranging from 3.70–4.05 per cent with the average of 3.91 per cent out of the total budget. ~~The Ministry of Agriculture~~ received the most which was, on the average, 47.47% of the total budget. The analysis of the fund for different research areas which is shown in Table 7 indicates that the emphasis was placed more on sciences and technology than social and related sciences. It is also revealed as indicated in Table 8 that, on the average, 41.39% of total fund were granted for agriculture and natural science research, 26.46% were granted for engineering and industry. The areas which received more than 5% of the total amount included economics, medical and social sciences.

The research fund granted by the Bureau of University Affairs to research under the responsibility of universities and institutes followed a similar pattern of the total research fund provided by the government (see Table 8). It did put strong emphasis on agriculture and natural sciences. The major difference was in philosophy, political and social sciences which were in better positions than others.

Allocation of the research fund by the government may not be relevant to the qualified manpower existing in each organization. Results of the survey on scientific and technical manpower of the National Research Council in 1973 showed that the number of qualified research personnel, using higher degrees, master's and doctoral as an index, in higher education institutions was far higher than in other general government service sectors (see Table 10). The number of qualified faculty members which increased rapidly in the past five years (see Table 11) results in an increasing number of human resources for research within the institutes of higher learning. It is the shortage of the research fund received by the Bureau that forced faculty members to seek for outside assistance. At the same time, it appears that a large number of faculty staff, especially in sciences and technology, refuse to accept post-graduate students under their guidance. The reason is simply because of the high

expenses of research for thesis. It is a burden not only to the department but also to the faculty members concerned.

Supportive Organizations

There is a number of government organizations outside the Bureau of University Affairs which provide financial aid or physical facilities for graduate students to conduct their research. Among these organizations, the National Research Council is the most important one. Each year the Council grants research funds not only to researchers but also to graduate students. The magnitude of this assistance is shown in Tables 12 and 13.

It can be seen from these tables that within the past five years, more than 80% of the projects and financial aids were granted to universities. The number of projects and funds available increased year by year. The data in Tables 13 and 14 indicate that there was an excessive competition among graduate students to get grants from the NRC, and, on the average, only 64.32% of the requested proposals received grants. The fund available each year was low, and, on the average, 25.59% of the total proposals were granted assistance. For all organizations, the percentage received is not beyond 25%. (see Table 15).

The assistance given by other government institutions is usually in the form of the provision of physical facilities to faculty and graduate students. Such assistance is generally originated from part-time or affiliated staff members who are attached to the offices or departments of various ministries. They are appointed by universities to be graduate thesis committee chairmen or committee members. They normally allow students to use their laboratories for research work. Such practices are common in departments of the Ministries of Agriculture, Industry, Education, and Public Health.

Foreign Aid

Foreign aid for the post-graduate education and research come in various forms. The Rockefeller and Ford Foundations are among the organizations which have played important roles in the development of post-graduate education and research in Thailand. The former philanthropy has placed its emphasis on medical and agricultural sciences

while the latter is orientated toward social sciences and humanities. The technical assistance at the governmental level is given by international agencies, such as the United Nations Development Program, the Colombo Plan, the US AID, the SEAMES and other donor countries. It is given in the forms of scholarships for further study and advanced training, services of experts, and equipment. In addition, private programs at the institutional level have been arranged with other Western and Asian institutions.

Concluding Remarks

Post-graduate education has been initiated by faculty members from academically strong departments where physical facilities are also available. There are no definite government policies to direct institutes of higher learning to produce highly qualified manpower in specialized fields vital to the country's economy. There is no major investment directly in post-graduate programs, particularly in the fields of sciences and technology. Those which have already been developed depend heavily on the surplus resources left from the baccalaureate degree programs. The rapid increase of highly qualified faculty members results mainly from foreign aid which has helped to accelerate the development of post-graduate education but the lack of financial resources in research has hindered the growth particularly in the areas where the graduate thesis requires a large amount of financial support. As a result, post-graduate education may not fulfill the social demands of the developing country for more experts in areas of sciences and technology for the development of the country's economy. With this regard, it is necessary for Thailand to review post-graduate programs in the Fourth Five-Year Educational Development Plan which is being implemented in the country.

When Thai staff members educated in highly developed countries overwhelm those educated in developing countries, they create some problems in the educational system. This may also be true in other Asian countries. Without research, they lack the experience in solving problems in the country. As a result, they try to direct education and research programs which are not relevant to the country needs. In many cases, they have created more problems rather than solved them. It is a great loss to the country in terms of brain power which has sometimes been overlooked

by many of us. In this case, post-doctoral training as well as intern training programs organized by senior scientists will be very useful for the country.

Post-graduate students should be regarded as a high-valued brain-power resource of the country. They have helped in the solving of problems in many ways. Their research findings in many cases are useful and have sometimes been a great impact to correct the social problems or improve the national economy. This can be seen from journals and literatures in developed countries where research papers occupy a large part of publications. They have expanded the scope of work of their professors which in turn accelerate the growth of scientific knowledge for the benefit of the country. Poor quality thesis and poor quality post-graduate programs should be regarded as a big loss to the country and such loss should be examined.

It is important for Thailand to make most use of graduate students as well as to turn out only graduates with best quality. They should not be regarded as an expensive investment because the rate of return of social benefits will always be greater. Planning research investment should be incorporated in the post-graduate programs and they should be, at the same time, implemented to the maximum benefit to the country.

Table 1. Number of universities and institutes of higher learning offering graduate courses and degrees in Thailand.

Classification	Number of University and Institute			Total
	State University	Private University	International Institute	
With Bachelor's Degrees	13 ¹	10	0	23
With Graduate Programs	9	0	1	10
With Graduate Schools	5	0	1	6
With Master's Degrees	9	0	1	10
With Doctoral Degrees	4	0	1	5

¹ Not included technical, or professional training colleges under the Jurisdiction of the Ministry of Education and other government organizations, such as military and police academies.

Table 2. Number of post graduate student enrollment and graduation
classified by UNESCO fields of study.

Fields of Study	NUMBER IN THE YEAR											
	1972		1973		1974		1975		1976		1977	
	Grade.	Enroll.	Grade.	Enroll.	Grade.	Enroll.	Grade.	Enroll.	Grade.	Enroll.	Grade.	Enroll.
Humanities	56	316	61	403	65	591	71	523	100	529		
Education	454	1346	512	1681	481	1288	470	1504	371	1669		
Fine Arts	0	32	5	52	4	65	8	112	5	183		
Social Sciences	307	3263	408	3056	488	3248	453	3396	407	3019		
Law	191	323	7	684	4	409	5	445	2	428		
Natural Sciences	62	394	76	496	75	627	91	610	183	836		
Engineering	27	413	41	468	56	621	67	694	50	632		
Medical Science	451	258	229	291	232	299	156	385	93	652		
Agriculture	83	189	51	223	68	251	52	373	49	408		
Total	1631	6534	1390	7354	1473	7399	1373	8042	1260	8356		

Source : Bureau of University Affairs.

Table 3. Summary of post-graduate student enrolment and graduation, classified by UNESCO fields of study.

Fields of Study	Number of Graduation		Number of Enrolment	
	1972-1979		1976-1977	
	Aver.No./Yr	Per Cent ¹	Aver.No./Yr	Per Cent ¹
Humanities	70.60	4.95	472.40	6.27
Education	457.60	32.10	1497.60	19.87
Fine Arts	4.40	0.31	88.80	1.18
Social Sciences	412.60	28.96	3196.40	42.42
Law	41.80	2.93	457.80	6.07
Natural Sciences	97.40	6.83	592.60	7.86
Engineering	48.20	3.38	565.60	7.50
Medical Sciences	232.20	16.29	377.00	5.00
Agriculture	60.60	4.25	288.80	3.83
Total	1425.40	100.00	7537.00	100

Table 4. Enrolment target of post-graduate students (which appeared) in the Fourth Five-Year National Education Development Plan (1977-1981).

Fields of Study	Difference ¹ 1977	Number According to Plan					Aver. Per Year	% of Total
		in year						
		1977	1978	1979	1980	1981		
Humanities	-126	655	859	984	1110	1194	960.4	7.68
Education	-158	1827	2053	2239	2466	2661	2249.2	17.98
Fine Arts	+23	160	185	223	273	306	229.4	1.84
Social Sci.	-678	3697	4018	4377	4711	4983	435.72	34.84
Law	+133	295	315	325	330	350	323.0	2.58
Natural Sci.	-97	933	1108	1290	1497	1710	1307.6	10.46
Engineering	-88	720	791	870	1027	1150	911.6	7.29
Medical Sci.	-582	1234	1365	1439	1528	1580	1429.2	11.42
Agriculture	-100	508	663	780	857	887	739.0	5.91
Total	-1673	10029	11357	12527	13799	14821	12506.6	100

Note ¹ Compared with the actual number admitted by universities in 1977; + is over target, - is below target.

Source: National Education Development Commission.

Table 5. Research supporting institutes attached to state universities and institutes of higher learning.

Universities or Institutes attached	Name of Research Institutes
Chulalongkorn University	Institute of Environmental Research Institute of Health Research Institute of Population Studies Institute of Languages
Kasetsart University	Institute of Food Research and Product Development National Corn and Sorghum Research Center National Biological Control Research Center
Mahidol University	Institute for Population and Social Research
Thammasat University	Center of Thai Studies Graduate Volunteer Center
Chiang Mai University	Anemia and Malnutrition Research Center

Table 5 a. Some organizations outside the Bureau of University Affairs which support post-graduate and research programs.

Organization	Ministry
OFFICE	
National Research Council	Prime Minister
National Education Commission	Prime Minister
Others	Prime Minister
Atomic Energy for Peace	Industry
Food and Drug Administration	Public Health
DEPARTMENTS	
Agriculture	Agriculture & Coop
Fisheries	Agriculture & Coop
Livestock Development	Agriculture & Coop

Organization	Ministry
Royal Forest	Agriculture & Coop
Agricultural Extension	Agriculture & Coop
Royal Irrigation	Agriculture & Coop
Cooperative Promotion	Agriculture & Coop
Meteorological	Communication
Fine Arts	Education
Medical Sciences	Public Health
Science	Industry
Mineral Resources	Industry
Applied Scientific Research Corp	State Enterprises
Fish Marketing Organization	State Enterprises
Rubber Estate Organization	State Enterprises

FOREIGN AID

Foundation (R.F., Ford, Asia, etc.)
 UNDP
 Columbo plan
 SEAMES
 Donor Countries

Table 6. Research budget allocated by the Thai government to different ministries in the fiscal years 1975-1977.

Ministry	Budget in % in Fiscal Years			Average
	1975	1976	1977	
University Affairs	4.05	3.70	3.99	3.91
Prime Minister	11.15	15.86	13.84	13.62
Defence	0.00	0.01	0.23	0.08
Finance	1.77	3.69	0.57	2.01
Foreign Affairs	0.00	2.06	2.49	1.52
Agriculture	46.67	47.92	47.84	47.47
Communications	15.51	4.11	6.60	8.74
Commerce	2.53	2.64	3.05	2.74
Interior	3.28	5.10	4.67	4.35
Justice	0.00	0.06	0.00	0.02

Ministry	Budget in % in Fiscal Years			Average
	1975	1976	1977	
Education	2.29	2.20	1.30	1.93
Public Health	4.75	4.30	8.53	5.86
Industry	5.57	5.80	5.55	5.64
State Enterprises	2.16	2.55	1.35	2.02
Others	0.27	0.00	00.0	0.09
Total	100	100	100	100
Total Budget (million B)	1190.89	1165.68	1277.13	1211.23

Source: National Research Council of Thailand.

Table 7. Budget allocated by the Thai government on research in the fiscal years 1973-1977.

Item	Budget in % in the Fiscal Year					Average
	1973	1974	1975	1976	1977	
Total ¹	3.42	3.13	2.48	1.86	1.86	2.55
Sciences & Technology	86.13	84.17	83.34	77.38	80.89	82.38
Social Sciences	13.87	15.83	16.66	22.66	19.11	17.62

¹ % of the total budget allocated for the whole country.

Source: National Research Council of Thailand.

Table 8. Research fields and the budget allocated by the Thai Government in the fiscal years 1975-1977.

Fields of Research	Budget in Fiscal Years (%)			Average
	1975	1976	1977	
Physics and Mathematics	4.93	4.14	5.17	4.75
Medical Sciences	6.47	4.23	8.61	6.44
Chemistry and Pharmacology	0.91	1.73	1.61	1.42
Agriculture & Natural Sci.	36.15	39.26	48.77	41.39
Engineering & Industry	34.64	28.02	16.73	26.46
Philosophy	2.74	2.76	1.92	2.47
Law	0.01	0.15	0.31	0.16
Political Sciences	4.10	4.63	4.45	4.39
Economics	6.03	8.26	6.75	7.01
Social Sciences	4.02	6.82	5.68	5.51

Total	100	100	100	100
Total Budget (in millionsB)	1190.88	1165.68	1277.13	1211.23
Country Budget (in millionsB)	48.00	62.65	68.68	59.78
% of Research Budget	2.48	1.86	1.86	2.07

Source: National Research Council of Thailand

Table 9 Research fields and the government budget spent by the Bureau of University Affairs in the fiscal year 1976.

Areas	Budget	
	In Million (B)	In %
Physics and Mathematics	0.925	2.15
Medical Sciences	2.969	6.88
Chemistry and Pharmacology	1.380	3.20
Agriculture and Natural Sci.	19.005	44.07
Engineering and Industry	2.868	6.65
Philosophy	3.443	7.98
Law	0.000	0.00
Political Sciences	5.288	12.26
Economics	0.504	1.17
Social Sciences	6.745	15.64
Total	43.127	100

Source: National Research Council of Thailand.

Table 10 Number of scientific and technical organizations by sector of performance and by number of full time personnel in 1973.

Sector of Employment	Doctors	Masters	Technicians	
			Bachelors	Hi-Certificates
General Government Service	46	457	1743	2507
Higher Education	1216	3781	3728	423
Government Enterprise	18	110	858	3898
Production	2	45	228	1016
Grand Total	1282	4393	6557	7844

Source: National Research Council of Thailand.

Table 11. Number of staff by qualifications of state universities and institutes of the Bureau of State University.

Degree Holder	Number in Year				
	1973	1974	1975	1976	1977
Honorary Doctorates	36	32	33	16	36
Doctorates	1,180	1,302	1,512	1,776	2,130
Masters	3,781	4,467	4,980	5,880	6,486
Higher Certificates	371	462	480	519	496
Bachelors	3,357	3,698	3,889	4,014	3,894
Diplomas & Lower	423	550	660	774	4,415
Total	9,148	10,511	11,554	12,979	17,457

Source: Bureau of University Affairs

Table 12. Research granted to universities by the National Research Council of Thailand from 1973-1977.

Year	Total Number of Projects	Amount of Funds in Millions	Number of Projects Allocated to		% University Received	
			University	others	Project	Budget
1973	49	1.84	44	5	89.80	85.97
1974	51	1.91	43	8	84.31	87.57
1975	56	2.05	45	11	80.36	73.34
1976	96	3.05	85	11	88.54	88.03
1977	143	4.82	117	26	81.81	77.04
Total	395	13.67	334	61	424.82	411.95
Average/yr. 79.		2.73	66.8	12.2	84.96	82.39

Source: National Research Council of Thailand.

Table 13. Research granted for graduate students by the National Research Council of Thailand.

Year	Number of Projects	Number of Projects	% Received	
	Requested	Granted	Project	Budget
1973	60	49	81.67	8.68
1974	70	48	68.57	20.07
1975	96	49	51.04	31.20
1976	157	96	61.15	41.46
1977	147	87	59.18	26.53
Total	530	329	321.61	127.94
Average/yr.	106	65.8	64.32	25.59

Source: National Research Council of Thailand.

Table 14. Magnitude of supports of postgraduate student theses made by various government and private organizations.

Year	Number of Theses Reported	Number of Grantees	% Support (by Number)
1972	624	146	23.40
1973	569	70	12.30
1974	1269	147	11.58
1975	1218	201	16.50
1976	1149	189	16.45

Source: Bureau of University Affairs.



**NORTHEAST REGIONAL OFFICE OF
AGRICULTURE
MINISTRY OF AGRICULTURE AND
COOPERATIVES**

Northeast Regional Office of Agriculture

The Northeast Regional Office of Agriculture was formerly known as the Northeast Agricultural Center (NEAC). It was established in 1964 as the Center for research; thus was provided with a sufficient number of officials, laboratories and a modern library. Research findings could be disseminated to the farmers through the extension workers. To accomplish this purpose, the NEAC received aid from the United States Agency for International Development (US-AID) under the cooperation of the University of Kentucky in the institution building program and technical assistance. The Royal Thai Government, US-AID, and the University of Kentucky started this partnership in 1967 and finished in June 1975. Twenty seven long term technical advisers and 20 short term consultants served at the NEAC during this period, representing most of the major fields of agricultural science, library science, and management. For scholarships, 164 training grants were made

available which comprised 115 M.S. level, 38 Ph.D. level and 11 on-the-job training grants. These were provided to the MOAC technicians through US-AID in order to study in the USA. During the period of 1967-1975, US-AID provided approximately 20.7 million Baht in equipments and supplies to develop the NEAC research capability.

In 1976, the MOAC concentrated on the promotion of agricultural development at farm level as being strongly stressed in statements of the government policy. The MOAC decentralized its operations and established four Regional Offices of Agriculture. Since then the NEAC was renamed the Northeast Regional Office of Agriculture (NEROA) which encompasses 16 Changwads in the Northeast.

Currently, the NEROA occupies approximately 1,000 rai of land. The Physical facilities include an administration building, an auditorium, a library, six laboratory buildings, a dormitory and houses for staff

members. The present staff consists of approximately 105 researchers and administrators. Approximately 150 field labors are employed.

The Office is now administered by the Office of the Under-Secretary of State with guidance from an "Executive Board" comprising the Under-Secretary of State as Chairman of the Board and all the Director Generals of the Departments within the MOAC as members. This Executive Board is responsible for planning and guiding the policies of the Regional Office of Agriculture. Each region has a Regional Administrative Board consisting of the Director of the Office as the Chairman of the Board and the representatives to the Departments as the members. They implement the integrated agricultural development plans of their own region following the assigned policy laid down by the Executive Board.

The Northeast Regional Office of Agriculture is organized into five main

divisions, according to the policy of the MOAC and its major functions. These divisions are :

1. Administration: Correspondence, Finance and Accounting, Supplies, General Service, and Library.

2. Planning and Agricultural Economics

2.1 Coordinate and support various government agencies in studying, experimenting, analyzing and researching in agricultural economics, marketing, farm management including a survey and data collection for a consideration in assesment of agricultural development policy.

2.2 Coordinate and cooperate with various Departments in planning an integrated development policy for agriculture and cooperating in deciding an overall plan in order to achieve the abjective of the regional plan.

2.3 Coordinate and cooperate with various Departments concerned in analyzing a "program of work" to set up priorities and a follow up program of the regional development plan.

3. Research

3.1 Coordinate and cooperate in considering and recommending research projects for the various departments according to the regional need.

3.2 Cooperate with departments in planning and conducting an integrated research program.

3.3 Serve as a central laboratory and offer laboratory analysis facilities in agriculture to research workers and farmers.

3.4 Serve as a coordinating center for research data to the region.

3.5 Analyze research problems in order to improve the research program for the region.

3.6 Provide other technical assistance.

4. Trials, Demonstrations and Training

4.1 Coordinate in planning with other departments concerned to test and demonstrate research results so that the farmers will accept and utilize the improvement in modern technology.

4.2 Coordinate and facilitate a training program in agricultural development for government officers, farmer groups, etc.

4.3 Serve as a coordinating center and implement agricultural extension in order to transfer technology to farmers and to promote the flow feedback from problems in the field as well as the needs of the farmers.

5. Natural Resources Development and Conservation

5.1 Coordinate and support the relevant Departments concerning forestry, soil, water, reservoir pasture, etc. Also to cooperate with respective Departments in surveys, experiments and conservation of natural resources aiming at efficient utilization of the natural resources.

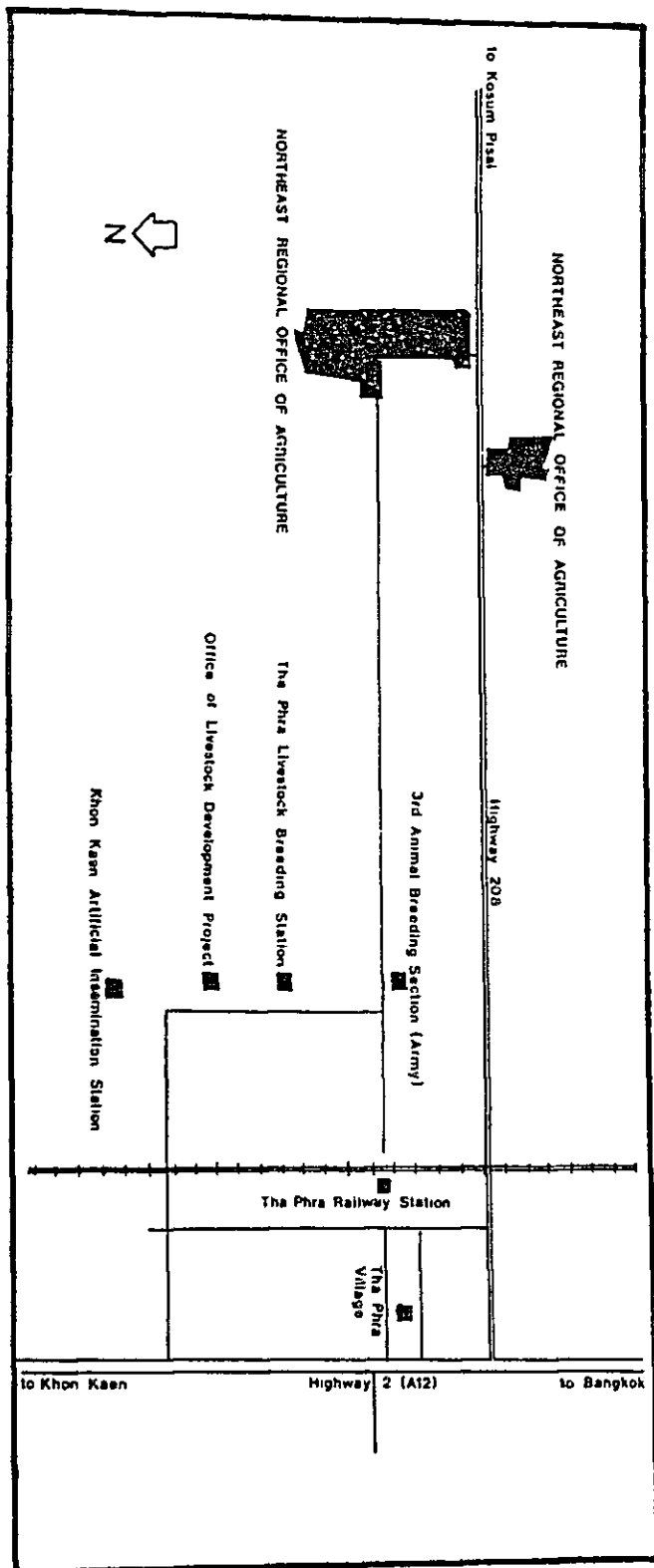
5.2 Coordinate and cooperate in planning for effective natural resource utilization including an assessment program for potential development and efficient conservation of valuable natural resources.

5.3 Serve and provide data related to natural resources in agriculture.

NEROA Service to the Farmers

1. Advice on proper cultural practices on field and horticultural crops.
2. Analysis of soil, water, plant, fertilizer, and feed samples.
3. Suggestions on control and eradication of insect pests.
4. Suggestions on control and eradication of plant diseases.
5. Advice on breeding and management of livestock and poultry.
6. Diagnostic services and disease treatment and control for livestock and poultry.
7. Marketing news and information.
8. Advice on use and care of farm machineries.
9. Tree seedlings for farm use.
10. Advice on fish production.
11. Advice on utilization of natural resources in agriculture.

พิมพ์ที่: ห้องทำงานพิมพ์คำคิด โรงพิมพ์คตดงนาวิทยา
33/17-18 ถนนหน้าเมือง ขอนแก่น โทร. 238344
นายสมพงษ์ วิจิตรกุล ผู้พิมพ์ - โฆษณา



Nong Hai Irrigated Agricultural

Extension Project

I General

The project area of about 75,000 rai is located on the right bank of Nom Pong River in ^{Khon} Kaen Province covering 5 tambons of 2 amphure or 45 mubans. The total farm families living in the project area are about 4,000 with the average of 7 persons per family. According to the project proposal, 32,950 rai of lands will be consolidated and the ditch improvement programme for 36,204 rai will be operated.

II Objectives:

The extension programme would be developed and implemented with several objectives specified below:+

1. To upgrade the framers' families socially and economically to the comparable standard to the other professions.
2. To accelerate the adoption of newly adapted technical know-how on irrigated farming which is different from the traditional farming scheme.
3. To render extension services to encourage the farmers to utilise all available resources efficiently.
4. To increase farmers' incomes through effective farm management and diversified farming practices.
5. To encourage a formation of efficient farmers' associations to carry on farm businesses.
6. To promote economic crop production for domestic consumption, industrial uses and exports.

III. Work programme

1. Extension service

- 1.1 To select 20 farmers' foremen to assist extension officers in the project area.
- 1.2 To provide technology in both the wet- and dry-season crop productions to the farmers.
- 1.3 To promote the farmers to grow recommended crop varieties
- 1.4 To provide agri-material services for the farmers.
- 1.5 To produce suitable publications and then distribute to the farmers.
- 1.6 To have regular visits by well trained extension officers and farmers's foremen.
- 1.7 To cooperate with other agricultural development units concerned e.g. Kaen Rice Experiment Station and FAO Pilot Farm Project at Kalasin to conduct some trials or applied research.
- 1.8 To conduct demonstration plots on the crop which are mainly grown in the project area such as rice, peanut, mungbean, sweet corn and soybean in both the wet and dry seasons, in addition large-scale package demonstration plots to an area of 100-200 ha are organised every season,

2. Training programme

- 2.1 To establish a training centre to conduct intensive and regular training for the field extension personnel.

2.2 To organize fortnightly training for the extension officers and farmers'foremen to discuss the technical problems arisen during the preceding, then one or more lectures are given to the attendants, and prepare for a plan of action for the following two weeks.

2.3 To integrate all extension methods with the use of mobile communication unit.

3. Farm management

3.1 To advise and help the farmers to increase their farm productivity by using appropriate farm techniques and inputs.

3.2 To give advice on multiple cropping pattern in connection with the principle of farm management.

4. Farmers' association promotion

4.1 Farm families within the project area have been unified into small groups of about 30 - 50, these small groups are then constituted into farmers'associations,

4.2 The house-wives' groups have been organized to support farm activity in particular home economic, and also the farm youth club have been set up which new agricultural technology is steadily injected so that the youth is growing up to be leading farm population in the future.

5. Credit

Farm credit have been supplied by the Bank for Agriculture and Agricultural Cooperatives (BAAC) through Farmers'associations.

IV. Period of work

From 1976 to 1981.

V. Expenditures

The total expenses spent from 1976 to the end fiscal year 1979 was accounted for $\text{฿ } 5,747,231.23$

VI. Results of extension service

1. Eleven training courses, stressed on rice and some important field crop production, were held to extension officers and farmers' foremen before the beginning of each cropping season.
2. Short period (1-3 days) training courses were also held for the peasants in different localities regularly.
3. Various farm techniques were timely given to the local farmers during farm visits of extension officers and farmers' foremen.

Trial and demonstration scheme

The trial and demonstration scheme were conducted on both the wet and dry season crops with the supporting guidance from the local Institutions such as Khon Kaen rice experiment station, FAO pilot farm project at Kalasin and so forth. The number of trial and demonstration plots conducted are shown in the following table:-

Crop	1976/No. of plots		1977/NO. of plots		1978/NO. of plots		1979/NO. of plots	
	dry	wet	dry	wet	dry	wet	dry	wet
Rice (1 rai each)	-	47	9	35	42	72	24	74
Rice (large-scale 100 rai)	-	-	1	2	2	2	1	1
Field crops (1rai each)	-	-	82	3	47	-	39	-

Field trips to these trial and demonstration plots were arranged periodically for the farmers in the project area during cropping seasons.

Increasing of productivity

Not only having the local farmers to adopt newly technology and practices but also the irrigable lands used have been enlarged and crop production has been increased progressively, as shown in the following table:-

Table a: Cultivated land in irrigable area during dry season

year	irrigable area	cultivated area	percentaged
1976	-	-	-
1977	20,000	4,631	23.15
1978	21,000	8,054	38.35
1999	28,000	14,034	50.10
1980	27,000	11,516	42.65

Note: 1980 The water had no more in the reservoir.

Table b: Cultivated area for various crops during dry season

Crop	1977		1978		1979		1980	
	cultivated area(rai)	%	cultivated area(rai)	%	cultivated area(rai)	%	cultivated area(rai)	%
Rice	240	5.2	3,485	43.3	11,823	84.2	9,392	81.50
Peanut	519	11.2	1,381	17.2	670	4.8	552	4.79
mungbean	2,126	45.9	377	4.7	52	0.4	8	0.00
Sweet corn	200	4.3	285	3.5	181	1.3	169	1.44
vegetables	1,467	31.7	2,693	21	910	6.5	971	8.43
Others	79	1.7	832	10.3	388	2.8	424	3.68
Total	4,631	100	8,054	100	14,034	100	11,516	100

Note 1977-1980 The cultivated area of Mungbean decreased due to the marketing

Average yield of rice (wet season)

1976	342 kg/rai
1977	450 kg/rai
1978	-
1979	426 kg/rai

1978 The paddy field in project area was damaged by flooding, couldn't harvest.

Average yield of rice (Dry season)

1976	-
1977	370 kg/rai
1978	416 kg/rai
1979	409.76 kg/rai

Note Beginning the project in the wet season

The cultivation and using the land in dry season

From the surveyed of farmers' cultivation area in land consolidating area, it was found that most of the farmers, about 67.89 percent, growing dry-season crops. But cultivated area was only 44.98 percent. It was shown that farmers could not use the land for dry-season in whole area while holding. The main reason of these are the following below.

1. Lacking of labors. Most of them go out to get a job with RID that get money directly, not risking.
2. Lacking of capital, some could not get a loan.
3. Fearing of lost.
4. The price of crops production was not firm, should have the guarantee.
5. Salty soil.
6. Cultivation depended upon man-power.
7. Get rest.
8. Insufficient water in some plots.

The problem for operation in the project.

A. Personnel Problems

The extension officials who engaged in the project, had been decreased by the General policy so that the extension programs and various activities of the project were slow progressively extended.

The duties of the farmers foremen were stopped and abolished in the end of March in 1980 by the national agricultural extension project's Policy so that the project activities was fallen within the Provincial Agri-Extension office. And now 12 Kasate tambons have been engaged to work replacement of farmer foremen.

B. Administration problem

The agri-extension team leader was not firm, and was often assigned to the other place so that work policy of each was changed often. When the project got a new one, the extension agent who was under his responsibility followed up the new team leader. Activities in the field was not stable so that the activities of this project has been successfully carried out, but it has not quite satisfied. After transferring to be under kasate tambon's responsibility and hope this is a change for better.

VII 付表・付図

(表 : 10 ~ 22)
 図 : 6 ~ 8)

表10 国民総生産部門別内訳

生産部門	生産額	割合
農業	1,763億0,700万バーツ	26.2%
工業	1,258 3,000	18.7
商業	1,249 9,800	18.6
サービス業	644 3,400	9.6
交通運輸	477 4,600	7.1
銀行	390 2,000	5.7
建築	370 1,100	5.5
公共事業体	288 3,100	4.3
鉱山	144 4,400	2.1
住宅	73 1,200	1.1
電気・水道	58 0,900	0.9
その他	13 9,000	0.2
総生産	6,731 3,200	100.0

(注) 1980年・タイ国国家経済社会開発委員会事務局資料

表11 主要商品別輸出货量

(単位:百万バーツ)

品目	1960		1965		1970		1975		1976		1977		1978		1979	
	金額	%	金額	%	金額	%	金額	%	金額	%	金額	%	金額	%	金額	%
① 米	2,370	23.6	4,224	23.3	2,316	17.0	5,822	13.0	6,603	14.2	12,382	15.8	10,123	12.6	15,922	14.3
② ゴム	2,579	23.9	1,979	15.4	2,222	15.1	2,474	7.7	5,237	8.7	6,164	8.7	8,020	9.7	11,242	11.4
③ パイナップル	286	2.3	674	5.2	1,223	8.2	4,587	10.2	7,327	12.1	7,728	10.8	10,892	12.1	9,522	8.8
④ 魚	527	5.2	1,164	9.0	1,618	11.0	2,217	5.6	2,973	4.9	4,541	6.4	7,223	8.7	9,222	8.5
⑤ イス	231	2.4	1,024	7.8	1,268	12.2	2,702	12.7	4,478	9.2	2,248	4.7	4,273	5.1	8,227	8.2
⑥ その他	9	0.1	100	0.8	94	0.6	5,686	12.7	6,843	11.2	7,642	10.4	2,989	4.4	3,547	3.1
その他	2,087	24.2	2,642	20.2	2,120	14.7	17,426	28.7	22,879	29.2	28,601	30.2	28,242	34.6	47,142	43.5
計	8,612	100.0	12,941	100.0	14,772	100.0	45,087	100.0	60,737	100.0	71,138	100.0	82,064	100.0	108,428	100.0

(資料) BANK OF THAILAND

(注) 1. 順位の1979年 2. 1979年12月期

表 12 主要相手国別輸出額

(単位：百万バーツ)

国名	歴年	1960	1965	1970	1975	1976	1977	1978	1979
①日 本		1,530 (17.8)	2,359 (18.2)	3,770 (25.5)	12,420 (27.6)	15,686 (25.8)	14,029 (19.7)	16,866 (20.3)	23,039 (21.3)
②オランダ		164 (1.9)	513 (4.0)	1,276 (8.6)	4,547 (10.1)	8,064 (13.3)	9,564 (13.4)	12,185 (14.7)	12,259 (11.3)
③アメリカ		1,204 (14.0)	970 (7.5)	1,985 (13.4)	4,968 (11.0)	6,098 (10.0)	6,939 (9.7)	9,153 (11.0)	12,134 (11.2)
④シンガポール		966 (11.2)	799 (6.2)	1,018 (6.9)	4,068 (9.0)	4,114 (6.8)	4,505 (6.3)	6,723 (8.1)	9,222 (8.5)
⑤香 港		753 (8.7)	857 (6.6)	1,112 (7.5)	2,716 (6.0)	3,036 (5.0)	3,342 (4.7)	4,436 (5.3)	5,302 (4.9)
⑥マレーシア		1,477 (17.1)	1,887 (14.6)	830 (5.6)	2,099 (4.7)	2,552 (4.2)	3,769 (5.3)	4,296 (5.2)	4,768 (4.4)
その他を含む計		8,614 (100.0)	12,941 (100.0)	14,772 (100.0)	45,007 (100.0)	60,797 (100.0)	71,198 (100.0)	83,065 (100.0)	108,406 (100.0)

(資料) BANK OF THAILAND

(注) 1 順位は1979年 2. 1979年は速報値 3. ()内はシェア(単位%)

表 13 日本のタイからの商品別輸入

(単位：千ドル)

品目	1960		1965		1970		1975		1976		1977		1978		1979	
	金額	%	金額	%	金額	%	金額	%	金額	%	金額	%	金額	%	金額	%
①生ゴム	33,416	46.2	23,572	21.3	56,403	22.7	110,360	15.2	143,380	16.5	164,971	22.0	226,064	26.8	221,130	27.6
②砂糖	-	-	196	-	3,928	1.5	208,261	28.5	222,201	26.4	128,062	17.1	78,559	9.0	138,129	17.3
③茶	-	-	949	0.7	3,755	2.0	37,146	5.1	44,312	2.7	66,912	8.5	74,258	8.8	80,358	7.6
④除虫エビ	-	-	3,774	2.9	14,022	7.4	36,763	5.1	59,715	7.0	45,941	6.1	39,749	7.0	46,459	7.5
⑤ノイズ	18,578	25.6	26,162	27.7	23,263	16.7	125,341	17.3	129,801	15.3	52,239	7.0	44,542	5.3	63,467	5.6
⑥炭石	-	-	-	-	3,160	1.7	16,631	2.3	11,580	1.7	15,047	2.1	29,160	4.4	33,079	4.7
⑦織物	-	-	-	-	-	-	27,550	3.8	22,518	2.7	16,598	2.3	29,271	2.3	31,150	4.4
⑧鉄鋼	-	-	2,644	2.2	4,317	2.3	12,703	1.8	16,220	1.9	19,611	2.6	21,073	2.3	18,941	1.6
⑨アピオカ	-	-	-	-	4,762	2.2	17,754	2.5	13,693	1.9	18,835	2.5	14,462	1.7	22,822	1.1
その他を含む合計	71,306	100.0	130,780	100.0	189,598	100.0	723,729	100.0	848,041	100.0	718,201	100.0	842,642	100.0	1,169,256	100.0

(資料) 日本通関統計

(注) 順位は1979年

表14 日・タイ貿易の推移

(単位:百万ドル)

年	1960	1965	1970	1975	1976	1977	1978	1979
日本の輸出(A)	118	219	449	959 (0.8)	1,070 (11.6)	1,360 (27.1)	1,528 (12.4)	1,714 (12.1)
日本の輸入(B)	72	131	190	724 (5.5)	848 (17.1)	748 (△11.8)	843 (12.7)	1,169 (38.7)
バランス(A-B)	46	88	259	235	222	612	685	545
輸出入比率(A/B)	1:1.6	1:1.7	1:2.7	1:1.3	1:1.3	1:1.8	1:1.8	1:1.47
(参考) タイの貿易赤字に 占める対日赤字の 割合 %	98.5	111.5	51.8	39.7	65.9	71.5	64.2	38.7

(資料) 日本通関統計、但し(参考)はタイ側通関統計
()内は対前年伸び率(%)

表15 気候統計

(1977年)

地名	気温(摂氏)			年間雨量 (mm)	年間平均 湿度(%)
	最高	最低	年平均		
バンコク	36.1	20.9	28.7	1,040.1	74.5
チェンマイ	32.7	15.6	24.1	1,261.3	81.4
ナコンサワン	37.3	19.9	28.9	698.6	62.8
ナコンラチャシマ	37.3	18.3	27.3	884.2	70.4
ブケット	33.7	22.0	28.2	1,993.9	72.9
ソンクラ	32.6	22.6	27.8	1,513.2	75.4

(資料) STATISTICAL YEARBOOK THAILAND 1977-1978

(注) 1977年は異状気象により降雨量は例年より少なかった。

表 16 農業用土地利用の概況

単位：千ライ

	全国土	国有林	農家所有面積	同 左 内 訳				
				水 田	畑 地	樹 園 地	林 地	宅 地 そ の 他
1950 (A)	319,960	173,188	55,697	37,375	5,039	5,769	5,366	2,148
1960 (B)	321,250	167,218	61,683	37,127	6,906	6,145	5,336	5,169
1975 (C)	321,250	131,663	116,282	73,226	21,507	11,395	4,743	5,411
割合 (%)	100.0	41.0	360 (100.0)	(629)	(185)	(98)	(4.1)	(4.7)
(C) / (B)	1.00	0.79	1.89	1.97	3.11	1.85	0.89	1.05

(出所) 農業協同組合省統計

1ライ=0.16ha

()内数字は農家所有面積を100とした地目別割合を示す。

表 17 作物別作付面積の推移

単位：千ライ

	米	キャッサバ	砂糖キビ	メイズ	ケナフ	緑豆
1960/61 (A)	37,012	447	986	1,785	877	327
1977/78 (B)	53,465	6,000	3,541	7,534	1,603	2,720
倍率(B)/(A)	1.44	13.42	3.59	4.22	1.83	8.32

(出所) 農業・協同組合省統計 (1ライ=0.16ha)

表 18 農産品生産目標

品目	年次	単 位	1977年	1981	参 考 1979実績	1981 ~1982	1983 ~1984	1985 ~1986
米		百万トン	15.4	16.5	17.0	18.0	19.3	20.5
ゴ ム		千 トン	407.0	466.6	512.0	620.0	700.0	900.0
サトウキビ		百万トン	21.9	28.6	16.0	22.5	23.3	25.0
メ イ ズ		"	3.5	3.8	3.3	3.3	3.8	4.2
緑 豆		千 トン	292.5	390.4	261.3	330.0	510.0	750.0
タ ビ オ カ		百万トン	9.8	10.8	12.0	17.0	16.9	16.8
タ バ コ		千 トン	44.7	65.5	—	45.0	47.0	50.5
綿 花		"	63.0	205.0	70.0	—	—	—
大 豆		"	310.0	431.2	331.0	200.0	300.0	390.0

- (注) 1. 1977年, 1981年, 参考値付
 2. 1981~1986年の数値は, タイ国国家経済社会開発委員会事務局資料による。

表 19 農業機械普及状況

単位: 台

機種	年次	1976	1977	1978	1979	1980
二 輪 耕 う ん 機		90,001	113,286	151,504	192,004	230,591
四 輪 耕 う ん 機		14,575	16,427	23,942	26,984	31,158
ト ラ ク タ ー		13,338	17,569	22,826	28,987	33,285
発 動 機 塔 載 運 搬 車		9,882	9,000	8,700	8,200	8,000
農 薬 散 布 機		1,310,464	1,379,436	1,452,038	1,528,461	1,604,884
揚 水 機		56,891	68,219	81,923	89,775	107,730
ポンプ(エンジン付)		251,288	277,084	317,328	359,308	473,975
脱 穀 機		42,342	47,423	53,114	59,488	66,806
脱 粒 機 (corm)		5,721	6,407	7,175	8,036	9,000
精 米 機		3,055	4,430	4,962	5,557	6,224
飼 料 粉 砕 機		374	419	469	525	588
風 車		1,937	2,169	2,429	2,721	3,047
甘 蔗 刈 取 機		—	—	—	—	5
精 米 処		24,658	24,914	25,170	25,426	25,682

- (注) 1. この調査は1975~1976年に行ったものの再調査結果である。
 2. 精米機は商務省の調査結果である。
 3. 農薬散布機は人力・動力を含む。
 4. ポンプ(エンジン付)は, ポンプのみの数を示す。
 5. トレーラ(発動機塔載運搬車)は年々減少している。
 6. 飼料粉砕機は大型のみの数字である。
 7. 注に示していないものは農家経済調査の結果から抽出した。

表 20 二輪・四輪耕うん機，農薬散布機のタイ国産機利用状況

単位：台

機種	年次	1976	1977	1978	1979	1980
二輪耕うん機		27,860	31,766	49,722	52,281	54,124
四輪耕うん機		2,582	2,914	4,568	5,031	4,920
農薬散布機		1,310,464	1,379,436	1,452,038	1,528,461	1,604,884
内訳	手動式	929,251	978,159	1,029,642	1,083,832	1,138,025
	背負式	104,706	110,216	116,017	122,124	128,230
	トラクター搭載	2,358	2,483	2,613	2,751	2,888
	その他	274,149	288,578	303,766	319,754	335,741

- (注) 1. 他機種については目下調査中
 2. 農薬散布機は1978～1979年の農業普及局の調査である。
 3. 耕うん機のエンジンはいずれも輸入品を使用している。
 台数は生産工場の数字であり，一部は耕うん機協会の報告による。
 4. この数字は，農務・協同組合省・農業経済局の調査により摘出した。

表 21 最近におけるタイの農業機械の輸入台数

単位：台

機種	年次	1974	1975	1976	1977	1978	1979
Farm Tractors		1,112	4,231	5,257	6,161	4,298	3,559
Water Pumps		168,524	149,021	208,101	202,101	258,369	281,668
Ploughs		37,709	1,141	31,242	2,260	824	12,570
Harrows		56	105	834	2,558	988	1,636
Cultivators		52	128	117	45	42	16
Distributors		12	23	14	638	144	69
Harvesting Machine		30	34	12	72	6	13
Grass Mowers		5,661	3,812	3,919	6,226	6,636	2,885
Threshing Machine		2	32	16	49	480	2
Cleaning Machine		371	215	206	485	162	10
Polishing Machine of Rice		43	127	155	340	256	3,335
Land Engines		58,295	56,485	75,146	96,804	172,621	159,365
Sprayers		5,659	20,301	22,978	62,353	46,191	82,058

Note : 1979. is the basic data of dept of custom

Source : Dept of custom

Grass Mowers は庭口管理用のものである。

表 22 農業機械輸出実績対比表(タイ国分)

単位金額：1,000円

機種	項目	52年			53年			54年			55年		
		台数	金額	左の前年比	台数	金額	左の前年比	台数	金額	左の前年比	台数	金額	左の前年比
	合計	-	1,349,793	98.2	-	1,466,194	108.6	-	2,108,679	143.8	-	1,428,825	67.7
農具	フォーク	-	-	-	-	-	-	-	-	-	-	-	-
	くわ	16	489	-	-	-	-	-	-	-	-	-	-
	かま	-	-	-	-	-	-	-	-	-	-	-	-
	その他農具	-	61,538	342.5	-	49,846	81.0	-	55,665	111.7	39,149	57,554	103.3
	小計	-	62,027	345.3	-	-	-	-	-	-	-	-	-
耕うん整地用農機	プラウ	20	1,620	13.9	10	237	14.6	393	18,401	7,764.1	5	132	-
	ハロー	10	720	2.2	10	521	72.4	91	1,850	355.1	-	-	-
	カルチベータ	30	2,642	167.4	-	-	-	6	186	-	63	1,427	767.2
	耕うん機	1,905	372,075	93.4	1,616	315,494	84.8	2,146	547,007	173.4	1,096	239,337	43.7
	播種機, 植付機, 移植機等	23	961	310.0	-	-	-	45	9,652	-	5	602	6.2
	同上部分品	-	3,427	40.0	-	4,803	140.2	-	4,357	90.7	3,073	2,650	60.8
	農業用車輪式トラクター	268	177,474	40.8	627	395,562	222.9	721	481,833	115.0	1,073	609,872	126.5
	小計	-	558,919	63.0	-	716,617	128.2	-	1,063,286	148.4	5,315	854,020	80.3
防除用農機	人力ふんむ機	44,780	19,788	153.8	11,906	9,912	50.1	70,352	11,826	119.3	31,530	16,643	140.7
	動力ふんむ機	7,490	228,198	129.9	6,059	165,377	72.5	9,067	428,085	258.9	9,442	334,795	78.2
	人力散粉機	50	445	247.2	536	861	193.5	52	112	13.0	1,150	2,462	219.8
	動力散粉機	5,770	156,777	605.9	5,195	135,971	86.7	2,802	84,707	62.3	4,719	136,598	161.3
	同上部分品	-	42,705	119.2	-	54,821	128.4	-	79,519	145.1	-	76,636	96.4
	小計	-	447,913	178.9	-	366,942	81.9	-	604,249	164.7	-	213,234	35.3
脱こく調製用農機	脱こく機	45	4,086	876.8	-	-	-	1	194	-	1	111	57.2
	コンバイン	-	-	-	11	1,875	-	7	2,852	152.1	18	13,795	483.6
	コンバイン, 脱こく機を除く機械	3,537	94,109	86.5	1,911	34,804	37.0	1,797	52,601	151.1	662	18,461	35.1
	選別機, その他の分類機	4	1,975	104.9	-	-	-	7	12,006	-	7	3,209	26.7
	同上部分品	-	2,877	542.8	-	2,754	95.7	-	1,369	49.7	390	1,138	83.1
	もみすり機	32	3,133	70.7	5	985	31.4	1	328	33.3	-	-	-
	乾燥機(工業用除く)	9	237	151.0	10	276	116.5	-	-	-	-	-	-
	もみすり用ゴムロール	-	-	-	-	-	-	-	-	-	-	-	-
	その他調製品農機の部品	-	5,103	246.4	-	2,210	43.3	-	5,209	235.7	9,129	17,683	339.5
小計	-	111,520	93.6	-	42,904	38.5	-	74,559	173.8	10,207	54,397	72.9	
食糧加工農機	クリーム分離機および部分品	-	122,235	171.2	-	200,703	162.9	-	173,474	86.4	2,566	196,119	113.0
	酪農用機械および部分品	-	790	-	-	-	-	-	-	-	-	-	-
	果実飲料用機械および部分品	-	15,417	-	-	126	0.8	-	-	-	-	-	-
	製粉機	2	3,082	-	3	2,919	94.7	1	339	11.6	1	747	220.3
	精白機	17	1,129	69.7	-	-	-	2	445	-	4	335	75.2
	その他穀物加工機	1	668	-	12	1,138	918.1	-	-	-	-	-	-
	製茶用機械	-	-	-	-	-	-	-	-	-	-	-	-
小計	-	144,321	196.1	-	209,881	145.4	-	174,258	83.0	2,571	197,201	113.2	
わら加工	製筵機	4	5,007	-	5	6,924	138.3	-	-	-	6	9,028	-
	小計	-	-	-	-	-	-	-	-	-	-	-	-
	その他の農業用機械および部品	-	20,086	76.2	-	73,080	363.8	-	136,662	187.0	-	43,392	31.7
	チェンソー	-	-	-	-	-	-	-	-	-	-	-	-

(注) 日本農業機械工業会資料による。

資料：大蔵省通関統計 資料：FOB

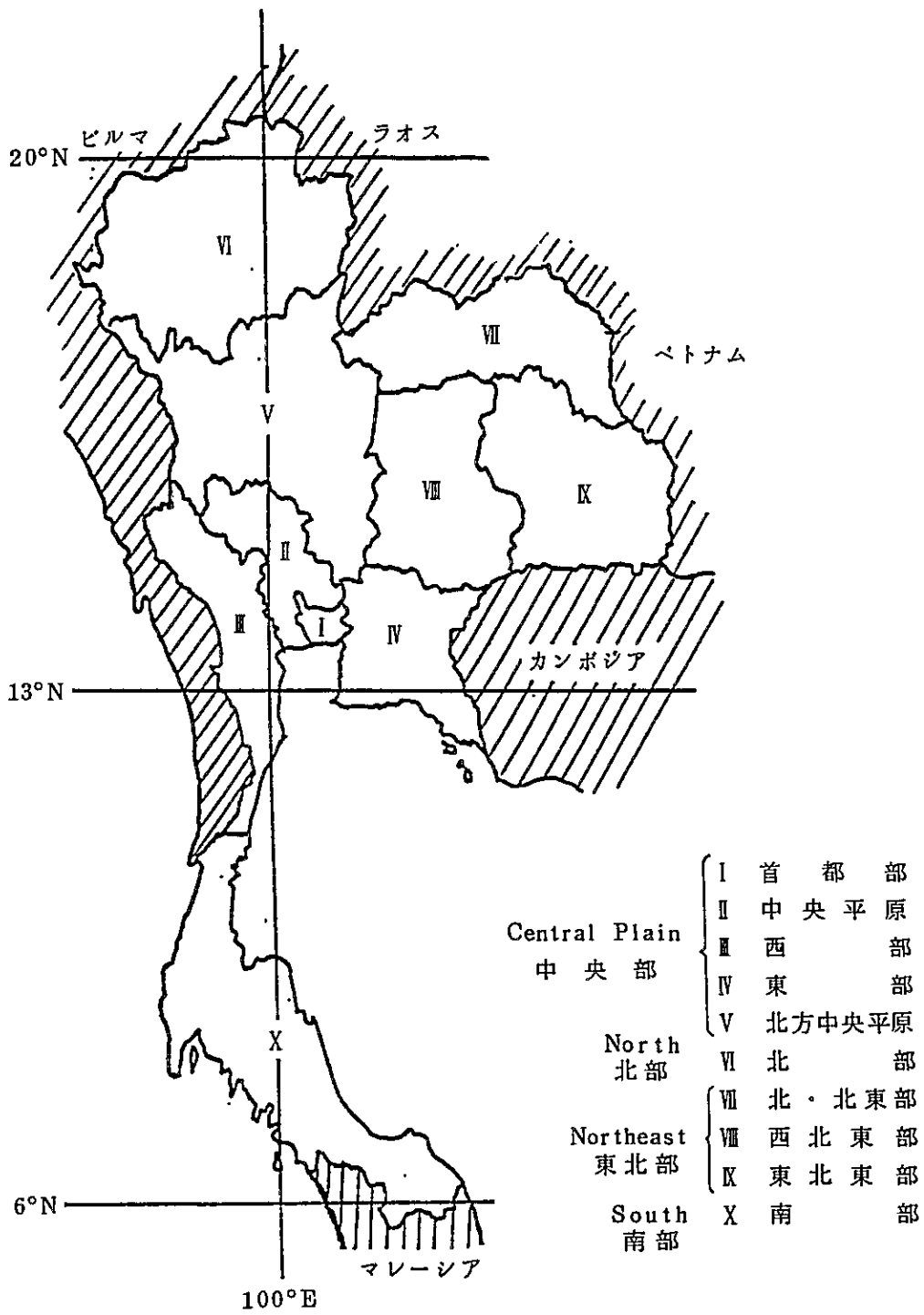


図6 タイ農業の地域区分

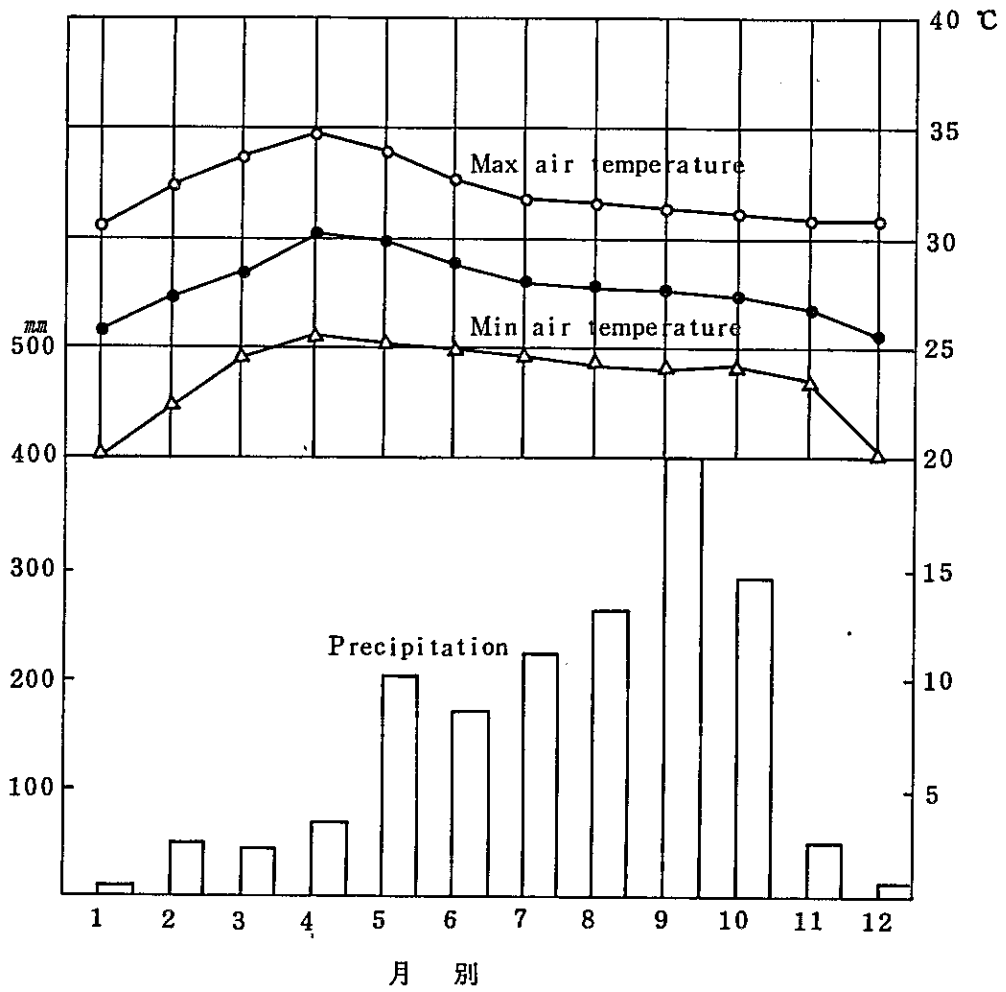


图7 Meteorological Conditions
(Central Plain Bangkok 13° 44')

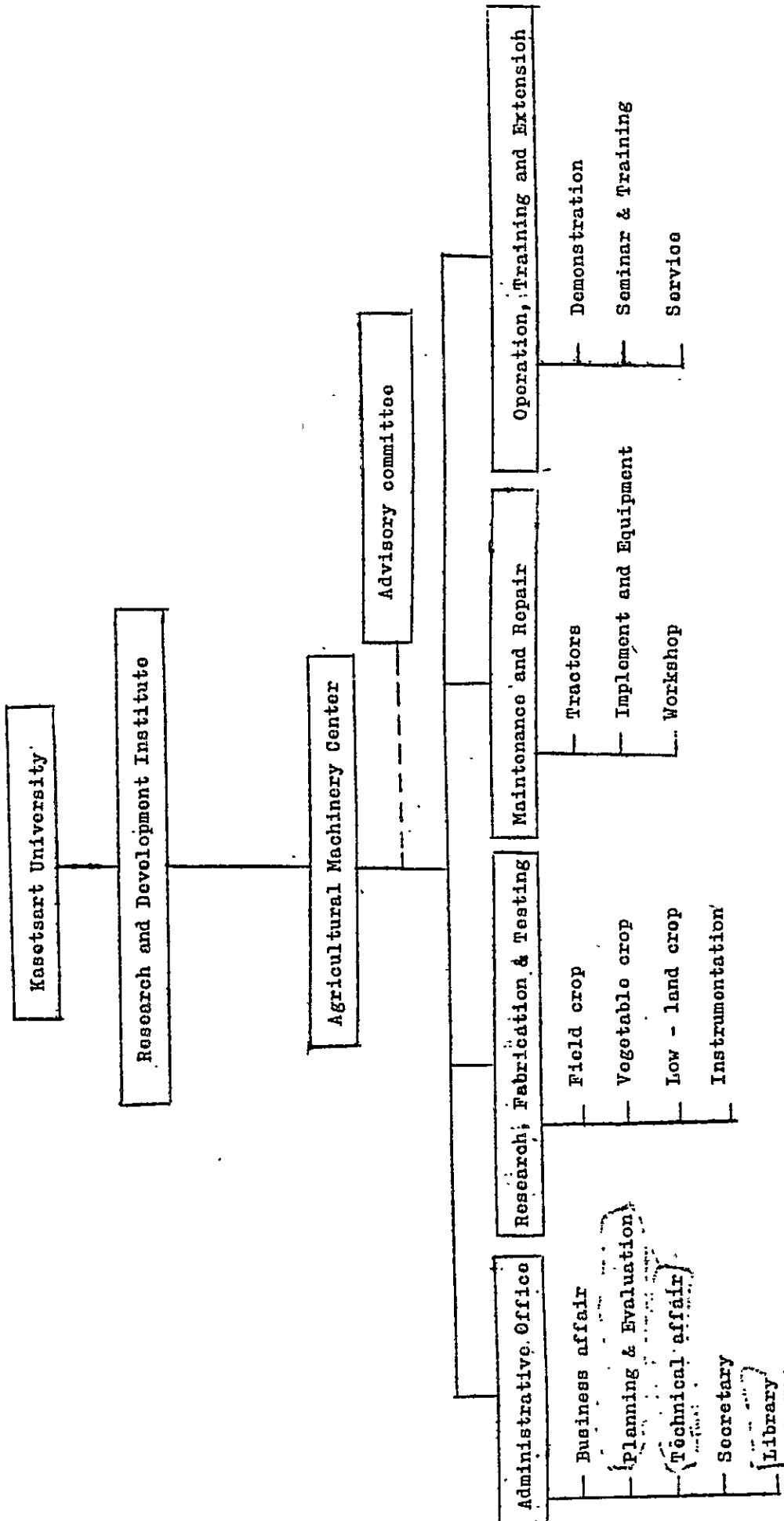


Figure 4 Organization Chart of Agricultural Mechanization Center

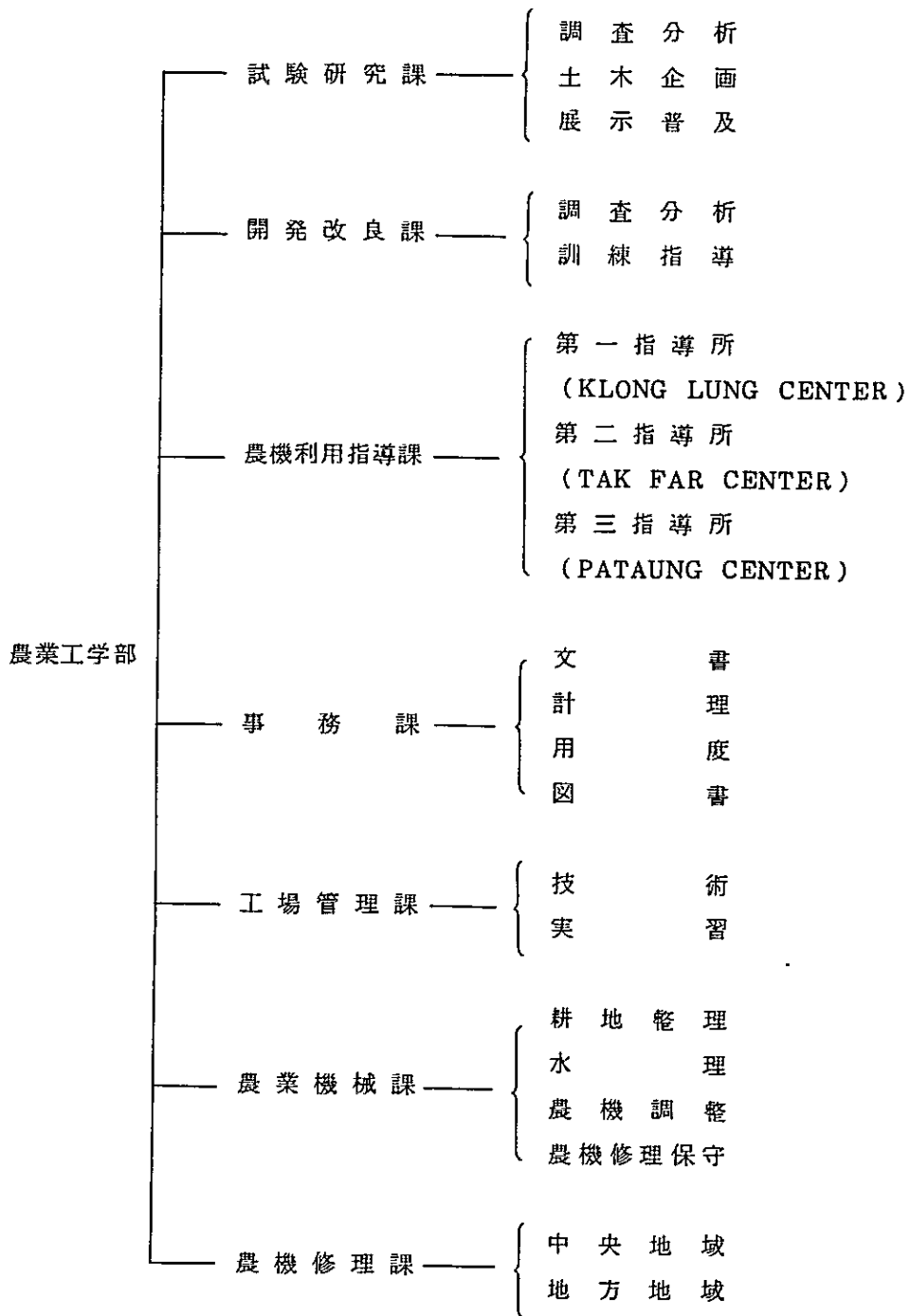


図8 農業協同組合省，農業工学部の組織

JICA

