

CONCLUDED PROJECTS OF CSB-CSR&TI PAMPORE

(MARCH 2021-MARCH 2026)

S.NO	CODE	TITLE	DURATION OF PROJECT	
1	PIB-3586	Development of superior mulberry varieties through controlled hybridization for North-West Indian states	September 2016	August 2021
2	AIB-3626	Identification of Bivoltine Silkworm Hybrids for Temperate Region of North West India	March 2018	February 2022
3	PIB-3629	Development of Drought Tolerant Mulberry Genotypes Suitable for Rainfed hill farming in North –West India.	January 2018	June 2022
4	MOE03001SI	Innovative Approach for multiple cocoon crops and Stabilization of Autumn crop in North-west India	February 2019	January 2021
5	AIB03002SI	Development of sustainable bivoltine silkworm double hybrids suitable to North West India	March 2020	February 2023
6	APR03003SI	Rescheduling of brushing date for second commercial crop rearing during autumn in Kashmir and Doon Valley.	March 2020	February 2022
7	AIB03004SI	Evaluation and identification of high yielding bivoltine Silkworm (<i>Bombyx mori</i> L.) hybrids for temperate region of Jammu & Kashmir.	March 2020	February 2023
8	ARE03005SI	Development of trap through biorational tactics for the management of mulberry leaf webber <i>Glyphodes pyloalis</i> (Lepidoptera: Crambidae)	March 2020	February 2022
9	AIB03007SI	Development of autumn specific bivoltine silk worm (<i>Bombyx mori</i> L.) hybrids suitable for temperate region of Jammu & Kashmir	March 2021	February 2024
10	AIB03008SI	Development of Nutrigenetic hybrids of bivoltine silkworm (<i>Bombyx mori</i> L.) under sub-tropical conditions of North-West India	March 2021	February 2024
11	MOE03010SI	Evaluation of improved mulberry silkworm hybrids and technologies for North & North West India	March 2022	February'2024
12	MOT03011MI	Popularization of Mulberry Sericulture in Kargil (Ladakh UT)	March 2022	February 2024
13	PIE03012SI	Evaluation of Mulberry Somatic Hybrids	March 2022	February 2025

CONCLUDED PROJECTS

PIB 3586: Development of superior mulberry varieties through controlled hybridization for North-West Indian states

Project Period: 2016- 2021

Scientists: Shailendra Singh Chauhan (up to 31.12.2018), Pawan saini, Rajesh Kumar (01.01.2019). Aftab A Shabnam (Upto 18.06.2018), K.Jhansi Lakshmi*, K.Viayan*and G.Thanavendan*.

Outcome:

- Out of 270 temperate mulberry accessions at CSGRC, Hosur, 21 were identified with early sprouting and good growth, and four (ME-0253, ME-113, MI-0240, MI-0308) and three crosses were made (ME-0253 x ME-113, ME-0253 x MI-0240 and ME 0253 x MI-0308) were selected for controlled hybridization.
- 1850 hybrid seeds from three crosses were collected and sown at CSB-CSR&TI, Pampore, and CSGRC, Hosur, with recorded germination and survival rates ranging from 8.0% to 23.46%.
- From 281 F1 progenies, 10 were selected based on morphological traits, including growth, leaf characteristics, disease resistance, and rooting parameters, for further evaluation at the Progeny Row Trial (PRT) level.

Current Status of Utilization:

Nil

PIB-3629: Development of mulberry genotypes suitable for rainfed hill farming in North West India *(In collaboration With CSGRC, Hosur)*

Project period: Jan 2018-June 2022

Scientist: Chattar Pal, S Murali, J A Limbaji (upto 30.11.2018), Santosh M, Sardar Singh, K Jhansi Lakshmi.

Outcome: 23 progenies out of 971 showed desirable traits under moisture stress were selected and raised and maintained under Progeny Row Trial (PRT). Diseases (leaf spot, powdery mildew, tukra) and pests (leaf webber) were observed. Promising hybrids suitable for rainfed hill farming were identified.

A total of 971 segregating mulberry progenies generated are of immense importance as systematic utilization of the material will be helpful in identification of trait-specific as well as drought tolerant mulberry genotypes. Utilization of genomic resources with these genetic resources will be beneficial in discovering the useful genomic regions associated with economically important traits i.e. leaf yield, quality parameters, tolerance to biotic and abiotic stresses and rooting parameters for multiplication and propagation.

Current Status of Utilization

Follow up project under PIE03015SIC

AIB-3626: Identification of Bivoltine Silkworm Hybrids for Temperate Region of North West India

Project period March 2018 - February 2022

Scientists: Shakeel Ahmad (up to 18.06.2018), Mir Nisar Ahmad, Bharath Kumar N and Shivkumar.

Outcome:

Identified that spring and summer specific hybrid CSR27xPAM117 and autumn specific hybrid Line-7xN5

Conducted field trial at farmer level in three seasons ie., spring, summer and autumn

Among 30 season, specific hybrids evaluated in each season the following were shortlisted for further TOT programmes.

S.No.	Season	Hybrid
1	Spring specific	CSR 27 × Pam 117
2	Summer specific	CSR 27 × Pam 117
3	Autumn specific	Line 7 × N5

Current Status of Utilization

Follow up project under MOE03010SI component IV

MOE03001SI: Innovative Approach for multiple cocoon crops and Stabilization of Autumn crop in North-west India. (Collaboration with RSRS's)

Project Period: 2019 – 2021

Scientist(s): Sardar Singh, Murali S, Pankaj Tewary (upto 27.08.2019), K K Rai (CI)

Outcome: The project achieved remarkable success in enhancing sericulture productivity and sustainability. In Jammu division of J&K, project-adopted rearers recorded impressive average yields of **70.67 kg/100 dfs** during the spring season and **40.67 kg/100 dfs** in the autumn season, while in Himachal Pradesh the yields reached **60.33 kg/100 dfs** in spring and **43.67 kg/100 dfs** in autumn. Compared to traditional rearing practices, these results translated into significant yield gains of **43.47% in spring** and **44.10% in autumn** in Jammu, with similarly high improvements in Himachal Pradesh. The introduction of summer crops between spring and autumn further optimized land use and provided farmers with additional income avenues. Overall, the project demonstrated the effectiveness of knowledge diffusion and innovative practices in strengthening sericulture, ensuring both higher productivity and sustainable livelihood opportunities for farmers.

Current Status of Utilization

Follow up project under MOE03010SI Component I

AIB03002SI Development of sustainable bivoltine silkworm double hybrids suitable to North West India

Time period: Mar, 2020-Feb, 2023

Scientist: Bharat Kumar N, Shivkumar, Kiran R & Mir Nisar Ahmad

Outcome:

- Developed 09 bivoltine silkworm double hybrids and evaluated their performance during summer & autumn 2020, spring, summer & autumn 2021 and spring 2022
- Two bivoltine silkworm double hybrids DH-3 & DH-8 are identified for North West India
- Double Hybrid-8 (DH-8) performed better in spring (EI: 60.32 vs. control 59.83) and summer (60.37 vs. 59.59)

Current Status of Utilization

- The first ever silkworm double hybrid developed at CSB-CSR&TI, Pampore has the potential to thrive well in field conditions by following all the recommended silkworm rearing practices.
- The hybrid is currently under On-Farm Trial (OFT) evaluation for large-scale validation.

APR03003SI: Rescheduling of brushing date for second commercial crop rearing during autumn in Kashmir and Doon Valley.

Project period: Mar, 2020-Feb, 2022

Scientists: Gulzar Ahmad Khan, Gulab Khan R, Haroon Rashid, Kamlesh K. Rai, Babulal.

Outcome:

At CSB-CSR&TI, Pampore

- Brushing date for autumn rearing can be preponed by 15–20 days (from August 20 to August 1–15).
- Improved parameters in early brushing dates:
- Higher weight of mature larvae, good cocoons, and productivity.
- Lower defective cocoon percentage.
- Better pupation rate, single cocoon weight, shell weight, and filament length.

At RSRS, Sahaspur

- Brushing on August 31 performed better than the normal date (September 5).
- Higher productivity (50.04 kg/100 DFLs) observed in the August 31 treatment.
- Improved average filament length (973 m), reelability (81.06%), and renditta (7.32).

New pruning and brushing schedule for stabilization of 2nd commercial crop under temperate climatic conditions of Kashmir

Date of pruning (Chawki)	Date of Pruning (Late age)	Date of brushing	Date of Chawki distribution / Late age rearing	Age of leaf
1st – 5th June	10th – 15th June	5th – 10th Aug	15th – 20th Aug	65 days

Mulberry Plantation:

- **Mode of plantation:** Bush (Chawki), Tree (Late age rearing)
- **Age of plants:** 8–10 years old
- **Variety:** Ichinose (Chawki), Goshocrami (Late age rearing)
- **Spacing:** 3' × 3' (90 × 90 cm), 9' × 8' (270 × 240 cm)

Cultural operations and inputs (as per recommended package of practices):

- FYM – 10–20 kg/plant/year
- Pruning/top clipping and digging/weeding during March
- **Chemical fertilizer (per plant/year in two split doses – April & July):**
 - Urea: 99 g (I Dose) + 163 g (II Dose) [Nitrogen – 46%]
 - DAP: 163 g [Nitrogen – 16%, Phosphorous – 84%]
 - MOP: 125 g [Potash – 100%]
- Bottom pruning and digging/weeding in June
- Leaf harvesting in August
- Digging/weeding and irrigation during last week of November

Silkworm Rearing:

- **Season:** Early Autumn
- **Name of hybrid:** CSR DH (FC1 × FC2)
- **Date of brushing:** After 60–65 days of bottom pruning.

Current Status of Utilization:

Under On Station Trials (OST) under CSB-RSRS's of North India.

AIB03004SI: Evaluation and identification of high yielding bivoltine Silkworm (*Bombyx mori* L.) hybrids for temperate region of Jammu & Kashmir.

Time period: Mar, 2020-Feb, 2023

Scientist: Kiran R, Bharath Kumar N, Shivkumar & Mir Nisar Ahmad

Outcome:

- A total of 8 parents and 16 hybrids were reared across Spring, Summer, and Autumn 2021, and evaluated using EI, MPV, BPV, CPV, multivariate clustering, and ANOVA.
- The hybrids -10 (HybridBP-2 × Line-13) and Hybrid- 12(BP-2 × SO-17) exhibited superior performance and were shortlisted for On-Station Trials (OST) at CSB-CSR&TI Pampore, RSRS Jammu, and Sahaspur.
- The shortlisted hybrids recorded average EI values above 50, with most MPV, BPV, and CPV values being positive for major economic traits.

Current Status of Utilization:

The shortlisted Hybrid- 12(BP-2 × SO-17) were under multi-location OFT evaluation as an alternative for the conventional hybrid SH6 × NB4D2.

ARE-03005SI Development of trap through biorational tactics for the management of mulberry leaf webber *Glyphodes pyloalis* (Lepidoptera: Crambidae)

Project period: Mar 2020-Feb 2022

Scientists: Rajesh Kumar, Sahadev Chouhan, Satish Y

Outcome: The natural enemies i.e. *Chelonus carbonator* was multiplied on both the hosts viz., *Glyphodes pyloalis* and *Corcyra cephalonica*. A new solar trap of LED (440 nm wavelength) in combination with Tangle Foot Transparent Glue was found effective to attract the adults in trap, which will be multiplied for field trial for minimizing the population of monophagous pest, *Glyphodes pyloalis*. Two traps with LED, solar plates and batteries were developed but not validated.

Current Status of Utilization

Nil

AIB03007SI: Development of autumn specific bivoltine silk worm (*Bombyx mori* L.) hybrids suitable for temperate region of Jammu & Kashmir

Time period: Mar, 2021-Feb, 2024

Scientist: Shivkumar, Bharath Kumar N and Kiran R

Outcome:

16 developing autumn-specific bivoltine hybrids were evaluated for their performance during spring and autumn seasons of 2021 and 2022. Data were recorded for nine key economic traits, including fecundity, hatching percentage, larval weight, cocoon yield, single cocoon weight, single shell weight, shell ratio, pupation rate, and filament length.

Among these, one autumn-specific silkworm hybrid, **ASH-14 (Line-18 × Line-6)**, was shortlisted for On-Station Trial (OST) at **CSB-CSR&TI**, Pampore; **RSRS**, Jammu; and **RSRS**, Sahaspur. The OST results during the autumn season were encouraging, with **cocoon yields of 68, 58, and 63 kg/100 DFLs**, respectively, at the three locations. These values were consistently higher than the control **SH6 × NB4D2** (57, 49, and 55 kg/100 DFLs).

The promising performance of **ASH-14 suggests its potential suitability for autumn rearing under temperate conditions**, and therefore, this hybrid warrants further evaluation under **On-Farm Trials (OFT)** during the autumn season.

Current Status of Utilization:

The hybrid **ASH-14** is currently under On-Farm Trial (OFT) evaluation for large-scale validation.

AIB03008SI: Development of Nutrigenetic hybrids of bivoltine silkworm (*Bombyx mori* L.) under sub-tropical conditions of North-West India

Project period: Mar, 2021-Feb, 2024

Scientists: Murali, S, Sardar Singh, Chhattar Pal, Kiran R, Rita Singh

Outcome: 15 hybrids along with 2 control hybrids were evaluated during spring and autumn season of 2021 and 2022. Further, 3 hybrids viz., **CSR50xBcon1**, **CSR50xBcon4** and **RSJ14xBcon1** were as exhibiting exceptional potential shortlisted for On Station Trial executed at including the esteemed **CSB-CSR&TI**, Pampore, and RSRS Jammu and Sahaspur.

Current Status of Utilization:

The shortlisted 03 hybrids is presently undergoing multi-location On-Farm Trials (OFTs) for large-scale validation.

MOE03010SI Evaluation of improved mulberry silkworm hybrids and technologies for North & North West India

Time Period: March'2022 - February'2024

Scientists: Sardar Singh, Murali S & K K Rai

Component	Title	Outcomes
I (Outcome of MOE-03001SI)	Large Scale Farmer-Level Trial of Summer Crop and Its Impact on Autumn Crop in Selected Areas of North West India	Potential yields of 50 kg/100 DFLs in Himachal Pradesh, 46 kg/100 DFLs in Jammu region, and 50.40 kg/100 DFLs in Pauri district of Uttarakhand were obtained during the summer crop using the hybrid SH6 × NB4D2 . The study confirmed that a summer crop between spring and autumn is feasible , and further, conducting the summer crop resulted in improved performance of the subsequent autumn crop .
II (Outcome of PIN-3608)	Cocoon Production Improvement During Autumn Rearing Through Fortification of Mulberry Leaf	Feeding silkworms with fortified mulberry leaves resulted in a 6% increase in cocoon production . Specifically, fortification with 0.5% glutamic acid was found effective during autumn rearing, leading to enhanced cocoon yield .
III (Outcome of PIP-3543)	Revalidation of Induction of Water Stress Tolerance in Mulberry Under Rainfed Condition by Application of Paclobutrazol	Mulberry plants treated with 20 mg/litre paclobutrazol recorded a 38.42% increase in leaf yield per plant compared to control. This concentration was found to be the most effective, significantly improving leaf biomass under rainfed conditions . The technology offers an economic, eco-friendly, and practical solution for enhancing mulberry foliage yield and improving quality silk production in North-West India.
IV (Outcome of AIB-3626)	Evaluation of Identified Bivoltine Silkworm Hybrids for Temperate Region of North West India	The hybrid CSR27 × PAM117 exhibited slightly better performance than the control hybrid SH6 × NB4D2 in On-Station Trials (OST) conducted across Kashmir valley during spring, summer, and autumn seasons .
V (Outcome of PPA-3603)	Soil Health-Based Fertilizer Recommendation for DoS Farms in North India	Soil samples were collected from 19 DoS mulberry farms across six states/UTs of North-West India and analyzed for both macronutrients and micronutrients . Based on the nutrient status, fertilizer application recommendations were formulated for each farm to address soil deficiencies and imbalances under rainfed conditions , thereby ensuring improved mulberry productivity .

VI	Popularization and Strengthening of CRC Concepts at Selected DoS Locations in North India	A total of 50 Chawki Rearing Centres (CRCs) across North India were mapped to assess infrastructure and critical gaps: J&K (25 CRCs), Himachal Pradesh (6), Uttarakhand (6), Uttar Pradesh (11), Punjab (1), and Haryana (1) . This mapping provided insights into infrastructure gaps and resource requirements for effective strengthening of CRCs in the region.
VII (Outcome of AIB-03569)	On-Farm Trial of BmNPV-Tolerant Silkworm Hybrids in North & North-West India	During autumn 2022, the following results were obtained: • PamDR4 × PamDR6 in Kashmir valley: 17.62 kg/100 DFLs (max 34 kg) • PamDR7 × PamDR8 in Uttar Pradesh: 34.61 kg/100 DFLs (max 51.20 kg) • PamDR1 × PamDR6 in Uttarakhand: 16.78 kg/100 DFLs (max 36 kg) During spring 2023: • PamDR4 × PamDR6 in Kashmir valley: 24.25 kg/100 DFLs (max 30 kg) • PamDR1 × PamDR6 in Uttarakhand: 28.68 kg/100 DFLs (max 35.5 kg) Three bivoltine hybrids—PamDR4 × PamDR6, PamDR7 × PamDR8, and PamDR1 × PamDR6—were identified as moderately tolerant to BmNPV. Their region-specific performance in Jammu & Kashmir, Uttarakhand, and Uttar Pradesh was confirmed under On-Farm Trial (OFT) evaluation, establishing their potential for sustainable cocoon yield under disease-prone conditions.

Current Status of Utilization:

MOT03011MI: Popularization of Mulberry Sericulture in Kargil (Ladakh UT)

Project period: Mar, 2022-Feb, 2024

Scientists: Sh. Gulzar Ahmad Khan, Muttanna, P. Kumaresan & Z.I.Buhroo (SKAUST-K)

Outcome:

In the **Batalik Sector of Kargil**, a total of **3,000 mulberry saplings** were planted in May 2023 to strengthen the mulberry wealth of the area. To promote **large-scale awareness among stakeholders**, five technical bulletins/folders on mulberry plantation and silkworm rearing were prepared and distributed in the selected villages. Additionally, **awareness programmes were organized** in schools and colleges of Kargil district to sensitize students and local communities about sericulture. As a part of practical exposure, a **silkworm rearing demonstration was conducted** in the Batalik Sector, where **100 DFLs were brushed on 11th July 2023 at the farmer's level**—marking the first-ever experience of silkworm rearing for the local farmers. The demonstration recorded a yield of **44.26 kg/100 DFLs**, providing farmers with valuable **hands-on experience and practical insights** into silkworm rearing practices.

Current Status of Utilization:

Follow up project was coded and ongoing developmental Project at Ladakh UT under MOE03019SNC (March, 2025-January 2028).

PIE03012SI: Evaluation of Mulberry Somatic Hybrids (Follow up Project PIB-3571)

Project period: Mar 2022 – Feb 2025

Scientists: Gulab Khan Rohela; Pawan Saini, Ashok Kumar Kasukurthi (up to 31-08-2024)
Syam S (w.e.f. 01.09.2024)

Outcome:

Flow cytometric karyotyping confirmed **tetraploid status in SH2 (PPR1-Chinese White) and SH3 (PPR1-PPR1), validating successful genome integration**. Field trials during spring 2024 and 2025 demonstrated that SH2 and SH3 not only matched but also in some instances surpassed the best control varieties in leaf yield and associated traits. Biochemical profiling from 2022 to 2024 revealed **SH2's superior total soluble carbohydrates and protein content**, crucial for enhancing leaf palatability and silkworm nutrition. Bioassay and post-cocoon analysis conducted with Bivoltine Double Hybrid (FC1 × FC2) silkworms confirmed SH2 and SH3's suitability for rearing, showing improved larval survival, cocoon yield, filament length, and raw silk output. **SH2 excelled in pupation and silk yield, while SH3 stood out for cocoon and reeling traits**, establishing both hybrids as strong candidates for commercial sericulture applications.

Current Status of Utilization:

Under multiplication of SH-2&3 hybrids at nursery level at CSB-CSR&TI, Pampore and in process of submission of FYT project proposal.