JOINT EVALUATION REPORT ON THE PROJECT FOR PROMOTION OF POPULARIZING THE PRACTICAL BIVOLTINE SERICULTURE TECHNOLOGY IN INDIA

April, 1999

Japan-India Joint Evaluation Committee

CONTENTS

LIST OF ANNEXES

1. BACKGROUND AND OUTLINE OF THE PROJECT

1－1. Background of the Project

Silk consumption in India is increasing continuously, however, the majority of Indian silk is produced from multivoltine sericulture which is not suitable for warp. A large quantity of bivoltine silk is being imported from China.

Ministry of Textiles, India had planned to promote high quality silk production to meet the increasing domestic demand by introducing bivoltine sericulture technology.

Under the plan, Central Silk Board (CSB) had implemented the Bivoltine Sericulture Technology Development Project (BSTDP) to improve bivoltine sericulture technology in the institutes of CSB, with the Project-type technical cooperation of Japan International Cooperation Agency (JICA), from June 1991 to March 1997. BSTDP cooperation was successfully accomplished with the major achievements, such as development of new bivoltine silkworm races and cultivation practices for high yielding mulberry varieties.

The Government of India had planned a project to verify, demonstrate and popularize the CSR bivoltine technology developed through BSTDP, and made proposal for Project-type technical cooperation of JICA.

After a series of discussions for preparation, the Project for Promotion of popularising the Practical Bivoltine Sericulture Technology (PPPBST) was started from 1st April, 1997.

1－2. Outline of the Project

PPPBST is designed with the purpose to practicalise the technology developed by BSTDP for the future dissemination activities among farmers and reelers by the initiation of the Indian Government.

The Project has six major fields of activities namely, 1) maintenance of silkworm race, 2) silkworm seed production, 3) silkworm rearing and disease control technology, 4) mulberry cultivation, 5) silk reeling technology and 6) training.

The Project designed to achieve the following outputs through the activities. 1) improvement of the technology developed by BSTDP, 2) verification, demonstration and popularization of the technology developed by BSTDP at selected farmers and reelers for future extension and 3) training of technical staff of CSB and department of sericulture (DOS) of concerned states.

2. METHODS OF THE EVALUATION

2－1. Purpose of the Evaluation

The evaluation activities were performed with the purposes of:
1) Evaluate the degree of achievement based on the Tentative Detailed Implementation Plan (TDIP) during last two years of the Project;
2) Identify problems on any aspects of Project implementation and propose necessary solution; and
3) Assess the appropriateness of TDIP for the rest of the Project period.

2－2. Composition of the Joint Evaluation Committee

(1) Japanese members

1) Chairman of the committee
Mr. Fumihide NISHI,
Executive Director, Japan Silk Association Inc.

2) Dr. Shigeo IMANISHI,
Chief, Cell Engineering Laboratory, Insect genetics and Breeding Department,
National Institute of Sericulture and Entomological Science,
Ministry of Agriculture, Forestry and Fisheries (MAFF)

3) Mr. Hiroshi SUZUKI,
Deputy Director, Upland Crop Division,
Agricultural Production Bureau, MAFF

4) Mr. Ichiro MUKAI,
Deputy Director, Livestock and Horticulture Division, Agricultural Development Cooperation Department, JICA

5) Dr. Yukita SATO,
Staff, Livestock and Horticulture Division, Agricultural Development Cooperation Department, JICA

(2) Indian members

1) Dr. Ramaswamy Dwarakinath,
Member of State Planning Board,
General Council of Manage, Research Council of CSB, Ministry of Textiles

2) Dr. Rajat Kumar Datta,
Director of Central Sericultural Research and Training Institute (CSRTI),
CSB, Ministry of Textiles

3) Dr. T.H.Somashekar,
Director of Central Silk Technological Research Institute(CSTRI),
CSB, Ministry of Textiles

4) Dr. M.Vines Samson,
Director of Silkworm Seed Technology Laboratory (SSTL),
CSB, Ministry of Textiles

2－3. Items of the Evaluation

The following items were evaluated.

1) Inputs
2) Appropriateness of the Project Design
3) Achievement
4) Prospects for Sustainability
5) Impact
6) Amendment of TDIP

2 － 4 ． Schedule of the Evaluation

Date	Schedule
Mar. 25 Thr.	Formulation of the Committee Evaluation of silkworm seed production (NSSP and SSTL)
26 Fri.	Evaluation of silk reeling technology (CSTRI)
27 Sat.	Evaluation of other activities (CSRTI and DOS, Karnataka)
28 Sun.	Preparation of the report
29 Mon.	Field visit to selected farmer, reeler, cocoon market
30 Tue.	Discussions and report preparation
31 Wed.	Discussions and report preparation
Apr. 1 Thr.	Presentation of report to the Joint Coordinating Committee meeting,

3. Results of the Evaluation

3－1. Abstract of Evaluation Results

The Bivoltine Sericulture Technology developed through the past cooperation between CSB and JICA has been gradually verified and demonstrated at the " selected farmers " level, and improved based on the feedback from the results with the efforts of the personnel concerned to this Project.

In the first crop of verification and demonstration at the selected farmers, the result was unsuccessful mainly due to lack of preparation and insufficient understanding of technology and the silkworm disease control measures. The lessons learnt from the first crop have helped in successful verification and demonstration of subsequent crops.

Realising the benefits of bivoltine sericulture, Government of Karnataka has taken measures to assist farmers for the promotion of bivoltine with continuous guidance and assistance of JICA Experts and counterparts of CSB.

Therefore, it is concluded that the purpose of the past two years' Project has been achieved to a large extent.

These successful results are owing to the concerted efforts and guidance by the counterparts and the Japanese Experts as well as necessary support, such as subsidy, provision of necessary equipment and materials, of CSB and DOS, Karnataka. Moreover, the promotion of bivoltine sericulture to those other than the selected farmers of Karnataka state is still necessary for further re-inforcement and development.

Thus, several issues are required to be solved to establish and to sustain the Project outputs towards the termination of the cooperation.

The following issues are recommended as indispensable countermeasures: Continuation of present concerted efforts and guidance by the counterparts and the JICA Experts to the farmers, reelers and technical staff of DOS; and formulation and implementation of bivoltine sericulture promotion plan by CSB and concerned states.

3－2. Inputs

Inputs from both Japanese and Indian side are annexed.

3－3．Appropriateness of the Project Design

The Project design is thought to be appropriate, because the promotion of bivoltine sericulture has been intensively supported by both central and concerned state Governments.

3－4．Achievement

Progress reports submitted by the Project team are attached.
The detailed evaluation is in the attached sheets. The highlights are as follows.

(1) Maintenance of Silkworm Race

CSR race maintenance and multiplication technologies have been verified and demonstrated to basic seed farmers (BSFs) under the newly arranged multiplication and distribution system. Long-term training for technical staff of BSFs as well as enlightenment programme on silkworm race maintenance and multiplication have been conducted.

Further emphasis is required in maintenance and multiplication of basic stocks with special reference to racial characters of CSR breeds.

(2) Silkworm Seed Production

Bivoltine silkworm seed production technologies have been verified and demonstrated and a manual for these has been prepared by SSTL. Maintenance and multiplication of CSR breeds have been conducted at NSSP, and these technologies have also been verified and demonstrated at BSFs and selected farmers.

However, in certain crops of BSFs and certain cases of seed supply, difficulties were observed. It is necessary to re-emphasize and intensify management of silkworm disease control in BSFs, selected seed farmers and quality control in mass egg production.

(3) Silkworm Rearing and Disease Control Technology

Silkworm rearing and disease control technology verified and demonstrated have brought fruitful outcome such as popularising the young silkworm rearing technology. After identification of the causes of silkworm disease, suitable control measures have been successfully introduced to selected farmers.

Therefore, the activities in this field have been successfully carried out. It is recommended further continuation of training to make technical staff aware of importance of silkworm disease control management.

(4) Mulberry Cultivation

Cultivation technology of new mulberry cultivars has been verified and demonstrated. The demonstration mulberry gardens have also been established. Besides, mulberry varieties suitable for young and late age silkworm are being tested.

However, in general, it is evaluated that the adoption of the recommended technology by the farmers, especially doses of fertilizer application and pruning practice of mulberry is behind schedule.

(5) Silk Reeling Technology

Silk reeling technological package for CSR race cocoon has been successfully verified and demonstrated at CSTRI and selected reelers, and a manual has been prepared. Training for technical staff of CSB and DOS, Karnataka and selected reelers as well as enlightenment programmes for the purpose to improve raw silk quality have been conducted.

Therefore, the activities in this field have been successfully carried out.

(6) Training

Scheduled training and enlightenment programmes have been successfully planned and conducted. Thus, improved bivoltine sericulture technologies have been introduced and understood by technical staff of CSB and DOS, Karnataka as well as farmers and reelers.

Therefore, the activities in this field have been successfully carried out.

3－5．Prospects for Sustainability

The outcome of the Project indicates that there is good prospects for future sustainability.

The prospects are evaluated on the basis of the following.

Excellent counterparts of CSB and Karnataka state have been created. Bivoltine sericulture support programme has been vigorously promoted by Karnataka state and stable bivoltine cocoon production has been gradually realised by selected farmers.

Nevertheless, the following measures are found necessary to ensure the prospects of sustainability.

Close coordination among the Project related organizations namely, CSB, DOS, Karnataka and Project Team may be further strengthened and continued.

Concrete plan to demonstrate and popularize bivoltine sericulture technology with adequate support to selected and new bivoltine farmers has to be formulated and implemented by the concerned states.

3－6．Impact

The production and quality of bivoltine cocoon have significantly increased and improved with selected farmers.

The awareness and understanding on the superiority of bivoltine cocoon are realised through the training and enlightenment programmes. The reelers' demand for bivoltine cocoon has increased. Besides, a large number of farmers has realised the benefits of raising bivoltine crops and are showing keen interest to rear bivoltine not only in Karnataka but also in other states.

3－7．Amendment of TDIP

As a result of the evaluation, it can be concluded that the objectives of past two years' Project has been almost achieved. Hence, there is no necessity to amend the TDIP for the rest of the cooperation term.

4. Recommendations

The following issues and necessary measures are recommended by the Joint Evaluation Committee as a conclusion.

(1) Close coordination among the Project related organizations namely, CSB, DOS, Karnataka and Project Team may be further strengthened and continued.

(2) Allocation of necessary budget ,to strengthen the extension activities of counterparts, may be made.

(3) Introduction of cocoon auction system with quality classification is recommended.

(4) Strengthening of the management of disease control and quality control in silkworm seed production are required.

(5) Concrete plan to demonstrate and popularize bivoltine sericulture technology with adequate support to selected and new bivoltine farmers has to be formulated and implemented by the concerned states. Such plan must include necessary support, such as improving facilities of CRCs, re-strengthening of functions of TSCs and development of human resource for bivoltine extension services.

JOINT EVALUATION COMMITTEE

Highlights of Observations of Dr. R. Dwarakinath

Evaluation Strategy

The approach adopted was most appropriate, considering the time constraint. Based on the TDIP, each activity was subjected to "self evaluation" by the concerned functionaries. The "activity status" was reviewed at the individual, team and institutional levels, before being presented to the JEC. The exercise provided valuable learning experience to those involved in the task, for improving future action.

Project Design

PPPBST, in reality, is a follow-up project of BSTDP. Its major focus is on developing practical technologies based on the technology outputs of the previous project. It is critically important that, within the purview of this project, efforts are concentrated on maintaining the technology standards already set, and on adapting these technologies to different local situations through verification. This will help promotion and stabilization of the BST based sericulture industry. Other original research efforts by the counterpart agencies must be regarded as supplementary to this project.

Policy Aspects

Establishing and imparting BST in user's situations (farmers, reelers and seed producers) is a task that requires investment of many technical mandays. Otherwise, the adoption of BST will be defective leading to all-round frustration. But, at present, funding for the fieldwork seems to be inadequate. This constraint needs to be removed.

While verification and demonstration of BST are mainly the responsibility of CSB, popularization of BST is the responsibility of DOS. A good working relationship, in this regard, between CSB and DOS already exists. It is necessary that on the basis of the experience gained so far, this relationship is further streamlined and institutionalized in order to ensure more effective and rapid transmission of BST to the field. It appears possible, in this context, for KSSDI to forge closer links with the project.

Training

There is a solid component of training activity in the project, with a focus on the technologists, field staff, farmers, and seed producers. In the last two years, many training events have been conducted. Based on this experience, it is possible to further strengthen the training component. reelers

1. Since each training course in the project is intended to enhance the competence in performing a particular job, it is possible, in the light of the present experience, not only to refine the course design but also to identify the specific set of skills to be dealt with in training. For the purpose of making the **skill training** more effective, it is necessary to ensure a benchmark assessment as well as a terminal assessment, for comparison.

2. In the **teacher's training** courses, it is necessary that attention is given not only to the technology aspects but also to educational methodology and management aspects, in addition to extension education for the technical staff.

3. In its totality, the training should aim not only at capacity building but also at institution building, in terms of norms of performance and organizational interactions. This is necessary for ensuring effectiveness and sustainability in technology delivery.

Extension

Apart from generation of BST, as noted earlier, the responsibility of CSB includes **verification** to fit the technology to a given agro-climatic and socio-economic situation, and **demonstration** to prove the worth of the recommended technology under different conditions. Popularization of BST is understood as the responsibility of DOS. In this background, the extension strategy for BST may take the following points into consideration:

1. Project must work in the pre-determined areas for the rest of the period in order to establish time-tested validity for BST Shifting locations from time to time defeats this purpose.

2. In these locations, it should work with the selected groups of clients (in preference to individuals) in order to secure the multiplier effect in technology transfer process.

3. Activities like enlightenment, verification, demonstration and popularization must be looked upon as inter-related chain of events rather than as disparate events, in order to enhance the total effectiveness of the extension effort.

LIST OF ANNEXES FOR INPUTS

(1) Inputs from Japanese side

- Experts
- Training in Japan
- Equipment

(2) Inputs from Indian side

- Counterparts
- Running cost

INPUT BY JAPANESE SIDE

Despatch of experts (Long term) for PPPBST Project

FISCAL YEAR	NAME (FIELD)	YEAR	1997	1998	1999	2000	2001
1997 to 2001	Dr. K. KAWAKAMI - (Team Leader)		4/10		4/9		
	Mrs. J. ICHIMURA – (Coordinator)			4/11			
	Mr. S. OSAKA – (Coordinator)			7/27		7/26	
	Dr. K. TAKAMIYA - (Silkworm Breeding)			4/4			
	Ms. H. MATSUO - (SW Race Maintenance)			5/28		5/27	
	Dr. K. KURATA - (SW Rearing & Disease Control)		5/8		5/7		
	Dr. H. YAGITA – (Mulberry Cultivation)		4/10		4/9		
	Mr. A. YAMAZAKI - (Mulberry Cultivation)				5/25		5/24
	Mr. T. MIYAKODA – (Training)		5/8		5/7		

INPUT BY JAPANESE SIDE

Despatch of experts (Short term)

FISCAL YEAR	NAME (FIELD)	1997	1998	1999	2000	2001
1997	Mr. YODA - (Silkworm Reeling)	9/4 —— 12/3				
	Mr. K. YAZIMA – (Silkworm Reeling)	11/9 —— 2/7				
	Mr. M. MOMOSE – (Sericulture Extesnion)	9/4 —— 12/3				
	Mr. Y. MATSUURA – (SW Eee production)	10/16 —— 12 /15				
	Mr. H. MIYAZAWA – (Installation of Cold Storage)	9/4 —— 10/2				
	Mr. N. OKUHARA – (Installation of Cold Storage)	9/4 —— 10/2				
1998	Mr. Y. SEKINO (Coordinator)		5/28 —— 8/7			
	Dr. M. MAURA – (Young age SW rearing & Mounting)		9/27 —— 11/26			
	Mr. T. HARA – (Sericulture Extn.)		9/27 —— 11/26			
	Mr. T. TSUCHIYA – (Mass SW egg production & quality control)		9/27 —— 12/25			
	Mr. Y. ISHIZAKA – (Silk Reeling)		12/ 3 —— 12/17			
	Mr. K. YODA – (Silk Reeling)		1/29 —— 4/24			
	Mr. S. NAKAZAWA – (Maintenance of SW egg cold storage)		9/27 —— 10/16			
	MrR. M. HORIGUCHI – (Installation of SW egg cold storage)		11/ 15 —— 12/7			

INPUT BY JAPANESE SIDE
Despatch of Indian counterparts

FISCAL YEAR	NAME (FIELD)	1997	1998	1999	2000	2001
1997	Dr. T. PAVAN KUMAR – (Management of SW egg production)	9/7 ——— 9/25				
	Mr. K.N. MAHESH – (Silkworm Race Maintenance)	3/1	——— 7/5			
	Dr. G. K. KALPANA – (Silkworm Race maintenance)	3/1	——— 7/5			
	Dr. Y. D. REDDY (Silkworm egg production)	3/1	——— 7/5			
1998	Dr. M.T. HIMANTHA RAJ (Silkworm Rearing)		4/13 ——— 8/5			
	Mr. NOOJI I BHAT - (Extension & Training)		4/13 ——— 8/5			
	Mr. SHANKARA (Silkworm Race Maintenance)		4/13 ——— 8/5			
	Dr. K.L. RAJANNA (Seed Production)		4/13 ——— 8/5			
	Mr. K. BOGESHA – (Agri. Exten. System group training)		5/5 ——— 7/10			

INPUT BY JAPANESE SIDE

Equipment supply

	1997	1998	1999	2000	2001
Equipment for supply i)Purchased and shipped in Japan ii)Local procurement	i) 31,002,000-(Japanese Yen) ii) Rs.328,797-	i) 21,000,000-(Japanese yen) ii) Rs.2,157,603- (upto 31/12/1998)			
Equipment accompanied with Japanese Experts (Local procurement)	Rs.733,518-	Rs.173,402- (upto 31/12/1998)			

Enlightenment Activities

	1997	1998	1999	2000	2001
Enlightenment Activities	Rs.917,524-	Rs.639,727- (upto31/12/1999)			

INPUT BY JAPANESE SIDE

A list of Equipments (costed more than 1.6Million Japanese Yen) Up to Dec. 31, 1998

Fiscal Year	Number	Namme of the equipment	Price (Jap. Yen)	Quant.	Users of the Equipments.	State of the use	State of mainte.	A remark
1997	97-14 97-15	Vehicle: TOYOTA LAND CRUISER STATION WAGON 4X4	2,735,000 (Jap. Yen)	2	CSR&TI, Mysore.	A	A	At present, 1 Vehicle is under repairing because of an accident.
	97-16	BREEDING COCOON CUTTING MACHINE	1,980,000	1	NSSP, Bangalore	A	A	
	97-17	COCOON EGG LOW TEMPERATURE ROOM	4,728,000	2	NSSP, Bangalore	A	A	

A list of Equipments (costed more than 100Thousand but less than 1.6Million Japanese Yen) - 1

Fiscal Year	Serial Number	Namme of the equipment	Supplied number	Disposed number	Present number	State of the use	State of mainte.	The reason of disposal etc.
1997	97-01	OHP:Sumitomo 3M. Model:9700.	1		1	A	A	
	97-02	Video Camera:Sony Handycam High8. TRV-91.	1		1	A	A	
	97-03	Computer set;PACKARD BELL P-100Mhz /HP DJ200 PRINTER and others.	1		1	A	A	
	97-04-1 97-04-2	TV-Set:29inchs BHL NQR29.	2		2	A	C	1 set was stolen at lecture room.
	97-05	Data Station:IBM 300GL 133Mhz.	1		1	A	A	
	97-06-1 97-06-2	Computer set:NICROTEK /HP DJ760C PRINTER and others.	2		2	A	A	
	97-07	Computer set:HCL BEANSTALK and others.	1		1	A	A	
	97-08	Copy Machine:MODI XEROX Model5510	1		1	A	A	
	97-09	Copy Machine:MODI XEROX Model5828 SYS□	1		1	A	A	
	97-10	Circular pressurised cooking machine: stainless steel ϕ 915x400	2		2	A	A	
	97-11	Small reel permeation chamber:stainless steel D2001t. ϕ 750x600	2		2	A	A	
	97-12	Moss crushing machine:rotary mixer 12000rpm. 3001t.	4		4	A	A	
	97-13	Centrifuge:Model R23/Max. sp. 7000rpm.	4		4	A	A	
1998	98-01	FAX machine:MODI XEROX MODEL-F2900	1		1	A	A	
	98-02 98-03	Phase contrast microscope:LIVING THING MICROSCOPE SEB-3	2		2	A	A	

A list of equipments (costed more than 100thousand but less than 1.6million Japanese Yen) -2

Fiscal year	Serial Number	Name of the eqipments	Supplied number	Disposed number	Present number	State of the use	State of mainte.	The reason of disposal etc.
1998	98-04	Cold Strage:Mitsubishi ERA-RH08A	1		1	A	A	
	98-05	OHP:3M Model 9700	1		1	A	A	
	98-06	Laptop computer:PC"THINKPAD 385DX"	1		1	A	A	
	98-07	Computer set:ZENITH PC Model-1 and others	1		1	A	A	
	98-08	Electric data filing machine:SONY P.MD FILE PDF-V55	1		1	A	A	

INPUT BY INDIAN SIDE

Counterpart allocations for PPPBST project

FIELD	NAME OF THE COUNTERPART	INSTITUTION	TRG.IN JAPAN (JICA)	TRG. INSTI-TUTE	LINGUISTIC AVAILABILITY
Silkworm Race Maintenance	H.K. Basavaraja	CSRTI, Mysore	1992	NISES	Kannada, Eng., Jap., Hindi
	N. Mal Reddy	CSRTI, Mysore		NISES	Kannada, Eng., Hindi.
	M. Ramesh Babu	CSRTI, Mysore			Kannada, Eng. Telu, Tamil
	S. Nirmal Kumar	CSRTI, Mysore	1993	NISES	Kannada, Eng., Jap., Hindi, Telu.
	G.V. Kalapana	CSRTI, Mysore	1997	NISES	Kannada, Eng., Hindi
Silkworm Rearing	R.K. Rajan	CSRTI, Mysore	1993	NISES	Eng., Malayalam, Jap. Hindi
	M.T. Himantha Raj	CSRTI, Mysore	1998	NISES	Kannada, Eng., Tamil
	G.B. Singh	CSRTI, Mysore	1994	NISES	Kannada, Eng., Hindi, Jap.
	R. Singh	CSRTI, Mysore			Hindi, Eng.
	P.S. Rao	CSRTI, Mysore			Hindi, Eng, Telugu, Kannada
Disease Control	B. Nataraju	CSRTI, Mysore	1992	NISES	Kannada, Eng., Hindi
	M. B.V. Subbaiah	CSRTI, Mysore			Kannada, Eng., Telu.
	Virendra Kumar	CSRTI, Mysore	1999	NISES	Hindi, Eng, Kannada
	T. Selvakumar	CSRTI, Mysore			Tamil, Eng. Kannada
Mulberry Cultivation	A. Sarkar	CSRTI, Mysore	1992	NISES	Bengali, Eng., Hindi, Jap.
	R. Balakrishna	CSRTI, Mysore			Kannada, Eng., Hindi, Telugu
	P. Thippeswamy	CSRTI, Mysore			Kannada, Eng., Hindi, Telu.,Tam.
	M.K.P.Raje Urs	CSRTI, Mysore			Kannada, Eng., Hindi
	T. Mogili	CSRTI, Mysore			Kannada, Eng., Jap., Hindi,Telu.

Training	R.G. Geetha Devi C.C. Choudhury V.B. Mathur G.S. Vindhya P.K. Das	CSRTI, Mysore CSRTI, Mysore CSRTI, Mysore CSRTI, Mysore CSRTI, Mysore	 (1999) 1991	 NISES	Kannada, Eng., Hindi, Tam.,Telu. Eng., Sanskrit, Bengali, Hindi Kannada, Hindi, Eng., Jap. Kannada, Eng., Hindi Bengali, Eng., Hindi
Extension	N.B. Vijaya Prakash B. Mallikarjuna K. Bogesh P. Kumaresan	CSRTI, Mysore CSRTI, Mysore CSRTI, Mysore CSRTI, Mysore	 1998	 MAFF	Kannada, English Kannada, English Kannada, Eng., Tamil, Telugu Kannada, Eng., Hindi
SSTL	A. Manjula K.L. Rajanna B.A. Parthasarathy T. Jayappa N. Jagadesh	SSTL, B'lore SSTL, B'lore SSTL, B'lore SSTL, B'lore SSTL, B'lore	1996 1998 (1999)	NISES NISES	Kannada, Eng., Hindi, Jap. Eng., Hindi, Kannada Eng., Hindi, Kannada, Tamil Eng., Hindi, Kannada, Tam.,Telu Kannada, Eng., Hindi
NSSP	B.S. Angadi J. Somi Reddy Y. D. Reddy Shankara K.K. Sharmila	NSSP, B'lore NSSP, B'lore NSSP, B'lore NSSP, B'lore NSSP, B'lore	1992 (1999) 1997 1998	NISES NISES NISES	Kan., Eng., Hindi., Jap., Mal. Kannada, Hindi, Eng., Telugu Kannada, Hindi, Eng., Telugu Kannada, Eng., Hindi Kannada, Eng., Tamil
Reeling (CSTRI)	G. Hariraj S.V. Naik K.N. Mahesh P. Bhat	CSTRI, B'lore CSTRI, B'lore CSTRI, B'lore CSTRI, B'lore	1993 1995 1997	NISES NISES NISES	Eng., Tamil, Telu., Kan., Jap. Eng., Tamil., Kan., Jap., Hindi Kannada, Eng., Telugu Kannada, Eng., Hindi

DOS	N. Ishwara Bhat	SEO,Sr.Patna,Mandya	1998	MAFF	
	K.M. Thimaiah	SEO, Baragur, Sira, Tumkur			
	K. Jagadesh	SEO, Halagur, Mala-valli, Mandya	(1999)		
	R. Srirangappa	SEO, Sira, Tumkur			
	J.M. Munishi Basaiah	SEO, Halakere,Chitra-durga	(1999)		

NISES : NATIONAL INSTITUTE OF SERICULTURE AND ENTOMOLOGICAL SCIENCE
MAFF : MINISTRY OF AGRICULTURE FARESTRY AND FISHERIES

Expenditure incurred on PPPBST Project

	1997	1998	1999	2000	2001
Local cost including • Salary • Wages • TA/DA • Medical reimbursement • JICA Office Chamber • Contingent expenses • Others	CSRTI - Rs. 3,826,000 NSSP - Rs. 654,000 SSTL - Rs. 462,000 CSTRI - Rs. 251,000 Rs. 5,193,000	CSRTI-Rs.4,700,000 NSSP - Rs. 601,000 SSTL - Rs. 505,000 CSTRI-Rs. 328,000 Rs. 6,134,000 (upto 31/12/1998)			

付属資料３．　プログレスレポート

LIST OF ANNEXES FOR PROGRESS REPORT

(1) Maintenance of silkworm race

(2) Silkworm seed production

(3) Silkworm rearing and disease control

(4) Mulberry cultivation

(5) Silk reeling technology

(6) Training

PROGRESS REPORT

Maintenance of silkworm race

Keeping in view of maintenance of original seed characteristics, new system of maintenance and multiplication technology of basic stocks (P4 to P2) was implemented at selected Basic Seed Farms. Three basic stocks viz; CSR2, CSR4 and CSR5 were included in the programme. Guidelines for rearing of CSR breeds in the basic seed farms was prepared and circulated. Three crops of demonstration and verification test were conducted. The basic stocks are in conformity with the original breed characteristics (Breeder stock to P3) except in P2 centres. Inadequacies of BSFs such as disinfection and rearing techniques were identified and improvement was suggested. Forty-one technical staff of BSFs(P4 to P2) of CSB were imparted training on race maintenance and multiplication technology. Enlightenment programme on race maintenance and multiplication technology was conducted for 10 technical staff of selected BSFs(P4 to P2) of CSB and 10 staff of BSFs(P3 to P2) of DOS. Three enlightenment programmes were conducted for seed cocoon rearers at C.R.Patna and Hassan

Activities for the remaining period

Verification and demonstration of maintenance and multiplication technologies in selected Basic Seed Farms (P4 to P2) conforming to the original characteristics of basic stocks. Verification of quality egg production technology and supply system. Training of technical staff on race maintenance and multiplication technology. Enlightenment programme for technical staff of BSFs and seed rearers.

PROGRESS OF IMPLEMENTATION OF PPPBST PROJECT (199 -99)

Name of the Institute : CENTRAL SERICULTURAL RESEARCH AND TRAINING INSTITUTE, MYSORE

Name of the discipline :MAINTENANCE OF SILKWORM RACE

Item as per TDP	97 98 99 00 01	Goal of achievement	Score	Present status and attainment	Activities in the remaining period
I) Implementation of maintenance technology of bivoltine silkworm original race characters					
1) Selection of basic stocks		Periodical selection of basic stocks after authorization of hybrids	B	The basic stocks of CSR2,CSR4 and CSR5 are included in the maintenance and multiplication programme. The hybrids, CSR12 x CSR6, CSR3 x CSR6,CSR16 x CSR17 (productive) and CSR18 x CSR19 (robust) have completed Race Authorization Test.	Selection of basic stocks will be continued
2) Implementation of rearing technology for basic stocks		Improvement of rearing technology of selected BSFs (P4 to P2)	C	Guidelines for rearing of CSR breeds in the BSFs was prepared and circulated. Inadequacies of BSFs, such as disinfection and rearing techniques were identified and improvement was suggested. Besides, on the spot suggestions/demonstrations were imparted to improve disinfection and rearing management	Demonstration of disinfection and rearing technology at selected BSFs (P4 to P2) will be continued till the target (pupation rate >85%) in P2 farms achieved.
3) Maintenance and multiplication of basic stocks		New system of maintenance and multiplication technology of basic stocks(P4 to P2) conforming to their original characteristics.	B	Three crops of demonstration and verification test were conducted in selected BSFs (P4 to P2) with two-way system.	Maintenance and multiplication of basic stock will be continued by following one way system of multiplication

Item as per TDIP	97 98 99 00 01	Goal of achievement	Score	Present status and attainment	Activities in the remaining period
4) Preservation of basic stocks in different hibernation schedules	———	Systematic preservation of basic stocks in suitable hibernation schedules	C	Inadequacies in the preservation of basic stocks were identified and accordingly modifications were suggested. The required quantity of layings were preserved under short-term and long term chilling, 4 and 6 month hibernation schedules	Preservation of required quantity of basic stocks in different schedules will be continued. Long term preservation of eggs (10 months schedule) for CSR breeds will be implemented.
II) Verification and demonstration of bivoltine silkworm race maintenance and multiplication technology 1) Survey and selection of BSFs	——	Selection of suitable BSFs(P4 to P2)	A	During 1997-98, after survey, five BSFs viz; P4, Hassan, P3, Nagamangala, P2, BSFs Dharmapura, Gavimata and yelagiri Hills were selected for maintenance and multiplication of CSR breeds. During 1998-99, all the above BSFs were continued except P2, Yelagiri Hills	———
2) Verification in selected BSFs	———	Verification and demonstration of maintenance and multiplication technology in selected BSFs	C	Three crops of verification test were conducted in the selected BSF (P4 to P2)	The programme will be continued as per TDIP till the target is achieved for pupation rate above 85% in selected P2 farms

Item as per TDIP	97 98 99 00 01	Goal of achivement	Score	Present status and attainment	Activities in the remaining period
				Egg production details of CSR breeds % recovery of dfls CSR2 CSR4 CSR5 1 37.1 36.0 36.4 2 38.1 40.3 40.1 3 23.5 39.0 35.0 4 11.2 17.5 12.8 1.Breeders Stock,Mysore 2. P4,Hassan 3. P3,Nagamangala 4. P2, Gavimata	
III) Training and guidance of Technical staff 1) Training of technical staff		Training of technical staff of CSB on race maintenance and multiplication technology	A	A total number of 41 technical staff of BSFs (P4 to P2)of CSB were imparted (4 batches) training on race maintenance and multiplication technology	Training on race maintenance and verification technology will be continued
2) Guidance to technical staff and seed farmers		On the spot guidance to technical staff of BSFs and seed farmers	B	Guidelines and check memo with regard to rearing of CSR breeds for technical staff of BSFs and seed farmers 4 times in each rearing were prepared and distributed. By frequent visits of expert along with counterparts, technical guidance was given to the staff of selected BSFs and selected seed farmers	On the spot technical guidance to the technical staff and seed farmers will be continued.

<table>
<tr><th>Item as per TDIP</th><th>97 98 99 00 01</th><th>Goal of achievement</th><th>Score</th><th>Present status and attainment</th><th>Activities in the remaining period</th></tr>
<tr><td></td><td></td><td></td><td></td><td>Mean performance of CSR breeds
(Mean of 3 trials)

<table>
<tr><th></th><th colspan="2">CSR2</th><th colspan="2">CSR4</th><th colspan="2">CSR5</th></tr>
<tr><th></th><th>*P.R (%)</th><th>**SR (%)</th><th>P.R (%)</th><th>SR (%)</th><th>P.R (%)</th><th>SR (%)</th></tr>
<tr><td>1</td><td>91.7</td><td>24.6</td><td>90.0</td><td>22.0</td><td>88.3</td><td>23.6</td></tr>
<tr><td>2</td><td>90.5</td><td>24.4</td><td>86.6</td><td>24.0</td><td>85.1</td><td>23.9</td></tr>
<tr><td>3</td><td>94.0</td><td>24.5</td><td>91.0</td><td>24.0</td><td>91.0</td><td>24.6</td></tr>
<tr><td>4</td><td>88.6</td><td>24.7</td><td>-</td><td>-</td><td>88.6</td><td>23.4</td></tr>
<tr><td>5</td><td>68.2</td><td>22.9</td><td>87.3</td><td>22.7</td><td>64.1</td><td>22.3</td></tr>
<tr><td>6</td><td>64.0</td><td>24.0</td><td>86.4</td><td>23.9</td><td>90.0</td><td>24.4</td></tr>
</table>
* PR-Pupation Rate
** SR -Cocoon Shell Ratio
1. Breeders Sock, Mysore
2. P4, Hassan
3. P3, Nagamangala
4. P2, Dharmapura
5. P2, Gavimata
6. P2, Yelagiri Hills</td><td></td></tr>
<tr><td>3) Verification of quality egg production technology and supply system</td><td></td><td>Verification of quality egg production technology and supply system in the selected BSFs</td><td>C</td><td>Guidelines were drawn for verification of quality egg production and supply system</td><td>Verification of quality egg production technology and supply system in selected BSFs will be continued till the target of above 30% egg recovery at P2 farms is achieved.</td></tr>
</table>

Item as per TDIP	97 98 99 00 01	Goal of achievement	Score	Present status and attainment	Activities in the remaining period
IV) Enlightenment activities for expanding bivoltine sericulture technology					
1) Enlightenment activities at selected BSFs	——	To enlighten the technical staff of selected BSFs on race maintenance and multiplication technology	A	An enlightenment programme on race maintenance and multiplication technology was conducted for 10 technical staff of selected BSFs (P4 to P2) of CSB and 10 staff of BSFs (P3 to P2) of DOS	The programme will be continued as per TDIP
2) Enlightenment activities at other BSF s and seed farmers	——	To enlighten the seed farmers and other officials of BSFs on quality seed cocoon production	A	Three enlightenment programmes were conducted for seed rearers at C.R.Patna and Hassan	The programme will be continued as per TDIP

PROGRESS REPORT AS PER TDIP FOR THE YEAR 1997-98 & 1998-99

SILKWORM SEED PRODUCTION

PROGRESS :

Evaluation of technologies being practiced in the selected P1 and F1 Seed Production Centres of Department of Sericulture was conducted. Based on the observations made, demonstration of bivoltine loose egg production and preservation technologies (chilling and hibernation schedules) was conducted at Silkworm Seed Production Centres of DOS viz. Chennapatna, Hassan and SSPC, NSSP.

Survey was undertaken in the selected P2 Basic seed farms of Department of Sericulture, Karnataka. H.Malligere and Kanva farms were selected and demonstration of seed crop rearing technologies were conducted for 2 crops.

Joint survey was conducted for selection of P1 seed farmers in Hassan, K.R.Pet, C.R.Patna and Bangalore. Three batches of CSR races, seed crop rearing were conducted at the selected seed farmers. The rearing of chawki larvae was conducted at Basic Seed Farm, Gavimata and larvae during 3rd instar were distributed to the selected seed farmers.

Participated in the race maintenance, disinfection and demonstration programmes in the Basic Seed Farms of Nagamangala, Dharmapura and Gavimata of NSSP. Prepared the guidelines, check-memo, planning sheet in co-ordination with CSRTI, NSSP and SSTL for seed farmers and Basic Seed Farms.

A manual on "Bivoltine Seed Production Technology" has been brought out and distributed to the trainees under different training programmes.

Curriculum for the training programme was prepared. Conducted 4 batches of training programme, two on chawki for seed crop rearing, two on Bivoltine seed preservation technology under integrated training programme. A total of 26 technical staff from NSSP has been trained.

Counterparts of SSTL participated in the nine enlightenment programme organised by JICA for seed farmers, commercial farms and for the staff of Basic Seed Farms.

Activities for the remaining period :

Verification and demonstration of seed production and seed crop rearing technologies at the selected P1 & F1 Silkworm Seed Production Centres, Basic Seed Farms and selected seed farmers will be established.

The training programmes for the staff of Department of Sericulture & CSB on "Chawki rearing for seed crop" and Bivoltine "Silkworm seed preservation technology" will be continuously conducted.

DATE: 26/03/1999

SILKWORM SEED TECHNOLOGY LABORATORY, KODATHI, BANGALORE

PROGRESS SITUATION OF PROJECT ACTIVITIES

2. SILKWORM SEED PRODUCTION

Item as per TDIP	Milestones 1997 1998 1999 2000 2001	Target	Grade	Present status and attainment	Activities in remaining period
b) Verification, demonstration & popularisation of Bivoltine Seed Production Technology					
i) Evaluation of seed production technologies at P1 and commercial bivoltine seed production centres (SSTL & NSSP)	1997–1998	By undertaking survey, suitable technical evaluation will be made to improve the P1 and F1 seed production	A	Completed the evaluation of technologies being practiced in the selected P1 and F1 seed production centres viz., Hassan, Channapatna, Chikkonahalli, Chandapura, Thandavapura, Chadalapura of DOS, Karnataka and SSPC, NSSP, Bangalore. a) <u>The following observations were made at DOS, Seed Production Centres:</u> • Pure, hybrid and cross breed layings are being produced. • Cold acid treatment and long term chilling not practiced. • While adopting hibernation schedules, intermediate temperatures is not followed. • Incubation of layings conducted upto second, sixth and eighth day and supplied to technical service centres. • Loose eggs in small scale is produced at Channapatna grainage. b) <u>The following observations were made at the Silkworm Seed Production Centre, NSSP, Bangalore.</u> • Pure, hybrid and cross breed layings are being produced. • Cold acid treatment, short term chilling and long term hibernation schedules are not being practiced. • Layings are directly issued to technical service centres.	Completed.
ii) Verification & demonstration of seed production technologies (SSTL & NSSP).	1998–2001	Seed production technologies will be verified, improved and demonstrated in Seed Production Centres.	B	Demonstration of Seed production and Preservation technologies were conducted at Silkworm Seed Production Centre, NSSP, Bangalore, DOS units - Hassan (Hibernation schedule) and Channapatna (Loose egg production, acid treatment, incubation, long term chilling and hibernation schedules). The silkworm eggs scheduled under chilling and hibernation at DOS, units of Hassan and Chennapatna will be released during April-May 1999. A Manual on "Bivoltine Silkworm Seed Production Technology" has been brought out.	Demonstration of the seed production technologies will be continued.

Item as per TDIP	Milestones 1997	1998	1999	2000	2001	Target	Grade	Present status and attainment	Activities in remaining period
iii) Verification & demonstration of seed crop rearing technology (SSTL & NSSP)						Seed crop rearing technology will be verified and demonstrated.	A	The survey was undertaken in the selected P2 Basic Seed Farms viz., Kanva, H. Malligere, Chikkonahalli, Chandapura of DOS, Karnataka. The following inadequacies were observed: • Improvement in Garden Management (except Chikkonahalli Farm). • Frequent crop loss due to grasserie and flacherie disease. • Disinfection technology needs to be improved. • Inadequate staff. The technology of disinfection, incubation, Pre-conditioning of rearing house, Chawki rearing, late age rearing and Seed crop monitoring, for two crops was demonstrated and harvested at an average of 40 Kgs/100 dfls. Joint survey was conducted for selection of seed farmers in K.R.Pet, C.R.Patna, Hassan and Bangalore. Three batches of seed crop rearing with CSR races were conducted. The chawki rearing was conducted at Basic Seed Farm, Gavimata and larvae during 3rd instar were distributed to the selected seed farmers. The crops were successfully harvested. Participated in the race maintenance and demonstration programmes in the Basic Seed Farms of Nagamangala, Dharmapura and Gavimata of NSSP.	Demonstration of seed crop rearing technologies in the identified Basic seed farms of DOS & NSSP and seed farmers will be continued.
c) Improvement of Bivoltine Silkworm seed production technology and their manuals : iii) Improvement of seed crop technologies and preparation of manual (SSTL & NSSP)						Seed crop technology and their manual will be improved.	B	Based on the Seed Crop Rearing and Seed Production Technologies developed during I Phase of JICA under BSTD project, a "Manual on Bivoltine Silkworm Seed Production Technology" has been brought out. Improvement of seed crop rearing technology necessary, as per the milestones, guidelines for seed farmers has been prepared, and an improved manual on "Seed Crop Rearing Technology" will be brought out based on the modified technologies.	Improved manual on "Seed crop rearing technology" will be prepared.

<table>
<tr><th>Item as per TDIP</th><th>Milestones
1997 1998 1999 2000 2001</th><th>Target</th><th>Grade</th><th>Present status and attainment</th><th>Activities in remaining period</th></tr>
<tr><td>d) Training and guidance of technical staff (NSSP & SSTL)
i) Training of technical staff in industrial seed production, pebrine inspection & quality control</td><td></td><td>Technical staff/field functionaries both from DOS & NSSP will be trained on the improved seed production technology.</td><td>A</td><td>The curriculum for the training programme was prepared. Conducted 4 batches of training programme for the Senior Technical Assistants, Senior Research Assistants, Senior Research Officers and Deputy Directors, as per the milestone.

<table>
<tr><th>Topic</th><th>Duration (days)</th><th>No. of trainees</th></tr>
<tr><td>1) Chawki for seed crop rearing (2 batches)</td><td>10</td><td>13 (5+8)</td></tr>
<tr><td>2) Bivoltine preservation technology - Integrated training programme (2 batches)</td><td>6</td><td>13 (8+5)</td></tr>
</table></td><td>Proposed to conduct 4 batches of training.
a) Two batches on chawki for seed crop rearing (10 trainees per batch)
b) Two batches of integrated training programme on loose egg production, mass mother moth examination & Bivoltine silkworm seed preservation technology in association with NSSP (10 trainees per batch).</td></tr>
<tr><td>ii) Training of seed farmers & enlightenment activities (NSSP & SSTL)</td><td></td><td>Selected seed farmers will acquire the improved technology of seed crop rearing followed by popularisation.</td><td>A</td><td>Selected 10 seed farmers of K.R.Pet and C.R. Patna were trained during rearing of CSR races. Two batches of Trainers Training Programme on "Chawki for Seed Crop Rearing" was conducted for the field functionaries of TSC C.R.Patna and Grainage Extension Centre, K.R. Pet.

Conducted enlightenment programme for seed farmers of Attibele on 23.2.99 and also participated in enlightenment programme (6) and silkworm race maintenance programme (3) for the seed, commercial farmers and staff of Basic Seed farms of NSSP, DOS, Karnataka organised jointly by JICA and CSB.</td><td>Training of Seed farmers and enlightenment activities will continue.</td></tr>
</table>

Grade : A - above 75%, B - 50 – 75%, C - 25 – 50%, D - 0 – 25%

NATIONAL SILKWORM SEED PROJECT, BANGALORE.

PROGRESS AS PER TENTATIVE DETAILED IMPLEMENTATION PLAN

Sl. No.	Item of Project Activities	MILESTONE 1997	1998	1999	2000	2001	Grade	Target of Activity in each Item	Present status and attainment	Activities in Remaining period
2	SILKWORM SEED PRODUCTION :									
(a)	Multiplication of parent silkworm seed :									
i)	Evaluation of present system of silk worm basic stock multiplication at P3 and P2 centres of NSSP and DOS (NSSP)						'A'	Suitable technical evaluation will be made to improve basic stock multiplication at P3 and P2 levels	Evaluated existing system of basic stock multiplication at P3 BSF Nagamangala, P2 BSF Yelagiri Hills, Dharmapura and Gavimata. Disinfection and rearing aspects that improve survival to maintain single cocoon and shell weight to conform with breed characteristics emphasized with no selection pressure that cause variations.	Evaluation completed
ii)	Multiplication of basic seed and egg production (NSSP).						'B'	Technology of basic seed multiplication and seed production will be improved.	Four seed crop rearings completed at P3 and P2 Basic Seed Farms. 6 batches of P1 rearing (3 in 97-98 and 3 in 98-99) completed. P1 cocoons were used for preparation of F1 dfls at SSPC Bangalore. 43,350 F1 dfls were distributed to JICA identified farmers of TSCs of DOS Karnataka for field trial. The entire F1 dfls requirement is fulfilled.	Technology of basic seed multiplication and seed production will continue.

Sl. No.	Item of Project Activities	MILESTONE 1997	1998	1999	2000	2001	Grade	Target of Activity in each item	Present status and attainment	Activities in Remaining periods
(a) iii)	Management of basic seed multiplication and quality control (NSSP).						'C'	Management of basic seed multiplication and system of quality control will be improved.	Basic stock dfls were maintained and multiplied at P3,Basic Seed Farm, Nagamangala to prepare quality P2 dfls. These were reared at identified P2 farms of Dharmapura, Yelagiri Hills and Gavimata for production of P1 dfls. Planning sheets for three batches of P1 rearing were drawn for seed cocoon generation at GEC Channarayapatna and K.R.Pet. Field staff of GECs trained in chawki rearing for seed crop to guide rearers. P2 BSF Yelagiri Hills was dropped during 1999 since 2 Farms will be able to meet the requirement of JICA. The problems for failure of P2 rearing at BSF Gavimata have been identified, necessary measures like thorough disinfection by power sprayers and effective prevention of disease will be implemented. The improvement of technology level is necessary to reach the required level of performance.	Management and multiplication system of quality control will continue, incorporating the proper disease control measures at BSF Gavimata.
(b)	Verification, demonstration and popularisation of Bivoltine Seed Production Technology :									
i)	Evaluation of seed production technologies at P1 and commercial bivoltine seed production centres (SSTL and NSSP).						'A'	Suitable technical evaluation will be made to improve P1 and F1 seed production.	During September 1997, survey was conducted in selected P1 and commercial bivoltine seed production centres, Chikkonahalli, Chandapura, Thandavapura Channapatna, Hassan of DOS and SSPC Bangalore of NSSP to verify the technologies which are practiced.	Evaluation completed

Sl. No.	Item of Project Activities	MILESTONE 1997	1998	1999	2000	2001	Grade	Target of Activity in each item	Present status and attainment	Activities in Remaining months
ii)	Verification and demonstration of seed production technologies (SSTL and NSSP).						'B'	Seed production technologies will be verified, improved and demonstrated in seed production centres.	Demonstration of technologies on loose egg preparation and mass mother moth examination at Model Grainage Channapatna was conducted on 29/30-01-1999. Demonstration at Model Grainage Hassan will also be taken up during 1999.	Verification and demonstration of seed production technologies at seed production centres will continue
iii)	Verification and demonstration of seed crop rearing technology (SSTL and NSSP).						'A'	Seed crop rearing technology will be verified and demonstrated.	Joint verification and demonstration of technologies such as disinfection, incubation preconditioning of rearing houses, brushing, chawki, late age rearing and seed crop monitoring for 2 crops were demonstrated at H.Malligere. Joint team has inspected all the three batches of P1 crop rearing during chawki stages at BSF, Gavimata. The larvae were distributed to seed farmers during 3rd instar. Joint survey was conducted at C.R.Patna, K.R.Pet Hassan and Bangalore for seed crop rearing.	Verification and demonstration of seed crop rearing technology will continue.
iv)	Demonstration of industrial seed production and quality control measures (NSSP)						'B'	Technology of industrial egg production and quality control measures will be demonstrated at SSPC Bangalore.	Industrial egg production and quality control measures were demonstrated at SSPC, Bangalore to NSSP officials during Integrated training programme. The backlog 6 number of trainees will be covered during 1999.	Demonstration of industrial egg production and quality control measures will continue.

Sl. No.	Item of Project Activities	MILESTONE 1997	1998	1999	2000	2001	Grade	Target of Activity in each item	Present status and attainment	Activities in Remaining period
(c)	Improvement of bivoltine silkworm seed production technology and their manuals									
i)	Improvement of basic seed multiplication technology and preparation of manual (NSSP)						'C'	The basic seed multiplication technology will be improved and manual will be prepared.	Based on the improvement of Basic seed multiplication at BSF Gavimata, improved draft manual will be prepared by December 1999	Basic seed multiplication technology will be improved at BSF Gavimata and the manual will be prepared.
ii)	Improvement of industrial seed production technology and preparation of manual (NSSP)						—	Industrial seed production technology will be improved and manual will be prepared.	—	Suggestions on industrial seed production by Short Term Expert also will be implemented and included in manual.
d)	Training and guidance of technical staff :									
i)	Training of technical staff in industrial seed production, pebrine inspection and quality control (NSSP and SSTL).						'B'	Technical staff will be trained on the improved seed production technology.	Curriculum for joint integrated training programme was prepared. Training in two batches on mass egg production, loose egg preparation and mass mother moth examination was given to NSSP staff at SSPC, Bangalore (NSSP) and SSTL.. The backlog 6 number of trainees will be covered during 1999 .	Training of technical staff in industrial seed production, pebrine inspection and quality control will continue.
ii)	Training of seed farmers and enlightenment activities (NSSP and SSTL).						'B'	Selected seed farmers will acquire the improved technology of seed crop rearing followed by popularisation.	Seed farmers of K.R.Pet and C.R.Patna were trained in seed crop rearing. Three enlightenment programmes one each at Dehradun C.R.Patna and Attibele are completed.	Training of seed farmers and enlightenment activities will continue.