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1　合同評価報告書

MINUTES OF UNDERSTANDING OF THE JOINT EVALUATION ON THE JAPANESE TECHNICAL COOPERATION FOR THE CHIANG MAI UNIVERSITY PLANT BIOTECHNOLOGY RESEARCH PROJECT IN THAILAND

With about three months remain until the termination of the cooperation period of "The Chiang Mai University Plant Biotechnology Research Project in Thailand" (hereinafter referred to as "the Project") on July 31, 1998, which started on August 1, 1993, as stated in the Record of Discussions (hereinafter referred to as "R/D"), the Japanese Evaluation Team organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Dr. Masashi Kobayashi has visited the Kingdom of Thailand in order to conduct an overall review and evaluation of the performance of the Project. In order to achieve this, a Joint Evaluation Team (hereinafter referred to as "the Team") is formed consisting of the aforementioned Japanese Evaluation Team and a Thai Evaluation Team.

The Team has conducted interviews with the Japanese experts and the Thai counterparts assigned to the Project, a series of discussions with the Thai authorities concerned, field surveys and view exchange among the members of the Team.

As a result, the Team has agreed to forward to their respective Governments a summary of the evaluation and recommendations which are referred to in the document attached hereto.

Chiang Mai, April 10, 1998

M. Kobayashi

Dr. Masashi Kobayashi
General Leader
Joint Evaluation Team

N. Sitthiphong

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Vice President for Research and
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JOINT EVALUATION REPORT
ON THE JAPANESE TECHNICAL COOPERATION
FOR
THE CHIANG MAI UNIVERSITY
PLANT BIOTECHNOLOGY RESEARCH PROJECT
IN THAILAND

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1. INTRODUCTION

The Government of Thailand has aimed at strengthening the biotechnology for the quality improvement of agricultural production and development of export production, according to the gap of income and living standards between urban and farming areas, which is one of the political strategies on the 6th economical and social development plan which commensurated in 1986.

In light of this, the National Center for Genetics Engineering and Biotechnology supervised by Ministry of Science Technology and Energy has requested to the Japanese Government "the project of the Biotechnology Center for Agricultural Industry in Thailand" under the condition that common center would be established by the grant aid cooperation.

To this proposal, Japanese Government has decided its policy that is difficult to give grant aid cooperation considering recent economical development. Then the Government of Thailand has requested to the Japanese Government for the revised proposal "Research Project on biotechnology for agricultural industry in Thailand", in which the implement organization is Chiang Mai University (hereinafter referred to as "CMU") supervised by Ministry of University Affairs (hereinafter referred to as "MUA") that is one organization on the initial proposal.

As a results of examination to this new proposal in stead of initial proposal, the Japanese technical cooperation has been conducting from August 1, 1993, scheduled five year period, to strengthen the capability of the CMU researchers in the filed of plant biotechnology.

Following are the items provided for the Project by the Japanese Technical assistance.

1. To establish the technology for practical production systems and acclimatization methods for selecting seedlings for agricultural crops
   (1) Plant biotechnology research to establish the technology for a practical production systems to select seedlings for agricultural crops
      1) Plant tissue culture technology
      2) Plant protoplast technology
   (2) Culture medium and environmental effects research to establish the acclimatization method to the field for those seedlings
      1) Culture medium

2) Environmental effects
3) Acclimatization technology

2. To transfer the technology to academic staff at CMU in the field of plant biotechnology
(1) To produce training manuals on activities 1.
(2) To operate seminars and workshops using these training manuals

As the cooperation period is about to end by July 31, 1998, the Government of Japan and the Government of Thailand conducted a joint evaluation of the general achievements of the Project.

2. MEMBERS OF THE JOINT EVALUATION TEAM

Joint Evaluation Team consists of the following members and organization shown in ANNEX 1.

(1) The Japanese Evaluation Team

1) Dr. Masashi Kobayashi : Leader
Project Leader Head,
Bio-oriented Technology Research Advancement Institution
2) Dr. Hiroshi Taguchi : Plant Biotechnology
Professor, Faculty of Bioresources, Mie University
3) Dr. Yukihiro Fujime : Acclimatization Technology
Professor, Faculty of Agriculture, Kagawa University
4) Mr. Takeo Sasaki : Effect on Technical Cooperation
Deputy Director, Agricultural Development Cooperation Division,
Agricultural Development Cooperation Department,
Japan International Cooperation Agency (JICA)
5) Mr. Takeshi Ishikawa : Planning Evaluation
Staff, Agricultural Development Cooperation Division,
Agricultural Development Cooperation Department, JICA

(2) The Thai Evaluation Team

1) Dr. Oradee Sahavacharin
Associate Professor, Department of Horticulture,

Faculty of Agriculture,
Kasetsart University

2) Ms. Jiraporn Unkasem
Program Officer, Monitoring and Evaluation Sub-Division,
Department of Technical and Economic Cooperation

3. OBJECTIVES OF THE EVALUATION

(1) To conduct a comprehensive and objective evaluation of the achievements of the Project with regard to the contents of Record of Discussions (hereinafter referred to as "R/D") and Tentative Schedule of Implementation (hereinafter referred to as "TSI") and other concerned official agreements. The period of the Project which is the subject of the evaluation is 5 years from August 1, 1993 to July 31, 1998 (including scheduled input, activities and output).

(2) To make recommendations and suggestions to the authorities of both Governments prior to and after the termination of the cooperation period of the Project.

(3) To use the results obtained from the evaluation of the Project for cooperation planning and project implementation in similar cases in the future.

4. EVALUATION METHOD

(1) Examination of the accomplishments of the Project

The Joint Evaluation Team (hereinafter referred to as "the Team") has conducted an examination of the accomplishments of the Project with regard to the following items listed in R/D, TSI and other official documents.

1. Project input
(1) Japanese input
1) Dispatch of experts
2) Acceptance of trainees

3) Provision of machinery and equipments
4) Supplementation of expenditure for local costs
5) Dispatch of study teams

(2) Thai input

1) Provision of land, buildings and facilities
2) Allocation of budget
3) Assignment of counterparts and other personnel

2. Accomplishment of the project activities and output

(2) Analysis in terms of five basic evaluation components

The team has discussed the contents of draft Project Design Matrix (hereinafter referred to as "PDM") to understand the backgrounds and objectives of the Project and related information. As a results of discussions, PDM shown in ANNEX 2 is completed, so, Team has conducted its analysis of the results of the survey in terms of the following five basic evaluation components with utilization of PDM.

1. Effectiveness
2. Impact
3. Efficiency
4. Relevance
5. Sustainability

5. RESULTS OF THE SURVEY

5-1. ACCOMPLISHMENTS IN TERMS OF THE INPUT

5-1-1. JAPANESE INPUT

(1) Dispatch of experts

The Japanese side has dispatched the experts in accordance with the R/D and the TSI. 8 long-term experts (cumulative) with expertise have been dispatched in the following fields, team leader, coordinator, plant biotechnology and acclimatization technology as scheduled. In addition, 30 (cumulative) short-term experts have been dispatched in the fields necessary for smooth implementation of the Project. Additionally, 1 short term expert is scheduled to be dispatched before

the end of the Project period.

The list of dispatched experts are shown in ANNEX 3.

(2) Acceptance of trainees

The Japanese side has accepted 18 Thai counterpart personnel as trainees in Japan for technical training (ANNEX 4). The trainees have acquired the advanced knowledge and techniques necessary for the smooth implementation at Kagawa and Mie universities which are cooperation agencies upon this Project.

(3) Provision of machinery and equipments

The Japanese side has provided machinery and equipments valued at about 238 million Japanese Yen (hereinafter referred to as "JY") through the 1993-1997 fiscal year (the Japanese fiscal year starts on April 1 and ends on March 31, and is hereinafter referred to as "FY") in order to carry out the Project activities effectively. The Japanese side plans to provide an additional amount valued at JY 5 million in FY1998. Most of equipments were purchased at local agency in Thailand for easy acceptance on receiving the spare parts and consumption articles.

In addition, other equipments and machinery were brought by hand along with the dispatch of long and short-term experts.

The list of machinery and equipments donated are shown in ANNEX 5.

(4) Supplementation of expenditure for local costs

For the smooth and scheduled implementation of the Project, the Japanese side has paid a part of the project management cost which the Thai side should have borne on daily activities for Japanese experts, implementing annual seminar on the research activities of the Project, the program of technical knowledge exchange with other projects which were implemented in Malaysia and constructing the glasshouse for the experimentation on acclimatization research of plant seedlings. Total budget allocated to above activities came up to 46 million JY (excluding the budget in FY1998).

(5) Dispatch of study teams

The Japanese side has dispatched 2 study teams, a Consultation Study Team and a Technical Guidance Team, during the Project period for the main purpose of formulating a detailed activity plan and annual

implementation plan of the Project and intermediately evaluating the activities and achievements of the Project over the previous 2 years, respectively.

5-1-2. THAI INPUT

(1) Provision of land, buildings and facilities

The Thai side has provided land as well as buildings and facilities related to Faculty of Agriculture, CMU, necessary for the implementation of the Project.

(2) Allocation of budget

The Thai side has allocated running expenses on the Project such as salaries of Thai personnel, allowance for accommodation of Japanese experts and expenses for light, fuel and water upon the Project facility.

Expenses necessary for research is not allocated from Thai side for the Project activities due to its system in Thailand. Most of counterparts have gained the research funds from the other organization by themselves. So, it means that a part of that fund is allocated to the activities related to the Project.

(3) Assignment of counterparts and other personnel

The Thai side has assigned counterparts and other personnel to the administration and management of the Project. Presently, 9 counterparts for plant biotechnology, 7 counterparts for acclimatization technology have been assigned (ANNEX 6). For the daily activities of the Japanese experts, 2 secretaries and 2 drivers have been assigned.

5-2. PROJECT ACTIVITIES AND ACCOMPLISHMENTS

5-2-1 To establish the technology for practical production systems and acclimatization methods for selecting seedlings for agricultural crops.

(1) Plant biotechnology research to establish the technology for a practical production system to select seedlings for agricultural crops.

1) Plant tissue culture technology

i) Improvement in the techniques for raising disease free plants (1993-1998)

The following table shows that the project has succeeded in producing virus-free tissue cultured seedlings of potato, strawberry, garlic, carnation and chrysanthemum through thermotherapy and meristem culture.

Methods used for virus detection were electron microscopy, indicator plants and serological test (ELISA and Ouchterlony's double diffusion test).

Crops	Laboratory	Nursery	Field	Post Harvest
Potato	X	X	X	X
Strawberry	X	X	X	X
Garlic	X	X	X	-
Rose	X	-	-	-
Carnation	X	X	X	-
Chrysanthemum	X	X	X	-

Note X : Successfully carried out, - : under investigation

Recommendation

- Work should be emphasized on practical and mass production of potato and strawberry.
- Develop the technique for maintenance of virus-free mother plants as long as possible.

ii) Improvement in culturing techniques of somatic cells (1994-1998)

Various somatic cells were obtained from strawberry (meristem, stolon and petiole) and various culture techniques have been studied to produce plantlets.

Crops	Meristem	Stolon	Petiole
Strawberry	X	X	X
Garlic	X	-	-

Recommendation

- Other crops should be investigated.

iii) Improvement in the techniques for regulation and utilization of

somaclonal variation (1994-1998)

To check somaclonal variation, the chromosome number and isozyme pattern have been studied in Garlic and some variations have been recognized in the plantlet stage.

Crop	Chromosome number	Isozyme Pattern
Garlic	X	X

Recommendation

- Induced mutation by irradiation and chemical mutagens should be done.
- Try to induce polyploidies in certain crops.

2) Plant protoplast technology

i) Improvement of techniques used in plant protoplast research

i-1) Isolation and culture of protoplast (1993-1998)

Protoplasts of various crops have been isolated by enzymatic digestion techniques and successfully cultured to microcolony and plantlet stages as shown in the following table. In the case of tobacco and potato, protoplast fusion was successful and the plantlets could be obtained.

Crops	Protoplast				
	Culture			Fusion	
	Isolation	Microcolony	Plantlet	Microcolony	Plantlet
Tobacco	X	X	X	X	X
Potato	X	X	X	X	X
Orchid	X	X	-	-	-
Strawberry	X	X	-	-	-
Chinese Kale	X	X	-	-	-
Broccoli	X	-	-	-	-

Recommendation

-Research on protoplast fusion in strawberry should not be continued because of poor prospect due to its genetic background.

i-2) Selection of fused cells, regeneration of whole plants and testing

for useful characters (1994-1998)

The following two topics have been tested and some useful lines were obtained.

- Production of virus resistant lines in potato
- Antibody Production lines in tobacco

Recommendation

- Pathogen resistant cultivars of potato should be developed.

ii) Improvement in the conditions of callus culture medium and related techniques (1994-1998)

- Have successfully conducted in potato, tobacco and strawberry cullus culture regeneration.

(2) Culture medium and environmental effects research to establish the acclimatization method to the field for those seedlings.

1) Culture medium

i) Improvement of tissue culture media and systems (1993-1998)

The following two topics have been studied.

- Agar replacement by soybean, cassava, marrow root, mungbean, corn flour and high water absorbing (HWA) polymer
- Develop *in vitro* flower induction media for orchid, begonia, carnation, celosia and *Solanum sp.*

Recommendation

- Try to use cheaper materials than agar.

2) Environmental effects

i) Analysis of environmental stress effect (1994-1998)

- Study on controlling light quality and quantity
- Study on CO_2 enriched atmosphere

ii) Analysis of nutritional stress effects (1994-1998)

- Effects of calcium concentration on growth of *in vitro* plantlets

Recommendation

- Experiment should be progressed to increase the survival rate at the transplanting time from tissue culture laboratory to the nursery.

3) Acclimatization technology

i) Improvement in devised technology for raising seedlings to be transplanted into tropical soils (1995-1998)

- Use of sterilized and fumigated media for tissue cultured seedlings (burnt rice husk + coarse sand + fine soil)
- Application of super parasitic fungi to improve the survival rate of strawberry plants
- Use of VA-mycorhizal fungi in the medium for strawberry
- Use of free-living N_2 fixing bacteria and VA-mycorhizal fungi for vetiver grass

Recommendation

- Try to use effective microorganisms to enhance plant growth in the field.

ii) Improvement in techniques to minimize environmental and nutritional stresses (1995-1998)

- Strawberry runner production as affected by temperature, GA_3 and Ethephon

Recommendation

- Try to develop the day-neutral and ever-bearing strawberry cultivars.

5-2-2 To transfer the technology to academic staff at CMU in the field of plant biotechnology.

Works done by Japanese experts are listed in ANNEX 7. Research reports written by Thai staff are also listed in ANNEX 8.

(1) To produce training manuals on activities 5-2-1

i) To produce training manuals and related materials (1994-1998)

- Protoplast Technology 1995 (written in Thai, 31 pages, 200 volumes)
- Molecular Biology of Cell 1997 (written in Thai, 239 pages, 500 volumes)
- Protoplast Technology 1998 (in preparation, 500 volumes)
- Techniques in Plant Tissue Culture (in preparation, 500 volumes)

(2) To operate seminars and workshops using these training

manuals

i) To operate seminars (1994-1998)

JICA-CMUPB Plant Biotechnology Seminars

- Trends of Biotechnology for the Agriculture Improvement
  (22-24 March 1994, 59 participants)
- Trends of Biotechnology for the Agriculture Improvement II
  (16-17 March 1995, 60 participants)
- Trends of Biotechnology for the Agriculture Improvement III
  (20 March 1997, 75 participants)

ii) To operate workshops (1994-1998)

- Protoplast Culture Technology:1
  (11-14 January 1994)
- Protoplast Culture Technology:2
  (1-4 February 1994)
- Cytological Technique for Chromosomes
  (23 September 1994)
- Protoplast Culture Technology:3
  (16-19 May 1995)
- Protoplast Technology
  (22-25 April 1997)
- Protoplast Technology
  (27-30 May 1997)

6. RESULTS OF THE EVALUATION

6-1. EFFECTIVENESS

Counterparts (a part of academic staff) have acquired sufficient knowledge, basic and advanced experiments techniques necessary for the research in the field of plant biotechnology and acclimatization technology, and consequently they are capable of conducting the research activities in the field of biotechnology smoothly in their laboratories.

Furthermore, some academic staff besides counterpart have gained same experience by participation to the seminars and workshops as well. But the number of attendance of academic staff at CMU is small, because of the capacity limitation of the workshops.

After this, by continuation of seminars and workshops and transfer related technology to the academic staff, it is expected to contribute to the improvement of the research capability of academic staff at CMU.

6-2. PROJECT IMPACT

6-2-1. IMPACT

(1) Technical impact

Technical impact of this project through counterparts and staff attending lectures, seminars, workshops and research laboratories is appeared in research activity of academic staff at CMU in the field of biotechnology.

(2) Economical impact

It is expected to increase the yield of strawberry, potato and garlic in the northern parts of Thailand through Royal Project and other agencies.

6-2-2. EXTENT OF IMPACT

(1) Project level

The counterparts and staff can get more knowledge and techniques in the field of biotechnology.

(2) Regional level

The Project has produced virus-free seedlings for strawberry, potato and garlic. In case of strawberry, the Project has cooperated with the Royal Project in mass propagation of two Japanese varieties namely Nyoho and Toyonoka and distributed to some villagers in the northern parts of Thailand. Thus, this can generate income for them as the export products to Japan. However, it is needed to improve or to find a new variety strawberry with the better taste and quality for export.

6-3. EFFICIENCY

Japanese experts with expertise necessary for the advancement of research in the field of plant biotechnology and acclimatization technology have been dispatched. Additionally, short-term experts on

the list at Kagawa and Mie Universities have been dispatched timely, the advanced techniques are effectively transferred to the academic staff at CMU through workshops and special lectures during short stay (around one month) in the Project.

Greenhouse constructed by model infrastructure preparation is made full use of the research activities in the field of acclimatization, then that contributed to the acquisition of techniques for counterparts and development of technology which should be transferred to other academic staff.

Competent counterparts with some year's experience in the research activities have been assigned from the beginning of the Project.

Thai local cost allocated to the Project by the CMU and MUA is not enough to conduct the research activities. A part of counterparts has gained the necessary fund from related organization, but most counterparts have been under the condition of the shortage of research budget. So it is expected to make efforts to prepare the budget necessary for the continuation of improvement of research capability for academic staff from related organization.

It is realized that literature related to research activities, such as periodical magazines and abstracts of research reports, are necessary for making of manual, implementation of seminars and workshops and making research reports. A purchase plan by Thai side or Japanese side should be drawn up.

6-4. RELEVANCE

(1) Relevance of project purpose and overall goal

The overall goal that is to improve the capability and productivity for agricultural production still remains a prerequisite for the northern parts of Thailand in terms of correction of balance between urban and rural areas, which are considered in the 8th National Economic and Social Development Plan (1997-2001). Furthermore, according to that Plan, genetic engineering for resistance to disease and high yield and the technology research development are showed as the field related to the Project, under that situation, MUA has considered CMU as a strong point for proceeding with the agricultural development at the northern of Thailand. Moreover, it looks on CMU as the center of biotechnology research activities which are focused on agricultural development

strategies. Thus improvement of technical skill level of personnel concerned with CMU has a high priority, and right justification as project purpose.

(2) Relationship among overall goal, project purpose, output and input

In this Project, "plant biotechnology" and "acclimatization technology" are focused as the research activities. In other words, not only protoplast technology and tissue culture but also field trial is effective in terms of supplying seedlings which is adaptable to the situation of the northern Thailand.

6-5. PROSPECTS FOR SUSTAINABLE DEVELOPMENT

6-5-1. PROSPECTS FOR INSTITUTIONAL SUSTAINABILITY

The biotechnology unit is located in the institutional chart of Faculty of Agriculture, so that it is expected to keep the institutional sustainability.

Organization chart of CMU and administration chart of Faculty of Agriculture, CMU are shown in ANNEXES 9, 10, respectively.

6-5-2. PROSPECTS FOR FINANCIAL SUSTAINABILITY

Economic crisis in Thailand has started from 1997, the budget of Faculty of Agriculture in CMU is also reducing about 15%, so there is no budget to employ the new staff, purchase new equipments and maintain for equipments. In this serious situation, allocation of the budget for biotechnology research will not be expected even though some staff make an effort to get grants by themselves for their research and continue their work.

6-5-3. PROSPECTS FOR PHYSICAL AND TECHNICAL SUSTAINABILITY

The academic staff has transferred knowledge and techniques pass through seminars, workshops and collaboration with Japanese experts. The transferred techniques are utilized in their daily research work to develop a useful biotechnology for farmers such as establishment of virus free seedlings.

6-5-4. RESTRICTION FACTOR FOR MANAGEMENT

Some equipments will be needed to be repaired in the near future and some of them need a lot of budget for maintenance, especially the equipment in laboratories are very sophisticated to take care, but at present the CMU has some difficulties with the budget because of the government financial problem due to the economic crisis.

There is a problem on this project management because the Project gets no research fund to do research from JICA. Staff must find the other sources for the research fund.

7. CONCLUSIONS AND RECOMMENDATIONS

7-1. SUMMARY OF EVALUATION

The activities of the Project have been conducted in accordance with the items mentioned in the TSI with the efforts of the Japanese experts and the Thai counterparts concerned. Counterpart personnel concerned has acquired the capabilities on each research field of the Project activities and the Project has been accomplishing the project purpose. The Project will be completed successfully in the planned period on July 31, 1998.

7-2. RECOMMENDATIONS

(1) In the succeeding phases following the termination of the Project, the Thai side is requested to make efforts to the issues described below, this, in order to realize the overall goal of improving agricultural productivity by promoting biotechnology techniques.

- In the implementation of the policy for improving the agricultural productivity, the CMU staff should continue to make efforts to research in the field of biotechnology by making the best use of the achievement of the Project.

- The counterparts of the Project should continue their research work by using transferred techniques to develop and enhance manpower in the

field of biotechnology.

- In order to assure the financial sustainability of CMU, effective budgetary measures should be taken by Faculty of Agriculture, including to apply research funds or grant.

(2) The following areas of activities which have proven to be beneficial through the implementation process of the Project should be given proper attention to realize further development.

- Based on the achievements attained through lectures and workshops about the basic and advanced techniques, efforts should be made to implement the research aim at higher level of agriculture productivity for researchers.

- Efforts should be made to revise the various instruction textbooks and technical manuals according to the changing needs. Efforts are also solicited for their effective transfer among academic staff of CMU to outside of the university.

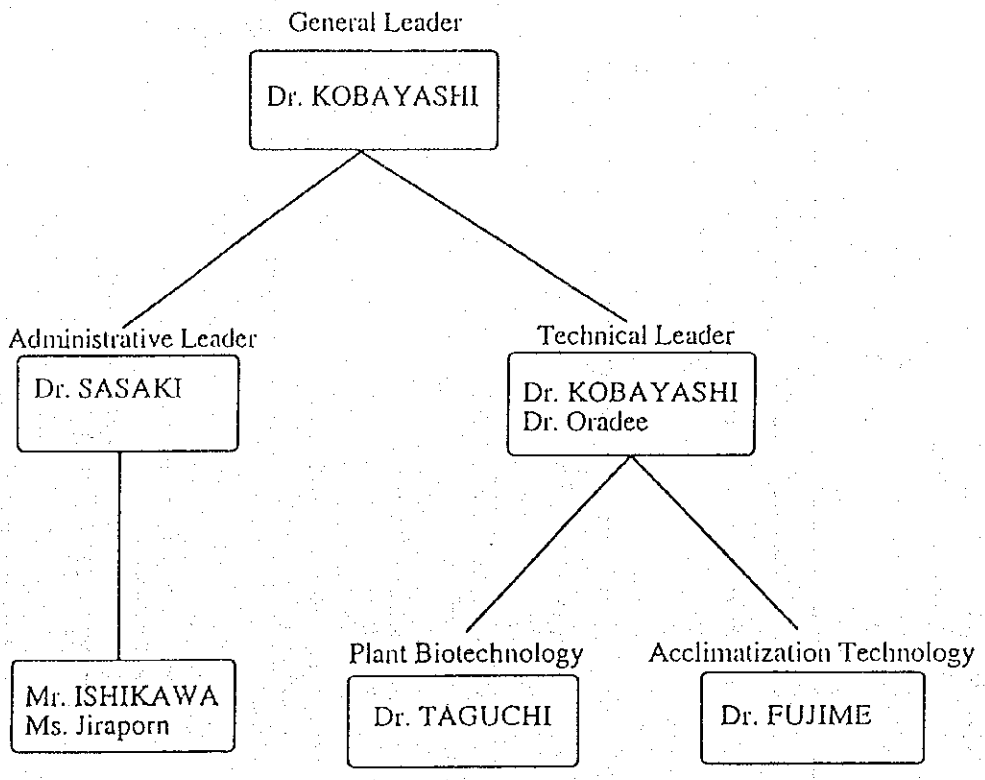
(3) As an extrapolation of the Project achievements in the near future, Thai side in CMU is expected to play an important role in the northern parts of Thailand for disseminating technologies in the field of biotechnology. To fulfill this role, continuous efforts are required to following aspects;

- By adequately coordinating the programs implemented by concerned governmental agencies or private company, efforts should be made to generate technologies for biotechnology products and to disseminate them among farmers.

- Due efforts should be made to coordinate with other South East Asian countries that are promoting agricultural productivity.

(4) For maximizing the results of the Project to the neighboring countries, Thai side may apply for the international training course from Japanese Government (the third country training course) or other agencies.

Organization of Joint Evaluation Team



Project Design Matrix

Title of the Project : The Chiang Mai University Plant Biotechnology Reseach Project in Thailand

Cooperation period : 1/8/1993 - 31/7/1998

Project site : Faculty of Agriculture, Chiang Mai University (CMU)

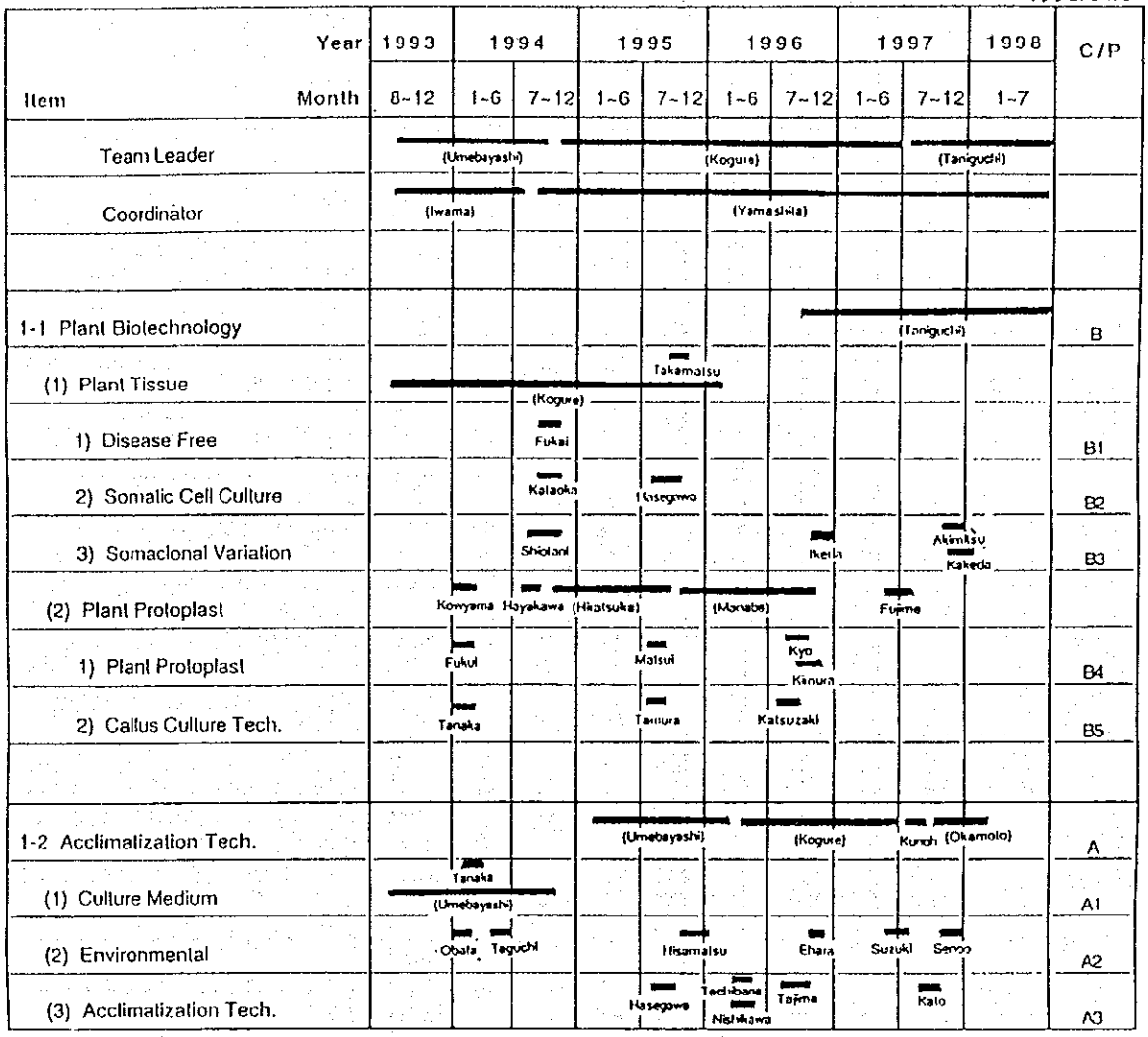
Target Group : Academic staff at CMU in the field of biotechnology

Narrative summary	Verifiable indicator	Means of verification	Important assumptions
*Overall goal Agricultural productivity in the northern part of Thailand is improved	Productivity of high quality agricultural crops such as strawberry, potato and garlic	Interview with farmers and consumers Agricultural statistics	The demand and price of agricultural product are not fall so drastically The government policy on agriculture is not changed
*Project purpose Research capability of academic staffs of CMU in the field of biotechnology is improved.	The number of reports presented to the related academic societies	Project reports	Appropriate technology in the northern Thailand is developed Economic crisis effect the Project not seriously
*Outputs 1. Academic staffs have proper knowledge 2. Academic staffs have gained more basic and advanced techniques	1-1. The number of staffs attending seminars and lectures 1-2. The number of seminars or lectures (are held in the project period) 2-1. The number of staffs attending workshops and lectures 2-2. The number of workshops and number of lectures	1. Project reports 2. Project reports	The Thai counterparts and CMU academic staff are still working at CMU
*Activities 1-1. Preparing documents for lectures 1-2. Operating seminars and lectures 2-1. Oprerating workshops 2-1-1. Preparing manuals for workshop for basic and advanced techniques 2-1-2. Operating workshop on basic and advanced techniques 2-2. To conduct plant biotechnology research in the laboratory 2-2-1. To transfer plant tissue culture technology 2-2-2. To transfer plant protoplast technology 2-3. To conduct acclimatization research in the laboratory 2-3-1. To transfer culture medium development methods 2-3-2. To transfer the techniques on the field of environmental affect 2-3-3. To transfer the techniques on the field of acclimatization technology	*Inputs -Japanese side- (1)Dispatched experts:long-term 8, short-term 30 (cumulative) (2)Accepted trainees:18 (3)Provided equipments: 238 million JY (Japanese Yen) (4)Other budget:approx.46 million JY -Thai side- (1)Land and buildings:facilities of Faculty of Agriculture (2)Allocated budget:3 million Bahts for allowance of personnel and living and transportation of experts (3)Counterparts and other staffs:16 counterparts, 2 secretaries and 2 drivers		The staffs are interested in attending seminars and lectures Counterparts transfer the knowledge and techniques to their colleagues Self-study in academic staff group is done *pre-conditions

ANNEX 3

Chiang Mai University Plant Biotechnology Research Project in Thailand
Dispatch of Japanese Expert Schedule

1998/04/9



(Name) : Long-term Experts, (No.) : C/P 1st category

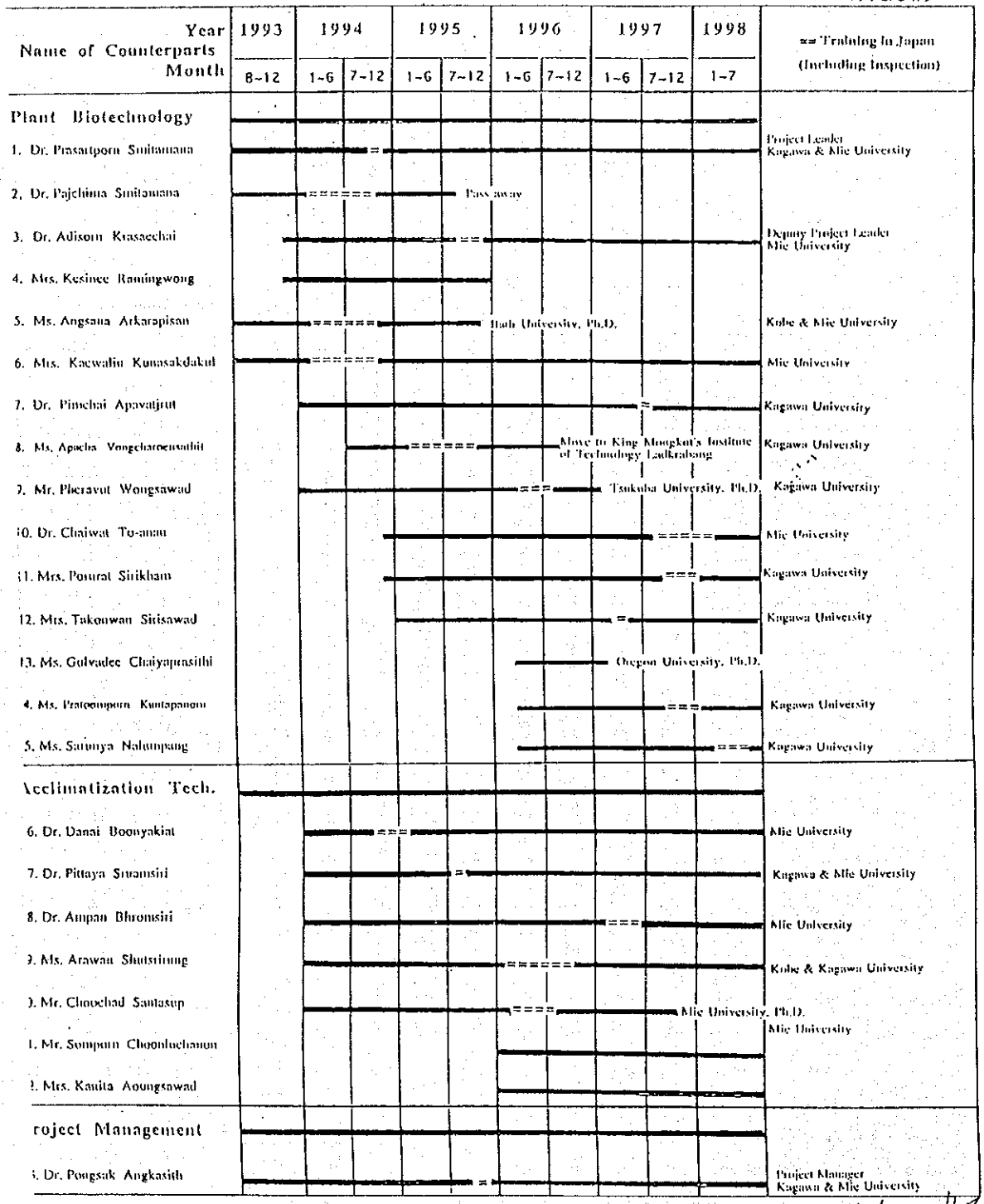
Number and Name of Counterparts

1.	Assoc. Prof. Dr. Prasarnporn Smitamana	(A), (B), B1, B3, (B4)	
2.	Assoc. Prof. Dr. Adisorn Krasaechai	(B3)	
3.	Assist. Prof. Dr. Pillaya Sruamsiri	A2, A3	
4.	Assoc. Prof. Dr. Danai Boonyaklai	(A2)	
5.	Assist. Prof. Dr. Pimchai Apavatjrut	(B2), A3	
6.	Assist. Prof. Dr. Ampan Bhumiraksa	A1, (A2), A3	
7.	Ms. Arawan Shotsirikung	A1, A2, (A3)	
8.	Mrs. Kaewalin Kunasakdakul	B1, B2, (B4), (B5)	
9.	Mrs. Pornrat Sirikam	B3	
10.	Mr. Choochad Santasup	A1, A2, (A3)	
11.	Dr. Chaiwat To-anun	(B1), B5	
12.	Mrs. Takonwan Sirisawad	(B2), A1, A3	
13.	Ms. Sarunya Natumpang	B1, (B4), B5	
14.	Ms. Pratoompom Kuntapanom	B3, (B4), (B5)	
15.	Dr. Somporn Choonluchanon	(A2), A3	
16.	Ms. Kanita Aoungsawad	A2, (A3)	

ANNEX 4

Chiang Mai University Plant Biotechnology Research Project in Thailand
Thai Counterpart Activities

1998/04/9



ANNEX 5

Equipment List in JFY 1993

No.	Name of Equipment	Quantity
1	Electrofusion Equipment	1
2	Invertted Microscope	1
3	Micromanipulator System	1
4	Fluorometer	1
5	Autoclave	1
6	Bioreactor 5L	1
7	Bioreactor 2.5L	1
8	CO2-O2 Gas Analizer	1
9	Deep Freezer	1
10	Ultrasonic Pipette Washer	1
11	Tissue Homogenizer	1
12	Tubing Pump System	1
13	Low Temperature Incubator	1
14	Water Bath	1
15	Cooling Circulator	1
16	Rotary Evaporator	1
17	Rotating Cultivator	1
18	Phytotron	1
19	Laminar Air Flow	1
20	Heating Mantle	1
21	Air Compressor	1
22	Ice Maker	1
23	Generator, Local Supply	1
24	4WD-Vehicle	1
25	Minibus	1
26	Personal Computer Set	1
27	Laser Printer	1
28	UPS Powerback	1
29	Lap Top Personal Computer	1
30	Computer Desk	1
31	Facsimile	1
32	Photocopy Machine	1
	Total	32

Equipment List in JFY 1994

No.	Name of Equipment	Quantity
1	CO2 Incubator	1
2	CO2 Incubator	1
3	Illumination Incubator	1
4	Illuminated Incubator	1
5	Ultrasonic Cell Breaker	1
6	Microcentrifuge	1
7	Fraction Collector	1
8	Table-Top Ultra Centrifuge	1
9	Immersion Cooler	1
10	Ultra Deep Freezer	1
11	Electroporation	1
12	Biolistic System/Image Analysis	1
13	CO2/H2O Analyzer/Leaf Area System	1
14	Gas Chromatograph	2
15	Chromatopac	1
16	Tubing Pump System	1
17	Cooling Circulator	1
18	Rotary Evaporator	1
19	Waring Blender	1
20	Magnetic Stirrer	1
21	pH Meter	2
22	Ultrasonic Cleaner	1
23	Force Air Flow Oven	2
24	Book	24
25	TV	1
26	Movie Camera	1
27	Video Recorder	2
28	Digital AV Mixer	1
29	Digital Slide Maker	1
30	DNA Sequence Reader Software	1
31	Colony Counter Sorting Software	1
32	Shaker	1
33	Inverted Microscope	1
34	Infrared CO2 Controller	1
	Total	**61**

Equipment List in JFY 1995

No.	Name of Equiptment	Quantity
1	Biohazard Laminar Airflow 6'	1
2	Horizontal Laminar Air Flow 4'	2
3	Clean Room	1
4	Chlorophyll Meter	1
5	Rotating Cultivator	1
6	Shaker Bath	1
7	Cryogenic Storage w. Accessories	1
8	Thermohygrograph	4
9	Phytotron	1
10	Pressure Bomb	1
11	Porometer	1
12	Solar irradiance integrator	1
13	Air Cleaner	2
14	PCR Set In situ Hybridization Pulsed Field Electrophoresis	1
15	Fluorescence Microscope	1
16	Ultrasonic Pipette Cleaner	1
17	Gas Burner	3
18	Capillary Electrophoresis	1
19	pH Meter	1
20	Water Purifier Unit	1
21	Stereomicroscope w. Camera	1
22	Aspirator	1
23	Fumehood	2
24	Concentrator Centrifuge	1
25	Denature Gradient Gel Electrophoresis	1
	Total	33

Equipment List in JFY 1996

No.	Name of Equipment	Quantity
1	Fusion Chamber	15
2	Rotary Shaker	1
3	Controlled Temperature Shaker	1
4	Dry Heat Block	1
5	N Digestion & Distillation	1
6	Chromameter	1
7	Laminar Air Flow (Biohazard)	1
8	Laminar Air Flow (Horizontal)	3
9	Generator	1
10	Cabinet X-ray Apparatus	1
11	Hybridization Oven	1
12	HPLC	1
13	Spectrophotometer	1
14	Preparative Electrophoresis	1
15	Research System Microscope	1
16	Electronic Autoradiography System	1
17	Microplate Reader	1
18	Immunowash Microplate Washer	1
19	Refrigerated Micro Centrifuge	1
20	Refrigerated Centrifuge	1
21	Submarine Gel Electrophoresis	2
22	Homogenizer	1
23	Homogenizer	1
24	Spectrophotometer	1
25	Vortex Mixer	2
26	Shaker Bath	2
27	DNA Amplifier	1
28	Chromatograph Chamber	1
	Total	48

Equipment List in JFY 1997

No.	Name of Equipment	Quantity
1	DNA Sequencer	1
2	Flow Cytometer	1
3	Protein Electrophoresis System	1
4	Laminar Air Flow	1
5	Autoclave	1
6	Flow Injection Analyzer	1
	Total	6

ANNEX 6

Counterpart List of CMUPB

1998/04/9

Name of Counterparts	Department / Faculty / Institute	Academic Position	Speciality	Education
Plant Biotechnology				
1. Dr. Prasartporn SMITAMANA (CMUPB Project Leader)	Plant Pathology / Agriculture	Assoc. Prof.	Protoplast Technology Plant Transformation	Dr. rer. nat. (Biology-Plant Virology) HOHENHEIM Univ.
2. Dr. Adisorn KRASAECHAI (CMUPB Deputy Project Leader)	Horticulture / Agriculture	Assoc. Prof.	Mutation Breeding Floriculture	Ph.D. (Horticulture) LONDON Univ.
3. Ms. Kaewalin KUNASAKDAKUL	Plant Pathology / Agriculture	Lecturer	Protoplast Technology	M.S. (Plant Pathology) KASETSART Univ.
4. Dr. Pinchai APAVATJRUT	Horticulture / Agriculture	Assist. Prof.	Micropropagation Tissue Culture	Ph.D. (Plant Science) LONDON Univ.
5. Dr. Chaiwat TO-ANAN	Plant Pathology / Agriculture	Lecturer	Molecular Biology	Ph.D. (Agri. Science) KINKI Univ.
6. Ms. Pornrat SIRIKHAM	Horticulture / Agriculture	Scientist	Chromosome Analysis Isozyme Analysis	B.S. (General Science) Chiangmai Teacher's College
7. Ms. Takonwan SIRISAWAD	ISTRD	Researcher	Micropropagation	M.S. (Biology) CHIANGMAI Univ.
8. Ms. Sarunya NALUMPANG	Plant Pathology / Agriculture	Lecturer	Tissue Culture	M.S. (Biotechnology) CHULALONGKORN Univ.
9. Ms. Pratoomporn KUNTAPANOM	ISTRD	Researcher	Isozyme Analysis	M.S. (Horticulture) CHIANGMAI Univ.
Acclimatization Technology				
1. Dr. Danai BOONYAKIAT	Horticulture / Agriculture	Assoc. Prof.	Postharvest Technology Physiology	Ph.D. (Horticulture) OREGON STATE Univ.
2. Dr. Pittaya SRUAMSIRI	Horticulture / Agriculture	Assist. Prof.	Crop Physiology, Industrial Crop (Herbs&Spices)	Dr. Agr. (Crop Physiology) BONN Univ.
3. Dr. Ampan BHROMSIRI	Soil Sci.&Conserv. / Agriculture	Assist. Prof.	Soil Microbiology (Bacterial N2 Fixation)	Ph.D. (Soil Science) TOKYO Univ.
4. Ms. Arawan SHUTSRIRUNG	Soil Sci.&Conserv. / Agriculture	Researcher	Soil Microbiology (Bacterial N2 Fixation)	M.S. (Soil Science & Water Management) WAGENINGEN AGRI. Univ.
5. Dr. Somporn CHOONLUCHANON	Soil Sci.&Conserv. / Agriculture	Lecturer	Soil Microbiology (Non Symbolic Nitrogen Fixation)	Ph.D. (Soil Science) KYUSYU Univ.
6. Ms. Kanita AOUNGSAWAD	Soil Sci.&Conserv. / Agriculture	Scientist	Agricultural Meteorology Water Analysis	M.S. (Soil Science) CHIANGMAI Univ.

ANNEX 7

Activities done by Japanese Experts at CMUPB

I. Special Lecture including Seminar & Other Meeting

1. *Emer. Prof. Dr. Kiyoshi KOGURE, Kagawa University,*
   JICA Long-term Expert (19/Oct.,1993 ~ 8/Oct.,1995), CMUPB.
   "Biotech-Agriculture" in Japan.
   1994, Mar. 22, Pang Suan Kaew Hotel, Chiang Mai, Thailand.

2. *Assoc. Prof. Dr. Yasuo KOWYAMA, Mie University,*
   JICA Short-term Expert (26/Feb.~ 27/Mar.,1994), CMUPB.
   Molecular Characterization of Self-incompatibility in Higher Plant.
   1994, Mar. 22, Pang Suan Kaew Hotel, Chiang Mai, Thailand.

3. *Assoc. Prof. Dr. Hitoshi OBATA, Mie University,*
   JICA Short-term Expert (19/Mar. ~ 16/Apr.,1994), CMUPB.
   Use of Radioisotope Techniques in Plant Science Study.
   1994, Mar. 22, Pang Suan Kaew Hotel, Chiang Mai, Thailand.

4. *Prof. Dr. Masanao UMEBAYASHI, Mie University,*
   JICA Long-term Expert (19/Oct.,1993 ~ 18/Oct.,1994), CMUPB.
   Developing Medium Technology to Support Plant Biotechnology Research: Utilization of Water-absorbing Polymer as a Plant Growth Medium for Tissue and Intact Plant.
   1994, Mar. 22, Pang Suan Kaew Hotel, Chiang Mai, Thailand.

5. *Prof. Dr. Michio TANAKA, Kagawa Univerity,*
   JICA Short-term Expert (7/Apr. ~ 26/Apr.,1994), CMUPB.
   Novel Micropropagation of Orchid using Synthetic Seeds.
   1994, Apr. 16, Graduate School Building, CMU, Chiang Mai, Thailand.

6. *Prof. Dr. Hiroshi FUKUI, Kagawa University,*
   JICA Short-term Expert (7/Apr. ~ 6/May.,1994), CMUPB.
   Production of Useful Secondary Metabolites by Plant Cell Culture.
   1994, Apr. 16, Graduate School Building, CMU, Chiang Mai, Thailand.

7. *Prof. Dr. Hiroshi TAGUCHI, Mie University,*
JICA Short-term Expert (5/Jul. ~ 30/Aug.,1994), CMUPB.
Biosensors using Plant Tissues and Various Receptors - Principle and Applications to Biotechnology and Health Sciences -
1994, Jul. 29, Graduate School Building, CMU, Chiang Mai, Thailand.

8. *Prof. Dr. Itaru SHIOTANI, Mie University,*
JICA Short-term Expert (25/Aug. ~ 30/Sep.,1994), CMUPB.
Sweet Potato Genetic Resources as a Basis for Crop Improvement.
1994, Sep. 12, Graduate School Building, CMU, Chiang Mai, Thailand.

9. *Prof. Dr. Shigeru HAYAKAWA, Kagawa University,*
JICA Short-term Expert (25/Aug. ~ 19/Sep.,1994), CMUPB.
Introduction of Plant Biotechnology Researches by Professors in Kagawa University.
1994, Sep. 12, Graduate School Building, CMU, Chiang Mai, Thailand.

10. *Assoc. Prof. Dr. Ikuo KATAOKA, Kagawa University,*
JICA Short-term Expert (1/Nov., ~ 29/Nov.,1994), CMUPB.
Developmental Physiology of Grape Berry and its Chemical Regulation.
1994, Nov. 7, Graduate School Building, CMU, Chiang Mai, Thailand.

11. *Assoc. Prof. Dr. Seiichi FUKAI, Kagawa University,*
JICA Short-term Expert (1/Nov. ~ 29/Nov.,1994), CMUPB.
***In vitro* Gene Bank in Horticultural Crops.**
1994, Nov. 7, Graduate School Building, CMU, Chiang Mai, Thailand.

12. *Emer. Prof. Dr. Kiyoshi KOGURE, Kagawa University,*
JICA Long-term Expert (19/Oct.,1993 ~ 8/Oct.,1995), CMUPB.
Overview of Plant Biotechnology in Japan.
1994, Dec. 13, Universiti Pertanian Malaysia (UPM), Kuala Lumpur, Malaysia.

13. *Assoc. Prof. Dr. Shin HIRATSUKA, Mie University,*
JICA Long-term Expert (6/Sep.,1994 ~ 5/Sep.,1995), CMUPB.
Relationship between Self-incompatibility Gene and Stylar Protein in Japanese Pear.
1994, Dec. 13, Universiti Pertanian Malaysia (UPM), Kuala Lumpur, Malaysia.

14. *Assoc. Prof. Dr. Shin HIRATSKA, Mie University,*
JICA Long-term Expert (6/Sep.,1994 ~ 5/Sep.,1995), CMUPB.
Some Propertis of a Stylar Protein Associated with Self-incompatibility Genotype of Japanese Pears.
1995, March. 16, Pang Suan Kaew Hotel, Chiang Mai, Thailand.

15. *Prof. Dr. Toshiyuki MATSUI, Kagawa University,*
JICA Short-term Expert (4/Jul. ~ 14/Aug.,1995), CMUPB.
Fundamental Techniques in Plant Biotechnology.
1995, Jul. 17, Multiple Cropping Center (MCC), CMU, Chiang Mai, Thailand.

16. *Assoc. Prof. Dr. Hirotoshi TAMURA, Kagawa University,*
JICA Short-term Expert (4/Aug. ~ 8/Sep.,1995), CMUPB.
Production and Analytical Method of Useful Secondary Metabolites from Cultured Cells.
1995, Aug. 22, Multiple Cropping Center (MCC), CMU, Chiang Mai, Thailand.

17. *Prof. Dr. Atsushi HASEGAWA, Kagawa University,*
JICA Short-term Expert (14/Sep. ~ 13/Oct.,1995), CMUPB.
The Orchids in Japan.
1995, Sep. 26, Multiple Cropping Center (MCC), CMU, Chiang Mai, Thailand.

18. *Assoc. Prof. Dr. Susumu TAKAMATSU, Mie University,*
JICA Short-term Expert (5/Oct. ~ 9/Nov.,1995), CMUPB.
DNA Analysis as a Tool to Study Diagnosis and Phylogeny of Plant Pathogens.
1995, Oct. 12, Graduate School Building, CMU, Chiang Mai, Thailand.

19. *Assoc. Prof. Dr. Makoto HISAMATSU, Mie University,*
JICA Short-term Expert (7/Dec.,1995 ~ 12/Jan.,1996), CMUPB.
Structures and Functions of Polysaccharides related to Plants.
1995, Dec. 21, Multiple Cropping Center (MCC), CMU, Chiang Mai, Thailand.

20. *Assoc. Prof. Dr. Shiro NISHIKWA, Mie University,*
JICA Short-term Expert (29/Feb. ~ 4/Apr.,1996), CMUPB.
Development and Structure-Activity Relationship of New Cytokinin Analogs as Plant Growth Regulators.
1996, Mar. 5, Multiple Cropping Center (MCC), CMU, Chiang Mai, Thailand.

21. *Prof. Dr. Shoji TACHIBANA, Mie University,*
JICA Short-term Expert (29/Feb. ~ 13/Mar.,1996), CMUPB.
Physiological Basis of Plant Growth Inhibition caused by Supraoptical Root Zone Temperature.
1996, Mar. 5, Multiple Cropping Center (MCC), CMU, Chiang Mai, Thailand.

22. *Prof. Dr. Shigeyuki TAJIMA, Kagawa University,*
JICA Short-term Expert (7/Aug. ~ 7/Sep.,1996), CMUPB.
Metabolism and Compartmentation of Carbon and Nitrogen in Legume Nodules.
1996, Aug. 19, Graduate School Building, CMU, Chiang Mai, Thailand.

23. *Assist. Prof. Dr. Hirotaka KATSUZAKI, Mie University,*
JICA Short-term Expert (13/Aug. ~ 12/Sep.,1996), CMUPB.
Structure and Antioxidative Activity of Lignans Isolated from Sesame Seed.
1996, Aug. 19, Graduate School Building, CMU, Chiang Mai, Thailand.

24. *Assoc. Prof. Dr. Masaharu KYO, Kagawa University,*
JICA Short-term Expert (8/Oct. ~ 7/Nov.,1996), CMUPB.
The Early Period of Pollen Embryogenesis in Tobacco.
1996, Oct. 16, Graduate School Building, CMU, Chiang Mai, Thailand.

25. *Assist. Prof. Dr. Tetsuya KIMURA, Mie Univertsity,*
JICA Short-term Expert (15/Oct. ~ 5/Nov.,1996), CMUPB.
Relaxation of Biomass Tissues by Expressing Bacterial Cellulase and Xylanase Genes in Plant Cells.
1996, Nov. 1, Multiple Cropping Center (MCC), CMU, Chiang Mai, Thailand.

26. *Assist. Prof. Dr. Hiroshi EHARA, Mie Unvirsity,*
JICA Short-term Expert (22/Oct. ~ 27/Nov.,1996), CMUPB.
Fundamental Growth Response to Fertilizer in Rice Plants
-Improvement of Production Efficiency for Low Input Cultivation-
1996, Nov. 1, Multiple Cropping Center (MCC), CMU, Chiang Mai, Thailand.

27. *Assist. Prof. Mr. Shigeru IKEDA, Kagawa University,*
JICA Short-term Expert (26/Nov. ~ 29/Dec.,1996), CMUPB.
Detection of Somatic Mutations using PCR-Base Techniques.
1996, Dec. 2, Graduate School Building, CMU, Chiang Mai, Thailand.

28. *Prof. Dr. Yukihiro FUJIME, Kagawa University,*
JICA Short-term Expert (15 /Jun. ~ 13 /July.,1997), CMUPB.
Morphogenesis of Adventitious Bud Formation and Embryogenesis In Vitro and its Morphological Observation by SEM
1997, July 4, New Faculty of Agriculture Building, Faculty of Agriculture, CMU, Chiang Mai, Thailand.

New Trends on Plant Biotechnology in Domestic in Japan and International Conferences and its my Practical Trail to make New Vegetables (Galic and Brassicas) In Vitro
1997, July 9, New Faculty of Agriculture Building, Faculty of Agriculture, CMU, Chiang Mai, Thailand.

29. *Prof. Dr. Haruo SUZUKI, Kagawa University,*
JICA Short-term Expert (31/July ~ 31/Aug.,1997), CMUPB.
Micrometeorology of Mulched Row Surface
1997, Aug.15, Department of Soil Science, Faculty of Agriculture, CMU, Chiang Mai, Thailand.

30. *Prof. Dr. Hitoshi KUNOH, Mie University,*
JICA Short-term Expert (19/Aug. ~ 16/Sept.,1997), CMUPB.
Detection of Antifungal Bacterial from Fields
1997, Sept. 5, Department of Soil Science, Faculty of Agriculture, CMU, Chiang Mai, Thailand.
Cytoskeleton Involved in Expression of Plant
1997, Sept. 5, Department of Soil Science, Faculty of Agriculture, CMU, Chiang Mai, Thailand.

31. *Assoc. Prof. Dr. Hisashi KATO, Kagawa University,*
JICA Short-term Expert (29/Oct. ~ 2/Dec.,1997), CMUPB.
Effects of Low-oxygen Atmosphere on Glycolysis
1997, Nov. 18, New Faculty of Agriculture Building, Faculty of Agriculture, CMU, Chiang Mai, Thailand.

32. *Assoc. Prof. Dr. Kazuya AKIMITSU, Mie University,*
JICA Short-term Expert (2/Dec. ~ 29/Dec.,1997), CMUPB.
Molecular Basis of Compatibility : Roles of Host-Specific Toxin on Citrus Disease
1997, Dec. 22, New Faculty of Agriculture Building, Faculty of Agriculture, CMU, Chiang Mai, Thailand.

N.S.H

33. *Assoc. Prof. Dr. Keishi SENOO, Mie University,*
JICA Short-term Expert (6/Dec.~ 29/Dec., 1997), CMUPB.
Factors Affecting Survival of a Bacterium Inoculated to Soil
1997, Dec. 22, New Faculty of Agriculture Building, Faculty ot Agriculture, CMU, Chiang Mai, Thailand.

34. *Assoc. Prof. Dr. Katsuyuki KAKEDA, Mie University,*
JICA Short-term Expert (17/Dec. 1997 ~ 9/Jan., 1998), CMUPB.
Molecular Analysis of Self-incompatibility Genes in Plants
1998, Jan. 5, New Faculty of Agriculture Building, Faculty of Agriculture, CMU, Chiang Mai, Thailand.

35. *Prof. Dr. Hidetoshi OKAMOTO, Ehime University,*
JICA Short-term Expert (13/Oct., 1997 ~ 21/Mar., 1998), CMUPB.
Present Situation of Agriculture and Agricultural Scientists : Affirmation to the Sustainable Agriculture
1998, Mar. 16, Conference Room of Soil Science, Department of Soil Science, Faculty of Agriculture, CMU, Chiang Mai, Thailand.

I' Special, Special Lecture

1. *Prof. Dr. Akira SAKAI,*
Emeritus Prof. Institute of Low Temperatures Science, Hokkaido University.
Cryopreservation of Cultured Cells, Meristems and Somatic Embryos by Novel Cryoganic Procedures.
1996, Feb. 8, Multiple Cropping Center (MCC), CMU, Chiang Mai, Thailand.

II. Workshop

1. *Assoc. Prof. Dr. Yasuo KOWYAMA, Mie University,*
JICA Short-term Expert (26/Feb. ~ 27/Mar.,1994), CMUPB.
Basic Technigues Utilized in Molecular Biotechnology.
1994, Mar. 15-16, Central Laboratory, CMU, Chiang Mai, Thailand.

2. *Assoc. Prof. Dr. Hitoshi OBATA, Mie University,*
JICA Short-term Expert (19/Mar. ~ 16/Apr.,1994), CMUPB
High Resolution Electrophoresis of Plant Protein by O'Farrell's Method.
1994, Mar.31- Apr. 1, Central Laboratory, CMU, Chiang Mai, Thailand.

3. *Prof. Dr. Michio TANAKA, Kagawa University,*
JICA Short-term Expert (7/Apr. ~ 26/Apr.,1994), CMUPB.
Novel Micropropagation System Using Film Culture Vessel.
1994, Apr. 19, Tissue Culture Research Center, CMU, Chiang Mai, Thailand.

4. *Prof. Dr. Hiroshi FUKUI, Kagawa University,*
JICA Short-term Expert (7/Apr. ~ 6/May ,1994) , CMUPB.
Thin Layer Chromatographic (TLC) Techniques for Plant Biotechnology.
1994, May. 3-4, Central Laboratory, CMU, Chiang Mai, Thailand.

5. *Prof. Dr. Hiroshi TAGUCHI, Mie University,*
JICA Short-term Expert (5/Jul. ~ 30/Aug.,1994), CMUPB.
Biochemical Regulations of Plant Growth and Flowering Niacin-related Compounds.
1994, Aug. 3, Central Laboratory, CMU, Chiang Mai, Thailand.

6. *Prof. Dr. Shigeru HAYAKAWA, Kagawa University,*
JICA Short-term Expert (25/Aug. ~ 19/Sep.,1994), CMUPB.
Imunochemical Detection of Food Proteins from Rice and Milk by Elisa and Western Blotting.
1994, Sep. 16, Central Laboratory, CMU, Chiang Mai, Thailand.

7. *Prof. Dr. Itaru SHIOTANI, Mie University,*
JICA Short-term Expert (25/Aug. ~ 30/Sep.,1994), CMUPB.
Chromosomes in Mitosis and Meiosis.
1994, Sep. 19, Department of Horticulture, CMU, Chiang Mai, Thailand.

8. *Assoc. Prof. Dr. Ikuo KATAOKA, Kagawa University,*
JICA Short-term Expert (1Nov. ~ 29/Nov), CMUPB.
Micropropagation of Carica, Annona and Eugenia Fruit Crops.
1994, Nov. 17, Central Laboratory, CMU, Chiang Mai, Thailand.

9. *Assoc. Prof. Dr. Seiichi FUKAI, Kagawa University,*
JICA Short-term Expert (1/Nov. ~ 29/Nov.,1994), CMUPB.
New Techniques for Cryoprservation.
1994, Nov. 18, Tisse Culture Research Center, CMU, Chiang Mai, Thailand.

10. *Prof. Dr. Toshiyuki MATSUI, Kagawa University,*
JICA Short-term Expert (4/Jul. ~ 14/Aug.,1995), CMUPB.
The Isolation Methods for Genomic DNA of Plants.
1995, Aug. 4, Multiple Cropping Center (MCC) and Central Laboratory, CMU, Chiang Mai, Thailand.

11. *Assoc. Prof. Dr. Hirotoshi TAMURA, Kagawa University,*
JICA Short-term Expert (14/Aug. ~ 8/Sep.,1995), CMUPB.
GC Analysis of Plant Volatic Secondary Metabolites.
1995, Aug. 24, Multiple Cropping Center (MCC) and Central Laboratory, CMU, Chiang Mai, Thailand.

12. *Prof. Dr. Atsushi HASEGAWA, Kagawa University,*
JICA Short-term Expert (14/Sep. ~ 13/Oct.,1995), CMUPB.
Micropropagation of Native Orchids, Especially Terrestrial Orchids..
1995, Oct. 6, Multiple Cropping Center (MCC) and Central Laboratory, CMU, Chiang Mai, Thailand.

13. *Assoc. Prof. Dr. Susumu TAKAMATSU, Mie Universtiy,*
JICA Short-term Expert (5/Oct. ~ 9/Nov.,1995), CMUPB.
Nonradioactive Labeled Southern Blot Hybridization.
1995, Oct. 31, Multiple Cropping Center (MCC) and Central Laboratory, CMU, Chiang Mai, Thailand.

14. *Assoc. Prof. Dr. Makoto HISAMATSU, Mie University,*
JICA Short-term Expert (7/Dec.,1995 ~ 12/Jan.,1996), CMUPB.
Isolation of Rhizobium, Production of Polysaccharide and Analysis of Sugar Component.
1996, Jan. 5, Soil Science Laboratory and Central Laboratory, CMU, Chiang Mai, Thailand.

15. *Prof. Dr. Shoji TACHIBANA, Mie University,*
JICA Short-term Expert (29/Feb. ~ 13/Mar.,1996), CMUPB.
Quantitative Analysis of Abscisic Acid in Plant Tissue.
1996, Mar. 8, Central Laboratory, CMU, Chiang Mai, Thailand.

16. *Assoc. Prof. Dr. Shiro NISHIKAWA, Mie University,*
JICA Short-term Expert (29/Feb. ~ 4/Apr.,1996), CMUPB.
A Convenient Bioassay Method using Amaranthus Seedlings for RAPID Determination of Cytokinin Activity.
1996, Mar. 28, Central Laboratory, CMU, Chiang Mai, Thailand.

17. *Prof. Dr. Shigeyuki TAJIMA, Kagawa University,*
JICA Short-term Expert (7/Aug. ~ 7/Sep.,1996), CMUPB.
Application of Polymerase Chain Reaction (PCR) Technique to Classify Soil Bacteria.
1996, Aug. 23 & Sep. 3, Plant Biotechnology Building (Kanda Building), CMU, Chiang Mai, Thailand.

18. *Assist. Prof. Dr. Hirotaka KATSUZAKI, Mie University,*
JICA Short-term Expert (13/Aug. ~ 12/Sep.,1996), CMUPB.
Isolation and Identification of Caffeine and Evaluation of Antioxidatve Activity.
1999, Sep.5, Plant Biotechnology Building (Kanda Building), CMU, Chiang Mai, Thailand.

19. *Assoc. Prof. Dr. Masaharu KYO, Kagawa University,*
JICA Short-term Expert (8/Oct. ~ 7/Nov.,1996), CMUPB.
Isolation of Protoplast and Gene Transfer.
1996, Oct.31, Plant Biotechnology Building (Kanda Building), CMU, Chiang Mai, Thailand.

20. *Assist. Prof. Dr. Tetsuya KIMURA, Mie University,*
JICA Short-term Expert (15/Oct. ~ 15/Nov.,1996), CMUPB.
Isolation and Analysis of DNA from Various Plant Tissues.
1996, Nov. 5, Plant Biotechnology Building (Kanda Building), CMU, Chiang Mai, Thailand.

21. *Assist. Prof. Dr. Hiroshi EHARA, Mie University,*
JICA Short-term Expert (22/Oct. ~ 27/Nov.,1996), CMUPB.
Measurement of Nutrient Absorbing Ability and Respiration Rate of Roots.
1996, Nov. 22, Laboratory of Department of Soil Science and Conversation., CMU, Chiang Mai, Thailand.

22. *Assist. Prof. Mr. Shigeru IKEDA, Kagawa University,*
JICA Short-term Expert (26/Nov. ~ 29/Dec.,1996), CMUPB.
"PCR-Based DNA Fingerprinting Techniques"
1996, Dec. 19 & 24, Plant Biotechnology Building (Kanda Building), CMU, Chiang Mai, Thailand.

23. *Prof. Dr. Haruo SUZUKI, Kagawa University,*
JICA Short-term Expert (31/July ~ 31/Aug.,1997), CMUPB.
Measurement of Temperature and Radiation for Crop Cultivation
1997, Aug. 21, Soil Chemistry Laboratory, Department of Soil Science and Conservation, Faculty of Agriculture, CMU, Chiang Mai, Thailand.

24. *Assoc. Prof. Dr. Hisashi KATO, Kagawa University,*
JICA Short-term Expert (29/Oct. ~ 2/Dec.,1997), CMUPB.
Assessment of Allelopathic Potential of Plant Materials
1997, Nov. 20, Biotechnology Building, Faculty of Agriculture, CMU, Chiang Mai, Thailand.

25. *Assoc. Prof. Dr. Kazuya AKIMITSU, Kagawa University,*
JICA Short-term Expert (2/Dec. ~ 29/Dec.,1997), CMUPB.
Isolation and Identification of Plant Genome and Genes
1997, Dec. 23, Biotechnology Building, Faculty of Agriculture, CMU, Chiang Mai, Thailand.

26. *Assoc. Prof. Dr. Keishi SENOO, Mie University,*
JICA Short-term Expert (6/Dec. ~ 29/Dec.,1997), CMUPB.
Identification of Rhizobial Strain in Nodules by PCR-based Fingerprinting
1997, Dec. 24, Biotechnology Building, Faculty of Agriculture, CMU, Chiang Mai, Thailand.

27. *Assoc. Prof. Dr. Katsuyuki KAKEDA, Mie University,*
JICA Short-term Expert (17/Dec. 1997 ~ 9/Jan.,1998), CMUPB.
A Cytological Technique for Preparing Quality Chromosome Spreads in Plants
1998, Jan. 6, Biotechnology Building, Faculty of Agriculture, CMU, Chiang Mai, Thailand.

ANNEX 8. List of research reports written by Thai staff.

Year 1993

- Proper media used for *Begonia* sp. propagation and preservation
- Mutant induction in garlic using chemical treatment
- *Aloe* sp. improvement by mutation induction
- Forcing of *Curcuma roscoeana* Wall. rhizomes

Year 1994

- Micropropagation of strawberry
- Purification and serological study of garlic viruses
- A study on chromosome of *Curcuma thorelli* Gagnep. and C. *parviflora* Wall
- A study on seed germination of *Paphiopedilum villosum* (Lindl.) Steln.
- The effect of light intensity on growth and flower quantity of Brisbane lily *(Eurycles amboinensis)*
- Effect of heat treatment and calcium chloride on chilling injury of mango cv. Choke A-nun
- Effect of heat treatment and calcium solutions on chilling injury of sweet pepper (*Capsicum annuum*)

Year 1995

- Comparison of agar and water absorbing polymer for strawberry mass propagation
- Identification of strawberry varieties using isozyme pattern analysis
- Dual culture of *P. parasitica* on Brassica callus and pathogenisity test
- The use of electrophoretic analysis as an aid for cultivar identification in strawberry

Year 1996

- Propagation of *Rhizophora apiculata* Blume by tissue culture and hypocotyl cutting techniques
- Comparison of agar and starches in strawberry micropropagation
- Chromosome counts of eight *Curcuma* species
- The use of isozyme patterns to support identification in *Curcuma aurantiaca* van Zijp
- Floral development of *Curcuma alismatifolia*
- Studies on chromosome number of seventeen Thai *Curcuma* species
- Effects of pod age, medium and peptone on germination and plantlet develoopment in *Paphiopedilum bellatulum* (Rchb.f.) Rfitz.

- The effect on initial explant on *in vitro Eurycles amboinensis* bulblet formation
- Effects of protocorm size and initial protocorm explant of *Eulophia flava* (Lindl.) on protocorm formation *in vitro*
- Postharvest physico-chemical quality of strawberry

Year 1997

- Isozyme differentiation and yield performance of local upland rice
- Establishment of disease-free clones and propagation in Crown of Thorn
- Thai flora in the North
- Effect of different concentrations of plant growth regulators on *in vitro* propagation of *Curcuma roscoeana* Wall
- Flower formation of flowerbulbs
- Studies of isozyme patterns in different tissues of Patumma (*Curcuma alismatifolia* Gagnep.)
- The effects of seedling sizes, cutting of initial cultured explants, and BA concentrations on new shootlet formation in *Pecteilis susannae* (L.) Rafin
- The effects of explant position, length, placing, and 6-benzylaminopurine on dragon fruit new shoot formation
- Physico-chemical quality of deastringence persimmon

Year 1998

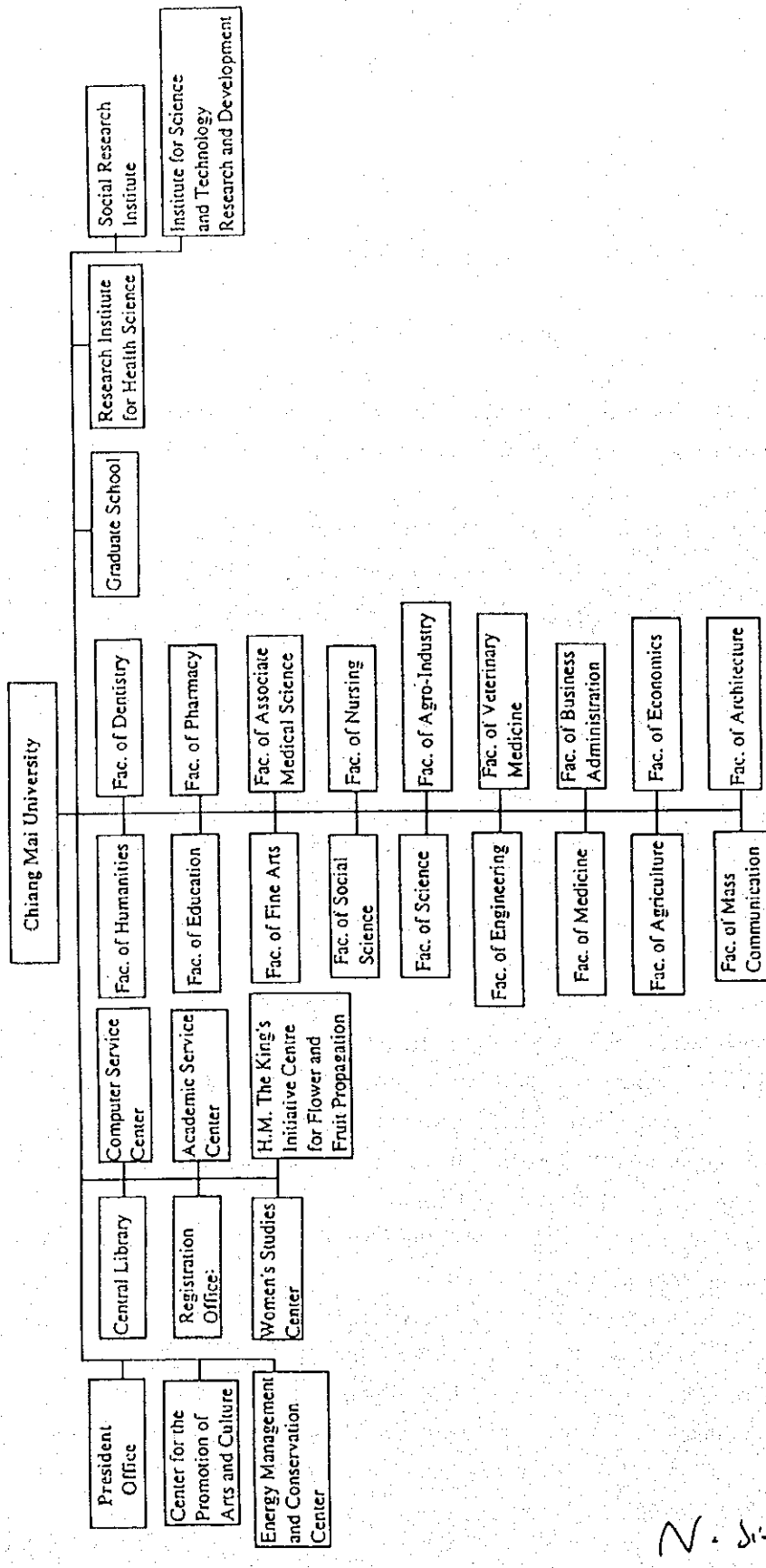
- The use of vesicular-arbuscular mycorrhizal fungi to acclimate tissue cultured plantlets of strawberry in the nursery
- Free living N2 fixing bacteria in the rhizosphere of Vetiver grass and the use of N_2 fixing bacteria and VA mycorrhizal fungi inoculation for acclimatization of tissue cultured plantlets of Vetiver grass
- Bulb formation of flowerbulbs. I. formation of corm and tunicate bulb
- Effect of BAP levels, medium volume and cultured condition on Torch ginger (*Etlingera elatior* (Jack) R.M. Smith) cultured *in Vitro*
- The effect of IBA combinations and cutting-base wounding on some *Fuchsia* hybrids
- Effects of dehydration on storage of *Spathoglottis plicata* Bl. synthetic seeds
- The study on seedling size and medium suitable for *Habenaria rhodocheila* Hance seedling transplantation
- The response of *Gerbera jamesonii* to X-Irradiation
- Effect of low level of X-ray on Chrysanthemum
-The effect of x-ray on *Alpinia purpurata*

- Growth and development of Chrysanthemum after X-Irradiation
- The response of *Dianthus caryophyllus* to X-ray

Year not mentioned
- Organogenetic induction and plantlet formation of longan (*Euphoria longana* Lamk.) in culture
- Effect of growth regulators on layering, cutting and tissue culture of *Aglaia odorata* Lour
- Random amplified Polymorphic DNA technique for genetic analysis of*Curcuma spp.*
- Growth and floral development of *Curcuma sparganifolia* gapnep.H.
- Isozymes and yield differentiation of rice varieties grown by Karen Community
- Isozyme differentiation and yield performance of local upland rice
- *In vitro* propagation of Torch ginger (*Etlingera elatior*)Jack(R.M. Smith)
- *In vitro* propagation of *Hydrangea macrophylla* Thunb
- Factors influencing initiation and growth of buds from Pummelo (*Citrus grandis* (L.) osbeck.) node cultured *in vitro*
- *In vitro* propagation of *curcuma aurantiaca* van Zijp no. A033
- *In vitro* propagation of *curcuma roscoeana* Wall
- Identification of *curcuma alismatifolia* gagnep. ecotypes by isozyme patterns
- *In vitro* propagation and mutation induction of rose (*rosa hybrida*) by Gamma irradiation
- Factors affecting *in vitro* seed germination and protocorm development of *Phaius tankervilleae* (Banks ex L Her.) Bl.
- Factors influencing seed germination and protocorm development of *Paphiopedilum bellatulum* (Rchb.f.) Pfitz.
- Factors influencing proliferation and quality of shootlets of paper mulberry (*Broussonetia papyrifera* Vent.) grown *in vitro*
- *In vitro* propagation of Brisbane lilly (*Eurycles amboinensis* Lindl.)
- DNA sequencing in Rhizoctonia plasmid
- Effects of soil management on red kidney bean-Rhizobium-indigenous VA mycorrhizal fungi in the highland soil
- Commercial production of certified strawberry seedling
- Chromosomal study in some *Dendrobium* spp.
- Study on *Isozyme* patterns in two *Dendrobium* species
- Effect of microelement deficiency on the yield and protein of tobacco cells
- Aneuploid and RFLP analysis of genes conferring boron tolerance in Durum wheat (*Triticum turgidum* var. durum)

ANNEX 9

Organization Chart of Chiang Mai University

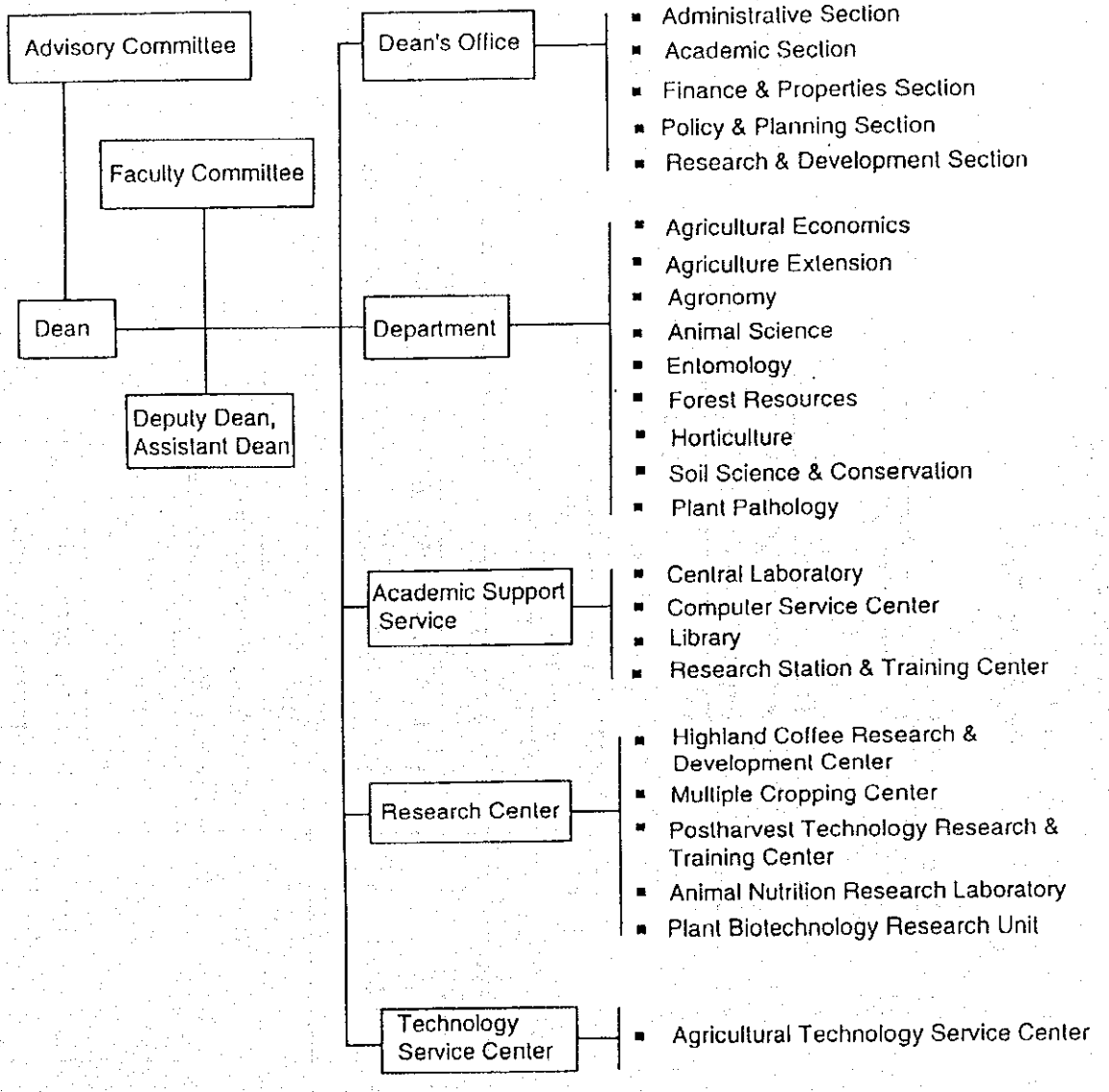


ANNEX10

ADMINISTRATION

Faculty of Agriculture, Chiang Mai University

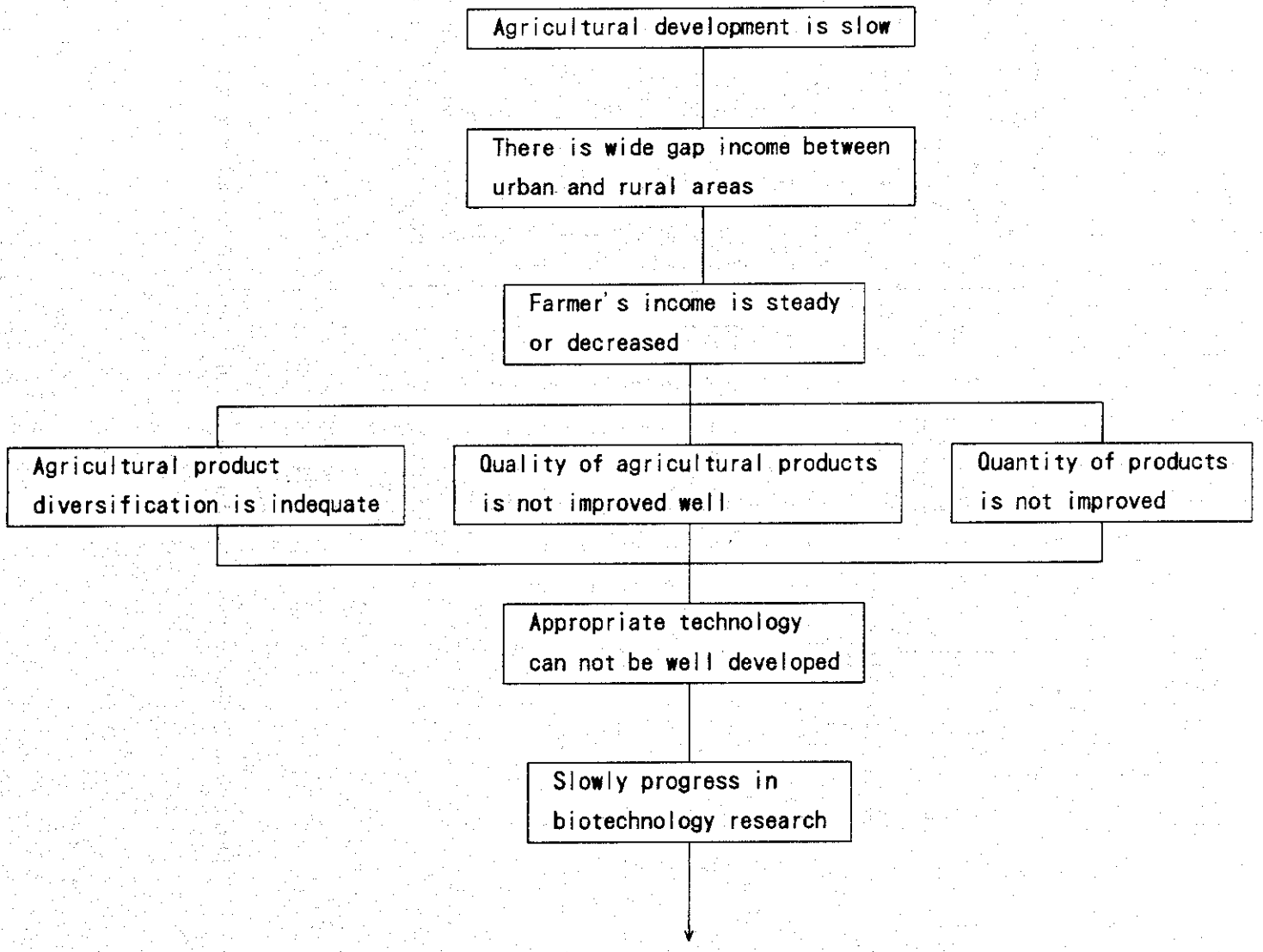
(Division by Administrative)

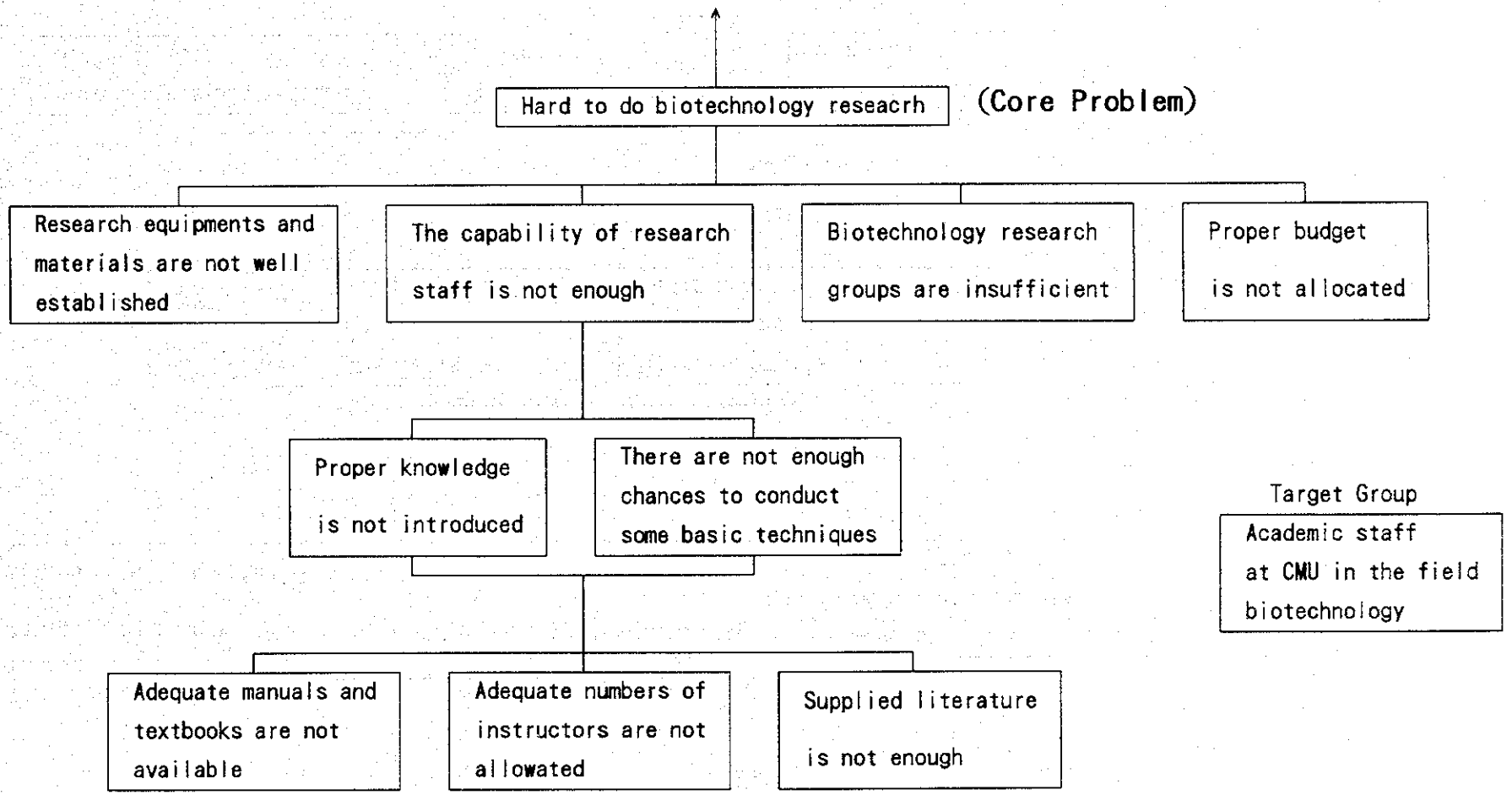


Source : Profile October 1997, Faculty of Agriculture, Chiang Mai University

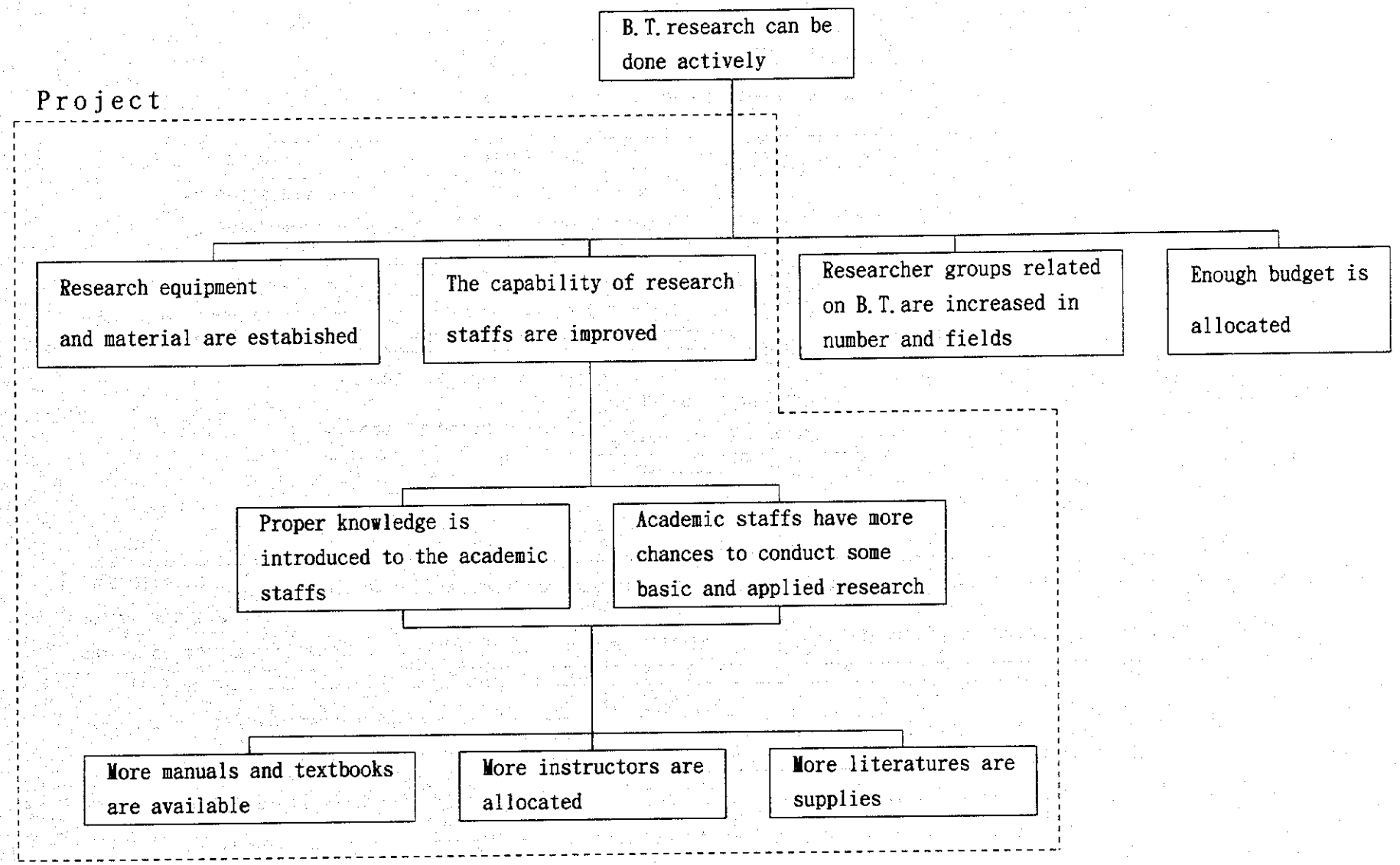
2　目的系図および問題系図

Problem Tree




Hard to do biotechnology reseacrh
(Core Problem)
Research equipments and materials are not well established
The capability of research staff is not enough
Biotechnology research groups are insufficient
Proper budget is not allocated
Proper knowledge is not introduced
There are not enough chances to conduct some basic techniques
Adequate manuals and textbooks are not available
Adequate numbers of instructors are not allowated
Supplied literature is not enough
Target Group
Academic staff at CMU in the field biotechnology

Objective Tree



植物バイテクビル

1 階

Conferrence & Training room	1. TV Monitor & Videoplayer-'94
	2. Air Cleaner-'95
Head Oddice room	1. Chlorophyll meter-'95
Machine room	1. Generator-'93

2 階

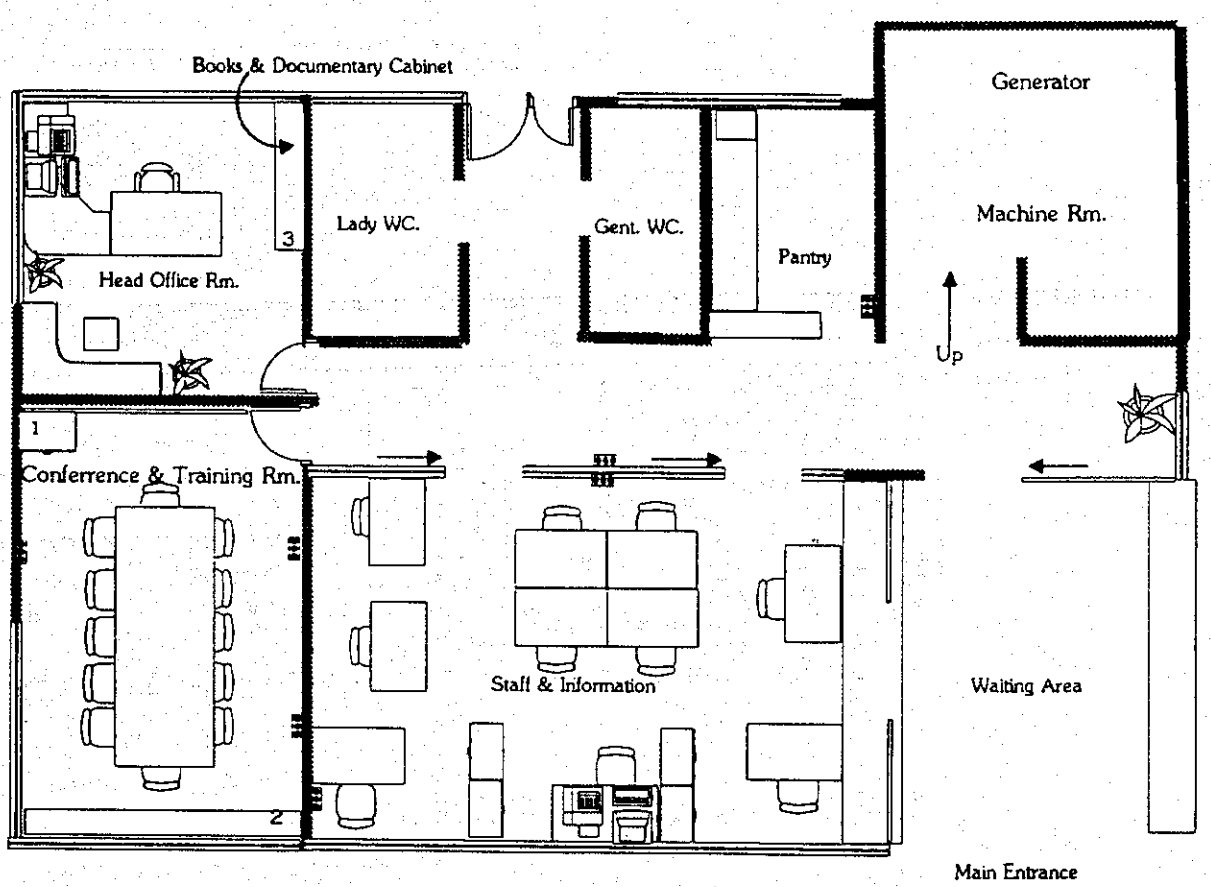
Study & Training room	1. Pulse Field Electrophoresis-'95
	2. Digital AV mixer-'94
	3. Video camera-'94
	4. Shaker bath-'95
Electrophoresis room	1. pH meter-'95
	2. Microcentrifuge-'94
	3. Tissue homogenizer-'94
	4. Capillary electrophoresis-'95
	5. Cooling circulator-'94
	6. Aspirator-'94
Clean room	1. Electroporation-'94
	2. Biolistic gun-'94
	3. Micromanipulator-'93
	4. Inverted Microscope-'95
	5. PCR set-'95
	6. Table top Centrifuge-'94
	7. Ultra deep freezer-'94
Microscopy room	1. Fluorescece microscope-'95
	2. Stereomicroscope w. camera-'95
	3. Image analysis & Slide maker-'94
Corridor	1. Ultra deep freezer, horizontal-'94
	2. Ice maker-'94

3 階

Transfer room 1	1. Laminar air flow-'95
	2. Biohazard Laminar air flow-'95
	3. Electrofusion-'94
Incubator room	1. Bioreactor 2.5 L-'94
	2. Bioreactor 5.0 L-'94
	3. Illuminated incubator-'94
	4. Illuminated incubator-'95
	5. Low temp. incubator-'94
	6. Rotating cultivator-'94
	7. CO_2 incubator-'94
	8. Rotating cultivator-'95
	9. Inverted Microscope-'94
	10. Aspirator-'94
	11. Tubing pump
Media Preparation Area	1. Water purification unit-'95
	2. Ultrasonic pipette washer-'94
	3. Ultrasonic pipette cleaner-'?
	4. Autoclave-'94
	5. Force air oven-'95
	6. Microwave oven-'95
	7. pH meter-'95
	8. Rotary evaporator-'94
	9. Rotary evaporator-'95
	10. Balance-'95
	11. Aspirator-'95
	12. Shaker bath-'94
Transfer room 2	1. Laminar air flow -'95
	2. Gas burner-'95
Culture room 2	1. Solar Irradiance Integrator-'95
	2. Thermohygrograph-'95
Germplasm collection room	1. Fraction Collector-'94
	2. Cryogenic storage-'95

4 階

1. Phytotron-'94



Conference & Training Rm.

1. TV monitor & Videoplayer (1994)
2. Air Cleaner (1995)

Head Office Rm.

3. Chlorophyll meter (1995)

Machine Rm.

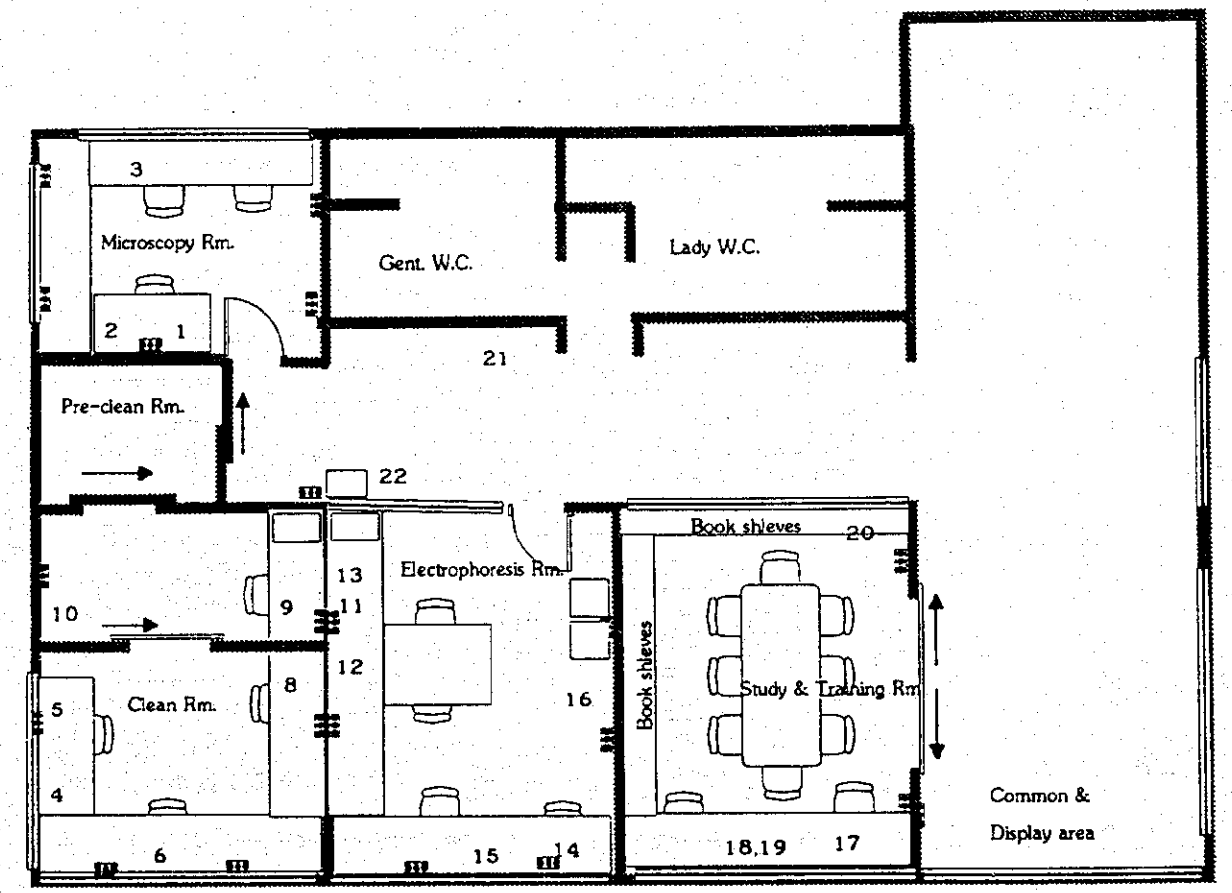
4. Generator (1994)

Remarks

Phytotron (1994) installed in the 4th floor (nursery)

Grd. Floor Plan 1:100

植物バイテクビル



Second Flr. Plan 1:100

Microscopy Room

1. Fluorescence Microscope (1995)
2. Stereomicroscope w. camera (1995)
3. Image analysis & Slide maker (1994)

Clean Room

4. Electroporation (1994)
5. Biolistic gun (1994)
6. Micromanipulator (1993)
7. Inverted Microscope (1995)
8. PCR set (1995)
9. Table top Centrifuge (1994)
10. Ultra deep freezer (1994)

Electrophoresis Room

11. pH meter (1995)
12. Microcentrifuge (1994)
13. Tissue homogenizer (1994)
14. Capillary electrophoresis (1995)
15. Cooling circulator (1994)
16. Aspirator (1994)

Study and Training Room

17. Pulse Field Electrophoresis (1995)
18. Digital AV mixer (1994)
19. Video camera (1994)
20. Shaker bath (1995)

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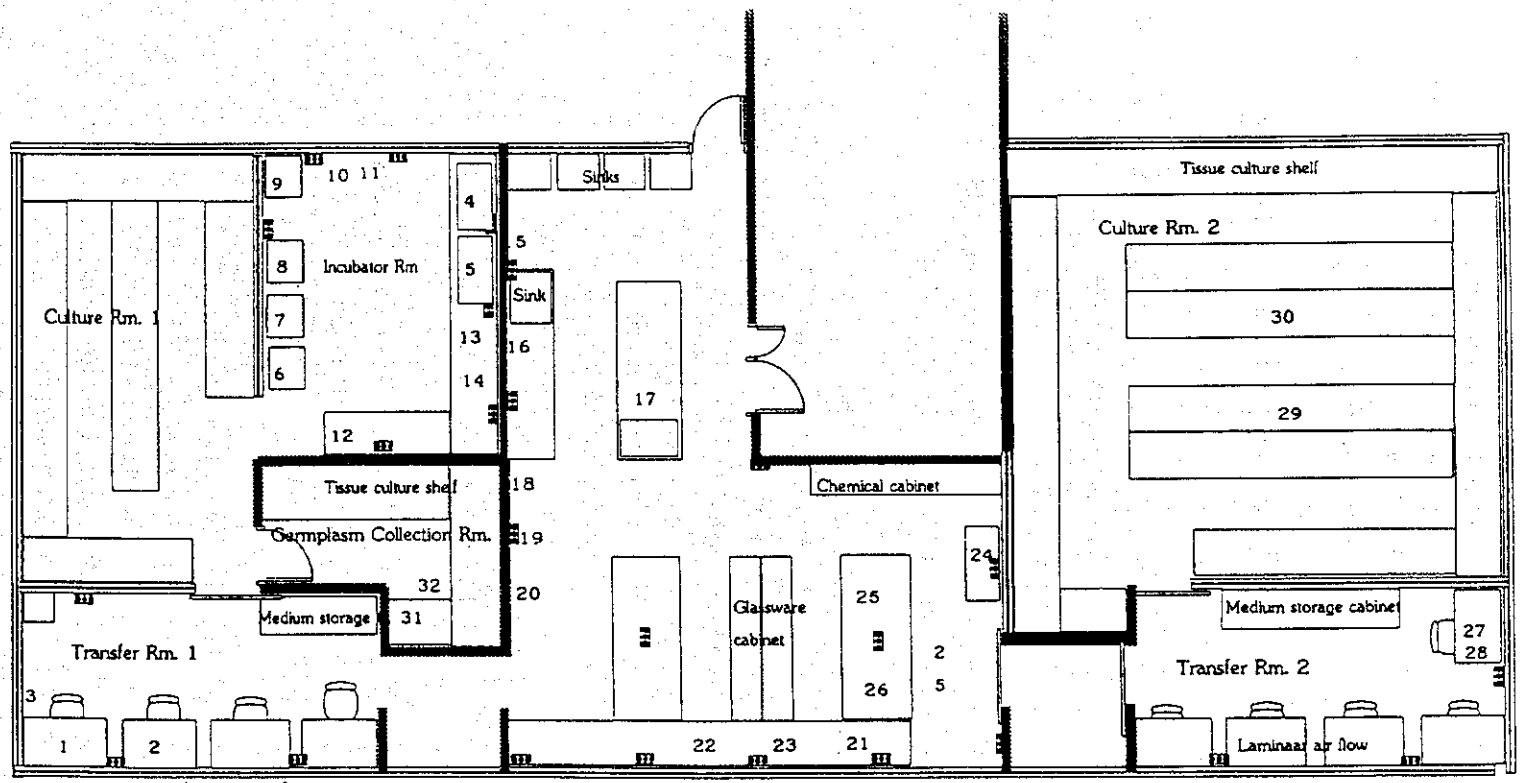
21. Ultra deep freezer, horizontal (1994)
22. Ice maker (1994)



Third Flr. Plan 1:100

Gas burner will be install in each laminar air flow

Transfer Rm. 1
1. Laminar air flow (1995)
2. Biohazard Laminar air flow (1995)
3. Electrofusion (1994)

Incubator Rm.
4. Bioreactor 2.5 L (1994)
5. Bioreactor 5 L (1994)
6. Illuminator incubator (1994)
7. Illuminator incubator (1995)
8. Low temp. incubator (1994)
9. (Rotating cultivator (1994)
10. CO2 incubator (1994)
11. Rotating cultivator (1995)
12. Invertedmicroscope (1994)
13. Aspirator (1994)
14. Tubing pump (1994)

Media Preparation Area
15. Water purification unit (1995)
16. Ultrasonic pipette wasaher (1994)
17. Ultrasonic pipette cleaner
18. Autoclave (1994)
19. Force air oven (1995)
20. Oven (1995)
21. pH meter (1995)
22. Rotary evaporator (1994)
23. Rotary evaporator (1995)
24. Balance (1995)
25. Aspirator (1995)

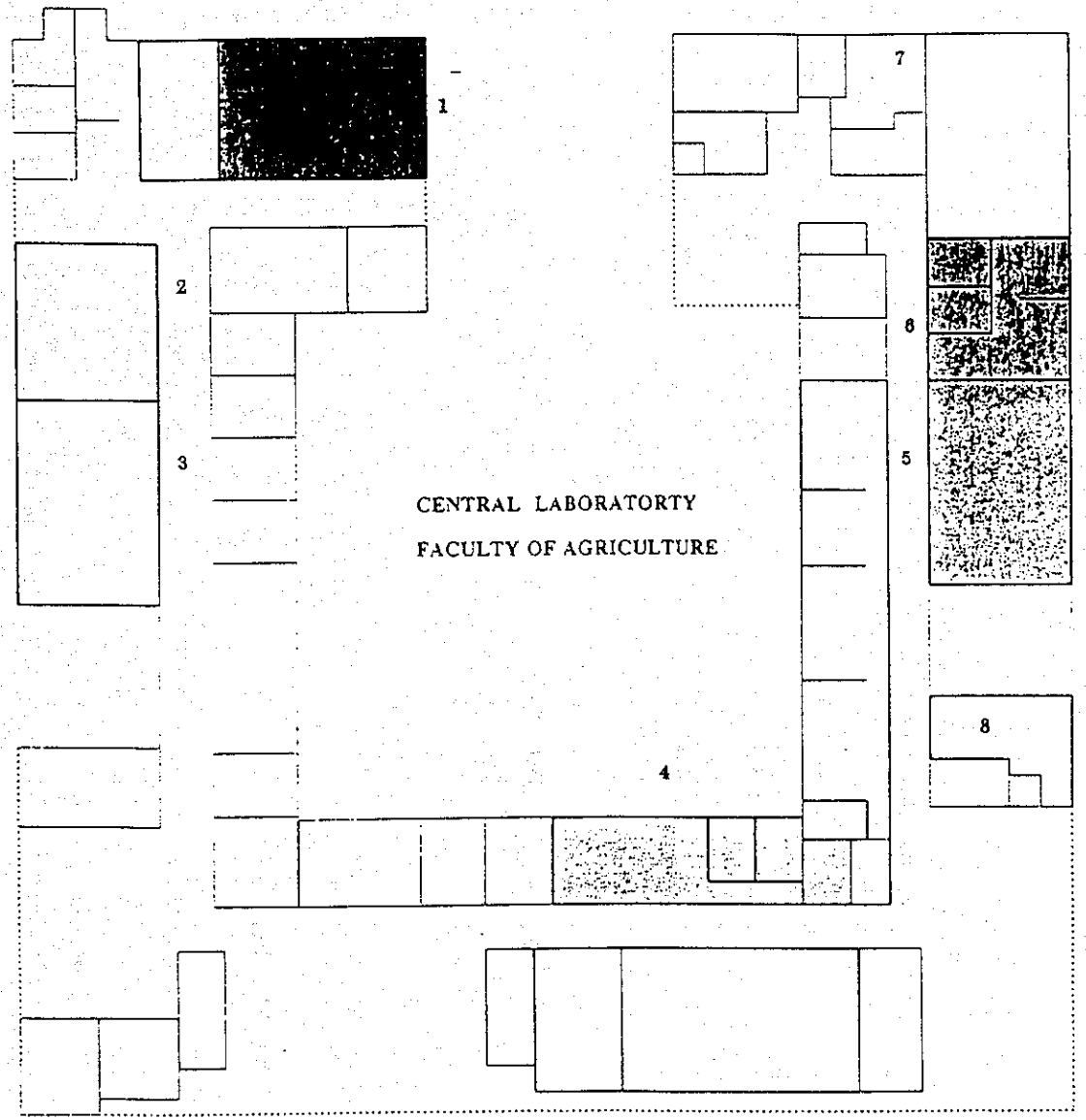
Transfer Rm 2.
27. Laminar air flow (1995)
28. Gas burner (1995)

Culture Rm. 2
29. Solar Irradiance Integrator (1995)
30. Thermohygrograph (1995)

Cold Rm.
31. Fraction Collector (1994)
32. Cryogenic storage (1995)

農学部本館共通実験室　2　階

Laboratory of Postharvest	1. CO_2/O_2 gas analizer-'93 2. Chromometer-'96
Laboratory of Chemical Analysis I	1. Gas chromatograph-'94 2. Chromatopac-'94 3. HPLC-'96 4. Spectrophotometer-'96
Laboratory of Chemical Analysis II	1. Nitrogen digestion & distillation-'96
Laboratory of Physiology I	1. CO_2/H_2O analyzer & Leaf area system-'94 2. Thermohygrograph-'95 3. Porometer-'95 4. Pressure bomb-'95 5. Solar irradiance integrator-'95 6. Chlorophyll meter-'95
Laboratory of Biotechnology and Cell	1. Rotary evaporator-'93 2. Rotary evaporator-'94 3. Cryogenic storage with accessories-'95 4. Shaker bath-'95 5. Shaker bath-'96 6. Refrigerated micro centrifuge-'96 7. Refrigerated centrifuge-'96 8. Homogenizer-'96 9. Waring blender-'96 10. Chromatograph chamber-'96
Laboratory of Cell and Genetic	1. Submarine gel electrophoresis-'96 2. DNA amplifier-'96 3. Fraction collecter-'96
Laboratory Microbiology	1. Fumehood-'95 2. Homogenizer-'96 3. Shaker bath-'96 4. Lamiana air flow(Horizontal)-'96 5. Rotary shaker-'96
Room for Growth Chamber	1. Phytotron-'95



1. LABORATORY OF POSTHARVEST
2. LABORATORY OF CHEMICAL ANALYSIS I
3. LABORATORY OF CHEMICAL ANALYSIS II
4. LABORATORY OF PHYSIOLOGY I
5. LABORATORY OF BIOTECHNOLOGY AND CELL
6. LABORATORY OF CELL AND GENETIC
7. LABORATORY OF MICROBIOLOGY
8. ROOM FOR GROWTH CHAMBER

C／P 研究室

1. Dr. Prasartporn, Ms. Kaewalin, Dr. Chaiwat, Ms. Pratoomporn

2. Dr. Adisorn
   Growth cabinet, x 4, -'95 (hand made)

3. Dr. Pittaya

4. Dr. Danai
   Personal computor(CPU, printer, monitor)-'94
   pH meter-'95
   Water bath-'95
   Balance-'95

5. Dr. Ampan, Ms. Arawan, Mr. Choochad
   Gas chromatograph, GC8-'94
   Gas chromatopac-'95
   Block bath-'95
   Gas burner-'94
   Heating mantel x 2 -'95
   Refrigerator-'93
   Vortex mixer-'93
   Balance -'95

6. Dr. Pimchai, Ms. Takonwan
   Infra-red CO2 meter-'94
   Heat sealer-'93

7. Mr. pheravut

8. Ms. Pornrat

9. Ms. Gulvadee

10. Horticulture Lab.
    pH meter x 2, Refregirator, Digital pipptte, Vacum desscicator, Block heater, Lux meter, Hand refractometer, Vortex mixer, Slide warmer, EC-meter

4　特別講義およびワークショップ参加者リスト

1997 Mar. 31

PARTICIPANT LISTS OF SPECIAL LECTURE

No.	Lists of Organization or Agencies　Names of Experts	Kowyama	Obata	Fukui	Tanaka	Taguchi	Shiotani	Hayakawa	Katsuoka	Fukai	Total
1	Chiang Mai University (5 Faculties and 1 Institute)	29	29	10	10	15	12	12	40	40	197
2	Mae Jo University (2 Faculties)	7	7	3	3	7	6	6	4	4	47
3	Chiang Mai Ratchapat Institute										0
4	Chiang Mai Field Crops Center						1	1			2
5	Sanpatong Rice Experiment Station	2	2			1					5
6	Chiang Mai Royal Project					1					1
7	Maesa Butterfly and Orchid Farm										0
8	Lampang Agricultural Research & Training Center										0
9	Lampang Horticulture Association Hang-Chat										0
10	Lampang Ratchapat Institute										0
11	Lampang Rachamangala Institute of Technology						2	2			4
12	Chiang Rai Horticulture Research Center										0
13	Lamphun Chalayon Garden										0
14	Phrae Rice Research Center										0
15	Nakhon Sawan Field Crops Research Center										0
16	Nakhon Ratchasima Nursery Center						1	1			2
17	Sakon Nakorn Agricultural Research & Training Center			1	1						2
18	Patum Thani Rice Research Center										0
19	Mahasarakam Srinakarintaravirot University					1					1
20	Naresuan University										0
21	Prince of Songkhla University										0
22	Kasetsart University		1								1
23	JICA Thailand Office and others related										0
24	Yunnan Agricultural University										0
25	Others										0
	Total	38	39	14	14	25	22	22	44	44	262

1997 Mar. 31

PARTICIPANT LISTS OF SPECIAL LECTURE

No.	Lists of Organization or Agencies Names of Experts	Matsui	Tamura	Hasegawa	Takamatsu	Hisamatsu	Tachibana	Nishikawa	TAjima	Katsuzaki	Total
1	Chiang Mai University (5 Faculties and 1 Institute)	20	15	20	8	15	11	11	22	22	144
2	Mae Jo University (2 Faculties)	7	1		2	4	4	4	4	4	30
3	Chiang Mai Ratchapat Institute						1	1	1	1	4
4	Chiang Mai Field Crops Center										0
5	Sanpatong Rice Experiment Station	2									2
6	Chiang Mai Royal Project										0
7	Maesa Butterfly and Orchid Farm			1			1	1			3
8	Lampang Agricultural Research & Training Center				2		1	1			4
9	Lampang Horticulture Association Jang-Chat	1									1
10	lampang Ratchapat Institute	2		1	1						4
11	Lampang Rachamangala Institute of Technology				1						1
12	Chiang Rai Horticulture Research Center	1									1
13	Lamphun Chalayon Garden			1							1
14	Phrae Rice Research Center	1	1								2
15	Nakhon Sawan Field Crops Research Center										0
16	Nakhon Ratchasima Nursery Center										0
17	Sakon Nakorn Agricultural Research & Training Center										0
18	Patum Thani Rice Research Center										0
19	Mahasarakam Srinakarintaravirot University										0
20	Naresuan University										0
21	Prince of Songkhla University										0
22	Kasetsart University										0
23	JICA Thailand Office and others related										0
24	Yunnan Agricultural University										0
25	Others										0
	Total	34	17	23	14	19	18	18	27	27	197

1997 Mar, 31

PARTICIPANT LISTS OF SPECIAL LECTURE

No.	Lists of Organization or Agencies Names of Experts	Kyo	Kimura	Ehara	Ikeda	Fujime	Fujime	Suzuki	Kunoh	Kato	Total
1	Chiang Mai University (5 Faculties and 1 Institute)	17	8	8	16	20	25	20	26	11	151
2	Mae Jo University (2 Faculties)	1				3	5	1	1		11
3	Chiang Mai Ratchapat Institute	2	1	1					1	1	6
4	Chiang Mai Field Crops Center										0
5	Sanpatong Rice Experiment Station							1			1
6	Chiang Mai Royal Project		1	1						1	3
7	Maesa Butterfly and Orchid Farm	1	1	1	2	1	1	1	1	1	10
8	Lampang Agricultural Research & Training Center		1	1		1	1	4			8
9	Lampang Horticulture Association Hang-Chat										0
10	lampang Ratchapat Institute										0
11	Lampang Rachamangala Institute of Technology										0
12	Chiang Rai Horticulture Research Center										0
13	Lamphun Chalayon Garden										0
14	Phrae Rice Research Center										0
15	Nakhon Sawan Field Crops Research Center										0
16	Nakhon Ratchasima Nursery Center										0
17	Sakon Nakorn Agricultural Research & Training Center										0
18	Patum Thani Rice Research Center										0
19	Mahasarakam Srinakarintaravirot University		1	1							2
20	Naresuan University										0
21	Prince of Songkhla University										0
22	Kasetsart University										0
23	JICA Thailand Office and others related									2	2
24	Yunnan Agricultural University										0
25	Others	1	1	1				1	1		5
	Total	22	14	14	18	25	32	28	30	16	199

1997 Mar. 31

PARTICIPANT LISTS OF SPECIAL LECTURE

No.	Lists of Organization or Agencies Names of Experts	Akimitsu	Senoo	Kakeda							Total
1	Chiang Mai University (5 Faculties and 1 Institute)	19	19	10							48
2	Mae Jo University (2 Faculties)	1	1	1							3
3	Chiang Mai Ratchapat Institute	1	1	1							3
4	Chiang Mai Field Crops Center										0
5	Sanpatong Rice Experiment Station										0
6	Chiang Mai Royal Project	3	3	1							7
7	Maesa Butterfly and Orchid Farm	1	1								2
8	Lampang Agricultural Research & Training Center			2							2
9	Lampang Horticulture Association Hang-Chat										0
10	Lampang Ratchapat Institute										0
11	Lampang Rachamangala Institute of Technology										0
12	Chiang Rai Horticulture Research Center										0
13	Lamphun Chalayon Garden										0
14	Phrae Rice Research Center										0
15	Nakhon Sawan Field Crops Research Center										0
16	Nakhon Ratchasima Nursery Center										0
17	Sakon Nakorn Agricultural Research & Training Center										0
18	Patum Thani Rice Research Center										0
19	Mahasarakam Srinakarintaravirot University										0
20	Naresuan University	2	2								4
21	Prince of Songkhla University										0
22	Kasetsart University										0
23	JICA Thailand Office and others related	2	2								4
24	Yunnan Agricultural University										0
25	Others			1							1
	Total	29	29	16	0	0	0	0	0	0	74

1997 Mar, 31

PARTICIPANT LISTS OF SPECIAL LECTURE

No.	Lists of Organization or Agencies Names of Experts	Kogure	Umebayashi	Kogure	Hiratsuka	Hiratsuka	Taniguchi	Total			Grand Total
1	Chiang Mai University (5 Faculties and 1 Institute)	29	29	7	7	32	34	138			678
2	Mae Jo University (2 Faculties)	7	7			9	13	36			127
3	Chiang Mai Ratchapat Institute						1	1			14
4	Chiang Mai Field Crops Center					2		2			4
5	Sanpatong Rice Experiment Station	2	2			2		6			14
6	Chiang Mai Royal Project							0			11
7	Maesa Butterfly and Orchid Farm						5	5			20
8	Lampang Agricultural Research & Training Center	1	1			2	9	13			27
9	Lampang Horticulture Association Hang-Chat							0			1
10	Lampang Ratchapat Institute					2	1	3			7
11	Lampang Rachamangala Institute of Technology					2		2			7
12	Chiang Rai Horticulture Research Center							0			1
13	Lamphun Chalayon Garden							0			1
14	Phrae Rice Research Center					2		2			4
15	Nakhon Sawan Field Crops Research Center							0			0
16	Nakhon Ratchasima Nursery Center							0			2
17	Sakon Nakorn Agricultural Research & Training Center					2	1	3			5
18	Patum Thani Rice Research Center							0			0
19	Mahasarakam Srinakarintaravirot University						1	1			4
20	Naresuan University						6	6			10
21	Prince of Songkhla University							0			0
22	Kasetsart University					1	1	2			3
23	JICA Thailand Office and others related			3	3			6			12
24	Yunnan Agricultural University					1		1			1
25	Others			14	14		3	31			37
	Total	39	39	24	24	57	75	258			990

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PARTICIPANT LISTS OF WORKSHOP

No.	Lists of Organization or Agencies Names of Experts	Kowyama	Obata	Fukui	Tanaka	Taguchi	Shiotani	Shiotani	Hayakawa	Katsuoka	Total
1	Chiang Mai University (5 Faculties and 1 Institute)	25	12	8	10	11	8	17	9	11	111
2	Mae Jo University (2 Faculties)	5	8		3	7	4	4	6	1	38
3	Chiang Mai Ratchapat Institute										0
4	Chiang Mai Field Crops Center						1	1	1		3
5	Sanpatong Rice Experiment Station		2			1				1	4
6	Chiang Mai Royal Project										0
7	Maesa Butterfly and Orchid Farm										0
8	Lampang Rachamangala Institute of Technology									2	2
9	Lampang Horticulture Association Hang-Chat										0
10	Lampang Ratchapat Institute										0
11	Lampang Agricultural Research & Training Center										0
12	Chiang Rai Horticulture Research Center										0
13	Lamphun Chalayon Garden										0
14	Phrae Rice Research Center										0
15	Nakhon Sawan Field Crops Research Center					2					2
16	Nakhon Ratchasima Nursery Center						1	1			2
17	Sakon Nakorn Agricultural Research & Training Center									2	2
18	Patum Thani Rice Research Center										0
19	Mahasarakam Srinakarintaravirot University					1					1
20	Naresuan University										0
21	Ubol Ratchapat Institute										0
22	Ubol Ratchathanee University										0
23	Prince of Songkhla University			1							1
24	Kasetsart University										0
25	JICA Thailand Office and others related										0
26	Yunnan Agricultural University										0
27	Others										0
	Total	30	22	9	13	22	14	23	16	17	166

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PARTICIPANT LISTS OF WORKSHOP

No.	Lists of Organization or Agencies Names of Experts	Fukai	Matsui	Tamura	Hasegawa	Tala,atsi	Hisamatsu	Tachibana	Nishikawa	Tajima	Total
1	Chiang Mai University (5 Faculties and 1 Institute)	9	17	12	12	10	13	7	7	11	98
2	Mae Jo University (2 Faculties)	7	5	1			6	6	3	2	30
3	Chiang Mai Ratchapat Institute							2	1	1	4
4	Chiang Mai Field Crops Center										0
5	Sanpatong Rice Experiment Station										0
6	Chiang Mai Royal Project				1						1
7	Maesa Butterfly and Orchid Farm				2	1		1	1	1	6
8	Lampang Rachamangala Institute of Technology		1		2	3		2	2	1	11
9	Lampang Horticulture Association Hang-Chat										0
10	Lampang Ratchapat Institute			1							1
11	Lampang Agricultural Research & Training Center										0
12	Chiang Rai Horticulture Research Center										0
13	Lamphun Chalayon Garden										0
14	Phrae Rice Research Center		1								1
15	Nakhon Sawan Field Crops Research Center										0
16	Nakhon Ratchasima Nursery Center	1									1
17	Sakon Nakorn Agricultural Research & Training Center	2					1				3
18	Patum Thani Rice Research Center		1								1
19	Mahasarakam Srinakarintaravirot University				1		2				3
20	Naresuan University						1				1
21	Ubol Ratchapat Institute										0
22	Ubol Ratchathanee University										0
23	Prince of Songkhla University										0
24	Kasetsart University										0
25	JICA Thailand Office and others related										0
26	Yunnan Agricultural University										0
27	Others				2	1					3
	Total	19	25	14	20	15	23	18	14	16	164

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PARTICIPANT LISTS OF WORKSHOP

No.	Lists of Organization or Agencies / Names of Experts	Tajima	Katsuzuki	Kyo	Kimura	Ehara	Ikeda	Ikeda	Suzuki	Kato	Total
1	Chiang Mai University (5 Faculties and 1 Institute)	12	7	13	12	11	13	12	4	7	91
2	Mae Jo University (2 Faculties)	1				4			2		7
3	Chiang Mai Ratchapat Institute		1	1		2		3	2	1	10
4	Chiang Mai Field Crops Center										0
5	Sanpatong Rice Experiment Station										0
6	Chiang Mai Royal Project				1					1	2
7	Maesa Butterfly and Orchid Farm		1	1	1	1		1		1	6
8	Lampang Rachamangala Institute of Technology		1								1
9	Lampang Horticulture Association Hang-Chat										0
10	Lampang Ratchapat Institute										0
11	Lampang Agricultural Research & Training Center				2	2		1	4		9
12	Chiang Rai Horticulture Research Center										0
13	Lamphun Chalayon Garden										0
14	Phrae Rice Research Center										0
15	Nakhon Sawan Field Crops Research Center										0
16	Nakhon Ratchasima Nursery Center										0
17	Sakon Nakorn Agricultural Research & Training Center					1					1
18	Patum Thani Rice Research Center										0
19	Mahasarakam Srinakarintaravirot University			1							1
20	Naresuan University				2						2
21	Ubol Ratchapat Institute										0
22	Ubol Ratchathanee University										0
23	Prince of Songkhla University										0
24	Kaseisart University										0
25	JICA Thailand Office and others related									1	1
26	Yunnan Agricultural University										0
27	Others			1							1
	Total	13	10	17	18	21	13	17	12	11	132

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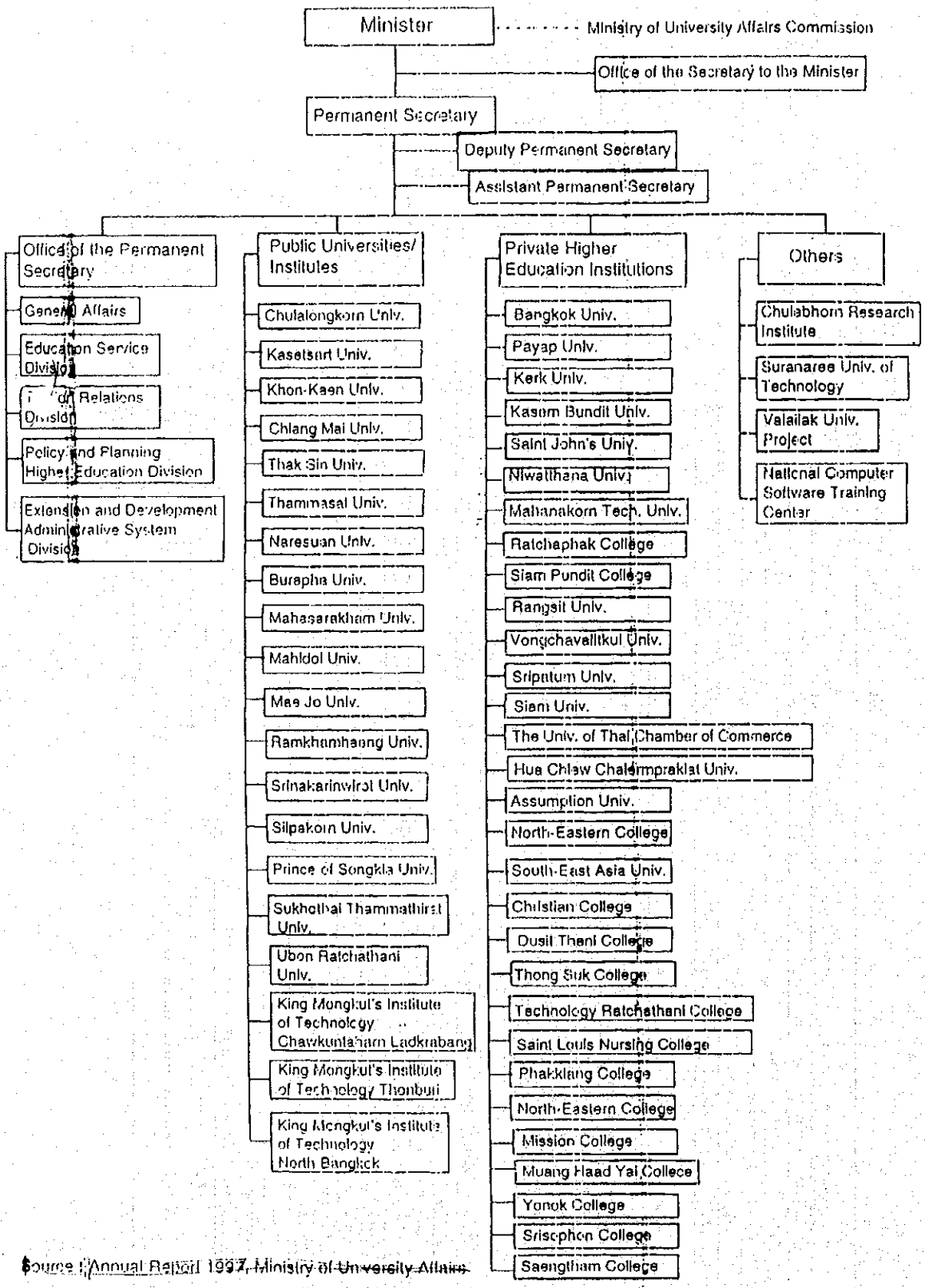
PARTICIPANT LISTS OF WORKSHOP

No.	Lists of Organization or Agencies Names of Experts	Akimitsu	Senoo	Kakeda							Total
1	Chiang Mai University (5 Faculties and 1 Institute)	11	9	12							32
2	Mae Jo University (2 Faculties)			1							1
3	Chiang Mai Ratchapat Institute	1	2	1							4
4	Chiang Mai Field Crops Center										0
5	Sanpatong Rice Experiment Station										0
6	Chiang Mai Royal Project	1		1							2
7	Maesa Butterfly and Orchid Farm	1	1								2
8	Lampang Rachamangala Institute of Technology										0
9	Lampang Horticulture Association Hang-Chat										0
10	Lampang Ratchapat Institute										0
11	Lampang Agricultural Research & Training Center										0
12	Chiang Rai Horticulture Research Center										0
13	Lamphun Chalayon Garden										0
14	Phrae Rice Research Center										0
15	Nakhon Sawan Field Crops Research Center										0
16	Nakhon Ratchasima Nursery Center										0
17	Sakon Nakorn Agricultural Research & Training Center										0
18	Patum Thani Rice Research Center										0
19	Mahasarakam Srinakarintaravirot University										0
20	Naresuan University	2	2								4
21	Ubol Ratchapat Institute										0
22	Ubol Ratchathanee University										0
23	Prince of Songkhla University										0
24	Kasetsart University										0
25	JICA Thailand Office and others related	1	1	1							3
26	Yunnan Agricultural University										0
27	Others			1							1
	Total	17	15	17	0	0	0	0	0	0	49

5　大学省組織図

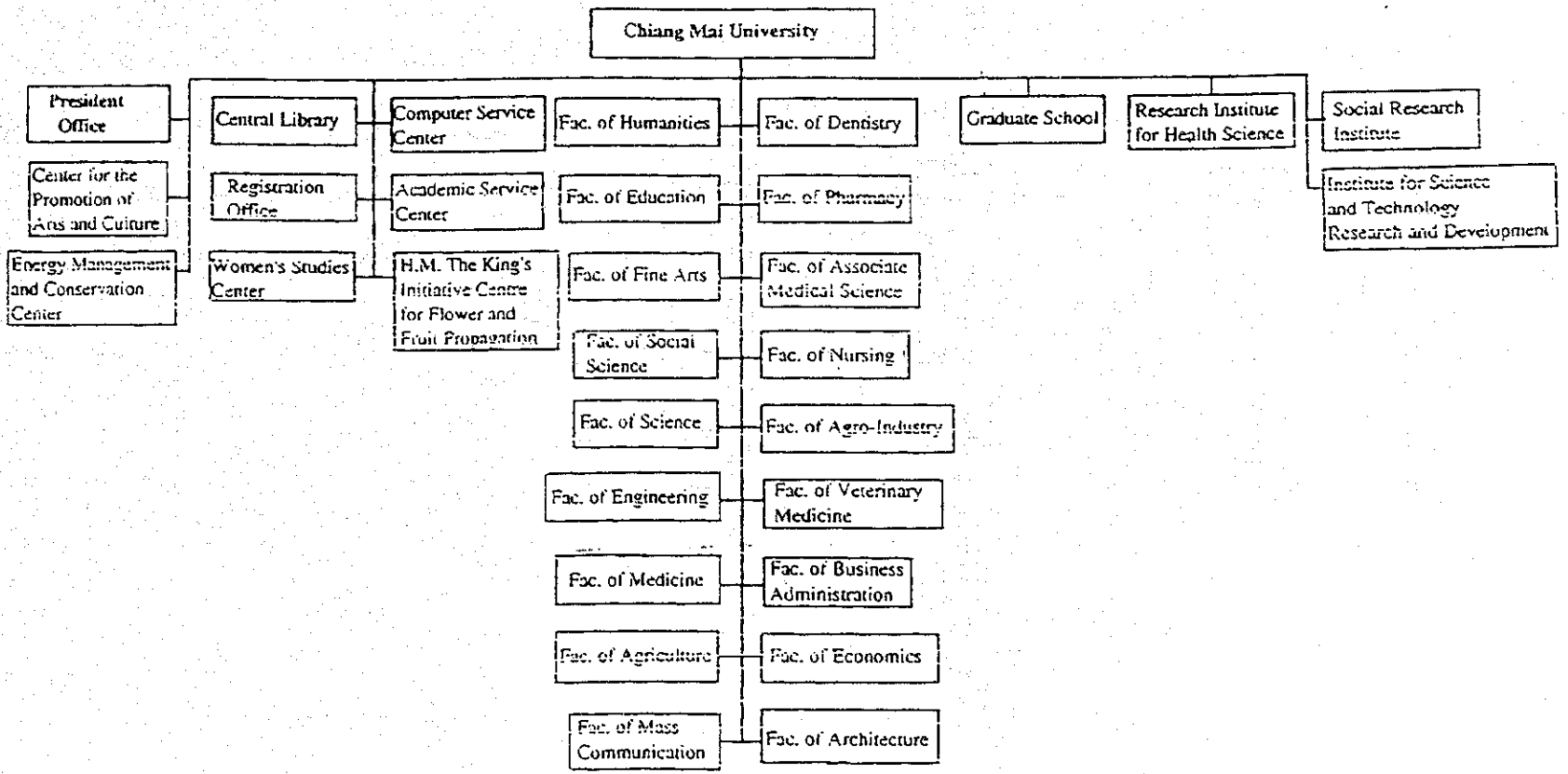
The Ministry of University Affairs Organizational Structure



Source : Annual Report 1997, Ministry of University Affairs

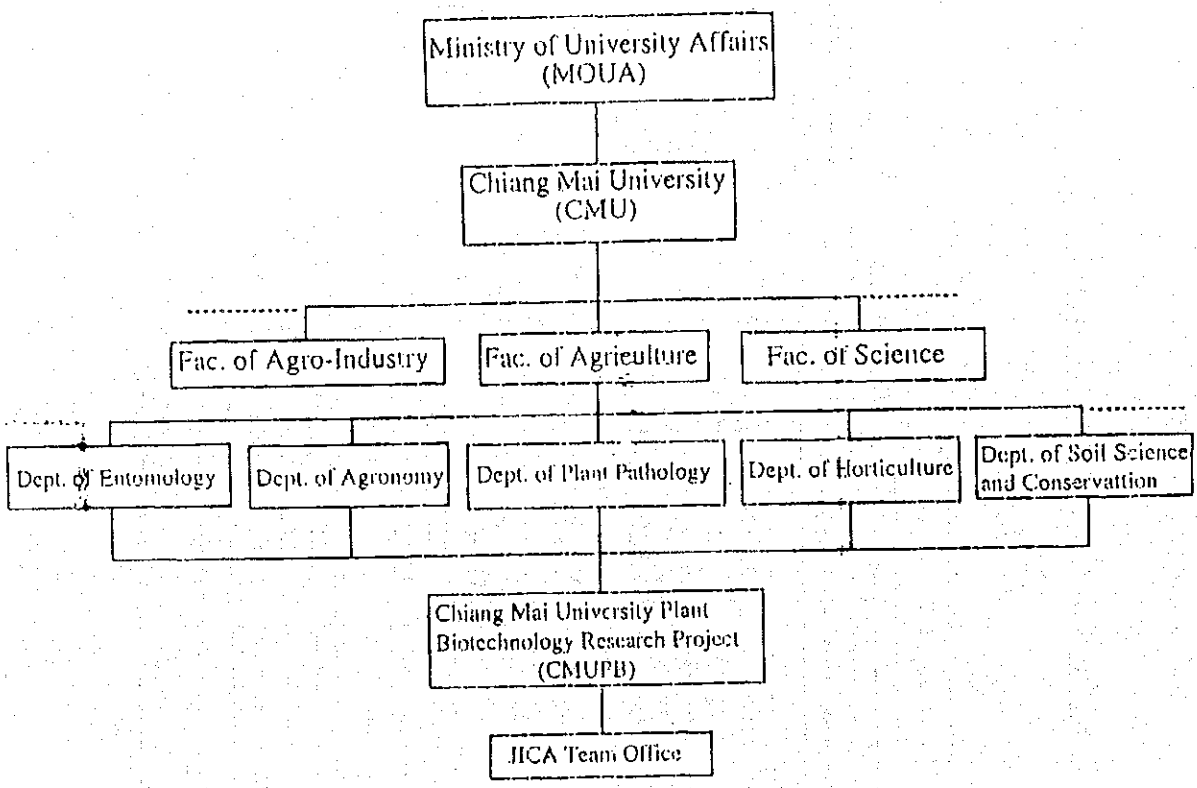
6　チェンマイ大学組織図

Organization Chart of Chiang Mai University



7　プロジェクト実施体制図

Project Organization Structure



8 農学部管理人員

ADMINISTRATIVE STAFF IN FACULTY OF AGRICULTURE, CMU

1.	Assoc. Prof. Dr. Pongsak Angkasith Dean, Faculty of Agriculture	(from October 1, 1996)
2.	Assoc. Prof. Dr. Vichian Hengsawad Deputy Dean for Research and Academic Service	(from October 1, 1996)
3.	Assoc. Prof. Dr. Chuckree Senthong Deputy Dean for Academic Affairs	(from October 1, 1996)
4.	Assoc. Prof. Theera Visithpanich Deputy Dean for General Administrative Affairs	(from October 1, 1996)
5.	Assist. Prof. Dr. Pittaya Sruamsiri Deputy Dean for Planning and Developing Affairs	(from October 1, 1996)
6.	Assist. Prof. Thanom Klodpeng Deputy Dean for Student Affairs	(from October 1, 1996)
7.	Assist. Prof. Songchao Insomphan Deputy Dean for Research and Academic Service	(from October 1, 1996)
8.	Ms. Nittaya Suwarnnarat Assistant Dean for Academic Affairs	(from October 1, 1996)
9.	Assist. Prof. Virat Chavalgul Assistant Dean for General Administrative Affairs	(from October 1, 1996)
10.	Ms. Rampaiphun Apichartpongchai Assistant Dean for Planning and Developing Affairs	(from October 1, 1996)
11.	Assoc. Prof. Dr. Danai Boonyakiat Assistant Dean for Student Affairs	(from October 1, 1996)
12.	Assoc. Prof. Dr. Jariya Visitpanich Head, Dept. of Entomology	(Acting)
13.	Assist. Prof. Dr. Manas Sanmaneechai Head, Dept. of Soil Science and Conservation	
14.	Assoc. Prof. Chalermpone Sampet Assoc. Prof. Suthat Julsrigiwan Head, Dept. of Agronomy	(until October 27, 1996 (from October 28, 1996)
15.	Assoc. Prof. Dr. Tragool Tunsuwan Head, Dept. of Horticulture	
16.	Assoc. Prof. Dr. Nuchnart Jonglaekha Head, Dept. of Plant Pathology	(Acting)
17.	Assist. Prof. Dusdee Nalampang Head, Dept. of Agricultural Extension	
18.	Assist. Prof. Dr. Boonserm Cheva-Isarakul Head, Dept. of Animal Sciences	
19.	Ms. Laxmi Worachai Head, Dept. of Agricultural Economics	

THE ROYAL GOLDEN JUBILEE PROJECT : THE SUPPORT FOR PRODUCING SUFFICIENT NUMBER OF RESEARCH WORK AND PH.D. RESEARCHERS FOR THE NEED OF THE COUNTRY IN THE NEXT 25 YEARS (VISION 2020)*

EXECUTIVE SUMMARY

1. RATIONALE

At present, Thailand is far behind in number of researchers and university faculty at Ph.D. level to produce sufficient new knowledge and manpower for the need of government and private sectors. An important measure to tackle the economic and social problems so that the country can become competitive in this globolization age is to produce enough high level manpower-for research, technocrats and future social leaders, particularly in the fields of science and technology . Based on the data from "Thailand Vision 2020" study , it could be projected that Thailand will need about 250,000 researchers in the next 25 years. Therefore, Thailand Research Fund in collaboration with the Ministry of University Affairs and The National Science and Technology Development Agency propose a program to support the production of research work and 25,000 doctorate researchers in the next 25 years. This number accounts for only 10 % of the overall need of the country. The work-plan will be divided into 2 phases. In Phase I (1997 - 2011) 5,000 research work and doctorates (a four-fold increase from the present level) would be produced. A critical assessment of the program will be carried out toward the end of Phased I. If the result is satisfactory, Phase II will be proceeded to produce another 20,000 Ph.Ds. Due to the importance of this program which is also compatible with the policy on development of human resources in the eighth National Socio-economic Development Plan, it is appropriate to be approved as a program to commemorate His Majesty the King's 50th (Golden Jubilee) year of reign.

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* 1. Abbreviation : "Royal Golden Jubilee Ph.D. Project" (R.Ph.D. Project)

2. Responsible organization : The Thailand Research Fund (TRF)

Tel. (662) 642-5186-9 Fax (662) 642-5190 E-mail:vicharn@nwg.nectec.or.th.

2. PHASE 1 WORK-PLAN (1977-2011)

In the first year (1997), the R.Ph.D. Project plans to lay the administrative and infrastructure ground work especially to publicize the project and to seek co-operation from universities and various organizations. In 1998, 400 research grants will be allocated to all disciplines although priority will be given to those fields needed most such as science and technology. The number of grants will increase 10 % annually until 2006. Most of the Phase I receipients will graduate by 2,011 when an estimated 5,000 research work and 5,000 doctorates will be produced . Such estimation has already excluded probable 12 % drop-outs of the program.

3. STRATEGIES AND NEEDED BUDGET

Most Ph.D. programs in Thailand have not been strongly supported up to now. Hence at present only about 100 doctorates are produced annually and the quality in many cases is still to reach international standard. One of the basic problems is the lack of research grant to attract top students to enroll in the programs. The main strategy used in the R.Ph.D. Project is to give sufficient no-bonded research grants (approximately 2 million baht or US$ 80,000) to each student for their Ph.D. studies in Thai universities. Each grant covers not only student's near market-price stipend, tuition and research allowance, but also a budget to pursue up to one year Ph.D. study and research in collaborating university abroad. Expense for participating in professional international symposium is also included. Attempts will also be made to link the R.Ph.D. Projects with the on-going complementary projects such as the collaborative and students exchange agreements made between universities in Thailand and abroad, the education loan projects (from ADB and OECF), the government supported reverse-brain drain project, and the various mega-research projects on biodiversities, tropical drug research, synchrotron related etc. .

The budget proposed in the eigth National Socio-economic Development Plan (1997-2001) is 1.32 billion-baht (or 0.5 % of total R&D expenditure) and the total budget requested for Phase I (1997 - 2011) Program is 12.394 billion baht. In view of the importance and usefulness of R.Ph.D. Project, the budget requested to supplement this program should not bear too much burden on the annual national budget.

4. EXPECTED OUTPUT

The R.Ph.D. Project is expected to produce 5,000 Ph.Ds. for the country in the first phase and another 20,000 Ph.Ds. in the second phase. These high quality human resources will be most useful to serve as researchers in both government and private sectors. Some will also become faculty in universities which is presently badly in need. The situation will become more severe in the near future when the 9- year mandatory primary education students reach tertiary level. In addition, a good number of the output of this program will become economic and social leaders holding key-positions in both private and governmental sectors in the coming globalized era.

The great quality of research work produced during Phase I and Phase II will be most valuable for the country both in terms of new knowledge and application. They should be very useful for industrial development and for solving socio-economic problems of the country. In a long term, the most direct impact of the R.Ph.D. Project is the strengthening of graduate programs in Thailand and raising them to high international standard. This should help reducing the more than one billion baht foreign deficit Thailand currently suffers annually.

5. ENHANCING INTERNATIONAL RESEARCH COLLABORATION AND STUDENT EXCHANGES

Over the years, there are many collaboration and exchange programs and agreements made between universities in Thailand and those in all continents of the world. Since there are no sustainable source of funding to support such international collaboration and exchanges programs, only a few of these agreements have actually been implemented. This new long term R.Ph.D. Project provides budget for Ph.D. students from Thailand to spend up to one year at collaborated universities abroad and some budget to support short trips of foreign professors to follow up the collaboration project in Thailand. It is visualized that through this mechanism there will be many more meaningful and lasting collaborations and exchanges of students and faculty between Thai and universities oversea over the next decades