

No.

**REPORT OF JAPANESE
EVALUATION TEAM
ON
THAI SERICULTURAL DEVELOPMENT
COOPERATION PROJECT**

SEPTEMBER 1977

JAPAN INTERNATIONAL COOPERATION AGENCY

A D T
J R
79-12

RY

**REPORT OF JAPANESE
EVALUATION TEAM
ON
THAI SERICULTURAL DEVELOPMENT
COOPERATION PROJECT**

SEPTEMBER 1977

JAPAN INTERNATIONAL COOPERATION AGENCY

JICA LIBRARY



1050694[7]

国際協力事業団

受入 月日 '85. 6. 18	122
登録No. 11621	86
	ADF

Preface

On the occasion of termination of our Sericultural Technical Cooperation for 9 years we have visited Thailand, unexpectedly appointed as members of the Evaluation Team on the results of the Technical Cooperation Project.

In agriculture there are still many kinds of crops including sericulture depending mainly upon man hands. Those are easily acceptable kinds of crops to industrially developing countries, particularly sericulture is the favourable field of industry to those countries seeking industrial development as it is connected with light industries like raw silk reeling and weaving ones. However, people, who are responsible for application of the techniques as principal role, have manners and customs as well as national character which have been formed during a long history of the race. Each has his own different nature and way of thinking. In addition, it is difficult to let a new crop take root unless farmers can get more income and raise their living standard when they introduce the kind of crops and its production techniques among not only fluctuating social and economic situations but also agricultural situation dealing with yearly fluctuating climatic conditions and nature together with living things which are still leaving unknown part to some extent. With such situation, it seems there is immanent difficulty in overseas technical cooperation of agriculture.

The place of Korat where the Sericultural Research and Training Centre is established as centre of the sericultural technical cooperation for this time is the historical one where a Japanese overseas technical cooperation in a full scale for the first time on the sericultural field had developed for full three years from 1901 to 1905 by Dr. Kamataro Toyama who was the great pioneer in Japanese sericultural science and also in genetics.

In the same place the Sericultural Research and Training Centre has been established again and it is endorsed that this technical cooperation is getting the great success as considered with the fact that production of the warp raw silk has been commenced by the almost established production technique on the targetted warp raw silk for Thai silk after the 9-year result of technical cooperation and also the fact that this technique has been applied to other fields than the cooperation framework.

However, it will be the problem left to be solved in future whether the techniques as established by the results of this cooperation will take root into Thai agriculture, what degree of effect will be left, or will disappear like a former technical cooperation.

When we contacted with sericultural farmers through our trip in the North-Eastern part of Thailand, we have felt that they are seemingly enjoying their lives comfortably as contented with the living situation even though it is not materially abundant. This fact gives a reconsideration to us on

what would be a real happiness be to a human being, but, on the other side, it can not be denied that there is a side where their effort is not sufficient to raise their living standard by employing better techniques actively. We are afraid that this might be an obstacle in introduction and taking root of the techniques. This problem will be the greatest one left to be conquered by Thai people themselves in order to arrange letting the modern sericultural techniques take root.

In concluding this report, we would express our deep gratitude to all the persons we met on the occasion of this mission for their esteemed assistance.

September 1977

Dr. Nobuyuki MORI
Leader of the Japanese
Evaluation Team on the
Development of Thai
Sericulture

C O N T E N T S

	PAGE
CHAPTER 1. MEMBERS OF THE EVALUATION TEAM AND ITINERARY -----	1
1. Members of the Evaluation Team -----	1
2. Survey Itinerary -----	3
CHAPTER 2. OUTLINE OF THE THAI SERICULTURAL DEVELOPMENT PROJECT AND THE JAPANESE TECHNICAL COOPERATION PROJECT-----	10
CHAPTER 3. RESULTS OF SURVEY-----	14
1. Fields of Research-----	14
2. Field of Training-----	27
3. Field of Extension-----	30
4. Management of the Centre and Sub-centres-----	40
5. Donation of Machinery and Materials-----	42
6. Method of Delivery-----	46
7. Current Situation of the Thai Sericultural Industry and This Technical Cooperation Project's Extending Influences-----	47
CHAPTER 4. CONTENTS OF THE DISCUSSION WITH THAI PEOPLE -----	48
CHAPTER 5. PROBLEMS IN PROMOTING COOPERATION PROJECT-----	61
 APPENDICES	
Itinerary Map of the Evaluation Team-----	9
Fig. 1. Air Temperature at the Centre in Korat-----	76
Fig. 2. Rainfall at the Centre in Korat-----	77
Fig. 3. Date Calculator for Silkworm egg Production-	81
Fig. 4. Flow Chart from Fresh Cocoon Purchase to Thrown Raw Silk Production -----	85
Fig. 5. Map of Sericultural Research and Training Centre, Korat -----	129
Fig. 6. Sericulture & Silk Development in Thailand-----	148
Table 1. Results of Researches and Evaluation-----	63
Table 2. List of Yearly Report Groups into Sections (1970 - 1977)-----	75

Table 3. Hybrid Tests -----	78
Table 4. Hybrid Tests among Several Stations-----	79
Table 5. Standard Treatment of Artificial Hatching Method -----	80
Table 6. Production and Distribution of Silkworm Eggs in the Korat Centre-----	84
Table 7. Price Calculation Table for Reelable Cocoon and Rejected Cocoon-----	86
Table 8. Cocoon Price Table -----	88
Table 9. Reception of Trainees -----	89
Table 10. Results of Sericultural Training -----	91
Table 11. Reception of Trainees in Japan -----	93
Table 12. P.W.D. Settlers Trained -----	95
Table 13. Results of Each Silkworm Rearing in Pilot Sericultural Villages -----	96
Table 13-B. Receipt of Cocoons -----	99
Table 14. Evaluation of Pilot Sericultural Villages -----	101
Table 14-B. Evaluation of Pilot Sericultural Villages -----	102
Table 15. Cocoon Yield by Each Farmer in Pilot Villages in 1976 -----	109
Table 16. Questionnaire Form (Sericultural farmers in Pilot Villages)-----	115
Table 17. Questionnaire Form (Non-sericultural farmer in Pilot Villages) -----	117
Table 18. Results of Questionnaire to Sericultural Farmers -----	118
Table 19. Results of Questionnaire to Non-sericul- tural Farmers in Pilot Villages -----	127
Table 20. The Staff, including Workers, of the Sericultural Research and Training Centre -----	131
Table 21. Results of Business Activities of Sub-centres and Problems -----	132
Table 22. List of Donated Machinery and Materials-	133
Table 23. Raw Silk Production Plan and Results in Thailand -----	136

Table 24. Polyvoltine Silkworm Rearing in Thailand -----	138
Table 25. Plan of Silkworm egg Production applied to 10 USOM Settlements for the year 1977 - 1978 -----	139
Table 26. Financial Analysis and Plan (USAID)-----	140
Table 27. Implementation Schedule -----	141
Table 28. List of Experts dispatched on the Cooperation Project for the Develop- ment of Thai Sericulture -----	142
Table 29. List of Survey Mission on the Coope- ration Project for the Development of Thai Sericulture -----	144
Table 30. List of Publications on the Cooperation Project for the Development of Thai Sericulture -----	146

CHAPTER 1. MEMBERS OF THE EVALUATION TEAM AND ITINERARY

1. Members of the Evaluation Team

(Japanese side)

Leader	Dr.Nobuyuki MORI Director of Kyushu Branch Station, The Sericultural Experiment Station, MAF.
Raw Silk in General	Mr.Yoshinori TOKORO Chief of Sericultural Section, Silkworm & Horticultural Bureau, MAF.
Silkworm Eggs	Mr.Yoshiaki HORIGUCHI Director of Shinjo Silkworm Eggs Experiment Station, The Sericultural Experiment Station, MAF.
Filature	Mr.Kiyoshi KATAGIRI Chief of Raw Silk Improvement Section, Silkworm & Horticultural Bureau, MAF.
Planning & Coordination	Mr.Yasuaki NAZAWA International Cooperation Division, Economic Affairs Bureau, MAF.
Coordinator	Mr.Masatoshi NAGATOMO Agricultural Technical Cooperation Division, Agricultural Development Cooperation Dept., Japan International Cooperation Agency

(Thai side)

(1) (Department of Technical and Economic Cooperation)

Mr.Wanchai Sirirattans	Deputy Director General
Mr.Sombhong Pattamavichaiporn	Div. of Technical Services
Mrs.Nongnith Meerprasert	Div. of External Cooperation Office 2
Mr.Sutin Susila	"

(2) (Budget Bureau)

Mrs.Hansa Kaebandit

(3) (Department of Agricultural Technology)

Mr.Phaderm Titatarn

Deputy Director General

Mr.Chote Suvipakij

Director of Silk Division

Mr.Samchart Rattanachata

Director of Sericural
Research and Training
Center, Korat

Mr.Smack Corvanich

Chief of Nongkai
Sub-Center

Mr.Satit Chanchareon

Chief of Konkaen
Sub-Center

Mr.Sombat Maneechote

Chief of Mukdahan
Sub-Center

2. Survey Itinerary

<u>Date</u>	<u>Contents of Survey</u>
Sep. 15(Thu.)	Tokyo(10:50) <u>JAL 465</u> → Bangkok(17:22) (Stayed in Bangkok)
Sep. 16(Fri.)	Courtesy call at the Japanese Embassy and JICA Bangkok Office. Prearrangement at Bangkok office of JICA on the line, schedule, etc. of the survey. (Attended by : Mr.Imafuji, Agricultural Attache', Mr.Suwa, staff of the office, Mr. Sugiyama, Leader of the Japanese expert and the members of the Survey Team) Courtesy call on the Director-General of the Department of Technical and Economic Coopera- tion, consulting on the survey schedule, etc. Courtesy call at the Department of Agricultu- ral Technology. (Stayed in Bangkok)
Sep. 17(Sat.)	Prearrangement between the Japanese members of the Survey Team and the Japanese experts on the evaluation survey. (Attended by Mr.Sugiyama, Leader of the Japa- nese experts, Messrs.Maruyama and Yamakawa, Japanese experts and the members of the Survey Team) (Stayed in Bangkok)

- Sep. 18(Sun.) Bangkok → Korat
Inspection of the Sericultural Research and
Training Centre in Korat.
(Stayed in Korat)
- Sep. 19(Mon.) Inspection of the Sericultural Research and
Training Centre in Korat.
Prearrangement among the members of the Joint
Evaluation Survey Team and the Japanese ex-
perts on the evaluation survey.
(Attended by: the members of the Joint Evalu-
ation Survey Team (the members of the Japa-
nese Team, Messrs. Somchart, Sombat and ano-
ther officer of DAT) and 7 Japanese experts)
(Stayed in Korat)
- Sep. 20(Tue.) Korat → Phimai → Khon Kaen
The first field survey was commenced by the
Japanese and Thai Joint Evaluation Survey Team.
(Participated by the members of the Joint
Evaluation Survey Team and Mr. Sugiyama,
Leader of the Japanese experts)
Inspection and survey of Phimai Pilot Sericul-
tural Village and Khon Kaen Pilot Sericultural
Village.
(Stayed in Khon Kaen)

- Sep. 21(Wed.) Khon Kaen → Ubonrat → Udon
 Inspection and survey of Khon Kaen Sericultural
 Sub-Centre and Ubonrat Pilot Sericultural Village.
 (Stayed in Udon)
- Sep. 22(Thu.) Udon → Chian Pin → Udon
 Inspection and survey of Chian Pin Sericultu-
 tural Village and Udon Sericultural Sub-Centre.
 (Stayed in Udon)
- Sep. 23(Fri.) Udon → Ban Phai → Chonabo → Korat
 Inspection and survey of Ban Phai Poly-voltine
 Silkworm Sericultural Village, Ban Phai Weaving
 Mill, Chonabo Poly-voltine Silkworm Cooperative
 Rearing House and Chonabo Weaving Mill.
 (Stayed in Korat)
- Sep. 24(Sat.) Discussion and report among the Japanese experts
 and the members of the Joint Evaluation Survey
 Team on the results of the first field survey.
 (Stayed in Korat)
- Sep. 25(Sun.) Prearrangement between the Japanese experts
 and the Joint Evaluation Survey Team on the
 second field survey.
 Preparation for the second field survey.
 (Stayed in Korat)
- Sep. 26(Mon.) Korat → Bankruat → Surin
 Inspection and survey of Bankruat Pilot
 Sericultural Village and Surin Sericultural
 Experiment Station.
 (Stayed in Surin)

- Sep. 27(Tue.) Surin → Lam Dom Noi → Ubon
 Inspection and survey of Ubon Sericultural
 Sub-Centre and Lam Dom Noi Pilot Sericultural
 Village.
 (Stayed in Ubon)
- Sep. 28(Wed.) Ubon → Mukdahan → Sakon Nakon
 Inspection and survey of Mukdahan Sericultural
 Sub-Centre and Mukdahan Pilot Sericultural Vil-
 lage.
 (Stayed in Sakon Nakon)
- Sep. 29(Thu.) Sakon Nakon → Korat
 Inspection and survey of Sakon Nakon Sericul-
 tural Experiment Station.
 (Stayed in Korat)
- Sep. 30(Fri.) Discussion and report between the Japanese
 experts and the Joint Evaluation Survey Team
 on the second field survey.
 (Stayed in Korat)
- Oct. 1(Sat.) Consulting on the making the intermediate re-
 port.
 Inspection of the Sericultural Research and
 Training Centre in Korat.
 Prearrangement on the third field survey.
 (Stayed in Korat)

- Oct. 2(Sun.) Korat → Kabin Buri → Rayong
Inspection and survey of sericultural area
along the main coast of the Gulf of Thailand,
Kubo Sericultural Farm (Private firm) and
Pairoj Thai Silk Mill (Firm filature)
(Stayed in Rayong)
- Oct. 3(Mon.) Rayong → Bangkok
Reporting the results of the survey to the
Japanese Embassy and Bangkok office of JICA.
(Attended by : Mr.Imafuji, Agricultural Attache,
Mr.Kitano, Director of JICA office,
Mr.Suwa, staff of the office, Mr.Sugiyama,
Leader of the Japanese experts and the member
of the Japanese Survey Team)
(Stayed in Bangkok)
- Oct. 6(Thu.) Final consulting with the Thain Government
and officers concerned on the results of the
survey and the line of the further cooperation.
(Attended by :
(Thai Government side)
(Budget Bureau) Mrs.Hansa Kaebandit
(Department of Technical and Economic Co-
operation) Mr.Sombhong Pattamavichaiporn
Mrs.Nongnath Meerprasert
Mr.Sutin Susila
(Department of Agricultural Technology)
Mr.Chote Suvipakij

(Sericultural Research and Training Centre)

Mr.Somchat Rattanachata

Mr.Smack Corvanich

Mr.Satit Chanchareon

Mr.Damrong Sienawatana

Mr.Sambat Maneechote

(Japanese Government side)

(Japanese Embassy)

Mr.Imafuji, Agricultural Attache

(JICA) Mr.Kitano, Director

Mr.Suwa, Staff

(The members of the Survey Team)

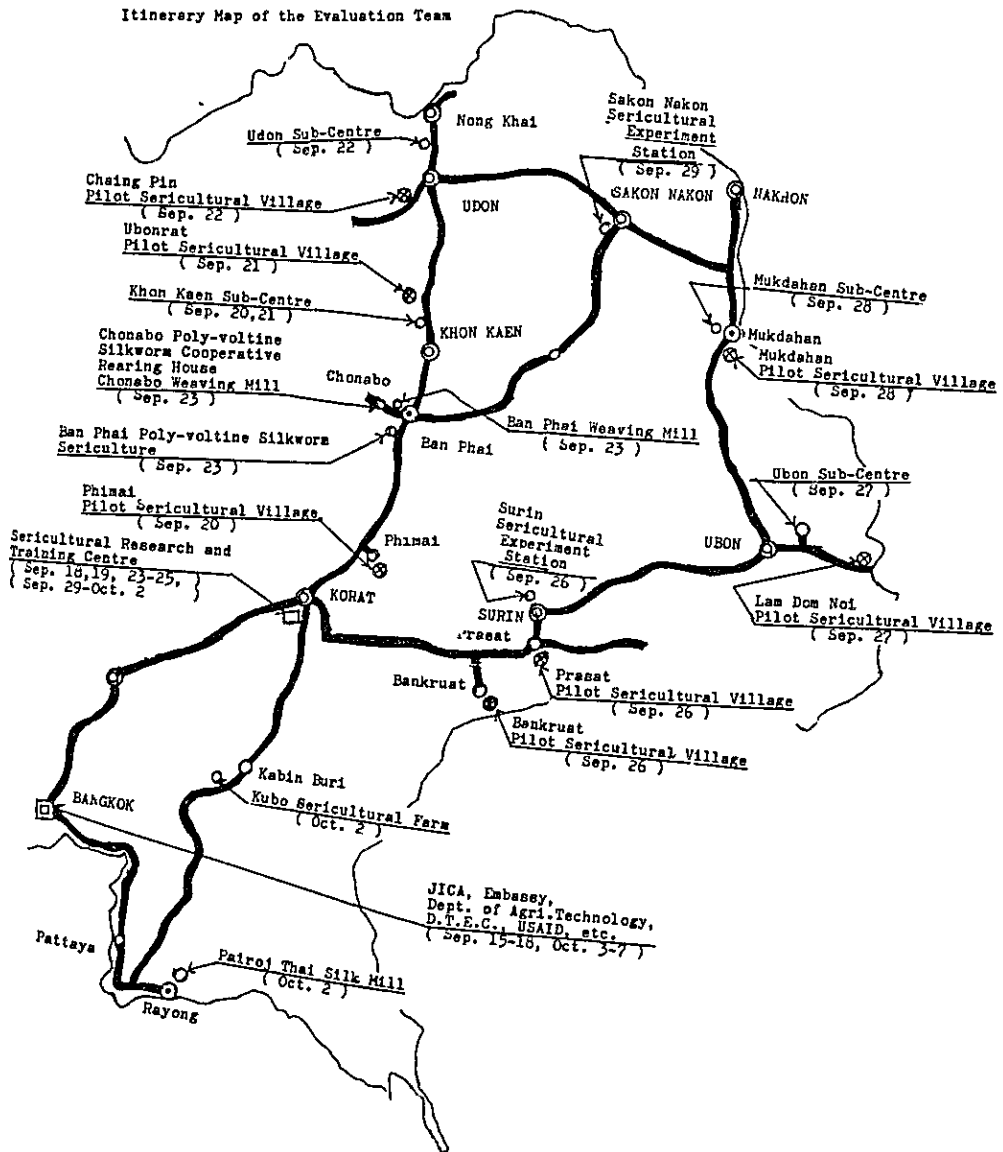
Mr.Mori, Leader and 5 other
members

Mr.Sugiyama, Leader of Japanese
experts)

(Stayed in Bangkok)

Oct. 7(Fri.) Bangkok(8:20) → Tokyo(18:45)

Itinerary Map of the Evaluation Team



CHAPTER 2. OUTLINE OF THE THAI SERICULTURAL DEVELOPMENT
 PROJECT AND THE JAPANESE TECHNICAL COOPERATION
 PROJECT

1. Outline of the Thai Sericultural Development Project

The Thai Government made a plan to encourage her production of the warp raw silk for Thai silk achieving a self-supply system as a result, while developing stable production of the Thai silk in a high reputation after the World War II as export goods as well as souvenirs in sight-seeing industry, instead of depending upon imported warp raw silk. At the same time the Thai Sericultural Development Project was planned to encourage cocoon production for the warp raw silk at the North-Eastern farmers, who can get the lowest income in Thailand, making more income to them to contribute to the stabilization of their farm management.

This development project consisted of experiment and research to raise the quite low technical level on culberry cultivation, silkworm rearing and raw silk reeling, which have been existed in the North-Eastern part of Thailand since old times, to the level as high as to produce the warp raw silk; application and systematization of the techniques, training of technical officers and technical extension to farmers.

The Japanese Government decided to cooperate with this sericultural development project since the First Technical Cooperation Project as signed in March 1969, followed by extension of terms in the Second and Third Projects which will terminate in March 1978.

The Project includes businesses as follows.

(1) Establishment of the Sericultural Research and Training Centre

An institute will be established in Korat to conduct experiment and research on mulberry cultivation, silkworm rearing, raw silk reeling, etc., where research and experiment are promoted to create the techniques suitable for the country and national characters of Thailand, while arranging facilities for training of technical leaders and training the people concerned.

(2) Reinforcement of Local Sericultural Experiment Stations

Facilities of Local Sericultural Experiment Stations will be arranged and reinforced to establish techniques on mulberry cultivation, silkworm rearing suitable for each local area, while handling production and distribution business of mulberry saplings and silkworm eggs.

(3) Setting up of Bases for Technical Extension

Sericultural model areas will be set up in the central areas for technical extension to sericultural farmers, accompanied with young silkworm cooperative rearing houses and joint mulberry fields, etc.

2. Outline of the Japanese Technical Cooperation Project

The Japanese Technical Cooperation Project for the Thai Sericultural Development Project started with dispatch of one or two experts according to the Colombo Plan since 1964.

Following to the above-mentioned planning of the Thai Sericultural Development Project, the First Technical Cooperation Project was commenced on full scale since 1969 as 3-year project to 1971 supporting strongly the above-mentioned Thai Sericultural Development Project. Under which, Japanese expert team was dispatched, cooperation project was planned, experiment and research were commenced to find out a new sericultural technique; machines and instruments for experiment and research, sericultural tools, agricultural machines and tools for mulberry cultivation and various other materials were donated; trainees were received, among others, putting stress on the buildup of the foundations. The cooperation was extended for another 3 years (1972 - March 1975) on :

(1) in the Sericultural Research and Training Centre in Korat, experiment and research to establish new sericultural techniques, production of parent silkworm eggs of F_1 hibrid and the training of staff of the Centre and Sub-centres (Khon Kaen, Udon, Mukdaharn and Ubon), local leaders and farmers;

(2) in the Centre and Sub-centres, the production, multiplication and distribution of silkworm eggs as bred by the Centre;

(3) technical advice on promotion of the raw silk reeling industry;

(4) technical guidance and extension on priority by the establishment of pilot sericultural farm groups;

(5) examination of the training of the third nations to sericultural techniques;

(6) and donation of various machines and materials, among others.

In the meantime, the Thai Government, on the occasion of the implementation of the second cooperation project, set up the Sericultural Division in the Department of Agriculture to reinforce its administrative mechanism. In conjunction with the Reclamation Division, Public Welfare Department, Ministry of Home Affairs, pilot sericultural villages, etc. were established to expedite the buildup of the bases for the extension of new sericultural techniques.

In March 1975, when the cooperation project came to an end after 6 years duration, the Thai Government strongly requested its extension. In compliance, it was extended for 3 years, up to March 7, 1978.

The third cooperation project is now under way along the line of the second Record of Discussion, in expectation that the consolidation of the Thai sericultural industry on the fruit of 6 years endeavours according to the first and second R/D, such as new sericultural techniques spreading deep root, will produce a happy result that Thai people themselves operate the Centre, Sub-centres, etc., in research work, training and so forth, and lead farmers in a proper direction.

CHAPTER 3. RESULTS OF SURVEY

1. Fields of Research

Since the start of this project in 1969, basic and practical researches, which could be directly utilized for production field while solving technical problems, have been enthusiastically pursued in the fields of mulberry cultivation, silkworm rearing, silkworm breeding, production of silkworm eggs, mulberry and silk pathology and raw silk reeling, in order to establish modern sericultural techniques which are suitable for the natural features and climate of Thailand.

Research results are presented by experts and counterparts at the annual meeting held in March every year, and published in the Bulletin of the Thai Sericultural Research and Training Centre, already coming up to No.6. No.7 is now under printing with 370 articles in total (See Table-2). Those will become a valuable data for the development of Thai sericultural industry in the future.

Looking at the research results, as proved by domestic production of the warp raw silk for Thai silk reaching to possibly one quarter of the necessary amount which depended largely upon import previously, it can be said as an epoch-making result in technical cooperation, consolidating results of each research field.

The evaluation method in the fields of research was to extract the research themes connected with items to be established as mentioned in the "Research target" of the "Concrete items of research to be developed and established with priorities" of the Report (See page 29), compiled by the 1976 Guidance and Survey Team; and classified them into 3 categories such as "Practical", "Unfeasible" and "Continued" which was further classified into 2 categories as mentioned in Table-1, i.e. "Continued till March 1978" when the Third R/D terminates and "Continued after March 1978". Consolidating the results of evaluation of each theme, target of the technical research was evaluated. It resulted there were remaining problems for further study except following themes whose research targets can be said that the technical systematization has been almost completed as far as putting into extension system.

- (1) Establishment of training and harvesting method of mulberry field for young silkworms.
- (2) Establishment of training and harvesting method of mulberry field for grown silkworms.
- (3) Tabulation of rearing standard of young silkworms.
- (4) Tabulation of rearing standard of grown silkworms (the above 4 items are prepared by sections of mulberry cultivation, silkworm rearing and physiology)
- (5) Breeding of healthy commercial silkworm races (Section of improvement of the silkworm races).
- (6) Tabulation of rearing standard of parent silkworms of F_1 hybrid.

- (7) Tabulation of production standard of silkworm eggs
(Section of the silkworm egg production).
- (8) Establishment of raw silk reeling techniques for warp
of Thai silk (Section of raw silk reeling), etc.

On the other hand, techniques mentioned in the rearing standard, completed at the Centre, requires local adaptability from now on, while profitability in selection of silkworm varieties suitable for each rearing season in cooperation with the silkworm breeding field as well as in mass rearing (common experimentation) of F_2 silkworm varieties has been remained for further study.

(3) Pathology

In this field, 50 articles were published, out of which 11 articles were connected with control of mulberry diseases and pests, 39 articles were on control of silkworm diseases and pests and 31 articles were connected with the research target on training and harvesting method of mulberry field and tabulation of rearing standard of silkworms.

Root rot is the largest problem to study among mulberry diseases. Only a part of disinfection route and mechanism to be attacked with disease at the field were found out. A control method with grafting in cooperation with the field of mulberry cultivation has already been existed after finding out the difference of disease resisting property among mulberry varieties.

Research priorities were given to mulberry scale and mulberry borer among mulberry pests, and a control method is under study as a part of its physiology and ecology were found out.

Control methods to poly-voltine silkworm maggot and pebrine among silkworm diseases have already been established.

(Remaining problem)

Having no maintenance custom of mulberry field existed in Thailand, there has been difficulty for sericultural farmers in practicing of application of enough fertilizers. In this respect a common experimentation on application method of fertilizers corresponding to conditions of locality based on the fundamental technique as completed by the Centre has been conducted at the Centre, some Sub-centres and Local Sericultural Experiment Stations in the current fiscal year, but the Centre itself could not participate due to shortage of field. This fact is unfavourable in view of guidance and cultivating common consciousness among them, so that the Centre is required to participate.

Among others, there remained such techniques for further study as relationship between weeding and mulberry yield, harvesting method of mulberry shoots for 3 rearing seasons (6 harvests a year of mulberry shoots as combined A and B mulberry fields, planting of scions for grafting at the field after controlling root rot, bud grafting at mulberry field, utilizing technique of green manure of the pulse family and survey on denitrogen phenomena at mulberry field.

(2) Silkworm rearing

In this field researches of 76 articles including ones in training field were published, out of which 48 articles were connected with the tabulation of rearing standard of young and grown young silkworms has already been practiced at cooperative rearing house of each Pilot Sericultural Village, while the tabulation of rearing standard of grown silkworms has already been extended into sericultural farmers through the training. Rearing technique basing fundamentally on controlling diseases and pests will be contributed to the stabilization of cocoon crop if the standard technique is faithfully followed.

(Remaining problems)

Connecting with pathology field, the largest problem may be how to stabilize the cocoon crop. Even the technique has been established, it happened a bad crop at the rearing spot because of neglecting the fundamental disease controlling technique. Future sericultural development in Thailand will become quite worse unless disease control technique is developed into silkworm rearing. In this respect, with conducting a fact finding survey at bad crop areas making of countermeasures and establishing of disinfection method should be required. In addition, having constructed the rearing room of grown silkworms with block, brick and slate instead of originally planned wood, it is advantageous in disinfection due to its tightly closed type but it happened a bad crop in the rearing season of high temperature due to lack in heat proofing and aeration, so that an improvement measure is required.

(1) Mulberry cultivation

In this field of research 100 articles have already been published, 72 articles out of which were connected with establishment of training and harvesting method of mulberry fields for young and grown silkworms as referred to Table-1, showing each name of articles (and so forth). The training and harvesting method of mulberry field for the purpose of 4 rearings a year as well as field maintenance have already been established, while the technique has been illustrated and extended into the sericultural farmer's side.

By March 1978 the training and harvesting method of mulberry fields for young and grown silkworms corresponding to the 6 rearings a year will be prepared with illustrations and explanations.

In addition, as countermeasures to the root rot which is a large obstacle in mulberry cultivation, attentive results have been obtained in referring of disease-resistant mulberry varieties, controlling measure by grafting, etc. during the progress of research as cooperated with the pathology field. By March 1978, as controlling method of root rot, practical techniques such as grafting method (illustrated), mass production of scions, early-yield mulberry field employing the group planting of cuttings, etc. will be obtained.

Fig.1 and Fig.2 show results of the meteorological observation since 1972 as existed at the Centre in this field.

Two new chemicals replacing Seresan, disinfection agent, are under testing as control method to muscardine, and the results are expected to obtain by March 1978. A method of diagnosis of flachrie together with muscardine is under study. Currently a fact-finding survey on a bad crop is under way at the Pilot Sericultural Villages.

(Remaining problems)

A research has been conducted on root rot since the beginning of this Project, but it has met a dead-rock such that even separation of pathogenic fungi could not be succeeded. The previous Survy Team recommended the suspension of this research as it was no hope to get a success during the term of the cooperation project. However, being an important problem to be solved in all means in order to develop the Thai sericultural industry, it will be necessary to take a measure giving direction of study from now on by organizing an expert team composed of researchers on plant pathology, plant physiology and soil. Testing of the root rot resisting mulberry varieties and study connected with pest control are remained.

A control method should urgently be established to Aspergillus disease and Nuclear polyhedrosis which are seemingly the main reason to bad crops at the production spot in the field of silkworm rearing as mentioned above. A research on identification of sick silkworm is under way as softening and decomposition of silkworm is fast due to high temperature in Thailand and as difficulty of classification of kind of diseases on a sick silkworm, but this problem should urgently be solved as it should be a basic knowledge to establish a control method.

(4) Silkworm breeding

In this field there were 47 articles published, out of which 32 articles were connected with the target of research on breeding of commercial silkworm varieties. Breeding of parent silkworm varieties suitable for natural features of Thailand and aptitude testing of those hybridation patterns have been conducted in order to be utilized practically. There are 2 Japanese strains of K_1 and K_6 , 3 Chinese strains of T, K_8 and K_{14} , 6 combinations of hybridation patterns of $K_1 \times K_{14}$, $K_1 \times K_8$, $K_1 \times T$, $K_1 \times K_{14}$, $(K_1 \times T)F_2$, $(K_1 \times K_6) \times K_{14}$ as utilized practically. Among others many strains as mentioned in Table 3 (Experimentation on the Improved Silkworm Hybrids) were under breeding.

The comparison experimentation on silkworm hybrids, commenced last year, has been conducted in cooperation with the Centre, 2 Sub-centres and 4 Local Sericultural Experiment Stations. Each institute has been familiar with such experimentation and results of the experimentation are mentioned in Table 4. Such experimentation is required to conduct actively from now on in order to intensify the joint responsibility among institutes.

(Remaining problems)

Recently imported silkworm eggs from Japan are reared at reclaimed villages, etc. where it is said that the silkworm eggs distributed by the Centre are not strong enough, so that breeding of silkworm varieties with priority to stronger ones is required.

It needs a long time in breeding stronger commercial silkworm varieties and establishment of its hybridation patterns, which will be the foundation of the Thai sericultural development. In this connection, even after the termination of this cooperation project well-trained technical officers having silkworm breeding technique should become a core to pay every effort to higher technique on silkworm breeding in a long run, while testing of adaptability of hybrids and comparison experimentation on hybrids should be continued.

(5) Silkworm egg production

In this field 53 articles were published, all of which were connected with target of research. Tabulation of rearing standard of parent silkworms has been completed. Among practicing of silkworm egg production technique, technique itself has almost been completed, out of which technical standard has been established in the silkworm egg handling method and artificial hatching method as shown in Table 5. With the completion by March 19978 of tabulation of working manual on the silkworm production process and preparation of the calculator of dates on the silkworm egg production, etc. (Fig.3) the technical standard will be established.

Situation of the silkworm egg production and distribution by the Centre at Korat is shown in Table 6.

(Remaining problems)

Even the silkworm varieties bred at the field of silkworm breeding have been improved to meet with national features of Thailand, the ancestor was not the Tropic strain but originated in the Temperate Zone. In the current silkworm egg preservation

technique which preserves the silkworm eggs at the natural high temperature except refrigerating period, distributed silkworm eggs to sericultural farmers suffered from bad harchability often, resulting bad crop and the silkworm varieties bred at the Centre lost reputation. In this connection, establishment of the silkworm egg preservation technique with reviewing the preservation method should urgently be made as important problem to study.

Also stabilized supply of necessary silkworm eggs is quite important, became it becomes the foundation to the Thai sericultural development. In the future the mass production technique of silkworm eggs suitable for natural and social features of Thailand should be urgently established and taken root (including making a production plan and practicing) to meet with increased demand of silkworm eggs following to increase of sericultural farmers groups as established by the Pilot Sericultural Villages and USAID.

Among others, utility experimentation on the prefabricated moth preservation room (donated in 1977), confirmation experimentation on the newly bred silkworm varieties and refrigerating limit experimentation on the newly bred silkworm varieties should be conducted continuously.

Besidws, the refrigerator should be maintained completely as a life or death matter to the silkworm egg production.

(6) Raw silk reeling

In this field 47 articles were published, out of which 43 articles were connected with target of research.

Technical standard has been established on raw silk reeling process of drying of fresh cocoons, storing of cocoons, selection of cocoons, cocoon cooking, reeling, re-reeling and finishing arrangement; and throwing processing process of raw silk soaking, winding, plying, throwing, re-winding.

Also technical standard on the doupion silk production process made of rejected cocoons (See Table 1 Results of evaluation on the researches, and Fig. 4 Production process as illustrated).

Determination method of purchase price of fresh cocoons has been made according to the new method since July 1977 when the old method was revised.

In other words, putting price of the amount of reelable cocoons (fresh) necessary for producing one kg of raw silk at 400 bahts, raw silk yield of cocoon shell (raw silk percentage of cocoon shell) at 73 %, respective cocoon price is calculated according to shell percentage with the above factors. In calculating of the rejected cocoon (fresh) price, the price of the rejected cocoons necessary for producing one kg of doupion silk is put at 140 bahts and doupion silk yield of rejected cocoon at 12.42 %. With the above-mentioned calculation formula a simple calculation table is prepared for quick reference in combination of shell percentage with rejecting cocoon percentage. Therefore, purchase price of fresh cocoon is determined with raw silk yield as more correspondingly than before

and consideration of economic value of rejected cocoon (See Table 7 Cocoon price calculation table for reable cocoon and rejected cocoon, and Table 8 Cocoon price table).

(Remaining problems)

As mentioned in above, the raw silk yield at 73 % shows that such raw silk yield is not good enough, particularly a lot of low quality cocoons including sick worm cocoons are produced, no utility value of waste silk. In this connection, it is necessary to increase the reeling efficiency in general by improvement of cooking method of low quality cocoons and establishment of reeling technique in accordance with the change of type of automatic reeling machine. Considering that there is no quality evaluation standard on the thrown silk for warp of Thai silk, studies on this evaluation standard, doupion silk evaluation standard made of rejected cocoon and the conditioned test system.

2. Field of training

Training conducted at the Sericultural Research and Training Centre in Korat is made four times a year at every silkworm rearing season, not only for counterparts as routine, but also for staff of Sub-centres, staff of Local Sericultural Experiment Stations, extension officers and sericultural farmers at the Pilot Sericultural Villages. Contents of the training are shown in the Table 9 totalling 28 times with 854 people as trained on sericulture.

Majority of the trained people was sericultural farmers amounted to 548 people (out of which 427 people were the re-claimed farmers), while 306 others were staff of Sub-centres, Local Sericultural Experiment Stations, Department of Agricultural Technology, Department of Extension, etc. (See Table 9). Since the beginning of training in 1970 approximately 100 - 150 people have been trained every year, particularly contents of the training have been filled up recently as shown in Table 10. Among farmers women trainees have increased remarkably, and by age-group young people of 10 years and 20 years old occupy a majority. Subjects of the training consist of 8 items such as mulberry cultivation, mulberry disease and pest, silkworm disease, silkworm egg, silkworm breeding, raw silk reeling and general education, while priority is given to practicals. Training hour amounts to 300 hours in practicals and 30 hours in lectures, totalling about 330 hours. Daily training hour is full day or 10 hours for a month. For the beginners in silkworm rearing, audio and visual education with movie films and projector slides, etc. on sericulture are used getting success.

Practicals are existed with priority to fundamental work for silkworm rearing, getting a great success. However, there happened bad crops sporadically at the rearing spots, because sericultural farmers did not give enough attention to such important matters as disease and pest control, disposition of silkworm feces and litters having close relationship with silkworm disease, etc.; proving that their technical knowledge and practicing were not partly satisfied. However, through this training almost of sericultural farmers are engaging in their sericultural work with conquered highly technique on rearing of bi-voltine silkworms. When the contest of excellent sericultural farmers was held in 1976, the first and third place winners in Phimai Pilot Village and the first, second and third place winners were the trainees, proving that the training was actually effective. They are young men and women, trained on the modern sericultural techniques, who are going to engage in newly developing sericulture, and by whom future development of Thai sericultural industry will be promised.

In addition to the above general training situation, 5 special trainings to technical officers were conducted one each on Raw silk reeling training (1971), Stabilizing crop training (1976), Refrigerator maintainance training (1976), Technical training on silkworm egg production (1976) and Tractor handling and maintenance training (1976) (See Table 9).

Those trainings are fundamental factors to let the modern sericultural technique take root in Thailand, and quite so important field that strengthening measures to conduct each training to meet with each object systematically, deeply and tightly are required.

Training of counterparts said to be generally under good progress through routine study or field guidance or dispatching them to the training in Japan. Counterparts dispatched to Japan have amounted to 30 persons so far on subjects as shown in Table 11. Directors of the Centre and Sub-centres, responsible for leading and supervising in the trained in researches, may need the research managing training because of necessity in supervising and managing inside and outside their institutes as well as levelling up of their capability.

Training of extension officers is as shown in Table 9, giving them for the time being priority to arrange the extension system in Pilot Sericultural Villages, particularly for the staff in charge of sericulture among staff at the Reclaiming Offices field guidance has been given corresponding to actual situation of their area on technical guidance to sericultural farmers. Furthermore, deep and tight training is required to let them have superior capability and higher knowledge.

Advancement of the modern sericultural development in Thailand depends on whether the extension and guidance system is well organized or not. Along with the strengthening of the extension system, increasing of capability of extension officers is so required that significance of importance of training is understandable. In this respect training of technical officers cannot be made once but increase of training times and filling

up the training contents are required.

Training of extension agents, responsible for sericulture, was under the administration of the Department of Extension, but in 1977 it was consigned to the Department of Agricultural Technology, which can arrange its own line. Increasing plan of extension officers (150 officers in 5 years) is advanced, while 50 officers are trained at the Centre in Korat in this year. In this connection future activities of extension agents are expected.

Training of sericultural farmers, originally to be made by extension officers or Sub-centres as planned in this Cooperation Project, is made mainly at the Centre,; because the Sub-centres have not reach the level giving such training yet as those have not been fully equiped. At Surin Sub-centre training facilities have been newly equiped, so that the training there has been scheduled to begin in 1978.

Number of reclaimed farmers by each Pilot Sericultural Village is shown in Table 12.

3. Field of extension

As bases for extension of sericultural techniques, established at the Sericultural Research and Training Centre, Pilot Sericultural Villages are planned to be established 2 villages each near the Centre and Sub-centres; and also those are expected to play quite important roles in the future sericultural development as foundation for encouraging of the modern sericulture in Thailand.

(1) Pilot sericultural village

As the working business of the Public Welfare Office, Ministry of Home Affairs, Pilot Sericultural Villages are going to be established at 11 places throughout the country, out of which the cocoon producing ones are 7 villages such as Phimai, Prasat, Bangruad, Mukdahan, Ubolrat, Chiang-pin and Lam-Dom-Non; while remaining 4 reclaimed villages are going to practicing except Huoy Luong.

Phimai Pilot Sericultural Village has started in 1973 as the first one when the new sericulture with bi-voltine silkworm variety was commenced. As it is directly under the Sericultural Research and Training Centre in Korat, guidance was made so thoroughly that the cocoon production amount is the largest (See Table 13-A) and the future development is expected as advanced sericultural area.

Cocoon delivery to the Centre amounted to 5.3 ton in 1974, increased to 5.8 ton in 1975, but decreased since 1976 and none in 1977; the fact like that attracts attention (See Table 13).

Looking at the silkworm varieties, having the closest relation with silkworm rearing, the most suitable varieties suitable for climatic conditions in Thailand and reared in sericultural farmers are such bred ones at the Centre as $K_1 \times K_6$, $K_{14} \times (K_6 \times K_1)$, $K_8 \times K_1$, $K_1 \times K_{14}$, etc. In September 1977 commercial silkworm eggs of 240 cases (Kinsho x Showa) were imported from Japan, which were reared in good health, instead of anticipated concept that the imported eggs could be weak in rearing, and harvested in good yield with higher crop per case of eggs and rich shell percentage, resulting 20 - 30 % higher cocoon income than that of eggs distributed by the Centre. In this

respect a careful and rapid study is desirable as it is thought an important problem whether the above-mentioned good results can be available throughout a year or not.

A young silkworm cooperative rearing house has been established to each Pilot Village, accomplishing the purpose as expected; but mainly it is actually like a joint rearing of each shared silkworms there by each sericultural farmer because of the reason that each one's silkworm rearing cannot be consigned to others. In this connection, arrangement will be required to organize a system bringing the merit of the young silkworm cooperative rearing into full play with improvement in rearing technique of each sericultural farmer.

The project connected with USOM established a young silkworm cooperative rearing house of the similar capacity at each respective Pilot Village at the same time (See Table 14-A).

Many silkworm cooperative rearing house each has a rearing capacity of 60 - 100 cases of eggs at most (reared up to the third instar), with 60 - 80 rai of joint mulberry field. Almost no techniques on mulberry cultivation, and training and harvesting method of mulberry field have been introduced. In this respect, as such mulberry field is not good for exhibition purpose in Pilot Villages those mulberry fields should be improved to good ones by introducing new techniques as soon as possible in order to make the referring standard mulberry field for sericultural farmers (See Table 14-B).

Installation of grown silkworm rearing rooms by sericultural farmers have progressed in good order, but newly participation of farmers into sericulture is in a difficult situation due to shortage of fund for increased cost of construction recently.

Size of rearing room is almost same at each Pilot Village, Many have 1.5 - 2.0 cases of eggs for one time of rearing. Almost of rearing rooms have been constructed according to the design guided by the Centre as modern model rearing room suitable to each area. However, even there are good rearing rooms, many farmers have no well equiped water tank from which water is supplied to disinfect rearing rooms and tools as required for disease control. There are some farmers who dispose silkworm feces and litters around the rearing rooms though such are connected with spread of silkworm disease.

Interval between silkworm rearings is limited to a short period because of many rearing times (5 - 8 times) a year in Thailand, so that perfect disinfection cannot be expected. In order to avoid bad crops which might happen due to spread of silkworm disease, a thoroughly disease control measure is urgently required. Particularly in the reclaimed area an insuring measure of water is necessary for disinfection as there is a season even in short of drinking water. There were many farmers who suffer from none of cocoon crop, 20 % crop or 30 % crop because of spread of silkworm disease according to the questionnaire for this time.

Analyzing the result of cocoon production by sericultural farmers in 1976 (See Table 15), there was a large difference in cocoon production amount as pointed out in spite of

no large difference in mulberry area. This owes to differences in rearing times, cocoon yield per case of eggs and efficiency of mulberry fields such that rearing times ranged once to 7 - 8 times, cocoon yield of eggs showed a difference of 10 - 20 kg and total length of mulberry shoots at mulberry shoots at mulberry fields had a large difference. Those obstacle factors against the increase of productivity should be required to remove by a complete countermeasure.

The most important problem as remained for future resolution is the one how important the stabilization of cocoon crop is, in other words, by which thorough disease and pest control measure can be established. Along with the above, a double crop may be possible even in the current area if cultivation method of mulberry field is improved by better cultivation to increase efficiency of the mulberry field. Though application of chemical fertilizers is difficult in the current situation, it may be comparatively easy to apply more compost, crude and large organic matters as well as introduction of green manures of pulse family into mulberry fields. Following to the stabilization of cocoon crop, this is another important problem for future sericultural development.

Even it is difficult in a direct comparison due to difference of conditions efficiency of the mulberry field (cocoon yield per unit area) is quite low like 1/5 as compared with as in Japan, so that its improvement is an item to be solved seriously to materialize the modern sericulture.

Pilot Sericultural Villages as bases for taking the modernization of sericulture root have generally been fixing techniques by earnest efforts of leaders concerned, proper extension and guidance. Furthermore, thorough penetration and higher efficiency are strongly required from now on.

In this connection, with tight cooperation among experts, technical staff of the Centre and Sub-centres as well as staff of Reclaiming Offices to materialize the penetration of techniques (including management ones) to sericultural farmers are earnestly desired. In doing so, to clear up tasks of cooperation and inter-relation between organizations concerned and to take reinforcement measures on mutual cooperation and tying up system are desired.

In the mean time, outline of the questionnaire which was surveyed to sericultural farmers and other farmers in Pilot Villages is shown as follows.

(2) Questionnaire in Pilot Villages

A questionnaire was surveyed to farmers in 7 Pilot Villages (reclaimed area), according to the survey items (See Table 16) to sericultural farmers, taking 6 - 10 farmers a village totalling 45 farmers; while the survey items (See Table 17) to non-sericultural farmers, taking 3 farmers a village (2 farmers to one village) totalling 20 farmers. In this survey method no statistical system has been considered.

(A) Outline of results of the questionnaire to sericultural farmers in Pilot Villages

(a) Situation before introduction of sericulture

- (i) Management before introduction of sericulture depended on types of upland crops (cassaba, jute, sugar cane, kenaf, etc.), rice crop or rice and upland crops with which buffaloes, cattles, porkers, etc. were introduced, according to conditions of each reclaimed land. Size of cultivation corresponded to the allotment of reclaimed land, i.e. 25 rai, 15 rai, etc., but as seen in Phimai, Chiang-pin and Bangruad there were larger size farmers who bought more land as land transaction becomes possible after 5 years of settlement.
 - (ii) Livelihood before introduction of sericulture was classified into 60 % as usual, 22 % as better and 18 % as worse.
 - (iii) Motive of introduction of sericulture was almost as suggested by the Government, while there were a few who were suggested by other people in Phimai.
 - (iv) Experience in sericulture was varied according to reclaimed land such as many cases with no experience in sericulture introduced sericulture in Phimai, Mukdaha and Bangruad; and only farmers experienced in sericulture in Ubolrat, Lam Dom and Noi.
- (b) Situation after introduction of sericulture
- (i) All farmers received the Government or other fund (5,000 - 25,000 bahts, interest rate of

8 % per annum for 15 years), invested to es-
tablishment of mulberry fields, construction
of silkworm rearing rooms, purchase of seri-
cultural tools, etc.

Attention must be made to the interest amoun-
ing to 1,600 bahts per year if a farmer borrows
20,000 bahts, equivalent to cocoon value of one
crop of 2 cases of eggs.

- (ii) At the time of introduction of sericulture al-
most farmers received training at the Centre or
Mukdahan Local Sericultural Experiment Station
as example for 30 - 60 days. Half of them felt
the contents of training difficult, while other
half not difficult (or ordinary). Almost keep
the contents of training in mind.
- (iii) On difficulty in techniques after practicing
the sericulture actually, judgement varied
quite widely, i.e. 30 % each for difficult,
easy or other.
- (iv) On rearing times the survey was made on that
of the current year (i.e. January - August),
so that the answer like 2 - 4 times may mean
4 - 8 times per year.
- (v) Cocoon crop amount varied among farmers as
difference of size of cases of eggs to be hatch-
ed, loss during rearing, etc. There were far-
mers in a considerably large size shown in
examples as 500 kg, 250 kg or 240 kg in Phimai,

equivalent to 1,000 kg per year in 8 times of rearing with a size of 5 cases of eggs in the case of Phimai as example. But, generally speaking, half of farmers producing less than 50 kg each, including such as the one having no crop because of silkworm disease.

(vi) Future opinion on sericulture, increasing minded farmers to get more income were 45 % in Ubolrat and Mukdahan while ones wanted to maintain current level were 45 % in Phimai and Prasart.

(vii) Almost farmers answered to know sericultural guidance institutes like the Centre in Korat, Sub-centres, etc.

(Referring the above-mentioned to Table 18 "Results of Questionnaire to Sericultural Farmers in Pilot Sericultural Villages".)

(B) Outline of results of the questionnaire to non-sericultural farmers in Pilot Sericultural Villages

- (a) Through all the surveyed farmers it is not thought that their managing situation was not necessary to introduce sericulture except a few farmers as considered with size of management, introduced crops, annual income by crops, etc. (Gross proceeds per unit area (rai) by sericulture are the most profitable as compared with that by rice or cassaba.)
- (b) Half farmers had experience in sericulture, other half had none, while the sericultural minded were

at 60 % and others at 40 %.

- (c) The most difficult problem in farm management was poor capital fund and facilities in Lam Dom Noi, Prasert and Bangruad, no irrigation system available in Mukdahan. In general it can be said that shortage of fund was the problem.
- (d) Sericultural minded farmers occupied 60 %. It is observed there were considerable number of farmers who were latent to transfer the traditional upland crops like cassaba, etc. to introduction of modern sericulture which is the most profitable and capital intensively among crops.

However, in introduction of sericulture which is more capital intensively than any other crops, results of stabilization of cocoon crops, increase of income, etc. for the sericulture introduced farmers (by the Centre system or by USAID(former USOM)), as connected with borrowing of fund, will seemingly affect to the developing speed.

(Referring the above-mentioned to Table 19 " Results of Questionnaire to non-Sericultural Farmers in Pilot Sericultural Villages")

4. Management of the Centre and Sub-centres

The cooperation for the development of Thai sericulture is supposed to be promoted by the consolidation and reinforcement of the Sericultural Research and Training Centre in Korat and 4 Sub-centres. As pointed out by the previous guidance teams, those are in different organization from as in the main and branch stations of the National Sericultural Experiment Station in Japan. Those are independent institutes respectively as organized in parallel, so that cooperative relation and common consciousness are not sufficient. In this respect, it is earnestly necessary to clarify the division of business and cooperation between the Centre and Sub-centres, and to take measures to strengthen the cooperation and liaison among them.

(1) Sericultural Research and Training Centre in Korat

The cooperation for the development of Thai sericulture has begun with the construction of the Centre, which has been equipped so far as shown in Fig. 5 with about 30 buildings including the main one and mulberry fields. In addition, 7 Japanese experts and staff of Thailand as shown in Table 20 have been posted currently. As mentioned in paragraphs (1), (2) and (3) of this Chapter, the business of the Centre has been progressed in good order, and the Centre has become the central institute in the name and reality. Evaluating with the R/D, the Center has established more than 100 % in its equipment and personnel posting.

However, when the leaders in charge of advancement of experiment and research on the Thai sericulture were asked for evaluation of counterparts in each section, majority of tech-

nical sides were evaluated highly, but planning, practicing, summing up and leading on researches were evaluated as middle or low; so that further guidance and training are required.

(2) Sub-centre

Equipment of the Sub-centres has been progressed steadily, but equipments and personnel posting have not been satisfied yet, as evaluated at about 70 - 80 % according to the schedule planned by the R/D. Progress of equipment and business at the Sub-centres are shown in Table 21, where production and distribution of silkworm eggs and distribution of mulberry saplings have been under way while guidance of farmers has been just started and only a few of experiment and research have been existed.

At some Sub-centres it happened a large loss of crop in the parent silkworm rearing, because no disinfection was existed as the interval period between rearings was limited due to the tight schedule like the silkworm egg production, farmers training and the egg production again. This should not be happened at such Sub-centres which are responsible for transferring the sericultural techniques established at the Entre to pilot sericultural farmers. It owed to lack of proper personnel posting.

However, production technique on the F_1 hybrid silkworm eggs has been taking root at the Sub-centres, which was thought difficult at the beginning. If priority is given to such silkworm egg production, another measures such as suspension of farmers training or establishment of a new independent training facility outside are required.

On the other hand, common experimentation between the Centre and Sub-centres on the hybridation of improved silk-worm varieties and the application method of fertilizer to mulberry field have been conducted. Furthermore, more common experimentations should be conducted so strongly that make relation between both centres tightly; and at the same time raising the efficiency of experiment and research should be materialized.

In all means, priority should be given to secure the personnel and the thorough training of technical staff.

5. Donation of Machinery and Materials

For the last 9 years, machinery and materials have been donated for the Sericultural Centre, Sub-centres and pilot villages as listed in the following table. These have been effectively used for the introduction of bivoltine silkworm rearing by Sub-centres, pilot villages, to say nothing of the Centre.

As reported by the Survey Team, there were damages by white ants at refrigerators of some Sub-centres, the donated machinery and materials cannot be properly used unless an urgent repairing is made. Also reported that excellent sericultural extension agents are doing activities to raise up the income of sericultural farmers with full use of donated machinery and materials in pilot villages.

This project has a long cooperation period and another technical cooperation for 2 years as Follow-up after March 1978 will be scheduled, while spare parts will mainly be donated to maintain the machinery as donated during past 9 years.

List of Donated Machinery and Materials

Year	Sum 1,000 yen	Destination and kinds
1969	68,368	For the Centre (rearing machinery, machinery for pathological research, refrigerators of silkworm eggs, machinery for mulberry cultivation, vehicles)
1970 (carry-over)	409	For the Centre (reeling machines, machines for mulberry cultivation, books)
1970	55,270	For Sub-centres (refrigerators of silkworm eggs)
1971	2,824	For the Centre supplements to (reeling machines, machines for mulberry cultivation, and refrigerators of silkworm eggs)
1971	49,858	For the Centre (trenchers of back-hoe type, supplements to donated machinery and materials) For Sub-centres (rearing machinery and materials, refrigerators of silkworm eggs)

1972	49,377	<p>For the Centre (reeling machines, machinery for engineering and iron works, vehicles)</p> <p>For Sub-centres (rearing machinery and materials, refrigerators of silkworm eggs)</p> <p>For sericultural farmers groups (machinery and materials for cooperative rearing of young silkworms)</p>
1973	55,000	<p>For the Centre (supplements to agricultural machinery, reeling machines, fertilizers, books)</p> <p>For Sub-centres (machinery and materials for silkworm rearing, refrigerators of silkworm eggs)</p> <p>For sericultural farmers groups (machinery and materials for cooperative rearing of young silkworms, fertilizers)</p>
1974	57,000	<p>For the Centre (machinery and materials for engineering and iron works)</p> <p>For Sub-centres (apparatus for pebrine inspection, vehicles, machinery and materials for communications)</p> <p>For pilot villages (rearing tools, fertilizers, machinery and materials for mulberry cultivation)</p>

1975	41,192	<p>For the Centre (agricultural machines, supplements to reeling machines, fertilizers, audio-visual aids)</p> <p>For Sub-centres (machinery and materials for silkworm rearing)</p> <p>For pilot villages (machinery and materials for silkworm rearing, fertilizers)</p>
1976	46,762	<p>For the Centre (supplements to agricultural machinery, reeling machines, supply fixtures to fertilizers, pathology, silkworm egg and breeding; rearing tools, etc.)</p> <p>For Sub-centres (machinery and materials for silkworm rearing, fertilizers)</p> <p>For pilot villages (machinery and materials for silkworm rearing, fertilizers)</p>
1977	100,000 (plan)	<p>For the Centre (Agricultural machinery, reeling machines, fertilizers, audio-visual aids, fixtures for experiment and office use, rearing tools)</p> <p>For Sub-centres (apparatus for pebrine inspection, machinery and materials for silkworm rearing, fertilizers)</p> <p>For pilot villages (machinery and materials for silkworm rearing, fertilizers)</p>

6. Method of delivery

At the time of termination of this cooperation project in March 1978, discussion between the Survey Team and the experts on the method of delivery of techniques and donated machinery and materials, etc. to Thailand have reached a conclusion that confirmation may be enough to the ledger of properties which are now under arrangement by the Thai authorities as the donated machinery and materials have become ~~her~~ properties at its arrival at Thailand. However, there are some fixtures, etc. having been used exclusively by the experts, which cannot be handled by Thai officers. The Team recommended to arrange the handling manuals of those fixtures.

Established techniques have been delivered to counterparts through routine research activities, and the results of researched are published in the "Bulletin of the Thai Sericultural Research and Training Centre".

In addition, almost of the systematized techniques to be introduced to pilot sericultural villages will be published by March under compiling by the experts earnestly with contents as understandable for technical officers leading farmers as well as farmers themselves.

7. Current situation of the Thai Sericultural Industry and This Technical Cooperation Project's Extending Influences

As Thailand has become to produce warp raw silk with this Technical Cooperation Project, the importation of warp raw silk has been limited to 3 times as much as the holdings of Thai raw silk since March 4, 1976 by law (effective on April 12). The target is that warp raw silk will be completely self-supplied in 5 years. (See Table 23-1). However, 4 filatures are currently in operation, produced 2,262 kg of raw silk during March through August this year, only 40 % of the target (5,777 kg, equivalent to 17,700 kg per year). (See Table 23-2). In this connection, it is observed that weavers are suffering from decrease of raw silk for weft in the market, while the Government is countermeasuring in planning of introducing techniques such as replantation of mulberry field, disease control and fly control into poly-voltine silkworm rearing like that in bivoltine one. (Table).

Pilot sericultural villages connected with this Project have difficulty in development due to shortage of fund, etc., but those connected with USAID are developing along with the plan even behind the target established at the beginning as 10 settlements are going to commence the silkworm rearing between July of this year and February of next year, and cocoon production has already been existed partly.

There are many business, other than those directly connected with this Technical Cooperation Project, adopting techniques established as the results of the sericultural technical cooperation of three times for 9 years. Those can be regarded

as the large influence extended by this Technical Cooperation Project. Those have been introduced to the Pilot Sericultural Village Project by USAID (former USOM), the King's and Queen's Project, the independent sericultural development projected planned by the Thai Government or Prefectures, the sericultural firms, etc., by which the techniques are put into practical use in bivoltine silkworm rearing as well as polyvoltine one. Those facts may be special features to be particularly mentioned among this Technical Cooperation Project.

Chapter 4. CONTENTS OF THE DISCUSSION WITH THAI PEOPLE

(1) Evaluation survey

The Evaluation Survey Team held field surveys, inspections and repeated discussions jointly with Thai Government officials concerned and dispatched experts, and made the following Summary Report (written in Japanese and English) which was agreed upon by Thai Government.

Summary Report on the Thai-Japan Joint
Evaluation of the Technical Cooperation
Project on Sericulture Development in Thailand

The Thai-Japan joint evaluation team for the Technical Cooperation Project on the Sericulture Development in Thailand consisted of the representatives of the Department of Technical and Economic Cooperation, the Budget Bureau and the Department of Agricultural Technology and the Japanese evaluation team headed by Dr. Nobuyuki Mori, Director of Kyushu Branch of National Sericultural Experiment Station, Ministry of Agriculture and Forestry.
(list of Participants Annex II)

The joint team visited the Sericultural Research and Training Centre, the four sub-centres, several local sericultural experiment stations and self-help land settlements in the North-East Region of Thailand, and made necessary studies from September 16 to October 6, 1977 for the purpose of evaluating the results of approximately nine years Technical Cooperation Project being carried-out under the Record of Discussions of 1969, 1972 and 1975.

The joint team reported the following findings:

1. General evaluation:

The results of experimental research on various technical problems in sericulture have been fully utilized in production through the training and extension activities. Warp of the Thai silk used to depend upon import from the other countries at the time of inception of the project, but at present approximately one-fourth of warp is being produced by bivoltine silkworm in Thailand.

This fact merits our attention as a remarkable result of the 9-year technical cooperation effort, although a number of technical problems remain unsolved.

2. Experimental Research:

The techniques developed under the project and the remaining issues are as shown in Annex I. In order to solve these issues and promote the further development of sericulture, the following technical considerations will have to be made.

- (1) To protect silkworms from various disease thereby stabilizing the cocoon crop production.
- (2) To facilitate mass production of silkworm eggs in order to meet increasing demands by using silkworm races bred in the Centre.
- (3) To increase the land productivity of mulberry field.
- (4) To improve reeling efficiency for production of warp.

3. Training and Extension

Sericultural training at the Centre for the farmers is making satisfactory progress. Production of warp from bivoltine silkworm races using the model silkworm rearing room is becoming increasingly popular. Furthermore, it would be necessary to incorporate the research results in training and extension according to local conditions.

Training:

- (1) Technical officers in the Centre and Sub-Centres are performing their roles satisfactorily in their respective fields of technical specialization. However, there is a need to improve upon their Planning and training capabilities.
- (2) It is essential to further provide extension officers with intensive training to ensure a transfer of sericultural techniques to the farmers.

Extension:

- (1) Measures should be urgently taken to point out to the farmers the fundamental principle of silkworm rearing, the prevention of diseases, thereby stabilizing cocoon crop production.
- (2) The sub-centres should further step-up their training systems in close coordination with these at the Centre.

October 6, 1977

Annex I

Results of evaluation on the researches and surveys activities of Sericulture Development Project (1968-1977)

Classification	Technics to be developed	Evaluated		Remaining problems after pre-evaluated, Nov., 1976	Evaluated	
		pract- unfea- rical sible	conti- nued		Till March 1978	After March 1978
Mulberry cultivation or young and old silkworms, respectively.	1. Establishment of training and harvesting method of mulberry field for young silkworms.	⊙	○	1. Training and harvesting method for 6 rearings a year.	⊙	○
	2. Establishment of training and harvesting method of mulberry field for old silkworms.	⊙	○	2. Training and harvesting method for 6 rearings a year.	⊙	○
	Number of the Reports; on item 1 & 2 (84) on other item (27)	(44)	(36)			
	3. Establishment of the physiology, ecology and control method of mulberry diseases and insect pests	○	○	3. ibid.	○	○
	Number of the Reports; (12)	(5)	(7)			

Classification	Technics to be developed	Evaluated		Remaining problems after pre-evaluated, Nov. 1976	Evaluated	
		practical	unfeasible		continued	After March 1978
Silkworm rearing	4. Tabulation of rearing standard of young silkworms	⊙				○
	5. Tabulation of rearing standard of old silkworms Number of the Report: on item 4 & 5 (48) on other items (24)	⊙	(2)			○
	6. Establishment of the controlling method of silkworm diseases and the method of diagnoses of sericultural diseases Number of the Report: on item 6 (20) on other item (19)	○	(3)		6. ibid	○

Classification	Technics to be developed	Evaluated		Remaining problems after pre-evaluated, Nov. 1976	Evaluated continued	
		practical	unfeasible		Till March 1978	After March 1978
Silkworm breeding and silkworm egg production	7. Breeding of healthy silkworm races	⊙		⊙		⊙
	Number of the Reports; on item 7 (32) on other items (15)	(31)		(1)		
	8. Establishment of technics for silkworm egg production	⊙		⊙		⊙
Raw silk reeling	Number of the Report; on item 8 (53)	(49)	(1)	(3)		
	9. Establishment of raw silk reeling technics for-warp of Thai silk	⊙		⊙		⊙
	Number of the Report; on item 7 (43) on other items (4)	(37)	(6)			

Note: The table is made up as of Sept. 1977

⊙ shows technics to be transferred to farmers.

○ shows technics to be partly transferred or to be done in the future

Annex II

List of participants in the Thai-Japanese joint
evaluation on Sericulture Development Project

1. Thai-side

(1) Department of Technical and Economic Cooperation

Mr. Wanchai Sirirattana	Deputy Director General
Mr. Sombhong Pattamavichaiporn	Div. of Technical Services
Mrs. Nongnath Meeprasert	Div. of External Cooperation Office 2
Mr. Sutin Susila	

(2) Budget Bureau

Mrs. Hansa Kaebandit

(3) Department of Agricultural Technology

Mr. Phadern Titatarn	Deputy Director General
Mr. Chote Suvipakij	Director of Silk Division
Mr. Somchart Rattanachata	Director of Sericulture Research and Training Center, Korat
Mr. Smack Corvanich	Chief of Nongkai Sub-Center
Mr. Satit Chanchareon	Chief of Konkaen Sub-Center
Mr. Damrong Siawatana	Chief of Ubol Sub-Center
Mr. Sombat Maneechote	Chief of Mukdahan Sub-Center

2. Japanese side

(1) Survey Team

Leader	Dr. Nobuyuki MORI Director of Kyushu Branch Station, The Sericulture Experiment Station, MAF.
Raw Silk in General	Mr. Yoshinori TOKORO Chief of Sericultural Section, Silkworm & Horticultural Bureau, MAF.
Silkworm Eggs	Mr. Yoshiaki Horiguchi Director of Shinjo Silkworm Eggs Experiment Station, The Sericulture Experiment Station, MAF.
Filature	Mr. Kiyoshi KATAGIRI Chief of Raw Silk Improvement Section, Silkworm & Horticultural Bureau, MAF.
Planning & Coordination	Mr. Yasuaki ANAZAWA International Cooperation Division, Economic Affairs Bureau, MAF.
Coordinator	Mr. Masatoshi NAGATOMO Agricultural Technical Cooperation Division, Agricultural Development Cooperation Dept., Japan International Cooperation Agency

(2) Experts

Leader	Dr. Toshiro SUGIYAMA Mr. Kazuhiro YAMAKAWA Mr. Makoto SUDO Mr. Yoshikiyo EGUCHI Mr. Masashi RACHI Mr. Isao FUJIMOTO Mr. Yoshiju MARUYAMA
--------	--

(3) Embassy of Japan & Bangkok Office, JICA

Mr. Hiromi IMAFUJI	First Secretary, Embassy of Japan
Mr. Yasuo KITANO	Director, Bangkok Office, JICA
Mr. Ryo SUWA	Staff, "

(Draft)

Project Request for Foreign Technical Assistance

1. Requesting agency : Sericulture Division,
Department of Agriculture,
Ministry of Agriculture
2. Project title : Sericulture Development Project
3. Source of assistance : Colombo plan
4. Objectives :
 - 4.1 To study and do the research especially in the mass production of silkworm eggs and the stabilization of cocoon production. These works are mainly to continue the previous work that has not reached the target as of this date.
 - 4.2 To study, work and solve the farmer problems especially when new techniques and equipments are introduced. Work closely with the farmer is a must to ensure proper instructions, techniques, procedures and equipments are recommended.
 - 4.3 To improve and strengthen the training courses at the center especially for the extension officers. Those officers must be in very close contact with the farmers at all times, be available and acknowledgeable in solving problems for the farmers.
 - 4.4 To upgrade and improve the qualifications needed of the technicians and officers.
 - 4.5 To improve the efficiency of the silk reeling techniques for obtaining the best quality raw silk at a lower production cost.

5. Origin or background of the project :

- 5.1 The sericultural development project has been implemented at present based on the third Record of Discussion (RD), and the cooperation period will be expired on March 7, 1978.
- 5.2 The Japanese Evaluation Team visited the Sericulture Research and Training Center, four Sub-Centers and several Self-Help Land Settlements for inspection and evaluation of practices since September 15, 1977 through October 3, 1977.
- 5.3 Results indicated that more research is needed in: 1. protection of silkworms from virus diseases, 2. how to facilitate mass production of silkworm eggs, etc.

6. Scope of the project and work plan :

- 6.1 Duration : 2 - 3 years
- 6.2 Site of the project : Korat Center,
Sub-Centers, and Self-Help Land Settlements
- 6.3 Target : The project involves a shift from traditional sericultural practice to a more modern, higher productivity and practical practice which will encourage farmers to increase their supplemental income of raising silkworms to a major income.
- 6.4 Method of operation :
 - 6.4.1 Continue and improve the research methods that are already in use.

6.4.2 Improve and rebuild at least a pilot farm and make them became an up-to-date pilot farm which is able to supply farmers both knowledgement and practicality.

6.4.3 Build up and extend the training courses with the addition of refresher courses, added off and on throughout a year.

6.4.4 Improve the silkworm breeding and especially silkworm egg production. In order o obtain the good silkworm quality and more eggs supplied to farmers.

6.4.5 To improve the efficiency of the silk reeling techniques.

7. Assistance requested :

7.1 Expert

7.1.1 Needed the expert teams who are involved with breeding, egg production, silkworm rearing and silk reeling.

7.1.2 Sophiscated extension specialist acknowledgeable in methods and problems involved.

7.2 Fellowship & Seminar

7.2.1 1 - 2 people per for long term training and in advanced degree.

7.2.2 Short course training, 4 people per year.

7.2.3 Study tour : 4 - 5 Thai senior staff
for observation trips to different sericul-
tural research industries for a period of
1 - 2 months.

7.2.4 Exchange Seminer and Symposiums need to be
arranged both in Thailand and in Japan.

7.3 Equipment :

7.3.1 Equipment for silk breeding and
silk reeling to be added.

7.3.2 Equipments to be renew such as egg cold
storage silk rearing equipments.

7.3.3 Equipments for Maintenance.

Chapter 5. PROBLEMS IN PROMOTING COOPERATION PROJECT

The cooperation project for 9 years based on the 1st through R/D is expected to end in March 1978. This Technical Cooperation Project had a remarkable success as the Thai sericultural development project in North-Eastern Region has been put on a rail for the present to promote the modernization of sericulture though is considerably slower than the target. However, there are many problems left remained until the time when all the need of warp raw silk can be selfsupplied with the reeled raw silk production reeled from cocoons of bivoltine silkworms, introduced by the technical cooperation project. As a result of this technical cooperation project Thai technical people have been piling up powers in solving problems by themselves, most of the remaining problems should be solved by the Thai technical people themselves in the future. However, still there are some fields among those problems, requiring further cooperation of the Japanese side, as considered with importance of the problem or degree of mastering the techniques, etc., i.e.

- (1) Diagnosis of silkworm disease and control techniques by the sericultural farmers.
- (2) Mass production and conservation techniques of silkworm eggs.
- (3) Raising techniques of raw silk efficiency.

The sericultural techniques have such natures as requiring to make development in relation closely and mutually among every field ranging from mulberry cultivation to silkworm rearing and raw silk reeling. Dispatch of a Japanese expert team is needed instead of individual one of expert in order to get a success

in every field. In addition, it is desired to arrange a system to make a proper research cooperation on the problems among important research ones to be solved for the Thai sericultural development in the future, if the Japanese cooperation can promote such researches remarkably.

In the field of training, for the purpose of raising capability of Thai technical officers (counterparts) on designing, planning and leading, the dense and deep trainings are continuously required. If necessary, a long-term training in Japan as well as research managing training of research promotion managers should be arranged. Besides, consideration on the machinery and equipments, etc. to establish such techniques is needed. Particularly, to let officers in charge of sericultural extension master the techniques established at the Sericultural Research and Training Centre in Korat with this Technical Cooperation Project, through dense and deep training.

In the field of extension, as technical guidance capabilities of sericultural extension officers are the largest factors to penetrate the techniques to sericultural farmers, the Thai Government should promote the extension measures strongly. In this case, it is desired that allotment of works between the Centre and Sub-centres should be more clarified and mutually supplemented to strengthen the cooperation system, if extension of sericultural technical development and its results in Thailand is carried out effectively and efficiently.

Table 1. Results of researches and evaluation

Target of researches (Techniques to be extended)	Techniques developed		Continued	Remaining Problems after re-evaluation, Nov. 1976	Evaluated continued Till After March 1978	Remarks
	Research items	Evaluated Practical feasible				
1. Establishment of training and harvesting method of mulberry field for silkworms	1) Cultivation and harvesting method of mulberry for young silkworms (No. 1 - 3)	①	○	Illustrated explanation on training and harvesting method of mulberry field for young silkworms corresponding to 6 silkworm rearings per year	○	
	2) Trial to make germination of new shoots by pruning old shoots. (for young and grown worms) (No.1)	①				
	3) Number and growth of new shoots after intermediate pruning (for young and grown worms) (No.2)	①				
	4) Growth of regenerated shoots after intermediate pruning and pinching in different time (No.3)	①				
	5) Spraying experiment of liquid fertilizer to mulberry field for young worms (No.7)	①				
2. Establishment of training and harvesting method of mulberry field for grown silkworms	1) Harvesting method of mulberry for grown worms as the planned rearing (No.1)	①	○	1) Illustrated explanation on training and harvesting method for grown worms, corresponding to 6 rearings per year 2) Application experiment of fertilizer according to locality (common experiment) (New) 3) Experiment on relation between weeding and yield at mulberry field (New)	○	
	2) Influence of low or wide cut training and harvesting method to yield (No.2 - 6)	⑤				
	3) Mulberry yield survey in different time of cutting the base of branch (No.2 - 6)	⑤				

Note: Figures in a circle show number of research reports

<p>4) Experiment on establishment of high yield mulberry field (No.2 - 6)</p> <p>5) Experiment on fertilizer to mulberry field (No.2 - 5)</p> <p>6) Experiment on fertilizer to mulberry field (No.5 - 6) (Mukdahan)</p>	<p>4) Experiment on shoot harvesting method for 3 instars (6 shoot harvests per year in combination of mulberry fields of A & B)</p>	<p>○</p>
<p>7) Experiment on rearing productivity of low damp land (No. 7)</p> <p>8) Experiment on mulberry planting spare (No.6 - 7)</p>	<p>①</p> <p>②</p>	<p>○</p>
<p>9) Experiment on harvesting method of shoots for 3 instars (1st and 2nd reports)</p> <p>10) Experiment on mulberry yield forecast (No.3)</p>	<p>②</p>	<p>○</p>
<p>11) Survey of characteristics of Thai mulberry varieties (No.4)(Ubon)</p> <p>12) Survey of economical character of Thai mulberry varieties, yield survey varieties, (No.2 - 7)</p> <p>13) Survey of economical character of Thai mulberry varieties, draft resistance survey (No.2)</p>	<p>①</p> <p>①</p> <p>①</p>	<p>○</p>
<p>14) Ibid., characteristics of shoots and leaves (No.3)</p> <p>15) Ibid., survey of leaf fall (No.4)</p>	<p>②</p> <p>①</p>	<p>○</p> <p>○</p>
<p>16) Experiment on mulberry grafting (No.4, No.5, No.6)</p> <p>17) Comparison experiment on grafting and mulberry in the field (No.4, No.5, No.6)</p>	<p>②</p>	<p>○</p>

18)Improvement experiment of mulberry plantation (Measure to root rot) (No.5, No.6)	②				
19)Experiment on control of root rot by intercept trench(No.5)	①				
20)Trial of new early-yield mulberry field by group planting of cuttings (No.6, No.7)	②				
21)Production of sapling by cuttings (No.1)	①				
22)Rooting character of Thai mulberry varieties (No.5)	①				
23)Experiment on mulch in mulberry field(No.3-7)	⑤				
24)Experiment on inter crop and green manure in mulberry field("0.4-7)	⑧				
25)Experiment on materials and production of compost	①				
26)Survey of analysis of mulberry leaf(young and grown) (No.5)	①				
Technique to control mulberry diseases and pests (Survey on separation, physiology and ecology of fungi of mulberry root rot)	○				
27)On mulberry root rot in Thailand(No.1, No.3, No.4)	○				
(Selection of disease resistant mulberry varieties)	○				
28)Resistability to mulberry root rot(No.4, No.7)	②				
(Ecological control of Stem-borer and Mealy bug)	①				
29)Chemical control of Stem-borer at low cut pruning (No.6)	①				
7)Experiment on planting of grafting sapling at the site after root rot controlled (New)	○				
8)Experiment on mulberry bud grafting in the field	○				
9)Trial of new early-yield mulberry field by group planting of cuttings	○				
10)Breeding survey	○				Same in mulberry field for young worms
11)Testing of disease resistant mulberry varieties	○				Same in mulberry field for young worms
(Managing techniques on control of Stemborer and Mealy bug)	○				Same in mulberry field for young worms
12)Chemical effect on control of Stemborer	○				Same in mulberry field for young worms

3. Rearing standard of young silkworm	<p>30) Observation of adult stemborer (No.6) ①</p> <p>31) Control of mulberry borer in the field (No.7) ①</p> <p>32) Relation between mulberry varieties and mealy bug (No.5) ②</p> <p>33) Observation of egg stage of mealy bug (No.6) ①</p> <p>34) Ecological history of mealy bug (No.7) ④</p> <p>Total (84) ④</p> <p>Other (27) ④</p>		①	Examination of local adaptability	○	including mulberry disease items
<p>Tabulation of rearing standard of young silkworm ①</p> <p>1) Withering control of chopped leaves (No.3) ①</p> <p>2) Silkworm growth and feeding times (No.3, No.4) ②</p> <p>3) Record of actual situation at each feeding time (No.4, No.5, No.6) ③</p> <p>4) Experiment on standardization of feeding amount (No.3) ①</p> <p>5) Survey of actual space of silkworm rearing (No.2) ②</p> <p>6) Kind of covering material and silkworm growth, survival percentage (No.3, No.4) ②</p> <p>7) Control of muscardine and aspergillus by screen lime (No.3) ①</p> <p>8) Method of cleaning and spreading of rearing bed (No.1) ①</p>			①		○	

4. Rearing standard of grown silkworms	9) Application method of reared rice hull (No.1)	①			
	(1) Tabulation of rearing standard of grown silkworms (No.5, No.7)	②			○ ○
	1) Influence of mulberry variety on cocoon weight, survival percentage (No.5, No.7)	②			
	2) Experiment on rearing house, keeping from parasite fly (No.1, No.2)	②			
	3) Practical utility of outdoor rearing net stand (No.7)	①			
	4) Silkworm rearing on hanging rearing bed (No.2, No.3)	②			
	5) Experiment on rearing with shoots (No.1, No.3)	②			
	6) Relation between feeding amount in 5th instar and cocoon yield (No.2, No.3, No.4)	②			
	7) Experiment on feeding of soaked leaves to 5th instar worms (No.2, No.5)	②			
	8) Feeding time and times as influenced on silkworm growth (No.7)	①			
	9) Record of actual situation of feeding amount at each feeding time (No.5, No.6)	②			
	10) Survey of actual situation of cocoon crops in settlement villages Phimai, Prasert, Bangruad (No.6, No.7)	③			
	11) Uniformity of hatched amount for rearing by farmers (No.6)	①			

	<p>12) Observation of distributing worms in molting during delivery (No.6)</p> <p>13) Examination of natural wood as cocooning frame (No.1, No.2)</p> <p>14) Examination of Kok Grass as materials for cocooning frame (No.3)</p> <p>15) Influence of cocooning place on cocoon quality (No.7)</p> <p>16) Silkworm disease control, control of muscardine, aspergillus by Seressee lime (No.3, No.4)</p>	<p>①</p> <p>②</p> <p>①</p> <p>①</p> <p>②</p>			<p>Establishment of disinfection method at continuous rearing area</p> <p>Economical examination (Experiment on mass rearing)</p>	<p>○</p> <p>○</p>		<p>Including training field</p>
	<p>(2) Tabulation of rearing standard of F₂</p> <p>1) Survey on economical character in selecting the most suitable variety among F₂ worms (No.1)</p> <p>2) Comparison survey on economical characters of F₁ and F₂ worms (No.2, No.6)</p> <p>3) Survey on economical characters of F₂ in large scale rearing (No.7)</p>	<p>①</p> <p>②</p> <p>①</p>					<p>①</p> <p>①</p> <p>①</p>	
	<p>Total (48)</p> <p>Other (24)</p>	<p>④</p>					<p>①</p> <p>①</p>	
<p>5. Control techniques on silkworm disease and insect pests</p>	<p>(Diagnosis and control of each silkworm disease)</p> <p>1) Nuclear polyhedrosis and resistibility of silkworm varieties (No.4)</p> <p>2) Silkworm spoil and mummify by muscardine (No.1)</p> <p>3) Silkworm disease in Thailand (No.1)</p>	<p>①</p> <p>①</p> <p>①</p>			<p>Diagnosis of each silkworm disease, Control of each silkworm disease</p> <p>(1) Control of nuclear polyhedrosis</p> <p>(2) Control of aspergillus</p>	<p>○</p> <p>○</p> <p>①</p>		

④			
④			
④			
④			
④			
④			
④			
④			
④			
④			
④			
④			
④			
④			
④			
④			
④			
④			
④			
④			
④			

② Testing of 2 kinds of chemicals

	Total Other	(20) (19)					Increase of rearing amount
6. Breeding of healthy economical silkworm varieties	(1) Breeding of health silkworm varieties 1) Japanese strain, K ₁ , K ₆ ; Chinese strain; T, K ₈ , K ₁₄ (No. 1 - No. 7) (2) Adaptability test of hybrid 1) F ₁ : K ₁ x K ₁₄ K ₁ x K ₈ K ₁ x T K ₁ x K ₁₄ (No. 1 - No. 7) 2) F ₂ : (K ₁ x T) ₂ (No. 2 - No. 7) 3) Multi-cross hybrid (K ₆ x K ₁) x K ₁₄ (No. 3 - No. 7) (3) Common experiment on silkworm varieties Karat, Sakon Nekon, Mukdehan, Kon Kaen, Ray-et, Buriyah, Sisaket, 7 places (No. 7)	① ③ ⑦ ⑥ ⑤ ③	(1) Breeding of healthy silkworm varieties (2) Adaptability test of hybrid 1) F ₁ 2) F ₂ 3) Multi-cross hybrid (Japanese x Chinese) x (Japanese x Chinese) (3) Common experiment on silkworm varieties	① ①	① ①		○ ○
7. Rearing standard and of parent silkworms	Tabulation of rearing standard of parent silkworms 1) Survey of growing silkworm egg embryo (No. 4, No. 5) 2) Damage by low temperature during incubation (No. 4) 3) Feeding mulberry amount and labour (No. 2, No. 3)	① ② ① ④					○ ○

<p>4) Survey on growth in 4th and 5th instars (No.3)</p> <p>5) Mulberry feeding amount and egg laying amount (No.2, No.3, No.4)</p> <p>6) Working efficiency in cocooning (No.3)</p> <p>7) Egg laying ability of moth as mounted in unmaturred stage of worms (No.3)</p> <p>8) Survey on rearing days of main parent silkworm races (No.4, No.5 - No.7)</p> <p>9) Survey on mulberry feeding amount of main parent silk worm races (No.5 - No.7)</p>	<p>①</p> <p>④</p> <p>①</p> <p>①</p> <p>④</p> <p>③</p>		<p>2) Manufacture and utilization of rush net, cocooning frame, etc. with local materials</p>	<p>○</p>
<p>8. Production technical standard of silkworm eggs</p> <p>1) Systematization of silkworm production technique</p> <p>1) Survey of sex discrimination ability of moth body (No.4)</p> <p>2) Influence of temperature during moth stage to hatchability of artificial hatching silkworm (No.5)</p> <p>3) Production work efficiency (No.5)</p> <p>4) Eclosion, copulation time and egg laying speed (No.5)</p> <p>5) Difference of egg laying amount per moth between in Japan and in Thailand (No.5)</p> <p>6) Comparison between varieties in production F₁ and F₂ (No.7)</p> <p>7) Experiment on egg laying, using cotton cloth (No.4)</p> <p>8) Results of F₁ production Buriram, Udon, Surin (No.6, No.7)</p>	<p>①</p> <p>①</p> <p>①</p> <p>③</p> <p>①</p> <p>①</p> <p>①</p> <p>①</p> <p>①</p>	<p>○</p> <p>○</p> <p>○</p> <p>○</p> <p>○</p> <p>○</p> <p>○</p> <p>○</p> <p>○</p>	<p>1) Preparation of working manual of silkworm egg production process</p> <p>2) Preparation of date calculator for silkworm egg production</p> <p>3) Designing of mass production plan and practicing</p> <p>4) Utility experiment of prefabricated moth conservation room</p> <p>5) Preparation of simplified egg laying tools</p>	<p>○</p> <p>○</p> <p>○</p> <p>○</p> <p>○</p> <p>○</p> <p>○</p> <p>○</p>

	9) Experiment on artificial hatching suited to Thailand (No.1)	①						
	10) Difference between varieties in acid treatment (No.5)	①			6) Examination on confirmation of new varieties	○		
	11) Experiment on common acid treatment (No.2, No.3, No.4, No.5, No.6, No.7)	⑥						
	12) Experiment on acid treatment after chilling (No.2, No.3, No.4, No.5, No.6, No.7)	⑦						
	13) Test on heating method by coil heater (No.6)	①						
	14) Experiment on long-term refrigeration (No.2, No.3)	②			7) Limit of refrigeration of new varieties	○		
	15) Relation between refrigeration period and hatchability of artificial hatching silkworm eggs (No.6, No.7)	②						
	16) Experiment on intermediate temperature (No.7)	①			8) Management of maintenance of refrigerator for silkworm egg conservation	○		
	Total (53)	④⑨	①	③				
9. Establishment of reeling technique of raw silk for Thailand	(Tabulation of cocoon price calculation table)	③		○				
	1) Relation of cocoon shell percentage and raw silk percentage (No.6)	①						
	2) Degree of cocoon sorting and reeling results (No.5)	①						
	3) Appreciation of rejected cocoon, duplon silk yield of rejected cocoon (No.7)	①						
	(Experiment and survey on drying of raw cocoon, dried cocoon and cocoon storing)							

①	1) Experiment to identify standard drying degree (No.3)			
②	2) Drying condition and reeling results (No.4, No.6)			
③	3) Comparison of sericin solved amount of raw cocoon shell and dried cocoon shell (No.5)			
	4) Variation of cocoon quality during storage (No.8, No.7)			
	(Experiment on cocoon cooking method)		Experiment of cooking method of low quality cocoon	○
①	1) Worsening phenomenon of cocoon cooking water (No.2)			
②	2) Relation between cooking condition and sericin solved amount (No.6, No.7)	②		
	(Experiment and survey on reeling method)			
③	1) Experiment on reeling of carried-over cooked cocoon (No.3, No.4)		Reeling technique by new automatic reeling machine of KEMAM-SEB type	○
④	2) Comparison experiment on each reeling method (No.5, No.4)			
⑤	3) Reeling condition and reeling results (No.4, No.5)			
①	4) Survey on cocoon filament size by cocoon shell (No.5)			
⑫	5) Survey on cocoon quality by variety and locality (No.2 - No.7)			
	6) Survey on reeling situation	△	Testing of raw silk tenacity and elongation	○
	(Testing of raw silk and thrown raw silk)			No report available

1) Survey on raw silk water regain percentage (No.3, No.4)	②			
2) Twisted number of Kennel and raw silk cohesion (No.5)	①			
3) Survey on degummed percentage by cocoon layer (No.5)	①		○	Quality evaluation method of thrown raw silk and dupion silk
4) Survey on irregularity of twists of thrown raw silk (No.3)				
5) Testing of raw silk and thrown silk produced at the Centre (Periodically)				
(Utility of rejected cocoon and waste cocoon)				
1) Utility of pierced cocoon by floss silk production (No.3)	①			
2) Experiment on spinning method of hand-spun of floss silk (No.4)	①			
3) Reeling of dupion silk of rejected cocoon	△			
Total (43)	③7			
Other (4)				
Grand total (268)	⑥	⑥		
Other total (101)			④2	
				No report available

Table-2 List of yearly report groupes into sections (1970-1977)

	Mul- berry	Silk- worm rear- ing	Silk- worm breed- ing	Silk- worm egg	Patho- logy	Silk reel- ing	Train- ing	Other	Total	Re- marks
1970	3	4			1				8	Bul. No.1 1971
1971	9	9	6	3	8			1	36	
1972	10	8	8	5	10	6	1		48	Bul.No.2 1972
1973	15	11	8	10	6	9	3		62	Bul.No.3 1973
1974	13	5	6	8	6	11	4		53	Bul.No.4 1974
1975	19 (5)	2	8	8	6	11	2		56	Bul.No.5 1975
1976	14 (3)	7	5	9	9	5	6		55	Bul.No.6 1976
1977	17 (6)	8	6	10	4	5	2		52	Not pub- lished
Total	100	54	47	53	50	47	18	1	370	

Note: (): Number of items reported by Sub-centre

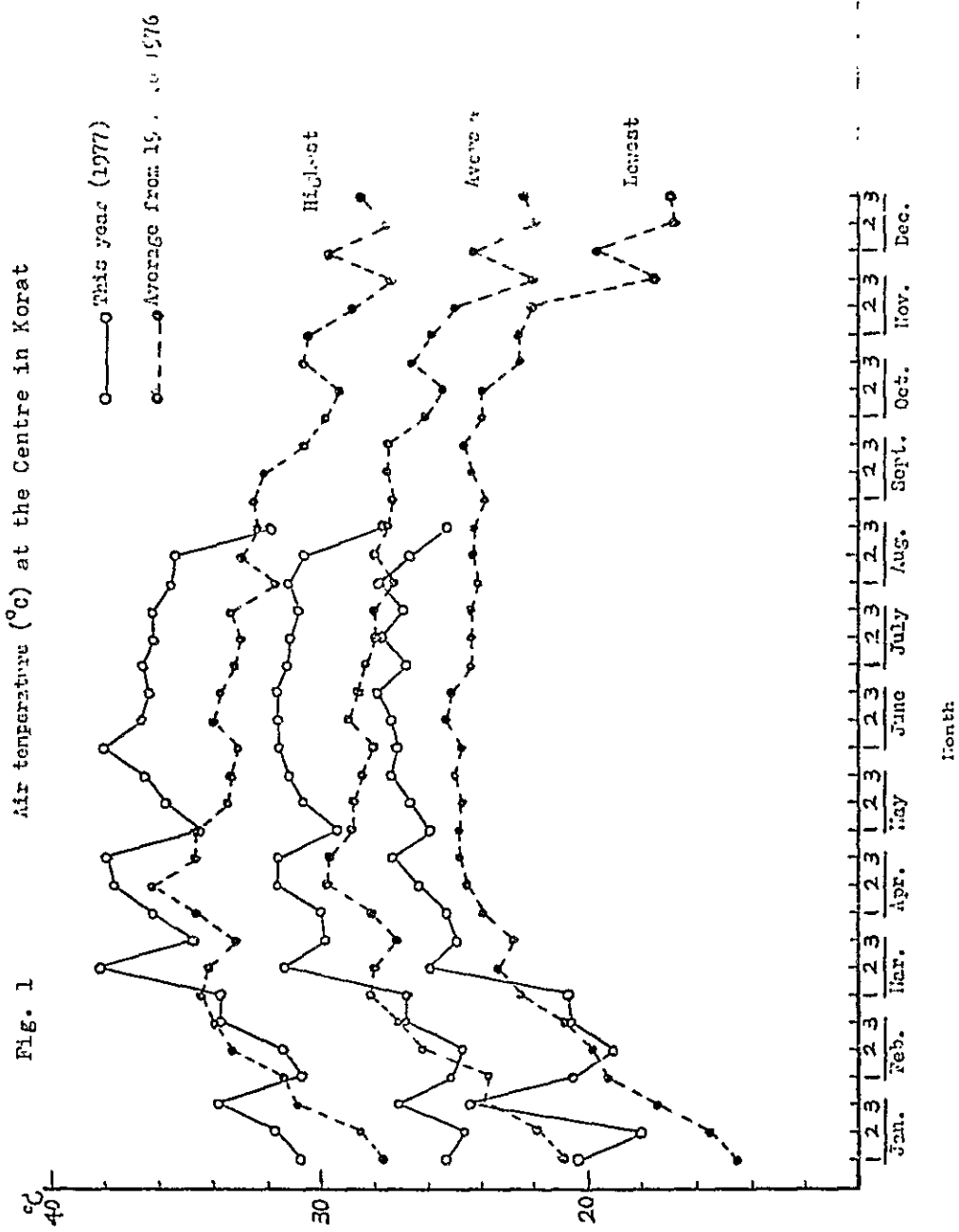


Fig.2 Rainfall (mm) at the Centre in Korat

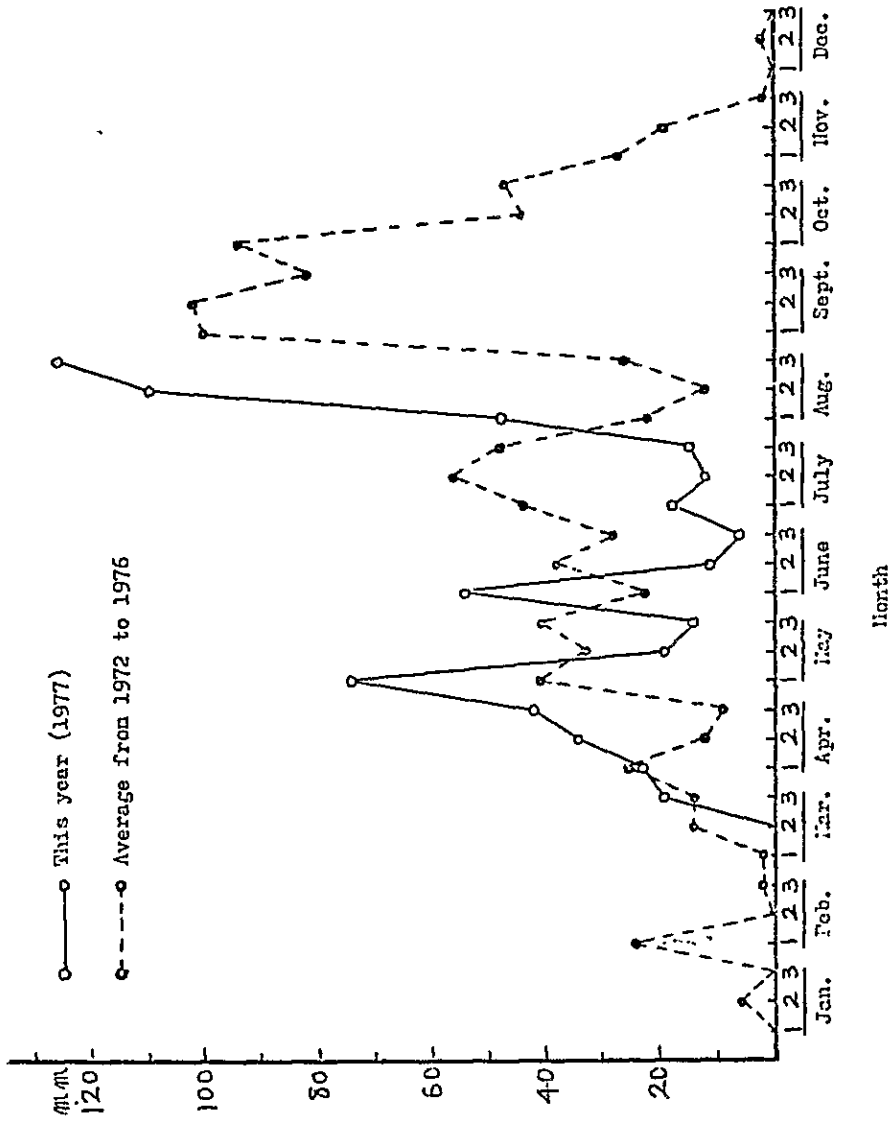


Table-3 Hybrid tests

The 30th Test
Rearing started on 8-8-1977

No.	Hybrid	Feeding term		Sound pupa	Normal cocoon	Cocoon weight	Shell weight	Shell ratio	Remarks
		5 days	5 days						
141	K1xT	5.03	20.00	94.5	84.2	1.54	29.8	19.4	
142	K6xT	"	"	97.7	89.5	1.64	31.4	18.5	
143	A8xT	"	"	93.5	79.4	1.84	35.5	19.3	
144	K1xK8	"	"	97.0	78.1	1.49	29.5	19.8	
145	K1xK14	6.03	21.00	93.0	72.8	1.49	29.3	19.7	
146	A9xK1	(suspended)							
147	A10xK1	5.03	20.00	98.0	71.1	1.75	33.7	19.3	
148	A11xK1	"	"	97.0	80.5	1.67	33.1	19.8	
149	K8xK6	"	"	87.5	87.0	1.82	37.2	27.4	
150	K14xK6	6.03	21.00	92.5	77.0	1.92	40.1	20.9	
151	A9xK6	5.03	20.00	55.0	57.0	1.51	26.7	17.7	
152	A10xK6	"	"	89.5	65.8	1.93	33.4	19.9	
153	A11xK6	"	"	94.5	90.6	1.81	37.4	20.7	
154	E25xE28	"	"	98.0	77.8	1.76	35.9	20.4	
155	(K1xT) ₂	5.73	20.00	94.5	67.5	1.57	28.6	18.2	
156	(K6xK8) ₂	5.03	20.00	93.3	68.6	1.71	35.7	20.9	
157	(K1xK3)x(K1xT)	5.03	20.00	96.0	73.8	1.65	32.3	19.6	No.157-
158	(K1xK14)x(K1xT)	"	"	88.5	71.1	1.65	30.9	18.7	167
159	(K6xK14)x(K1xT)	"	"	97.0	75.5	1.79	34.8	19.4	J.CxJ.C
160	(K1xK8)x(K6xT)	"	"	95.7	69.7	1.63	30.6	18.8	
161	(K1xK14)x(K6xT)	"	"	98.5	82.9	1.81	35.3	19.5	
162	(K3xK4)x(K6xT)	"	"	96.5	77.2	1.79	35.4	19.8	
163	(A14xT)x(K1xK8)	"	"	92.5	80.2	1.62	31.9	19.7	
164	(A14xT)x(K1xK6)	"	"	98.4	86.0	1.73	32.8	19.7	
165	(A14xT)x(K6xK14)	"	"	85.8	86.1	1.55	35.6	19.2	
166	(K1xK4)x(K8xT)	5.03	20.00	95.0	79.9	1.70	32.7	19.2	
167	(K6xK1)x(K8xT)	"	"	97.0	84.0	1.72	34.2	18.9	
168	(K1xK4)x(A9xT)	"	"	88.0	70.2	1.75	39.4	19.1	
169	(K6xK1)x(A9xT)	"	"	98.5	87.2	1.85	35.9	18.4	
170	(K6xK4)x(K6xK14)	"	"	98.1	85.4	1.78	36.0	20.2	

Table-4 Hybrid tests among several stations

August 1977

	Hybrid	Place	Feeding term		Viability			Cocoon		
			5 age	1-5 age	1-3 age	sound pupa	normal	whole weight	shell weight	shell ratio
			d.h.	d.h.	%	%	%	g	cg	%
A	(K1.KB)X(K1.T)	Korat	5.03	20.00	97.6	96.0	73.8	1.65	32.3	19.6
B	(K1.KB)X(K6.T)		5.03	20.00	96.6	95.0	67.7	1.63	30.6	18.8
C	(K1.K14)X(K6.T)		5.03	20.00	98.5	93.5	82.9	1.81	35.3	19.5
D	(K6.K1)X(KB.T)		5.03	20.00	98.0	97.0	84.0	1.72	34.2	19.9
A		Sakon -Nakon	6.10	18.00	80.3	77.4	63.8	1.70	32.1	18.9
B			6.10	18.00	76.9	78.3	74.4	1.74	34.6	19.9
C			6.10	18.00	78.9	74.5	69.9	1.89	36.5	19.4
D			6.10	18.00	71.3	84.2	80.9	1.80	36.5	20.4
A		Mukdaharn	5.22	21.00	87.3	69.3	69.7	1.38	27.4	19.8
B			5.22	21.00	89.1	49.6	58.8	1.39	27.1	19.6
C			6.22	22.00	94.1	69.7	64.8	1.45	28.6	19.8
D			6.22	21.00	94.8	78.6	68.5	1.40	29.9	21.4
A		Khon Kaen	5.10	19.00	96.7	86.4	62.7	1.49	28.6	19.2
B			5.10	19.00	94.3	87.7	75.2	1.58	31.2	19.7
C			5.10	19.00	97.1	86.1	76.4	1.62	31.2	19.2
D			5.00	19.00	95.5	92.4	77.9	1.56	30.3	19.5
A		Roi-et	5.10	19.00	91.3	11.3	42.7	1.27	22.6	17.8
B			5.10	19.00	95.2	62.8	60.4	1.46	27.4	18.8
C			5.10	19.00	93.0	52.4	64.9	1.48	27.9	18.9
D			5.10	19.00	96.9	37.0	58.3	1.47	28.9	19.7
A		Buriram	5.00	18.00	87.9	93.7	75.0	1.82	34.7	19.0
B			5.00	18.00	88.5	93.6	78.1	1.96	39.2	20.0
C			5.00	18.00	93.0	90.0	80.3	2.07	40.1	19.4
D			5.00	18.00	95.2	95.4	84.2	1.96	40.9	20.9
A		Srisakate	5.18	20.00	68.5	75.0	55.1	1.84	35.4	19.2
B			5.18	20.00	83.0	88.1	69.4	1.98	40.3	20.4
C			5.18	20.00	85.7	81.5	65.3	2.05	39.9	19.5
D			4.18	19.00	88.5	87.6	64.8	1.94	39.7	20.6

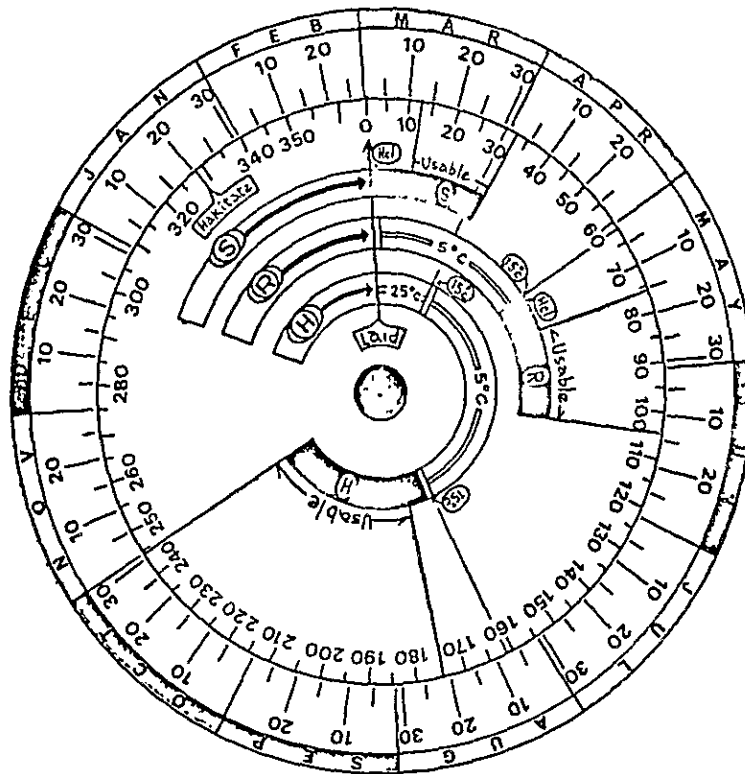
* Cocoon qualities measured on Sept. 20, 1977
(10 days after mounting)

Not A.B.C. — N.C X N.C D — N.N X C.C

Table-5

<u>STANDARD TREATMENT OF ARTIFICIAL HATCHING METHOD</u>				
Order of date	0'clock	Hydrochlorization shortly after laid (SOKUSHIN)	Hydrochlorization after chilling (REISHIN)	Artificial hibernation
1	9-11 13-15 18-20	Copulation Separation Laying	Copulation Separation Laying	Copulation Separation Laying
2	8-9 9-10 11-12	Moth removing Soaking in formalin solution Hydrochlorization (15 hours after being laid)	Moth removing Soaking in formalin solution Preservation at 25°C for 45 hours after being laid	Moth removing - Preservation at 25°C for 30 days
3	11 16-17	Refrigeration 5°C -	Refrigeration 5°C	↓
31	16-17	-	-	Preservation at 15°C
32	16-17	-	-	Refrigeration at 5°C
Term of refrigeration		0 - 20 days	60 - 100 days	130 - 200 days
Condition of artificial hatching		Formalin solution: 2.5% for 5 minutes Hydrochlorization: HCl S.G.: 1.10 (at 35°C) Temp.: 35°C Time: 35 ^{min}	Formalin solution: 2.5% for 5 minutes Hydrochlorization: HCl S.G.: 1.11 (at 35°C) Temp.: 35°C Time: 40 ^{min}	No hydrochlorization

Fig.-3 Date Calculator for Silkworm egg Production



Explanation of the figure:

1. Motive of preparation:

This calculator has been prepared, based on the standard data connected with parent silkworm rearing, silkworm egg production, etc. in the Tropics, for the purpose of calculation of the following two items simply and quickly.

- (1) Forecast of the usable (putting into rearing) time (or period) of the silkworm egg produced by its egg-laying time.

(2) Forecast of the starting(rearing) time of the parent silkworm and the egg-laying time by the silkworm egg production corresponding to its usable (putting into rearing) time as desired.

2. Mechanism of this calculator:

- (1) This calculator consists of 2 discs piling a small one on a long one, each can rotate around the centre as axis.
- (2) At each circumference of both large and small discs number of days is graduated in whole circumference as 365 days (normal year) in 73 equal sections having 5 days each.
- (3) On the large disc (referred to as "Date disc") 365 days (normal year) are divided by each month, and name of months from January to December are printed.
- (4) On the small disc (referred to as "Operating disc") figures of every 10 days starting with 0 are printed. Putting the point 0 as egg-laying time, usable periods available for respective silkworm egg, processed by such common acid treatment, acid treatment after chilling or artificially hibernated, are printed on number of days. Also starting time of parent silkworm rearing corresponding to its egg-laying time (point at 0) is printed.
- (5) Explanation of abridged signs
 - 1) Hakitate: Putting hatched parent silkworm into rearing
 - 2) Laid: Date laid, or time of egg-laying where the calculation is made as the starting point.

- 3) S : SOKUSHIN, or common acid treatment
 H : HIBERNATING, or artificially hibernated
- 4) 5°C, 15°C, 25°C etc.: Silkworm egg conservation
 (or refrigeration) temperature
- 5) HCl : Hydrochlorization, or acid treatment
- 6) Usable : Usable period (usable period putting
 egg into rearing)

3. Directions :

- (1) How to calculate usable time by its egg-laying time:

Putting the point O of the Operating disc on the egg-laying time of the Date disc, and read respective usable period on the Date disc by S , R and H .

- (2) How to do the silkworm egg production corresponding to starting time (putting into rearing) as desired;

Putting the beginning time of the usable period of S (or R , H) of the Operating disc on the starting date of rearing as desired, read its silkworm egg production date (last day of egg-laying) as that of the Date disc where the point O of the Operating disc comes, as corresponding to S (or R , H)

In addition, read the starting date of rearing (of parent silkworm) corresponding to this silkworm egg production (egg-laying) time on the point of the Date disc where the point of "HAKITATE" of the Operating disc comes.

Table-6 Production and Distribution of Silkworm eggs
in the Korat Centre

Unit: Number of moth

	1973	1974	1975	1976	1977	Total
<u>Production</u>						
F ₁	50,529	61,054	59,904	66,037	37,140	254,664
F ₂	33,869	35,350	21,485	18,991	1,132	110,827
Poly-voltine:	1,224	-	-	-	-	1,224
Total	65,622	96,404	81,389	85,028	28,272	366,715
<u>Distribution</u>						
F ₁	14,270	40,827	68,285	42,104	41,913	207,399
F ₂	32,353	31,935	23,384	17,450	300	105,422
Poly-voltine:	1,790	-	-	-	-	1,790
Total	48,413	72,762	91,669	59,554	42,213	314,611

Note: Including those for experiment.

Excluding 14,037 mothes of F₁ produced by the
Udon Sub-centre in Nov. 1976 with guidance of
the Korat Centre.

In 1977 production up to July, distribution August.

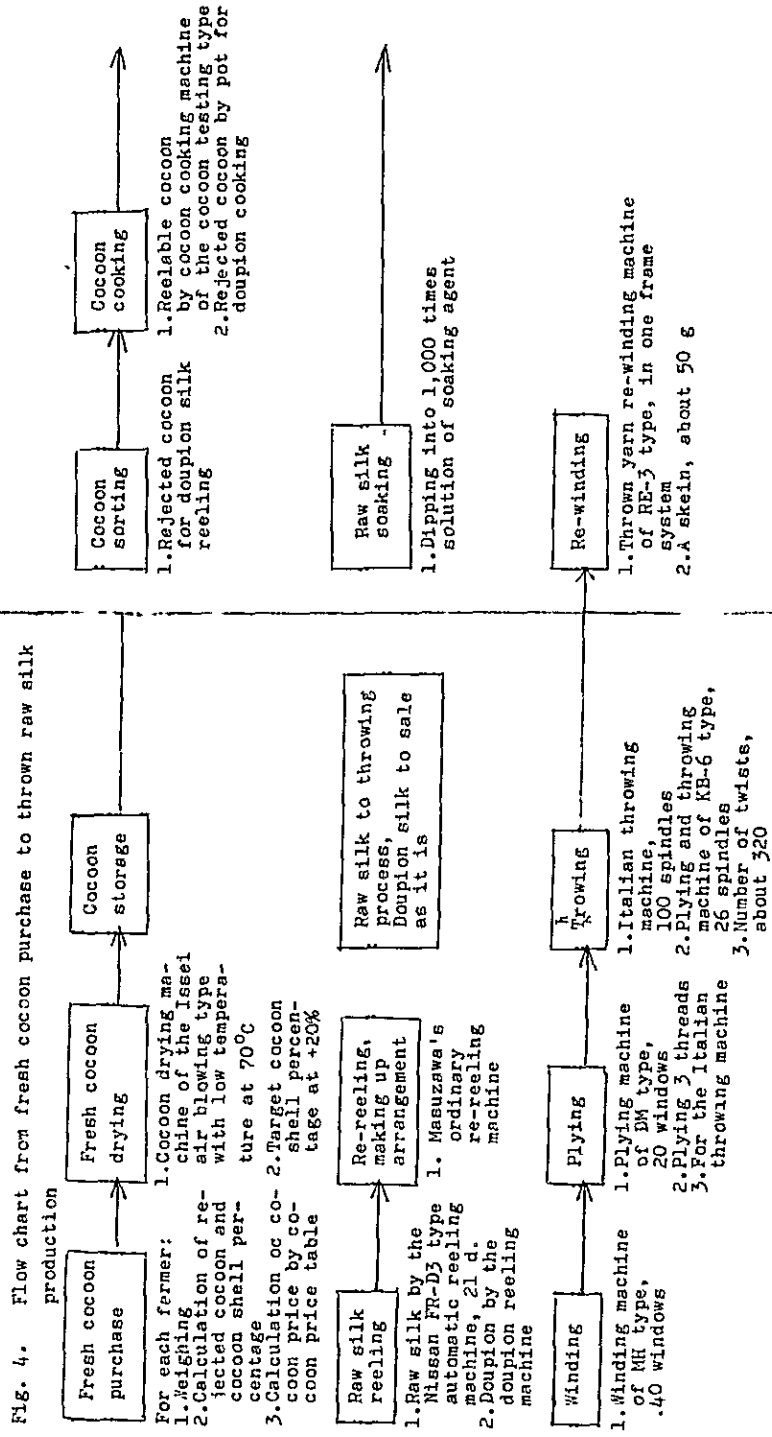


Table-7. Price Calculation Table for Reelable Cocoon and Rejected Cocoon

Effective in July 1977

Price of cocoon = Price of reelable cocoon and price of rejected cocoon

Reelable cocoon	Rejected cocoon
1. Price of cocoon for producing 1 kg of raw silk 400 Baht	1. Price of rejected cocoon for producing 1 kg of doupion silk 140 Baht
2. Raw silk percentage of cocoon shell 73 %	2. Doupion silk percentage $13.8\% \times 0.9 = 12.42\%$
3. Cocoon shell A %	3. Price of rejected cocoon (fresh 1 kg) = 140 baht x 12.42 - 17.388 = 17.4
4. Price of cocoon (fresh 1 kg) = 400 Baht x A% x 73% = B Baht	

Reelable fresh cocoon (1 kg)			Rejected fresh cocoon		
Cocoon shell (A) %	price		percentage %	weight g	price Baht
	present Baht	new (B) Baht			
20	56	58.4	100	1000	17.4
19	54	55.5	95	950	16.5
18	52	52.6	90	900	15.7
17	50	49.6	85	850	14.8
16	48	46.7	80	800	13.9
15	46	43.8	75	750	13.0
14	44	40.9	70	700	12.2
13	42	38.0	65	650	11.3
12	40	35.0	60	600	10.4
11	38	32.1	55	550	9.6
10	36	29.2	50	500	8.7
9	34	26.3	45	450	7.8

8	32	23.4	40	400	7.0
7	30	20.4	35	350	6.1
6	28	17.5	30	300	5.2
5	26	14.6	25	250	4.3
4	24	11.7	20	200	3.5
3	22	8.8	15	150	2.6
2	20	5.8	10	100	1.7
1	18	2.9	5	50	0.9
0	16	0			

Table-8, Cocoon Price Table
Bahts per kg of fresh cocoon

Rejected cocoon	Cocoon shell %									
	15	16	17	18	19	20	21	22	23	24
0%	43.8	46.7	49.6	52.6	55.5	58.4	61.3	64.7	67.2	70.1
1	43.5	46.4	49.3	52.2	55.1	58.0	60.9	63.8	66.7	69.5
2	43.3	46.1	49.0	51.9	54.7	57.6	60.4	63.3	66.2	69.0
3	43.0	45.8	48.7	51.5	54.3	57.2	60.0	62.8	65.7	68.5
4	42.7	45.5	48.3	51.2	54.0	56.8	59.6	62.4	65.2	68.0
5	42.5	45.2	48.0	50.8	53.6	56.3	59.1	61.9	64.7	67.4
6	42.2	45.0	47.7	50.4	53.2	55.9	58.7	61.4	64.2	66.9
7	41.9	44.7	47.4	50.1	52.8	55.5	58.2	61.0	63.7	66.4
8	41.7	44.4	47.1	49.7	52.4	55.1	57.8	60.5	63.2	65.9
9	41.4	44.1	46.7	49.4	52.1	54.7	57.4	60.0	62.7	65.3
10	41.2	43.8	46.4	49.0	51.7	54.3	56.9	59.6	62.2	64.8
11	40.9	43.5	46.1	48.7	51.3	53.9	56.5	59.1	61.7	64.3
12	40.6	43.2	45.8	48.3	50.9	53.5	56.0	58.6	61.2	63.8
13	40.4	42.9	45.4	48.0	50.5	53.1	55.6	58.1	60.7	63.2
14	40.1	42.6	45.1	47.6	50.1	52.7	55.2	57.7	60.2	62.7
15	39.8	42.3	44.8	47.3	49.8	52.2	54.7	57.2	59.7	62.2
16	39.6	42.0	44.5	46.9	49.4	51.8	54.3	56.7	59.2	61.6
17	39.3	41.7	44.2	46.6	49.0	51.4	53.8	56.3	58.7	61.1
18	39.0	41.4	43.8	46.2	48.6	51.0	53.4	55.8	58.2	60.6
19	38.8	41.1	43.5	45.9	48.2	50.6	53.0	55.3	57.7	60.1
20	38.5	40.9	43.2	45.5	47.9	50.2	52.5	54.9	57.2	59.5
21	38.2	40.6	42.9	45.2	47.5	49.8	52.1	54.4	56.7	59.0
22	38.0	40.3	42.5	44.8	47.1	49.4	51.7	53.9	56.2	58.5
23	37.7	40.0	42.2	44.5	46.7	49.0	51.2	53.5	55.7	58.0
24	37.5	39.7	41.7	44.1	46.3	48.6	50.8	53.0	55.2	57.4

Table-9 Reception of Trainees (1970-Sep.1977)

1.Silkworm Rearing Training

		Trainee			Remarks	
		Occupation	man	wo-man		Total
1st	1970		8		8	Term: 1-2months
2nd-5th	1971		55	9	64	
6th-9th	1972		54	29	83	
10th-13th	1973	Mentioned below	75	21	96	
14th-17th	1974		96	79	175	
18th-21st	1975		65	84	149	
22nd-25th	1976		34	109	143	
26th-28th	Sep. 1977		85	51	136	
Total			472	382	854	
		Farmer	201	347	548	Of which 427 set- tlers
		Sericultural Exp.Stn.Officer	45	8	52	
		Seed Multi.Stn.Officer	23	3	26	
		Agricultural Exp.Officer	35	5	40	
		Sericultural Division	-	1	1	
		Agricultural Officer	17	3	20	
		Public Welfare Dept.	39	8	47	
		Accelerated Rural Developm't	11	1	12	
		District Office	1	-	1	
		King's and Queen's Project	8	-	8	
		Welfare School	5	-	5	
		Teacher	4	-	4	
		Student	8	-	8	
		Firm	2	-	2	
		Company Employee	6	4	10	
		Laos Officer	10	-	10	
		Others	7	1	8	
		Extension worker	50	-	50	
		Cooperative Extension	-	1	1	
		Total	472	382	854	

2.Silk Reeling Training

1st	1971	Officer, Company Employee				
-----	------	---------------------------	--	--	--	--

3. Special Training for Silkworm Rearing

1st	1976	Korat Centre Officer	3	7	10	Term: 15 days
		Sericultural Stn. Officer	14	3	17	
		P.W.D. Officer	9	1	10	
Total			26	11	37	

4. Special Training for refrigerator management

1st	1976	Centre & Sub-centre Officer	10	-	10	Term: 6 days
-----	------	-----------------------------	----	---	----	-----------------

5. Special Training of techniques on silkworm egg production

1st	1977	Centre, Sub-centre, Seri. Exp. Stn. Officer	18		18	Term: 6 days
-----	------	--	----	--	----	-----------------

6. Special Training for Tractor (KUBOTA B 6000) management and practice

1st	1977	Centre & Sub-centre Officer	10	1	10	Term: 2 days
-----	------	-----------------------------	----	---	----	-----------------

Table-10 Results of Sericultural Training

Date (period)	Object	Trainee		Occupation	Average Age	Sex		Lecture	Practical	Total	Subject	Re-marks
		Man	Woman			Total	Total					
18th Jan. 13, 1975 (1/13 - 2/14)	Training on rearing technique of young worms; Shoot rearing of grown worms	19 20	27 27	Farmer Farmer Total	1 46 47	-	15	310.5	325.5	330	Subject of lecture (1) Moriculture (2) Mulberry disease & pest (3) Rearing (4) Silk worm disease	Lecturer: Chief of each section or Counterparts of General the expert concerned
19th May 31, 1975 (5/31 - 6/30)	Ibid.	8 3 4 16	-	Seri. Exp. Stn. Officer Farmer Company employee Laos Officer Total	1 40 3 4 48	-	16	288.5	304.5	320	(5) Silk worm egg (6) Silk worm breeding (7) Raw silk reeling (8) General study	1 the expert concerned
20th Aug. 13, 1975 (8/13 - 9/10)	Ibid.	1 1 6 4 12	-	A.R.D. Officer Extension Officer Farmer Laos Officer Total	1 1 23 4 35	19	30	274.5	304.5	329	Lecture hour: On 5 hour (29 days); (16:00am-4:30pm) 10.5 hrs.	
21st	Ibid.	3 2 3 3 6 17	-	Seri. Exp. Stn. Officer P.W.D. Officer Teacher Farmer University student Total	3 2 3 5 6 19	-	28	287.0	325.0	325		
22nd Jan. 3, 1976 (1/9 - 2/9)	Ibid.	5	14	Farmer College student Total	19	18.4 14-23	26	299.5	322.5	331		
23rd Jun. 1, 1976 (6/1 - 7/1)	Ibid.	5	40	Farmer	45	29.5 13-64	30	285.0	315.0	330		

Date (Period)	Object	Trainee				Hour		Subject	Re- marks
		Occupation	Men	Women	Total	Average age	Lecture Practical Total		
24th Aug. 10, 1976 (8/10-3/10)	ibid.	Farmer	13	29	42	17.5 15-24	30* 306.0 (32 days)		
25th Oct. 12, 1976 (10/12-11/11)	ibid.	P. W. D. Officer Farmer Total	1: 8 9	1: 26 27	2: 34 36	29.4: 15-58	30* 299.5 (31 days)		
26th Jan. 16, 1977 (1/16-2/18)	ibid.	P. W. D. Supervisor Extension Officer Cooperative Extension Officer Firm Farmer Total	7 18 - 1 3 20	3: 1 1 - 15 20	10: 19 1 1 18 49	27.9: 15-51	30* 316.5: (33 days)		
27th Jun. 13, 1977 (6/13-7/13)	ibid.	Farmer	27	36	26.6: 16-57	30* 285.0: (30 days)			
28th Aug. 8, 1977 (8/9-9/8)	ibid.	Extension Officer Serl. exp. Stn. Officer Total	50 1 51	- - -	50 1 51	30.9: 24-58	45** 270.0: (30 days)		

Note: A. R. D. = Accelerated Rural Development
P. W. D. = Public Welfare Dept.

** Sericultural subject 27 hrs.
General non-agricultural 16 " by instructors outside/
Total 45 " /the Centre

T-ble-11. Reception of Trainees in Japan 1971-1977

Year	Name	Specialized course	Term	Remarks	Receiving institution
1971:	Mr. Pisam Prac. Hantason	Refrigerator management for silkworm egg storage	Aug. 4 - Nov. 30		Silkworm Physiology Div., Seri. Exp. Stn. MAF.
1972:	Mr. Sombat Maneechote	Mulberry cultivation	July 9 - Oct. 9	Chief, Mukdahan St.	Moriculture Div., Seri. Exp. Stn. MAF.
	Mr. Pam Pannengpet	Silkworm breeding	" "		Chubu Branch Stn., Seri. Exp. Stn. MAF.
	Mrs. Chaunya Pannagpet	Silk reeling	" "		Okaya Filature Exp. Stn., Seri. Exp. Stn. MAF.
	Miss Laksanawadee	Pathology	" "		Pathology Div., Seri. Exp. Stn. MAF.
1973:	Mr. Sombat Supapa	Silkworm rearing	Aug. 20 - Dec. 19	Chief, Lodi-ed Stn.	Moriculture Div., Seri. Exp. Stn. MAF.
	Mr. Virechart Chomocuen	Silkworm egg production	" "		Shinjo Silkworm Egg Exp. Stn., Seri. Exp. Stn. MAF.
	Miss Mallapa Laosethakul	Training for sericulture	" "		Chubu Branch Stn., Seri. Exp. Stn. MAF.
	Miss Palwann Lekuthai	Silkworm breeding	" "		Tohoku Branch Stn., Seri. Exp. Stn. MAF.
	Mr. Maoch Penyawanich	Mulberry cultivation	Sep. 1 - Dec. 19		Moriculture Div., Seri. Exp. Stn. MAF.
1974:	Mr. Nimitt Muttanura	Mulberry cultivation	Aug. 25 - Dec. 24		Kyushu Branch Stn., Seri. Exp. Stn. MAF.
	Miss Jaree Jaroonchai	Silkworm breeding	" "		Chubu Branch Stn., Seri. Exp. Stn. MAF.
	Mrs. Konhawirat Chomhuen	Silk reeling	" "		Okaya Filature Exp. Stn., Seri. Exp. Stn. MAF.
	Mr. Tienchai Aunchitwantana	Silkworm egg production	" "	Buriyom Stn. Mukdahan Stn.	Muyezaki Silkworm Egg Exp. Stn., Seri. Exp. Stn. MAF.
	Mr. Marschai Sithikan	Silkworm egg production	" "		Same as above
1975:	Mr. Swvit Intrawankool	Mulberry cultivation	May 22 - Sep. 21	Ubol Stn.	Chutu Branch Stn., Seri. Exp. Stn. MAF.
	Mr. Lek Sriswan	" "	" "	Surin Stn.	Same as above
	Miss Subatip Butchund	Silkworm breeding	" "		Tohoku Branch Stn., Seri. Exp. Stn. MAF.
	Mrs. Ponthip Pethmont	Silkworm rearing	" "		Sericulture Div., Seri. Exp. Stn. MAF.
	Mr. Cheum Kamla	Silkworm egg production	" "	Buriyom Stn.	Shinjo Branch Stn., Seri. Exp. Stn. MAF.
	Mr. Puchong Pethmont	" "	May 14 - Feb. 16	(JETRC)	

Year	Name	Specialized course	Term	Remarks	Receiving Institution
1976	Mr. Caras Chienchiam	Mulberry cultivation	June 13 - Oct. 17		Kyushu Branch Stn., Seri. Exp. Stn., MAF.
	Mr. Tecera Ngamprasit	Silkworm rearing	"		Same as above
	Mr. Peerapong Chaosattakul	Silkworm egg production	"	Udon Sta.	Miyazaki Silkworm Egg Exp. Stn., Seri Exp. Stn. MAF.
	Mr. Eunjob Harntongchai	"	"	Khonkasa Stn.	Same as above
	Mr. Sittinong Unkhut	"	"		Same as above
1977	Mr. Somruk Taengratanaprasert	Silkworm egg production	Jul 14 - Nov. 13		Same as above
	Mr. Sompong Kripot	Silkworm breeding	"		Same as above
	Mr. Thongcha Sittisonern	Pathology	"		Tohoku Branch Stn., Seri. Exp. Stn., MAF.
	Mr. Bhinai Hongthondaeng	Mulberry cultivation	"		Same as above

Table-12.

P.W.D. Settles Trained

(Total as of end of
September 1977)

Pilot Village	Province	Trained settlers
Phimai*	Korat	67
Praset*	Surin	73
Bangruad*	Buriam	60
Mukdaharn*	Nakorn Panom	31
Ubolrat*	Khonkaen	60
Lampao	Kalasin	21
Lam Don Noi*	Ubol	21
Kuchinarai	Kalasin	41
Phonphi Sai	Nongkhai	39
Cheng Pin*	Udon	3
Huey Luong	"	11
Total		427

Note: *Cocoon production is underway.

Table-13. Results of Each Silkworm Rearing in Pilot Sericultural Villages

No.	No. of rearing farmers	Starting date of rearing	Silkworm eggs used (sheet)	Cocoon crop (kg)	Cocoon weight (g)	Cocoon shell weight (g)	Cocoon shell ratio (%)	Cocoon cocoon ratio (%)	Rejected cocoon ratio (%)	Cocoon purchase price (Baht)	Reared silkworm variety
1	27	7/21	28	494.5	1.17	19.7	16.8				(K ₁ T)F ₂ ·K ₄ X T
2	27	7/10	28	369.6	1.51	29.5	19.5				K ₁ X T
3	27	10/18	29	546.5	1.33	26.5	19.2				K ₄ X T ₁ , K ₁ X T
4	27	12/18	30	470.0	0.88	15.5	17.6				T x K ₁
5	5	1974/2/15	7	106.2							T x K ₄
6	21	3/26	25	414.0			16.9				(K ₄ X T)F ₂
7	26	5/30	33	378.8	1.08	20.1	18.5	21.9			K ₁ X T, K ₁ ·K ₁₆ X T·Ta
8	9	7/15	23	246.4	1.29	22.7	17.6	16.1			T x K ₁
9	27	7/24	36	640.0	1.34	23.7	17.7				T x K ₁
10	31	9/15	70	907.0	1.56	27.6	17.7	10.9			T x K ₁
11	32	10/15	72	1300.7	1.33	22.4	16.8	12.7			K ₁ X T·TKK ₁
12	30	11/27	48	863.0	1.41	24.9	17.7	14.8			TKK ₁ ·K ₁ X T
13	10	1975/1/30	15	177.9	1.36	22.9	16.8	14.5			TKK ₁ ·K ₁ X T
14	28	3/10	31	391.1	1.30	23.3	17.9	18.8			TKK ₁ ·K ₁ X T
15	5	3/24	20	353.6	1.27	23.9	18.8	21.6			K ₁ X T
16	31	5/21	59.5	995.0	1.49	32.8	22.0	17.8			K ₇ X K ₆
17	27	6/6	38	272.4	1.36	28.2	20.7	41.1			(K ₆ X K ₇)F ₂
18	6	6/19	31	252.0	1.38	23.1	20.4	36.3			K ₆ X K ₇
19	32	7/6	72.5	914.0	1.43	30.2	21.1	23.6			K ₆ X K ₇
20	18	7/25	67	264.2	1.39	27.2	21.0	57.6			(K ₆ X K ₇)F ₂
21	32	8/22	52.5	715.6	1.65	34.2	20.8	17.2			K ₆ X K ₇
22	18	9/17	60	200.3	1.72	37.1	21.6	34.3			K ₆ X K ₇
23	30	10/6	90	818.8	1.40	23.8	17.2	23.4			(K ₁ X T)F ₂
24	13	10/22	28	464.7	1.58	32.5	20.6	48.9			K ₆ X K ₇
25	28	12/10	75	611.9	1.08	20.3	19.2	18.8			K ₁ X K ₁₄
26	28	1976/6/20	20	791.1	1.28	25.4	19.9	37.1			K ₁₄ X K ₆
27	25	8/27	55	700.2	1.61	32.3	20.1	42.8			K ₁₄ X (K ₁ X K ₆)

Prasert

No.	No. of farmers reared	Starting date of rearing	Silkworm eggs used for rearing	Cocoon crop	Cocoon weight	Cocoon shell weight	Cocoon shell ratio	Cocoon ratio	Rejected cocoon ratio	Cocoon purchase price	Reared silkworm variety
1	15	1974/6/6	15	307.0	1.41	25.6	18.2				K ₁ .K ₁₀ x T.Ta
2	25	9/25	25	442.0	1.69	32.9	19.5				T.Ta x K ₁ .K ₆
3	23	11/25	18	307.4	1.40	25.3	13.1				K ₁ x T.Ta x K ₁
4	25	1975/1/17	22.5	377.4	1.83	32.5	17.8				K ₆ x K ₇
5	26	3/3	26	571.1	1.41	25.9	18.4				K ₆ x K ₇
6	15	5/10	30	337.8	1.71	34.4	20.1				K ₆ x K ₇
7	14	6/5	18	384.4	1.65	35.8	21.7	20.0			K ₆ x K ₇
8	28	6/29	48	702.0	1.72	36.3	21.1	15.3	51.8		K ₆ x K ₇
9	27	8/1	40	537.7	1.80	37.8	21.0	24.5	47.4		K ₆ x K ₇
10	27	9/17	40	317.1	1.79	38.1	21.3	14.5	51.0		K ₆ x K ₇
11	20	10/22	54	305.0	1.43	22.8	16.0	46.7	33.0		K ₆ x K ₇
12	14	12/15	35	293.6	1.16	21.5	18.6	12.9	48.8		K ₁ x K ₁₄
13	9	1976/3/10	30	80.0	1.53	33.9	22.2	34.1	44.8		K ₁ x K ₁₄
14	27	5/5	38	631.1	1.51	30.8	20.4	25.8	44.5		K ₁₄ x K ₁
15	13	6/10	44	224.0	1.57	32.0	20.8	17.9	49.2		K ₆ x K ₁₄
16	31	7/30	58.6	635.2	1.75	38.3	21.9	23.0	46.2		K ₁₀ x K ₁
17	19	9/30	40	198.5	1.07	19.5	18.2	42.5	36.6		K ₁ x K ₁₄
18	22	1977/2/10	24	293.0	1.00	19.5	19.5	20.2	48.1		K ₁₄ x (K ₆ x K ₁)
19	11	5/3	27	90.9	1.41	27.2	19.3	15.3	49.2		K ₁ x K ₈
20	15	7/26	50	133.7	1.38	27.2	19.7	26.9	47.2		K ₁ x K ₁₄

Bangruad

No.	No. of farmers reared	Starting date of rearing	Silkworm eggs used for rearing sheet	Cocoon crop kg	Cocoon weight g	Cocoon shell weight cg	Cocoon shell ratio %	Rejected cocoon ratio %	Cocoon purchase price Bant	Reared silkworm variety
1		1974 2/17	1	9.0	1.00	17.1	17.1	13.3	48	K ₁ x T
2		3/20	4	17.2	0.98	17.1	17.4	11.3	50	(K ₄ x T) ₂
3		9/30	4	11.3				39.0	34	K ₁ x T
4	20:	1975 4/15	3	205.1	1.85	37.7	20.4	15.6	50.2	K ₁ x K ₁₃
5	28	10/2	30	639.7	1.44	26.4	18.3	24.9	42.9	(K ₁ x T) ₂
6	29	12/10	38	409.3	1.12	20.8	18.6	15.3	48.1	K ₁ x K ₁₄
7	25	1976 3/10	34	110.9	1.52	34.2	22.5	38.2	44.4	K ₆ x K ₇
8	28	5/20	33	373.8	1.41	27.2	19.3	40.2	39.9	K ₁₄ x K ₁
9	29	6/20	33	218.1	1.51	30.4	20.1	23.7	47.6	K ₁ x K ₁₄
10	24	7/15	33	168.4	1.98	43.0	21.7	29.6	46.2	K ₆ x K ₁₄
11	22	9/25	33	311.7	1.70	34.7	20.4	19.3	49.0	K ₆ x K ₁₄
12	17	11/25	31	246.9	1.16	21.7	18.7	31.7	41.3	K ₈ x K ₁
13	24	1977 1/30	55	475.6	1.11	21.5	19.4	14.3	48.7	K ₁₄ x (K ₆ x K ₁)
14	19	6/15	47	160.1	1.22	23.3	19.1	29.8	43.2	K ₈ x K ₁
15	11	8/25	55	224.2	1.47	29.5	20.1	17.5	50.9	K ₁ x K ₁₄

Table-13-B Receipt of Cocoons 1973 - Aug.1977
(kg)

Year	Month						Total
		Phimai	Pra- sert	Bang- ruad	Mukda- harn	Kabin- buri	
1973	Aug.	494					494
	Oct.	370					370
	Nov.	547					547
	Total	: 1,415					1,411
1974	Jan.	470					22: 492
	Feb.						
	Mar.	106		9			115
	Apr.	414		17			14: 445
	May				158		158
	Jun.	379					71 450
	Jul.						36 36
	Aug.	386	307				108 1,301
	Sep.						97 97
	Oct.	907	442	11	146		80 1,586
	Nov.	1,300					131 1,431
	Dec.	863	307				166 1,336
Total	5,325	1,056	37	304		725 7,447	
1975	Jan.						150 150
	Feb.	178	377				555
	Mar.						144 144
	Apr.	745	571				1,316
	May						24 24
	Jun.	995	722				77 1,794
	Jul.	524	702				343: 1,698
	Aug.	1,178	538				54 1,770
	Sep.	716		205			90 1,011
	Oct.	1,020	317	640			1,977
	Nov.	465	305			129	351 1,250
	Dec.						155 155
Total	5,321	3,532	845		472	1,174 11,844	

1976	Jan.	612	294	409		30		1,345
	Feb.							
	Mar.					180		180
	Apr.		80	111				191
	May		631					631
	Jun.			374		30		404
	Jul.	791	224	218		288	19	1,540
	Aug.		635	168				803
	Sep.	700			94	258	22	1,074
	Oct.		199	312	128	228		867
	Nov.					269	a)453	722
	Dec.			247		335	b)186	768
	Total		2,103	2,063	1,839	222	1,618	680
1977	Jan.						c) 22	22
	Feb.							
	Mar.		393	496				789
	Apr.							
	May							
	Jun.		91			355		446
	Jul.			160		101	d)184	445
	Aug.		344	248		149	e)692	1,432

Note: a)Ubolrat 153
b) " 186
c)Sampang
d)Ubolrat
e)Ubolrat 212
Others 430

Table-14-A Evaluation of Pilot Sericultural Villages

Name of Pilot Sericultural Village	Year introduced sericulture	No. of sericultural farms	No. of average mulberry area* (a)	Young worm cooperative rearing house in Pilot Villages		Young worm cooperative rearing house in Pilot Villages						
				No. of sericultural farms	Large- Area of hatch-ery for young worms	No. of reared farmer	Month of rearing	Silkworm varieties (b)	Cocoon crop of each farmer	Cocoon receipt by the Centre	Cocoon price per farmer	Cocoon price
Phimai	1973	72	6-20	1 (USOM)	100 (100)	47	May, Jun, Jul, Aug, Sep, Oct, Nov	K14xK6 (Separate table)	2,105	72	39-41	Largest : 388 Smallest : 16
Prasert	1974	48	2-10	1 (USOM)	60 (60)	35	Feb, Apr, Jun, Jul, Aug, Oct, Nov	K1xK14, K6xK14, K10xK1	2,063	60	37-49	125
Bangruad	1974	60	2-4	1 (USOM)	60 (60)	31	Jan, Apr, Jun, Jul, Aug, Oct	K6xK7, K14xK1, K6xK14	1,839	60	41-49	88
Mukdaharn	1974	32	4-10	1 (USOM)	60 (60)	17		K1xK14	222	15		48
Ubolrat	1976	25	1-5	1 (USOM)	100 (100)	14			339			5
Cheng-Pin	1977	31	4-12	1 (USOM)	100 (60)							
Lam Don Noi	1977	16	4-5	1 (USOM)	60 (60)							

Note: * as of Oct. 1977
 (a) those by USOM included
 (b) main ones only

Table-14-B
Evaluation of Pilot Sericultural Villages

Pilot Village Name	No. of farmers trained	Technical level and interest in general evaluation	Motive introducing sericulture and previous crop before mulberry	Items connected with Pilot Village	Under-developed items in facility, interest and countermeasures	General evaluation
Phimai						
(1) No. of sericultural farmers concerned	Total 67 Of which none in 1977	(1) Technical level Excellent partly Good majority Fair	(1) Motive introducing sericulture (a) Suggested by Government 60% (b) Suggested by other people 40% (c) Because of lean (d) Other (2) Previous crop before mulberry Cassava	(1) Main item of technical guidance Rearing technique, silkworm disease control, training and cultivation method of mulberry (2) Results of technical guidance improved; rearing mounting; as better Worsened: Disease control, partly not thoroughly	(1) Facility and instruments Shortage of disinfection tub, bad cocooning frame (2) Interest of disease control insufficient (3) Counter-measures Equipment of disinfection tub for complete disinfection (4) Disease control Silkworm disease control technique not well penetrated.	(1) To be developed (Heason) (2) To decrease, but remain (Heason) (3) To be maintained at current level, but known in future (Heason) (4) To be improved, harvesting, and cultivation method of mulberry field for more efficiency. (5) Strengthening of extension and guidance system.
(2) Average lean per farmer Initial 5,000 - 25,000 Additional		(2) Interest in sericulture for a larger size is observed, but majority of farmers have quite a lot of interest in improving sericultural farm management.				

Table-14-B
Evaluation of Pilot Sericultural Villages

Pilot Village Name	No. of farmers trained	Technical level and interest in general evaluation	Active introduction in culture and previous crop before mulberry	Items connected with technical guidance	Under-developed items in facility, interest and countermeasures	General evaluation	Problem in promotion in Pilot Villages
Ubolrat							
(1) No. of sericultural farmers concerned	Total 60 Of which 30 in 1977	(1) Technical level excellent Partly Good Majority of Fair	(1) Native introduction in sericulture by Government 100% (b) Surrested by other people (c) Because of loan (d) Other (2) Previous crop before mulberry Jute Sugar cane	(1) Main item of technical guidance Rearing technique, Disease control technique, Establishing mulberry field, Training and (2) Results of technical guidance Rearing technique, Disease control technique, As before Mulberry cultivation, Harvesting method. Disease control technique, had partly. **technique	(1) Facility and instruments not well equipped of disinfection tub. (2) Interest more income, increase of size expected with more mulberry field and increased production level maintained (3) No be maintained at current level, unknown future (season)	(1) Thorough Penetration of sericultural Suid-ance. (2) Stabilization of cocoon crop (Thorough penetration of disease control. (3) Mulberry disease control (4) Improvement of harvesting method of mulberry to increase productivity. Thorough penetration of cultivation technique. (5) Strengthening of sericultural extension system.	
(2) Average loan per farmer Initial 20,000 Baht							
Additional							

Table-14-B

Evaluation of Pilot Sericultural Villages

Pilot Village Name	No. of farmers trained	Technical level and general evaluation	Motive introducing sericulture and crop before mulberry	Items connected with Pilot Villages	Under-developed items in facility, interest and countermeasures	General evaluation	Problem in sericultural promotion in Pilot Villages
Chieng Pin							
(1) No. of sericultural farmers concerned	Total 3 Of which 0 in 1977	(1) Technical level of excellent of good of fair (2) Interest in sericulture At present only 3 farmers introduced sericulture, but many farmers have idea to introduce it actively as establishing mulberry field with much interest.	(1) Motive introducing sericulture by Government 100% (b) Suggested by other people (c) Because of loan (d) Other (2) Previous crop before mulberry	(1) Main item of technical guidance Overall technical mulberry cultivation, rearing to mounting were guided to new sericultural farmers. (2) Results of technical guidance improved: Generally AS before: worsened:	(1) Mulberry cultivation technique The Centre's techniques on cultivation, training and harvesting. (2) Harvesting technique was not penetrated sufficiently as rearing just began. (3) Mounting wire-net frame used partly as it is cheap. (4) Disease control technique. Note: Relation of silk-worm disease with wild insects not cleared. *method did not reach well. Little organic matter applied. **A few farmers rear polyvoltine	(1) To be developed (Reason) Increase of farmers, or size expected, due to advantage in sericulture (1) To be developed (Reason) Increase of farmers, or size expected, due to advantage in sericulture (2) Current level maintained (Reason) Many new farmers also expected. (3) To be maintained at current level, unknown in future (Reason)	1) Well reaching of technical guidance) 2) thorough penetration of disease control technique. 3) Well developed in cultivation, training and harvesting method. 4) Strengthening of technical extension and guidance system.

Evaluation of Pilot Sericultural Villages

Pilot Village Name	No. of farmers trained	Technical level and interest in general evaluation	Motive introducing sericulture and crop before mulberry	Items connected with sericulture	Facilities in village	Under-developed items	General evaluation	Problem in sericulture
Bangruad								
(1) No. of sericulturists concerned	Total 60 Of which none in 1977	(1) Technical level excellent Partly good Majority of fair	(1) Motive introducing sericulture (a) suggested by government 100% (b) Suggested by other people (c) Because of loan (d) Other	(1) Main item of technical guidance Training and harvesting method of mulberry, Disease control of mulberry and silkworm. Rearing technique. (2) Results of technical guidance Improved rearing technique. As before. Agriculture technique. Improved: Mulberry, silkworm, etc.	(1) Mulberry cultivation technique The Centre techniques penetrated little. A few mulberry field. (2) Rearing	(1) Facility and instruments in facility, interest and countermeasures (Technically penetrated level)	Increase of No. of farmers, or farmer's size expected, due to advantage in sericulture (1) To be developed 50% (Reason) Many farmers have idea developing size, due to more income than other crops and possibility of multi-times rearing. A few new farmers. (2) Current level maintained 50% A half main-taining level due to labour and fund. Increasing of size is possible with proper guidance. (3) To be maintained at current level, unknown future (Reason)	1) Thorough visiting dense guidance to individual farmer. 2) Thorough disinfection room and tool for crop sterilization. 3) Thorough mulberry cultivation. 4) Strengthening of sericultural technical guidance system.
(2) Average loan per farmer Initial 25,000 Baht		(2) Interest in sericulture Small size farmers have a little interest. Medium and large size farmers have a large interest.	(2) Previous crop before mulberry Rice Peanuts Cassava Maize	Control of disease of mulberry and silkworm. Control of disease of mulberry and silkworm.	(3) Mounting measures Improvement of mulberry storage and processing place. More disinfection tubes.			
Additional					(4) Disease control A few farmers had bad crops due to disease. * without care.			

Evaluation of Pilot Sericultural Villages

Pilot Village Name	No. of farmers trained	Technical level and interest in general evaluation	Active introduction of culture and previous crop before mulberry	Items introduced	Technical level and interest in general evaluation	Under-developed items in facility, interest and countermeasures	General evaluation
Prasart	73	(1) Technical level of excellent. Partly good. Majority of fair.	(1) Motive in introducing sericulture by Government 100% by other people.	(1) Main item of technical guidance mulberry cultivation technique. Rearing and mounting.	(1) Mulberry cultivation technique. The Centre's techniques largely, but not well generally.	(1) Facility developed items: Disinfection tub not well equipped.	(1) To be developed 40% (reason) Half farmers expected to increase size actively, due to profitability of sericulture.
(1) No. of sericultural farmers concerned	48	(2) Interest in sericulture Majority farmers have large interest to improve.	(c) Because of loan (d) Other	(2) Result of technical guidance improved: Rearing and mounting technique. Sericulture disease control technique.	(2) Bearing (2) Interest in sericulture.	(2) Current level maintained 60% About half farmers expected to have active size increasing ideas pending a little on sericulture in small size.	(2) To decrease, but remain (reason)
(2) Average loan per farmer Initial Rsht 16,000-20,000			(2) Previous crop before mulberry		(3) Mounting method.	(3) Counter-measures Well equipped. Infection tub.	(3) Thorough improvement of mulberry harvesting method and cultivation.
Additional					(4) Disease control. Sericulture disease control technique, rearing, mounting, rearing, rearing, rearing.	(4) Disease control. Sericulture disease control technique, rearing, rearing, rearing.	(3) To be maintained at current level, unknown in future (reason)

Evaluation of Pilot Sericultural Villages

Pilot Village Name	No. of farmers trained	Technical level and interest in general evaluation	Motive introducing sericulture and previous crop before mulberry	Items connected in main items of technical guidance	Lead with Pilot Village	Underdeveloped items	General evaluation	
Lam Dem Noi					<p>Technically un- developed (Technically penetrated level)</p> <p>Increased interest and countermeasures</p> <p>For a certain reason: development, unexpected decrease of farmers, difficulty in cultivation in con-</p>			
(1) No. of sericultural farmers concerned	Total 21	(1) Technical level of excellent Partly good	(1) Motive introducing sericulture (a) suggested by Government 100%	(1) Main items of technical guidance Sericulture technique, rearing and mounting techniques, mulberry and silkworm disease control technique.	(1) Mulberry cultivation and harvesting method of mulberry.	(1) Facility and instruments developed in sericulture equipments.	(1) To be developed (season) 75% many farmers are intending to develop as more profitable than other crops. A few expected to introduce newly.	(1) Thorough and dense guidance. (2) Thorough silkworm disease control measures. (3) Thorough improvement in training and harvesting method and cultivation of mulberry.
(2) Average per farmer Initial 20,000 Baht	Of which none in 1977	(2) Interest in sericulture Comparatively large farmers have active interest in sericulture.	(b) suggested by other people (c) because of loss (d) other	(2) Results of technical guidance Vicious rearing, * * before.	(2) Rearing Mulberry feeding method. Polyvoltine worm rearing at a part of mounting method.	(2) Interest	(2) To decrease, but remain (season)	(2) Thorough improvement in training and harvesting method and cultivation of mulberry.
Additional			(2) previous crop before mulberry Rice, Kenaf, Cassava, Peanut, Cotton	Worsened: * mounting, disease control (partly) techniques.	(3) Countermeasures Small size farmers depend a little on sericulture having small interest in improvement, so currently maintaining expected.	(3) To be maintained of current level, unknown future (Season)	(3) To be maintained of current level, unknown future (Season)	

Evaluation of Pilot Sericultural Villages

Pilot Village Name	No. of farmers trained	Technical level and general evaluation	Motive introducing sericulture and previous crop before mulberry	Items connected with Main items of technical guidance	Underdeveloped items in facility, interest and countermeasures	General evaluation	Problem in sericultural promotion in Pilot Villages
Mukdahan							
(1) No. of sericultural farmers concerned	Total 31 Of which none in 1977	(1) Technical level excellent Partly good Majorly fair (2) Interest in sericulture Quite large	(1) Motive introducing sericulture (a) Suggested by Government 100% (b) Suggested by other people (c) Because of loan (d) Other (2) Previous crop before mulberry Rice, Kani, Peanuts, Sugar cane Cotton	(1) Main item of technical guidance Sericulture technique, rearing and mounting technique, Disease control technique of mulberry and silkworm. (2) Results of technical guidance Improved: Rearing and mounting method AS before: Moriculture worsened: <u>Worm silk</u> control, worm disease control.	(1) Facility and instruments shortage of disinfection tub. (2) Interest good (3) Countermeasures Well or more equipment of disinfection tub. Equipment of cocooning frame. Separation of rearing and mounting rooms.	(1) To be developed Reason) 90% Majority of farmers have idea to increase size actively, as thinking sericulture is more profitable than other crops. (2) Current level maintained 10% Small size farmers, depending on sericulture, expected to maintain current level. (3) To be maintained at current level, unknown future (Reason)	(1) Strengthening of extension and guidance system and dense guidance. (2) Thorough control of silkworm disease for crop stabilization. (3) Improvement of harvesting method and thorough cultivation of mulberry for better efficiency.
(2) Average loan per farmer Initial 20,000 Baht							
Additional							

Table-15. Cocoon Yield by Each Farmer in Pilot Villages in 1976

(1) Phimai Village

No.	Name	Rearing season					Total
		Jan.	July	Sep.	Oct.	Nov.	
		kg	kg	kg	kg	kg	kg
1	Mr. Sin	20.6	23.8	-	-	-	44.4
2	Mr. Lern	23.8	31.0	33.7	29.2	19.6	137.3
3	Mr. Yey	32.5	35.7	53.9	39.0	40.1	199.2
4	Mr. Chark	12.0	15.1	20.5	35.0	18.9	101.5
5	Mr. Ma (C)	8.9	14.0	16.9	11.0	16.3	67.1
6	Mr. Lek	11.7	17.1	-	17.3	17.4	63.5
7	Mr. Noi	9.9	14.5	-	26.3	31.2	81.9
8	Mr. Chuen	16.3	28.3	-	22.7	19.4	86.7
9	Mr. Yord	14.4	32.8	32.6	-	49.7	136.5
10	Mr. Pol	15.9	35.5	35.4	39.4	37.7	163.9
11	Mr. Tuan	25.8	-	-	-	-	25.8
12	Mr. Pan	22.5	42.5	-	-	-	65.0
13	Mrs. Chum	13.0	35.6	-	-	-	48.6
14	Mr. Law	24.1	46.2	19.8	-	14.4	104.5
15	Mr. Tongbai	61.3	-	-	-	-	61.3
16	Mrs. Cheen	21.7	23.5	-	-	-	45.2
17	Mrs. Tongmuan	11.7	38.5	-	-	-	50.2
18	Mr. Tong	30.8	41.0	8.5	24.3	35.4	149.0
19	Mr. Ma (F)	8.6	17.4	-	-	-	26.0
20	Mr. Lai	9.6	9.1	16.9	-	14.0	49.6
21	Mr. Boon	19.9	-	-	-	-	19.9
22	Mr. Tuen	36.5	-	-	-	-	36.5
23	Mr. Pe	28.1	-	-	-	-	28.1
24	Mr. Nark	39.2	-	41.7	-	-	80.9
25	Mr. Yarn	10.0	19.1	15.1	-	13.3	57.5
26	Mr. Pakdee	21.0	34.4	30.1	32.0	-	117.5
27	Mr. Ak-kapoon	31.8	-	-	-	-	31.8
28	Mr. Ruangdet	21.3	-	-	-	-	21.3
29	Mr. Charern	-	17.0	17.5	19.2	20.3	74.0
30	Mr. Pai	-	17.5	-	-	-	17.5
31	Mrs. Chanda	-	14.4	14.8	10.2	4.3	43.7

32	Mr..Kerd	-	19.7	13.8	-	-	33.5
33	Mr. Mun	-	40.6	23.9	-	-	64.5
34	Mr. Suwan	-	11.6	17.6	14.3	-	43.5
35	Mr. Boonma	-	32.7	32.4	21.9	14.4	101.4
36	Mr. Damrong	-	77.1	80.6	120.4	109.7	387.8
37	Mr. Tieng	-	-	24.8	-	20.0	44.8
38	Miss ongdee	-	-	12.0	-	35.3	47.3
39	Mr. Ta	-	-	13.1	18.5	26.3	62.9
40	Mr. Oui	-	-	59.8	61.6	52.4	173.8
41	Mr. Mee	-	-	-	13.0	-	13.0
42	Mr. Prom	-	-	-	15.6	-	15.6
43	Mr. Kong	-	-	-	33.3	10.4	43.7
44	Mr. Somrit	-	-	-	-	40.9	40.9
45	Mr. Poy	-	-	-	-	58.7	53.7
46	Mr. Poon	-	-	-	-	17.5	17.5
	Total	611.9	790.7	640.4	609.2	737.6	3,389.8

(2) Prasart Village

No.	Name	Hearing season						Total
		Jan.	April	May	July	Aug.	Oct.	
		kg	kg	kg	kg	kg	kg	kg
1	Mr. Joom	31.9	-	38.4	25.4	23.8	5.2	124.7
2	Mr. En	18.3	-	20.5	3.9	13.1	-	55.8
3	Mr. Koey	19.8	-	16.9	-	17.6	-	54.3
4	Mr. Wer	19.2	-	17.6	-	13.5	-	50.3
5	Mr. Yon	21.6	-	24.1	-	21.5	-	67.2
6	Mrs. In	14.2	-	10.6	-	17.9	-	42.7
7	Mrs. Pa	20.3	-	32.1	27.1	22.1	-	101.6
8	Mr. Klin	21.8	-	20.8	14.7	17.0	-	74.3
9	Mr. Wern	20.1	-	6.1	-	12.4	-	38.6
10	Mrs. Aew	15.1	-	21.4	12.5	19.2	-	68.2
11	Mr. Prin	23.8	-	12.9	-	-	4.2	41.0
12	Mr. Pane	20.2	-	19.3	-	21.3	5.8	66.6
13	Mr. Sanern	27.1	8.0	25.3	22.1	23.6	8.9	115.0
14	Mr. Kraab	20.2	-	22.8	-	10.9	4.5	58.4
15	Mr. Yoo	-	12.4	27.1	29.8	23.7	14.2	107.2
16	Mr. Sai	-	8.3	33.9	10.4	26.1	16.4	95.1
17	Mr. Mee	-	16.0	34.9	22.7	26.8	16.2	116.6
18	Mr. Lun	-	6.5	27.8	-	27.8	10.8	72.9
19	Mr. Poy	-	5.6	31.5	-	25.2	19.9	82.2
20	Mr. Tong	4.1	23.7	-	24.8	-	-	52.6
21	Mr. Jiam	-	5.2	20.0	-	-	-	26.1
22	Mr. Heng	-	13.9	16.3	17.4	26.8	16.9	91.3
23	Mrs. Thanyn	-	-	25.7	-	21.1	-	46.8

24	Mr. Suan	-	-	22.2	-	20.9	10.7	53.8
25	Mr. Koy	-	-	5.7	17.8	28.5	12.6	64.6
26	Mr. Prom	-	-	22.9	13.4	15.1	-	51.4
27	Mr. Saner	-	-	49.7	6.5	-	19.4	75.6
28	Mr. Parn	-	-	-	-	22.9	14.9	37.8
29	Mr. Keb	-	-	-	-	17.1	4.4	21.5
30	Mr. Lai	-	-	-	-	25.1	9.2	34.3
31	Mr. Sa	-	-	-	-	13.2	-	13.2
32	Mr. Thin	-	-	-	-	13.5	-	13.5
33	Mr. Had	-	-	-	-	19.6	-	19.6
34	Mr. Sood	-	-	-	-	22.8	5.5	28.3
35	Mrs. Payorm	-	-	-	-	-	4.4	4.4
:Total		297.7	99.6	607.4	285.5	610.1	204.2	2,067.6

(3) Bangruad Village

No.	Name							Total
		Jan.	Apr.	June	July	Aug.	Oct.	
1	Miss Pranee	14.5	2.5	30.7	7.7	16.7	15.8	87.9
2	Miss Darun- ee	19.9	4.3	15.5	6.7	15.4	12.9	74.7
3	Miss Boonta	16.8	6.2	18.2	9.1	5.9	23.8	80.0
4	Mr. Prasit	17.6	4.9	9.0	11.3	12.4	-	55.2
5	Mr. King	10.4	5.0	17.6	9.1	-	-	42.1
6	Miss Pongs- ri	21.1	1.9	14.5	5.2	13.1	23.9	79.7
7	Mr. Pongpan	16.6	6.4	14.7	10.8	6.9	12.9	68.3
8	Mr. Pirot	14.9	-	14.8	6.6	8.4	-	44.7
9	Mr. Buala	12.3	9.2	6.5	6.4	-	-	34.4
10	Mr. Winai	13.2	5.6	12.3	4.2	3.0	-	38.3
11	Miss Sang- chan	11.2	4.1	-	16.3	4.6	9.1	45.3
12	Mr. Tongmee	14.8	1.2	10.9	4.3	2.2	14.9	48.3
13	Mr. Chana	11.3	6.0	4.5	5.2	4.2	17.3	48.5
14	Mr. Pupot	10.7	5.5	16.5	10.9	8.8	11.5	64.1
15	Mr. Boonroen	12.1	-	17.7	8.1	8.6	17.1	63.6
16	Miss Pruang	10.0	3.9	16.1	10.0	9.0	12.5	61.5
17	Miss Suwan- nee	14.4	6.5	11.0	4.2	4.5	11.7	52.3
18	Miss Chal- uey	13.2	3.3	13.4	1.9	-	-	31.8
19	Mr. Amnat	13.3	2.5	13.2	6.2	7.9	11.7	54.8
20	Mr. Somchai	10.0	4.0	-	6.4	6.6	12.7	39.7
21	Miss Somnu- ey	16.9	-	7.6	5.0	3.4	11.5	44.4
22	Miss Chal- ern	16.6	9.2	19.7	12.7	2.5	16.8	77.5
23	Miss Sanit	16.0	1.6	9.5	4.7	-	5.0	36.8

24	Mr. Banchong	15.4	2.7	24.5	5.9	-	35.4	83.9
25	Miss Niem	18.1	4.2	7.3	13.8	6.1	8.1	57.6
26	Mr. Sonmai	11.8	1.9	5.9	1.8	-	-	21.4
27	Miss Rasam- ee	15.8	6.1	7.0	9.1	6.3	13.7	58.0
28	Miss Nikol	11.6	4.1	17.4	3.4	3.2	-	39.7
29	Miss Dupin	8.6	-	9.9	8.1	4.5	15.1	46.2
30	Miss Tongd- ang	-	-	17.8	-	-	15.1	17.8
31	Mr. Boonchai	-	-	-	-	4.2	-	4.2
Total		409.3	112.8	383.7	215.1	168.4	313.4	1,602.7

Table-16. Questionnaire Form (Sericultural farmer in Pilot Village)

Person engaging in sericulture:

Head of household:

Name()

Sex (Man, Woman)

Age ();No. of family ()

Have you ever engaged in sericulture ? (Yes, No)

1. Previous situation before engaged in sericulture ?

(1) Motive to engage in sericulture

a) Suggested by other person; b) Because of loan;

c) Suggested by the Government; d) Other, concretely

(2) What kind of crops have you cultivated before engaged in sericulture?

a) Rice; b) Cassava; c)Other main crop;

How was your livelihood before engaged in sericulture ?

a) Good; b)Fair; c) Bad

(3) How large area are you cultivating ? (About rai)

(4) How many heads of buffaloes, cattles or pigs have you ?

2. Situation since engaged in sericulture? (at present)

(1) Have you got any loan from the government or other source as you have engaged in sericulture ? (Roughly Baht)

(2) For what have you spent such money ?

a) Mulberry field rai; b) Rearing room rooms;

c) Other

(3) Have you been trained in sericulture at the Korat Centre?

a) Yes ; b) No

If you said yes;

(i) How many days? days; (ii) When? ,
Month Year

a) Was sericultural technique difficult for you ?

(i) Yes ; (ii) Not so ; (iii) No answer

b) Have you still kept it in mind ?

(i) Yes ; (ii) No (iii) No answer

(4) How do you think sericulture (cocoon production) since engaged?

(i) Difficult ; (ii) Easy ; (iii) Not sure

(iv) Other

(5) How many times have you reared in this year ?

(i) Times ; (ii) Cocoon crop kg

(6) Which idea have you about your sericulture ?

(i) Increase ; (ii) Maintain the present level

(iii) Decrease ; (iv) Suspend

(a) Reason of increase

(b) Reason of decrease

(7) What happened to you livelihood since engaged in sericulture?

(i) Improved ; (ii) No change ; (iii) Worsened

(8) Do you know the Korat Centre and Sub-centres?

(i) Yes (ii) No

Table-17. Questionnaire Form (Non sericultural farmer in Pilot Village)

Head of household:

Name: ()

Age : (); No.of family; ()

1. How many rai are your cultivated area ? (rai)

2. What kind of crops are you cultivated ?

Rice ; Cassava ;Other

3. How much is your income by kind of crops per year ?

4. How many heads of buffaloes, cattles or pigs have you ?

5. What kind of crops are you dependeding on to ge income ?

6. What is the most difficult problem in managing agriculture ?

7. Have you ever engaged in sericulture ?

Yeas No

8. Have you any idea to engage in sericulture ?

Yes No

Table-18. Results of Questionnaire to Sericulturists in Pilot Sericulturist Villages

Pilot Village Name	Farmer No.	Character of sericulturist		Previous situation	before engaged in sericulture			No. of buffaloes raised	No. of cattle raised	No. of pigs raised
		Head of household engaged in sericulture	Age of family		Exp. in sericulture	Motive to engage in sericulture	In sericulture			
Phimral	1	0	54	0		0	0	20	4	
	2	0	48	0		0	0	50	1	
	3	0	63	0		0	0	24	2	2
	4	0	61	0		0	0	16	2	
	5	0	41	0		0	0	24	2	
	6	0	42	0		0	0	20		
	7	0	43	0		0	0	50	1	1
	8	0	49	0		0	0	20	7	3
	9	0	73	0		0	0	20	7	1
	10	0	56	0		0	0	24	7	1
	Total 10			27	4	6	17	24	2	
Ubolrat	1	0	52	0		0	0	15	1	
	2	0	54	0		0	0	13	2	
	3	0	47	0		0	0	13	2	
	4	0	57	0		0	0	13	4	
	5	0	60	0		0	0	13		
	6	0	45	0		0	0	13	2	
	Total 10			6		6	6	66	11	

Pilot village name	Farmer No.	Character of sericulturist				Previous situation			Before engaged in sericulture			Cult. area in village	No. of buffaloes raised	No. of cattle raised	No. of pigs raised	
		Head of household engaged in sericulture	Age	No. of family	Experience in sericulture	Motive to engage in	Suggested by government	Other	Crop	Livelihood						
										Good	Fair					Bad
Chiengpin (USOM only)	1	0	45	4	0								4	6	3	
	2	0	49	7	0								2			
	Total	2			2								45	4	6	3
Mukdahan	1	0	54	6	0								24	2	1	2
	2	0	45	8	0								24	4	4	2
	3	0	49	5	0								24	4	2	8
	4	0	53	6	0								25	2	1	1
	5	0	49	6	0								24	3	2	2
	6	0	42	10	0								24	7	4	3
Total	6			24	4								24	2	1	2
Lan Dom Noi	1	0	57	5	0								15	0		
	2	0	43	11	0								15	2		
	3	0	60	4	0								15	2		
	4	0	64	11	0								15	5		
	5	0	38	7	0								15	4		
	6	0	64	4	0								15	3		
	7	0	49	7	0								15	6		
Total	7			7	-								15	2	3	2

Pilot village name	Farmer No.	Character of sericulturist				Previous situation			Cult. area in village	No. of buffaloes raised	No. of cattle raised	No. of pigs raised
		Head of household engaged in sericulture	Age	No. of family	Experience in sericulture	Motive to engage in	Suggested by government	Other				
Chiengpin (USOM only)	1	0	45	4	0							
	2	0	49	7	0							
	Total	2			2							
Mukdahan	1	0	54	6	0							
	2	0	45	8	0							
	3	0	49	5	0							
	4	0	53	6	0							
	5	0	49	6	0							
	6	0	42	10	0							
Total	6			24	4							
Lan Dom Noi	1	0	57	5	0							
	2	0	43	11	0							
	3	0	60	4	0							
	4	0	64	11	0							
	5	0	38	7	0							
	6	0	64	4	0							
	7	0	49	7	0							
Total	7			7	-							

Pilot Village Name	Farmer No.	Character of agricultural farmer			Previous situation		before engaged in sericulture				Culti- vating area	No. of buffaloes raised	No. of cattle raised	No. of pigs raised	
		Head of household engaged in sericulture	Age	No. of family engaged in sericulture	Experience in sericulture	Yes No.	Notive to engage in sericulture	Suggested by Government	Other	Crop					Good
Prasert	1	0	52	7	0	0	0	0				RAI	2		
	2	0	56	7	0		0	0					1		
	3	0	52	7	0		0	0					2		1
	4	0	40	6	0	0		0					2		3
	5	0	46	-	0		0	0					2		4
	6	0	43	8	0		0	0					2		
	7	0	60	5	0		0	0					2		
	Total	6	1	5	2	1	-								
Bangruad	1	0	52	6	0	0	0						25		
	2	0	42	8	0	0	0						25	1	
	3	0	43	11	0	0	0	0					25	2	
	4	0	55	8	0	0	0	0					25	1	
	5	0	52	11	0	0	0	0					25	3	
	6	0	38	8	0	0	0	0					50	3	
	7	0	58	10	0	0	0	0					25	4	
	Total	1	1	4	3	6									

Pilot village Name	Characters of sericulturist				Situation since		
	Farm-er No.	Head of household engaged in sericulture	Age	No. of family	Expe-rience in sericul-ture	Borrowed Government loan for engaging in sericulture	Spent for Malbe try field
	Man	Woman	Year	No.	Baht	rai	
Phiasai	1	0	64	-	0	5,000	6
	2	0	48	2	-	25,000	14
	3	0	63	9	0	15,000	11
	4	0	61	4	0	18,000	10
	5	0	41	11	0	5,000	8
	6	0	42	6	0	11,000	-
	7	0	43	9	0	23,000	20
	8	0	49	12	0	7,000	-
	9	0	73	6	0	5,000	8
	10	0	56	11	0	5,000	-
	Total	10	-		2	7	
Ubolrat	1	0	52	8	0	20,000	5
	2	0	54	6	0	20,000	5
	3	0	47	8	0	20,000	5
	4	0	57	6	0	20,000	1
	5	0	60	5	0	20,000	4
	6	0	45	6	0	20,000	1
	Total	6	-		6	-	
Chinegpin	1	0	45	4	0	25,000	8
	2	0	49	7	0	25,000	4
	Total	2	-		2	-	

engaged in sericulture										
for										
Training at the Korat Centre										
Near- ing rooms No. of house	Other	Yes	No	When Trained? Term (days)	When (Year)	Difficult?		Kept in mind ?		
						Yes	No	Yes	No	Yes
1		0		60	'72		0		0	
1		0			'74		Fair		0	
1		0		30	'74	0			Fair	
1		0		30	'74		0		0	
1		0		60	'73		0		0	
1		0		30	'74		0		0	
1		0		60	'72		0		0	
1		0		30	'72		0		0	
1		0		60	'72		0		0	
1		0		60	'72		0		0	
		10	-				3	7	-	8
1		0		30	'75		0		0	
1		0		30	'75		Fair		0	
1		0		30	'75	0			0	
1		0		-		0			0	
1		0		30	'75	0			0	
1		0		-	'76		0		0	
		6	-				4	2	-	6
1		0		Udorn 30	'77		0		0	
1		0		Udorn 30	'77		0		0	
		2	-				-	1	1	2

Pilot village Name	Characters of sericulturist				Situation since engaged in sericulture				Training at the Korat Centre				engaged in sericulture						
	Farm-er No.	Head of household engaged in sericulture	Age	No. of family	Expe-rience in sericulture	Borrowed loan for sericulture	Spent for mulberry field	Rear-Other rooms	When trained?	Difficult?		Kept in mind?		Rear-Other rooms	When trained?	Difficult?		Kept in mind?	
										Yes	No	Yes	No			Yes	No	Yes	No
Mukdahan	1	0	54	6	0	20,000	4	1	0	Mukdahan S.S.	0	0	0	0	0	0	0	0	0
	2	0	45	8	0	20,000	8	1	0	M.S.S.	0	0	0	0	0	0	0	0	0
	3	0	49	5	0	20,000	9	1	0	M.S.S.	0	0	0	0	0	0	0	0	0
	4	0	53	6	0	20,000	8	1	0	M.S.S.	0	0	0	0	0	0	0	0	0
	5	0	49	6	0	20,000	10	1	0	M.S.S.	0	0	0	0	0	0	0	0	0
	6	0	42	10	0	20,000	8	1	0	M.S.S.	0	0	0	0	0	0	0	0	0
	Total	6	-			2	4		6	-		4	2	-	5	1	1		
Lam Dom Noi	1	0	57	5	0	20,000	4	1	0		30	176	0	0	0	0	0	0	0
	2	0	43	11	0	20,000	4	1	0		30	176	0	0	0	0	0	0	0
	3	0	60	4	0	20,000	4	1	0		31	176	0	0	0	0	0	0	0
	4	0	64	11	0	20,000	5	1	0		32	176	0	0	0	0	0	0	0
	5	0	38	7	0	20,000	4	1	0		30	177	0	0	0	0	0	0	0
	6	0	64	4	0	20,000	4	1	0		30	177	0	0	0	0	0	0	0
	7	0	49	7	0	20,000	4	1	0		32	176	0	0	0	0	0	0	0
Total	7				7		4	7	-		4	2	1	5	1	1			
Preasert	1	0	52	7	0	20,000	4	2	0		40	174	0	0	0	0	0	0	0
	2	0	56	7	0	20,000	25	1	0		40	174	0	0	0	0	0	0	0
	3	0	52	7	0	16,000	10	1	0		40	174	-	-	-	-	-	-	-
	4	0	40	6	0	20,000	2	1	0		40	175	0	0	0	0	0	0	0
	5	0	46	-	0	20,000	4	1	0		40	175	0	0	0	0	0	0	0

Pilot Village Name	Famer No.	Since engaged in sericulture			Rearing times this year: (Jan- Esp.)		kg.	Inc- crease	No Change	Future plan		Reason	Does he know the Korat Centre, Sub-centres, etc.?			
		Diffi- cult	Easy	Not sure	Other	Times Cocoon Yield				Dec- rease pend- ed	In- crease pend- ed		Imp- roved chan- ge	No Wor- sened	Yes	No
Mukdahan	1	0				2	18	0				Increased income	0	0		
	2				0	3	48	0				"	0	0		
	3				0	3	47.7	0				"	0	0		
	4	0				3	2	0				"	0	0		
	5			0		3	30	0	0			"	0	0		
	6		0			3	46	5	1			-	0	0		
Lam Dom Noi	1	2	1	1	2			5					2	4	-	5
	2				0	2	15	0				Increased income	0	0	0	
	3		0			2	14	0	0			"	0	0	0	
	4				0	2	16.4	0				Increased income	0	0	0	
	5			0		2	14	0				"	0	0	0	
	6			-		-	-	-	-				-	-	-	0
	7	0				2	11		0				4	1	-	5
Prasart	1	1	1	1	-			3	2			Increased income	0	0	2	
	2				0	3	Disease damage		0				0	0	0	
	3				0	2	5		0				0	0	0	
	4	0			0	5	19		0			Increased income	0	0	0	
	5				0	2	16	0	0				0	0	0	

Pilot village Name	Characters of sericulturist farmer				Situation since			
	No. of farmers	Head of household engaged in sericulture	Age	No. of family	Experience in sericulture	Honored government loan for culture	Spent for Mulberry field	Spent for
	Man	Woman		Yes	No	Baht	rai	
Presart	6	0	43	8	0	20,000	4	
	7	0	60	5	0	20,000	4	
Total	6	1		5	2			
Baugruad	1	0	52	6	0	25,000	2	
	2	0	42	8	0	25,000	3	
	3	0	43	11	0	25,000	3	
	4	0	55	8	0	25,000	3	
	5	0	52	11	0	25,000	3	
	6	0	38	8	0	25,000	4	
	7	0	58	10	0	25,000	4	
		6	1		4	3		

engaged in sericulture									
for	Training at the Korat Centre		When trained?	Difficult?		Kept in mind?		Yes	No
	Rear- ing rooms	Other		Yes	No	Yes	No		
1	0	10	'75	0	0	0	0		
1	0	30	'75	0	0	0	0		
7	-			3	2	1	4	1	-
1	0	30	'76	0	0	0	0		
1	0	32	'76	0	0	0	0		
1	0	32							
1	0	30	'76	0	0	0	0		
1	0	30	'76	0	0	0	0		
1	0	30	'76	0	0	0	0		
1	0	30	'76	0	0	0	0		
7	-			1	5	-	6	-	-

Pilot Village Name	Farmer No.	Since engaged in sericulture			Rearing times this year (Jan-Sep)	Times Cocoon yield	Inc- No rease change	Reason		Livelihood with sericulture		Does he know the Kerat Centre, Sub-centres, etc. ?	
		Difficult	Easy	Not sure				Other	Decrease	Increase	Imp- No roved chan- sened etc.		Wor- sened etc. ?
								Dec- rease pend- ed	Inc- rease pend- ed	Imp- No roved chan- sened etc.	Wor- sened etc. ?	Yes	No
Prasart	6	0			3	Decrease damage 14	0			0		0	
	7	0			1		0			0		0	
	Total	3	-	-	4		1	6		5	1	7	-
Bangruad	1				2	21.7	0			0		0	
	2				2	24.8	0			0		0	
	3				2	14	0			0		0	
	4				2	18	0			0		0	
	5				2	26	0			0		0	
	6	0			2	20	0			0		0	
	7	1			5		4	2		6		0	6

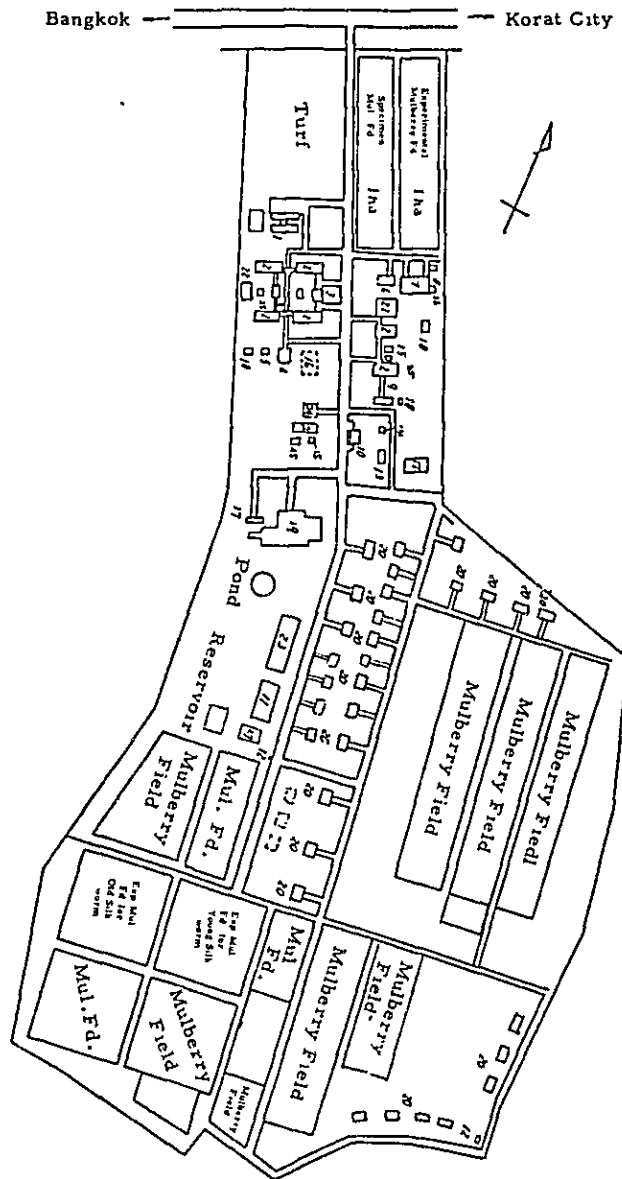
Table-1). Results of Questionnaire to Non-sericultural Farmers in Pilot Villages

Pilot village Name	Farmer No.	Age	No. of family	Cultivated crops			Cultivated area (rai)	Cultivated area (ha)	Farm income per year (Baht)	No. of buffalo raised	No. of main crops on which income depends	Most difficult problem in farm management	Experience in sericulture		Remarks
				Rice	Other								Yes	No	
Phimai	1	33	6	5	20	5	20	-	Cattle 2	Cattle		0	0		
	2	73	11	30	70	30	70	-	Cattle 6	Rice		0	0	(Labour shortage)	
	3	74	6	12	13	12	13	-	Cattle 2 Pig 2	Cattle		0	0	(Land shortage)	
Ubolrat	1	33	3	13	Banjanu	13	Banjanu	-	Bird 2 Cattle 2	Cattle		0	0	(Labour shortage)	
	2	26	3	6	" 1	6	" 1	-	-	Cattle		0	0	(Money shortage)	
	3	48	7		Mulberry		Mulberry	-	-	Chilli		0	0	(Labour shortage)	
Chainagpin	1	53	10	20	7	Mango	7	Mango	6	Rice		0	0		
	2	52	11	Banana Flower Nuts	5 2	Banana Flower Nuts	5 2	Banjanu	3	Flower		0	0		
Mukdahan	1	49	6	24	Bread tree, Mando	12	Bread tree, Mando	2,000	6	Cattle 10	Irrigation	0	0		
	2	57	10	24	3 Kenaf	3	Kenaf	2,000	4	Cattle 5	Irrigation	0	0		
	3	53	5	24	13 Kenaf	1	Kenaf	6,000	2	Kenaf, Cattle	Irrigation	0	0		
Lum Dom Noi	1	60	3	15				-	3	Rice	Inferior fund, equipments	0	0		
	2	37	8	15	1	Peanut	1	-	6	Peanut	"	0	0		
	3	75	3	15	4	Kenaf	4	-	1	Kenaf	"	0	0		

Table-19. Results of Questionnaire to Non-sericultural Farmers in Pilot Villages

Pilot village Name	Farm-er No.	Age	No. of family	Cultivated area (rai)		Cultivated crop		Farm income per year Baht	No. of buf-falo raised	Main crops on which income depends	Most difficult Problem in farm management	Experimented in sericulture		Remarks
				Rice	Other	Cas-ava	Other					Yes	No	
Prasart	1	37	5	25	25			5,000	1	Tobacco	Inferior fund, emp't	0	0	
	2	51	5	25	24			2,600	2	Peanut	"	0	0	
	3	30	4	25	15		Kenaf 3	3,000	1	Tobacco	"	0	0	
Bangruad	1	38	13	30	5	6		10,000	4	-	"	0	0	
	2	45	7	12	13			3,000 net	4	Rice	"	0	0	
	3	34	2	25	20			3,000	-	Peanut	"	0	0	

Fig. 5. Map of Sericultural Research and Training Centre,
Korat



1. Main Building
2. Rearing Room
3. Silkworm Research Room
4. Egg Refrigerator
5. Power House
6. Pebrine Inspection Room
7. Silk Reeling House
8. Boiler Room
9. Mul.Fd. Maintenance Room
10. Chemicals Warehouse
11. Mulberry Sapling Shed
12. Well
13. Water Tank
14. Water Tower
15. Rearing Tool Washing Place
16. Meteorological Observatory
17. Garage
18. Lavatory
19. Trainee Dormitory
20. Residence
21. Workshop
22. Acid Treatment Room
23. Compost Shed
24. Lecture House
25. Rearing Tool Storeroom
26. Silk Reeling Storeroom
27. Water Purification Tower

Table-20. The staff, including workers, of the Sericultural
Research and Training Centre

1st Sept. 1977

Section	Japanese expert	Officer	Permanent worker	Temporary worker
Chief	1	1		
General affairs		2	1	2
Moriculture	1	4	2	22
Silkworm rearing	1	4		4
Training	(1)	2	1	-
Breeding	1	6	4	8
Silkworm egg production	1	7	1	8
Pathology	1	4	1	-
Silk reeling	1	6	2	12
Refrigerator & Machinery		1	8	2
Total	7(1)	37	20	58

() : Concurrently served.

Table-21. Results of Business Activities of Sub-centres and Problems

	Khon Kaen	Udon	Mukdahan	Ubon	Remarks
Equipments in operation					
Rearing room(house)	3 (2)	3 (2)	2 (2)	2 (1)	() new system rearing room.
Refrigerator(")	1	1	1	1	One under construction in Mukdahan.
Mulberry field(rai)	50	110	62	60	
Total area (")	71	600	300	730	
Allocation of staff					(At this survey)
Director	1	1	1	1	() regular personnel
Technical staff	9	6	6	5	
Clerical staff	11(8)	8(9)	7(10)	6(8)	
Permanent worker	17 (18)	17 (20)	76 (17)	12 (15)	
Temporary worker	40	40	30	50	"
Silkworm egg production & distribution	Production : Distribution	Production : Distribution	Production : Distribution	Production : Distribution	(Oct. 1976-Sep. 1977)
Bivoltine F1	41,662 : 26,932	19,482 : 18,400	12,375 : 2,805	7,150 : 3,430	K1XK14, K1xg8, K1xf
"	- - 93,410	- - 100,000	18,195 : 5,400	- - 30,000	Eggs produced in the local exp. sta'n distributed in its prefecture.
Polyvoltine F2					(Oct. 1976-Aug. 1977)
Mulberry sapling's distribution(No. of cuttings)	28,800	560,000	48,000	100,000	
Pilot Villages	A few	168,000	24,000	50,000	
Other farmers	Mainly	392,000	24,000	50,000	
Training of farmers	Persons	Persons			
Pilot villages	32	303	17*	30*	(Oct. 1976-Aug. 1977)
Other	1,017	1,060	24	8	* USAID included.
Guidance at spot			693	440	30-35 days (Oct. 1976-May, 1977)
Common experiments with the Centre					1 - 4 days
Comparison experiment of hybrids	0		0		
Fertilizer application experiment	0		0		
Staff training in Japan	1976, Silkworm-egg 1	1976, Silkworm-egg 1	1972, Moriculture 1		
Year, field, persons			1974, Silkworm-egg 1	1975, Moriculture 1	
Important problems in view of business promotion and countermeasures	Distribution of disease resisting silkworm varieties. Proper allocation of personnel.			Mul. root rot control measure. Breeding of disease resisting silkworm varieties (varieties by season included)	

Table-22. List of Donated Machinery and Materials

Year	Sum 1,000 yen	Destination (kinds)
1969	68,368	For the Centre (rearing machinery, machinery for pathological research, refrigerators of silkworm eggs, machinery for mulberry cultivation, vehicles)
1970 (carry-over)	409	For the Centre (reeling machines, machines for mulberry cultivation, books)
1970	55,270	For Sub-centres (refrigerators of silkworm eggs)
1971 (carry-over)	2,824	For the Centre supplements to (reeling machines, machines for mulberry cultivation, and refrigerators of silkworm eggs)
1971	49,858	For the Centre (trenchers of back-hoe type, supplements to donated machinery and materials) For Sub-centres (rearing machinery and materials, refrigerators of silkworm eggs)
1972	49,377	For the Centre (reeling machines, machinery for engineering and iron works, vehicles) For Sub-centres (rearing machinery and materials, refrigerators of silkworm eggs) For sericultural farmers groups (machinery and materials for cooperative rearing of young silkworms)

1973	55,000	<p>For the Centre (supplements to agricultural machinery, reeling machines, fertilizers, books)</p> <p>For Sub-centres (machinery and materials for silkworm rearing, refrigerators of silkworm eggs)</p> <p>For sericultural farmers groups (machinery and materials for cooperative rearing of young silkworms, fertilizers)</p>
1974	57,000	<p>For the Centre (machinery and materials for engineering and iron works)</p> <p>For Sub-centres (apparatus for pebrine inspection, vehicles, machinery and materials for communications)</p> <p>For pilot villages (rearing tools, fertilizers, machinery and materials for mulberry cultivation)</p>
1975	41,192	<p>For the Centre (agricultural machines, supplements to reeling machines, fertilizers, audio-visual aids)</p> <p>For Sub-centres (machinery and materials for silkworm rearing)</p> <p>For pilot villages (machinery and materials for silkworm rearing, fertilizers)</p>

Year	Sum 1,000yen	Destination and kinds
1976	46,762	<p>For the Centre (supplements to agricultural machinery, reeling machines, supply fixtures fo fertilizers, pathology, silkworm egg, and breeding; sericultural tools, etc.)</p> <p>For Sub-centres (machinery and materials for silkworm rearing, fertilizers)</p> <p>For pilot villages (machinery and materials for silkworm rearing, fertilizers)</p>
1977	100,000 (plan)	<p>For the Centre (Agricultural machinery, reeling machines, fertilizers, audio-visual aids, fixtures for experiment and office use, rearing tools)</p> <p>For Sub-centres (apparatus for pebrine inspection, machinery and materials for silkworm rearing, fertilizers)</p> <p>For pilot villages (machinery and materials for silkworm rearing, fertilizers)</p>

Table-23 Raw silk production plan and results in Thailand

1. Target in Fiver Year Plan: 50 ton

Month	Product in Thailand	Import	Total
	kg	kg	kg
January		3,884	
February		4,548	
March		9,709	
April	1,240	600	1,840
May	586	6,919	7,505
June	1,480	7,485	8,965
July	2,109	4,205	6,314
August	1,602	10,183	11,785
Sept.	840	4,728	8,568
Oct.	1,204	2,388	3,592
Nov.	1,950	2,400	4,350
Dec.	1,769	3,000	4,769
January	1,640	3,900	5,540
February	1,775	2,880	4,655
March	1,511	3,600	5,111
Total	17,706	52,288	69,994

Note: Import Regulation : Start on March 4, 1976

Implementation : on April 12, 1976

2. Product of warp silk (1977)

(Unit:kg)

	May	June	July	Aug.	Total
Chul Thai Silk (Petchaboon)	-	230	720	440	1,390
Somsap Thai Silk (Korat)	99	105	170	28	402
Pairroj Thai Silk (Rayong)	134	-	100	150	384
Chaya Business and Agriculture (Chumporn)	30	56	-	-	86
Total	263	391	990	618	2,262

(Sources) Department of Industry Promotion
 THAI Silk Promotion Board
 THAI Silk Association

Seminar on Silk Marketing
 (Oriental Hotel 20 Sept. 1977)

Table-24. Polyvoltine Silkworm Rearing in Thailand

Year	Province	Farmer (Families)	Mulberry (Rai)	Raw Silk (kg)
1970	16	335,352	188,963	479,380
1971	16	397,803	233,990	443,114
1972	25	380,708	233,352	498,640
1973	27	457,774	264,668	571,584
1974	30	431,906	322,913	705,861
1975	30	455,103	335,365	637,109

Table-25 Plan of silkworm egg production applied to
10 USOM Settlements for the year 1977 - 1978
(March 1977)

Sub-Centre	Year, month Terms	1977			1978	Total
		June	August	October	January	
Khon Kaen	Batches of Hakitate	130	130	230	230	720
	Sheets of eggs produced	160	160	300	300	920
Udon	Batches of Hakitate	300	350	400	350	1,400
	Sheets of eggs produced	380	400	530	450	1,820
Mukdaharn	Batches of Hakitate	130	230	180	120	710
	Sheets of eggs produced	230	300	230	150	910
Ubol	Batches of Hakitate	120	230	120	120	590
	Sheets of eggs produced	150	300	150	150	750
Total	Batches of Hakitate	750	940	930	820	3,420
	Sheets of eggs produced	920	1,220	1,210	1,050	4,400

Note: Domestic silkworm eggs for 4 rearings.
Imported silkworm eggs for 2 rearings.

Table-26. Financial Analysis and Plan (USAID)

1. Production/Revenue Relationships

The following tables based on the present design of the project provide background in considering the economic, marketing, and financial implications of the projects.

Per farmer:

Mulberry area 4 rai
 Leaf production @ 1,053 kg/rai/yr.) 4,212kg/yr.
 Cocoon production (6 cycles @39kg/cy (1) 234kg/yr.
 No. of boxes of eggs (6 cycles & 2/cycle) 12 Boxes/yr.
 Farmer revenue @ B 50/kg. with 10% losses) B10,530/yr.

Total Project (with 10% losses)

	1st yr.	2nd yr.	3rd yr.	4th yr.	5th yr.
Production (kg.)	63,180	126,360	189,540	252,720	315,900
Revenue (B 1,000 @ B50/kg.)	3,159	6,318	9,477	12,636	15,795
Warp yarn					
Production (kg.)	7,897.5	15,795	23,692.5	31,590	39,487.5
Total value (2)	4,748.5	9,477	14,215.5	18,954	23,692.5

(1) Ranges from 34 to 44 kg./cycle, i.e. $\pm 15\%$

(2) Includes value added by reelers which is approximately 1/3 of the total value according to Nathan report.

Table-27. Implementation Schedule
(PWD Sericulture/Settlement Project)
(C.Y. 1977 - 1978)

	1st Jan.-Feb.	2nd June-July
1. Sericulture Supervisor Training	1st group trained at Korat Jan.-Feb.	2nd group trained at Korat Jan.-Feb. '78
2. AG Extension worker Training	1st time (Jan.-Feb.) trained at Korat (Prasat, Bangruad)	2nd time (June-July) trained at Korat (Ubolrat)
3. Training of Farmers and silkworm rearing (1st Group)	1st silkworm rearing July-Aug. (2 settlements)	2nd silkworm rearing Sept. (4 settlements)
(2nd Group)	1st time Feb. '78 Trained at Surin (Prasat, Bangruad)	1st time (June-July) trained at Surin (Phonphisea)
4. YSERH	Contract signed and begin the construction (Jan.)	PWD Procurement of equipped supplies (Apr.) Construction completed (Apr.)
5. OSWRH	1st group starts building Completed (June)	Headquarter approved the loan (May)
6. BAAC		

(Note) * Surging Training Centre begin construction (March)

Preparation of mulberry leaves to feed the old worms March - Apr.

Preparation of mulberry leaves to feed the young worms May

PWD request the new position of the second group of AG Extension workers. Aug.-Sep. OSC Approved the position Oct. Assigned Jan. '78

3rd time (Aug-Sept.) Trained at Korat (Makdahan, Chiang pin)

4th time (Oct.-Nov.) (La' Dom Noi, Lam Dom Yai)

3rd silkworm rearing 4th silkworm rearing 5th silkworm rearing

Oct.-Nov. (6 Settlements) Dec. (6 settlements) Jan.-Feb. '78 (10 settlements)

2nd time (Dec.-Jan. '78) Trained at Surin (Lampao, Kuchinarsai)

Table-28. List of Experts dispatched on the Cooperation Project
for the Development of Thai Sericulture
(Long-term Experts)

Speciality	Name of Experts	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Project Leader	Sainosuke OHMURA Toshiro SUGIYAMA	9/1←						→4/9← 4/1←			→5/7
Moriculture	Shiroshi GOTO Eki IWATA Kazuhiko YAMAKAWA Yoshito YANO	9/1←		→6/13 5/19←		→3/31 →3/26←		→3/28 3/25←	9/20← →2/24		→3/7
Silkworm Rearing	Tsunao KUWANO Shigeji KURIBAYASHI Makoto SUDO				8/22←			→3/31 3/25←	→9/24 9/20←		→3/7
Silkworm Breeding	Moriaki AZUMA Hideo ONODERA Yoshikiyo EGUCHI	9/1←			→8/31 9/14←			→3/31 3/25←			→3/7
Egg Production	Yujiro HAYASHI Tadashi RYOCHI		6/10←			→6/9 5/30←					→3/7
Pathology	Kiyoshi AOKI Setsumi ITOI Isao FUJIMOTO	9/1←			→8/31 9/14←				→3/7 3/19←		→3/7
Silk Reeling	Takushi KOJIMA Jousuke MURAYAMA Shiji MARIYAMA			3/24←			→3/23 2/9←	→3/28 4/3←			→3/7

(Short-term Experts)

Speciality	Short-term Expert	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Reeling Technique	Heruko SHIRAKURA			↔ (9/23-11/23)							
Regulation of doubling and throwing machine	Kazuo KOBAYASHI			↔ (12/5-12/16)							
Installation of egg collecting equipment	Satoshi TAMAISHI				↔ (11/27-1/10)						
"	Minoru SAHO				↔ ()						
"	Naotoke HAYAKAWA				↔ ()						
Installation of cocoon drying machine	Yuji OHTSU				↔ (3/7-3/28)						
Installation of automatic reeling machine	Akitake KOMATSU				↔ (5/21-6/23)						
"	Kiyoshi YOSHIZAWA				↔ ()						
Reeling Technique	Reiko TATE				↔ (8/1-8/30)						
Installation of refrigerator	Tsuyoshi NAKAMURA				↔ (6/20-7/19)						
"	Tadashi SANO				↔ ()						
"	Tekeo KASHI				↔ ()						
Soil Survey	Makoto SUZUKI				↔ (11/1-12/31)						
Reeling Technique	Koyoka MURAYAMA				↔ (11/25-12/24)						
Sericultural Management	Atsushi OHTSURA				↔ (3/25-9/24)						
Maintenance of Egg Refrigerator	Saburo IGARASHI									↔ (6/14-7/27)	
Reeling Technique	Hiroo YAMAMOTO									↔ (6/14-7/13)	

Table-29 List of Survey Mission on the Cooperation Project
for the Development of Thai Sericulture

Name of Survey Mission	Term of Dispatch	Leader and No. of members	Remarks
Japanese Survey Mission on the Agricultural Development Cooperation in Thailand	July 3-Aug. 8, 1968	ISHIKURA and 4 members	
Japanese Survey Mission on the Implementation of Cooperation in the Development of Thai Sericulture	Feb. 18-Mar. 10, 1969	OHMURA and 4 members	Signed the 1st Record of Discussion
Japanese Guidance Team on the Cooperation Project for the Development of Thai Sericulture for 1969	Feb. 26-Mar. 18, 1970	KOIWAI and 3 members	
" for 1970	Nov. 9-28, 1970	NIKI and 2 members	
" for 1971 (1st)	Dec. 11-25, 1971	FUKUDA and 2 members	
" for 1971 (2nd)	Feb. 27-Mar. 9, 1972	FUKUDA and 2 members	Signed the 2nd Record of Discussion
" for 1972	Mar. 22-Apr. 11, 1973	ASHINO and 4 members	
" for 1973	Feb. 23-Mar. 15, 1973	ITO and 4 members	
Japanese Evaluation Mission of the Development of Thai Sericulture for 1974	Nov. 1-15, 1974	HAZAMA and 3 members	
Signed the 3rd Record of Discussion (JICA Bangkok Office)			
Japanese Consultation Team on the Cooperation Project for the Development of Thai Sericulture	Aug. 25-Sep. 6, 1975	SUGIHARA and 3 members	

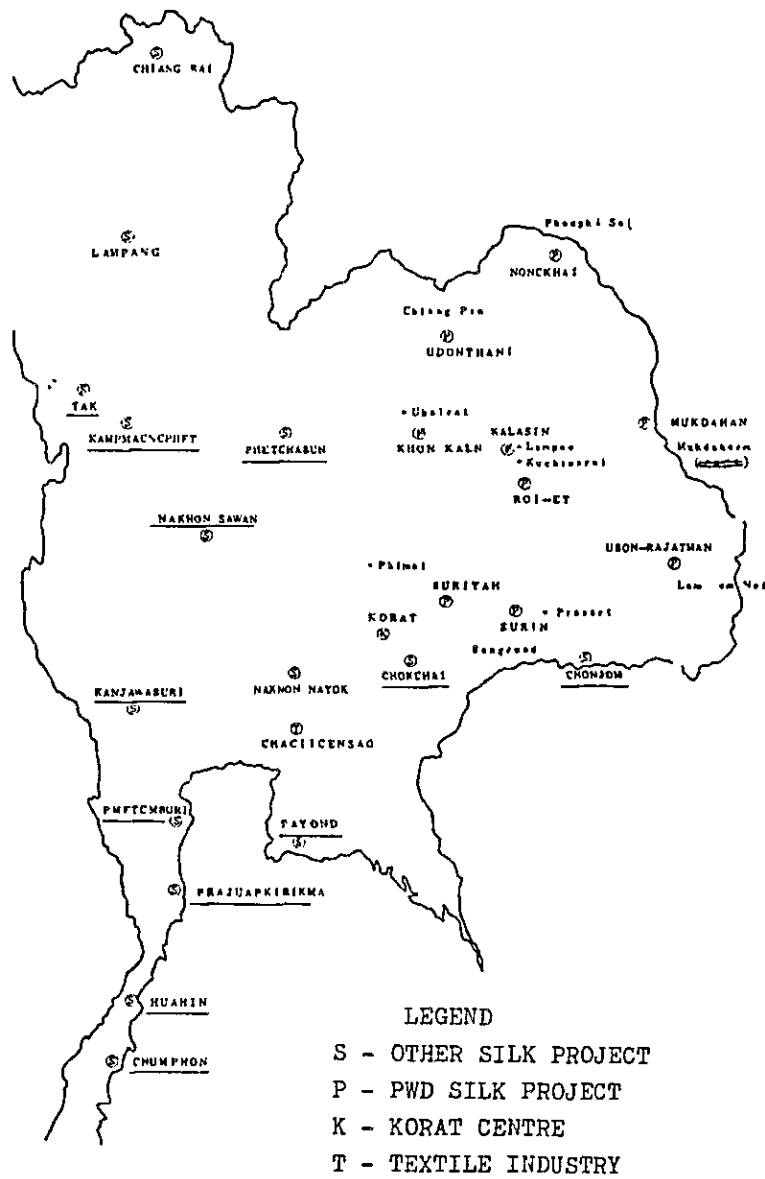
Japanese Guidance Team on the Cooperation Project for the Development of Thai Sericulture	Nov.30-Dec.6, 1976	HAZAMA and 3 members	
Japanese Evaluation Team on Thai Sericultural Development Cooperation Project	Sep.15-Oct.7, 1977	MORI and 5 members	

Table-30. List of Publications on the Cooperation Project
for the Development of Thai Sericulture

Name of Publications	Month of Publication	Publisher
Report of the Japanese Survey Mission on Agricultural Development Cooperation in Thailand	December 1968	Overseas Technical Cooperation Agency
Report of the Japanese Survey Mission on the Implementation of Cooperation in the Development of Thai Sericulture	March 1969	"
Pebrine Disease of Silkworm	March 1971	"
Report of Japanese Guidance Team on the Cooperation Project for the Development of Thai Sericulture for 1970	June 1971	"
" for 1971	May 1972	"
" for 1972	June 1973	"
Bulletin of the Thai Sericultural Research and Training Centre No.1	June 1971	"
" No.2	December 1972	"
" No.3	August 1973	"
Silkworm Rearing Technics in the Tropics	March 1973	"
List of Donated Machinery and Materials on the Development Cooperation Project for Thai Sericulture	March 1973	"
Business Report on the Cooperation in the Development of Thai Sericulture (September 1969-December 1973)	January 1974	"
Bulletin of the Thai Sericultural Research and Training Centre, No.4	May 1974	"

Report of Japanese Guidance Team on the Sericultural Cooperation Development in Thailand for 1973	August 1974	Japan International Cooperation Agency
Summary Report on the Technical Cooperation Project for the Sericultural Development in Thailand for 1974	January 1975	"
Bulletin of the Thai Sericultural Research and Training Centre, No.5	May 1975	"
Report of Japanese Consultation Team on the Cooperation Project for the Development of Thai Sericulture	September 1975	"
Report on the Sericultural Management on the Cooperation Project for the Development of Thai Sericulture	November 1975	"
Bulletin of the Thai Sericultural Research and Training Centre, No.6	May 1976	"

Fig.-6. SERICULTURE & SILK DEVELOPMENT IN THAILAND



JICA

2025