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**SEED TECHNOLOGY
AND PHYSIOLOGY**

**SILKWORM SEED
PATHOLOGY**

**HUMAN RESOURCE
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**Grainage and
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**Reproductive
Physiology**

**Seed Crop
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Seed Pathology

**Quarantine
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**Seed Act
Training**

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**Silkworm
Disease
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Survey**

**Awareness
programme**

**Transfer of
Technology**

Vol.32

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ANNUAL REPORT
2024 - 25



रेशमकीट बीज प्रौद्योगिकी प्रयोगशाला
राष्ट्रीय रेशमकीट बीज संगठन
केन्द्रीय रेशम बोर्ड, वस्त्र मंत्रालय, भारत सरकार
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प्रस्तावना

मुझे वर्ष २०२४-२५ के लिए रेशम कीट बीज प्रौद्योगिकी प्रयोगशाला (एसएसटीएल) की वार्षिक प्रतिवेदन प्रस्तुत करते हुए प्रसन्नता हो रही है। राष्ट्रीय रेशमकीट बीज संगठन (एनएसएसओ) के अंतर्गत एक प्रमुख संस्थान के रूप में, एसएसटीएल शहतूत और वन्य रेशमकीट बीज प्रौद्योगिकी में अनुसंधान और विकास के क्षेत्र में निरंतर योगदान दे रहा है। प्रयोगशाला रेशम कीट के बीज उत्पादन के प्रति प्रतिबद्ध है और रेशम उत्पादन क्षेत्र को गुणवत्तापूर्ण रोगमुक्त बीजों की आपूर्ति सुनिश्चित करने के लिए प्रयासरत है। एसएसटीएल के प्रमुख उद्देश्यों में से एक पेब्राइन रोग का प्रभावी प्रबंधन है और यह रेशम उत्पादन विभागों के समन्वय से कर्नाटक, आंध्र प्रदेश और तमिलनाडु में बीज गुणन केंद्रों की व्यवस्थित रोग निगरानी, नैदानिक सहायता और निरंतर निगरानी के माध्यम से किया जाता है। एसएसटीएल क्षमता निर्माण और प्रौद्योगिकी प्रसार पर भी जोर देता है। वर्ष के दौरान, रेशम उत्पादन विभाग के अधिकारियों के लिए बीज उत्पादन प्रौद्योगिकी और पेब्राइन रोग प्रबंधन पर प्रशिक्षण कार्यक्रम आयोजित किए गए। इसके अतिरिक्त, बीज उत्पादन को बढ़ावा देने के लिए हितधारकों को पंजीकृत बीज उत्पादक के रूप में अर्हता प्राप्त करने हेतु बीज अधिनियम के ढांचे के तहत प्रशिक्षित किया गया। मैं रेशम कीट बीज प्रौद्योगिकी के प्रति उनकी प्रतिबद्धता और

योगदान तथा बीज क्षेत्र को समर्थन देने के लिए एसएसटीएल के अधिकारियों और कर्मचारियों की सराहना करता हूँ।

डॉ. एस मंथिरा मूर्ति

निदेशक, रा रे बी स

FOREWORD

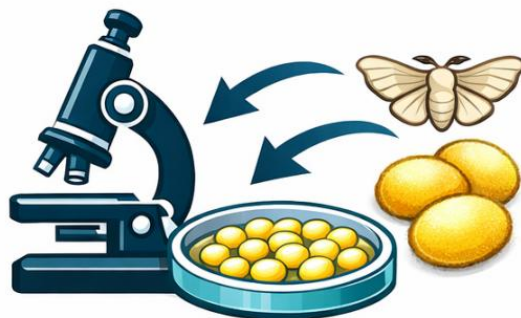
I am pleasure to present the Annual Report of the Silkworm Seed Technology Laboratory (SSTL) for the year 2024-25. As a premier institute under the National Silkworm Seed Organization (NSSO), the SSTL continues to serve in research and development in mulberry and vanya silkworm seed technology. The Laboratory remains commitment to silkworm seed production and ensuring the supply of quality disease-free seeds to the sericulture sector. One of the core mandates of the SSTL is the effective management of Pebrine disease and through systematic disease surveillance, diagnostic support, and continuous monitoring of seed multiplication centres in Karnataka, Andhra Pradesh, and Tamil Nadu in coordination with the Departments of Sericulture. The SSTL also has an emphasis on capacity building and technology dissemination. During the year, training programmes were organized for officials of the Departments of Sericulture on seed production technology and Pebrine disease management. In addition, stakeholders were trained under the Seed Act framework to qualify as Registered Seed Producers to enhancing the seed production. I appreciate the officers and staff of SSTL for their commitment and contributions towards silkworm seed technology and supporting the seed sector

Dr. S. Manthira Moorthy
Director, NSSO



VISION

To emerge as a nationally recognized centre of excellence in silkworm seed technology



MISSION

To transform the Research and Development efforts of the Institute towards increasing quality silkworm seed production

MANDATE OF THE INSTITUTE

BASIC, APPLIED AND STRATEGIC RESEARCH IN SILKWORM SEED TECHNOLOGY

- Research & Innovation
 - ▶ Silkworm Seed Development



QUARANTINE TESTING AND CERTIFICATION OF SILKWORM SEED / COCOONS

- Export & Import Certification
 - ▶ Quarantine Testing



CAPACITY BUILDING IN SILKWORM SEED PRODUCTION, TESTING & QUALITY ASSURANCE

- Training & Extension
 - ▶ Skill Development
 - ▶ Quality Assurance



PEBRINE DISEASE MONITORING & MANAGEMENT

- Disease Surveillance
 - ▶ Pebrine Detection
 - ▶ Disease Control



HUMAN RESOURCES

Director	Dr. S. Manthira Moorthy
Scientist-D & Head	Dr. Sailaja Bandam
Scientist-C	Dr. R. Saravanakumar Dr. Mala N
Senior Technical Assistant	Mr. J. N. Chandrashekar Mr. B.V. Raviprasad Mrs. K. R. Rathnamma
Field Assistant	Mr. Harish H. N
Driver	Mr. Shivaji
Multi Task Staff	Mr. L. H. Hemanna Gowda Mr. Lakshminarayana
Junior Research Fellow	Mr. M. Sharath (up to 16.01.2025) Ms. Mashetty Ruchitha (from 7.02.2025)
Project Assistant	Mr. Akash Madival Mr. R. Gokul Raj (from 13.02.2025) Mr. Chandan K.J (from 14.02.2025)

SEED ADVISORY COMMITTEE (SAC)

1	CHAIRMAN	Dr. S. B. Dandin Former Vice-Chancellor (UHS, Bagalkot) & Former Director (CSB)
2	MEMBER	Dr. B. S. Angadi Former Director (CSB)
3	MEMBER	Dr. Ravindra Singh Teotia Former Director (CSB)
4	MEMBER	Dr. P. Ramtarak Rao P Retd. Scientist -D (CSB)
5	MEMBER	Shri. Jayarama Raju Retd. Scientist -D (CSB)
6	MEMBER	Shri. Brajendra Choudhary Retd. Scientist -D (CSB)
7	MEMBER	The Director Department of Sericulture, Govt. of Karnataka
8	MEMBER	The Director Department of Sericulture, Govt. of Assam
9	MEMBER	The Director Handloom Sericulture and Handicraft, Jharkhand
10	MEMBER	The Director (Tech) Central Silk Board, Bengaluru-560 068
11	MEMBER	Scientist D & Head Research Coordination Section, Central Silk Board, Bengaluru-560 068.
12	MEMBER-CONVENER	The Director National Silkworm Seed Organization (NSSO), Central Silk Board, Bengaluru-560 068.

गतिविधियों की मुख्य विशेषताएँ

कुल ११० माइक्रोस्पोरिडिया आइसोलेट्स रेशम उत्पादन क्षेत्रों से एकत्र किए गए और उनके विषालुता के लिए मूल्यांकन किए गए।

उत्पादन में अंतर को समझने के लिए एरी रेशम कीटों के प्रजनन प्रदर्शन का मूल्यांकन पारंपरिक और गैर-पारंपरिक रेशम उत्पादन क्षेत्रों में किया गया।

कर्नाटक, तमिलनाडु और आंध्र प्रदेश में रेशम कीट रोग निगरानी सर्वेक्षण किए गए, जिसमें रेशम कीट रोगों के समय पर पता लगाने और प्रबंधन के लिए २०४५ नमूनों का परीक्षण किया गया।

सीबीटी और सीड अधिनियम प्रशिक्षण कार्यक्रमों के तहत, ८५ व्यक्तियों को रेशम उत्पादन प्रबंधन और रोग नियंत्रण के विभिन्न पहलुओं पर व्यावहारिक प्रशिक्षण दिया गया।

कुल सात विस्तार और संचार कार्यक्रम आयोजित किए गए, जिनसे १३६ हितधारकों को व्यावहारिक ज्ञान और तकनीकी मार्गदर्शन का लाभ मिला।

गुणवत्ता मानकों और पेब्राइन मुक्तता पर हितधारकों को तकनीकी सेवाएँ प्रदान कीं, और अनुपालन सुनिश्चित करने और उत्पादन परिणामों में सुधार के लिए ७१७३ नमूनों का परीक्षण किया।

इन गतिविधियों से आरएंडडी उत्पादों, प्रशिक्षण कार्यक्रमों और नमूना परीक्षण सेवाओं से रॉयल्टी के माध्यम से २२.५० लाख रुपये की आय भी प्राप्त हुई।

HIGHLIGHTS OF ACTIVITIES

- ❖ A total of **110 microsporidia isolates** were collected from sericulture fields and evaluated for their virulence.
- ❖ The **reproductive performance of Eri silkworms** was assessed across both traditional and non-traditional sericulture areas to understand productivity variations.
- ❖ **Silkworm disease monitoring surveys** were conducted in **Karnataka, Tamil Nadu, and Andhra Pradesh**, encompassing **2045 samples** tested for management of silkworm diseases.
- ❖ Under the **CBT and Seed Act training programs**, **85 individuals** received hands-on training on various aspects of seed production technology and disease management.
- ❖ A total of **seven extension and communication programs** were organized, benefiting **136 stakeholders** on technical guidance.
- ❖ Technical services were provided to stakeholders on **quality standards and pebrine freeness**, with **7173 samples** tested to ensure compliance and improve production outcomes.
- ❖ The activities also generated a **revenue of Rs. 22.5 lakhs** through royalties from R&D products, training programs, and sample testing services.

❖ PART I: ON-GOING RESEARCH PROJECTS

1. APS09002MI: Diapause induction in Muga Silkworm (*Antheraea assamensis* Helfer)

Dr. R. Saravana Kumar, Dr. Rajal Debnath*, Dr. K. Indira Kumar**, Shri. M. Majumder**,
Dr. Vikram Kumar**,
(In collaboration with SBRL*, Bangalore and MESSO**) (June 2022- May 2025)

The muga silkworm, *Antheraea assamensis* Helfer is endemic to the northeastern region of India, particularly Assam and is largely reared under outdoor conditions. Muga silkworm rearing during unfavorable conditions to generate pre-seed and seeds for commercial crops is not very productive. The lack of seeds for commercial crops has a direct impact on the overall Muga silk production in India. The primary objective of this research is to develop a reliable method for long-term preservation of seed cocoons by artificially inducing pupal diapause by regulating diapause under controlled conditions.

Objectives:

1. To determine effective diapause mechanism (classical/ molecular) in Muga silkworm.
2. To develop protocol for induction of pupal diapause in Muga silkworm

Muga seed cocoons were treated by varying temperatures and photoperiods (5°, 10°, 12° C with 6h L: 18h D, 10L: 14D) for different durations (10, 15, and 20 days). Treated cocoons kept at 25° C for observation. No pupal diapause was observed under the tested experimental conditions. All treated seed cocoons resumed normal development after being transferred to 25 °C, and moth emergence occurred within 14 days of incubation. Once returned to favorable conditions (25 °C), development proceeded normally, indicating that the treatments did not trigger a hormonally programmed developmental arrest.

2. SPP09004MNC: Studies on virulence status of different microsporidian species in Silkworm (*Bombyx mori* L).

(Collaborative project of SSTL¹, SBRL², KSSRDI³, APSSRDI⁴, CSR&TI-Mysore⁵).

(Jan 2024 to Dec 2026). Budget: Rs. 86.25 Lakhs

¹Dr. R. Saravana Kumar, ¹Dr. Sailaja Bandam, ²Dr. G. Subrahmanyam, ³Dr. N. B. Jyothi, ⁴Dr. J. Seetharamulu, ⁵Dr. G. Mallikarjun. Dr. S. Manthira moorthy¹

Introduction

Pebrine is the most destructive disease of silkworm, *Bombyx mori* L. as it is transovarially transmitted to the next generation and inflicts crop loss. Outbreak of pebrine continues to pose a constant threat to sericulture industry in India. These microsporidian strains differ in their pathogenicity, rate of spread, mode of transmission. In recent years, the emergence of different microsporidian variants has created confusion among seed producers regarding the actual cause and extent of crop damage. Differentiating virulent from non-virulent strains is therefore essential for effective disease management, accurate diagnosis, and minimizing economic loss.

Objective:

- 1.To identify different microsporidian pathogens infecting silkworm (*Bombyx mori* L)
- 2.To study the virulence character of various microsporidia
- 3.To detect virulent and non-virulent microsporidia to ascertain crop loss

A total of 110 microsporidian isolates were obtained from infected silkworm crops in various field locations. Infected larvae, pupae, and moth samples displaying typical pebrine symptoms were examined under a microscope. The isolates were purified and cultured to generate sufficient spore quantities for experimental bioassays. The multiplied isolates were infected to healthy silkworm batches to assess differences in pathogenicity and virulence. Variations were noted in mortality rates among the different isolates. Histopathological and microscopic analyses were conducted for 60 isolated to determine the tissue tropism of the isolates. Microsporidian spores were identified in various tissues including, midgut epithelium, fat body, silk gland,

malpighian tubules, Gonadal tissues. PCR amplification was carried out for 30 isolates using microsporidia-specific primers targeting conserved regions like the small subunit ribosomal RNA (SSU rRNA) gene for species identification.



3. SRP09005MIC: Study on Effect of Sulphur-Based Fungicide cum Miticide on Mulberry Silkworm Seed Crop.

(Collaboration project of SSTL¹, CSRTI, Mysore² & CO, Bangalore³).

(Jan 2025 to March 2026. Budget Rs. 11.00 Lakhs)

Dr. Mala. N¹, Dr. R. Saravanakumar¹, Dr. S. Mahiba Helen², Dr. G.R. Halagundegowda³

The success of silkworm rearing largely depends on the nutritional quality of mulberry leaves, which are the exclusive diet of the domesticated silkworm, *Bombyx mori* L. However, mulberry crops are frequently attacked by a variety of insect pests, necessitating the application of insecticides to protect leaf yield and maintain plant health. Although pesticides are effective in pest control, they often leave residues on the foliage, which may adversely affect the silkworm health and silk production when consumed. In light of the above, this study is proposed using Wettable Sulphur which acts as both acaricide/miticide and fungicide which is used in field by sericulturists to study/validate corresponding waiting periods, concentration, number of sprays and residual toxicity to silkworm, especially on rearing and grainage parameters of silkworm, *B mori* L.

Objectives:

1. Effect of wettable sulphur spray on qualitative parameters of mulberry
2. Effect of feeding wettable sulphur sprayed mulberry leaves on rearing and grainage parameters of silkworm.

Soil and leaf samples were collected from the experimental mulberry plots following standard sampling protocols. Samples were analyzed to assess baseline nutrient status and health of the mulberry plants before treatment. Healthy mulberry saplings were procured from the Department of Sericulture (DoS), Tamil Nadu. Saplings were raised in polybags under controlled conditions to ensure uniform growth prior to experimentation. Wettable sulphur (fungicide cum miticide) was applied to the mulberry plants at specified treatment concentrations.



Wettable sulphur spray in field



Control



Wettable Sulphur sprayed plant

4. SPS09006SIC: Studies on the estimation of bio-active compounds and chemical composition in silk moth and eggs of silkworm, *Bombyx mori* L.

Jan 2025 to Dec 2025. Budget Rs.5.00 Lakh

Dr. Sailaja Bandam and Dr. R. Saravana Kumar

Adult silkworm moths used for egg-laying are often discarded after reproduction, leading to a loss of potentially valuable biological material. Similarly, unsupplied or surplus silkworm eggs that are not used to meet market demand often go to waste, creating environmental disposal concerns. These discarded moths and eggs represent untapped bio-resources that may contain valuable chemical and bio-active compounds. This study aims to quantitatively and qualitatively assess the bio-active constituents and overall chemical profile of both the adult silkworm and its eggs in the domesticated silkworm *Bombyx mori* L.

Objectives:

1. To analyze the bio-active and chemical compounds of silkworm and eggs.
2. To identify the essential nutrients and their physiological functions for formulating the by-product.

Collection of Materials

Adult silkworm moths were collected immediately after egg-laying. Silkworm eggs (both supplied and surplus) were collected and categorized based on availability.

Preliminary Analysis

Initial physical observations of moths and eggs were recorded (size, colour, weight). Bio-Active Compound Screening: Conducted qualitative tests for proteins, lipids, carbohydrates, flavonoids, and antioxidants.

PART II: CONCLUDED RESEARCH PROJECT

1. APS 09003MI: Evaluation of reproductive performance of Eri silkworm, *Samia ricini* (Donovan).

(In Collaboration with *ESSPC, Hosur & **P2 EBSF, Topatoli, Assam)
(June 2022- May 2024).

Dr. Mala N, Dr. Sailaja. B, Dr. Pratheesh Kumar P.M*, Dr. Lalitha N**

India, with its contribution towards production of silk has secured the second place among the world's silk producing nations. In India, eri silk contributes 68% of total Vanya silk and due to its unique features, increasing demand, easy rearing practices and assured crop, ericulture is being promoted across the country. Eri-culture is most appropriate for an integrated farming ecosystem as it is highly polyphagous in nature and having potential to tolerate various biotic and abiotic stresses which makes it amenable for rearing in varied agro-climatic conditions throughout the year. To achieve the production as 3 per the set targets under Silk Samagra, Considering the techno-economic feasibility of taking up eri enterprise, the study focus to assess the comparative performance and fixation of benchmarks for reproductive traits of eri silkworm reared on different host plantations at traditional (Assam) and non-traditional (Tamil Nadu) areas having provided with uniform source of dfls to ASRs under different seasons.

Objectives:

1. Analysis of eri seed crop performance in traditional and non-traditional areas
2. Fixation of reproductive fitness traits for eri silkworm, *Samia ricini*

Methodology:

Experiment 1: Assessment of Seed Cocoon parameters in different traditional (AssamP2 BSF, Topatoli) and non-traditional (Tamil Nadu - Hosur) zones. The seed cocoons production was carried out through 24 ASRs, under P2 BSF - Topatoli (Castor-6, Tapioca-6 & Kesseru-6) and ESSPC - Hosur (Castor-6) cluster adopting standard protocols under

the supervision during 2022-23 & 2023-24. The dfls (C2 breed) was supplied from ESSPC-Hosur @ 30 dfls each to the selected ASRs and rearing data was recorded at Assam and Tamil Nadu areas for two years during different crops viz., C1: June-Aug, C2: Sep-Oct, C3: Jan-Feb & C4: March-April.

Experiment 2: Assessment of comparative grainage performance of eri silkworm On completion of rearing, the seed cocoons produced using different host plants at selected ASRs level was procured and assessed for cocoon and grainage parameters separately adopting the standard protocol at Assam and Tamil Nadu areas. The meteorological parameters such as Temperature (Max & Min), Relative humidity (%) and Rainfall (mm) were also recorded during the period at traditional and non-traditional areas.

Table 1: A Standard has derived for rearing and grainage characteristics across different seasons at different locations using primary host plant castor.

Particulars		Combined Range (Min-Max)	Assam	Tamil Nadu	Standard
ERR%		46.20 - 86.97	71.15	84.19	77.67
Cocoon weight (g)	M	2.85 - 3.46	3.34	2.90	3.12
	F	3.24 - 3.65	3.53	3.29	3.42
Shell weight (g)	M	0.41 - 0.57	0.50	0.43	0.47
	F	0.40 - 0.50	0.45	0.46	0.46
Pupal weight (g)	M	2.39 - 2.91	2.83	2.46	2.65
	F	2.80 - 3.16	3.08	2.83	2.96
Shell ratio %	M	14.03 - 16.58	15.12	15.02	15.08
	F	11.43 - 14.35	12.78	13.96	13.38
Cocoon yield/100dfls		19.16 - 62.37	42.73	61.36	52.05
Cocoon no./kg		288.91- 322.9	302.37	328.45	315.42
DFL:Cocoon ratio		1:53.69 - 1:225.36	130.09	221.03	175.56
Cocoon: DFL ratio		3.05:1 - 6.24:1	4.98:1	3.18:1	4.08
DFL:DFL ratio		1:8.56 - 1:73.55	1:28.36	1:70.35	49.36
Fecundity (No.)		306.17 - 347.58	321.06	312.16	316.61
Hatching %		62.25 - 94.92	74.98	93.83	84.41

Table 2: A standard has derived for rearing and grainage characteristics across different seasons using primary and secondary host plants.

Particulars		Combined Range (Min-Max)	Castor	Kessuru	Tapioca	Standard
ERR%		21.23 -85.95	71.14	70.03	70.917	70.70
Cocoon weight (g)	M	2.7 - 3.5	3.34	2.93	3.24	3.17
	F	2.91 - 3.8	3.53	3.17	3.43	3.38
Shell weight (g)	M	0.39 - 0.58	0.50	0.24	0.47	0.41
	F	0.32 - 0.51	0.45	0.37	0.41	0.41
Pupal weight (g)	M	2.31 - 2.94	2.83	2.50	2.76	2.7
	F	2.51 - 3.34	3.08	2.79	3.02	2.97
Shell ratio %	M	12.49 - 16.67	15.12	14.64	14.74	14.83
	F	8.98 - 14.69	12.78	11.98	12.03	12.26
Cocoon yield/100dfls		11.88 - 59.59	42.73	37.47	41.74	40.65
Cocoon no./kg		286.16 - 358.33	302.37	336.27	311.18	316.61
DFL:Cocoon ratio		26.0 - 175.33	130.11	125.02	126.56	127.23
Cocoon: DFL ratio		3.9 - 6.6	4.98	5.335	5.02	5.11
DFL:DFL ratio		5.0 - 42.0	28.39	24.51	26.36	26.42
Fecundity (No.)		280 - 359.16	321.06	299.25	317.06	312.45
Hatching %		52.66 - 86.5	74.98	73.58	73.30	73.95

- The present study revealed the realistic field performance of ASRs across the season at traditional and non-traditional provinces. The findings from the study proved that the rearing and grainage characteristics of eri silkworm performed better in Tamil Nadu compared to Assam rearing conditions due to conducive climatic factors prevalent in Tamil Nadu. It is found that the values at Assam and Tamil Nadu recorded 42.73 & 61.36 kg cocoon yield/100 dfls, 4.98:1 & 3.18:1 cocoon to dfls ratio and 1:28 & 1:70 dfl to dfl ratio respectively. The standard value established over traditional and non-traditional localities are 52kg cocoon yield/100dfls, 316 fecundity (no.), 4:1 cocoon to dfl ratio and 1:49 dfl to dfl ratio.
- Due to seasonal shifts and extreme climatic fluctuations, the production of seed cocoons was challenging in Assam, whereas in Tamil Nadu region there is no much difference is observed in seed cocoon production across the seasons and found insignificant.
- The upscaling of eri silkworm seed production to be taken up during C2: Sep-Oct and C4: March-April representing favorable seasons and should be avoided during summer at ASRs filed in Assam. The results indicated that irrespective of the crops having different season, eri silkworms can be reared throughout the year under the

agro-climatic conditions of Tamil Nadu showing eri culture can be effectively taken up for wider expansion to increase eri production in non-traditional area.

- Among the diversified host plants under study, the rearing and grainage performance was better with castor followed by tapioca and kesseru. Tapioca has illustrated equivalent production of seed cocoon and on-par reproductive attributes with castor. It is found that the values with castor and tapioca recorded 42.73 & 41.73 kg cocoon yield/100 dfls, 4.95:1 & 4.95:1 cocoon to dfls ratio and 1:28 & 1:26 dfl to dfl ratio respectively. The standard established with respect to host plants was 40kg cocoon yield/100dfls, 312 fecundity (no.), 5:1 cocoon to dfls ratio and 1:26 dfl to dfl ratio. From the results it is evident that available tapioca plantations in Tamil Nadu also can be used for eri silkworm rearing for increasing eri production.



PART III: COLLABORATIVE RESEARCH PROJECT

1. Ongoing project: AIB08007MI Development and evaluation of Eri Silkworm (*Samia ricini* Donovan) Breeds/Hybrids with improved productivity

(Collaborative project of SBRL*, ²MESSO, ³CMER&TI and SSTL¹ as CI)

Dr. Rajal Debnath*, Dr. Ramesha*, Dr. Himanshu Dubey*, **Dr. Mala N¹**, Dr. Lalitha N²,
Dr. Reeta Luikham³, Dr. Pratheesh Kumar²

Eri silk has shown potential by drawing significant attention from stakeholders. Thus, improvement in the production and productivity of Eri silk is one of the major mandates of socio-economic development of marginal farmers practicing Ericulture. The project outcome tries to support this by developing eri breeds with improved silk/protein trait by utilizing the genetic variability existing in silkworm strains/morphotypes.

Objectives

1. Generation of stable breeding lines of Eri silkworm strains/morphotypes
2. Utilization of molecular markers to develop and characterize eri hybrids with economic value

The cellular rearing of different strains/morphotypes viz., YP (Yellow Plain), YS (Yellow Spotted), YZ (Yellow Zebra), GBP (Greenish Blue Plain), GBS (Greenish Blue Spotted), and GBZ (Greenish Blue Zebra) and their crosses were continued for eleven generations. The parameters were recorded separately for all morphotypes.

PART IV: PROGRAMMES OF THE INSTITUTE

1. Capacity building and Training on silkworm seed production

Dr. Mala N, Dr. Sailaja B, Dr. R. Saravana Kumar, B.V. Raviprasad,
K.R. Rathnamma

A total of eight training programs were held for stakeholders on various aspects of seed technology as part of the CBT initiative, with a total of 85 stakeholders participated (Table 1, 2 & 3). Three training sessions focused on activities related to grainages under the Central Seed Act for RSPs recommended by NSSO, Bangalore, to enable them to obtain a certificate to establish a new private grainage. Three training programs were also organized for officials from the Department of Seed (DoS) in Karnataka and Tamil Nadu. In addition to these standard training sessions, two additional programs were specifically conducted for RSPs/CRCs.

Table 1: CAPSULE / REGULAR COURSES

Sl. No.	Name of the training programme	Period	Total Number of persons trained sponsoring agencies			
			KAR	TN	AP	TOTAL
1	Silkworm Seed production techniques	11.06.2024 to 13.06.2024	09	-	-	09
2	Pebrine detection in Silkworm	19.06.2024 to 21.06.2024	13	-	-	13
3	Disease examination in Chawki and silkworm eggs	04.09.2024	-	20	-	20
SUB TOTAL			22	20	-	42

Table 2: SEED ACT TRAINING PROGRAMMES (2024-25)

Sl. No.	Name of the training programme	Period	KAR	TN	AP	TOTAL
1	SEED ACT – RSPs Silkworm Seed Production Techniques (3 Months) I - Batch	11.06.2024 to 09.09.2024	08	-	-	08
2	SEED ACT – RSPs Silkworm Seed Production Techniques (3 Months) II - Batch			-	-	
3	SEED ACT – RSPs Silkworm Seed Production Techniques (3 Months) III - Batch	15.06.2024 to 12.09.2024	02	-	-	02
SUB TOTAL			10	-	-	10

Table 3: REGISTERED SEED PRODUCERS PROGRAMME (2024-25)

Sl. No.	Name of the training programme	Period	KAR	TN	AP	TOTAL
1	Pebrine detection and egg handling techniques in silkworm I - Batch	27.01.2025 to 28.01.2025	20	-	-	20
2	Pebrine detection and egg handling techniques in silkworm II - Batch	29.01.2025 to 30.01.2025	-	13	-	13
SUB TOTAL			20	13	-	33
GRAND TOTAL			52	33	-	85



DoS KARNATAKA



RSP/CRC TAMILNADU



DoS TAMILNADU

2. SILKWORM DISEASE SURVEYS

SSTL scientists were involved in a disease survey in three southern states: Karnataka, Tamil Nadu, and Andhra Pradesh, along with scientists from APSSRDI and KSSRDI. They inspected seed crops, ASR crops, and DoS Farms.

2.1. Joint Silkworm Disease Monitoring Survey (JSDMS)

SSTL Scientists visited seed areas in three southern states (Karnataka - Kunigal / Magadi, Anekal, and Attibele; Andhra Pradesh - Madanapalli / Hindupur; Tamil Nadu - Hosur / Denkanikottai) in different seasons.

Sl.No	Place of visit	No. of Lots	No. of samples	Disease incidence	Name of scientist/ Staff attended
1	Karnataka	123	355	Nil	Dr. R. Saravana Kumar Sri. B.V. Ravi Prasad
2	Andhra Pradesh	62	395	(2) 1.3 %	Dr. R. Saravana Kumar
3	Tamil Nadu	12	48	-	Dr. R. Saravana Kumar
4	Additional survey; Karnataka	141	446	(73) 15.6	Dr. R. Saravana Kumar
Total		338	1264	(75) 5.9 %	



2.2. Silkworm disease monitoring surveys of seed and commercial crop of south Indian states (Collaboration with CSR&TI, Mysuru, NSSO and DoS, Karnataka, Tamil Nadu)

1. Crop inspection/ Silkworm Disease Monitoring at BSF's/ Grainage

#	Date of visit	Place of visit	No. of lots	No. of samples	Disease incidence	Name of scientist Staff/attended
1	24.05.2024 10.05.2024	P3 BSF Berigai	04	08	Nil	Dr. R. Saravana Kumar
2	18.06.2024 08.07.2024 13.09.2024 07.03.2025	P3 BSF Avalapalli	22	38	Nil	Dr. R. Saravana Kumar
Total			26	46		



2. Moth and Egg Shell Testing at CSGRC, Hosur

#	Date of visit	Race	Stage	No. of Accn.	No. of sample	Disease incidence	Name of the scientist / Staff attended
1	4.06.2024	MV	Moth	23	460	Nil	Dr. Mala N
2	6.06.2024						
3	6.09.2024	BV	Moth	15	275	Nil	Dr. Mala N
Total				38	735		



Mother moth testing at CSGRC, Hosur

3. EXTENSION COMMUNICATION PROGRAMMES

Dr. Sailaja Bandam, Dr. R. Saravanakumar and Dr. Mala N

During the reporting period, 02 Awareness and 05 Technology Demonstration programs were conducted for the benefit of Sericulture Department staff in the southern States. A total of **136** persons were sensitized.

Table 1. Details of Extension Communication Programmes

Programmes	No. of events	Persons sensitized
AWARENESS PROGRAMME		
1. Silkworm disease management	01	29
2. Seed crop rearing package and Silkworm disease management	01	30
Total	02	59
TECHNOLOGIES DEMONSTRATION		
1. Pebrine detection methods in silkworm	01	20
2. Pebrine diseases management and disinfection	01	14
3. Disinfection and hygiene for seed crop	01	19
4. Artificial hatching methods	01	12
5. Embryo isolation technology	01	12
Total	05	77
Grand Total	07	136



Awareness program conducted on Disease management and disinfection

4. TECHNICAL SERVICES TO THE STAKEHOLDERS

Dr. R. Saravanakumar, Smt. K.R. Rathnamma

The Silkworm Seed Technology Laboratory (SSTL) is recognized under the Central Seed Act to conduct quarantine testing and issue quarantine certificates for exporting silkworm eggs to other countries. SSTL provides technical services to stakeholders, including testing disinfectants and analyzing samples of larvae, pupae, mother moths and eggshells in the Silkworm Seed Pathology division to ensure quality of the seed.

4.1 Quarantine testing of Silkworm eggs

Silkworm seeds were tested for quarantine certification to export seeds to foreign countries and certificates were issued to the stakeholders.

S.No	Address of the exporter	Country to export	No. of boxes/layings tested
1	M. Ramachandra Gowda VSSPC, Bengaluru-04	AI, SABAA BAHRAT, DAMASCUS, SYRIA	30
TOTAL			30 Boxes

4.2 Quality standards testing of disinfectants

Samples of Decol disinfectant received from M/s. Kamath Chlorotech, M/s. Sri Durga Biotech, and DoS Karnataka were tested at SSTL for compliance with quality standards to ensure effectiveness and safety in sericulture operations.

Sl. No	Stakeholders	No. of Samples
1	Dept. of sericulture, karnataka	13
2	M/s. Kamat Chlorotech, Bangalore	02
3	M/s. Shri Durga Biotech	01
Total		16

4.3 Sample testing for NSSO units

Samples of egg shells, larvae, and mother moth from P2 BSFs and SSPCs were tested for pebrine disease freeness. A total of **584** samples comprising egg shells (168), larval samples (191), and moth samples (225) were screened across various NSSO units.

#	Name of the unit	No. of Egg shells	No. of larval sample	No. Of Moth sample	Total samples	No. of positive samples
1	P2 BSF, Yelagiri Hills	30	02	-	32	2
2	P2 BSF, Palakkad	10	06	-	16	1
3	P2 BSF, Gavimatta	34	-	-	34	-
4	P2 BSF, Horsley Hills	06	40	-	46	-
5	P2 BSF, Madakasira	06	14	-	20	-
6	P2 BSF, Dharmapura	17	-	-	17	-
7	P2 BSF, Parigi	10	23	-	33	-
8	P2 BSF, Krishnagiri	-	09	-	09	-
9	P2 BSF, Haliyal	-	04	-	04	-
10	SSPC, Bangalore	12	-	24	36	11
11	SSPC, Palakkad	04	-	-	04	-
12	SSPC, Ramanagara	-	-	06	06	03
13	SSPC, Chintamani	-	-	04	04	-
14	SSPC, K. R. Nagar	22	-	168	190	24
15	SSTL (Seed crop)	17	93	23	133	-
Total		168	191	225	584	41

4.4 Sample testing for farmers

Larval and Pupal samples received from different farmers, DoS Karnataka, Tamil Nadu and Andhra Pradesh were tested and reported.

Sl. No	Stakeholders	No. of Farmers	No. of Samples	No. of Positive Sample	Pebrine incidence
1	DoS, Karnataka	10	25	-	Nil
2	DoS, Tamil Nadu	07	40		
3	DoS, Andhra Pradesh	-	-	-	
	Total	17	65	-	

4.5 P1 Egg sample testing (Nov 2024 to March 2025)

Dr. Sailaja Bandam, Dr. R. Saravanakumar, Dr. Mala N and Smt. K. R. Rathnamma visited CSB-SEPC, Mysuru on 16-11-2024, 21.11.2024, 23-11-2024 and 26.11.2024 for the collection of silkworm egg samples.

Race	No. of Samples tested	No. of Layings examined	No. of Positive Sample	Pebrine incidence (%)
FC1 and FC2	6508 samples	Approx. 1,30,160 layings	30	0.46 %

A total of 6,508 P1 egg samples comprising approximately 1,30,160 layings of FC1 and FC2 races were screened for pebrine infection. Among these, 34 samples tested positive, resulting in a pebrine incidence of 0.53%, indicating a relatively low level of infection during the period of Nov 2024 to March 2025.



Egg Sample Collection at CSB-SEPC and testing at CSB-SSTL

PART V: GENERAL / OTHER ACTIVITIES

1. Farm Management

Approximately 3.5 acres of cultivable land was maintained for the cultivation of mulberry and non-mulberry host plants to ensure a continuous and adequate supply of quality leaves for silkworm rearings. Regular maintenance and agronomic practices were carried out to support healthy plant growth and sustained leaf production. The host plants served as a reliable source of feed for silkworm rearings undertaken for ongoing activities as well as for proposed research projects during the year.



2. Seed crop and Cocoon Production

Dr. Sailaja Bandam, B.V. Raviprasad and K. R. Rathnamma

1. Multivoltine Seed Material:

10 DFLs of MV1 (Multivoltine) were received from CSR&TI, Mysuru. The rearing and grainage operations were successfully completed for HAC validation purposes.

2. Bivoltine Rearing and Cocoon Supply:

Crop No. 1: A total of 14 DFLs each of CSR2, CSR6, CSR26, and CSR27 were reared. The harvested cocoons were forwarded to P3 BSF, Mysuru.

Crop No. 2; A total of 40 DFLs each of CSR2, CSR6, CSR26, and CSR27 were reared. The harvested cocoons were forwarded to P3 BSF, Mysuru.

3. Seed Crop Rearing:

Seed crop rearing of 40 DFLs was conducted at SSTL, Kodathi, comprising 10 DFLs each of CSR2, CSR26, CSR27, and CSR6.



3. Tree Plantation maintenance

Economically significant trees like Jamun, Jackfruit, Pongamia, Shivane, Beete Mara, Tore Matti, Kadu Badami, etc. (a total of 1,700 tree plantations) were cared for in a 12-hectare area as a part of soil conservation in the vacant land. The

maintenance of these tree plantations was ongoing in the year 2024-2025 with the support of the Forest Department.

4. राजभाषा कार्यान्वयन/ Official Language Implementation

डॉ। माला. एन और बी. वी. रविप्रसाद

The Institute has achieved 86.50 % of the assigned target of 55 % along with notings towards the Hindi correspondences to Central Government offices as per OLIC Annual programmes of Ministry of Home affairs. Institute for Silkworm Seed Technology Research organized Hindi Pakhwada / Hindi Fortnight from 17.09.2024 to 28.09.2024.

A total of four OLIC meetings were conducted at this institute on 28.06.2024, 30.09.2024, 27.12.2024 and 25.03.2025, respectively. Dr. Mala N, Scientist C and Smt. Rathnamma, STA attended Hindi workshop organized at CO-CSB, Bangalore on 15.05.2024.

संस्थान ने अपने प्रयासों के माध्यम से भारत सरकार, गृह मंत्रालय, राजभाषा विभाग द्वारा जारी वार्षिक कार्यक्रम के अनुसार केंद्र सरकार के कार्यालयों में हिंदी नोटिंग सहित पत्राचार निर्धारित 55% के लक्ष्य के तुलना में 86.50% का लक्ष्य प्राप्त किया है। हिंदी पखवाड़ा/दिवस दिनांक 17.09.2025 से 30.09.2025 तक रेशम कीट बीज प्रौद्योगिकी अनुसंधान संस्थान द्वारा आयोजित किया गया।

रेशम कीट बीज प्रौद्योगिकी अनुसंधान संस्थान में क्रमशः 28.06.2024, 30.09.2024, 27.12.2024 और 25.03.2025 को कुल चार राजभाषा कार्यान्वयन समिति के बैठकें आयोजित की गईं। डॉ. माला एन, वैज्ञानिक सी और श्रीमती रत्नाम्मा, एसटीए ने 15.05.2024 को केंद्रीय कार्यालय, सीएसबी, बेंगलूर में आयोजित हिंदी कार्यशाला में भाग लिया।



First Seed Advisory Committee (SAC) Meeting

The First Seed Advisory Committee (SAC) meeting was held on 5th and 6th November 2024 at CO-CSB. During the meeting, SSTL presented its annual progress along with proposals for new project concepts for review and consideration by the committee.

Workshop on Quarantine Procedures

A two-day workshop on “Quarantine Procedures in Silkworm Seed Sector” was organized at SSTL, Kodathi on 03–04 September 2024 in commemoration of the CSB Platinum Jubilee celebrations. The workshop focused on best practices, regulatory guidelines, and safety measures in the silkworm seed sector.

Experts from plant quarantine, animal quarantine, and insect quarantine disciplines delivered lectures in their respective fields, providing comprehensive insights into quarantine protocols and their significance in preventing disease transmission. The programme was highly beneficial to stakeholders, enhancing their knowledge and awareness of quarantine procedures and strengthening biosecurity measures in the silkworm seed sector.





Field Visit:

Dr. Mala. N, Scientist-C Visited farmers field at Handenahally, Anekal Taluk on 29.12.2024 and addressed field related issues.



Vigilance Awareness Week

Vigilance Awareness Week was observed at SSTL from 30 October to 05th November 2024.

National Unity Day Celebration

National Unity Day was observed on 31st October 2024 at the campus to commemorate the birth anniversary of Sardar Vallabhbhai Patel.

SWACHH BHARAT ACTIVITIES

Swachh Bharat programme at SSTL, Kodathi from 1-15 March, 2025. All officials and farm workers of SSTL actively participated in Swachh Bharat initiatives by cleaning the roads and surroundings of the Institute and campus, contributing to a clean and healthy environment.



World Environment Day Celebration

World environment day was celebrated on 6th June 2024 at the SSTL campus. On this occasion, all officials actively participated in a tree plantation drive in the campus premises.



International Yoga day

International Yoga day was celebrated on 21st June 2024 at the SSTL campus. On this occasion, all officials actively participated in the yoga session conducted at the campus. The programme highlighted the importance of yoga in maintaining physical fitness, mental well-being.



Sports day Celebration

Sports day was organized at the SSTL campus with enthusiastic participation from all officials and staff. The event aimed to promote physical fitness and a spirit of healthy competition.



NSSO/SSTL Land survey work



Land survey work was carried out jointly by NSSO, SSTL RSRS, SBRL Kodathi to verify and document the land records, boundaries, and other related details of the Kodathi campus. A total of 123 acres were digitally surveyed, and the corresponding land records were updated. Additionally, boundary stones were placed to clearly demarcate the campus limits.

Students' Corner

1. Three students from Oxford College of Science, Bangalore underwent a 15-day internship at SSTL as part of the partial fulfilment of their B.Sc. (Zoology) course requirements.



2. Three students from STSN Government College, Kadiri, AP carried out one month dissertation work at SSTL as part of the partial fulfilment of their M.Sc. (Zoology) course.



3. One student from Karnataka state Open University, carried out Two months dissertation work at SSTL as part of the partial fulfilment of their M.Sc. (Biotechnology) course.

Educational Visits

1. A total of 130 students along with 12 faculty members from Vruksha School, Bangalore visited the SSTL campus on 20.07.2024 for educational exposure. The students were introduced to various aspects of sericulture, including silkworm rearing and related activities.



2. A total of 120 students accompanied by 4 faculty members from Christ Academy CBSE School visited the SSTL campus on 19.11.2024. During the visit, the students were given exposure to silkworm host plants, sericulture practices, and various by-products of the sericulture industry.





The Member Secretary and Joint Director (Admin) visited the SSTL campus on 3.09.2024 and 26.11.2024 and reviewed ongoing activities, the land-related records and details.



Visit of Director, CSB-NSSO to the campus



PART VI: PUBLICATIONS

1. Research publication

1. Saravanakumar R, Sudhakara Rao P, Sailaja B and Manthira Moorthy S. (2025) Fungal Biotransformation of Curcumin and Its Antibacterial Efficacy against Silkworm Flacherie Pathogens. *Journal of Advances in Biology & Biotechnology*, 28:2, 37-44. NAAS rating- 5.3
2. Saravanakumar R, Ponnuvel KM, Anupama J, Sailaja B, Mala N and Manthira Moorthy (2025) Identification and infectivity of different microsporidian isolates collected from sericulture (*Bombyx mori* L) areas. *International Journal of Biology Sciences*; 7(1): 36-40. NAAS rating- 4.8
3. Saravanakumar R, Akash M, Sailaja B and Manthira Moorthy S (2025) Microbial conversion of vanillin for enhanced antimicrobial activity: A comprehensive study. *International Journal of Advanced Biochemistry Research*; 9(4): 836-840. NAAS rating- 5.29
4. Ritwika Sur Chaudhuri, G Lokesh, R Saravanakumar, G Punithavathy, M Maheswari and V Nishitha Naik (2024) Characterization of mutant silkworm germplasm resources for resistance to *Bombyx mori* Bidesovirus. *Indian J. Seric.*, 58(1-2): 1-7.
5. Mala N. *et al.* (2025) Yield attributes of Eri Silkworm, *Samia ricini* Donovan in the rearing conditions of traditional and non-traditional provinces. international conference on "One Health Perspectives in Global Plant Protection Research (OHPGPR 2025)" organized during February 19-21, 2025 at TNAU, Coimbatore. 496-97.

2. SEMINARS / TRAININGS / WORKSHOPS/ MEETINGS

#	Title of Programme	Venue and Date	Person Participated
1	Online training programme on 'Writing quality research paper and proposal'	Department of Humanities and Social Sciences, Sardar Vallabhbhai National Institute of Technology from 11 th to 15 th June, 2024.	Dr. Sailaja Bandam Dr. R. Saravanakumar Dr. Mala N
2	'Hands on training on Real time PCR'	SBRL, Kodathi from 24 th to 28 th June, 2024.	Dr. R. Saravanakumar
3	Online workshop on "Ensuring compliance: Role of FSSAI in small food enterprises".	BioNEST Agri Innovation centre, UASB in association with Food safety works on 30.07. 2024.	Dr. R. Saravanakumar
4	Attended DST sponsored National programme for training on 'Personal Effectiveness for Women Scientists (Mothers and girls improving capability) MAGIC (Women component)	February 10-14, 2025 at XIM University, Bhubaneswar.	Dr. Mala. N,
5	Delivered lecture on 'Various Byproducts from sericulture and their uses' during Technology Orientation programme.	ESSPC, Hosur on 25.10.2024.	Dr. Mala. N
6	Hindi workshop	C.O, Bangalore on 15/05/2024	Dr. Mala Smt. K. R. Rathnamma
7	workshop on "Challenges & Opportunities in quality cocoon generation commercial egg production".	Organized by NSSO at CSRTI, Mysore on 25.07.2024	Dr. Sailaja Bandam Dr. R. Saravanakumar
8	Workshop on Industrial meet	Centre of Excellence, Central Silk Board, Bangalore on 28.09. 2024.	Dr. Sailaja Bandam Dr. R. Saravanakumar
9	Attended International conference on 'One Health perspectives in Global Plant Protection	February 19-21, 2025 at TNAU, Coimbatore.	Dr. Mala. N
10	Attended Webex meeting on Applications of drones in sericulture industry	on 16.04.2024.	All scientists

11	Webex meeting on Learning adoption of Chinese sericulture practices: Insights from the China visit (20 th May June 2024)	conducted by Central silk Board, Bangalore on 26.07.2024.	All scientists
12	Attended TPC meeting	Board room, Central office during August 2024	Dr. Sailaja Bandam
13	CSB 75 years platinum Jubilee celebrations	on 20.09.2024 at Mysore and on 21.09.2024 at at Bangalore	SSTL officials
14	Technical review meeting of Silkworm Seed Production Centres and Cold Storage Plants	SSTL, Kodathi on 01.10.2024	SSTL scientists
15	Attended Technical review meeting to discuss P1 laying testing process	CSB- SEPC, Mysuru on 25-11-2024	Dr. Mala. N
16	Attended workshop on 'Artificial Intelligence in mulberry sector'	05.03.2025 at CSRTI, Mysore.	Dr. R. Saravanakumar
17	Attended awareness programme on 'NABL accreditation and its benefits'	on 19.12.2024 at Centre of Excellence. C.O, Bangalore	Dr. Sailaja Bandam, Dr. R. Saravanakumar Dr. Mala. N
18	Attended workshop on 'Beyond silk samagra-2 scheme in southern zone on	La Marvel Hotel, Jayanagara, Bangalore on 11.03.2025	Dr. Sailaja Bandam Dr. R. Saravanakumar

Awards and Recognition

Dr. Sailaja Bandam, Scientist-D, received the **Best Scientist Award** during the CSB Platinum Jubilee celebrations held at Mysuru on 20.09.2024.



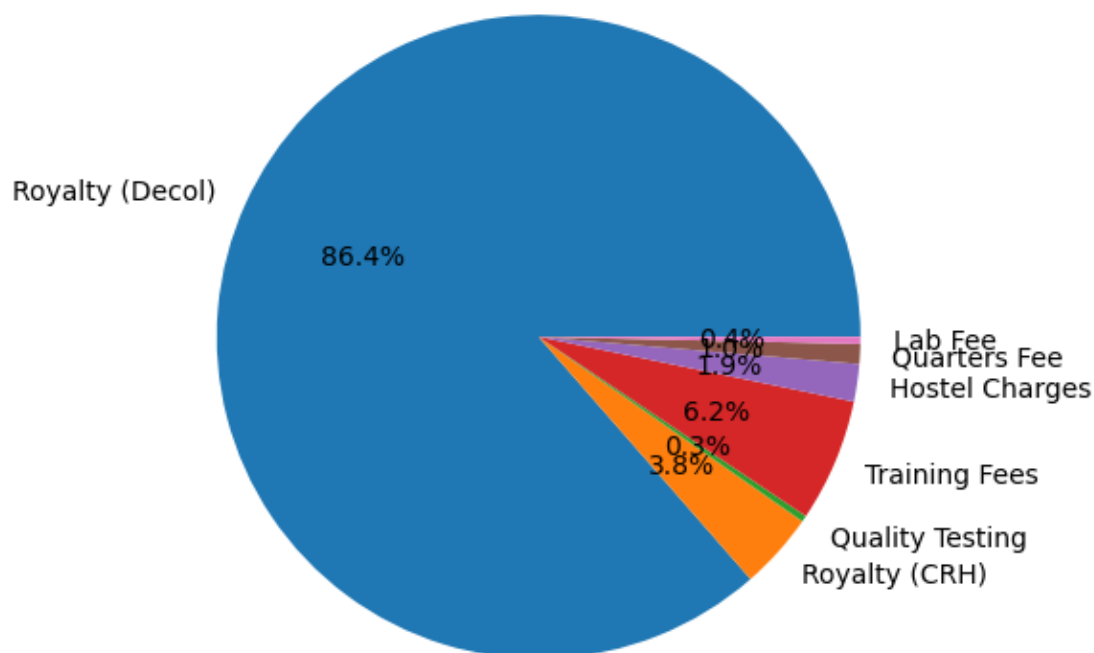
Dr. Mala N, Scientist-C received appreciation in Conference on “Health Perspectives in Global Plant Protection Research (OHPGPR 2025)” organized during February 19-21, 2025 at TNAU, Coimbatore.



PART VII: REVENUE GENERATION

A sum of Rs. **22.5** lakhs generated as revenue from different sources for the financial year 2024-25 and remitted to Central Office.

#	Particulars	Amount (Rs. in lakhs)
1	Royalty received for Decol	19.45
2	Royalty received for CRH	0.865
3	Quality analysis/ testing of products	0.07
4	Training course fee	1.39
5	Hostel charges	0.424
6	Fee from quarters	0.223
7	Laboratory fee for students	0.08
	Total	22.5



RETIREMENT OF FARM WORKERS DURING 2024-25



Sri. Wilson babu, SFW
Retired on 21.05.2024



Sri. Basavaraju, SFW (TS)
Retired on 7.06.2024