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केन्द्रीय रेशम उत्पादन अनुसंधान एवं प्रशिक्षण संस्थान,
CENTRAL SERICULTURAL RESEARCH & TRAINING INSTITUTE
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डॉ. राजेश कुमार,वैज्ञानिक–डी Dr. Rajesh Kumar, Scientist-D

डॉ. पवन सैनी,वैज्ञानिक–सी Dr. Pawan Saini, Scientist-C

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Central Sericultural Research & Training Institute, Pampore

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केन्द्रीय रेशम उत्पादन अनुसंधान एवं प्रशिक्षण संस्थान, पाम्पोर

केंद्रीय रेशम उत्पादन अनुसंधान एवं प्रशिक्षण संस्थान, पंपोर केंद्रीय रेशम बोर्ड, वस्त्र मंत्रालय, भारत सरकार के प्रमुख संस्थानों में से एक है,जिसेउत्तर भारत में शहतूत रेशम उत्पादन के अनुसंधान एवं विकास का कार्य सौंपा गया है। संस्थान के अंतर्गत दो क्षेत्रीय रेशम उत्पादन अनुसंधान केंद्र, मिरानसाहिब, जम्मू (जम्मू और कश्मीर)एवंसहस्पुर,देहरादून (उत्तराखंड), छह अनुसंधान विस्तार केंद्र और एक पी4,मूल बीज फार्म, मानसबल (कश्मीर) आतें हैं।संस्थान उत्तर भारत के राज्यों जैसे हिमाचल प्रदेश, उत्तर प्रदेश, उत्तराखंड, पंजाब, जम्मू-कश्मीरऔर हरियाणा को आवश्यकता आधारित अनुसंधान, विस्तार एवं प्रशिक्षण सहायता प्रदान करता है।

उत्तर भारत के रेशम उद्योग को बढ़ावा देने और पुनर्जीवित करने के प्राथमिक उद्देश्य के साथ, संस्थान ने शहतूत, रेशमकीट सुधार, रेशमकीट फसल प्रबंधन, आदि में कई अनुसंधान परियोजनाओं को लागू किया है जिससे शहतूत रेशम उत्पादन को बढ़ाने के लिए क्षेत्र / मौसम विशिष्ट प्रौद्योगिकियों का विकास किया जा सके। उत्तर भारत में गुणात्मक और मात्रात्मक रूप से रेशम उत्पादन हेतु यह संस्थान 111 रेशमकीट नस्लों और शीतोष्ण मूल के 82 शहतूत प्रजातियों का सम्वर्धन एवं संरक्षण करता है।

संस्थान श्रीनगर-जम्मू राष्ट्रीय राजमार्ग पर श्रीनगर शहर से लगभग 16 किलोमीटर की दूरी पर गालंदर, पंपोर में स्थित है। निकटतम हवाई अड्डा श्रीनगर है जबकि निकटतम रेलवे स्टेशन जम्मू है, जो 290 किमी की दूरी पर है।

Central Sericultural Research & Training Institute, Pampore is one among the premier institutes of Central Silk Board, Ministry of Textiles, Govt. of India entrusted with Research & Development of mulberry sericulture in North India. The Institute has two Regional Sericultural Research Stations at Miransahib, Jammu (J&K) and Dehradun (U.K.), 06 Research Extension Centres and one P4,Basic Seed Farm (B.S.F.)Station at Manasbal (J&K). The Institute provides need based Research, Development/Extension and HRD support to the states of North India *viz.* Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Uttarakhand, Punjab, Rajasthan and Haryana.

With the primary aim to boost and revitalize the silk industry of North India, the Institute has implemented a number of research projects in mulberry, silkworm improvement, silkworm crop management etc., so that, region/season specific technologies could be developed to increase the mulberry sericulturequalitatively& quantitatively in North India. The Institute maintains a rich germplasm of 111 silkworm races and 82 mulberry accessions of temperate origin for conservation and utilization.

The Institute is located at Gallandar, Pampore at a distance of approximately 16 kms from Srinagar city on the Srinagar - Jammu National Highway. The nearest airport is Srinagar while as the nearest railway station is Jammu Tawi, which is at a distance of 2**90** km.

दृष्टि :

- उत्तरी भारत में उत्कृष्ट प्रमुख रेशम उत्पादन अनुसंधान संस्थान के रूप में उभरे।

VISION:

- To emerge as a premier sericulture research institute of excellence in Northern India.

ध्येय :

- उत्पादन, उत्पादकता एवं द्विप्रज रेशम की गुणवत्ता में वृद्धि हेतु रेशम उत्पादन अनुसंधान, प्रशिक्षण एवं विस्तार गतिविधियों में व्यावसायिकता को बढ़ावा देने के लिए प्रतिबद्ध है।
- पर्यावरण, गरीब एवं महिलाओं के अनुकूल प्रौद्योगिकियों को उत्पन्न कर रेशम उत्पादन को एक व्यवहार्य उद्यम में रूपांतरण करना।
- ग्रामीण जनसंख्या के समावेशी विकास संबंधी राष्ट्रीय एजेंडे में विशेषकर महिलाओं एवं गरीब ग्रामीणों की आय पैदा करने की क्षमता में वृद्धि के माध्यम से योगदान करना।

MISSION:

- Committed to promote professionalism in sericulture research, training and extension activities leading to enhancing production, productivity and quality of bivoltine silk.
- To generate eco-friendly, pro-poor and women friendly technologies for transforming sericulture as a viable enterprise.
- Contribute to the national agenda of inclusive development of rural population especially women and rural poor by enhancing their income generation capability.

अधिदेश

- भारतीय रेशम की उत्पादन, उत्पादकता एवं गुणवत्ता में वृद्धि करने के लिए वैज्ञानिक, तकनीकी एवं लाभदायक अनुसंधान का संचालन करना।
- परपोषी पादप, रेशमकीट पालन, कोसोत्तर प्रौद्योगिकी एवं इसके प्रसार के लिए अभ्यास पैकेज विकसित करना।
- उत्पाद एवं प्रौद्योगिकियों तथा उद्योग इंटरफेश का व्यवसायीकरण।
- लागत आय एवं कठिन परिश्रम को कम करने एवं उप-उत्पादों का उपयोग कर शुद्ध आय एवं उत्पादकता में वृद्धि करना।
- आयात प्रतिस्थापन और विदेशी मुद्रा अर्जित करने के लिए अन्तरराष्ट्रीय ग्रेड रेशम के उत्पादन में वृद्धि।
- मानव संसाधन विकास।
- प्रजनक भण्डार का संरक्षण।
- रोग एवं पीड़क अनुवीक्षण तथा पूर्वानुमान एवं पूर्वसूचना।
- सूचना संचार प्रौद्योगिकी उपकरणों के माध्यम से ज्ञान का प्रसार, अनुसंधान व विकास नवाचार एवं अभ्यास पैकेज का प्रसार करना।
- प्रतिष्ठित राष्ट्रीय और अंतरराष्ट्रीयसंस्थानों के सहयोग से अनुसंधान कार्यक्रम / परियोजनाओं पर कार्य करना।
- वर्तमान अनुसंधान, सहयोगी गतिविधियों,वैज्ञानिक और तकनीकी गतिविधियों को संबल करने के लिए संस्थागत ढांचे को सुदृढ़ करना।
- बेहतर तालमेल के लिए अंतरसंस्थागतसहयोग करना।
- रेशमउत्पादनप्रौद्योगिकियों की तकनीकी-आर्थिक व्यवहार्यता पर अध्ययन।
- तकनीकी और परामर्श सेवाएं प्रदान करना।

MANDATE:

- Conduct scientific, technical and economic research to enhance production, productivity and quality of Indian Silk.
- Development of package of practices for Host Plant, Silkworm Rearing, Post Cocoon Technology and its dissemination.
- Commercialization of products & technologies and industry interface.
- Efforts to reduce input cost & drudgery and by-product utilization to increase net income and productivity.
- Enhance production of international grade silk for import substitution and earning foreign exchange.
- Human Resource Development.
- Maintenance of Breeders Stock.
- Disease & Pest Monitoring and Forecasting & Forewarning.
- Dissemination of knowledge, R&D innovations and package of practices through ICT tools.
- Undertake collaborative Research Programmes/Projects with reputed National and International R&D Institutions.
- Strengthening Institutional framework to support ongoing research, allied activities, scientific and technical activities.
- Inter Institutional collaboration for better synergy.
- Studies on techno-economic feasibility of sericulture technologies.
- Providing technical and consultancy services.

From the Desk of Director



It's my pleasure to place the Annual Reportof Central Sericultural Research & Training Institute, Pampore for the year 2020-21. This Instituteis extending Research & Development (R&D), Technical, Technological, Innovation, Human Resource Development and Extension service supports to the sericulture farmers and stakeholders in the entire Northern & North-Western regions of the country covering the Union Territory of Jammu & Kashmir, Ladakh and the states of Uttar Pradesh, Uttarakhand, Punjab, Haryana, Himachal Pradesh and Rajasthan. The Institute has two Regional Sericulture Research Station (RSRS) at Miransahib, Jammu (J&K) and Sahaspur, Dehradun (Uttarakhand) and threeResearch Extension Centre (REC),and one P-4, Basic Seed Farm, Manasbalspreadover different sericulture states in North India. The Research laboratories at the Institute and its RSRSs are in use for research on various aspects of sericulture.

Sericulture practices of the North Western states are different in many aspects. Sericulture is a subsidiary occupation and source of additional income generation in the entire region. Mulberry is cultivated as tree at bunds and periphery of main agriculture field or waste landin surroundings. R&D Mandate of the institute is guided by these factors. During the year under report, this institute continuedwith07 research projects of earlier years, initiated 03 new research projects, concluded 03 projects and 3 transfer of technology (ToT) Programmes as per the technological need of the region. Maintenance of germplasm for improvement of mulberry and silkworm were one of the priority areas at institute level along with regional stations of the institute. A total of 80 mulberry and 111bivoltine silkworm germplasmaccessions (exotic 60 and indigenous 51) were maintained at institute level.PPR-1 a new high yielding mulberry genotype developed by the institute is under AICEM Phase IV evaluation trial. Besides R&D, Human Resource Development is focus area of the institute, except J&K rest of the sericulture states are non-traditional.A total of 4421 sericulture farmers were enlightened on sericultureactivities through extension communication programmes in the region. A total of 827 persons/stakeholders were imparted skill enhancement training on various aspects of sericulture in north India under Capacity building & training programmes during the year 2020-21.

My Sincere thanks to the Chairpersons and distinguished member of Research Advisory Committee (RAC) of the Institute and the Research Coordination Committee (RCC) of Central Silk Board for their guidance on R&D aspects.Thanks are also due to heads of Sericulture Development Departmentsofthe Northern & North-Western states for constant support & coordination for implementing various schemes and overall development of sericulture in the region are acknowledged. During the year under report Covid-19 situations like other parts of the country adversely effected the cocoon production in many states in the region.

My sincere thanks and gratitude to ShriRajitRanjanOkhandiar, IFS, Member Secretary, Central Silk Board for constant support and guidance for development of the Institute and the silk industry and to adopt innovative approach like introduction of additional cocoon crops and integrations of mulberry plantation with other agri-practices to enhance the farmers income form single piece of land.

Thanks to my team of scientists and other colleagues for their untiring efforts and supports. There are always scopes for improvement;I look forward to work in close coordination with sericulture states of the region for improvement in cocoon production and productivity along with need base R&D support from the Institute, to take sericulture industry of the region to newer heights in the days to come.

(Dr.Sardar Singh)
DIRECTOR (I/C)

अनुसंधान उपलब्धियां

शहतूत फसल सुधार, उत्पादन और संरक्षण

- **उत्तर पश्चिम भारत के लिए सूखा प्रतिरोधक शहतूत किस्म का विकास (पीआईबी 3629):** उत्तर पश्चिम भारत के लिए उपयुक्त सूखा प्रतिरोधक जीनप्रारूप के अभिनिर्धारण के लिए विदेशी और स्वदेशी जीनप्रारुपो के नियंत्रित संकरण से 12 संयोजन-संकर संततियो को बनाया गया है। सूखा प्रतिरोधक शहतूत किस्म के चयन हेतू शहतूत संततियो के मूल्यांकन हेतू पीआरटी प्रयोग स्थापित किया गया है।
- **नियंत्रित संकरण के माध्यम से बेहतर शहतूत किस्म का विकास (3586 पीआईबी):** बेहतर शहतूत किस्म के विकास के लिए शहतूत के कुल 40 एफ 1-संकरो का पीआरटी प्रयोग से चयन किया गया है। चयनित पौधों के लिए रूपात्मक मापदंडों को दर्ज किया गया है।
- **उत्तर पश्चिम भारत की उपोष्णकटिबंधीय परिस्थितियों में चाकी पालन के लिए उपयुक्त शहतूत की किस्में (पीपीए-3623):** चाकी पालन की उपयुक्ता के आधार पर शहतूत की दो किस्मे नामतः एस-1635 और एस-140 (पीपीआर-1) उत्तर पश्चिम भारत की उपोष्णकटिबंधीय परिस्थितियों में बेहतर पाई गई हैं।
- **उत्तराखंड की विभिन्न ऊंचाई के लिए उपयुक्त शहतूत की किस्में (पीपीए-3624):** शहतूत की दो किस्मे अर्थात टीआर-10 और एस-140 (पीपीआर-1) उत्तराखंड के विभिन्न शीर्षलंब नामतः सहसपुर, बागेश्वर और अल्मोड़ा के लिए अनुग्रहित किया गया हैं।
- **भारत-उज्बेकिस्तान सहयोगी अनुसंधान परियोजना (एआईबी03006सीआई):** भारत-उज्बेकिस्तान की शीतोष्णकटिबंधीय परिस्थिति हेतूशहतूत और रेशमकीट के उन्नयन के लिए भारत-उज्बेकिस्तान सहयोगी अंतरराष्ट्रीय अनुसंधान परियोजना शुरू की गई।
- **सोमेटिक हाइब्रिड का शहतूत जन्नद्रव्य क्षेत्र में वायुजलानुकूलन (पीआईबी-3571):** सोमेटिक संकरण द्वारा विकसित तीन सोमेटिक संकर नामतः पीपीआर-1—चाईनीस व्हाईट, पीपीआर-1—इचिनोस और पीपीआर-1—पीपीआर-1 को केरेउअनुवप्रसं, पाम्पोर के शहतूत जन्नद्रव्य क्षेत्र में स्थानांतरित कर दिया गया और क्षेत्र की परिस्थिति में अच्छी तरह से अनुकूलित हैं।
- **अखिल भारतीय समन्वित प्रायोगिक शहतूत परीक्षण (एआईसीईएम चरण - IV):** संस्थान द्वारा विकसित की गई शहतूत की एक नई किस्म पीपीआर 1-को अखिल भारतीय समन्वित प्रायोगिक शहतूत परीक्षण (एआईसीईएम चरण - IV) में एक परीक्षण प्रविष्टि के रुप में चयनित किया गया हैं। एआईसीईएम चरण-IV को पांच परीक्षण केंद्रों नामतः केरेउअनुवप्रसं, पाम्पोर; पी4-बेसिक सीड फार्म, मानसबल; एसडीडी, मीरगुंड; क्षेरेअनुके, मीरांसाहिब और क्षेरेअनुके, सहसपुर पर शुरू किया गया।
- **केरेउअनुवप्रसं, पाम्पोर में शहतूत जन्नद्रव्यो का संरक्षण :** शहतूत के सक्रिय जन्नद्रव्य में कुल 82 शहतूत जीनप्रारूप (विदेशगत: 40, देशीय: 42) और नवीन जन्नद्रव्य में 56 शहतूत जीनप्रारूप का संरक्षण किया जा रहा हैं। इसके अलावा, शहतूत उन्नयन हेतू 58 शहतूत चयन केरेउअनुवप्रसं, पाम्पोर के प्रजनन भूखंडो में संरक्षित हैं।
- **क्षेरेअनुके, सहसपुर में शहतूत जन्नद्रव्यो का संरक्षण :** क्षेरेअनुके, सहसपुर के उपोष्णकटिबंधीय शहतूत जन्नद्रव्य में कुल 82 शहतूत जीनप्रारूप (विदेशगत: 10, देशीय: 72) संरक्षित हैं।

रेशम कीट फसल सुधार, उत्पादन और संरक्षण

- **ग्रीष्मकालीन कोसा फसल की पुरःस्थापना (एमओई03001एसआई):** जम्मू-कश्मीर के जम्मू सम्भाग और हिमाचल प्रदेश के चयनित पांच जिलो में 9 स्थानो पर वसंत और शरद ऋतु के मध्य ग्रीष्म फसल को सफलतापूर्वक पुरःस्थापित किया गया। डिम्भक-अंतरणतिथियों के संशोधण उपरांत और चयनित द्विपज संकरो के कीटपालन से वसंत फसल के दौरान औसत उपज65.5 किग्रा/100 रोमुच, ग्रीष्म फसल के दौरान 39.9 किग्रा/100 रोमुच और शरद फसल के दौरान 42.2 किग्रा/100 रोमुच अभिलिखित किया गया। डिम्भक-अंतरण तिथि के पुर्वस्थागित करने एवँ कीटपालन और आरोपण की नवीनत्म पद्धतियो के सफलतापूर्वकप्रदर्शन करने से हिमाचल प्रदेश मे 40 प्रतिशत और जम्मू-कश्मीर के जम्मू सम्भाग मे 60 प्रतिशत की उपज वृद्धि हुई हैं।

- **मार्कर असिस्टेड संकरो का परीक्षण कीटपालन (एआरपी-3605):** वसंत 2020 के दौरान एमएएसएन संकर (एमएएसएन4 x सीएसआर4) का जम्मू-कश्मीर और हिमाचल प्रदेश के विभिन्नस्थानो पर बडे पैमाने पर क्षेत्रीय स्तरीय परीक्षण किया गया। जम्मू सम्भाग में मार्कर असिस्टेड द्विपज संकर एमएएसएन4 x सीएसआर4 ने निर्णायक सीएसआर द्विसंकर की तुलना में प्रतिस्पर्धात्मक उपज (43.62 किग्रा/100 रोमुच द्विसंकर की उपज की तुलना में 44.94 किग्रा/100 रोमुच) और थोडा बेहतर उपज (48.09 किग्रा/100 रोमुच द्विसंकर की उपज की तुलना में 42.05 किग्रा/100 रोमुच) दिखाया।
- **पोषक आनुवंशिक संकरो का विकास (एआईबी03008एस आई):** उत्तर पश्चिम भारत की उपोष्णकटिबंधीय परिस्थितियोंके लिए पोषक आनुवंशिक विशिष्ट संकरो के विकास हेतू 8 रेशमकीट नस्लो नामत: बीएचआर-2, बीएचआर-3, बी कॉन-1, बी कॉन-4, सीएसआर-50, एटीआर-16, एनबी4 डी2 और आरएसजे 14अभिनिर्धारित की गई हैं।
- **जम्मू-कश्मीर के शीतोष्ण कटिबंधीय क्षेत्र के लिए शरद विशिष्ट द्विपज रेशमकीट संकर का विकास (एआईबी03007एसआई):** जम्मू-कश्मीर के शीतोष्ण कटिबंधीय क्षेत्र के लिए शरद विशिष्ट द्विपज रेशमकीट संकर के विकास हेतू कुल 8 रेशमकीट द्विपज लाईने नामत: डीएसके-3; डीएसके-5; डीएसके-6; डीएसके-7; डीएसके-9; डीएसके-16; डीएसके-17 और डीएसके-18 (अंडाकार और संकुचित के चार प्रत्येक) प्रयोग में लाई गई है।
- **उत्तर पश्चिम भारत के लिए उपयुक्त टिकाऊ द्विपज रेशमकीट द्विसंकर का विकास (एआईबी03002एस आई):** अनुसंधान परियोजना एआईबी-3609 के दौरान अभिनिर्धारित किए गए छह आधार संकरों से 18 द्विपज रेशमकीट द्विसंकर का ग्रीष्म और शरद 2020 में कीटपालन किया गया।मूल्यांकन सूचकांक 50 से अधिक के साथ, द्विपज डीएच-1, 3, 5 और 8 का ग्रीष्म ऋतु और डीएच-1, 5, 8 और 9 का शरद ऋतु के दौरान अच्छा प्रदर्शन रहा।
- **उत्तर पश्चिम भारत के लिए मौसम विशिष्ट संकरों का अभिनार्धारण (एआईबी-3626):** उत्तर पश्चिम भारत के शीतोष्ण क्षेत्रो के उपयुक्त रेशमकीट संकर सीएसआर27 x पाम117 वंसत एवं ग्रीष्म ऋतु और लाइन 7 x एन 5 शरद ऋतु के लिए सूचीबद्ध किए गए हैं।
- **जम्मू-कश्मीर के शीतोष्ण क्षेत्र के लिए अधिक उपज वाले द्विपज रेशमकीट नस्लों का अभिनिर्धारण (एआईबी03004एस आई):** रेशमकीट संकर बीपी-2 x लाइन-13, बीपी-2 x लाइन-14 और बीपी-2 x एसओ-17 मूल्यांकन सूचकांक 50 से अधिक के साथ अन्य संकरो पर उत्कृष्ट रहे और उनके पारस्परिक संकर आगामी मूल्यांकन हेतु तैयार कर लिए गए हैं।
- **शहतूत के पत्तो का फोर्टिफिकेशन (पीआईएन-ओएसटी 3608):** गलूटामिक एसिड के 0.5 प्रतिशत के उपयोग करने से 5.87 एवं 7.25 किग्रा/100 रोमुच कोसा उपज में बढोतरी दर्ज कि गई केरेउअनुवप्रसं, पाम्पोर और क्षेरेअनुके, सहसपुर में क्रमशः नियंत्रक की तुलना में।
- **कश्मीर धाटी में शरद डिम्भक-अंतरण तिथियों का पुनर्निर्धारण (एपीआर03003एसआई):** प्रथम वर्ष के परीक्षण आकड़ों से देखा गया है कि शरद कीटपालन के लिए डिम्भक-अंतरण तिथि को सामान्य शरद कीटपालन की डिम्भक-अंतरण तिथि से 15-20 दिवस पहले पुनर्निर्धारित किया जा सकता हैं
- **रेशमकीट जन्नद्रव्य का संरक्षण:** भावी रेशमकीट प्रजनन कार्यक्रमो में उपयोग हेतूकेरेउअनुवप्रसं, पाम्पोरके रेशमकीट जन्नद्रव्यमें कुल 111 रेशमकीट प्रजातिया[विदेशगत: 71 (जापानी, चीनी, रूसी और यूरोपीय), देशीय: 40] संरक्षितहैं।
- **रेश्मकीट प्रजनक स्टॉक का संरक्षण:** प्रवर पैतृक स्टॉक की आपूर्ति हेतु केरेउअनुवप्रसं, पाम्पोर में कुल 13 रेशमकीट प्रजनक स्टॉक संरक्षितहैं।

RESEARCH HIGHLIGHTS

Mulberry crop improvement, production and protection

- **Development of drought tolerant mulberry variety (s) for North West India (PIB-3629):**Mulberry progenies of 12 cross combinations of exotic and indigenous accessions have been raised for identification of drought tolerant genotypes suitable for North-West India. The PRT experiment has been established for development of a drought resistance mulberry variety.
- **Development of superior mulberry variety through controlled hybridization (PIB-3586):**A total of 40 mulberry F1 hybrids were selected in PRT for development of superior mulberry variety through controlled hybridization. The morphological parameters have been recorded for the selected plants.
- **Mulberry varieties suitable for chawkie rearing under sub-tropical conditions of NW India (PPA-3623):** Two mulberry varieties viz. S-1635 and S-140 (PPR-1) were found superior based on suitability for Chawkie rearing under the sub-tropical conditions of North India.
- **Mulberry varieties suitable for different altitudes of Uttarakhand (PPA-3624):** Two mulberry varieties viz. Tr-10 and S-140 (PPR-1) are recommended for different altitudes of Uttarakhandviz. Sahaspur, Bageshwar and Almora.
- Initiated an international collaborative research project with SRIS, Uzbekistan (AIB03006CI) for improvement of mulberry and silkworm of temperate regions.
- **Acclimatization of somatic hybrids in field condition(PIB-3571)**: The Somatic Hybrids (PPR1-Chinese white, PPR1 –PPR1, PPR1-Ichinose) developed by this institute were transferred to field conditions and are well acclimatized in the field conditions of CSR&TI, Pampore.
- **AICEM Phase IV:**A new mulberry variety PPR-1 developed by the institute has been identified as one of the test entries in the AICEM Phase IV, and the programme initiated at five test centres namely, CSRTI Pampore, P4-Basic Seed Farm, Manasbal, SDD, Mirgund, RSRS, Jammu and RSRS, Sahaspur.
- **Maintenance of mulberry germplasm at CSR&TI, Pampore:** A total of 82 mulberry genotypes (Exotic: 40, indigenous: 42) in working germplasm bank; and 56 mulberry accessions in new germplasm bank are being maintained. Moreover, 58 mulberry selections are maintained in breeding plots of CSR&TI, Pampore for their utilization in mulberry improvement.
- **Maintenance of mulberry germplasm at RSRS Shaspur**: Eighty two (exotic-10 and ingenious- 72) mulberry accessions were maintained at RSRS, Sahaspur as Sub-tropical Germplasm.

Silkworm crop improvement, production and protection

- **Introduction of summer crop (MOE03001SI)**: Summer crop wassuccessfully introduced betweenSpring and Autumn crops in selected 5 districts of Jammu province of J&K & HP, covering 9 locations. After rescheduling of brushing dates and rearing with shortlisted bivoltine hybrids an average yield 65.5 kg/100 DFLs during spring crop, 39.9 kg/100 DFLs during summer crop and 42.2 kg / 100 DFLs during autumn crop was recorded. Preponing of brushing dates & use of innovative rearing and mounting methods has successfully demonstrated over 40% gain in HP & 60% gainin Jammu province of J&K.
- **Trial rearing of Marker assisted hybrids (ARP-3605):**Large scale field trial of MASN hybrid (MASN 4 × CSR4) spring 2020 was conducted in different sites of Jammu province of J&K and Himachal Pradesh states. The marker assisted bivoltine hybrid MASN4 x CSR4 showed competitive yield in Jammu province (43.62 as compare to 44.94 kg/100 dfls of DH) and slightly improved yield (48.09 as compare to 42.05/100 dfls kg of DH) in comparison to ruling CSR double hybrid.

- **Development of nurtrigenetic hybrids (AIB03008SI):**Eight silkworm breeds *viz*., BHR 2, BHR 3, B.con 1, B.con 4, CSR 50, ATR 16, NB4D2 and RSJ 14 were identified for development of nutrigenetic specific hybrids for sub-tropical conditions of North West India.
- **Development of Autumn specific bivotine silkworm hybrid suitable for temperate region of Jammu & Kashmir (AIB03007SI)**: A total of 8 silkworm bivoltine lines viz., DSK-3; DSK-5; DSK-6; DSK-7; DSK- 9; DSK-16; DSK-17 and DSK-18 (four each of oval & constricted) are being utilized for development of autumn specific hybrids suitable for temperate region of Jammu & Kashmir.
- **Development of sustainable bivoltine silkworm double hybrids suitable for North West India (AIB03002SI):**From the identified six foundation crosses (AIB-3609), 18 bivoltine silkworm double hybrids (DH) reared during summer and autumn 2020. The double hybrids DH-1, 3, 5 and 8 performed well during summer season and DH-1, 5, 8 and 9 performed well during autumn with E.I value above 50.
- **Identification of season specific hybrids for North West India (AIB-3626)**: The silkworm hybrid CSR27×Pam117 was short-listed for spring and summer seasons and Line7×N5 for autumn season suitable for temperate region of North West India.
- **Identification of high yielding bivoltine silkworm breeds for temperate region of Jammu & Kashmir (AIB03004SI):**The silkworm hybrids BP- 2 x Line- 13, BP- 2 x Line- 14, and BP- 2 x SO- 17 excelled over other with more than 50 E.I value and their reciprocals were prepared for further evaluation.
- **Fortification of mulberry leaf(OST–PIN3608):** With 0.5% Glutamic acid reported an increase of 5.87 & 7.25 Kg/100 DFLs cocoon yield over control at CSR&TI, Pampore and RSRS, Sahaspur respectively.
- **Rescheduling of autumn brushing dates(s) in Kashmir valley (APR03003SI):**As per first year trial data it was observed that brushing for Autumn rearing can be preponed 15-20 days from thenormal autumn brushing date in Kashmir.
- **Maintenance of silkworm germplasm:**A total of 111 silkworm germplasm races of exotic-71 (Japanese, Chinese, Russian and European) and indigenous-40 are maintained at CSR&TI, Pampore for utilization in future breeding programmes.
- **Maintenance of silkworm breeder stock:** A total of 13 silkworm Breeders stock are being maintained at CSR&TI, Pampore for supply of elite parental stock.

Table-1: NEW RESEARCH PROJECTS INITIATED AS PI DURING 2020-21(CSB CODED)

#	Project Code	Project Title	PERIOD	SCIENTISTS INVOLVED
1.	**AIB03006CI**	Indo-Uzbekistan Collaborative Research Project on Improvement of Mulberry and Silkworm Breeding in Temperate Regions of India and Uzbekistan.	Aug., 2020- July, 2026	S. Roy Choudhary (*upto* 31.01.2021) Sardar Singh (*w.e.f* 01.02.2021) Mir Nisar Ahmad Pawan Saini Santosh Kumar Magdum
2.	**AIB03007SI**	Development of autumn specific bivoltine silkworm *Bombyx mori* L. suitable for temperate region of Jammu & Kashmir.	March 2021-Feb., 2024	Shivkumar Bharath Kumar Neelaboina Kiran R
3.	**AIB03008SI**	Development of nutrigenetic hybrids of bivoltine silkworm, *Bombyx mori* L. under sub-tropical conditions of North West India.	March 2021- Feb., 2024	Murali. S Sardar Singh Chhattarpal

Table-2: RESEARCH PROJECTS CONTINUED AS PI DURING 2020-21 (CSB CODED)

#	Project Code	Project Title	PERIOD	SCIENTISTS INVOLVED
4.	**PIB-3586**	Development of superior mulberry varieties through controlled hybridization for North-West Indian states **(In collaboration With CSGRC, Hosur)**	Sept. 2016- Aug. 2021	Rajesh Kumar Pawan Saini
5.	**PIB-3629**	Development of mulberry genotypes suitable for rainfed hill farming in North West India. **(In collaboration With CSGRC, Hosur)**	Jan. 2018 - Dec. 2021	Chhattarpal Murali S
6.	**AIB-3626**	Identification of Bivoltine Silkworm Hybrids for Temperate Region of North West India.	March, 2018 - Feb. 2022	Mir Nisar Ahmad Bharath Kumar Neelaboina Shivkumar
7.	**AIB03002SI**	Development of sustainable bivoltine silkworm double hybrids suitable to North West India.	March, 2020 - Feb., 2023	Bharath Kumar Neelaboina Shivkumar Kiran R Mir Nisar Ahmad
8.	**APR03003SI**	Rescheduling of brushing date for second commercial crop rearing during autumn in Kashmir and Doon Valley.	March, 2020 - Feb., 2022	Gulzar Ahmad Gulab Khan Rohela Haroon Rashid K K Rai Babulal
9.	**AIB-03004SI**	Evaluation and identification of high yielding bivoltine Silkworm *Bombyx mori* L. hybrids for temperate region of Jammu & Kashmir.	March, 2020 - Feb., 2023	Kiran R Bharath Kumar Neelaboina Shivkumar Mir Nisar Ahmad
10.	**ARE-03005SI**	Development of trap through biorational tactics for the management of mulberry leaf webber *Glyphodes pyloalis* (Lepidoptera: Crambidae)	March, 2020 - Feb., 2022	Rajesh Kumar Sahadev Chouhan Satish Y.
11.	**AICEM-IV**	All India coordinated experimental trial for mulberry	2019 - 2024	Sukhen Roy Chaudhary (*upto* 31.01.21) Sardar Singh (w.e.f 01.02.2021) Rajesh Kumar, R.P Singh Irfan Illahi Sahadev Chouhan Pawan Saini Chattarpal Satish Y

Table-3: RESEARCH PROJECTS CONCLUDED AS PI DURING 2020-21 (CSB CODED):

#	Project Code	Project Title	PERIOD	SCIENTISTS INVOLVED
1.	**PPA-3623**	Evaluation of mulberry varieties for suitability of chawkie rearing under sub-tropical conditions	Jan. 2018-Dec. 2020	K.K. Rai Babulal
2.	**PPA-3624**	Studies on the suitability of elite mulberry genotypes at different altitudes of hills in Uttarakhand.	Oct. 2017 - Dec. 2020	Babulal
3.	**MOE03001SI**	Innovative Approach for Multiple Cocoon Crops and Stabilization of Autumn Crop in North-West India.	Feb.2019-Jan. 2021	Sardar Singh Murali S K.K Rai

Table 04: RESEARCH PROJECTS CONTINUED AS C.I DURING 2020-21 (CSB CODED)

#	Project Code	Project Title	PERIOD	SCIENTISTS INVOLVED
1.	**AIE-06002MI**	Evaluation of bivoltine silkworm genetic resources for tolerance to abiotic stress in selected hot spots. *(In collaboration with *CSGRC Hosour, **SBRL, Bengaluru, ***REC, Chitradurga, #CSR&TI,Berhampore, ##RSRS,Jammu)*	April 2019 -March 2022	Sardar Singh Murali S

Table 05: RESEARCH PROJECTS CONCLUDEDAS C.I DURING 2020-21 (CSB CODED):

#	Project Code	Project Title	PERIOD	SCIENTISTS INVOLVED
1.	**ARP-3605**	Validation of the DNA markers in silkworm breed developed by the introgression of DNA markers associated with NPV resistance using Marker Assisted Selection Breeding and large scale field trial of the breed. **(DBT Project In collaboration with *SBRL Bangaluru, **CSR&TI Mysore, #CSR&TI Berhampur and ##RSRS Jammu and ***RSRS Sahaspur)**	Feb. 2017 - August, 2020	Sardar Singh Babulal

Table 06: CONTINOUS PROGRAMMES

#	Project Code	Project Title	PERIOD	SCIENTISTS INVOLVED
1.	**SS Pam-01**	Nutrient analysis of soils & mulberry under temperate conditions	Continous	Gulab Khan Rohela
2.	**PIB-Pam 1**	Acquisition, Conservation, Characterization and Utilization of mulberry germplasm under temperate conditions	Continous	Rajesh Kumar Pawan Saini
3.	**AIE -3056**	Maintenance of Silkworm germplasm	Continous	Mir Nisar Ahmad Shivkumar Bharath Kumar Neelaboina
4.	**AIE -3202**	Maintenance of Silkworm Breeders' stock.	Continous	Mir Nisar Ahmad Bharath Kumar Neelaboina Shivkumar
5.	**PIB -3212**	Maintenance and characterization of mulberry genepool	Continuous	Surendar Kumar (*w.e.f* 08.02.2021) Babulal (*upto* 13.01.2021)
6.	**AIB -2016**	Maintenance and evaluation of silkworm germplasm with manintainence of Parental Lines & Breeder's Stock	Continuous	Babulal
7.	**OFT Pam-17**	Evaluation & Characterization of silkworm germplasm under sub-tropical conditions of Jammu & Kashmir.	Continuous	S. Murli, Sardar Singh

ONGOING RESEARCH PROJECTS

HOST PLANT IMPROVEMENT

AT MAIN INSTITUTE

1. Project code &Title:PIB-3586 - Development of superior mulberry varieties through controlledhybridization for North-West Indian states*(in collaboration with CSGRC, HOSUR*)*
Project Duration: September, 2016–August, 2021
Investigator (s): Rajesh Kumar, Pawan Saini, G. Thanavanden *& K. Vijayan
Objective(s):

- Identification of desired parents from germplasm CSR&TI, Pampore and CSGRC, Hosur.
- Hybridization among selected parents with specific targeted traits.
- Evaluation of different F1s cross combinations for Development of HYVs suited to various agro-edaphic conditions and amenable to different agronomic practices, spacing's/ pruning systems under bush and tree mode of plantation in tropical/subtropical pockets of north-west states with emphasis on early sprouting nature, canopy configuration and rooting ability in cold/temperate/little-snowing areas.

Workdone:
The F_1 progenies of all three crosses *viz.*ME-0253 x ME-113 (175 seedlings), ME-0253 x MI-0240 (34 seedlings) and ME-0253 x MI-0308 (6 seedlings) maintained at the experimental plot of the main Institute were evaluated under Progeny Row Trial. Preliminary data on the promising F_1 progenies was recorded for selection of 30-40 superior plants for further evaluation under Primary Yield Trial (PYT).

2. Project Code & Title: PIE03001MI - All India coordinated experimental trial for mulberry (AICEM) Phase IV
Project Duration: 2019–2024
Zonal Coordinator: Sukhen Roy Chowdhury (*upto* 31-01-2021) &Sardar Singh (*w.e.f.* 01-02-2021)
Investigator (s): Rajesh Kumar, R. P. Singh, Sardar Singh, Irfan Illahi, Pawan Saini, Sahadev Chouhan, Chhattar Pal &Satish Y
Objective(s):

- Trial of developed mulberry varieties CBP-01 [C-1360 (Ganga)], CMY-01 (AGB-8) and CPP-01 (PPR-1) at national level.
- Bioassay of developed mulberry varieties CBP-01 [C-1360 (Ganga)], CMY-01 (AGB-8) and CPP-01 (PPR-1) at National Level.

Workdone: Theworkwascarried out as per the set milestones in the experiment at 05 test sites of North India *viz.* CSR&TI, Pampore,P4-Basic Seed Farm, Manasbal, SDD-Mirgund, RSRS, Jammu, RSRS, Sahaspur during the year 2020-21.The work done at each test site is as follows:

- **Maintenance of experimental plantation of mulberry genotypes:** The transplanted saplings of mulberry test entries/genotypes (CBP-01, CMY-01 and CPP-01) were maintained at all the 05 test sites along with controls*viz.*Goshoerami as local check variety at CSR&TI, Pampore; P4 BSF, Manasbal and SDD, Mirgund test sites; S-146 at RSRS, Miransahib, Jammu test site &03 checks at RSRS, Sahaspur test site *viz.* S-146 (local check), C-2038 (zonal check) and Vishala (national check). The advocated cultural practices like fertilizer application, irrigation, weeding, FYM application etc. were performed as per the scheduled activity calendar at each test site. After 90 days of transplantation of test entries, the survival percentage (%) was recorded at the 05 test sites (Table-7). After assessing the survival status of each variety, gap filling was accordingly done at each test site.
- **Analysis of soil health status of AICEM field:** The soil samples were collected from 03 sites of Kashmir division *viz.*, CSR&TI, Pampore; P4 BSF, Manasbal and SDD, Mirgund during autumn 2020. The soil samples were analysed through mridaparikshak in Agronomy and Soil Science section and 12 parameters including macro- and micro-nutrients were estimated (Table-8). The soil testing results revealed optimum and higher values of all the nutrient parameters.
- **Recording of yield and yield attributing parameters during spring, 2021:**Data on economic traits *viz.*total shoot length (cm), no. of leaves, total shoot (leaf + stem) (kg), fresh leaf weight (kg), leaf/shoot ratio, moisture content (%),

moisture retention capacity (%), leaf yield/plot (kg) and leaf yield/ha (kg) were recorded during spring 2021 at RSRS, Jammu test site and statistically analysed using SAS software (Table-9).

Table-7: Details of plantation, survival percentage (%) & gap filling at 05 test sites

Test Site	Test entry	Date of Plantation	Survival after 90 days (%)	Gap filling	Survival (%) (on 31.03.2021)
CSR&TI,Pampore (Temperate)	CBP-01 (C-1360)	04th April 2020	86.63	September 2020	98.35
	CMY-01 (AGB-8)		78.40		89.79
	CPP-01 (PPR-1)		100.00		100.00
	Goshoerami (Local Check)		100.00		100.00
P4 BSF, Manasbal (Temperate)	CBP-01 (C-1360)	12th March 2020	97.74	June 2020	100.00
	CMY-01 (AGB-8)		96.71		100.00
	CPP-01 (PPR-1)		100.00		100.00
	Goshoerami (Local Check)		100.00		100.00
SDD, Mirgund (Temperate)	CBP-01 (C-1360)	02nd May 2020	67.28	September 2020	55.1
	CMY-01 (AGB-8)		53.09		43.4
	CPP-01 (PPR-1)		100.00		70.7
	Goshoerami (Local Check)		100.00		39.9
RSRS, Jammu (Sub-tropical)	CBP-01 (C-1360)	10th February 2020	99.79	October, 2020	100.00
	CMY-01 (AGB-8)		65.84		98.97
	CPP-01 (PPR-1)		99.38		99.79
	S-146 (Local Check)		98.77		99.58
RSRS,Sahaspur (Sub-tropical)	CBP-01 (C-1360)	28th February 2020	95.92	October, 2020	99.32
	CMY-01 (AGB-8)		89.80		94.56
	CPP-01 (PPR-1)		92.86		92.52
	S-146 (Local Check)		93.20		95.24
	C-2038 (Zonal check)		89.46		93.20
	Vishala (National Check)		94.56		92.52

Table-8:Soil health status of 05 test sites (Autumn 2020)

Test Site	pH	EC (dS/m)	OC (%)	N (Kg/ha)	P_2O_5 (Kg/ha)	K_2O (Kg/ha)
CSR&TI, Pampore	7.23	0.27	1.49	385.00	127.75	198.08
P4 BSFManasbal	7.31	0.23	1.34	327.08	45.33	183.92
SDD, Mirgund	7.46	0.19	2.14	383.75	31.50	144.00
RSRS Miransahib	7.12	0.21	1.18	425.88	88.56	264.88
RSRS Sahaspur	7.1	0.18	0.57	341	162	74.81

Table-8 (contd.):

Test Site	S (mg/kg)	Zn (mg/kg)	B (mg/kg)	Fe (mg/kg)	Mn (mg/kg)	Cu (mg/kg)
CSR&TI, Pampore	21.33	0.70	1.65	8.28	3.00	3.01
P4 BSFManasbal	14.65	0.55	2.54	12.97	7.82	3.04
SDD, Mirgund	8.67	0.14	1.82	7.64	4.92	0.73
RSRS Miransahib	39.89	1.53	1.38	20.88	12.9	3.83
RSRS Sahaspur	6	2.29	0.47	30.2	1.08	3.18

Table-9:Data on economic parameters at RSRS, Jammu test site (Spring, 2021)

Test Entry	Sprouting period (days)		Leaf Moisture (%)	Moisture after 6 hrs (%)	Shoot Length/ Plant (cm)	No. of leaves/ metre length of shoot	Total shoot weight (Leaf + Stem) kg	Fresh leaf weight (kg)	Leat Shoot Ratio	Lief Yield/Plot (kg)	Leaf Yield (kg/ha)
	D75%	D100%									
CBP-01	20.00	25.00	78.60	74.43	1284.4	20.67	1.092	0.68	0.64	33.596	8296.78
CMY-01	37.33	43.00	78.53	75.01	908.8	21.77	0.909	0.58	0.65	28.701	7087.37
CPP-01	43.17	48.00	76.10	71.99	1435.2	16.97	1.161	0.71	0.62	35.140	8677.31

S-146 (Local check)	21.00	26.00	78.13	73.18	1999.8	20.67	1.242	0.75	0.60	36.881	9107.27
CD 5%	1.58*	2.40*	2.35	3.02	392.0	1.27	0.4	0.23	0.03	11.390	2813.04



AT RSRS, JAMMU

3. Project Code &Title: PIB-3629 - Development of mulberry genotype suitable for rainfed hill farming in North-West India *(in collaboration with CSGRC, HOSUR)*

Project Duration: January, 2018 – December, 2021

Investigator (s): Chattarpal, Murali S, Sardar Singh &G. Thanavanden*

Objective(s):

- Development of drought tolerant mulberry variety for rainfed hill farming system.

Workdone:

✓ **Sub-project/experiment 2:**Selection of hybrid progenies for trait related to yield and drought tolerance:

Hybrid progenies of 12 different crosses were visually observed for desirable traits such as plant vigour, phyllotaxy, leaf location, leaf texture, leaf base, leaf margin, leaf shape, leaf colour, leaf hairiness and leaf angle under moisture stress condition in nursery beds. On the basis of visual observations out of total *viz.*971 progenies; 236 progenies of different crosses were found desirable (Table-10).

Table-10:Details of desirable progenies based on visual observations

#	Cross combination	Total Number of progenies	Number of Desirable progenies
1	MI-0877 × MI-0836	360	45
2	ME-0256 × MI-0836	14	04
3	MI-0827 × MI-0836	43	13
4	ME-0256 × MI-0440	126	33
5	MI-0853 × MI-0836	33	09
6	MI-0458 × ME-0125	22	11
7	MI-0324 × MI-0313	35	11
8	MI-0310 × MI-0012	33	17
9	MI-0439 × MI-0012	150	42
10	MI-0675 × MI-0440	70	14
11	MI-0853 × ME-0125	52	22
12	MI-0486 × MI-0012	33	15
Total:		**971**	**236**

✓ **Establishment of Progeny Row Trial:**

The hybrid progenies pertaining to different crosses were raised and allowed to grow according to set procedure of progeny row trial & maintained in the experimental plot.

✓ **Incidence of disease & pest under progeny row trial:**

Data related to disease and pest incidence as well as leaf senescence was recorded during late autumn 2020. Three diseases *viz.* leaf spot, powdery mildew and tukra and one insect pest; leaf webber was observed. Percent disease index was calculated in case of leaf spot, powdery mildew and tukra and percent damage index in case of leaf webber (Table-11).

Table-11: Data on incidence of disease & pest under Progeny Row Trial (PRT)

#	Cross	Leaf Spot (PDI)	Powdery Mildew (PDI)	Tukra (PDI)	Leaf Webber (% damage index)	Leaf Senescence (%)
1	MI-0877 × MI-0836	24.63	12.13	65.75	4.63	40.70
2	ME-0256 × MI-0836	30.77	1.54	64.62	0.00	45.42
3	MI-0827 × MI-0836	31.90	5.24	44.76	2.86	44.20
4	ME-0256 × MI-0440	19.83	0.33	84.83	7.17	44.17
5	MI-0853 × MI-0836	16.00	0.00	47.20	5.60	64.96
6	MI-0458 × ME-0125	39.13	6.09	44.35	3.48	27.26
7	MI-0324 × MI-0313	14.71	0.00	34.71	7.65	40.82
8	MI-0310 × MI-0012	16.00	43.33	44.67	5.33	37.52
9	MI-0439 × MI-0012	20.71	1.43	57.57	9.86	32.79
10	MI-0675 × MI-0440	19.32	0.34	66.44	5.08	29.67
11	MI-0853 × ME-0125	18.67	12.44	49.33	7.56	31.00
12	MI-0486 × MI-0012	20.00	4.00	38.67	6.67	37.96
Mean		22.64	7.24	53.57	5.49	39.71
SD		7.53	12.20	14.48	2.60	10.00
CV (%)		33.28	168.47	27.04	47.33	25.18
SE ±M		2.175	3.520	4.181	0.750	2.887



Progeny Row Trial Experimental Plot of PIB-3629 at RSRS, Jammu

❖ At RSRS Sahaspur

4. Project Code &Title: PPA-3623 - Evaluation of mulberry varieties for suitability of chawkie rearing in sub-tropical conditions

Project Duration: January, 2018 – February, 2020

Investigator (s): K.K Rai & Babulal

Objective(s):

- To evaluate different mulberry varieties for chawki rearing in subtropical conditions

Workdone:

The mulberry plantation of six mulberry genotypes viz; C-2038, Tr-23, S-140 (PPR-1), S1635, S-146 & G2 were maintained as per recommended package of practices. Moisture%, Moisture Retention Capacity, Moulting test and Bioassays for evaluation of leaf quality were conducted during spring and autumn-2020 with 12 DFLs (02 DFLs for each variety) of CSR2 x CSR4 hybrid. Data on post cocoon analysis were also recorded during both the rearing season'*viz.*spring and autumn-2020.

Table-12:Moisture % and Moisture Retention Capacity % after 6 hours and 12 hours recorded (Spring-2020)

#	Name of the variety	Mean Moisture %	Mean Moisture retention capacity (%) after 6 hours	Mean Moisture retention capacity (%) after 12 hours
1	C-2036	74.470	64.715	60.953
2	TR-23	72.694	63.771	60.499
3	PPR-1 (S-140	76.343	66.538	62.976
4	S-1635	75.165	65.629	61.958
5	S-146	74.413	64.586	60.977
6	G-2	73.056	64.366	61.766
	C.D.	**1.522**	**N/A**	**N/A**
	SE(m)	**0.477**	**0.555**	**0.850**
	SE(d)	**0.674**	**0.785**	**1.202**
	C.V.	**1.111**	**1.481**	**2.394**

Table-13: Data on moulting test of six mulberry varieties (Spring-2020) Silkworm hybrid: CSR2 x CSR4

Test variety	1st Instar	2nd Instar	3rd Instar
	Moulting %	Moulting %	Moulting %
S-1635	98.80	99.05	99.46
C-2038	98.93	98.65	99.45
PPR-1 (S-140)	99.07	99.46	99.73
G-2	98.13	99.18	99.32
Tr-23	98.40	99.32	99.59
S-146	98.00	99.32	99.32
C.D.	**0.584**	**0.405**	**N/A**

SE(m)	**0.183**	**0.127**	**0.236**
SE(d)	**0.259**	**0.180**	**0.333**
C.V.	**0.321**	**0.222**	**0.410**

Bioassay for evaluation of leaf quality was conducted during spring crop-2020 of all 06 mulberry varieties raised under this experiment *viz*. C-2038, Tr-23, PPR-1(S-140), S-1635, S-146 and G2. 12 DFLs (02 DFLs for each mulberry variety) of hybrid CSR2 x CSR4 brushed and rearing completed (Table-14).

Table-14: Bioassay studies of 06 mulberry genotypes (Spring 2020)

Variety	**Fecundity**	**Hatching (%)**	**Larval period D:H**	**Wt. of 10 mature larvae (g)**	**Yield/10000 larvae retained/ brushed**		**SCW (g)**	**SSW (g)**	**SR (%)**
					By wt. (kg)	**By No.**			
C-2038	467	97.00	24:00	47.00	16.770	9750	1.720	0.342	19.88
Tr-23	469	98.00	24:00	45.00	15.620	9765	1.600	0.300	19.38
PPR-1 (S140)	484	98.00	23:12	47.00	15.530	9650	1.610	0.325	20.19
S-1635	480	96.00	23:12	48.00	17.401	9820	1.772	0.382	21.56
S-146	473	97.00	23:12	48.00	16.947	9745	1.739	0.349	20.07
G-2	476	97.00	24:00	46.00	16.369	9790	1.672	0.346	20.69
C.D.					**0.190**		**0.015**	**0.017**	**0.460**
SE(m)					**0.059**		**0.005**	**0.005**	**0.144**
SE(d)					**0.084**		**0.007**	**0.008**	**0.204**
C.V.					**0.642**		**0.505**	**2.780**	**1.234**

Table-15:Data on post cocoon analysis recorded (Spring-20)

Variety	**Filament length (m)**	**Denier**	**Renditta**	**Reelability %**
C-2038	1076	2.6	7.95	80.04
Tr-23	926	3.0	7.08	82.13
PPR-1 (S140)	1096	2.7	7.54	80.10
S-1635	901	2.4	7.50	79.79
S-146	798	2.6	6.54	81.96
G-2	958	2.8	9.03	79.06

Table-16: Data on Moisture % and Moisture Retention Capacity % after 6 hours and 12 hours recorded (Autumn 20)

Name of the variety	**Mean Moisture %**	**Mean Moisture retention capacity (%) after 6 hours**	**Mean Moisture retention capacity (%) after 12 hours**
C-2038	75.96	63.36	60.08
TR-23	75.18	63.02	60.10
PPR-1 (S-140)	78.46	68.68	64.21
S-1635	75.32	64.38	60.49
S-146	76.92	65.46	61.62
G-2	75.78	66.29	62.56
C.D.	**1.681**	**1.564**	**1.214**
SE(m)	**0.527**	**0.490**	**0.380**
SE(d)	**0.745**	**0.693**	**0.538**
C.V.	**1.216**	**1.314**	**1.073**

Table-17:Data on moulting test of six mulberry varieties (Autumn-2020) Silkworm hybrid: CSR2 x CSR4

Test variety	**1st Instar**	**2nd Instar**	**3rd Instar**
	Moulting %	**Moulting %**	**Moulting %**
S-1635	97.56	97.11	97.33
C-2038	96.67	96.56	97.22
PPR-1 (S-140)	97.78	97.11	97.44
G-2	97.22	97.11	97.11
Tr-23	97.11	96.78	97.00
S-146	97.11	97.11	97.33
C.D.	**N/A**	**N/A**	**N/A**
SE(m)	**0.258**	**0.188**	**0.217**
SE(d)	**0.364**	**0.266**	**0.306**
C.V.	**0.459**	**0.336**	**0.386**

Table-18:Data on bioassay studies recorded (Autumn 2020) Silkworm hybrid: CSR2 x CSR4

Variety	Fecundity	Hatching (%)	Larval period D:H	Wt. of 10 mature larvae (g)	Yield/10000 larvae retained/ brushed		SCW (g)	SSW (g)	SR (%)
					By wt. (kg)	By No.			
C-2038	487	97.94	22:00	38.00	14.080	9180	1.524	0.305	20.05
Tr-23	484	95.04	22:03	38.00	12.160	7880	1.615	0.322	19.95
PPR-1 (S140)	464	95.25	22:00	39.00	14.400	8760	1.654	0.349	21.60
S-1635	456	94.29	22:00	38.00	12.640	8120	1.575	0.333	21.14
S-146	423	95.27	22:00	38.00	14.500	8720	1.682	0.349	20.45
G-2	438	94.29	22:00	39.00	13.000	8140	1.627	0.339	20.87
C.D.					**0.498**		**0.041**	**0.015**	**0.717**
SE(m)					**0.156**		**0.013**	**0.005**	**0.225**
SE(d)					**0.221**		**0.018**	**0.006**	**0.318**
C.V.					**2.003**		**1.369**	**2.365**	**1.883**

Table-19:Data on post cocoon analysis recorded during autumn-20

Variety	Filament length (m)	Denier	Renditta	Reelability %
C-2038	821	2.5	7.5	78.67
Tr-23	924	2.5	6.5	81.35
PPR-1 (S140)	903	2.6	7.59	78.16
S-1635	937	2.4	7.07	81.21
S-146	859	2.4	7.21	80.20
G-2	936	2.8	6.77	80.22

Note: The project was scheduled to be concluded on December, 2020. However, as per 41st RAC decision, the final outcome was subjected to statistical analysis and submission of final concluding report got delayed, final report is under compilation.

5. Project Code &Title: PPA-3624 -Studies on the suitability of elite mulberry varieties at different altitudes of Uttarakhand

Project Duration:October, 2017 – February, 2020

Investigator (s): Babulal

Objective(s):

- To evaluate the nutritional efficiency and phenotypic characters of elite mulberry varieties as trees at different altitudes of hills in Uttarakhand.
- To evaluate the quantitative and qualitative characters of elite mulberry varieties as trees for enhancement of cocoon production at different altitude of hills in Uttarakhand.
- To enhance the mulberry wealth for silkworm rearing at different altitudes of hills in Uttarakhand to reduce the cost of mulberry leaf production.

Workdone:

The mulberry plantation of six mulberry varieties was maintained at RSRS, Sahaspur as per recommended package of RSRS, Sahaspur by following weeding, digging, pruning, application, FYM & chemical fertilizer.

The growth parameters *viz*. fresh weight of 25 leaves (gm), moisture (%) and moisture retention capacity (%) after 12 hours were recorded at RSRS, Sahaspur during spring and autumn, 2020 (table 20 to 27).

Table-20:Morphological Characters (Spring 2020) [Site: RSRS, Sahaspur]

Variety	Fresh wt. of 25 leaves (g)	Wt. After 12 hrs (g)	Dry Weight (g)	Moisture %	Moisture retention capacity after 12 hrs (%)
Tr-10	141	130	039	72.43	60.48
TR-23	136	127	039	71.18	60.13
PPR-1 (S-140)	232	216	058	74.90	62.03
S-1635	133	120	035	74.00	60.52
S-146	138	125	037	73.18	60.06
Vishala	146	135	039	73.13	61.66
C.D.	**0.011**	**0.012**	**0.004**	**1.126**	**1.082**

Variety	Fresh wt. of 25 leaves (g)	Wt. After 12 hrs (g)	Dry Weight (g)	Moisture %	Moisture retention capacity after 12 hrs (%)
SE(m)	**0.004**	**0.004**	**0.001**	**0.353**	**0.339**
SE(d)	**0.005**	**0.005**	**0.002**	**0.499**	**0.479**
C.V.	**3.935**	**4.618**	**5.710**	**0.836**	**0.966**

Table-21: Morphological Characters(Autumn 2020) [Site: RSRS, Sahaspur]

Variety	Wt. of 25 leaves (g)	Wt. after 12 hours (g)	Dry Weight (g)	Moisture %	Moisture Retention Capacity after 12 hrs (%)
Tr-10	145	134	040	72.45	60.58
Tr-23	173	162	049	71.47	60.35
PPR-1 (S-140)	254	241	065	74.55	63.09
S-1635	164	154	045	72.30	61.66
S-146	149	139	043	71.39	60.60
Vishala	151	143	043	71.65	61.26
C.D.	**0.042**	**0.041**	**0.012**	**1.145**	**1.227**
SE(m)	**0.013**	**0.013**	**0.004**	**0.359**	**0.384**
SE(d)	**0.019**	**0.018**	**0.005**	**0.507**	**0.544**
C.V.	**13.211**	**13.654**	**13.928**	**0.859**	**1.087**

Moulting test and Bioassay studies during Spring, 2020:

Bioassay for evaluation of leaf quality was initiated during spring and autumn crop-2020 with all 06 mulberry varieties raised under this experiment *viz*: S-1635, Tr-10, S-140 (PPR-1), Vishala, Tr-23 and S-146. 12 DFLs (02 DFLs for each mulberry variety) of hybrid CSR2 x CSR4 were brushed. The results of moulting test recorded during 1st, 2nd and 3rd instars are depicted in table-25.

Table-22:Moulting percentage (Spring 2020):

Variety	1st moult	2nd moult	3rd moult
S-1635	98.67	99.19	99.46
Tr-10	99.33	99.19	99.46
PPR-1 (S-140)	99.07	99.60	99.87
Vishala	98.00	99.18	99.45
Tr-23	98.27	99.19	99.59
S-146	97.73	98.77	99.31
C.D.	**0.536**	**0.419**	**N/A**
SE(m)	**0.168**	**0.131**	**0.133**
SE(d)	**0.237**	**0.185**	**0.188**
C.V.	**0.295**	**0.229**	**0.231**

Table 23:Bioassay studies (Spring 2020)Test Centre: RSRS, Sahaspur Hybrid: CSR2 x CSR4

Variety	Fecundity	Hatching (%)	Larval period D:H	Wt. of 10 mature larvae (g)	Yield/10000 larvae retained/ brushed		SCW (g)	SSW (g)	SR (%)
					By wt. (kg)	By No.			
S-1635	487.0	96.67	24.00	50.00	13.150	9786.00	1.74	0.35	20.11
Tr-10	482.00	97.33	24.00	45.00	13.260	9800.00	1.76	0.36	20.45
S-140 (PPR-1)	476.00	98.00	23.12	43.33	14.067	9720.0	1.72	0.36	20.93
Vishala	469.00	95.67	23.06	42.00	12.900	9906.00	1.78	0.35	19.66
Tr-23	480.00	96.67	23.06	48.00	12.860	9773.00	1.73	0.33	19.08
S-146	474.00	98.00	23.00	42.00	13.200	9800.00	1.66	0.33	19.88
C.D.					**0.616**	**64.866**	**0.022**	**0.019**	**0.890**
SE(m)					**0.193**	**20.323**	**0.007**	**0.006**	**0.279**
SE(d)					**0.273**	**28.741**	**0.010**	**0.008**	**0.394**
C.V.					**2.526**	**0.359**	**0.680**	**2.980**	**2.413**

Table-24: Post cocoon parameters (Spring 2020)

Variety	Filament length (m)	Denier	Renditta	Reelability %
S-1635	1021	2.7	7.67	79.03
Tr-10	898	2.7	7.22	81.27
S-140 (PPR-1)	1052	2.8	6.69	81.18
Vishala	1051	2.4	8.63	78.14
Tr-23	1087	2.8	7.58	80.12
S-146	1010	2.7	6.25	82.72

Table-25:Moulting percentage (Autumn 2020)

Variety	1st moult	2nd moult	3rd moult
Tr-10	97.33	97.00	97.56
PPR-1(S-140)	97.56	96.89	97.78
S-1635	97.33	96.89	97.11
Vishala	97.33	96.33	96.89
Tr-23	97.11	95.89	96.78
S146	97.22	96.44	96.89
C.D.	**NA**	**0.635**	**0.361**
SE(m)	**0.162**	**0.199**	**0.113**
SE(d)	**0.229**	**0.281**	**0.160**
C.V.	**0.288**	**0.357**	**0.202**

Table-26:Bioassay studies (Autumn 2020)Test Centre: RSRS, SahaspurHybrid: CSR2 x CSR4

Variety	Fecundity	Hatching (%)	Larval period D:H	Wt. of 10 mature larvae (g)	Yield/10000 larvae retained/ brushed		SCW (g)	SSW (g)	SR (%)
					By wt. (kg)	By No.			
S-1635	475.3	96.3	23.00	38.0	11.50	7830.0	1.61	0.320	19.88
Tr-10	373.33	95.33	23.00	37.00	12.07	8023.33	1.59	0.317	20.13
S-140 (PPR-1)	481.00	95.67	23.06	37.67	11.73	7961.67	1.57	0.320	20.38
Vishala	485.67	95.67	23.06	37.33	11.43	7738.33	1.59	0.300	18.87
Tr-23	475.33	95.67	23.06	37.33	11.41	7863.33	1.58	0.310	19.62
S-146	482.00	95.67	23.00	37.33	10.69	7436.67	1.55	0.293	18.90
C.D.					**0.487**	**92.164**	**0.028**	**0.017**	**0.770**
SE(m)					**0.153**	**28.876**	**0.009**	**0.005**	**0.241**
SE(d)					**0.216**	**40.836**	**0.012**	**0.008**	**0.341**
C.V.					**2.306**	**0.640**	**0.957**	**3.061**	**2.133**

Table-27:Post cocoon parameters (Autumn 2020)

Variety	Filament length (m)	Denier	Renditta	Reelability %
S-1635	946	2.5	6.500	79.14
Tr-10	832	2.4	7.291	81.06
S-140 (PPR-1)	872	2.4	7.738	79.75
Vishala	790	2.5	7.692	79.80
Tr-23	832	2.4	6.696	81.04
S-146	786	2.4	7.608	79.91

Note: The project was scheduled to be concluded on December, 2020. However, as per 41st RAC decision, the final outcome was subjected to statistical analysis and submission of final concluding report got delayed, final report is under compilation.

SILKWORM IMPROVEMENT

❖ AT MAIN INSTITUTE

1. Project Code & Title: AIB-3626 -Identification of Bivoltine Silkworm hybrids for temperate region of North-West India

Project Duration: March, 2018–February, 2022

Investigator (s): Mir Nisar Ahmad, Bharath Kumar Neelaboina& Shivkumar

Objective(s):

- Identification of season specific silkworm hybrids suitable for temperate region of North India
- Popularization of Identified hybrids through multi-location trial in temperate region of North West India for enhanced cocoon production

Workdone:

The hybrid evaluation of 30 spring specific, 30 summer specific and 30 autumn specific combinations was carried out during spring, summer and autumn 2020 respectively (Table-28 to 30).

Table-28:Comparative rearing performances of the silkworm hybrids during Spring, 2020

Hybrids	Fecundity (No.)	Hatching (%)	Yield/ 10,000 larvae brushed		SCW (g)	SSW (g)	SR (%)	Pupation (%)	Avg.E.I
			(By No.)	(By wt.)					
NW1	534	94.25	9620	13.89	1.61	0.33	20.50	93.50	59.75
NW2	537	94.35	9600	13.52	1.58	0.32	20.00	94.00	51.66
NW3	536	94.19	9640	13.78	1.60	0.32	19.75	94.00	54.95
NW4	535	93.27	9600	13.38	1.56	0.31	19.55	93.50	42.45
NW5	520	93.95	9640	13.73	1.59	0.32	19.81	93.50	51.28
NW6	523	94.01	9600	13.86	1.61	0.33	20.50	93.50	57.05
NW7	536	94.23	9620	13.65	1.59	0.32	19.87	94.00	53.13
NW8	541	94.17	9600	13.52	1.58	0.32	20.32	94.00	53.25
NW9	540	94.01	9580	13.54	1.58	0.33	20.57	94.00	54.02
NW10	543	94.20	9560	13.36	1.57	0.32	20.13	93.50	47.93
NW11	548	94.34	9580	13.68	1.60	0.32	20.06	93.00	53.47
NW12	502	93.44	9580	13.59	1.59	0.32	20.19	93.50	46.56
NW13	534	94.39	9580	13.54	1.58	0.32	19.94	92.50	48.03
NW14	540	94.48	9620	13.50	1.57	0.32	20.06	94.00	52.77
NW15	531	93.95	9560	13.65	1.60	0.33	20.38	92.50	50.54
NW16	502	93.58	9580	13.63	1.59	0.32	19.81	92.50	43.64
NW17	554	93.61	9620	13.22	1.54	0.30	19.16	93.00	39.67
NW18	522	94.42	9560	13.74	1.61	0.33	20.25	93.50	53.86
NW19	509	94.16	9660	13.37	1.55	0.31	20.00	94.00	47.14
NW20	521	94.48	9580	13.34	1.56	0.31	19.87	93.00	44.26
NW21	541	94.19	9620	13.45	1.57	0.32	20.13	94.00	51.56
NW22	541	93.96	9600	13.23	1.55	0.31	20.06	93.50	45.33
NW23	527	93.63	9540	13.42	1.58	0.32	20.32	92.00	43.67
NW24	535	93.30	9580	13.87	1.62	0.34	20.74	93.00	56.56
NW25	539	94.55	9600	13.47	1.57	0.31	19.75	92.50	47.15
NW26	543	94.57	9560	13.51	1.58	0.32	19.94	93.00	49.42
NW27	543	95.23	9560	13.46	1.58	0.32	20.32	93.00	52.54
NW28	539	94.13	9660	13.66	1.58	0.31	19.62	94.00	52.82
NW29	536	94.03	9560	13.41	1.57	0.32	20.06	93.00	46.24
NW30	513	93.95	9560	13.55	1.59	0.32	20.19	93.00	46.99
SH6 X NB4D2	519	95.25	9660	13.66	1.58	0.30	18.99	95.00	52.32
Mean	532	94.14	9596	13.55	1.58	0.32	20.03	93.39	
SD	12	0.46	33	0.17	0.02	0.01	0.38	0.64	

Table-29:Comparative rearing performances of the silkworm hybrids during Summer, 2020

Hybrids	Fecundity (No.)	Hatching (%)	Yield/ 10,000 larvaebrushed		SCW (g)	SSW (g)	SR (%)	Pupation (%)	Avg. E.I
			(By No.)	(By wt.)					
NW 1	520	95.25	9660	13.57	1.57	0.33	20.70	94.00	58.49
NW 2	530	95.17	9560	13.03	1.53	0.31	20.26	93.50	42.75
NW 3	520	94.90	9560	13.03	1.53	0.32	20.59	93.50	41.37
NW 6	516	95.13	9640	13.53	1.57	0.33	20.70	93.00	52.16
NW 7	536	94.85	9560	13.36	1.57	0.32	20.45	93.50	49.78
NW 8	520	94.70	9600	13.23	1.55	0.32	20.39	93.50	43.03
NW 11	530	95.32	9560	13.17	1.55	0.32	20.39	93.50	47.56
NW 12	522	94.90	9660	13.52	1.57	0.32	20.45	94.00	53.76
NW 13	529	95.29	9600	13.33	1.56	0.32	20.58	94.00	54.16
NW 16	531	94.71	9560	13.07	1.54	0.32	20.52	93.50	42.78
NW 17	514	95.24	9560	13.36	1.57	0.32	20.45	93.50	47.86
NW 18	526	95.24	9620	13.60	1.58	0.33	20.57	93.50	56.87
NW 31	524	95.22	9600	13.28	1.55	0.32	20.65	93.50	50.21
NW 32	530	95.11	9600	13.28	1.55	0.32	20.65	94.00	52.60
NW 33	520	95.17	9640	13.34	1.55	0.32	20.32	94.00	50.38
NW 34	515	95.01	9600	13.14	1.54	0.31	20.20	93.50	40.90
NW 35	518	95.22	9580	13.39	1.57	0.32	20.45	93.50	49.64
NW 36	528	95.24	9580	13.44	1.57	0.33	20.70	93.50	54.53
NW 37	516	95.22	9580	13.49	1.58	0.32	20.32	93.50	50.05
NW 38	535	95.15	9600	13.47	1.57	0.32	20.06	94.00	53.52
NW 39	527	95.27	9640	13.49	1.57	0.32	20.45	94.00	56.37
NW 40	528	95.13	9580	13.39	1.57	0.32	20.13	93.00	46.82
NW 41	528	94.99	9600	13.33	1.56	0.32	20.26	93.50	47.78
NW 42	532	95.01	9560	13.27	1.56	0.31	19.94	93.50	44.49
NW 43	527	95.11	9660	13.28	1.54	0.31	20.13	93.50	47.31
NW 44	527	95.30	9620	13.31	1.55	0.31	20.00	94.00	49.50
NW 45	515	95.28	9640	13.73	1.59	0.33	20.44	94.00	58.72
NW 46	525	95.12	9620	13.46	1.57	0.32	20.45	94.00	54.10
NW 47	527	95.01	9640	13.10	1.53	0.31	20.33	94.00	46.15
NW 48	529	95.29	9560	13.41	1.57	0.33	20.70	93.50	54.22
*SH6 X*NB4D2	522	95.54	9680	13.60	1.57	0.30	19.11	94.50	52.13
Mean	525	95.13	9604	13.35	1.56	0.32	20.36	93.68	
SD	6	0.18	36	0.17	0.02	0.01	0.31	0.33	

Table-30:Comparative Rearing Performances of the Silkworm Hybrids during autumn 2020

Hybrids	Fecundity (No.)	Hat. (%)	Yield/ 10,000 larvae brushed		SCW (g)	SSW (g)	SR (%)	Pupation (%)	Avg. E.I
			(By No.)	(By wt.)					
NW1	513	94.15	9640	13.39	1.56	0.32	20.58	94.00	54.59
NW2	527	94.54	9600	13.28	1.55	0.32	20.32	93.50	50.65
NW3	530	94.67	9620	13.26	1.55	0.32	20.39	94.00	53.16
NW4	517	93.83	9640	13.53	1.57	0.33	20.70	94.00	56.59
NW6	521	94.84	9560	13.22	1.55	0.32	20.32	93.50	50.49
NW7	498	93.04	9480	12.86	1.53	0.31	20.33	92.50	36.17
NW8	527	95.36	9600	13.33	1.56	0.32	20.58	93.50	55.66
NW9	531	94.23	9660	13.28	1.54	0.32	20.45	94.00	53.79
NW11	503	93.44	9520	12.87	1.52	0.31	20.39	92.50	41.34
NW12	526	94.54	9640	13.39	1.56	0.32	20.26	94.00	53.89
NW13	527	94.46	9600	13.42	1.57	0.33	20.77	93.50	56.36
NW14	507	93.44	9500	12.84	1.52	0.31	20.07	92.50	38.24
NW16	520	94.16	9640	13.39	1.56	0.32	20.58	94.00	55.34
NW17	508	94.01	9520	12.92	1.53	0.31	20.33	93.00	42.21
NW18	529	94.46	9640	13.34	1.55	0.31	20.00	94.00	53.95
NW19	530	94.96	9640	13.34	1.55	0.32	20.65	94.00	57.80
NW21	501	93.29	9440	12.75	1.52	0.31	20.39	92.00	37.69

NW22	521	93.80	9620	13.50	1.57	0.32	20.38	94.00	54.57
NW23	502	93.47	9480	12.81	1.52	0.31	20.39	92.00	38.78
NW24	526	94.17	9680	13.50	1.56	0.33	20.83	94.00	60.74
NW49	523	94.03	9660	13.37	1.55	0.32	20.65	94.00	54.29
NW50	502	93.30	9480	12.81	1.52	0.31	20.07	92.50	37.39
NW51	507	93.73	9480	13.19	1.56	0.32	20.51	92.50	47.02
NW52	503	93.51	9520	12.87	1.52	0.31	20.39	93.00	39.26
NW53	520	94.45	9640	13.34	1.55	0.32	20.65	94.00	54.48
NW54	525	94.12	9640	13.44	1.56	0.32	20.19	94.00	53.04
NW55	531	94.44	9600	13.42	1.57	0.32	20.13	93.50	52.77
NW56	523	94.32	9640	13.49	1.57	0.32	20.13	94.00	51.97
NW57	520	94.24	9600	13.38	1.56	0.32	20.51	93.50	50.73
NW58	523	94.10	9620	13.55	1.58	0.33	20.63	94.00	56.11
SH6 X NB4D2	518	94.90	9680	13.60	1.57	0.31	19.43	94.00	50.91
Mean	518	94.13	9590	13.25	1.55	0.32	20.39	93.47	
SD	10	0.55	69	0.26	0.02	0.01	0.28	0.68	

2. Project Code & Title: AIB03002SI-Development of sustainable bivoltine silkworm double hybrids suitable to North West India

Project Duration: March, 2020–February, 2023

Investigator (s): Bharath Kumar Neelaboina, Shivkumar, Kiran R & Mir Nisar Ahmad

Objective(s):

- To develop and evaluate the performance of double hybrids suitable for North West India.
- To identify high yielding bivoltine silkworm double hybrids suitable for North West India.

Workdone:

18 bivoltine silkworm double hybrids were reared during summer (July-August) and autumn (August-September) 2020. Three oval foundation crosses and three constricted foundation crosses identified and shortlisted under the project AIB-3609 were utilized for the preparation of 18 double hybrids. Two controls FC2×FC1 and FC1×FC2 were reared during summer and autumn 2020. The data of economically important traits such as Fecundity (no.), Hatching percentage (%), Yield by no., Yield by weight (kg), Single cocoon weight (g), Single shell weight (g), Shell ratio (%) and pupation rate of 18 double hybrids and average multi- traits evaluation index values of double hybrids are depicted in table-31to38.

Table-31: Rearing performance of, double hybrids (O×D) (Summer, 2020)

Breeds	Fecundity (No.)	Hatching (%)	Yield/ 10,000 larvae brushed		SCW(g)	SSW(g)	SR(%)	Pupation (%)
			(By No.)	(By wt.)				
DH-1	511	95.52	9720	14.10	1.62	0.34	21.05	94.50
DH-2	572	95.18	9700	13.97	1.61	0.33	20.25	94.00
DH-3	532	95.46	9740	14.28	1.63	0.34	20.55	95.00
DH-4	581	94.99	9620	13.45	1.57	0.32	20.13	93.00
DH-5	555	95.13	9740	14.23	1.63	0.34	20.92	95.50
DH-6	536	95.56	9640	13.39	1.56	0.31	19.94	93.00
DH-7	516	94.39	9620	13.07	1.53	0.30	19.67	93.00
DH-8	562	95.73	9700	14.31	1.64	0.35	21.04	95.00
DH-9	574	94.51	9560	13.36	1.57	0.31	19.81	93.00
FC2 x FC1	578	95.73	9740	14.08	1.63	0.34	20.55	94.00
Average	552	95.22	9678	13.82	1.60	0.33	20.39	94.00
SD	26	0.48	64	0.46	0.04	0.02	0.51	0.97

Table-32:Average multi-trait evaluation index values of the double hybrids (O×D) (Summer, 2020)

Double hybrids	Fecundity (No.)	Hatching (%)	Yield/ 10,000 larvae brushed		SCW (g)	SSW (g)	SR (%)	Pupation (%)	Avg. E.I
			(By No.)	(By wt.)					
DH-1	34.55	56.31	56.61	56.04	54.91	59.23	62.97	55.14	54.47
DH-2	57.71	49.19	53.46	53.17	52.39	49.68	47.22	50.00	51.60
DH-3	42.52	55.05	59.75	59.96	58.69	56.05	53.16	60.29	55.68
DH-4	61.30	45.22	40.87	41.89	42.31	43.32	44.84	39.71	44.93
DH-5	51.26	48.04	59.75	58.88	57.43	59.23	60.43	65.43	57.56

DH-6	43.78	57.15	44.02	40.53	39.79	40.14	41.08	39.71	43.27
DH-7	36.30	32.56	40.87	33.48	32.23	33.77	35.91	39.71	35.61
DH-8	53.97	60.70	53.46	60.65	61.21	62.41	62.65	60.29	59.42
DH-9	58.55	35.07	31.44	39.85	42.31	40.14	38.58	39.71	40.71
FC2 x FC1	60.07	60.70	59.75	55.56	58.69	56.05	53.16	50.00	56.75

Table-33:Rearing performance of the double hybrids (D×O) (Summer, 2020)

Double hybrids	Fec. (No.)	Hat. (%)	Yield/ 10,000 larvae brushed		SCW (g)	SSW (g)	SR (%)	Pupation (%)
			(By No.)	(By wt.)				
DH-10	515	94.79	9660	13.18	1.53	0.31	19.93	94.00
DH-11	519	94.69	9580	13.39	1.57	0.31	19.49	93.00
DH-12	545	94.39	9620	13.22	1.54	0.30	19.48	93.00
DH-13	536	95.05	9580	13.49	1.58	0.32	20.32	94.00
DH-14	556	94.85	9680	13.79	1.59	0.32	20.13	94.00
DH-15	558	94.84	9660	13.95	1.61	0.33	20.19	93.00
DH-16	571	94.80	9640	13.29	1.55	0.30	19.42	94.00
DH-17	543	95.21	9600	13.42	1.57	0.32	20.13	94.00
DH-18	561	94.60	9580	13.25	1.55	0.31	19.68	93.00
FC1 x FC2	521	94.43	9620	13.64	1.61	0.33	20.25	94.00
Average	543	94.76	9622	13.46	1.57	0.31	19.90	93.60
SD	19	0.25	37	0.26	0.03	0.01	0.35	0.52

Table-34: Average multi-trait evaluation index values of the double hybrids (D×O) (Summer, 2020)

Double hybrids	Fecundity (No.)	Hatching (%)	Yield/ 10,000 larvae rushed		SCW (g)	SSW (g)	SR (%)	Pupation(%)	Avg. E.I
			(By No.)	(By wt.)					
DH-10	35.83	50.89	60.25	39.05	36.32	43.04	50.97	57.75	46.76
DH-11	37.84	46.95	38.67	47.28	49.09	43.04	38.27	38.38	42.44
DH-12	51.32	35.14	49.46	40.44	39.97	38.07	38.04	38.38	41.35
DH-13	46.85	61.12	38.67	51.02	52.74	57.96	61.87	57.75	53.50
DH-14	57.04	53.44	65.65	62.70	58.21	57.96	56.41	57.75	58.64
DH-15	57.96	53.05	60.25	68.93	65.50	62.93	58.14	38.38	58.14
DH-16	64.60	51.28	54.86	43.45	41.79	38.07	36.24	57.75	48.50
DH-17	50.34	67.62	44.06	48.50	49.09	52.98	56.47	57.75	53.35
DH-18	59.40	43.60	38.67	41.75	43.62	43.04	43.65	38.38	44.01
FC1 x FC2	38.82	36.91	49.46	56.87	63.68	62.93	59.93	57.75	53.29

Table-35: Rearing performance of the double hybrids (O×D)(Autumn, 2020)

Double hybrids	Fecundity (No.)	Hatching (%)	Yield/ 10,000 larvae brushed		SCW (g)	SSW (g)	SR (%)	Pupation (%)
			(By No.)	(By wt.)				
DH-1	518	94.86	9740	14.23	1.63	0.34	20.62	93.50
DH-2	513	95.12	9660	13.52	1.57	0.32	20.13	94.00
DH-3	511	95.11	9700	13.68	1.58	0.32	20.32	94.00
DH-4	507	94.95	9620	13.50	1.57	0.32	20.38	93.50
DH-5	520	95.31	9660	14.10	1.63	0.33	20.31	94.00
DH-6	502	95.11	9640	13.39	1.56	0.32	20.26	94.00
DH-7	509	95.08	9620	13.65	1.59	0.33	20.50	94.00
DH-8	527	94.62	9740	13.89	1.59	0.33	20.44	94.50
DH-9	530	94.58	9720	14.29	1.64	0.34	20.49	94.00
FC2 x FC1	526	95.15	9720	13.51	1.58	0.33	20.63	94.00
Average	516	94.99	9682	13.77	1.59	0.32	20.41	93.95
SD	9	0.24	48	0.33	0.03	0.01	0.16	0.28

Table-36:Average multi-trait evaluation index values of the double hybrids (O×D) (Autumn, 2020)

Double hybrids	Fecundity (No.)	Hatching (%)	Yield/ 10,000 larvae brushed		SCW (g)	SSW (g)	SR (%)	Pupation (%)	Avg. E.I
			(By No.)	(By wt.)					
DH-1	51.99	44.57	62.19	63.76	62.37	64.49	62.94	34.15	55.81
DH-2	46.33	55.60	45.37	42.18	41.16	36.89	32.55	51.76	43.98
DH-3	43.94	54.96	53.78	47.05	44.70	43.79	44.38	51.76	48.04
DH-4	40.13	48.39	36.96	41.74	42.93	43.79	48.41	34.15	42.06
DH-5	54.06	63.44	45.37	59.81	62.37	57.59	43.77	51.76	54.77

DH-6	34.91	55.17	41.17	38.33	37.63	36.89	40.62	51.76	42.06
DH-7	42.42	53.90	36.96	46.12	48.23	50.69	56.05	51.76	48.27
DH-8	61.35	34.40	62.19	53.40	50.00	50.69	52.03	69.38	54.18
DH-9	64.50	32.71	57.99	65.73	65.91	64.49	55.09	51.76	57.27
FC2 x FC1	60.37	56.87	57.99	41.88	44.70	50.69	64.16	51.76	53.55

Table-37:Rearing performance of the double hybrids (D×O) (Autumn, 2020)

Double hybrids	Fecundity (No.)	Hatching (%)	Yield/ 10,000 larvae brushed		SCW (g)	SSW (g)	SR (%)	Pupation (%)
			(By No.)	(By wt.)				
DH-10	518	95.01	9660	13.37	1.55	0.31	20.00	94.00
DH-11	525	94.98	9580	13.39	1.57	0.32	20.13	93.00
DH-12	514	95.17	9720	13.52	1.56	0.32	20.26	94.00
DH-13	523	94.85	9740	13.64	1.57	0.32	20.45	93.00
DH-14	536	95.15	9620	13.21	1.54	0.31	20.13	93.00
DH-15	524	95.02	9700	13.53	1.56	0.32	20.19	94.00
DH-16	512	94.95	9680	13.70	1.58	0.32	19.94	93.00
DH-17	526	95.10	9700	13.58	1.57	0.32	20.13	94.00
DH-18	509	95.24	9600	13.09	1.53	0.31	19.93	93.00
FC1 x FC2	527	95.08	9640	13.29	1.57	0.32	20.13	94.00
Average	521	95.05	9664	13.43	1.56	0.31	20.13	93.50
SD	8	0.12	53	0.20	0.01	0.00	0.15	0.53

Table-38:Average multi-trait evaluation index values of the double hybrids (D×O) (Autumn, 2020)

Double hybrids	Fecundity (No.)	Hatching (%)	Yield/ 10,000 larvae rushed		SCW (g)	SSW (g)	SR (%)	Pupation (%)	Avg. E.I
			(By No.)	(By wt.)					
DH-10	46.08	46.18	49.25	46.90	44.79	41.50	41.67	59.49	46.98
DH-11	54.22	43.60	34.20	48.03	55.21	53.64	49.98	40.51	47.42
DH-12	41.27	59.92	60.53	54.26	48.26	53.64	58.39	59.49	54.47
DH-13	52.12	32.44	64.29	60.77	55.21	65.79	70.74	40.51	55.24
DH-14	68.15	58.20	41.72	38.90	37.84	41.50	50.11	40.51	47.12
DH-15	53.11	47.04	56.77	55.09	51.74	53.64	54.17	59.49	53.88
DH-16	38.93	40.60	53.01	63.46	65.64	53.64	37.56	40.51	49.17
DH-17	55.70	53.91	56.77	57.62	55.21	53.64	49.98	59.49	55.29
DH-18	34.12	65.92	37.96	32.45	30.88	29.35	37.43	40.51	38.58
FC1 x FC2	56.31	52.19	45.49	42.51	55.21	53.64	49.98	59.49	51.85

3. Project Code &Title:AIB03004SI -Evaluation and identification of high yielding bivoltine silkworm (*Bombyx mori* L.) hybrids for temperate region of Jammu & Kashmir

Project Duration: March, 2020–February, 2023

Investigator (s): Kiran R,Bharath Kumar Neelaboina, Shivkumar & Mir Nisar Ahmad

Objective(s):

- To evaluate the performance of hybrids for the temperate region of Jammu & Kashmir
- To identify high yielding bivoltine silkworm hybrids for the temperate region of Jammu & Kashmir

Workdone:

Breeding programs which heighten the production capability of silkworm are essential for the growth of sericulture. Thus, the need for the development of lines/breeds and evaluation of hybrids should be of great importance. The present study aims to evaluate and identify high yielding bivoltine silkworm hybrids. A total of 16 hybrids, 8 parents, and 2 controls were successfully reared during spring (May, June), summer (July, August) and autumn (August, September) seasons of 2020. The observations from data of three seasons are presented in table39 to 41.

Table-39: Comparative rearing performances of the silkworm hybrids during the spring season

Hybrids	Fecundity (No.)	Hatching (%)	Yield/ 10,000 larvae brushed		SCW (g)	SSW (g)	SR (%)	Pupation (%)	Avg. E.I
			(By No.)	(By wt.)					
KR1	470	91.91	9400	13.33	1.59	0.29	18.24	90.75	39.10
KR2	408	92.56	9640	13.85	1.60	0.32	19.65	93.67	48.22
KR3	502	94.43	9600	13.53	1.58	0.31	19.35	93.49	50.28
KR4	464	93.22	9620	14.19	1.64	0.33	19.80	93.58	51.79
KR5	436	91.79	9640	12.58	1.47	0.28	18.69	90.33	38.84

KR6	488	93.39	9640	14.07	1.63	0.32	19.38	93.23	51.40
KR7	505	94.68	9560	13.35	1.56	0.32	20.15	94.21	51.35
KR8	522	94.49	9600	14.72	1.70	0.34	19.91	90.28	54.24
KR9	447	91.18	9560	12.36	1.46	0.26	17.47	93.28	36.67
KR10	551	94.84	9580	14.87	1.72	0.37	21.23	95.12	62.05
KR11	522	93.57	9500	14.61	1.71	0.35	20.22	93.73	54.78
KR12	548	95.45	9620	14.71	1.70	0.36	21.24	94.75	62.15
KR13	443	91.82	9620	12.98	1.52	0.27	17.82	90.65	39.06
KR14	535	94.17	9640	13.13	1.53	0.31	20.28	94.06	52.11
KR15	473	93.88	9680	13.01	1.51	0.28	18.39	92.46	45.40
KR16	530	93.95	9560	13.65	1.60	0.32	19.74	92.31	50.36
SH6xNB4D2	519	95.25	9660	13.66	1.58	0.30	18.99	95.05	53.55
FC2	532	93.68	9700	14.69	1.70	0.34	20.13	93.90	58.63
Mean	494	93.57	9601	13.74	1.60	0.31	19.48	93.05	
SD	42	1.27	69	0.78	0.08	0.03	1.06	1.58	

Table-40:Comparative rearing performances of the silkworm hybrids during the summer season

Hybrids	**Fecundity (No.)**	**Hatching (%)**	**Yield/ 10,000 larvae brushed**		**SCW (g)**	**SSW (g)**	**SR (%)**	**Pupation (%)**	**Avg. E.I**
			(By No.)	**(By wt.)**					
KR1	586	95.21	9580	12.87	1.51	0.29	18.87	90.58	47.18
KR2	543	94.17	9520	13.25	1.56	0.29	18.33	92.45	45.85
KR3	506	95.44	9620	12.97	1.52	0.29	18.81	92.36	48.21
KR4	511	94.36	9660	13.03	1.52	0.29	18.91	94.53	49.77
KR5	445	95.07	9620	12.73	1.49	0.28	18.79	93.34	45.43
KR6	458	94.86	9680	12.17	1.42	0.27	18.62	90.73	40.32
KR7	503	94.85	9640	13.00	1.52	0.30	19.64	94.03	51.17
KR8	598	95.55	9600	13.95	1.62	0.33	20.10	92.29	59.13
KR9	463	93.04	9580	12.77	1.50	0.28	18.66	92.46	40.62
KR10	566	95.37	9660	13.61	1.58	0.33	20.95	94.56	61.27
KR11	544	93.80	9500	13.65	1.61	0.33	20.25	93.50	52.75
KR12	506	94.07	9720	13.51	1.56	0.33	20.90	95.07	57.96
KR13	582	94.61	9580	11.96	1.42	0.26	18.02	94.07	42.49
KR14	569	95.40	9640	13.02	1.52	0.30	19.45	92.81	52.45
KR15	533	94.43	9540	12.02	1.43	0.29	19.96	92.67	43.55
KR16	551	94.42	9560	13.55	1.59	0.31	19.56	93.69	53.00
SH6xNB4D2	522	95.54	9680	13.60	1.57	0.30	19.11	93.19	54.78
FC2	528	95.18	9640	12.85	1.52	0.31	20.07	94.50	54.08
Mean	528	94.74	9612	13.03	1.52	0.30	19.39	93.16	
SD	44	0.69	59	0.57	0.06	0.02	0.85	1.25	

Table-41:Comparative rearing performances of the silkworm hybrids during the autumn season

Hybrids	**Fec. (No.)**	**Hat. (%)**	**Yield/ 10,000 larvae brushed**		**SCW (g)**	**SSW (g)**	**SR (%)**	**Pupation (%)**	**Avg. E.I**
			By No.	By wt.					
KR1	509	93.27	9460	12.05	1.44	0.25	17.53	90.41	36.22
KR2	495	93.65	9580	13.53	1.58	0.30	19.06	92.43	49.76
KR3	503	93.78	9580	13.15	1.54	0.28	18.41	92.35	46.97
KR4	507	94.49	9620	13.75	1.60	0.30	18.86	94.51	54.68
KR5	433	92.63	9400	13.91	1.65	0.30	18.42	93.55	44.16
KR6	520	93.34	9660	13.16	1.53	0.29	18.72	90.58	47.12
KR7	475	93.64	9640	13.92	1.61	0.31	19.35	94.29	53.57
KR8	477	93.31	9660	12.77	1.49	0.28	18.82	92.59	45.24
KR9	446	93.55	9460	12.08	1.45	0.27	18.46	92.35	37.72
KR10	506	93.89	9620	14.37	1.66	0.33	20.15	94.89	60.10
KR11	506	93.00	9680	13.77	1.59	0.32	19.94	94.02	55.03
KR12	522	93.74	9680	15.15	1.73	0.34	19.45	95.37	63.38
KR13	478	93.50	9560	13.84	1.62	0.31	18.92	94.37	51.26
KR14	500	92.88	9520	13.95	1.63	0.29	17.75	92.67	46.85
KR15	502	92.20	9600	12.86	1.51	0.28	18.79	92.73	44.40

KR16	494	93.76	9620	13.07	1.53	0.29	19.21	93.39	49.54
SH6xNB4D2	518	94.90	9680	13.60	1.57	0.31	19.43	94.00	57.14
FC2	511	95.12	9680	13.20	1.55	0.32	20.32	92.50	56.85
Mean	495	93.59	9594	13.45	1.57	0.30	18.98	93.17	
SD	24	0.73	85	0.76	0.08	0.02	0.74	1.36	

4. Project Code &Title:AIB03006CI - Indo-Uzbekistan collaborative research project for improvement of mulberry and silkworm breeding in temperate regions of India and Uzbekistan

Project Duration: August, 2020 – July, 2026

Investigator (s): Sukhen Roy Choudhary (*upto* 31.01.2021), Sardar Singh (*w.e.f*01.02.2021), Mir Nisar Ahmad, Pawan Saini & Santosh Kumar Magdum

Objective(s):

- To identify silkworm breeds/ hybrids and mulberry varieties / line that are suitable for the temperate regions of India and the sharply continental climate of Uzbekistan.
- To use exotic breeds to produce silkworm hybrids (*Bombyx mori L.*) to increase the silk content in cocoons and their productivity.
- To utilize and develop exotic mulberry (*Morus* spp.) varieties / line for high leaf nutrients and yield.

Workdone:

Screening of available silkworm and mulberry genotypes for selection of resource material for exchange completed. Based on the information received from SRIS Uzbekistan, 05 silkworm breeds *viz*., Sovetskaya-14, Ipakchi 2, Mechenaya 1, Mechenaya 2 and YA-120 and 04 mulberry genotypes viz., Balkhi-tut, Marvarid-tut, Nar-tut and Katlama-tut selected for procurement. SRIS Uzbekistan has been approached for sharing the additional details regarding the four mulberry genotypes i.e. Balkhi-tut, Marvarid-tut, Nar-tut and Katlama-tut. Draft Material Transfer Agreement (MTA) was prepared for procurement of 05 silkworm breeds *viz*., Sovetskaya-14, Ipakchi 2, Mechenaya 1, Mechenaya 2 and YA-120 from SRIS Uzbekistan.

5. Project Code & Title: AIB03007SI &Development of autumn specific bivoltine silkworm (Bombyx *mori* L.) hybrids suitable for temperate region of Jammu & Kashmir

Project Duration: March, 2021 – February, 2024

Investigator (s): Shivkumar, Bharath Kumar Neelaboina & Kiran R

Objective(s):

- To develop stable autumn specific bivoltine hybrids to suit the temperate region of Jammu & Kashmir
- To increase autumn season cocoon yields in the temperate region of Jammu & Kashmir

Workdone:

The project was approved in the month of March, 2021 and activities as per the set milestones shall be carried out in the next year and reported accordingly.

❖ AT RSRS, JAMMU

6. Project Code &Title: AIB03008SI -Development of nutrigenetic hybrids of bivoltine silkworm(Bombyx *mori* L.) under sub-tropical conditions of North-West India

Project Duration: March, 2021 – February, 2024

Investigator (s): Murali S, Sardar Singh& Chattarpal

Objective(s):

- To select superior bivoltine silkworm nutrigenetic hybrids under sub-tropical conditions for enhancement of cocoon productivity

Workdone:

The project was approved in the Month of March, 2021 and activities as per the set milestones shall be carried out in the next year and reported accordingly.

MULBERRY & SILKWORM PROTECTION

❖ AT MAIN INSTITUTE

1. Project Code &Title: ARE03005SI-Development of trap through biorational tactics for the management of mulberry leaf webber Glyphodes *pyloalis* (Lepidoptera: Crambidae)

Project Duration: March, 2020–February, 2022

Investigator (s): Rajesh Kumar, Sahadev Chouhan & Satish Y

Objective(s):

- To develop a trap for controlling the monophagous pests, *Glyphodes pyloalis* of mulberry
- Field trial of developed trap for minimising the mulberry leaf damage.
- Multiply the identified biocontrol agent, *Chelonus carbonator* (Braconidae) and release in the field.

Workdone:

- Collection of different Larval instars, pupae and moths of Mulberry leaf webber *Glyphodes pyloalis*were reared from the various plots of mulberry varieties *viz.* TR-10, Goshoerami, PRR-1, Chinese white, KNG and Ichinose at CSRTI Pampore.
- The larvae after collection were placed in mesh cages at normal conditions for rearing purpose and by providing timely feed for further development.
- Besides,the parasitized larvae and parasitoids were also collected and placed separately for examination. The emerged adults of parasitoids were provided fresh larvae for further parasitisation and multiplication at laboratory level.
- The Solar plates, batteries and LED were purchased for preparation of trap. Two traps have been prepared with wooden frame and acrylic sheet along with solar plate batteries and LED of particular wavelength.
- The Kairomone and sex pheromone were not available in India.
- The pupae of parasitoids and *Glyphodes*were in diapauses condition.
- The laboratory is under progress for augmentation of Chelonus carbonator in the laboratory condition and to check the LED trap in the laboratory condition in particular LED.

Table-42: Recorded damage data and conducting rearing in laboratory for parasitoid and pest

Variety/Genotype	Total no. of Branches in Plant (50 plants)	Avg. No. of leaves (Aprox.)	No. of infested leaves by Glyphodes pyloalis	No. of larvae present
PPR-1	915	1670	669	114
Goshoerami	621	1305	746	202
Ichinose	763	1884	43	4
KNG	3471	2760	250	3



1. *Glyphodes* larva parsitized by C. carbonator in the laboratory condition;2. Adult emerged in Lab 3, 4, 6, 7, 8, 10 - laboratory culture of *Glyphodes pyloalis* and parasitoids,5. Pupa of *G. pyloalis*



Augmentation of *C. carbonator* on *Glyphodes pyloalis* in laboratory condition. 11-15. C. carbonator and other parasitoids pupae in lab condition, 16. Adult of parasitoid in lab condition

SERICULTURE EXTENSION

❖ At Main Institute & RSRS, Sahaspur

1. Project Code & Title: APR03003SI - Rescheduling of brushing date for second commercial crop rearing in autumn in Kashmir and Doon Valley

Project Duration: March, 2020 – February, 2022

Investigator (s): Gulzar Ahmad Khan, Gulab Khan & Haroon Rashid (Site A: CSR&TI, Pampore)
K.K. Rai & Babulal (Site B: RSRS, Sahaspur)

Objective(s):

Site A: CSR&TI, Pampore

- To stabilize second commercial crop by rescheduling of brushing date
- To develop package of practices for early autumn rearing

Workdone

The mulberry plantation under the experiment at CSR&TI, Pampore was pruned with 04 treatments alongwith 01 control treatment (Table-43). The plantation was maintained as per the package and practices recommended for temperate mulberry plantation. For Chawkie rearing Ichinose variety (bush) and for late age rearing Goshoerami variety (tree) was used. Ten (10) DFLs of FC1XFC2 for each treatment were incubated and brushed accordingly (Table-44). Data on fecundity and hatching percentage was calculated on 10 DFLs for each treatment. The data on other parameters *viz.* under size worms, feeding and moulting duration (larval duration), weight of 10 mature larvae, cocoon assessment (number of good cocoons, double cocoons, flimsy cocoons and defective cocoon % age), single cocoon weight, single shell weight and cocoon shell ratio (SR%), pupation rate, productivity was recorded on the 250 larvae retained per replication. Post cocoon data was recorded from 10 cocoons per replication on filament length, reelability, non breakable filament length, denier and renditta.

Observation (s): The data of all the treatments was analyzed by using OPSTAT software(Table-45to 47). As per first year analyzed data it was observed that brushing date for autumn rearing can be preponed 15-20 days from the brushing date 20thAugust being normal autumn brushing date in Kashmir valley. The observation was made on the basis of significance of following parameters *viz.*Weight of ten mature larvae, number of good cocoons, flimsy cocoons, stained, muted cocoons, defective cocoon percentage, productivity, pupation rate, single cocoon weight, single shell weight, SR% and filament length. On all these parameters, treatments with brushing dates 1st, 5th, 10th& 15th of August respectively have performed on par or better than control (Brushing date 20th of August).However, the final conclusion will be made after the second year silkworm rearing.

Table-43:Depicting treatments as well as larval duration of different treatments

Treatments	Date of pruning (Chawki)	Date of pruning (Late age)	Date of Brushing	Date of Chawki distribution	Larval duration
Control	05th June, 2021	15th June, 2021	20-08-2021	30-08-2021	26 days
Treatment 1	10th June, 2021	20th June, 2021	15-08-2021	25-08-2021	26 days
Treatment 2	05th June, 2021	15th June, 2021	10-08-2021	20-08-2021	24 days
Treatment 3	01st June, 2021	10th June, 2021	05-08-2021	15-08-2021	24 days
Treatment 4	01st June, 2021	10th June, 2021	01-08-2021	10-08-2021	25 days

Table-44:Analysed data on fecundity, hatching %, weight of 10 mature larvae and number of good cocoons

Treatments	Fecundity (%)		Hatching %		Weight of ten mature larvae (g)		Number of good cocoons	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
T1	475.000	3.536	92.000	0.408	36.000	0.408	240.000	1.414
T2	490.000	4.082	91.000	0.408	38.000	0.707	242.500	0.866
T3	510.000	3.536	91.000	0.707	36.750	0.479	241.000	0.577
T4	495.000	2.887	90.000	2.041	35.000	0.707	234.000	0.408
C	520.000	5.401	92.000	0.408	32.000	0.913	232.500	0.957
C.D.	13.339		N/A		2.266		2.668	
SE(m)	4.282		0.935		0.727		0.856	
SE(d)	6.055		1.323		1.029		1.211	
C.V.	1.720		2.051		4.092		0.720	

Table-45:Analysed data on double cocoons, flimsy cocoons, stained/muted Cocoons and defective cocoon %

Treatments	Double cocoons (By No.)		Flimsy cocoons (By No.)		Stained/Muted cocoons (By No.)		Defective cocoon(%)	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
T1	2.250	0.629	2.000	0.408	3.000	0.913	4.000	0.566
T2	1.750	0.250	2.000	0.577	2.000	0.408	3.000	0.346
T3	1.000	0.408	3.250	0.250	3.750	0.479	3.600	0.231
T4	1.250	0.250	9.000	0.577	4.500	0.289	6.400	0.163
C	1.750	0.250	8.500	0.500	5.500	0.957	7.000	0.383
C.D.	N/A		1.609		1.695		1.067	
SE(m)	0.433		0.516		0.544		0.343	
SE(d)	0.612		0.730		0.769		0.484	
C.V.	54.127		20.865		29.008		14.272	

Table-46:Analysed data on productivity, pupation rate, SCW, SSW, SR%

Treatments	Productivity (Kg/100 Dfls)		Pupation(%)		SCW (g)		SSW (g)		SR%	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
T1	79.075	0.405	95.930	1.188	1.648	0.005	0.360	0.004	21.850	0.282
T2	80.745	0.302	95.750	1.109	1.665	0.012	0.373	0.002	22.368	0.034
T3	80.490	0.273	96.000	0.913	1.670	0.004	0.368	0.002	22.000	0.111
T4	76.633	0.308	94.000	0.913	1.638	0.005	0.335	0.003	20.580	0.195
C	75.788	0.233	93.500	0.645	1.630	0.007	0.328	0.006	20.088	0.363
C.D.	1.049		1.340		0.023		0.013		0.778	
SE(m)	0.337		0.430		0.008		0.004		0.250	
SE(d)	0.476		0.608		0.011		0.006		0.353	
C.V.	0.857		0.905		0.914		2.415		2.337	

Table-47:Analysed data on filament length, reelability, denier, renditta and non breakable filament length

Treatments	Filament length (m)		Reelability		Denier		Renditta		NBFL	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
T1	854.250	7.169	85.500	1.323	2.455	0.193	2.558	0.103	-	-

T2	903.000	29.380	90.250	3.065	2.165	0.074	2.678	0.096	-	-
T3	947.500	12.500	83.000	1.225	2.410	0.149	2.533	0.075	-	-
T4	855.500	2.102	83.500	1.323	2.115	0.033	2.613	0.097	-	-
C	861.000	2.915	83.750	1.652	2.603	0.137	2.853	0.114	-	-
CD	40.237		N/A		N/A		N/A		-	-
SE(m)	12.915		1.864		0.117		0.078		-	-
SE(d)	18.265		2.635		0.165		0.111		-	-
C.V.	2.921		4.375		9.931		5.907		-	-

Objective (s):

Site B: RSRS, Sahaspur

- To stabilize autumn crop through rescheduling of pruning period.
- To improve the cocoon production during autumn season through rescheduling of brushing date

Workdone

The mulberry plantation utilized under the experiment at RSRS, Sahaspur was pruned with 05 treatments along with 02 controls (Table-48). The plantationwas maintained as per the recommended package and practices for sub-tropical region. For chawkie and late age rearing S-146 mulberry variety (tree mode) was used. Ten (10) DFLs of SH6 x NB4D2 for each treatment were incubated and brushed (table-49). Data on fecundity and hatching percentage (%) was calculated on 10 DFLs for each treatment. The data on other parameters i.e, Larval period (D:H), Weight of 10 mature larvae (g), Cocoon yield/100 DFLs (kg), Single Cocoon Weight (g), Single Shell Weight (g) and SR (%) was recorded on the 250 larvae retained per replication . The cocoon samples were sent to DCTC, Dehradun for post cocoon analysis for parameterslike Average filament length, Renditta, Denier and Reelability (Table-49).

Observation (s): As per first year tabular data at Sahaspur, brushing date of 31stAugust was found better as compared to normal brushing date of 5th September. The preliminary observation was made on the basis of following parameters: Fecundity, Hatching%, Larval duration, Weight of ten mature larvae, Productivity per 100 DFLs, Single cocoon weight, Single shell weight, SR%, Average Filament length, reelability,, denier and renditta.

Table-48: Datarecorded in rearing season: Autumn, 2020 **(**Hybrid: SH6 x NB4D2)

Date of pruning	Date of brushing	Fec.	Hat. %	Larval period D:H	Wt. of 10 mature larvae (g)	Cocoon yield/100 DFLs (kg)	SCW (g)	SSW (g)	SR (%)
25-6-2020 (Treatment)	20-08-2020	459	98.25	22:04	43.00	20.08	1.628	0.310	19.07
30-6-2020 (Treatment)	25-08-2020	472	98.51	22:06	43.00	34.200	1.825	0.343	18.79
05-7-2020 (Treatment)	31-08-2020	465	98.27	22:06	44.00	50.040	1.670	0.298	17.84
10-7-2020 (Treatment)	05-09-2020	477	97.91	22:00	43.00	28.460	1.789	0.316	17.68
15-7-2020 (Treatment)	10-09-2020	455	98.02	22:12	43.00	41.60	1.887	0.347	18.38
02-7-2020 (Control-1)	25-08-2020	465	98.06	22:07	41.00	29.280	1.835	0.327	17.83
No pruning (Control-2)	10-09-2020	479	98.53	22:00	41.00	36.74	1.750	0.324	18.51

Table-49: Data recorded on post cocoon analysis during-autumn-2020

Date of pruning	Date of brushing	Avg. filament length	Renditta	Denier	Reelability
25-06-2020 (Treatment)	20-08-2020	813	9.38	2.4	74.92
30-06-2020 (Treatment)	25-08-2020	797	7.81	2.4	81.11
05-07-2020 (Treatment)	31-08-2020	973	7.32	2.5	81.06
10-07-2020 (Treatment)	05-09-2020	792	7.77	2.4	78.96
15-07-2020 (Treatment)	10-09-2020	806	8.11	2.4	78.01
02-07-2020 (Control-1)	25-08-2020	757	6.88	2.4	81.23

No pruning (Control-2)	10-09-2020	863	7.66	2.5	78.99

CONCLUDED RESEARCH PROJECTS
(Institute as PI)
SERICULTURE EXTENSION

❖ At RSRS, Jammu

Project Code & Title: MOE03001SI -Innovative Approach for Multiple Cocoon Crops and Stabilization of Autumn Crop in North-West India
Project Duration: February, 2019 – January, 2021
Investigator (s): Sardar Singh (PI), Murali S(CI for Jammu & HP) & K K Rai (CI for Uttarkahnd)
Objective(s):

- Introduction of summer cocoon crop in between spring & autumn crop in North West India.
- Stabilization of autumn crop with introduction of additional crop.

Abstract:
Farmer's level trial rearing (2020):
Based on the overall rearing experiences and outcome of diagnostic study of 2018, followed by institute level rearing in 2019, field trial planned and conducted with the DOS sponsored farmers in given location covering 5 potential sericulture districts of North West India. Spring, Summer & followed up by autumn crop was conducted with shortlisted hybrid and brushing date at Jammu, Uttarakhand (Spring only) and Himachal Pradesh region of selected rearers at each location with actual rearing capacity of the farmers with shortlisted hybrid. Chawki worms were distributed during spring, summer and autumn season 2020 and leaves used from the same trees for the different seasons by adopting pruning schedule from time to time.

Table-50: List of nominated rearers and their location for adoption of three crop pattern during Spring, Summer and Autumn season 2020

#	Name of DOS sponsored farmer	Village	District
A.	**Jammu Division of J&K state:**		
1	Sh.Agya Ram S/o Sh. Kutti Ram	Majalta	Udhampur
2	Sh.Rattan Chand S/o Sh. Lakshman Dass	Dharamakot	Kathua
3	Sh.Kundan Lal S/o Sh. Sunder Dass	Lamberi	Rajouri
B.	**Himachal Pradesh state:**		
4	Smt. Rekha Devi W/o Sh. Vinod Kumar	Soi	Bilaspur
5	Smt. Prem Lata W/o Sh. Pritam Singh	Panol	Bilaspur
6	Smt. Salini Devi W/o Sh. Pawan Kumar	Naswal	Bilaspur
7	Smt. Sudesh Kumari W/o Sh. Pritam Chand	Sanot, Dehra	Kangra
8	Smt. Swarna Devi W/o Sh. Raj Kumar	Sanot, Dehra	Kangra
9	Smt. Tarsema Devi W/o Sh. Partap Singh	Sanot, Dehra	Kangra
C.	**Uttarakhand State (Spring, 2020 only)**		
10	Smt.Palli W/o Sh. Bishambar	Sabhawala	Dehradun
11	Smt.Pola W/o Sh. Sadhu Ram	Sherpur	Dehradun
12	Sh.Roop Singh S/o Sukkad	Sighniwala	Dehradun
D.	**Control Rearing (Lab Condition)**		
13	RSRS, Jammu (J&K)	Miran Sahib	Jammu

Farmers level Rearing Performance: Spring Crop 2020:
450 DFLs of shortlisted hybrid for spring season 2020 ($FC_1 \times FC_2$)procured from SSPC, Dehradun were distributed after chawki rearing among 09 selected sericulture farmers (50 DFLs to each rearer) of each location of Jammu province of J&K, HP and Uttrakhand state. The yield recorded was 76, 78 and 58 Kg / 100 DFLs for Lamberi (Rajouri Dist.), Majalta (Udhampur Dist.) and Dharamakot (Kathua Dist.) respectively in Jammu division of J&K state and overall

average yield was recorded as **70.67 Kg/100 DFLs,** whereas 71, 36 and 74 Kg/100 DFLs for Soi, Panol and Naswal region of Bilaspur Dist., Himachal Pradesh, with an average yield of **60.33 Kg/100 DFLs.** Average yield for control rearing at RSRS, Jammu was **83 Kg/100 DFLs**. Average yield at Uttarakhand region was recorded as **13.40 Kg / 100 DFLs**. The filament length was recorded about 974.00 mtrs, denier (2.59), Renditta (2.14), Reelability (84.45%), Raw silk (32.11%) and Neatness (95.00) at farmers level whereas at control batch rearing filament length was recorded about 855.00 mtrs, denier (2.34), Renditta (2.83), Reelability (74.86%), Raw silk (35.72%) and Neatness (90.00) respectively for the trial conducted during Spring season, 2020) (Table-51).

Table-51:Average data recorded during Spring Field trial (2020) of $FC_1 \times FC_2$ on multi-utility rearing stands at different rearing sites of Jammu division of J&K & HP and Control rearing at RSRS, Jammu

Location	Date of incubation	Date of brushing	Hatching (%)	Date of distribution	Wt. of 10 Mature Larvae (g.)	5th Instar Larval Period (D:H)	Total Larval Period (D:H)	Actual Yield (Kg)	Av. Yield / 100 DFLs
		Jammu Division (J&K)							
Lamberi, (Rajouri)	21.02.2020	01.03.2020	94.33	10.03.2020	55.00	6.00	29.00	38.00	76.00
Majalta, Udhampur	21.02.2020	01.03.2020	94.33	10.03.2020	56.00	6.19	31.00	39.00	78.00
Dharamkot, (Kathua)	21.02.2020	01.03.2020	94.33	10.03.2020	58.00	8.02	29.12	29.00	58.00
Avg.			**94.33**		**56.33**	**6.23**	**29.20**	**35.33**	**70.67**
		Himachal Pradesh							
Soi (Bilaspur)	21.02.2020	01.03.2020	90.00	10.03.2020	54.00	10.08	32.04	35.50	71.00
Panol (Bilaspur)	21.02.2020	01.03.2020	90.00	10.03.2020	50.00	10.08	32.04	18.00	36.00
Naswal (Bilaspur)	21.02.2020	01.03.2020	90.00	10.03.2020	56.00	10.08	32.04	37.00	74.00
Avg.			**90.00**		**53.33**	**10.08**	**32.04**	**30.17**	**60.33**
				Control Rearing (Lab condition)					
RSRS, Jammu	21.02.2020	01.03.2020	94.33	10.03.2020	52.00	7.16	27.03	41.50	83.00
Avg.			**94.33**		**52.00**	**7.16**	**27.03**	**41.50**	**83.00**

Table-51: Contd.

Name of Location	SCW (g)	SSW (g)	SR (%)
Jammu Division (J&K)			
Lamberi, (Rajouri)	1.90	0.40	21.04
Majalta, Udhampur	1.763	0.393	22.29
Dharamkot, (Kathua)	1.70	0.348	20.47
Avg.	**1.79**	**0.38**	**21.27**

Table-51: Contd.

Himachal Pradesh			
Soi (Bilaspur)	1.81	0.40	22.09
Panol (Bilaspur)	1.80	0.39	21.66
Naswal (Bilaspur)	1.81	0.40	22.09
Avg.	**1.81**	**0.40**	**21.95**
Control Rearing (Lab condition)			
RSRS, Jammu	1.84	0.38	20.28
Avg.	**1.84**	**0.38**	**20.28**

Table-52:**Uttarakhand**

Name of location	Actual yield (Kg)	Yield/100 Dfls
Sabhawala (Dehradun)	7.60	15.20
Shepur (Dehradun)	5.80	11.60
Sighniwala (Dehradun)	**13.40**	**9.00***

Note: 1. No. of DFLs distributed: 50 DFLs; No. of Farmers covered: 9; H-Hatching

2.Average data recorded under RSRS Sahaspur during spring crop only (FC1 x FC2); Summer & Autumn crop not conductedin Uttarakhand

** Crop got affected due to covid situation during rearing periodin Uttarakhand, summer & autumn crop also not conducted*

Table- 53:Data for post cocoon parameters recorded for $FC_1 \times FC_2$ (2020) trial rearing during spring (2020) at Field and Control batch at RSRS, Miran Sahib, Jammu.

Location	AFL (mtr)	Deneir	Renditta	Reelability (%)	Raw Silk (%)	Neatness
	Jammu Division					
Farmers level	974.00	2.59	2.14	84.45	32.11	95.00
	Control rearing					-
RSRS, Jammu	855.00	2.34	2.83	74.86	35.72	90.00
Avg.	**914.50**	**2.47**	**2.49**	**79.66**	**33.92**	**92.50**
SD±	**84.15**	**0.18**	**0.49**	**6.78**	**2.55**	**3.54**

Meteorological data recorded inside the rearing room (Spring season):

The weather parameters recorded at each location for temperature and relative humidity during spring season (2020) for every stage of rearing is depicted in table below:

Table-54:Meteorological data of Spring crop (2020) during rearing: (Internal)

Rearing Stage/ activity	Period		Dry Temp. (˚C)	Wet Temp. (˚C)	RH (%)	Range Temp. (˚C)	Range Humidity (%)
	From	To					
	Rajouri, J&K (Lamberi)						
Incubation	21.02.2020	29.02.2020	25.00	22.00	75.00	22-25	77-80
Chawki	01.03.2020	08.03.2020	27.00	25.00	84.00	25-27	80-85
3rd stage	09.03.2020	14.03.2020	25.00	22.00	75.00	20-25	70-80
4th stage	15.03.2020	20.03.2020	25.00	22.00	76.00	24-26	75-84
5th stage	21.03.2020	27.03.2020	25.00	21.00	68.00	23-25	75-83
Spinning	28.03.2020	04.04.2020	23.00	21.00	83.00	22-24	75-83
Avg.			**25.00**	**22.00**	**77.00**	**23-25**	**75**

Table-54:

	Bilaspur, HP (Soi)						
Incubation	21.02.2020	29.02.2020	25.00	22.00	77.00	22-25	77-80
Chawki	01.03.2020	08.03.2020	26.00	24.00	80.00	25-26	76-80
3rd stage	09.03.2020	14.03.2020	25.00	22.00	76.00	24-25	76-80
4th stage	15.03.2020	21.03.2020	25.00	22.00	76.00	24-25	76-80
5th stage	23.03.2020	02.04.2020	25.00	22.00	76.00	24-25	76-80
Spinning	03.04.2020	10.04.2020	26.00	24.00	80.00	24-26	78-80
Avg.			**25.00**	**23.00**	**77.00**	**24-25**	**76-80**
	Bilaspur, HP (Panol)						
Incubation	21.02.2020	29.02.2020	25.00	22.00	77.00	22-25	77-80
Chawki	01.03.2020	08.03.2020	26.00	24.00	80.00	25-26	76-80
3rd stage	09.03.2020	14.03.2020	25.00	22.00	76.00	24-25	76-80
4th stage	15.03.2020	21.03.2020	25.00	22.00	76.00	24-25	76-80
5th stage	23.03.2020	02.04.2020	25.00	22.00	76.00	24-25	76-80
Spinning	03.04.2020	10.04.2020	26.00	24.00	80.00	24-26	78-80
Avg.			**25.00**	**23.00**	**78.00**	**24-25**	**77-80**
	Bilaspur, HP (Naswal)						
Incubation	21.02.2020	29.02.2020	25.00	22.00	77.00	22-25	77-80
Chawki	01.03.2020	08.03.2020	26.00	24.00	80.00	25-26	76-80
3rd stage	09.03.2020	14.03.2020	25.00	22.00	76.00	24-25	75-76
4th stage	15.03.2020	21.03.2020	25.00	22.00	76.00	24-25	75-76
5th stage	23.03.2020	02.04.2020	25.00	22.00	76.00	24-25	75-76
Spinning	03.04.2020	10.04.2020	25.00	23.00	84.00	24-26	76-80
Avg.			**25.00**	**23.00**	**78.00**	**24-25**	**76-78**
	Udhampur, J&K (Majalta)						

Incubation	21.02.2020	29.02.2020	25.00	22.00	77.00	22-25	77-80
Chawki	01.03.2020	08.03.2020	27.00	25.00	84.00	25-27	80-85
3rd stage	10.03.2020	15.03.2020	19.00	17.00	80.00	17-21	74-86
4th stage	16.03.2020	22.03.2020	23.00	20.00	74.00	20-23	72-76
5th stage	24.03.2020	31.03.2020	26.00	24.00	80.00	24-26	72-78
Spinning	01.04.2020	07.04.2020	25.00	22.00	75.00	23-27	68-84
Avg.			**24.00**	**22.00**	**78.00**	**22-25**	**74-82**
	Kathua, J&K (Dharmakot)						
Incubation	21.02.2020	29.02.2020	25.00	22.00	77.00	22-25	77-80
Chawki	01.03.2020	08.03.2020	27.00	25.00	84.00	25-27	80-85
3rd stage	09.03.2020	13.03.2020	18.00	16.00	76.00	15-21	54-90
4th stage	15.03.2020	19.03.2020	20.00	17.00	73.00	15-24	72-91
5th stage	21.03.2020	29.03.2020	20.00	17.00	74.00	15-25	54-90
Spinning	30.03.2020	05.04.2020	21.00	18.00	74.00	17-26	54-91
Avg.			**22.00**	**19.00**	**76.00**	**18-25**	**65-88**
	RSRS, Jammu, J&K (Control Batch)						
Incubation	21.02.2020	29.02.2020	25.00	22.00	77.00	22-25	77-80
Chawki	01.03.2020	08.03.2020	27.00	25.00	84.00	25-27	80-85
3rd stage	09.03.2020	13.03.2020	26.00	23.00	81.00	25-27	75-85
4th stage	14.03.2020	18.03.2020	25.00	22.00	75.00	22-25	75-76
5th stage	20.03.2020	28.03.2020	25.00	22.00	75.00	25-25	79-83
Spinning	29.03.2020	04.04.2020	26.00	22.00	73.00	24-26	68-75
Avg.			**26.00**	**23.00**	**77.00**	**24-26**	**76-81**

Farmers level Rearing Performance during Summer Crop 2020:

450 DFLs of shortlisted hybrid: **SH_6×NB_4D_2**were distributed after chawkie rearing among 09 selected sericulture farmers (50 DFLs to each) for summer season. Brushing was done on 29.06.2020 and 28.06.2020 at Jammu division of J&K & Ghumarwin (HP) respectively. The yield recorded was about 44, 44 and 45.20 Kg / 100 DFLs for Lamberi (Rajouri Dist.), Majalta (Udhampur Dist.) and Dharamkot (Kathua Dist.) region respectively with average yield of about **44.40 Kg/100 DFLs** at Jammu division whereas 17, 16.67 and 14.60 Kg/100 DFLs for Soi, Panol and Naswal region of Bilaspur Dist., Himachal Pradesh and 42.60, 74.40, 46.80 Kg/100 DFLs for Sanot region (3 rearers) of Kangra Dist. Himachal Pradesh with average yield of about **35.35 Kg/100 DFLs** was recorded.The control batch reared at RSRS, Jammu recorded yield was about **51.87 Kg/100 DFLs**. The average filament length was recorded about 725.33 mtrs, denier (2.54), Renditta (3.44), Reelability (75.48%), Raw silk (29.46%) and Neatness (89.67) at Jammu division whereas at Himachal Pradesh the average filament length was recorded about 752.00 mtrs, denier (2.26), Renditta (3.66), Reelability (69.81%), Raw silk (27.72%) and Neatness (94.67) respectively for the field trial conducted during Summer season (2020) and the control batch rearing at RSRS, Jammu the filament length was recorded about 825.00 mtrs, denier (2.62), Renditta (2.95), Reelability (78.27%), Raw silk (34.12%) and Neatness (93.00) (Table-55 & 56).

Table- 55:Average rearing data of summer field trial of shortlisted Hybrid: SH_6×NB4D2 on multi-utility rearing stands at different rearing sites of Jammu division of J&K & HP and Control rearing at RSRS, Jammu

Name of location	Date of incubation	Date of brushing	Hatch. (%)	Date of distribution	Wt. of 10 Mature Larvae (g.)	5th Instar Larval Period (D:H)	Total Larval Period (D:H)	Actual Yield (kg)	Av. Yield / 100 DFLs
		Jammu Division (J & K)							
Lamberi, (Rajouri)	26.06.2020	29.06.2020	91.80	07.07.2020	45.03	7:00	24:00	22.00	44.00
Ramkot, (Udhampur)	26.06.2020	29.06.2020	91.80	07.07.2020	45.00	7:04	24:00	22.00	44.00
Barnoti, (Kathua)	26.06.2020	29.06.2020	90.00	07.07.2020	44.00	7:02	26:00	22.60	45.20
Avg.			**91.20**		**44.68**	**7:02**	**24:16**	**22.20**	**44.40**
		Himachal Pradesh							
Soi (Bilaspur)	25.06.2020	28.06.2020	90.00	07.07.2020	40.00	7:10	27:00	8.50	17.00
Panol (Bilaspur)	25.06.2020	28.06.2020	90.00	07.07.2020	38.00	7:10	27:00	8.34	16.67
Naswal (Bilaspur)	25.06.2020	28.06.2020	90.00	07.07.2020	36.00	7:10	27:00	7.30	14.60
Sanot (Kangra)	27.06.2020	30.06.2020	95.00	09.07.2020	56.00	7:10	26:10	21.30	42.60
Sanot (Kangra)	27.06.2020	30.06.2020	95.00	09.07.2020	60.00	7:13	26:08	18.60	74.40

Sanot (Kangra)	27.06.2020	30.06.2020	95.00	09.07.2020	58.00	7:12	26:11	11.70	46.80
Avg.			**92.50**		**48.00**	**7:11**	**26:17**	**12.62**	**35.35**
		RSRS Jammu (Control Batch)							
RSRS, Jammu	26.06.2020	29.06.2020	91.80	-	55.00	5:20	23:03	25.93	51.87
Avg.			**91.80**		**55.00**	**5:20**	**23:03**	**25.93**	**51.87**

Table- 55: (contd.)

Name of location	SCW (g)	SSW (g)	SR (%)
Jammu Division (J & K)			
Lamberi, (Rajouri)	1.819	0.351	19.29
Ramkot, (Udhampur)	1.560	0.310	19.24
Barnoti, (Kathua)	1.600	0.300	18.75
Avg.	**1.66**	**0.32**	**19.09**
Himachal Pradesh			
Soi (Bilaspur)	1.570	0.270	17.20
Panol (Bilaspur)	1.580	0.270	17.15
Naswal (Bilaspur)	1.560	0.260	17.05
Sanot (Kangra)	1.92	0.350	18.23
Sanot (Kangra)	1.88	0.340	18.08
Sanot (Kangra)	1.72	0.310	18.02
Avg.	**1.71**	**0.30**	**17.62**
RSRS Jammu (Control Batch)			
RSRS, Jammu	1.650	0.315	19.02
Avg.	**1.650**	**0.315**	**19.02**

Note: No. of DFLs distributed: 50 DFLs; No. of Farmers covered: 9; H-Hatching

Table- 56: Data for post cocoon parameters for Summer field trial rearing 2020 and Control batch at RSRS, Jammu

Location	AFL (mtr)	Deneir	Renditta	Reelability (%)	Raw Silk (%)	Neatness
	Jammu division					
Lamberi (Rajouri)	639.00	2.38	3.45	75.98	29.16	93.00
Majalta (Udhampur)	849.00	2.73	3.15	72.61	32.07	93.00
Dharamakot (Kathua)	688.00	2.52	3.73	77.85	27.14	83.00
Avg.	**725.33**	**2.54**	**3.44**	**75.48**	**29.46**	**89.67**
	Himachal Pradesh					
Soi (Bilaspur)	772.00	2.31	3.33	70.55	30.23	93.00
Panol (Bilaspur)	735.00	2.29	3.84	67.83	26.50	93.00
Naswal (Bilaspur)	749.00	2.18	3.82	71.04	26.43	98.00
Avg.	**752.00**	**2.26**	**3.66**	**69.81**	**27.72**	**94.67**
	Control batch rearing					
RSRS, Jammu	825.00	2.62	2.95	78.27	34.12	93.00
Overall Avg.	**751.00**	**2.43**	**3.47**	**73.45**	**29.38**	**92.29**
SD±	**73.36**	**0.20**	**0.35**	**3.99**	**2.96**	**4.50**

Note: AFL – Average filament length; SD-standard deviation

Meteorological data recorded inside the rearing room:

During summer season (2020), the weather parameters recorded at each location for temperature and relative humidity for every stage of rearing is given below:

Table-57: Meteorological data of Summer crop (2020) during rearing: (Internal)

IStage of Rearing activity	Period		Dry Temp. (˚C)	Wet Temp. (˚C)	RH (%)	Range Temp. (˚C)	Range Humidity (%)
	From	To					
	Lamberi, J&K (Rajouri)						
Incubation	26.06.2020	28.06.2020	28.00	25.00	78.00	25-30	72-84
Chawki	29.06.2020	06.7.2020	29.00	26.00	78.00	26-32	71-85
3rd stage	07.07.2020	10.7.2020	28.00	25.00	78.00	26-31	72-85
4th stage	12.07.2020	15.07.2020	29.00	27.00	80.00	25 -33	72-87

IStage of Rearing activity	Period		Dry Temp. (˚C)	Wet Temp. (˚C)	RH (%)	Range Temp. (˚C)	Range Humidity (%)
	From	To					
5th stage	16.07.2020	23.07.2020	28.00	26.00	86.00	22-32	80-93
Spinning	24.07.2020	29.07.2020	27.00	25.00	84.00	23-30	80-86
Avg.			**28**	**26**	**80.66**	**22-33**	**71-93**
	Soi, HP (Bilaspur Dist.)						
Incubation	25.06.2020	27.06.2020	30.00	25.60	70.40	25-31	57-85
Chawki	28.06.2020	06.07.2020	28.20	26.00	74.00	25-32	57-85
3rd stage	07.07.2020	11.07.2020	28.00	26.00	80.00	25 -33	85-92
4th stage	12.07.2020	17.07.2020	29.50	26.00	88.40	25-32	78-92
5th stage	18.07.2020	27.07.2020	28.30	26.90	89.80	25-31	85-92
Spinning	25.07.2020	30.07.2020	26.50	25.50	90.00	24-27	88-92
Avg.			**28.41**	**26.00**	**82.10**	**24-33**	**57-92**

	Panol, HP (Bilaspur Dist.)						
Incubation	25.06.2020	27.06.2020	30.00	25.60	70.40	25-31	57-85
Chawki	28.06.2020	06.07.2020	28.20	26.00	74.00	25-32	57-85
3rd stage	07.07.2020	11.07.2020	27.00	26.00	85.00	24-32	85-92
4th stage	12.07.2020	17.07.2020	27.95	26.95	91.00	24-30	90-93
5th stage	18.07.2020	27.07.2020	27.50	26.60	90.50	25-29	90-91
Spinning	25.07.2020	30.07.2020	27.00	25.90	91.00	24-28	90-91
Avg.			**27.94**	**26.17**	**83.65**	**24-32**	**57-93**
	Naswal, HP (Bilaspur Dist.)						
Incubation	25.06.2020	27.06.2020	30.00	25.60	70.40	25-31	57-85
Chawki	28.06.2020	06.07.2020	28.20	26.00	74.00	25-32	57-85
3rd stage	07.07.2020	11.07.2020	28.00	26.00	80.00	25 -33	85-92
4th stage	12.07.2020	17.07.2020	29.56	28.28	88.00	24-31	86-92
5th stage	18.07.2020	27.07.2020	28.96	27.52	89.40	23-33	85-91
Spinning	25.07.2020	30.07.2020	27.00	26.00	90.00	25-30	88-91
Avg.			**28.62**	**26.56**	**81.96**	**23-33**	**57-92**
	Majalta, J&K (Udhampur Dist.)						
Incubation	26.06.2020	28.06.2020	28.00	25.00	78.00	25-30	72-84
Chawki	29.06.2020	06.7.2020	29.00	26.00	78.00	26-32	71-85
3rd stage	07.07.2020	10.7.2020	28.00	25.00	78.00	26-31	72-85
4th stage	11.07.2020	15.07.2020	29.50	27.00	89.00	28-32	68-85
5th stage	16.07.2020	23.07.2020	27.80	25.60	85.00	24-31	76-85
Spinning	24.07.2020	29.07.2020	27.90	25.50	81.00	24-31	83-85
Avg.			**28.40**	**26.03**	**85.00**	**24-32**	**68-85**
	Dharamakot, J&K (Kathua Dist.)						
Incubation	26.06.2020	28.06.2020	28.00	25.00	78.00	25-30	72-84
Chawki	29.06.2020	06.7.2020	29.00	26.00	78.00	26-32	71-85
3rd stage	07.07.2020	10.7.2020	28.00	25.00	78.00	26-31	72-85
4th stage	11.07.2020	15.07.2020	30.30	28.00	77.50	28-31	77-78
5th stage	16.07.2020	23.07.2020	30.25	27.75	81.15	26-34	62-93
Spinning	24.07.2020	29.07.2020	30.50	27.50	81.00	27-31	77-85
Avg.			**30.35**	**27.75**	**79.88**	**26-34**	**62-93**
	RSRS, Jammu (Control batch)						
Incubation	26.06.2020	28.06.2020	28.00	25.00	78.00	25-30	72-84
Chawki	29.06.2020	06.7.2020	29.00	26.00	78.00	26-32	71-85
3rd stage	07.07.2020	10.7.2020	28.00	25.00	78.00	26-31	72-85
4th stage	11.07.2020	15.07.2020	28.00	25.00	78.00	25-32	74-79
5th stage	16.07.2020	22.07.2020	30.00	27.00	78.00	28-33	72-86
Spinning	23.07.2020	27.07.2020	32.00	28.00	73.00	29-34	68-81
Avg.			**29.16**	**26.00**	**77.16**	**26-32**	**71-83**

Farmers level rearing performance during Autumn Crop 2020:

During autumn season 2020, 450 DFLs of shortlisted hybrid for autumn season $SH_6 \times NB_4D_2$ were distributed after chawkie rearing among selected 9 sericulture farmers (50 DFLs to each) of Jammu division of J&K and HP state. Brushing was done on 08.09.2020 and 06.09.2020 in Jammu & HP respectively. The yield recorded was about 41.37 and 44.40 Kg/100 DFLs for Lamberi (Rajouri Dist.) Majalta (Udhampur) and Dharmakot area (Kathua Dist.) respectively in Jammu division and having average yield about **40.80 Kg/100 DFLs** whereas 46.70, 47.90 and 47.40 Kg/100 DFLs for Soi, Panol and Naswal village of Bilaspur, Himachal Pradesh and 39.50, 39.80, 40.70 Kg/100 DFLs for Sanot region (3 rearers) of Kangra dist., Himachal Pradesh with average yield of about **43.67 Kg/100 DFLs** was recorded for Himachal Pradesh. The control batch reared at RSRS, Jammu recorded yield was about **44.75 Kg/100 DFLs**. The average filament length was recorded about 768.67 mtrs, denier (2.40), Renditta (3.01), Reelability (76.28%), Raw silk (27.31%) and Neatness (94.33) at Jammu division whereas Himachal Pradesh the average filament length was recorded about 775.33 mtrs, denier (2.35), Renditta (3.42), Reelability (73.28%), Raw silk (25.96%) and Neatness (95.33) respectively for the field trial conducted during autumn season (2020) and the control rearing at RSRS, Jammu the filament length was recorded about 879.00 mtrs, denier (2.62), Renditta (3.15), Reelability (88.38%), Raw silk (33.26%) and Neatness (93.00) (Table-58 & 59).

Table- 58:Average data recorded during Autumn Field trial for the Hybrid, $SH_6 \times NB_4D_2$ on multi-utility rearing stands at different rearing sites of Jammu division of J&K & HP and Control rearing at RSRS, Jammu

Name of location	Date of incubation	Date of brushing	H (%)	Date of distribution	Wt. of 10 Mature Larvae (g.)	5th Instar Larval Period (D:H)	Total Larval Period (D:H)	Actual Yield (kg)	Av. Yield / 100 DFLs
		Jammu Division (J & K)							
Lamberi, (Rajouri)	31.08.2020	08.09.2020	88.91	17.09.2020	42.00	7:02	25:05	20.500	41.00
Majalta (Udhampur)	31.08.2020	08.09.2020	88.91	17.09.2020	42.00	8:21	24:00	18.500	37.00
Dharmakot (Kathua)	31.08.2020	08.09.2020	88.91	16.09.2020	43.00	8:06	28:03	22.200	44.40
Avg.			**88.91**		**42.33**	**8:02**	**25:19**	**20.40**	**40.80**
		Himachal Pradesh							
Soi (Bilaspur)	31.08.2020	06.09.2020	90.00	15.09.2020	47.00	7:22	24:04	23.350	46.70
Panol (Bilaspur)	31.08.2020	06.09.2020	90.00	15.09.2020	46.00	9:22	26:04	23.950	47.90
Naswal (Bilaspur)	31.08.2020	06.09.2020	90.00	15.09.2020	47.00	8:22	25:04	23.700	47.40
Sanot (Kangra)	31.08.2020	07.09.2020	90.00	17.09.2020	-	8:00	26:00	19.75	39.50
Sanot (Kangra)	31.08.2020	07.09.2020	90.00	17.09.2020	-	8:00	26:00	19.90	39.80
Sanot (Kangra)	31.08.2020	07.09.2020	90.00	17.09.2020	-	8:00	26:00	20.35	40.70
Avg.			**90.00**		**46.67**	**8:11**	**25:14**	**21.83**	**43.67**
		Control Batch rearing							
RSRS, Jammu	31.08.2020	08.09.2020	88.91		47.00	6:09	22:04	22.376	44.75
Avg.			**90.00**		**47.00**	**6:09**	**22:04**	**22.376**	**44.75**

Table- 58: (contd.)

Name of location	SCW (g)	SSW (g)	SR (%)
Jammu Division (J & K)			
Lamberi, (Rajouri)	1.729	0.342	19.80
Majalta (Udhampur)	1.513	0.265	17.51
Dharmakot (Kathua)	1.620	0.290	17.90
Avg.	**1.62**	**0.30**	**18.40**
Himachal Pradesh			
Soi (Bilaspur)	1.75	0.315	18.00
Panol (Bilaspur)	1.80	0.325	18.06
Naswal (Bilaspur)	1.80	0.324	18.00
Sanot (Kangra)	1.68	0.30	17.86
Sanot (Kangra)	1.70	0.30	17.94
Sanot (Kangra)	1.72	0.31	18.02
Avg.	**1.74**	**0.31**	**17.98**

Control Batch rearing			
RSRS, Jammu	1.654	0.303	18.41
Avg.	**1.654**	**0.303**	**18.41**

Note: No. of DFLs distributed: 50 DFLs; No. of Farmers covered: 9; H-Hatching

Table- 59:Data for post cocoon parameters of shortlisted hybrid: $SH_6 \times NB_4D_2$ (2020) for trial rearing and Control batch at RSRS, Miran Sahib, Jammu during autumn 2020

Location	AFL (mtr)	Deneir	Renditta	Reelability (%)	Raw Silk (%)	Neatness
	Jammu Division					
Lamberi (Rajouri)	728.00	2.43	2.37	75.32	30.69	93.00
Majalta(Udhampur)	764.00	2.36	3.15	80.28	31.89	95.00
Dharamkot (Kathua)	814.00	2.41	3.50	73.24	19.35	95.00
Avg.	**768.67**	**2.40**	**3.01**	**76.28**	**27.31**	**94.33**
	Himachal Pradesh					
Soi (Bilaspur)	780.00	2.49	3.06	75.04	32.86	98.00
Panol (Bilaspur)	698.00	2.22	3.87	70.11	25.97	93.00
Naswal (Bilaspur)	848.00	2.35	3.33	74.68	19.05	95.00
Avg.	**775.33**	**2.35**	**3.42**	**73.28**	**25.96**	**95.33**
	Control Batch					
RSRS, Jammu	879.00	2.62	3.15	88.38	33.26	93.00
Overall Avg.	**787.29**	**2.41**	**3.20**	**76.72**	**27.58**	**94.57**
SD	**64.41**	**0.12**	**0.46**	**5.96**	**6.21**	**1.81**

Note: AFL – Average filament length; SD-standard deviation

Meteorological data recorded inside the rearing room (Autumn season):

During autumn season (2020), the weather parameters recorded at each location for temperature and relative humidity for every stage of rearing is depicted in table below:

Table-60:Meteorological data of Autumn crop (2020) during rearing: (Internal)

Stage of Rearing activity	Period		Dry Temp. (˚C)	Wet Temp. (˚C)	RH (%)	Range Temp. (˚C)	Range Humidity (%)
	From	To					
	Lamberi, J&K (Rajouri Dist.)						
Incubation	31.08.2020	07.09.2020	25.00	23.00	81.00	23-28	76-85
Chawki	08.09.2020	14.09.2020	29.00	27.00	85.00	26-32	79-92
3rd stage	15.09.2020	19.09.2020	28.00	25.00	78.00	22-32	73-84
4th stage	20.09.2020	24.09.2020	27.00	24.00	76.00	21-30	71-88
5th stage	25.09.2020	01.10.2020	26.00	23.00	79.00	21-39	71-84
Spinning	02.10.2020	08.10.2020	24.00	21.00	77.00	22-25	75-82
Avg.			**27.00**	**24.00**	**79.00**	**23-31**	**74-86**
	Soi, HP (Bilaspur Dist.)						
Incubation	31.08.20	06.09.2020	28.00	25.00	80.00	27-28	82-92
Chawki	07.09.20	14.09.2020	28.00	26.00	83.00	27-28	82-92
3rd stage	15.09.20	18.09.2020	29.00	26.00	76.00	27-32	67-84
4th stage	19.09.20	23.09.2020	28.00	25.00	78.00	26-31	65-84
5th stage	25.09.20	31.10.2020	28.00	24.00	71.00	25-31	58-84
Spinning	01.10.20	06.10.2020	26.00	22.00	68.00	25-28	58-76
Avg.			**28.00**	**25.00**	**76.00**	**26-30**	**69-85**
	Panol, HP (Bilaspur Dist.)						
Incubation	31.08.20	06.09.2020	28.00	25.00	80.00	27-28	82-92
Chawki	07.09.20	14.09.2020	28.00	26.00	83.00	27-28	82-92
3rd stage	15.09.20	18.09.2020	29.00	27.00	84.00	25-31	78-92
4th stage	19.09.20	23.09.2020	28.00	26.00	85.00	24-30	77-92

Stage of Rearing activity	Period		Dry Temp. (˚C)	Wet Temp. (˚C)	RH (%)	Range Temp. (˚C)	Range Humidity (%)
	From	To					
5th stage	25.09.20	02.10.2020	25.00	23.00	84.00	22-30	70-92
Spinning	03.10.20	09.10.2020	25.00	22.00	76.00	21-27	70-85
Avg.			**27.00**	**25.00**	**82.00**	**24-29**	**77-91**
	Naswal, HP (Bilaspur Dist.)						
Incubation	31.08.20	06.09.2020	28.00	25.00	80.00	27-28	82-92
Chawki	07.09.20	14.09.2020	28.00	26.00	83.00	27-28	82-92
3rd stage	15.09.20	18.09.2020	29.00	26.00	76.00	24-32	73-85
4th stage	19.09.20	24.09.2020	28.00	25.00	77.00	24-32	65-85
5th stage	26.09.20	01.10.2020	26.00	24.00	84.00	22-29	70-85
Spinning	02.10.20	08.10.2020	25.00	23.00	84.00	22-28	58-76
Avg.			**27.00**	**25.00**	**81.00**	**24-30**	**72-86**
	Majalta, J&K (Udhampur Dist.)						
Incubation	31.08.2020	07.09.2020	25.00	23.00	81.00	23-28	76-85
Chawki	08.09.2020	14.09.2020	29.00	27.00	85.00	26-32	79-92
3rd stage	15.09.2020	18.09.2020	29.00	25.00	75.00	23-32	62-84
4th stage	19.09.2020	23.09.2020	28.00	24.00	70.00	24-31	59-84
5th stage	24.09.2020	02.10.2020	27.00	23.00	69.00	20-30	68-84
Spinning	03.10.20	09.10.20	25.00	21.00	72.00	20-28	63-81
Avg.			**27.00**	**24.00**	**75.00**	**23-30**	**68-85**
	Dharamkot, J&K (Kathua Dist.)						
Incubation	31.08.2020	07.09.2020	25.00	23.00	81.00	23-28	76-85
Chawki	08.09.2020	14.09.2020	29.00	27.00	85.00	26-32	79-92
3rd stage	16.09.2020	20.09.2020	30.00	25.00	68.00	24-37	63-84
4th stage	22.09.2020	26.09.2020	31.00	24.00	63.00	25-38	52-85
5th stage	28.09.2020	05.10.2020	30.00	25.00	62.00	25-37	52-84
Spinning	06.10.2020	12.10.2020	29.00	23.00	63.00	24-30	52-85
Avg.			**29.00**	**25.00**	**72.00**	**25-34**	**64-86**
	RSRS, Jammu (Control Batch)						
Incubation	31.08.2020	07.09.2020	25.00	23.00	81.00	23-28	76-85
Chawki	08.09.2020	14.09.2020	29.00	27.00	85.00	26-32	79-92
3rd stage	15.09.2020	18.09.2020	29.00	27.00	84.00	27-33	77-86
4th stage	19.09.2020	23.09.2020	30.00	27.00	76.00	28-33	61-85
5th stage	24.09.2020	30.09.2020	29.00	25.00	70.00	26-32	52-78
Spinning	01.10.2020	06.10.2020	28.00	23.00	64.00	22-33	44-84
Avg.			**28.00**	**25.00**	**77.00**	**25-32**	**65-85**

Project output: Measured in terms of *per cent* gain over existing practices after diffusion of knowledge and innovation and introduction of summer crop in between spring & autumn crop.

- The average yield recorded by project adopted rearers in Jammu division of J&K during spring and autumn season were 70.67 and 40.80 Kg respectively.
- The average yield recorded by project adopted rearers in HP was recorded 60.33 Kg during spring & 43.67 Kg/100 dfls during autumn crop. The *per cent* yield gain over traditional field rearing from experimental field trial revealed that 60.18 and 67.14 (%) gain record in spring and autumn season at Jammu division whereas 43.47 and 44.70 (%) gain record in spring and autumn season at Himachal Pradesh over traditional crop in the same area respectively (Table-61 & 62).

Knowledge:

- Project finding leads to understand the performance & evaluation of ruling new bivoltine & ICB hybrid under the rearing conditions of North West India especially at RSRS, Jammu a hotspot for hybrid evaluation in North India.
- Hybrid evaluation and short listing of hybrids procured form different R&D institutes of CSB for multiple cocoon crops (Spring, Summer and Autumn) has been done first time and evaluated hybrids can be utilized for future rearing programmes by DOSs of the region.
- A crop is possible between traditional spring and autumn crop in the form of summer crop and thus three crop schedules has been workout instead of two. Summer crop has positive impact on the autumn crop because of pruning was adopted/forced before autumn crop to improve mulberry leaf quality.
- Pruning and harvesting technology as advocated by the institute is also got validated.

- Overall knowledge & outcome has been shared through virtual mode & in the form of PPT among officers and field functionaries of DOS J&K, Himachal Pradesh and Punjab.

Innovation and diffusion:

- New date of brushing has assessed which suggest that Spring crop in the region needs to be preponed by a week over the traditional date(s), Summer crop can be conducted in the month of June between 2nd to 4th week and autumn crop to be postponed by a week over the traditional date of brushing specially in two major sericulture states *i.e.* Jammu region (Sub tropical) of J & K and Himachal Pradesh.
- Shelf rearing on innovative rearing stand (used both for rearing & mounting as well) developed by PI for sericulture farmers, diffusion of innovation was appreciated by the farmers during field trial specially sericulture farmers of Jammu region who used it first time. Technology adopted by SDD J&K after demonstration for frontline extension officers in presence of Director, Sericulture Development Department, Govt. of UT of J&K.

Table-61:Data showing % yield gain by Experimental field trial v/s Traditional field trial during spring and autumn season (2020)

Particulars	Spring Season (2020) Avg. Yield (Kg)	Yield gain over traditional rearing (%)	Autumn season (2020) Average Yield (Kg)	Yield gain over traditional rearing (%)
Jammu division				
Experimental field trial	70.67	**60.18**	40.80	**67.14**
Traditional field trial	44.12		24.41	
Himachal Pradesh				
Experimental field trial	60.33	**43.47**	43.67	**44.70**
Traditional field trial	42.05		30.18	

Table-62:Crop wise yield/100 Dfls

Spring (2020):	Summer (2020):	Autumn (2020): (after summer)
J&K- Ranged: 58-78 Kg (**Avg.** 70.67 Kg) HP- Ranged: 36-74 Kg (**Avg.** 60.33 Kg) UK: Ranged: 12-15 Kg (**Avg.** 13.40 Kg) - Covid affected.	J&K:Ranged: 44-45 Kg(**Avg.** 44.40 Kg) HP: Ranged: 15- 74 Kg (Covid effect in some location) (**Avg.** 35.35 Kg)	J&K- Ranged: 37- 44 Kg (**Avg.** 40.80 Kg) HP – Ranged: 39-48 Kg (**Avg.** 43.67 Kg)

Summer rearing (2020) at RSRS, Jammu (Lab condition):








SUMMER REARING (2020) AT FARMERS / FIELD LEVEL: TRANSFER & ADOPTION OF TECHNOLOGY(s)



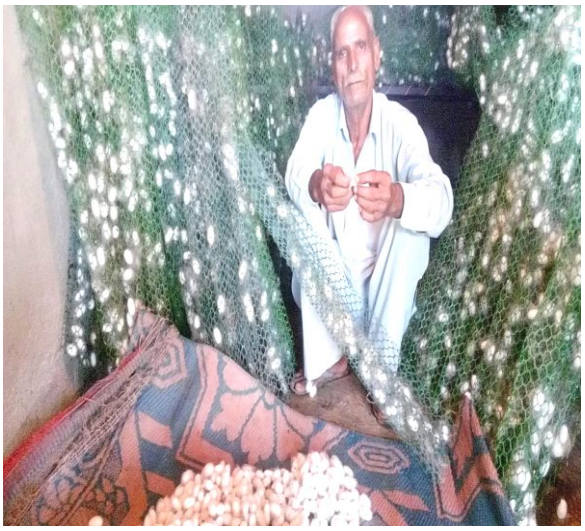
Shri Kundan Lal, doing Summer (2020) silkworm rearing at Village Lamberi, Distt. Rajouri, J&K





Shri Agya Ram, Progressive Farmer doing summer rearing (2020) at Village old Khoon, Udhampur, J&K



Shri Rattan Chand, doing Summer rearing (2020) at Village Dharamkot (Dangara), Distt. Kathua, J&K






Women sericulture farmers doing summer rearing (2020) in Ghumarwin area of Distt. Bilaspur, Himachal Pradesh

RESEARCH PROJECTS CONTINUED
(Institute as CI)

RSRS, Jammu

Project code & Title: AIE06002MIEvaluation of bivoltine silkworm genetic resources for tolerance to a-biotic stress in selected hotspots

Project Duration:April, 2020 – March, 2022

Investigator (s): Sardar Singh & Murali S

Objective(s):

- To evaluate and identify the bivoltine silkworm germplasm resources tolerant to abiotic stress in hot spot areas.

Workdone:

Rearing data for 1st trial of summer 2020 (brushed on 12.06.2020) of 39 DFLs with ten shortlisted bivoltine silkworm accessions (BBI-0044, BBI-0086, BBI-184, BBI-0301, BBI-0334, BBI-0336, BBI-0338, BBI-0339, BBI-0343 & BBI-0358) submitted to CSGRC, Hosur (Table- 63 to 65).

Table-63:Average data recorded of the Breeds (Summer-2020)

Breed	Fec. (No.)	Hatch. (%)	LD (D:h)	5th LD (D:h)	LW (g.)	ERR/10000 LARVAE		SCW (g.)	SSW (g.)	SR (%)	DC (%)	PR (%)
						No.	Wt. (Kg)					
BB1-44	428.00	93.78	20.23	5.04	25.00	300.00	0.26	1.06	0.24	22.64	7.33	25.67
BB1-86	476.00	94.51	20.23	5.04	25.67	116.50	0.10	0.00	0.00	0.00	22.33	44.33
BB1-184	511.00	96.15	20.05	5.00	25.67	3655.33	3.40	1.07	0.19	17.98	20.00	80.00
BB1-301	388.00	92.42	20.23	5.04	32.00	455.33	0.52	1.29	0.23	17.50	25.67	74.33
BB1-334	515.00	94.98	20.23	5.04	29.33	666.33	0.63	1.14	0.24	20.78	27.00	73.00
BB1-336	345.00	91.98	20.23	5.04	29.67	888.67	0.93	1.27	0.21	16.36	22.67	77.33
BB1-338	416.00	92.94	20.23	5.04	29.67	1566.50	1.62	1.24	0.25	19.91	13.00	53.67
BB1-339	435.00	91.42	20.23	5.04	31.67	1388.33	1.45	1.10	0.22	20.14	8.00	92.00
BB1-343	513.00	92.76	20.23	5.04	28.00	744.00	0.73	1.26	0.20	15.91	37.67	62.33
BB1-358	356.00	95.97	20.23	5.04	24.67	566.33	0.47	1.32	0.23	17.42	36.33	63.67
Avg. Mean	**438.00**	**93.69**	**20.21**	**5.04**	**28.13**	**1034.73**	**1.01**	**1.19**	**0.22**	**18.74**	**22.00**	**64.63**
SD	**64.00**	**1.66**	**0.06**	**0.01**	**2.74**	**1024.97**	**0.97**	**0.10**	**0.02**	**2.24**	**10.47**	**19.34**

Table- 63: (contd.)

Breed	4th instar loss (%)	5th instar loss (%)	Mounting Loss (%)	Total Loss (%)	Cocooning (%)	AFL (mtrs)	ANBFL (mtrs)	Denier
BB1-44	28.11	38.88	32.00	98.99	1.00	0.00	0.00	0.00
BB1-86	32.22	44.33	22.66	99.21	0.77	546.00	328.00	2.52
BB1-184	14.66	18.66	30.11	63.43	36.55	646.00	388.00	2.46
BB1-301	30.67	39.55	25.22	95.44	4.55	402.00	0.00	2.38
BB1-334	20.77	28.22	44.33	93.32	6.66	510.00	364.00	2.64
BB1-336	23.55	33.99	33.55	91.09	8.82	430.00	304.00	2.46
BB1-338	19.78	34.44	35.33	89.55	10.44	747.00	427.00	2.25
BB1-339	24.00	29.55	32.55	86.10	13.88	785.00	654.00	2.61
BB1-343	29.89	34.78	27.89	92.56	7.44	465.00	266.00	2.41
BB1-358	27.00	38.11	29.22	94.33	5.66	595.00	446.00	2.52
Avg. Mean	**25.06**	**34.05**	**31.29**	**90.40**	**9.57**	**512.60**	**317.70**	**2.23**
SD	**5.55**	**7.21**	**5.98**	**10.28**	**10.30**	**220.83**	**198.16**	**0.78**

Table- 64:Meteorological Data Recorded during Summer 2020 (Internal)

#.	Stage	From	To	Dry Temp. (˚C)	Wet Temp. (˚C)	Relative Humidity %	Range Temp. (˚C)	Range Humidity %	Remarks
1	Incubation	08.06.20	11.06.20	28	24	70	27-30	62-77	Seed
2	Chawki	12.06.20	18.06.20	28	25	78	26-31	72-84	received at

3	Third	19.06.20	22.06.20	28	24	70	25-32	61-80	RSRS Miran Sahib on 08.06.2020
4	Fourth	23.06.20	27.06.20	31	27	72	29-34	61-85	
5	Fifth	28.06.20	03.07.20	32	28	73	27-37	63-85	
6	Spinning	04.07.20	08.07.20	31	27	72	28-34	62-85	

Table- 65:External temperature recorded from 08.06.2020 to 07.07.2020 during Summer rearing

Period		Dry. Temp. Range	Wet. Temp. Range	R H Range	Avg. Dry/ Avg. Wet	Avg. RH
From	To					
08.06.2020	07.07.2020	25 - 40	25 -28	17 -78	33 / 24	48

1st trial rearing during autumn 2020 (brushed on 14/15.09.2020) of 42 DFLs of ten shortlisted bivoltine silkworm accessions *viz.* BBI-0044, BBI-0086, BBI-184, BBI-0301, BBI-0363, BBI-0336, BBI-0338, BBI-0339, BBI-0343 & BBI-0358 as received from CSGRC, Hosurwas completed (Table-66).

Table- 66:Average data recorded during Autumn (2020)

Breed	Fec. (No.)	Hatch. (%)	LD (D:h)	5th LD (D:h)	LW (g.)	ERR /10000 larvae		SCW (g.)	SSW (g.)	SR (%)	DC (%)	PR (%)
						By No.	By wt. (Kg)					
BBI-336	444.50	92.99	0:00	0:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BBI-339	506.67	94.22	21:12	5:16	37.67	1510.67	2.49	1.44	0.30	20.78	7.67	95.33
BBI-301	372.33	92.78	21:12	5:16	38.33	1810.67	2.22	1.35	0.29	21.24	13.33	89.00
BBI-184	506.67	93.68	21:05	6:04	33.67	1699.67	2.43	1.44	0.29	20.35	2.67	99.33
BBI-343	500.33	92.66	21:12	5:16	41.67	2233.33	3.33	1.54	0.32	20.62	11.00	90.33
BBI-86	509.67	95.72	21:05	5:09	38.00	1366.33	1.60	1.31	0.25	19.17	12.00	96.00
BBI-338	371.00	94.47	21:05	5:09	37.67	1722.00	2.40	1.54	0.30	19.58	11.00	84.33
BBI-363	453.67	89.64	21:05	5:09	38.67	1477.33	1.91	1.40	0.30	21.27	4.33	92.67
BBI-44	376.33	93.17	21:23	6:03	37.00	2833.00	4.53	1.63	0.33	20.02	10.00	95.33
BBI-358	466.00	87.54	21:23	6:03	30.00	9266.33	12.74	1.44	0.29	20.55	2.67	96.67
Avg.	**450.72**	**92.69**	**19.00**	**4.89**	**33.27**	**2391.93**	**3.36**	**1.31**	**0.27**	**18.36**	**7.47**	**83.90**
SD	**58.22**	**2.40**	**6.68**	**1.77**	**12.10**	**2519.46**	**3.49**	**0.47**	**0.10**	**6.48**	**4.69**	**29.80**

Table- 66: (contd.)

Breeds	4th instar loss (%)	5th instar loss (%)	Mounting loss (%)	Total loss (%)	Cocooning (%)	AFL (mtrs)	ANBFL (mtrs)	Denier
BBI-336	45.50	54.50	0.00	99.99	0.00	0.00	0.00	0.00
BBI-339	31.99	48.11	1.12	81.22	18.22	970.00	0.00	2.46
BBI-301	35.78	43.77	2.13	81.68	18.11	893.00	756.00	2.44
BBI-184	36.33	43.88	2.77	82.99	17.00	928.00	646.00	2.16
BBI-343	34.44	40.55	2.66	77.66	22.33	982.00	694.00	2.54
BBI-86	35.89	48.22	2.22	86.32	13.66	931.00	677.00	2.36
BBI-338	35.89	45.22	5.11	86.21	13.77	808.00	646.00	2.66
BBI-363	36.44	46.22	2.36	85.02	14.77	1003.00	778.00	2.33
BBI-44	29.44	40.55	1.67	71.66	28.33	954.00	793.00	2.35
BBI-358	1.44	1.89	3.66	6.99	92.55	1010.00	688.00	2.25
Avg.	**32.31**	**41.29**	**2.37**	**75.97**	**23.88**	**847.90**	**567.80**	**2.16**
SD	**11.60**	**14.43**	**1.38**	**25.30**	**25.19**	**303.75**	**303.62**	**0.77**

Table- 67:Metrological data recorded during Autumn 2020 (Internal)

#.	Stage	From	To	Dry Temp. (˚C)	Wet Temp. (˚C)	Relative Humidity (%)	Range Temp. (˚C)	Range Humidity (%)	Remarks
1	**Incubation**	10.09.20	14.09.20	26	24	84	25-30	76-92	Seed received at RSRS Miran Sahib on10.09.2020
2	**Chawki**	15.09.20	21.09.20	29	26	78	26-31	72-85	
3	**Third**	22.09.20	25.09.20	30	27	78	28-32	72-86	
4	**Fourth**	26.09.20	30.09.20	28	24	70	24-30	59-78	
5	**Fifth**	01.10.20	*07.10.20*	26	22	69	23-29	52-84	
6	**Spinning**	08.10.20	13.10.20	27	23	70	24-28	61-84	

Table- 68:External Temperature recording during the period 10.09.2020 to 13.10.2020 during Autumn Season

From	To	Dry Temp. (˚C)	Wet Temp. (˚C)	Relative Humidity (%)	Range Temp. (˚C)	Range Humidity (%
10.09.20	13.10.20	29	26	72	21-36	49-86

RESEARCH PROJECTS CONCLUDED
(Institute as CI)

❖ At RSRS Jammu&Sahaspur

Project code & Title: ARP-3605Validation of the DNA markers in silkworm breed developed by the introgression of DNA markersassociated with NPV resistance using Marker Assisted Selection Breeding and large scale field trial of the breed

Project Duration: February, 2017 – 5th August, 2020

Investigator (s): Sardar Singh (Jammu, Himachal Pradesh) & Babulal (Uttarakhand)

Objective(s):

- To evaluate the evolved bivoltine lines in various agro climatic conditions and select lines for their suitability in that particular environment

Workdone:

Under the project a total of 44500 dfls of MASN x CSR4 was testedduring spring and autumn seasons of 2019-20 in North West India. Highest average yield has been recorded in HP 51.41 kg/100 dfls followed by 40.75 kg/ 100 dfls in Jammu region, performance of the hybrid was almost at par with CSR DH during spring crop. However, during autumn crops performance of said hybrid not found below average.

During 2020 spring (Covid affected season), distribution and rearing is seriously affected by COVID- lockdown. In Signivala village in Dehradun, 450 DFLs were distributed to six farmers. The yield was lower with an output of 140 kg at an average of 34.53 kg / 100 DFLs.

The seed supply made from SBRL/ NSSO during spring crop'2020 was 24,000 dfls of MASN4 x CSR4 which was proposed to distribute to Department of Sericulture of Uttarakhand (5150 DFLs), DoS J&K (8600 DFLs) and DOS-HP (10300 DFLs). After hatching early aged (Chawki) larvae were reared but majority of the larvae could not be supplied to farmers. It has been intimated by DOS, HP/REC Ghumarwin that due to imposition of curfew for Covid 19 prevention, early aged (chawki) worms could not be supplied in Kangra, Mandi & Shimla districts of HP. In HP, out of 10300 dfls brushed, only 1300 (12.62%) dfls could be supplied during spring crop 2020 due to lock down.

At RSRS Jammu 100 dfls were discarded in 4th instar due to Covid 19 restrictions. Accordingly only 14,950 dfls could be reared against 24050dfls brushed and it is 62.29% of the seed received. Overall 37.7 % loss in terms of seed supply has occurred.

Table-69:Cocoon production during spring crop 2020 in North West India

State/UT	No. of DFLs	Average yield of MASN4 x CSR4 (Kg / 100 DFLs)	Average yield of other DH (Kg / 100 DFLs)in the area	Remarks
J&K	8600	43.62	44.94	100 dfls at RSRS office had to discarded in final stage due to lockdown
Himachal Pradesh	10300	48.09	42.05	Out of 10300 dfls **only 1300 dfls under** REC Ghumarwin was reared , rest could not be supplied after CRC due to covid 19 restrictions
Uttarakhand	5150	34.53	-	Crop affected due to covid -19 in entire state, **yield of 450 dfls only reported**.

Project was concluded in August 2020 and rearing data submitted to PI at SBRL, Kodathi. Central Silk Board has submitted the Final Report of the project to Department of Biotechnology, New Delhi.

Conclusion: The data of two seasons showed that the hybrid, MASN4×CSR4 has recorded better yield with economic parameters during spring season as compared to autumn season. Himachal Pradesh recorded better results as compared to Jammu division of J&K and Uttarakhand for both the seasons. Hybrid may be further evaluated for its rearing performance under the conditions of North West India.

PROGRAMMES OF CONTINOUS NATURE

❖ Main Institute

Programme Title: Nutrient analysis of soil and mulberry under temperate conditions
Project code: SS-PAM-01
Project Duration: Continuous
Investigator (s): Gulab Khan Rohela
Objective(s):

- Evaluation of soil health status at CSR&TI Pampore and nested units
- Biochemical analysis of mulberry varieties

Workdone:

Nutrient analysis of soil and mulberry leaf under temperate climatic conditions was carried during spring and autumn seasons of 2020. Biochemical analysis of mulberry leaf for total soluble protein content, total soluble carbohydrate content and total chlorophyll content was carried during spring and autumn season of 2020**.** The soil samples were collected from CSR&TI, Pampore and P4 Basic Seed Farm Manasbal during the last week of March, 2020.The soil samples were dried, finely powdered and analyzed for various parameters like pH, EC, organic carbon (OC), Macro nutrients (N, P and K) and Micro nutrients (S, Fe, Mn, Zn, Cu and B) status at Agronomy & Soil Science section laboratory at CSR&TI, Pampore by using Mridaparikshak kit and Mridaparikshak instrument developed by IISC, Bhopal. After the soil analysis, as per the values obtained the soil of CSR&TI, Pampore and P4 Basic Seed Farm Manasbal are in normal range (in comparison to recommendation of mulberry cultivation) with respect to pH, EC, organic carbon, macro nutrients (N, P, K, Ca and Mg) and micro nutrients like Fe, Mn, S and Zn. Whereas high levels of B and Cu were noticed in the samples of CSR&TI, Pampore and P4 basic seed farm Manasbal (Table-70)

Table-70:Analysis of soil samples from different areas of Kashmir (spring, 2020)

Location	Macronutrients							Micronutrients				
	pH	EC (dS/m)	OC (%)	N (Kg/ha)	P (Kg/ha)	K (Kg/ha)	S mg/kg	Zn mg/kg	B mg/kg	Fe mg/kg	Mn mg/kg	Cu mg/kg
CSR&TI, Pampore	**7.32**	**0.42**	**0.78**	**422**	**88**	**210**	**13**	**0.8**	**1.6**	**6.20**	**2.3**	**3.0**
SHR	**M**	**M**	**M**	**M**	**H**	**M**	**M**	**M**	**H**	**M**	**M**	**H**
P4-Manasbal	**7.44**	**0.28**	**0.72**	**288**	**14**	**165**	**10**	**0.6**	**2.5**	**12.2**	**9.0**	**1.8**
SHR	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**H**	**H**	**H**	**H**

H-High, M-Medium, L-Low, SHR-Soil Health Report

Biochemical analysis of leaf samples:

Leaf samples of eight superior mulberry varieties were collected during spring and autumn seasons from CSR&TI, Pampore for analyzing the different biochemical parameters. Biochemical parameters like total soluble protein, total soluble carbohydrate and total chlorophyll content were estimated from eight mulberry varieties of Goshoerami, PPR1, Chinese white, Rokokuyasu, KNG, TR-10, Ichinose and Karioroso during spring and autumn season, 2020. Anthrone method, acetone method and Bradford's methods were used for estimation of total soluble carbohydrate, total chlorophyll content and total soluble protein content respectively. After the estimation, it was deduced that the spring season mulberry leaf has higher chlorophyll, protein and carbohydrates content in comparison with autumn season mulberry leaf (Table 2). The total protein, total chlorophyll and carbohydrate contents were slightly decreased in the leaf during autumn season rearing (Month of September). During spring season, mulberry varieties Tr-10 (6.76 mg/g leaf), KNG (6.24mg/g leaf), Ichinose (6.50 mg/g leaf) and Chinese white (6.62 mg/g leaf) were estimated with higher chlorophyll content, KNG was estimated with higher protein content (52.56 mg/g dwt of leaf) and TR-10 showed higher carbohydrate content (298 mg/g dwt of leaf) (Table 2). Whereas during autumn season mulberry variety Ichinose was estimated with higher chlorophyll (6.26 mg/g leaf) and protein content (44.55 mg/g dwt of leaf), and Goshoerami was estimated with higher carbohydrate content (240 mg/g dwt of leaf) (Table-71)

Table-71: Biochemical analysis of mulberry leaves during spring and autumn 2020 (Main Institute).

Plant variety	Moisture Content (%)		Total Chlorophyll Content (mg/g leaf)		Total Soluble Carbohydrate (mg/g dwt leaf)		Total Soluble Protein (mg/g dwt leaf)	
	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn
Goshoerami	79.22	73.03	5.92	4.22	288	240	48.54	41.33
KNG	88.34	78.12	6.24	5.38	252	182	52.56	43.60
Ichinose	86.10	82.24	6.50	6.26	272	174	51.02	44.55
Chinese White	77.26	68.08	6.62	5.88	280	202	44.24	39.84
PPR1	84.42	77.12	5.88	4.94	286	200	49.57	40.34
Tr-10	74.16	63.42	6.76	5.83	298	266	47.24	39.82
Rokokuyaso	74.22	62.18	5.42	4.05	244	195	43.48	35.04
Karioroso	76.45	64.36	5.38	4.12	258	204	44.26	39.56

ProgrammeTitle:Acquisition, Conservation, Characterization and Utilization of mulberry Germplasm under temperate conditions.

Project Code: PIB-PAM-01

Duration: Continuous

Investigator(s): Rajesh Kumar & Pawan Saini

Objective(s):

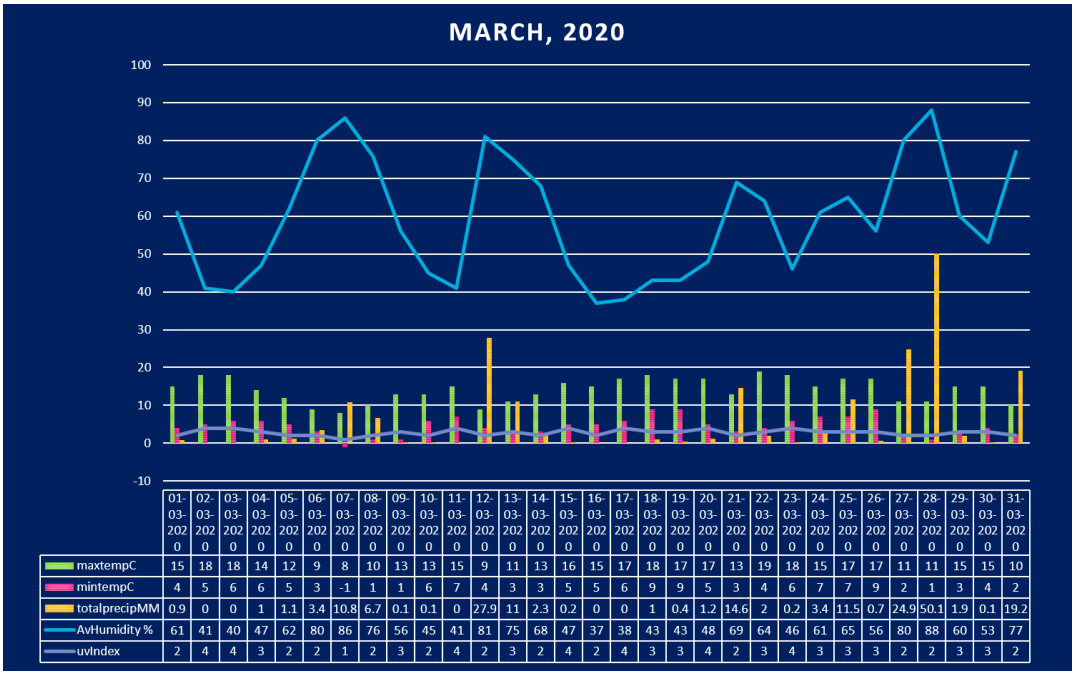
- Collection of diverse genetic stocks; Conservation and evaluation; Consequent documentation; Utilization in varied breeding programmes.

Conservation:

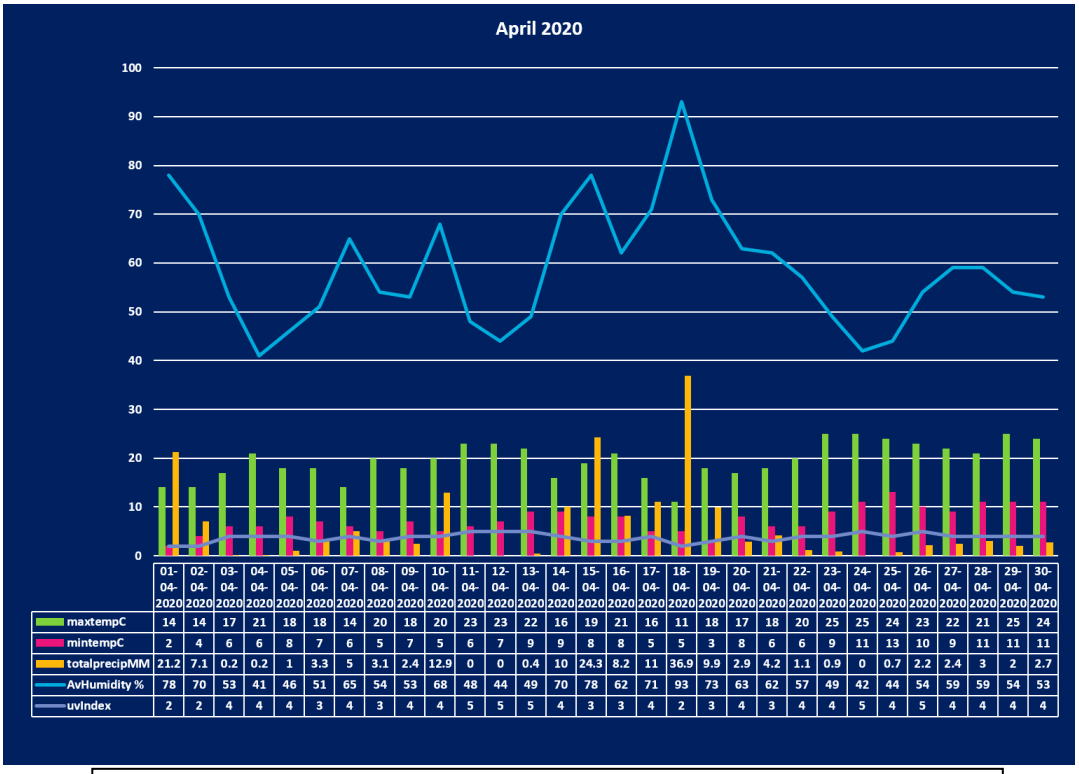
A total of 55 mulberry accessions (Exotics: 20; Indigenous: 32; 3 combinations of somatic hybrids) representing 5 countries, India, China, Japan, France and Burma, were maintained in the newly established germplasm bank (GPB) at CSR&TI, Pampore. In the working GPB, 80 accessions (Exotic: 37; Indigenous: 43) of 11 countries namely India, China, Japan, Italy, France, Bangladesh, Russia, Paraguay, Zimbabwe, Indonesia and Burma were maintained.

Identification of Early Sprouters and Bud Growth in Mulberry Accessions:

The 80 genotypes of Working Germplasm Bank (WGPB) and 50 genotypes of New Germplasm Bank (NGPB) were evaluated during April, 2020 to observe sprouting behaviour basing upon the bud growth pattern. The genotypes show considerable differences among themselves in this regard. Opening of buds in mulberry totally depends on the climatic factors and play a vital role in sprouting i.e., temperature, humidity and UV index. Three broadly classified mulberry bud growth stages, namely the bud break stage (Dapo), the swallow beak stage (Emco) and the leaf opening stage (Kaiyo) were recorded in both newly established GPB as well as old working GPB. A minimum of 10°C is required for mulberry bud break and 15 $^{\circ}$C or higher for higher subsequent bud growth, which leads to emergence of leaf. **UV** radiation initiates the life cycle of plantsand further enhance the intensity of photosynthesis processes by production of chlorophyll and nutrient absorption. Other side, excessive **UV** exposure can cause protein degradation in leaf cells, leading them to die. Thus, 36 genotypes in New GPB and 62 genotypes in working GPB were sprouted in the 1st week of April, 2020. 14 genotypes (NGPB) and 18 (WGPB) genotypes sprouted in 2nd week of April, 2020. Due to lower UV index, the sprouting of mulberry germplasm was initiated during First Week of April, 2020 and weather parameters and UV index is given in graphical manner for the month of March to April, 2020.



	01-03-2020	02-03-2020	03-03-2020	04-03-2020	05-03-2020	06-03-2020	07-03-2020	08-03-2020	09-03-2020	10-03-2020	11-03-2020	12-03-2020	13-03-2020	14-03-2020	15-03-2020	16-03-2020	17-03-2020	18-03-2020	19-03-2020	20-03-2020	21-03-2020	22-03-2020	23-03-2020	24-03-2020	25-03-2020	26-03-2020	27-03-2020	28-03-2020	29-03-2020	30-03-2020	31-03-2020
maxtempC	15	18	18	14	12	9	8	10	13	13	15	9	11	13	16	15	17	18	17	17	13	19	18	15	17	17	11	11	15	15	10
mintempC	4	5	6	6	5	3	-1	1	1	6	7	4	3	3	5	5	6	9	9	5	3	4	6	7	7	9	2	1	3	4	2
totalprecipMM	0.9	0	0	1	1.1	3.4	10.8	6.7	0.1	0.1	0	27.9	11	2.3	0.2	0	0	1	0.4	1.2	14.6	2	0.2	3.4	11.5	0.7	24.9	50.1	1.9	0.1	19.2
AvHumidity %	61	41	40	47	62	80	86	76	56	45	41	81	75	68	47	37	38	43	43	48	69	64	46	61	65	56	80	88	60	53	77
uvIndex	2	4	4	3	2	2	1	2	3	2	4	2	3	2	4	2	4	3	3	4	2	3	4	3	3	3	2	2	3	3	2



	01-04-2020	02-04-2020	03-04-2020	04-04-2020	05-04-2020	06-04-2020	07-04-2020	08-04-2020	09-04-2020	10-04-2020	11-04-2020	12-04-2020	13-04-2020	14-04-2020	15-04-2020	16-04-2020	17-04-2020	18-04-2020	19-04-2020	20-04-2020	21-04-2020	22-04-2020	23-04-2020	24-04-2020	25-04-2020	26-04-2020	27-04-2020	28-04-2020	29-04-2020	30-04-2020
maxtempC	14	14	17	21	18	18	14	20	18	20	23	23	22	16	19	21	16	11	18	17	18	20	25	25	24	23	22	21	25	24
mintempC	2	4	6	6	8	7	6	5	7	5	6	7	9	9	8	8	5	5	3	8	6	6	9	11	13	10	9	11	11	11
totalprecipMM	21.2	7.1	0.2	0.2	1	3.3	5	3.1	2.4	12.9	0	0	0.4	10	24.3	8.2	11	36.9	9.9	2.9	4.2	1.1	0.9	0	0.7	2.2	2.4	3	2	2.7
AvHumidity %	78	70	53	41	46	51	65	54	53	68	48	44	49	70	78	62	71	93	73	63	62	57	49	42	44	54	59	59	54	53
uvIndex	2	2	4	4	4	3	4	3	4	4	5	5	5	4	3	3	4	2	3	4	3	4	4	5	4	5	4	4	4	4

Weather details of the month March-April, 2020 with UV index

Table-72:Sprouting behaviour of New Mulberry Germplasm of CSRTI, Pampore in Spring Season in the year 2020

Dates	Mulberry genotypes	Total
1st April to 10th April 2020	TR-10, S-54, Goshoerami, Mysore Local, S-1733, ME-58, Obowase, Vishala, T-4, C-4, English Black, T-10, Punjab Local, S-41, S-1708, S-36, C-2038, S-146, ME-27, AR-14, PPR-1 (S-140), Chinese White, Mandalay, $BC_2$59, Almora Local, Kanva-2, S-1301, BR-2, S-763, ME-53, K_2XKosen, V-1, Himachal Local, S-1635, S-1531, C-776	36
11th April to 20th April 2020	Senmatsu, Okinawa, Tomeiso, Kokuso-27, Brentul Kashmir, Lajward, Kasuga, Rokokiyaso, French, Zagatul, Chattatul, Ichinose, Ensthatakasuke, Botatul	14

Table-73: Sprouting behaviour of Working Mulberry Germplasm of CSRTI, Pampore in Spring Season in the year 2020

Dates	Mulberry genotypes	Total
1st April to 10th April 2020	Goshorami, Rokokiyaso, Chinese White, Italian sarnal, Kasuga, Kokuso-20, Kokuso-21, Kokuso-27, Kairyoroso, Obowase, Sanish-5, Limoncina, Ensthatakusuke, Ichechei, Shrim-5, Shrim-8, Musuisao, Kosen, Himachal Local, Chattatul Zangir, Zagatul, China-8, China-30, China-31, ME-53, FGDTR, Kanva-2, C-763, C-1733, $BC_2$59, S-1, S-30, S-54, S-146, S-799, S-1301, S-1531, AR-12, BR-2, Almora Local, Female Local, ME-129, MS-2, Vishala, Okinawa, English Black, Narola, Saspol, TR-10, TR-8, T-4, T-10, C-4, Punjab Local, Mysore Local, S-36, S-41, S-1635, S-1708, AR-14, ME-129, Multicaulis	62
11th April to 20th April 2020	French, Chattatul, Brentul, Kashmir, Botatul, Zangbud, Chinar Pati, Nadigam, Lajward, Gurej, Ichinose, Togowase, KNG, Simanouchi, Senmatsu, Tomeiso, Tsukasaguwa, Serpentina	18

Programme Title: Maintenance of silkworm germplasm
Project code: AIE 3056
Project Duration: Continuous
Investigator (s): Mir Nisar Ahmad, Shivkumar, Bharat Kumar Neelaboina and Kiran R
Objective(s):

- Evaluation, characterization and maintenance of Germplasm of bivoltine races of different origin

Workdone:

One hundred and eleven bivoltine silkworm races of different origins were maintained at Silkworm Improvement Section, CSR&TI, Pampore during the year 2020. The races were brushed in cellular mode during spring, 2020. After 3rd stage, 250 larvae were retained in each replication. The seed prepared in all the races for next generation. The Origin-wise breakups of exotic and indigenous races are given in table-74 and rearing performance of the 111 races maintained under Germplasm is presented in table-75.

Table-74:Origin-wise breakups of exotic and indigenous races maintained under Silkworm Germplasm

Exotic races		**Indigenous races**	
Origin	**No.**	**Origin**	**No.**
European	04	Mirgund	10
Japanese	26	Dehradun	01
Chinese	13	Mysore	03
Russian	17	Assam	02
Total	**60**	Pampore	34
		Berhampore	01
		Total	**51**
Grand Total		**111**	

Table-75:Comparative rearing performance of the 111 silkworm races during spring 2020.

Race	Fecundity (No)	Larval Duration (Days)	Yield/ 10,000 larvae brushed		Single Cocoon Weight (g)	Single Shell Weight (g)	Shell Ratio (%)	Pupation Rate (%)
			By No.	By wt. (kg)				
EUROPEAN RACES								
Alps Jaune	442	25.04	9580	16.36	1.88	0.29	15.25	94.34
Alps Yellow	546	25.10	9600	14.91	1.72	0.31	17.74	94.32
Cevenese Yellow	488	25.91	9580	14.06	1.64	0.28	16.87	92.65
Ascoli Yellow	475	25.41	9520	12.62	1.49	0.27	18.14	93.56
JAPANESE RACES								
KN2	519	25.95	9560	11.83	1.41	0.24	16.88	90.98
Meigetsu	506	25.91	9580	12.48	1.47	0.24	16.23	92.78
B-36	464	25.41	9460	13.80	1.63	0.30	18.58	90.24
B-37	600	25.41	9620	13.49	1.57	0.31	19.44	92.84
B-39	427	25.91	9360	13.95	1.66	0.29	17.46	91.67
B-40	447	25.41	9440	11.77	1.42	0.25	17.21	93.87
GunkoManrie	523	25.41	9580	14.83	1.72	0.31	18.11	92.42
SS 4A	574	26.00	9500	12.95	1.53	0.29	19.07	93.62
SS 15A	626	25.91	9600	13.34	1.56	0.31	19.62	94.62
SS 17	484	25.91	9540	13.68	1.60	0.29	18.27	92.71
SS	503	25.41	9540	13.73	1.61	0.30	18.42	93.24
KY I	432	25.41	9620	13.68	1.59	0.29	17.94	93.76
KY II	586	25.41	9580	13.54	1.58	0.25	16.01	92.87
THAICHOAN X HOKOSHINGYAKO	532	25.41	9540	14.16	1.65	0.33	19.70	93.98
N124XC124	458	25.95	9400	14.33	1.70	0.29	17.60	91.88
N112xC110XN124XC 124	575	25.91	9550	12.52	1.48	0.28	19.05	92.12
SHOKO GINREI	541	25.41	9640	12.60	1.47	0.26	17.56	92.01
FUJI SAKURA	621	25.41	9620	13.09	1.53	0.27	17.32	94.13
TAICHOAN	621	25.41	9580	13.50	1.58	0.29	18.37	94.01
SHOGETSU HOSHO	575	25.91	9440	14.07	1.66	0.32	19.08	92.24
KYORIE SHIMPAKU (P)	429	25.91	9590	12.72	1.49	0.27	18.09	93.31
KYORIE SHIMPAKU (M)	512	26.00	9520	14.66	1.71	0.33	19.10	92.32
SHINKI REYAKU	587	25.91	9555	13.62	1.59	0.28	17.57	93.76
SHUNREI SHOGETSU	495	25.91	9540	12.34	1.46	0.28	19.21	92.76
SM 2	445	25.91	9555	14.55	1.69	0.30	17.60	91.87
ZEBRA	509	25.00	9610	11.79	1.39	0.23	16.72	91.11
CHINESE RACES:								
YAKWEI	525	25.91	9460	12.16	1.46	0.27	18.27	93.31
CHAUNG NAUNG	582	26.00	9565	14.01	1.63	0.32	19.50	92.31
C 110	510	26.00	9490	13.33	1.57	0.28	18.56	91.87
CHUKWEI	512	25.75	9400	12.56	1.51	0.26	17.25	90.12
CHINESE FARMER	533	25.41	9565	11.33	1.35	0.26	19.14	94.24
CHINESE GOLDEN 70	417	25.41	9400	12.44	1.49	0.27	18.07	91.91
CHINESE GOLDEN 80	579	25.41	9540	11.53	1.38	0.26	19.15	92.89
CHINESE GOLDEN 90	507	25.91	9400	12.86	1.54	0.30	19.18	91.63
HAULAK	612	25.41	9540	11.69	1.39	0.24	17.06	91.98
KING HAUNG	516	25.95	9400	13.66	1.62	0.28	17.27	89.80
HAUCHI	528	25.41	9580	13.86	1.61	0.27	17.02	92.67

Race	Fecundity (No)	Larval Duration (Days)	Yield/ 10,000 larvae brushed		Single Cocoon Weight (g)	Single Shell Weight (g)	Shell Ratio (%)	Pupation Rate (%)
			By No.	By wt. (kg)				
NAN NAUNG 6A	550	25.41	9540	14.62	1.70	0.29	17.15	94.76
CHINESE YELLOW	529	25.41	9580	14.06	1.64	0.29	17.52	92.87
MIRGUND RACES								
M III	519	25.75	9580	13.92	1.62	0.30	18.52	92.76
M 10	614	25.75	9580	13.70	1.60	0.31	19.11	93.12
M 42	534	25.75	9440	13.38	1.59	0.31	19.53	92.89
M 43	528	25.41	9580	14.10	1.64	0.31	18.66	92.76
M 45	600	25.41	9440	14.68	1.73	0.30	17.20	93.87
M 46	424	25.41	9540	14.06	1.64	0.32	19.31	91.87
MJ 20	607	25.75	9540	13.78	1.61	0.28	17.60	92.61
MJ 23	513	25.41	9540	12.98	1.53	0.29	18.73	94.11
MJ 103	551	25.75	9540	13.01	1.53	0.29	18.91	93.56
MJ 107	540	25.41	9400	14.41	1.70	0.31	18.27	92.19
RUSSIAN RACES								
AZAD	512	25.95	9540	13.20	1.55	0.30	19.03	91.98
AZERBAIIJAN	528	25.41	9400	14.10	1.67	0.28	16.90	92.35
SANISH E1 (P)	431	26.00	9740	14.34	1.64	0.31	19.01	94.78
SANISH E1 (M)	568	25.95	9420	13.72	1.63	0.30	18.56	93.87
SANISH E2 (M)	576	25.79	9440	14.43	1.70	0.31	18.25	92.00
SANISH 8	449	25.95	9580	14.19	1.65	0.30	18.19	92.67
SANISH 17	486	25.95	9440	12.92	1.54	0.27	17.66	93.12
SANISH 18 (P)	596	25.41	9580	12.71	1.49	0.27	18.16	92.71
SANISH 18 (M)	530	26.00	9420	13.83	1.64	0.32	19.38	91.32
SANISH 21 (P)	562	25.75	9540	13.09	1.54	0.28	18.19	93.87
SANISH 30	513	25.95	9540	12.22	1.45	0.27	18.66	92.31
SHEIKI I	536	25.41	9540	14.08	1.64	0.31	18.57	93.12
SHEIKI II	542	25.95	9460	12.76	1.52	0.26	17.17	89.90
TASHKASHI 112	530	25.91	9400	12.00	1.45	0.28	19.26	91.13
GYANDZA	594	25.95	9540	13.68	1.60	0.28	17.53	92.78
BELKOKONA-II	560	25.95	9400	14.71	1.74	0.29	16.34	92.11
MERIFA 7	519	25.95	9400	14.71	1.74	0.30	17.56	93.87
DEHRADUN RACE								
SH6	580	25.95	9580	14.78	1.71	0.31	18.13	92.14
MYSORE RACE								
NB4D2	449	25.95	9600	14.05	1.63	0.31	19.02	94.30
CSR2	528	25.95	9700	14.60	1.67	0.34	20.36	93.15
CSR4	498	25.95	9720	14.00	1.61	0.33	20.56	91.03
PAMPORE RACES								
PLF	456	25.95	9440	14.75	1.73	0.29	16.73	91.13
BL-1	450	26.00	9440	13.43	1.59	0.30	18.84	93.89
SF 17	520	25.41	9580	14.32	1.66	0.32	19.27	93.68
AT 4	468	25.95	9440	13.63	1.61	0.30	18.65	91.21
AT 9	455	26.00	9360	13.64	1.63	0.31	18.72	90.19
IB 2	534	26.00	9420	13.13	1.56	0.30	19.36	92.31
IB 3	515	25.95	9540	13.20	1.55	0.31	19.72	93.11
IB 9	549	26.00	9540	14.41	1.68	0.31	18.22	92.78
IB 11	549	25.41	9580	11.60	1.38	0.26	18.51	94.12
TA 3	506	25.41	9480	12.59	1.50	0.28	18.69	93.01
J PLAIN	532	26.00	9400	14.08	1.67	0.31	18.38	90.91
J MARKED	486	26.00	9540	14.47	1.69	0.32	18.79	92.87
HS 6 (SL)	560	25.95	9540	13.20	1.55	0.29	18.40	92.78
C. NICHI (SL)	536	25.95	9420	13.72	1.63	0.27	16.43	92.10
RP I	539	25.41	9440	13.55	1.61	0.28	17.59	92.11

Race	Fecundity (No)	Larval Duration (Days)	Yield/ 10,000 larvae brushed		Single Cocoon Weight (g)	Single Shell Weight (g)	Shell Ratio (%)	Pupation Rate (%)
			By No.	By wt. (kg)				
RP II	525	25.41	9440	12.78	1.52	0.29	18.79	89.09
PAM 101	529	25.95	9620	15.28	1.75	0.34	19.37	94.11
PAM 102	518	25.41	9600	14.38	1.67	0.30	17.74	93.98
PAM 103	533	25.41	9640	12.96	1.51	0.28	18.36	92.78
PAM 104	595	26.00	9420	15.07	1.77	0.34	19.22	91.76
PAM 105	537	25.95	9440	14.09	1.66	0.28	16.96	90.91
PAM 106	533	25.41	9440	12.92	1.54	0.30	19.27	92.11
PAM 107	523	25.00	9620	14.56	1.68	0.32	18.77	93.12
PAM 108	541	25.00	9600	14.48	1.68	0.32	18.80	93.98
PAM 109	556	25.95	9380	15.35	1.81	0.35	19.10	92.11
PAM 110	624	25.91	9420	14.49	1.71	0.30	17.72	93.11
PAM 111	549	26.00	9560	15.32	1.77	0.34	19.21	93.50
PAM 112	522	25.95	9380	12.69	1.52	0.28	18.46	93.20
PAM 113	540	25.41	9570	12.53	1.48	0.27	18.51	90.32
PAM 114	427	26.00	9640	14.59	1.68	0.33	19.64	92.00
PAM 115	482	25.95	9560	15.04	1.74	0.34	19.25	94.00
PAM 116	519	25.41	9580	12.05	1.43	0.27	18.75	93.12
PAM 117	530	25.95	9520	14.44	1.69	0.34	20.18	93.41
CS 6	580	25.95	9520	14.49	1.69	0.33	19.53	92.82
ASSAM RACES								
BARAPOLU	314	26.00	9580	9.16	1.12	0.14	11.82	87.78
BARAPATH	315	26.00	9400	8.04	1.03	0.11	10.25	87.91
BERHAMPORE RACES								
S 36	522	25.95	9460	13.71	1.62	0.28	17.23	92.78

Title: Maintenance of Breeders' stock
Project code: AIE 3202
Project Duration: Continuous
Investigator (s): Mir Nisar Ahmad, Shivkumar & Bharat Kumar Neelaboina
Objective(s):

- Maintenance of silkworm breeders' stock races to their original characteristics and to make supply of P3 layings for further utilization.

Workdone:

CS-6, Pam-101, Pam-111, Pam-114, Pam-115 and Pam-117 are being maintained under this programme. The races were brushed in cellular mode during spring, 2020. After 3rd stage, 250 larvae were retained in each replication. The seed prepared in all the races for next generation and for utilization in various breeding programmes. The performance of the races is given in table-76.

Table-76: Performance of the Silkworm Races maintained under breeder's stockduring spring 2020.

Race	Fecundity (No)	Larval Duration (Days)	Yield/ 10,000 larvae brushed		SCW (g)	SSW (g)	Shell Ratio (%)	Pup. Rate (%)
			By No.	By wt. (kg)				
CSR 2	528	25.95	9700	14.60	1.67	0.34	20.36	93.15
CSR 4	498	25.95	9720	14.00	1.61	0.33	20.56	91.03
CSR 6	496	25.95	9560	13.60	1.59	0.32	20.13	92.47
CSR 26	447	25.95	9680	13.30	1.54	0.30	19.48	94.17
CSR 27	498	25.95	9740	14.67	1.67	0.34	20.06	93.55
SH-6	580	25.95	9580	14.78	1.71	0.31	18.13	92.14
NB4D2	449	25.95	9600	14.05	1.63	0.31	19.02	94.30
CS 6	580	25.95	9520	14.49	1.69	0.33	19.53	92.82
Pam-101	529	25.95	9620	15.28	1.75	0.34	19.37	94.11
Pam-111	549	26.00	9560	15.32	1.77	0.34	19.21	93.50
Pam-114	427	26.00	9640	14.59	1.68	0.33	19.64	92.00

Race	Fecundity (No)	Larval Duration (Days)	Yield/ 10,000 larvae brushed		SCW (g)	SSW (g)	Shell Ratio (%)	Pup. Rate (%)
			By No.	By wt. (kg)				
Pam-115	482	25.95	9560	15.04	1.74	0.34	19.25	94.00
Pam-117	530	25.95	9520	14.44	1.69	0.34	20.18	93.41
Mean	507	25.96	9615	14.47	1.67	0.33	19.61	93.13
SD	77.07	0.14	89.75	2.05	0.21	0.07	2.91	1.95

❖ RSRS, JAMMU

Title: Evaluation and characterization of silkworm germplasm under sub-tropical conditions of J&K
Project code: OFT-PAM-17
Project Duration: Continuous
Investigator (s): Murali, S & Sardar Singh
Objective(s):

- Evaluation and characterization of silkworm germplasm under sub-tropical conditions of J&K

Workdone:

Thirty nine breeds were studied by rearing during spring (2020) under germplasm maintenance programme. Among these breeds, the fecundity observed was highest in JAM 10 is 612 and lowest in RSJ 17 is 379 and all the breeds showed significantly different from each other whereas hatching percentage was highest in SH_6 (98.00) and lowest in CSR6 & RSJ 6 (93.00). Yield per 10,000 larvae by weight (Kg) recorded as highest of 14.76 Kg in CSR6 and lowest of 12.26 Kg in RSJ 17 showing statistically significant among all the breeds with regard to weight basis and by number was highest recorded in CSR6 (9478) and was lowest in JAM 18 (P) (8767) and showing statistically significant among all the breeds. The shell ratio (%) also shows statistically significant among all the breeds and was highest in RSJ 6 (21.05) and lowest in JAM 25 (16.81) respectively. The pupation rate was recorded as maximum in RSJ 6 (97.00 %) and lowest in RSJ 3 (93.00 %) and showed statistically significant among all the breeds.

Seven breeding lines were studied by rearing during spring (2020) under continuous maintenance programme. Among these breeds, the fecundity observed was highest in 322 is 485 and lowest in O1 is 426 and all the breeds were significantly different from each other whereas hatching percentage was highest in 323 (98.00) and lowest in O1 (95.00). Yield per 10,000 larvae by weight (Kg), the highest about 13.82 Kg in O1 and lowest of about 12.29 Kg in 323 showing statistically significant among all the breeds with regard to weight basis and by number was highest in D2 (9267) and was lowest in 323 (8600) and showing statistically significant among all the breeds. The shell ratio (%) shows statistically significant among all the breeds and was highest in O-2 (19.08) and lowest in D1 (17.87) respectively. The pupation rate was recorded as maximum in D2 & O2 (96.00%) and lowest in 322 & 323 (92.00%) and showed statistically non significant among all the breeds.

Table-77:Average data recorded during spring 2020 all 39 breeds maintained under Germplasm

Breeds	F (No.)	H (%)	LD (D:h)	LD (D:h)	LW (g.)	ERR/10000 Larvae		SCW (g.)	SSW (g.)	SR (%)	PR (%)
						By No.	By wt. (Kg)				
JAM1	411.33 (20.30)	97.67 (81.22)	25:19	6:14	44.67	9211.00 (95.97)	14.13	1.55	0.27	17.66 (24.83)	95.00 (77.09)
JAM2	403.33 (20.10)	97.00 (79.99)	25:05	6:00	43.00	9066.33 (95.22)	13.96	1.57	0.27	17.41 (24.65)	94.33 (76.21)
JAM10	612.00 (24.75)	96.33 (78.95)	25:47	6:17	42.67	8833.00 (93.98)	13.22	1.54	0.27	17.44 (24.67)	94.00 (75.82)
JAM11	421.33 (20.55)	97.67 (81.22)	25:19	6:14	40.00	9178.00 (95.90)	13.64	1.49	0.26	17.19 (24.48)	95.67 (77.97)
JAM18 (P)	464.00 (21.56)	97.00 (80.08)	25:05	6:10	41.67	8766.67 (93.63)	12.81	1.44	0.26	17.78 (24.93)	96.00 (78.43)
JAM18(M)	375.00 (19.39)	95.33 (77.50)	25:19	6:14	44.00	9233.00 (96.09)	14.38	1.58	0.27	17.31 (24.57)	95.67 (77.97)
JAM21	394.33 (19.88)	96.67 (79.47)	25:23	6:18	42.67	9433.00 (97.12)	13.90	1.48	0.26	17.28 (24.55)	96.67 (79.47)
JAM22	409.00 (20.24)	96.00 (78.43)	25:06	6:10	42.00	9066.33 (95.22)	13.44	1.49	0.26	17.15 (24.45)	95.00 (77.09)
JAM23	420.00 (20.51)	97.00 (80.08)	25:06	6:10	41.67	9133.00 (95.56)	13.17	1.45	0.25	16.96 (24.30)	95.00 (77.09)

Breeds	F (No.)	H (%)	LD (D:h)	LD (D:h)	LW (g.)	ERR/10000 Larvae		SCW (g.)	SSW (g.)	SR (%)	PR (%)
						By No.	By wt. (Kg)				
JAM24	472.33 (21.75)	97.00 (79.99)	25:06	6:10	42.33	9244.33 (96.15)	13.38	1.48	0.27	17.98 (24.07)	95.67 (77.97)
JAM25	454.00 (21.33)	98.00 (81.83)	24:05	5:00	44.00	8977.67 (94.74)	13.26	1.48	0.25	16.81 (24.19)	94.00 (75.92)
JAM27	519.33 (22.80)	96.33 (78.95)	25:19	6:14	42.33	9033.00 (95.04)	13.50	1.51	0.27	17.89 (24.00)	94.67 (76.62)
JAM103	435.33 (20.88)	96.67 (79.47)	25:17	6:12	42.00	9211.00 (95.97)	13.81	1.51	0.27	18.07 (25.14)	95.67 (77.97)
JAM110	427.67 (20.70)	96.33 (78.95)	25:19	6:14	41.67	9233.00 (96.08)	13.30	1.47	0.28	18.90 (25.75)	95.67 (78.07)
JAM118	521.67 (22.86)	96.00 (78.68)	25:11	6:06	44.00	9244.33 (96.14)	13.81	1.53	0.27	17.92 (25.03)	95.00 (77.09)
JAM119	544.67 (23.35)	96.33 (78.95)	25:11	6:06	43.67	9299.67 (96.43)	13.84	1.53	0.27	17.66 (24.83)	96.00 (78.49)
JAM121	373.67 (19.35)	93.67 (78.77)	25:05	6:00	43.67	9300.00 (96.43)	13.88	1.49	0.26	17.44 (24.67)	95.67 (78.07)
JAM122	388.67 (19.74)	93.00 (74.65)	25:05	6:00	44.67	9333.00 (96.61)	13.74	1.47	0.25	16.93 (24.28)	96.33 (78.95)
JAM124	483.67 (22.01)	96.33 (78.95)	25:05	6:00	44.00	9077.67 (95.27)	13.50	1.52	0.26	17.32 (24.58)	93.00 (74.65)
JAM125	499.00 (22.36)	97.00 (80.24)	25:23	6:14	45.00	9266.33 (96.26)	13.93	1.56	0.28	17.74 (24.89)	96.00 (78.49)
JAM127	473.00 (21.77)	97.33 (80.60)	26:00	6:19	43.67	9333.00 (96.60)	13.94	1.53	0.28	18.02 (25.10)	96.00 (78.49)
RSJ1	518.67 (22.79)	94.67 (76.62)	25:05	6:00	43.67	9111.00 (95.45)	12.97	1.50	0.28	18.75 (25.64)	95.00 (77.09)
RSJ3	533.67 (23.12)	94.00 (75.79)	26:02	6:21	44.67	8833.00 (93.98)	13.17	1.54	0.30	19.20 (25.97)	93.00 (74.65)
RSJ4	582.67 (24.19)	95.00 (77.04)	25:39	6:09	42.67	9222.00 (96.03)	13.21	1.48	0.27	18.07 (25.14)	95.67 (77.97)
RSJ5	518.67 (22.79)	94.00 (75.82)	26:00	6:19	44.33	9300.00 (96.44)	14.06	1.53	0.31	19.98 (26.53)	96.00 (78.43)
RSJ6	430.00 (20.73)	93.00 (74.62)	25:19	6:14	45.00	9300.00 (96.44)	13.93	1.51	0.32	21.05 (27.30)	97.00 (79.99)
RSJ11	604.00 (24.59)	95.67 (77.97)	25:05	6:00	45.67	9067.00 (95.22)	13.82	1.55	0.31	20.12 (26.64)	94.00 (75.82)
RSJ13	549.67 (23.44)	93.33 (77.07)	24:05	5:00	43.00	9044.33 (95.10)	12.89	1.47	0.28	18.87 (25.73)	94.67 (76.62)
RSJ14	502.67 (22.44)	95.33 (77.50)	25:12	6:07	43.67	9067.00 (95.21)	13.12	1.47	0.28	19.00 (25.83)	94.00 (75.92)
RSJ15	486.00 (22.06)	96.33 (79.10)	25:23	6:18	45.00	9344.33 (96.65)	13.65	1.58	0.33	20.74 (27.08)	96.00 (78.68)
RSJ16	399.67 (20.00)	96.33 (78.95)	25:23	6:18	39.67	8900.00 (94.34)	12.50	1.44	0.25	17.13 (24.43)	94.00 (75.79)
RSJ17	379.00 (19.49)	97.00 (80.08)	25:23	6:18	40.00	8877.67 (94.22)	12.26	1.41	0.27	19.04 (25.85)	93.67 (75.46)
CSR2	439.00 (20.95)	93.67 (75.40)	25:23	6:18	45.33	9044.00 (95.10)	13.50	1.49	0.31	20.80 (27.12)	94.00 (75.79)
CSR4	412.00 (20.32)	96.67 (79.47)	25:05	6:10	44.33	9144.00 (95.62)	13.49	1.51	0.28	18.45 (25.42)	95.67 (77.97)
CSR6	479.00 (21.89)	93.00 (74.65)	25:05	6:00	46.33	9477.67 (97.35)	14.76	1.58	0.30	19.14 (25.93)	96.00 (78.43)
CSR26	373.00 (19.33)	95.67 (77.97)	25:19	6:14	46.00	9100.00 (95.39)	14.49	1.66	0.34	20.30 (26.76)	95.00 (77.79)
CSR27	500.00 (22.38)	95.33 (77.90)	25:23	6:18	43.67	8911.00 (94.40)	12.92	1.53	0.32	20.73 (27.07)	94.00 (75.79)
SH_6	483.67 (22.01)	98.00 (81.83)	25:23	6:18	42.67	8978.00 (94.74)	13.10	1.53	0.29	18.79 (25.68)	94.33 (76.28)

Breeds	F (No.)	H (%)	LD (D:h)	LD (D:h)	LW (g.)	ERR/10000 Larvae		SCW (g.)	SSW (g.)	SR (%)	PR (%)
						By No.	By wt. (Kg)				
NB_4D_2	492.67 (22.21)	96.00 (78.43)	25:19	6:14	43.67	9044.33 (95.10)	13.33	1.51	0.29	19.35 (26.08)	95.00 (77.09)
CD@ 5%	0.73	2.20	0.18	0.03	1.79	1.73	0.52	0.05	0.01	0.42	2.15
Sem±	0.26	0.78	0.06	0.01	0.63	0.61	0.18	0.02	0.005	0.14	0.76
CV (%)	2.08	1.72	0.45	0.36	2.53	1.11	2.39	2.26	2.87	1.01	1.71

Note: LD – Larval duration; D-days; H-hours; LW- Larval weight; PR- pupation rate; SCW- Single cocoon weight; SSW- Single shell weight; SR – Shell ratio; Values in parentheses are statistically transformed

Table-78:Average data recorded during Spring 2020 of the following Germplasm Breeding Lines

Breeds	F (No.)	H (%)	LD (D:h)	LD (D:h)	LW (g.)	ERR/10000 Larvae		SCW (g.)	SSW (g.)	SR (%)	PR (%)
						By No.	By wt. (Kg)				
D1	473.67 (21.78)	97.33 (80.60)	25:23	6:18	41.67	8977.67 (94.75)	12.42	1.43	0.25	17.87 (24.99)	94.00 (75.82)
D2	430.00 (20.76)	97.00 (79.99)	25:08	6:03	43.67	9267.00 (96.26)	13.70	1.54	0.29	19.01 (25.83)	96.00 (78.68)
O1	425.67 (20.65)	95.00 (77.04)	25:05	6:06	42.67	9111.33 (95.45)	13.82	1.56	0.28	17.90 (25.01)	95.00 (77.09)
O2	459.00 (21.44)	96.00 (78.43)	25:23	6:18	43.67	9166.67 (95.74)	13.33	1.55	0.30	19.08 (25.88)	96.00 (78.68)
O3	471.67 (21.74)	95.67 (77.97)	26:02	6:21	41.00	9084.33 (95.31)	12.63	1.42	0.27	18.74 (25.64)	95.00 (77.09)
322	485.00 (22.04)	96.00 (78.43)	25:23	6:18	44.67	8734.67 (93.44)	13.03	1.49	0.28	18.96 (25.80)	92.00 (73.89)
323	483.00 (21.99)	98.00 (81.83)	25:11	6:06	40.67	8600.00 (92.74)	12.29	1.44	0.27	18.87 (25.73)	92.00 (73.54)
CD@ 5%	0.31	0.88	0.02	0.02	0.94	-	0.60	0.02	0.003	0.11	-
Sem±	0.10	0.29	0.006	0.007	0.30	0.81	0.19	0.007	0.001	0.03	1.42
CV (%)	0.83	0.63	0.04	0.18	1.25	1.48	2.61	0.82	0.66	0.24	3.22

Note: LD – Larval duration; D-days; H-hours; LW- Larval weight; PR- pupation rate; SCW- Single cocoon weight; SSW- Single shell weight; SR – Shell ratio; Values in parentheses are statistically transformed

Nine breeds were also reared during spring 2020 under maintenance programme at RSRS, Jammu. Among these breeds, the fecundity observed was highest in PAM DR 16 is 566 and lowest in PAM DR 7 is 430 and all the breeds were significantly different from each other whereas hatching percentage was highest in PAM DR 6 (97.00) and lowest in PAM DR 8 (92.00). Yield per 10,000 larvae by weight (kg), the highest about 14.33 kg in PAM DR 9 and lowest of about 13.16 Kg in PAM DR 7 showing statistically significant among all the breeds with regard to weight basis and by number was highest in PAM DR 16 (9244) and was lowest in PAM DR 1 (8866) and showing statistically significant among all the breeds. The shell ratio (%) shows statistically significant among all the breeds and was highest in PAM DR 8 (19.11) and lowest in PAM DR12 (16.65) respectively. The pupation rate was recorded as maximum in PAM DR16 & PAM DR18 (95.33%) and lowest in PAM DR1 (93.67%) and showed statistically non significant among all the breeds.

Table-79:Average data recorded during Spring 2020 of all 9 PAM Breeds under maintenance programme

Breeds	F (No.)	H (%)	LD (D:h)	5th LD (D:h)	LW (g.)	ERR/10000 Larvae	
						By No.	By Wt. (Kg)
PAM DR 1	484.00 (21.99)	95.33 (77.50)	25:05	6:00	44.67	8866.00 (94.16)	13.33
PAM DR 4	511.00 (22.62)	95.33 (77.61)	25:05	6:00	45.00	9011.00 (94.92)	14.04
PAM DR 6	488.00 (22.11)	97.00 (79.99)	25:05	6:00	43.00	9144.00 (95.62)	13.50
PAM DR 7	430.00 (20.75)	95.00 (77.09)	25:05	6:00	42.67	8999.67 (94.87)	13.16
PAM	516.67 (22.74)	91.67 (73.78)	25:05	6:00	43.67	9044.00 (95.09)	13.33

Breeds	F (No.)	H (%)	LD (D:h)	5th LD (D:h)	LW (g.)	ERR/10000 Larvae	
						By No.	By Wt. (Kg)
DR 8							
PAM DR 9	472.00 (21.74)	96.33 (78.95)	25:05	6:00	46.67	8977.33 (94.75)	14.33
PAM DR 12	542.67 (23.30)	94.00 (76.38)	25:05	6:00	44.33	9011.00 (94.93)	14.17
PAM DR 16	565.67 (23.80)	94.00 (75.79)	25:05	6:00	45.00	9244.00 (96.14)	13.33
PAM DR 18	496.00 (22.29)	95.67 (77.97)	25.05	6:00	46.33	9133.00 (95.57)	14.16
CD@ 5%	1.11	-	0.01	0.001	1.82	-	0.55
Sem±	0.37	1.58	0.006	0.006	0.60	0.56	0.18
CV (%)	2.87	3.54	0.03	0.03	2.36	1.02	2.35

Note: LD – Larval duration; D-days; H-hours; LW- Larval weight; PR- pupation rate; SCW- Single cocoon weight; SSW- Single shell weight; SR – Shell ratio; Values in parentheses are statistically transformed

Table-79: (Contd.)

Breeds	SCW (g)	SSW (g)	SR (%)	PR (%)
PAM DR 1	1.55	0.29	18.94 (25.78)	93.67 (75.40)
PAM DR 4	1.60	0.29	18.05 (25.13)	94.67 (76.70)
PAM DR 6	1.52	0.27	17.87 (24.99)	95.00 (77.09)
PAM DR 7	1.51	0.28	18.60 (25.53)	94.67 (76.62)
PAM DR 8	1.52	0.29	19.11 (25.90)	95.00 (77.09)
PAM DR 9	1.64	0.31	18.72 (25.62)	94.33 (76.21)
PAM DR 12	1.54	0.26	16.65 (24.06)	94.67 (76.62)
PAM DR 16	1.51	0.27	17.97 (25.07)	95.33 (77.61)
PAM DR 18	1.56	0.28	18.14 (25.19)	95.33 (77.50)
CD@ 5%	0.04	0.007	0.36	-
Sem±	0.01	0.002	0.12	0.73
CV (%)	1.80	1.48	0.82	1.65

❖ RSRS, SAHASPUR

Title: Maintenance and evaluation of silkworm germplasm bank with maintenance of parental lines and breeders' stock.

Project code: AIB-2016

Project Duration: Continuous

Investigator (s): K.K. Rai& Surendra Kumar

Objective(s):

- To maintain the basic gene pool material for future utilization in breeding projects. To serve as basic material for development of region and season specific hybrids for different eco-zones.

Workdone:

Maintenance of Silkworm Germplasm: Spring rearing, 2020 of GPB stock was initiated with 480DFLs in respect of 48 races viz. (all @ 10 DFLs each), SM Series (2) : SM 1, SM 3; JP Series (3) : JP1A (P), JP1A(M), JP1B (M); PY Series (2) : PY 1, PY 5; AF Series (2) : AF 2, AF 6; C Series (2) : C 108, C 122; CP Series (2) CP1B (P), CP1B (M) J Series (2) : J 112, J 122; ATR Series (2): ATR 16, ATR 29, SH Series (1) : SH 2; YS Series (3) : YS 3, YS 5, YS 7; SF Series (4) : SF 2, SF 4, SF19,SF21; SL Series (6) : SL 3, SL6, SL 7, SL 9. SL 10, SL 11; Dun Series (3): Dun 12, Dun 19, Dun 21; Others (10) : RB 8, AS.HAHI, JJ 5, SY 6, NS 6, JD 6, ADG 6 , Su, NN6D, KA; Lines (4): Line 1, Line 4, Line 13 & Line 14. A total of 2045 DFLs were prepared and preserved at SSPC, CSP, Premnagar, Dehradun under Spring' 20 to Spring' 21 schedule.

On assessment of Germplasm Bank races on different parameters, following observations have been made in Spring-2020 rearing- Fecundity was maximum in JP1A(M) (536) and minimum in SU (412); Hatching percentage was maximum in YS5 (96.46) and minimum in JP1A(P) (91.83); Yield/10000 larvae by weight (kg) was maximum in SM1-(14.284) and minimum in JP1B(M)(12.500); Yield/10000 larvae by number was maximum in NS6-(9833) and minimum in SL6-(9250); Single cocoon weight (gm) was maximum in SL11-(1.760)and minimum in C-108-(1.284); Single shell weight (gm) was maximum in PY5- (0.344) and minimum in J112-(0.243); Shell Ratio % was maximum in PY5 (22.83) and minimum in JP1A(M) (16.73) ; Pupation rate (%) was maximum in SL3 (91.84) and minimum in Line-14 (90.16).

Table-80: Maintenance of silkworm germplasm during Spring 2020.

Race	Fec.	Hat. %	Larval period (D:H	Yield/ 10,000 Larvae Retained		Pupation %	SCW (g)	SSW (g)	SR (%)
				By No.	By Wt.(Kg)				
SM series (2)									
SM 1	489	95.12	30:00	9266	14.284	90.50	1.488	0.250	16.80
SM 3	500	94.71	29:00	9534	14.134	91.50	1.539	0.260	16.89
JP series (2)									
JP1A(P)	477	91.83	29:00	9800	13.250	91.50	1.421	0.254	17.87
JP1A(M)	536	94.87	29:00	9783	13.750	91.16	1.524	0.255	16.73
JP1B	525	95.89	29:00	9567	12.500	91.00	1.436	0.257	17.89
PY series (2)									
PY 1	497	95.58	29:00	9550	13.400	91.17	1.349	0.252	18.68
PY 5	520	93.76	30:04	9583	13.000	91.50	1.311	0.254	19.37
AF series (2)									
AF 2	501	95.11	30:00	9583	13.200	91.17	1.540	0.266	17.27
AF 6	507	95.16	30:02	9567	13.633	90.67	1.535	0.262	17.06
C series (2)									
C 108	496	93.96	30:00	9616	14.017	91.16	1.284	0.246	19.16
C 122	506	94.18	30:02	9633	13.866	90.50	1.389	0.258	18.57
CP1B (P)	486	95.57	29:00	9534	13.567	90.83	1.305	0.260	19.92
CP1B (M)	482	95.12	29:00	9800	14.133	90.84	1.301	0.255	19.60
J series (2)									
J 112	477	95.39	29:00	9650	13.984	90.66	1.396	0.243	17.41
J 122	494	94.73	29:04	9584	13.834	91.34	1.417	0.262	18.48
SH series (2)									
SH 2	484	95.86	29:03	9716	13.634	91.50	1.456	0.257	17.65
YS series (2)									
YS 3	474	95.04	30:00	9700	13.584	91.34	1.552	0.281	18.10
YS 5	482	96.46	30:00	9566	13.500	91.16	1.546	0.288	18.63
YS 7	503	95.92	30:00	9684	13.666	90.67	1.522	0.262	17.21
SF series (2)									
SF 2	455	95.49	30:00	9816	13.750	91.50	1.725	0.316	18.32
SF 4	495	95.56	29:04	9634	13.434	91.16	1.663	0.297	17.86
SF 19	491	94.91	29:04	9550	12.966	90.83	1.535	0.266	17.33
SF 21	492	95.02	30:02	9584	13.416	91.50	1.653	0.322	19.48
SL series (2)									
SL 3	448	95.19	30:00	9717	13.516	91.84	1.527	0.283	18.53
SL 6	492	92.58	29:02	9250	13.067	91.16	1.596	0.311	19.48
SL 7	475	94.73	29:02	9334	12.734	90.84	1.598	0.268	16.77
SL 9	462	94.80	29:02	9666	13.700	91.00	1.748	0.319	18.24
SL10	466	96.02	29:02	9717	13.750	90.84	1.519	0.283	18.63
SL 11	423	93.37	30:02	9534	13.534	90.84	1.760	0.324	18.40

Race	Fec.	Hat. %	Larval period (D:H	Yield/ 10,000 Larvae Retained		Pupation %	SCW (g)	SSW (g)	SR (%)
				By No.	By Wt.(Kg)				
Dun series (3)									
Dun 12	424	94.34	30:00	9400	13.084	91.50	1.561	0.294	18.83
Dun 19	417	93.66	29:00	9450	13.150	90.84	1.645	0.310	18.84
Dun 21	416	94.59	30:00	9450	13.683	91.16	1.551	0.263	16.96
ATR Series									
ATR16(P)	484	95.35	29:00	9266	13.267	90.83	1.401	0.248	17.70
ATR29(M)	502	94.72	30:00	9766	13.767	90.66	1.403	0.253	18.03
Others (19)									
RB 8	535	96.26	30:00	9700	13.900	90.84	1.515	0.265	17.49
Line-1	499	95.89	30:00	9783	13.450	90.50	1.592	0.299	18.78
Line-4	499	95.19	30:00	9817	13.884	91.00	1.458	0.257	17.63
Line-13	511	94.92	30:00	9600	13.750	90.66	1.492	0.282	18.90
Line-14	520	92.28	30:00	9484	13.784	90.16	1.615	0.274	16.96
AsHAHI	438	93.04	30:00	9550	13.250	91.50	1.559	0.268	17.19
JJ 5	507	94.57	30:00	9567	13.284	91.16	1.355	0.256	18.89
CP1B(P)	453	95.80	25:00	9484	13.034	91.83	1.507	0.259	17.19
CP1B(M)	454	95.92	26:02	9650	14.316	91.83	1.597	0.302	18.91
SY 6	470	95.96	29:02	9366	12.984	91.00	1.606	0.289	17.99
NS 6	487	96.31	29:00	9833	13.950	91.34	1.698	0.288	16.96
NN6D	499	94.99	30:00	9800	13.517	90.34	1.471	0.262	17.81
KA	486	94.54	29:02	9650	13.416	91.00	1.594	0.272	17.06
JD6	514	95.52	30:00	9717	13.417	90.66	1.646	0.279	16.95
ADG6	488	95.39	29:02	9634	13.266	91.00	1.493	0.255	17.08
Su	412	93.19	29:02	9700	13.400	91.50	1.415	0.257	18.16

To maintain the basic gene pool material for preparation of hybrids for Hybrid Testing Programmes:

To maintain active basic stock developed at this station: Spring rearing, 2020 of Parental Breeders Stock (PBS) was done with 425 DFLs in respect of 29 races / breeds viz. (all @ 10 DFLs each except mentioned in parenthesis/brackets against the race SH Series (1) : SH 6;(25 DFLs) NB Series (1) : NB2D2;(20 DFLs) Dun Series (4): Dun 6,(20 DFLs) Dun 17, Dun 18, Dun 22;(20 DFLs) CSR Series (5) : CSR 2 ,(20 DFLs) CSR 4,(20 DFLs) CSR 6, CSR 26, CSR 27; MASN Series (3) MASN 4, MASN 6, MASN 7; Pam DR Series (9) Pam DR 1, Pam DR 4,(20 DFLs) Pam DR 6, Pam DR 7, Pam DR 8, Pam DR 9, Pam DR 12, Pam DR 16, Pam DR 18; Others (5): SK 6,(30 DFLs)SK 7,(20 DFLs) APS 4, APS 5, (20 DFLS) APS 9,(20 DFLs) BBE 0198 (20 DFLs). A total of 1964 DFLs were prepared and kept for preservation under spring, 2020 to autumn, 2020 schedule.

On assessment of Parental Breeders Stock (PBS) races on different parameters, following observations have been made in spring rearing, 2020. Fecundity was maximum in APS9 (551) and minimum in CSR2 (343); Hatching percentage was maximum in Pam DR12 (98.74) and minimum in CSR2 (95.12); Yield/10000 larvae by weight (kg) was maximum in BBE198(14.600) and minimum in DUN18(13.533); Yield/10000 larvae by number was maximum in APS5(9934) and minimum in Pam DR12(9434); Single cocoon weight (gm) was maximum in DUN22(1.678)and minimum in Pam DR9(1.280); Single shell weight (gm) was maximum in BBE198 (0.304) and minimum in Pam DR12(0.282); Shell Ratio % was maximum in CSR4 (20.01) and minimum in SH6 (17.02) ; Pupation rate (%) was maximum in Pam DR9 (91.84) and minimum in CSR2 (90.50).

Table-81: Rearing performance of PBS during spring season 2020.

Race	Fec.	Hat. %	LP (D:H)	Yield /10,000 Larvae retained		Pupation %	SCW (g)	SSW (g)	SR (%)
				By No.	By Wt. (Kg)				
SH6	519	97.39	29:02	9700	13.634	90.84	1.563	0.266	17.02
NB4D2	532	95.88	29:05	9634	13.584	90.84	1.385	0.255	18.41
Dun 6	497	97.58	29:04	9916	14.483	91.34	1.491	0.276	18.51
Dun 17	493	97.25	29:04	9667	14.100	91.16	1.442	0.265	18.37
Dun 18	526	98.11	29:04	9550	13.533	90.66	1.601	0.300	18.74
Dun 22	511	98.24	30:05	9716	13.934	91.00	1.678	0.301	17.94
CSR 2	343	95.12	29:02	9650	13.916	90.50	1.609	0.276	17.15
CSR 4	505	97.05	30:03	9766	14.000	91.16	1.389	0.278	20.01
CSR 6	538	97.21	30:02	9800	14.084	91.00	1.469	0.266	18.10
CSR 26	421	98.34	30:02	9734	14.000	90.50	1.514	0.266	17.56
CSR 27	489	96.94	30:02	9883	14.250	91.34	1.501	0.296	19.72
SK6	489	97.01	30:00	9450	13.766	91.16	1.556	0.274	17.60
SK7	525	97.54	30:00	9683	14.200	91.17	1.488	0.277	18.61
APS5	522	97.98	30:04	9934	14.350	91.50	1.558	0.293	18.81
APS9	551	97.55	30:05	9566	14.050	91.50	1.531	0.283	18.48
BBE198	521	97.59	30:06	9800	14.600	90.84	1.612	0.304	18.86
APS4	476	97.46	29:04	9650	14.134	91.00	1.393	0.263	18.88
Pam DR-1	536	97.19	29:03	9500	14.000	91.50	1.428	0.282	19.74
Pam DR-4	528	97.35	30:04	9717	14.350	91.67	1.379	0.259	18.78
Pam DR-6	542	96.86	30:04	9634	13.966	91.16	1.499	0.257	17.14
Pam DR-7	517	97.76	29:05	9516	13.650	91.67	1.305	0.253	19.38
Pam DR-8	423	98.33	29:05	9650	13.766	91.50	1.487	0.265	17.82
Pam DR-9	475	97.76	29:02	9766	13.900	91.84	1.280	0.232	18.13
Pam DR-12	478	98.74	29:05	9434	13.750	91.50	1.466	0.282	19.24
Pam DR-16	539	97.22	29:06	9783	13.750	91.00	1.477	0.276	18.68
Pam DR-18	516	97.96	29:05	9784	13.750	91.34	1.513	0.273	18.04
MAS-N4	523	98.17	29:02	9784	13.750	91.16	1.499	0.285	19.01
MAS-N6	517	97.81	29:02	9700	13.667	91.34	1.529	0.291	19.03
MAS-N7	519	96.20	30:00	9766	13.884	91.50	1.505	0.273	18.14

Autumn rearing-2020 of Parental Breeder's Stock (PBS) was initiated with 175 DFLs in respect of 29 races/ breeds viz. SH Series (1) : SH6; NB Series (1) : NB2D2; Dun Series (4): Dun 6, Dun 17, Dun 18, Dun 22; CSR Series (5) : CSR 2 , CSR 4, CSR 6, CSR 26, CSR 27; MASN Series (4) MASN2, MASN 4, MASN 6, MASN 7; Pam DR Series (9) Pam DR 1, Pam DR 4, Pam DR 6, Pam DR 7, Pam DR 8, Pam DR 9, Pam DR 12, Pam DR 16, Pam DR 18; Others (5): SK 6, SK 7, APS 4, APS 5, APS 9, BBE 0198. Brushing is done on 08/09-09-2020. Rearing and grainage are completed.

On assessment of Parental Breeder's Stock (PBS) races on different parameters, following observations have been made in autumn-2020 rearing- Fecundity was maximum in Pam DR-12 (599) and minimum in Dun6 (441); Hatching percentage was maximum in Dun18 (98.58) and minimum in BBE0198 (94.16); Yield/10000 larvae by weight (kg) was maximum in Dun6(14.467) and minimum in DUN18(12.333); Yield/10000 larvae by number was maximum in SH6(9916) and minimum in NB4D2(9384); Single cocoon weight (gm) was maximum in SH6(1.819)and minimum in CSR26(1.279); Single shell weight (gm) was maximum in CSR27 (0.366) and minimum in Dun17(0.255); Shell Ratio % was maximum in CSR26(23.69) and minimum in SK7 (16.52) ; Pupation rate (%) was maximum in Dun22 (92.33) and minimum in NB4D2 (90.00).

Table-82: Rearing performance of silkworm races maintained inParental Breeder's Stock (PBS)during Autumn- 2020

Race	Fec.	Hat. %	LP (D:H)	Yield /10,000 Larvae retained		Pupation %	SCW (g)	SSW (g)	SR (%)
				By No.	By Wt.(Kg)				
SH6	452	97.57	22:12	9916	13.750	91.34	1.705	0.304	17.83
NB4D2	493	97.66	22:00	9384	13.900	90.34	1.636	0.317	19.37
Dun 6	444	97.41	21:12	9783	14.400	92.00	1.564	0.306	19.56
Dun 17	490	97.46	22:00	9534	13.416	90.83	1.471	0.263	17.88
Dun 18	495	98.28	22:00	9434	12.833	91.16	1.542	0.281	18.22
Dun 22	509	97.84	22:00	9850	13.917	92.16	1.605	0.294	18.32
CSR 2	468	96.90	22:00	9450	13.750	91.00	1.674	0.335	20.01
CSR 4	447	97.20	22:00	9583	13.750	90.66	1.630	0.297	18.22
CSR 6	491	98.36	21:12	9750	14.000	91.00	1.493	0.281	18.82
CSR 26	506	95.76	21:19	9600	13.666	91.17	1.488	0.305	20.49
CSR 27	558	96.24	22:00	9816	13.250	91.33	1.716	0.356	20.75
SK6	553	95.69	22:12	9884	13.416	91.16	1.467	0.264	18.01
SK7	448	97.44	22:12	9750	13.417	90.66	1.483	0.248	16.72
APS5	577	97.52	22:00	9834	13.650	91.00	1.503	0.318	21.16
APS9	465	97.06	22:00	9650	13.200	91.00	1.358	0.267	19.66
BBE198	540	94.66	22:00	9800	13.700	91.16	1.553	0.277	17.84
APS4	529	97.26	21:00	9650	13.466	91.34	1.588	0.284	17.88
Pam DR-1	453	96.80	21:12	9884	13.834	90.84	1.442	0.263	18.24
Pam DR-4	495	97.66	21:00	9634	13.416	90.33	1.462	0.297	20.13
Pam DR-6	491	97.05	21:00	9650	13.484	91.17	1.572	0.293	18.64
Pam DR-7	503	96.62	22:00	9850	13.784	90.83	1.586	0.304	19.17
Pam DR-8	433	97.45	21:00	9600	13.500	90.66	1.469	0.264	17.97
Pam DR-9	434	97.58	22:00	9766	13.350	91.17	1.505	0.283	18.80
Pam DR-12	553	97.49	21:00	9750	13.500	91.00	1.485	0.267	18.58
Pam DR-16	416	96.39	22:00	9633	13.334	91.00	1.631	0.301	18.45
Pam DR-18	426	97.18	21:00	9550	13.500	91.50	1.542	0.281	18.22
MAS-N4	478	98.02	22:00	9516	13.216	90.83	1.437	0.262	18.23
MAS-N6	559	97.15	22:00	9566	13.334	90.66	1.485	0.270	18.18
MAS-N7	562	96.25	22:00	9384	13.216	91.00	1.557	0.283	18.17

Table-83: Silkworm Germplasm Bank (GPB) spring 2020 to spring 2021 Schedule:

Series	Race	Sl. No.	No. of Laying	Laid on dates in April-2020	Remarks
SM Series (2)	1. SM 1	1-	48	19-21-04-2020	
	2. SM 3	2-	01	20-04-2020	
JP Series (2)	1. JP 1 A(P)	3-	37	19-22-04-2020	
	2. JP 1 A(M)	4-	32	19-21-04-2020	
	3. JP1 B	5-	14	9-06 to 10-06-2020	
PY Series (2)	1. PY 1	6-	21	18-22-04-2020	
	2. PY 5	7-	08	16-6 to 18-06-2020	Sent to SSPC on 29-06-2020 for preservation
AF Series (2)	1. AF 2	8-	68	18-21-04-2020	
	2. AF 6	9-	26	18-20-04-2020	
C Series (2)	1. C 108	10-	35	18-21-04-2020	
	2. C122	11-	15	17-21-04-2020	
CP Series (2)	1-CP1B(P)	12-	03	18-19-04-2020	+03 DFLs laid on 18-19-06-2020

Series	Race	Sl. No.	No. of Laying	Laid on dates in April-2020	Remarks
	2-CP1B(M)	13-	38	18-22-04-2020	
J Series (2)	1. J 112	14-	55	17-21-04-2020	
	2. J 122	15-	31	18-21-04-2020	
ATR Series (2)	ATR-16(P)	16-	26	18-22-04-2020	
	ATR-29(M)	17-	49	19-21-04-2020	
SH Series (2)	1. SH 2	18-	116	18-21-04-2020	
YS Series (3)	1. YS 3	19-	52	17-21-04-2020	
	2. YS 5	20-	37	18-22-04-2020	
	3. YS 7	21-	38	18-22-04-2020	
SF Series (4)	1. SF 2	22-	93	20-22-04-2020	
	2. SF 4	23-	56	19-22-04-2020	
	3. SF 19	24-	35	18-22-04-2020	
	4. SF 21	25-	89	19-22-04-2020	
SL Series (6)	1. SL 3	26-	48	19-22-04-2020	
	2. SL 6	27-	75	19-22-04-2020	
	3. SL 7	28-	74	17-22-04-2020	
	4. SL 9	29-	28	19-22-04-2020	
	5. SL 10	30-	39	18-22-04-2020	
	6. SL 11	31-	35	19-22-04-2020	
Dun Series (3)	1. Dun 12	32	55	19-20-04-2020	
	2. Dun 19	33-	76	21-24-04-2020	
	3- Dun 21	34-	19	20-21-04-2020	
Others	1-. RB 8	35-	72	18-21-04-2020	
	2. AS. HAHI	36-	36	20-22-04-2020	
	3. JJ 5	37-	73	19-22-04-2020	
	4- SY 6	38-	44	19-22-04-2020	
	5-. NS 6	39-	30	18-21-04-2020	
	6-. JD 6	40-	27	18-22-04-2020	
	7-.ADG 6	41-	77	19-20-04-2020	
	8-Su	42-	12	19-21-04-2020	
	9- NN-6D	43-	41	18-22-04-2020	
	10- KA	44-	02	20-21-04-2020	
Line Series (4)	Line-1	45-	30	20-22-04-2020	
	Line-4	46-	105	17-20-04-2020	
	Line-13	47-	37	79-20-04-2020	
	Line-14	48-	09	21-23-04-2020	
	Total		**2045**		

Table-84: Silkworm Parental Lines under Parental Breeder's Stock at RSRS, Sahaspur

Series	Race	Sl. No.	No. of Laying	Laid on dates in April-2020	Remarks
SH Series	SH6	1-	65	19-20-04-2020	
NB Series	NB4D2	2-	68	18-21-04-2020	
Dun Series	Dun6	3-	75	19-21-04-2020	
	Dun17	4-	107	20-22-04-2020	
	Dun18	5-	91	17-19-04-2020	
	Dun22	6-	80	19-20-04-2020	
CSR Series	CSR 2	7-	74	18-20-04-2020	
	CSR 4	8-	76	19-22-04-2020	
	CSR 6	9-	103	19-21-04-2020	

Series	Race	Sl. No.	No. of Laying	Laid on dates in April-2020	Remarks
	CSR 26	10-	74	18-22-04-2020	
	CSR 27	11-	09	21-22-04-2020	
SK Series	SK6	12-	121	17-22-04-2020	
	SK7	13-	38	18-22-04-2020	
APS Series	APS5	14-	108	20-21-04-2020	
	APS9	15-	72	19-21-04-2020	
	APS4	16-	40	18-22-04-2020	
	BBE198	17-	73	18-22-04-2020	
Pam Series	Pam DR-1	18-	07	18-20-04-2020	
	Pam DR-4	19-	32	18-20-04-2020	
	Pam DR-6	20-	107	17-20-04-2020	
	Pam DR-7	21-	70	18-20-04-2020	
	Pam DR-8	22-	39	19-04-2020	
	Pam DR-9	23-	38	18-19-04-2020	
	Pam DR-12	24-	79	18-19-04-2020	
	Pam DR-16	25-	69	19-22-04-2020	
	Pam DR-18	26	101	17-22-04-2020	
MAS-N Series	MAS-N4	27-	58	20-23-04-2020	
	MAS-N6	28-	55	19-21-04-2020	
	MAS-N7	29-	35	19-24-04-2020	
Total			**1964**		

Table-85: Details of seed under consignment at SSPC, Cold storage, Premnagar, Dehradun: Autumn- 2020 to Spring-2021, under Parental Breeder's Stock during- autumn-2020

Series	Race	Sl. No.	No. of Laying	Laid on Date in October-20	Remarks
SH Series	SH6	1-	21	13-15-10-2020	
NB Series	NB4D2	2-	21	12-14-10-2020	
Dun Series	Dun6	3-	44	13-14-10-2020	
	Dun17	4-	25	13-15-10-2020	
	Dun18	5-	32	12-14-10-2020	
	Dun22	6-	27	13-15-10-2020	
CSR Series	CSR 2	7-	42	13-14-10-2020	
	CSR 4	8-	24	14-15-10-2020	
	CSR 6	9-	45	12-14-10-2020	
	CSR 26	10-	34	12-14-10-2020	
	CSR 27	11-	12	13-15-10-2020	
SK Series	SK6	12-	24	11-15-10-2020	
	SK7	13-	20	14-15-10-2020	
APS Series	APS5	14-	13	12-13-10-2020	
	APS9	15-	18	14-10-2020	
	APS4	16-	33	12-15-10-2020	
	BBE198	17-	29	11-14-10-2020	
Pam Series	Pam DR-1	18-	15	13-14-10-2020	
	Pam DR-4	19-	25	14-15-10-2020	
	Pam DR-6	20-	46	11-13-10-2020	
	Pam DR-7	21-	04	13-14-10-2020	
	Pam DR-8	22-	37	12-13-10-2020	
	Pam DR-9	23-	28	13-14-10-2020	
	Pam DR-12	24-	16	12-15-10-2020	

Series	Race	Sl. No.	No. of Laying	Laid on Date in October-20	Remarks
	Pam DR-16	25-	20	12-14-10-2020	
	Pam DR-18	26-	30	11-13-10-2020	
MAS-N Series	MAS-N4	27-	17	13-15-10-2020	
	MAS-N6	28-	25	13-14-10-2020	
	MAS-N7	29-	20	12-14-10-2020	
	JP1B	30-	20	11-12-10-2020	
	Total		**767**		

Title: Maintenance and characterization of mulberry gene pool
Project code: PIB-3212
Project Duration: Continuous
Investigator (s): Surendra Kumar (*w.e.f*08.02.2021) & Babulal (upto 13.01.2021)
Objective(s):

- To evaluate the mulberry cultivars for their performance ability.

Workdone:82 mulberry genotypes (10 exotic and 72 indigenous) were maintained in the mulberry Germplasm at RSRS, Sahaspur. 43 genotypes were planted and maintained with a spacing of 4'x 4' having 10 plants of each genotypes whereas, 21 varieties planted and maintained with a spacing of 3'x3' having 24 plants each in two plots of each genotype. Rest of the 18 genotypes were maintained in scattered pattern having different number of genotypes by adopting the regular package of practices of this station. Phenotypic characters viz, No. of branch, Shoot length, Average internodal distance, Moisture (%), Weight of 100 leaves and Average leaf yield (gm) have been recorded during 2020 (Spring & Autumn).

Out 50 mulberry accessions received from CSGRC, CSB, Hosur (TN) 35 varieties viz. MI-0002, MI-0005, MI-0073, MI-0139, MI-0174, MI-0366, MI-0369, MI-0370, MI-0376, MI-0384, MI-0405, MI-0406, MI-0407, MI-0424, MI-0438, MI-0439, MI-0440, MI-0491, MI-0492, MI-0499, MI-0511, MI-0574, MI-0575, MI-0576, MI-0577, MI-0611, MI-0615, MI-0637, MI-0638 MI-0639, MI-0643, MI-0640, MI-0723, MI-0724 and MI-0741 comprising of *Morus indica, M. alba, M. laevigata, M. serrata and M. latifolia* species are being maintained as per the package of practices recommended by RSRS, Sahaspur.

Table-86:Morphological characters, Spring, 2020

#	Genotype	No. of branch	Shoot length (cm)	Avg Inter nodal distance (cm)	Moisture %	Wt of 100 leaves (gm)	Avg. leaf yield (gm)
1	China White	109.50	28.50	4.50	72.05	85.00	390.00
2	S-741	38.50	33.50	4.00	69.80	80.50	264.00
3	Rokokuyaso	11.00	19.00	5.00	74.89	86.00	115.00
4	MS-3	NA	NA	NA	NA	NA	NA
5	Local lobed	30.00	30.00	3.00	69.90	78.00	215.00
6	Kokuso-27	55.50	26.55	4.10	64.87	162.00	690.00
7	Majra-11	NA	NA	NA	NA	NA	NA
8	MS-2	45.00	28.00	3.75	66.93	112.50	240.00
9	LF-2	73.50	25.25	3.00	68.75	137.50	803.00
10	MS-8	35.00	14.50	1.75	69.84	69.00	200.00
11	MS-1	67.00	53.00	4.75	66.91	92.30	690.00
12	MS-5	72.00	36.50	3.50	72.82	41.94	390.00
13	S-642	54.00	36.50	3.00	67.86	40.71	267.50
14	MR-2	34.00	33.00	3.00	69.63	58.92	165.00
15	S-799	21.50	29.13	2.75	63.63	143.40	290.00
16	MS-9	32.00	24.00	2.85	67.88	82.19	240.00
17	S-1096	19.00	20.50	2.31	78.59	75.07	126.50
18	S-523	27.50	21.25	2.75	63.68	76.84	190.00
19	Sujanpur	38.00	31.50	4.00	64.63	52.29	192.23
20	MS-6	43.00	29.75	3.63	67.89	78.74	277.50

#	Genotype	No. of branch	Shoot length (cm)	Avg Inter nodal distance (cm)	Moisture %	Wt of 100 leaves (gm)	Avg. leaf yield (gm)
21	C-776	34.00	31.25	4.19	67.82	132.70	336.50
22	S-31	20.50	30.25	3.25	66.66	146.74	260.00
23	S-1301	39.00	21.75	3.50	68.74	132.70	264.00
24	MS-7	41.50	40.92	3.63	69.78	55.35	264.00
25	C-763	88.00	43.66	4.76	70.81	62.92	510.00
26	C-741	39.00	69.50	6.63	69.84	127.00	928.00
27	K-2(M)	42.50	40.50	4.00	62.74	101.00	985.00
28	Ichinose	17.50	24.75	2.50	65.88	106.24	115.00
29	LF-1	35.00	35.00	4.75	64.34	112.45	290.00
30	PGDTR-9	26.00	30.50	4.00	65.08	169.70	390.00
31	Kaiyorosao	26.50	22.50	2.75	64.92	104.70	227.00
32	C-1729	21.50	21.50	2.63	63.23	95.27	202.00
33	S-1635	48.50	27.00	3.13	63.67	49.42	165.00
34	C-1726	18.50	54.50	4.13	66.27	142.83	327.00
35	C1730	12.50	21.75	1.75	65.77	162.80	165.00
36	Mandaley	18.00	21.50	2.25	69.81	81.40	140.00
37	S-1685	19.50	32.00	2.00	62.60	77.85	174.00
38	C-1608	34.00	46.08	4.63	65.60	127.53	540.00
39	C-1733	61.50	51.06	5.13	64.70	103.80	627.00
40	C-1690	55.00	48.50	4.50	66.32	183.62	490.00
41	TR-4	27.00	75.00	4.70	64.88	112.00	540.00
42	S-1708	50.00	72.00	5.40	72.72	81.00	640.00
43	TR-5	52.00	70.00	5.40	69.68	75.67	510.00
44	TR-8	39.00	72.75	3.00	65.59	43.88	415.00
45	S-13	31.00	31.00	2.75	69.64	61.52	215.00
46	Philipines	13.50	81.75	6.25	63.82	75.93	265.00
47	Punjab Local	11.50	87.50	6.50	65.22	184.84	240.00
48	K2 (S)	14.50	65.34	6.75	72.63	133.00	365.00
49	S 799	18.00	62.58	5.50	65.77	165.56	340.00
50	L-4	16.00	48.66	5.75	65.70	117.50	652.00
51	S-146	14.00	58.25	5.75	64.90	139.00	340.00
52	L-6	22.00	77.50	6.75	66.26	164.30	415.00
53	China White	11.00	74.00	7.50	69.91	145.80	265.00
54	S-41	20.00	82.00	6.75	62.83	154.30	590.00
55	L-1	17.50	86.75	6.00	68.64	131.00	490.00
56	L-3	17.50	83.00	6.00	64.22	152.50	615.00
57	Mandaley	14.50	83.17	7.25	67.15	119.00	365.00
58	Tr-10	20.00	92.00	6.75	64.58	113.00	628.00
59	S-1531	15.00	75.85	6.50	70.50	186.70	410.00
60	Chack Majra	17.00	72.25	7.00	64.70	143.20	411.00
61	S-54	15.50	60.50	5.25	62.34	194.70	575.00
62	Goshoerami	11.00	29.75	5.25	62.80	195.00	184.00
63	L-2	44.00	65.00	5.50	63.15	62.00	325.00
64	L-5	15.00	79.00	6.50	62.20	133.85	244.00
65	Kollegal L	56.00	57.50	5.25	63.70	106.85	655.00
66	Mysore L	16.00	59.50	5.50	65.70	182.66	316.00
67	S-30	19.50	61.17	5.50	69.65	139.44	601.00
68	RFS-135	25.00	58.50	5.25	65.59	111.00	588.00
69	RFS-175	41.00	48.50	4.25	63.60	123.90	263.00
70	V1	14.50	59.25	4.75	66.50	139.00	433.00
71	Vishawa (DD)	14.00	55.75	6.75	70.63	136.42	387.00
72	Kajli	18.00	35.50	5.00	75.70	145.00	128.00
73	Matigara-L	14.00	86.00	6.25	65.04	186.88	360.00

#	Genotype	No. of branch	Shoot length (cm)	Avg Inter nodal distance (cm)	Moisture %	Wt of 100 leaves (gm)	Avg. leaf yield (gm)
74	H.P.-02/12	17.50	71.00	7.00	66.61	122.84	443.00
75	H.P.-02/13	NA	NA	NA	NA	NA	NA
76	H.P.-02/8	21.00	65.25	5.75	67.80	156.00	372.00
77	S-36	17.50	59.50	6.50	66.83	148.56	238.00
78	S-34	12.50	49.25	3.75	65.54	125.00	213.00
79	AR-12	12.50	49.25	3.75	66.78	154.00	307.00
80	AR-14	12.50	57.50	5.75	62.68	120.83	444.00
81	C-4	9.50	48.00	5.25	63.04	182.00	166.00
82	BR-2	10.50	61.67	4.75	65.61	83.87	117.00

Table-87:Morphological characters autumn, 2020

#	Genotype	No of branch (No)	Shoot length (cm)	Avg Inter nodal distance (cm)	Moisture %	Wt of 100 leaves (gm)	Avg. leaf yield (gm)
1	China White	18.00	72.75	4.58	77.17	338.67	643.67
2	S-741	15.67	86.67	4.33	70.37	144.00	231.33
3	Rokokuyaso	13.00	91.00	4.00	72.22	188.00	272.00
4	MS-3	13.00	68.25	3.00	67.74	248.00	245.00
5	Local lobed	17.00	43.5	3.75	68.42	152.00	186.00
6	Kokuso-27	15.67	72.25	4.83	74.39	218.67	381.33
7	Majra-11	-	-	-	-	-	-
8	MS-2	20.00	76.50	3.83	62.26	141.33	296.00
9	LF-2	14.33	62.17	3.67	63.38	189.33	390.00
10	MS-8	7.00	54.50	3.75	63.33	160.00	174.00
11	MS-1	14.00	39.50	3.42	64.81	144.00	136.00
12	MS-5	37.67	80.50	4.08	62.00	133.33	438.67
13	S-642	23.00	65.92	3.50	66.39	158.67	374.67
14	MR-2	20.00	82.42	3.83	65.43	122.67	328.33
15	S-799	15.50	71.75	3.75	70.00	280.00	370.00
16	MS-9	9.33	56.25	3.17	67.61	189.33	234.00
17	S-1096	14.33	51.33	3.25	69.74	202.67	246.00
18	S-523	14.00	54.25	3.50	67.80	157.33	211.33
19	Sujanpur	12.33	68.08	3.67	69.35	165.33	214.33
20	MS-6	11.67	46.00	3.58	60.71	149.33	183.33
21	C-776	19.33	78.33	4.33	67.07	218.67	516.67
22	S-31	13.00	70.58	4.17	74.68	210.67	340.67
23	S-1301	7.67	60.50	3.83	67.65	181.33	138.67
24	MS-7	13.00	52.00	4.00	57.78	120.00	236.00
25	C-763	18.33	85.75	5.58	66.37	296.00	464.00
26	C-741	28.67	75.00	4.33	63.46	138.67	302.33
27	K-2(M)	10.33	69.42	3.33	64.29	186.67	174.33
28	Ichinose	14.33	85.92	4.33	65.85	218.67	409.33
29	LF-1	6.33	67.50	3.92	62.07	154.67	233.33
30	PGDTR-9	7.50	31.00	3.25	53.57	112.00	188.00
31	Kaiyorosao	-	-	-	-	-	-
32	C-1729	18.33	77.08	4.92	72.84	216.00	470.00
33	S-1635	20.00	86.75	5.00	62.16	296.00	675.00
34	C-1726	14.33	59.17	3.75	55.29	113.33	198.67
35	C1730	16.00	53.75	3.75	65.22	184.00	419.33
36	Mandaley	10.00	54.33	3.00	69.35	165.33	204.00
37	S-1685	10.33	62.00	4.17	66.22	197.33	268.67
38	C-1608	9.67	27.17	3.75	54.55	117.33	643.67
39	C-1733	15.00	42.50	3.5	58.33	96.00	125.00
40	C-1690	16.00	70.67	2.92	55.06	118.67	350.00

#	Genotype	No of branch (No)	Shoot length (cm)	Avg Inter nodal distance (cm)	Moisture %	Wt of 100 leaves (gm)	Avg. leaf yield (gm)
41	TR-4	16.33	98.17	5.75	71.76	226.67	565.00
42	S-1708	17.50	74.88	4.25	64.21	190.00	567.50
43	TR-5	17.30	76.91	4.92	67.62	280.00	599.00
44	TR-8	14.00	77.42	5.17	67.82	232.00	663.00
45	S-13	10.00	62.50	3.50	67.65	272.00	402.00
46	Philipines	11.00	76.25	5.00	66.48	238.67	249.33
47	Punjab Local	16.33	95.00	4.58	67.50	213.33	290.00
48	K2 (S)	14.33	72.83	4.67	65.52	154.67	306.33
49	S 799	21.67	107.67	4.42	63.77	184.00	363.67
50	L-4	11.67	86.92	4.25	62.26	141.33	340.67
51	S-146	9.67	76.50	4.83	55.81	114.67	191.00
52	L-6	12.67	95.92	4.08	57.80	145.33	368.00
53	China White	9.67	74.58	4.83	63.40	204.00	351.00
54	S-41	9.67	75.16	5.17	56.86	204.00	337.67
55	L-1	16.00	80.91	5.00	63.46	138.67	516.33
56	L-3	9.67	76.50	4.75	81.25	298.67	333.33
57	Mandaley	12.67	96.17	4.50	76.70	274.67	341.00
58	Tr-10	9.33	90.00	4.08	67.35	130.67	265.33
59	S-1531	10.00	78.89	5.50	66.25	213.33	362.33
60	Chack Majra	10.67	79.08	4.50	68.97	232.00	503.33
61	S-54	10.67	85.92	4.00	67.14	186.67	488.67
62	Goshoerami	8.33	56.75	4.42	67.59	118.00	248.33
63	L-2	11.67	61.67	4.42	75.53	250.67	314.67
64	L-5	11.33	76.75	4.00	66.15	173.33	237.33
65	Kollegal L	47.67	84.00	3.25	60.00	120.00	896.67
66	Mysore L	20.00	97.67	4.75	63.64	146.67	567.33
67	S-30	12.33	84.00	3.58	65.67	178.67	534.00
68	RFS-135	11.67	94.42	3.58	68.50	338.67	675.00
69	RFS-175	9.00	71.67	3.42	72.32	298.67	483.33
70	V1	14.00	80.25	4.25	66.67	240.00	444.33
71	Vishawa (DD)	12.33	81.50	4.08	66.30	245.33	434.33
72	Kajli	-	-	-	-	-	-
73	Matigara-L	16.00	96.17	5.00	65.66	264.00	527.33
74	H.P.-02/12	15.00	81.17	3.92	60.94	170.67	481.33
75	H.P.-02/13	-	-	-	-	-	-
76	H.P.-02/8	9.00	87.08	4.58	69.16	285.33	409.67
77	S-36	12.67	80.08	4.17	67.59	288.00	414.67
78	S-34	9.67	77.92	4.33	64.94	205.33	292.33
79	AR-12	10.67	89.50	4.67	68.93	274.67	462.00
80	AR-14	14.00	90.75	3.83	69.49	314.67	600.67
81	C-4	9.00	81.50	4.42	74.71	348.00	375.33
82	BR-2	6.67	47.25	3.58	71.65	169.33	254.00

TRANSFER OF TECHNOLOGY

1. On Station Trials:

Name of Technology: Package and practices for autumn rearing through fortification of mulberry leaf
Project code: outcome of PIN-3608
Project Duration: Continuous
Investigator (s): Shivkumar, Bharath Kumar Neelaboina, K.K Rai & Rita Singh
Objective(s):

- Validation of the technology developed under the project with code PIN-3608 through OST.

Workdone:
The trial was carried out at 03 test site(s)*viz.* CSR&TI, Pampore, RSRS Jammu & RSRS, Sahaspur. The result of the trial at each test site is follows:

➢ At main Institute:

The rearing performance of CSR double hybrid treated with glutamic amino acid for ten economic traits conducted at CSR&TI, Pampore during autumn season,2020 is depicted in table-88.
Table-88:Rearing performance of CSR double hybrid treated with Glutamic amino acid during autumn, 2020

Amino Acid	Fecundity (No)	Hatching %	Weight of 10 mature larvae (g)	Yield/ 10,000 larvae brushed		SCW (g)	SSW (g)	SR (%)	Pupation (%)	Filament Length (m)
				By No.	By wt. (kg)					
Glutamic acid(0.5% conc.)	591	92.19	42	9460	13.8	1.66	0.35	20.93	91.5	990
Control-1 (No H_2O)	480	93.81	40	9120	12.625	1.60	0.30	19.04	90	887
Control-2 (H_2O)	576	92.07	41	9180	12.825	1.62	0.32	19.75	90.5	901
Average	549	92.69	41	9253	13.08	1.63	0.32	19.91	90.67	926
SD	60.22	0.97	1.00	181.48	0.63	0.03	0.03	0.95	0.76	55.87

Index: Control-1 = No spray (Normal control) and Control-2 = Spray with H_2O.**Source of seed**- CSR&TI, Pampore

Outcome:

- An increase of 5.87 Kg/100 DFLs in cocoon yield was observed in silkworm larvae fed with 0.5% Glutamic acid treated mulberry leaf over the control where no fortification was done at trial station of CSR&TI, Pampore.
- The shell ratio recorded in the treatment with amino acids was up to 20.93% with an increase of 1.89% over the control.
- The silk filament length recorded in the treatment with amino acids was up to 990m with an increase of 103m over the control.
- Fortification of mulberry leaf with 0.5% Glutamic acid found most suitable, profitable & recommended under the OST.

➢ At RSRS, Sahaspur:

The results obtained from the trial centre of RSRS, Sahaspur are depicted intable-89 along with the statistical test.
Table-89:Rearing performance of CSR double hybrid treated with Glutamic amino acid during autumn, 2020

Amino Acid	Fecundity (No)	Hatching %	Weight of 10 mature larvae (g)	Yield/ 10,000 larvae brushed		SCW (g)	SSW (g)	SR (%)	Pupation (%)	Filament Length (m)
				By No.	By wt.					
Glutamic acid(0.5% conc.)	-	-	42.5	9080	14.233	1.67	0.35	20.98	89.67	928
Control-1	-	-	37.67	8867	12.783	1.52	0.29	19.26	88	834

Amino Acid	Fecundity (No)	Hatching %	Weight of 10 mature larvae (g)	Yield/ 10,000 larvae brushed		SCW (g)	SSW (g)	SR (%)	Pupation (%)	Filament Length (m)
				By No.	By wt.					
(No H_2O)										
Control-2 (H_2O)	Loose eggs	92	38	9040	12.877	1.50	0.29	19.43	89.67	905
Average	-	-	39.39	8996	13.30	1.56	0.31	19.89	89.11	889
SD	-	-	2.70	113.21	0.81	0.09	0.03	0.95	0.96	49

Outcome:

- An increase of 7.25 Kg/100 DFLs in cocoon yield was observed in silkworm larvae fed with 0.5% Glutamic acid treated mulberry leaf over the control where no fortification was done at trial station of RSRS Sahaspur.
- The shell ratio recorded in the treatment with amino acid was up to 20.98% with an increase of 1.72% over the control.
- The silk filament length recorded in the treatment with amino acid was up to 928m with an increase of 94m over the control.
- Fortification of mulberry leaf with 0.5% Glutamic acid found most suitable, profitable & recommended under the OST.

➢ At RSRS, Jammu:

The results obtained at RSRS, Jammu during autumn 2020 was not up to the mark due to incidence of disease incidence during the rearing period. Hence, it was decided to repeat the trial at said site during spring 2021. The results obtained from the trial centre of RSRS, Jammu is depicted in table-90 along with the statistical test

Table-90: Rearing performance of CSR double hybrid treated with glutamic amino acid conducted under On Station Trial (OST) under validation of technology during spring 2021 at RSRS, Jammu.

Amino Acid	No. of Dfls	Hatching %	Larval Duration	Weight of 10 mature larvae (g)	Actual Yield (Kg)	Average yield/100 Dfls	SCW	SSW	SR%	Pupation
Glutamic acid (0.5% conc.)	50	96	25:12	52.0	36.70	73.40	1.69	0.389	23.02	97.0
Control	50	94	25:12	354.0	34.5	69.00	1.67	0.375	22.46	98.0
Average	100	95	25:12	53.0	71.2	71.2	1.68	0.382	22.74	98.0

Outcome:

- An increase of 4.4Kg/100 DFLs in cocoon yield was observed in silkworm larvae fed with 0.5% Glutamic acid treated mulberry leaf over the control where no fortification was done at trial station of RSRS, Jammu.
- The single shell weight recorded in the treatment with amino acids was up to 1.69g with an increase of 0.02g over the control.
- The shell ratio recorded in the treatment with amino acids was up to 23.02% with an increase of 0.56% over the control.
- Fortification of mulberry leaf with 0.5% Glutamic acid found most suitable, profitable & recommended under the OST.

2. On Farm Trials:

Title of OFT: Demonstration of root rot disease management of mulberry at farmers level in Kashmir
Investigators:Sahadev Chouhan, Rajesh Kumar, &Satish Y.
Duration: April, 2020-March, 2021
Objective:

- To demonstrate the management of root rot disease of mulberry in sericulture practising areas of Kashmir using 'Rot Fix'.

Progress: The demonstration of 'Rot Fix' was conducted in five villages of each North, Central and South Kashmir region.Fifty farmers / sericulturists from five villages (@10 sericulturists per village) at each location covering 150 farmers. The Root Rot infected mulberry plants were selected for demonstration and treated them with 'Rot Fix'.
Methodology Adopted: The demonstration of the 'Rot Fix', a target specific formulation developed by CSR&TI, Mysore was conducted at the mulberry farms, farmers fields of North, Central and South Kashmir including Department of Sericulture, P4, Manasbal and CSR&TI, Pampore (5 each at North, Central and South). Total 150 root rot infected mulberry plants were treated with Rot Fix at different locations. The data have been recorded on efficacy of Rot Fix application.
Method of Application:

- Pruning off the dried shoots of infected plants.
- Making a shallow ring around plant by removing the soil about 20-30 cm depth.
- Pouring Rot Fix solution made by mixing10 g Rot Fix in 2 litre water (0.5%).
- By applying Rot Fix solution the plant has been completely drenched 15-30 cm above ground and soil around plant. Then refilled the soil around the plant and firmly pressed it so as to get maximum effect. After three day treatment watering was done.
- Treatment of the surrounding mulberry plants were also considered to prevent disease spread.



'Rot Fix' for management of Root Rot disease at Chandigam



Digging of soil for application of Rot Fix at Rangwar



Imparted to Farmers in local language –Rot Fix application at Rangwar



Showing Root Rot damage in infected mulberry plant at Rednag



Demonstration of Rot Fix application at Dhobivan



Watering to plant after 3 day of treatment

Demonstration of Rot Fix application against Root Rot disease in infected mulberry plant in North Kashmir



Imparted Farmers of Ajas for management of Root Rot disease in mulberry by applying Rot Fix



Showing Root Rot symptom in infected plant



Digging of soil showing Root Rot infection



Preparation of Rot Fix solution at Pehlipora



Demonstration of Rot Fix application at Manasbal



Improvement in plant by reducing Root Rot infection

Demonstration of Rot Fix application against Root Rot disease in infected mulberry plant in Central Kashmir



Imparted Farmers of Achabal for management of Root Rot in mulberry by applying Rot Fix



Showing improvement after applying Rot Fix



Showing Root Rot infection to farmer at Ladhoo



Mulberry plant infected with Root Rot disease



Preparation of Rot Fix solution at Sallar



SDD employee explain about Rot Fix application to farmers at Satpakran

Demonstration of Rot Fix application against Root Rot disease in infected mulberry plant in South Kashmir

Observations/Results duly indicating the output in terms of adding to knowledge; know-how/new packages/practices/processes/products/ innovations developed and their utility and advantages; *etc*.:

- The observation was recorded after demonstration of 'Rot Fix' application.

- In North Kashmir a total of 50 root rot infected mulberry plants were treated with 'Rot Fix' in five villages viz., Rednag, Rangwar, Chandigam, Dhobivan and Nihalpora. Out of which 35 plants have shown recovery from the disease after the application of 'Rot Fix' (table-90)
- In Central Kashmir a total of 50 root rot infected mulberry plants were treated with 'Rot Fix' in five villages viz., Pehlipora, Vijpara, Manasbal, Ajas, and Sonmergteng. Out of which 37 plants have shown recovery from the disease after the application of 'Rot Fix' (table-91)
- In South Kashmir a total of 50 root rot infected mulberry plants were treated by 'Rot Fix' in five villages viz., Satpakran, Zantrag, Ladhoo, Achabal and Sallar. Out of which 38 plants have shown recovery from the disease after the application of 'Rot Fix' (table-92).

Table-91:Demonstration of application of 'Rot Fix' in North Kashmir

Region	Village	No. of plant treated	No. of plant showing recovery after Rot Fix application	No. of plant not showing recovery	% recovery
North Kashmir	Rednag	10	**7**	3	70
	Rangwar	10	5	5	50
	Chandigam	10	**7**	3	70
	Dhobivan	10	8	2	80
	Nihalpora	10	8	2	80
	Total	**50**	**35**	**15**	**70**

Table-92:Demonstration of application of 'Rot Fix' in Central Kashmir

Region	Village	No. of plant treated	No. of plant showing recovery after Rot Fix application	No. of plant not showing recovery	% recovery
Central Kashmir	Pehlipora	10	8	2	80
	Vijpara	10	7	3	70
	Manasbal	10	8	2	80
	Ajas	10	7	3	70
	Sonmergteng	10	7	3	70
	Total	**50**	**37**	**13**	**74**

Table-93:Demonstration of application of 'Rot Fix' in South Kashmir

Region	Village	No. of plant treated	No. of plant showing recovery after Rot Fix application	No. of plant not showing recovery	% recovery
South Kashmir	Satpakran	10	6	4	60
	Zantrag	10	6	4	60
	Ladhoo	10	8	2	80
	Achabal	10	10	0	100
	Sallar	10	8	2	80
	Total	**50**	**38**	**12**	**76**

Table-94: Statistical test: Paired t-test used to get the significance of 'Rot Fix' at the farmers' field.

Particulars	Before applying Rot Fix	After applying Rot Fix
No of plants demonstrated	150	150
Average disease %	31.3	14.5
P value	0.000**	

** Significant at 1% level of significance.

The above table reveals that after applying 'Rot Fix', the disease incidence reduced significantly at farmers' field in Kashmir valley.

Conclusion: The 'Rot Fix' is effective against Root Rot disease of mulberry and 73.33% recovery of plants recorded under field conditions in sericulture practicing areas of Kashmir.

Title of OFT: Private Chawkie Rearing Centre demonstration
Investigators:Sardar Singh& Surender Kumar
Duration: April, 2020-March, 2021
Objectiv:

- Demonstration& popularisation of private chawkie rearing among silkworm farmers

Progress:

With an aim to demonstrate & popularize the private CRC concept in 3P mode, a Chawkie rearing programme was organised in district Kathua of Jammu province during Autumn crop. CRC of 2100 DFLs was conducted by involving group of local silkworm rearers. Technology support was provided through RSRS Jammu and REC Barnoti. After CRC operation in rearers house, chawkiesilkworms weredistributed among 46 sericulture farmers during autumn 2020 in Dangara area of in Kathua district of J&K. As autumn crop is not stabilized in the area, and farmers are reluctant to take rearing during autumn, though an average yield of 29.3 kg / 100 DFLs was recorded with a gain of 27.03% against an average yield of 21.38 kg /100 DFLs distributed without chawki rearing. The demostrations has given idea and lead for develop a model for private CRC operatios under the conditions of North-West India.



Demonstrations at private Chawkie Rearing Centre (CRC) at Dangara, Distt. Kathua during Autumn (2020)

Title of OFT: Development / Popuraizatiion of Agro based model of mulberry tree plantationat farmers level
Investigators:Sardar Singh
Duration: April, 2020-March, 2021
Objective:

- Integration of sericulture practices with traditioanl agriculture practices

Progress:
Integration of sericulture practices with other agriculture practices without disturbing the ongoing agriculture practices and to generate scope of additional income form same piece of land was demonstrated in filed after successful development of the modal at RSRS Jammu. Under the programme as approved for the action plan for 2020-21, 11 farmers were identified (04 farmers in Lamberi area of Distt. Rajouri, J&K and 07 farmers in Kangra & Bilaspur districts of Himachal Pradesh) and total of 2100 mulberry saplings were planted in the farmers landholdings as a Agro based Model of Mulberry Tree plantation, in association with respective State Sericulture departments. Tree model of mulberry plantation was demonstrated with minimum 100 tree/farmer. After gestation period of three years and optimum leaf harvest from 4th year onwards it is expected that tree will produce about 10 kg of mulberry leaves /harvest and same ill be utilised for silkworm rearing and income thus generated will b over and above the from the same area of land.



Development of Agro based Model of Mulberry Tree Plantation in Distt. Rajouri, J&K and Distt. Kangra & Bilaspur, H.P

DEMONSTRATION OF TECHNOLOGY

Name of Technology:Multi-utility shelf rearing stand for commercial exploitation in J&K
Scientist involved: Sardar Singh
Abstract:

Traditioanlism is one of the identified botlelencek for increase in seed intake and improve quality cocoon production. Under technology demonstration, Multi-utility shelf rearing stands developed & designed by the scientist and adopted by Govt of HP were demonstrated among the field staff of DOS, J&K for large scale utility of the appliance in the field and its popularization among the sericulture farmers.

The product has been successful tried for rearing & mounting as well with adopted farmers with remarkable improvement in cocoon production in field under the Innovative Project (MOE03001SI) in Jammu province of J&K . The Utility and methodologies were discussed with the participants at SDD Directorate Complex, Reshamgarh Colony, Jammu on 10.11.2020. The Live demonstration was made in presence of Director, SDD, J&K and Additional Director(s) of both Jammu and Kashmir divisions among other field staff of SDD. Technology has been adopted and Sericulture Development Department (SDD) has made it part of rearing appliances unit under Silk Samagra





Demonstration of Technology for officers and Officials of Sericulture Development Department (SDD) J&K at Jammu on 10.11 2020 in presence of Director SDD and additional Director SDD .

CAPACITY BUILDING & TRAININGS (CBT)

The institute along with its RSRS's imparts need based training programmes in North & North West India on various aspects of sericulture at main institute and its nested RSRSs and REC's under Capacity Building and Training(CBT). The need based and demand driven training programmes in sericulture sector targets the sericulture farmers, Department of Sericulture (DoS) staff, technical staffs of CSB and other stakeholders of sericulture industry in the region for upgrading knowledge, skill and attitude of the beneficiaries. In addition to structured training programmers, this institute also imparts training on Silkworm Disease Management, mother moth examination and soil & moisture conservation for DoS officials and Non-profit organizations/other private sector firms across North Indian states.

Capacity Building & Training (CBT):

Training under Research and Development (R&D) sector, the structured training courses were imparted such as Intensive Bivoltine training programme (more than 30 days), Farmer Skill Training (FST) programme, exposure visit for technology awareness, Technical Orientation Programme (TOP) and Training under Post-Cocoon Sector to enhance skills of the stakeholders in sericulture sector under north Indian condition. In addition, the training under STEP were imparted i.e. Management development programme for 25 stakeholders at CSR&TI, Pampore. Along with above training programmes the Sericulture Resource Centers (SRC's) are established under CBT at farmer's location which is being operated by lead farmers to inculcate first hand information about rearing and management practices at doorstep of sericulture farmers. In addition to above mentioned training programmes, this institute also imparts need based and location specific training programmes for stakeholders in North India.

The brief progress of training programmes organised during the year 2020-21 is presented as under:

- A total of 827 persons/stakeholders were imparted skill enhancement training on various aspects of sericulture in north India under Capacity building & training programmes during the year 2020-21 with total annual expenditure of Rs. 1110557/-
- Training programme under STEP, The Management Development Programme were conducted at CSR&TI, Pampore for upgrading computing skills of GeM and PFMS. Under said programme a total of 25 stakeholders were benefitted.
- The training under R&D sector, The Farmer Skill Training (FST) programme were imparted to showcase recent technologies and to disseminate first hand information in sericulture sector of north Indian states, under FST Training programme, a total of 350 sericulture farmers were benefitted.
- In addition to FST, The Technical Orientation Programme (TOP) were conducted under the R&D sector, a total of 98 stakeholders were covered under said programme. The target groups of TOP programme includes Department of Sericulture (DOS) staff, CSB employees and other stakeholders in sericulture sector.
- Under structured training courses of R&D sector, The Post cocoon Technology Training were imparted to the weavers, rearers, students and other stakeholders in sericulture sector to strengthen post cocoon sector in north India. A total of 43 stakeholders/persons were benefitted under said programme.
- The sericulture resource centers (SRC) are established under CSR&TI Pampore and RSRS Sahaspur in collaboration with Sericulture Development Department (SDD) to inculcate first hand information about rearing and management practices under Capacity building and training (CBT) through lead farmer/progressive sericulture farmer. Under said programme a total of 311 sericulture farmers were benefitted in north India.

❖ AtCSR&TI, Pampore:

Table-95**:** Details of training programmes conducted

#	Training programme	Training Period	No of Trainees	Venue
1	Farmers Skill Training Programme (FST)	08.09.2020 to 02.09.2020 (05 Days)	25	P4 Seed Station, Manasbal, Kashmir
		08.03.2021 to 12.03.2021 (05 Days)	25	Achabal Seed Station, Anantnag
2	Technical Orientation Programme	22.02.2021 to 26.02.2021 (05 Days)	23	CSR&TI, Pampore
3	MDP under STEP	02.03.2021 to 04.03.2021 (3 Days)	25	CSR&TI, Pampore

#	Training programme	Training Period	No of Trainees	Venue
4	Post-cocoon Technology (PCT)	23.11.2020 to 27.11.2020 (5 Days)	21	CSR&TI, Pampore
		07.12.2020 to 11.12.2020 (5 Days)	22	CSR&TI, Pampore
5	Sericulture Resource Centre (SRC)	10.08.2020 (01 Day)	20	Sheikhpora, Anantnag
		22.08.2020 (01 Day)	20	Vail Nagbal, Anantnag
		27.08.2020 (01 Day)	21	Mouchow, Kulgam
		09.09.2020 (01 Day)	20	Saller, Anantnag
		26.09.2020 (01 Day)	20	Chadder, Kulgam
		31.10.2020 (01 Day)	20	Ainoo, Anantnag
		16.11.2020 (01 Day)	20	Losdanew, Shopian
		19.11.2020 (01 Day)	20	Hangalpawa
	Total		**302**	





Farmers Skill Training (FST)





Technical Orientation Programme (TOP)





Training on Post Cocoon Technology (PCT)

❖ At RSRS, Jammu:

Trainings under Capacity Building & Training (CBT)conducted at RSRS Jammu as per the target for the year 2020-21 (Table-96).However, one Intensive Bivoltine Training, (which was more than 30 days duration) couldn't be conducted due to unprecedented crisis due to Covid pandemic situation during the year.

Table-96:Details of training programmes conducted

#	Training programme	Training Period	No of Trainees	Venue
1	Farmers Skill Training Programme (FST)	03.11.2020 to 07.11.2020 (05 Days)	25	REC, Lamberi, J&K
		17.11.2020 to 21.11.2020 (05 Days)	25	REC, Lamberi, J&K
		17.11.2020 to 21.11.2020 (05 Days)	25	REC, Ghumarwin, HP
		23.11.2020 to 27.11.2020 (05 Days)	25	REC, Ghumarwin, HP
		19.01.2021 to 23.01.2021 (05 Days)	25	REC, Lamberi, J&K
		03.02.2021 to 08.02.2021 (05 Days) (with Sunday off on 07.02.21)	25	REC, Ghumarwin, HP
2	Technical Orientation Programme	04.01.2021 to 08.01.2021 (05 Days)	**25**	RSRS, Miransahib (Virtual Mode)
	Total		**175**	














Farmers Skill Training under CBT at REC level at Ghumarwin (Distt. Bilaspur, HP) and Lamberi (Distt. Rajouri,J&K)

Table-97:Training cum Exposure visits by farmers to RSRS, Jammu

#	Date / Period of Visit	Unit/Station/Institute	No. of Beneficiary	No. of days
1.	16.03.2021	SDD, J&K, Distt. Udhampur.	09 Farmers	01
2	16.03.2021	SDD, J&K, Distt. Kathua	07 Farmers	01
3	16.03.2021 to 18.03.2021	DOH, Sujanpur, Punjab	22 Farmers	03
4.	19.03.2021 to 21.03.2021	DOH, Mukerian, Punjab	20 Farmers	03
5	22.03.2021 to 24.03.2021	DOH, Haratika/Saarti, Punjab	25 Farmers	03
6.	24.03.2021 to 25.03.2021	DOH, Talwara, Punjab	20 Farmers	02
7	25.03.2021 to 27.03.2021	DOH, Bhatwan, Punjab	24 Farmers	03
TOTAL			**127 Farmers**	

❖ At RSRS, Sahaspur:

The station conducted 18 training programmes covering 350 beneficiaries under CBT for the year 2020-21 (Table-98).

Table-98:Details of training programmes conducted

#	Training programme	Training Period	No of Trainees	Venue
	Farmers Skill Training (FST)	01-12-20 to05-12-20	25	REC, Panchkula (HR)
		23-02-21 to 27-02-21	25	REC, Basti (UP)
		23-02-21 to 27-02-21	25	REC, Basti (UP)
		04-03-21 to 08-03-21	25	REC, Basti (UP)
		04-03-21 to 08-03-21)	25	REC, Basti (UP)
		16-03-21 to20-03-21	25	DOS, Ambari, Dehradun
	Technology Orientation	07-12-20 to11-12-20	25	REC, Haldwani (UK)

#	Training programme	Training Period	No of Trainees	Venue
	programme (TOP)	17-11-20 to 21-11-20	25	REC, Basti (UP)
	Sericulture Resource Centre (SRC)	16-02-21 to20-02-21	75	SRC, Haldiwani (UK)
		24-02-21 to 28-02-21	75	SRC, Haldwani, (UK)
	Total		**350**	

Table-99:Training programmes conducted other that CBT

#	Title of the training	Training period	Venue	No. of farmers covered					Total	Course Fee Collected (Rs.)
				SC	ST	OBC	Minor	Gen		
1	Mulberry Cultivation & Silkworm Rearing / Disease Management	16.02.21 to 20.02.21	D.O.S., Lakhimpur (U.P.)	0	0	09	0	0	09	2700/-
2	Mulberry Cultivation & Silkworm Rearing / Disease Management	16.02.21 to 20.02.21	D.O.S., Pilibhit (U.P.)	0	0	09	0	0	09	2700/-
3	Mulberry Cultivation & Silkworm Rearing / Disease Management	16.02.21 to 20.02.21	D.O.S., Meerut (U.P.)	02	0	04	03	02	11	3300/-
	Total			**02**	**0**	**22**	**03**	**02**		**8700/-**

SC: Schedule Cast; ST: Schedule Tribe; OBC: Other Backward Class; Min. Minority; GEN. General









Table-100: Consolidated details of training programmes conducted during the year 2020-21

#	Title of the training programme	Target			Achievement		
		No. of programmes	No. of stakeholders	Financial (Rs. in lakh	No. of programme	No. of stakeholders	Financial (Rs. in lakh)
3.1	Structured Training Course	--	--	--	--	--	--
3.1.1	PGDS	--	--	--	--	--	--
3.1.2	Intensive Sericulture Training	02	6.34	40	--	--	--
3.2	Farmers Skill Training	16	18.00	400	14	350	7.42413
3.3	Exposure visit for technology awareness	--	--	--	--	--	--
3.4	Technology Orientation Programme	04	3.80	100	04	98	1.38018
3.5	Sericulture Resource Centers (SRCs)	20	1.50	300	18	311	0.93626
3.6	**Training under Post Cocoon Sector**	--	--	--	--	--	--
3.6.1	Training on post cocoon technology	02	1.80	50	02	43	1.07424
3.7	Management Development Programme under STEP	01	0.38	25	01	25	0.29076
3.8	Training for Adopted Seed Rearers (ASRs)	--	--	--	--	--	--
3.9	Training to Registered seed Producers (RSPs)	--	--	--	--	--	--
3.10	Training on Seed Act	--	--	--	--	--	--
3.11	Other Need Based Training Programme	--	--	--	--	--	--
3.12	**Non-CBT:** Training programme funded by agencies other than CSB	-	-	-	-	-	-
3.13	**Training under SAMARTH**	--	--	--	--	--	--
3.13.1	Pre-cocoon (Silkworm rearing)	--	--	--	--	--	--
3.13.2	Post cocoon – Silk (Reeling, Spinning, Wet processing)	--	--			--	
3.13.3	Post cocoon – Handloom (Designing & Weaving)	--	--			--	
	Total	**45**	**31.82**	**915**	**39**	**827**	**11.10557**

RESEARCH EXTENSION CENTRES/CLUSTERS

Consolidated report on REC's/Clusters (2020-21):

Central Sericultural Research and Training Institute, Pampore is having extension network with 02 Regional Sericultural Research Stations located at Jammu (J&K), and Dehradun (U.K.), Three Research Extension Centers and one P4, Basic Seed Farm (B.S.F.) Station at Manasbal. 12 Clusters in J&K, H.P., U.K., and U.P.are operational under bivoltine cluster promotion programme. The extension activities are coordinated by respective RECs, RSRSs and Main Institute. Consolidated progress of all extension Centres and clusters is presented in table 101 to 103).

Table- 101: Consolidated Progress Report Of Clusters in North West India (2020-21):

#	Name of the Cluster/Mega Cluster	Particulars									
		No. of Villages covered during		No. of beneficiaries covered during		Qnty. of Silkworm Seed Distributed after chawkie (DFLs) during			Qnty. of Cocoons harvested (Kg) during		
		SPR.	AUT	SPR.	AUT	SPR.	AUT	Total	SPR.	AUT	Total
	Kashmir Valley										
1	Dachnipora	98	0	259	0	27925	0	27925	8349.51	0	8349.51
2	Sonawari	16	11	190	52	20700	7500	28200	5402	2250	7652
	Total	***114***	***11***	***449***	***52***	***48625***	***7500***	***56125***	***13751.51***	***2250***	***16001.51***
	Jammu										
3	Lamberi	16	10	305	66	29000	4000	33000	12636.6	836	13472.6
	Total	***16***	***10***	***305***	***66***	***29000***	***4000***	***33000***	***12636.6***	***836***	***13472.6***
	Uttar Pradesh										
4	Mahadeva	24	15	325	305	54500	50000	104500	32800	30035	62835
5	Gauspur	24	10	270	185	50000	37000	87000	30004	22207	52211
6	Kptangnj,Basti	28	30	368	310	58200	25900	84100	35036.4	14414.3	49450.7
7	Paraspur,	21	20	532	342	71800	49200	121000	43326.1	27060	70386.1
8	Dudahi	27	27	212	167	30000	20000	50000	17015	11319	28334
9	Gorakhpur	18	08	255	175	30000	20000	50000	17580	12040	29620
	Total	***142***	***110***	***1962***	***1484***	***294500***	***202100***	***496600***	***175761.5***	***117075.3***	***292836.8***
	Uttarakhand										
10	Kopa Chankpur	44	130	750	1036	36700	34100	70800	5946	13467	19413
11	Thari Gintigoan	43	90	510	860	34800	35100	69900	5707	14478.9	20185.9
	Total	***87***	***220***	***1260***	***1896***	***71500***	***69200***	***140700***	***11653***	***27945.9***	***39598.9***
	Himachal Pradesh										
12	Gumarwin(San)	132	90	656	370	48400	18500	66900	20350	5584	25934
	Total	***132***	***90***	***656***	***370***	***48400***	***18500***	***66900***	***20350***	***5584***	***25934***
	Grand Total:	**491**	**441**	**4632**	**3868**	**492025**	**301300**	**793325**	**234152.61**	**153691.2**	**387843.81**

Table-102: Consolidated Progress of Extension Communication Programmes under REC's during 2020-21

#	EVENT	UNDER REC'S		UNDER CLUSTER		TOTAL		Expenses (Rs.)
		NO	FARMERS	NO	FARMERS	NO	FARMERS	
1.	Krishi Mela	01	100	02	502	03	602	2.60
2.	Farmer Field Day	04	417	08	522	12	939	1.15
3.	Awareness Programme	08	822	20	1401	28	2223	1.96
4.	Technology demo/ Enlightment Prog.	06	129	22	528	28	657	0.26
	TOTAL	19	1468	52	2953	71	4421	5.97
A	Field Visits	86(454)				86	454	-
B	Others (Gr. Discusion)	03(20)				03	20	-

Table-103: Consolidated Demonstration of Technologies through Clusters by RECs 2020-21

#	NAME OF THE TECHNOLOGY	UNDER REC'S (No of farmers)	UNDER CLUSTER CENTRES
1	Mulberry Leaf Harvesting	210	7618
2	Mulberry Cultivation	-	75
3	Mulberry Leaf preservation	210	7608
4	Disinfection and Hygiene	210	7613
5	Feeding and Spacing	210	7638
6	Use of Bed Disinfectants (Vijetha &Ankush)	210	7713
7	Mounting, Harvesting & Drying	210	7638
8	Use of Sampoorna, Decol, Serichlore	220	3446
9	Vermi-composting	22	3446
	TOTAL	1502	52795

Research ExtensionCentre, Lamberi

Reasearch Extension Centre, Lamberi provided the need based technical support during Spring and Autumn, 2020 silkworm rearing conducted under Cluster promotion programme and details are depicted in Table-104 & 105.

Table-104: Details of Spring Crop, 2020 Lamberi Cluster:

Qty. of Seed Distributed (DFLs)	Hybrid	Source	No. of Rearers covered	No. of Villages covered	Cocoons harvested (Kg.)	Avg.Yield / 100 Dfls
1500	MASN4 x CSR4	SSPC Chintamani	-	-	638.000	42.533
5100	FC1 x FC2	SSPC Udhampur	-	-	1989.100	39.000
22400	FC1 x FC2	NSSO Bangalore	-	-	10009.500	44.685
29000	**-**	**-**	**305**	**16**	**12636.600**	**43.574**

Table-105: Details of Autumn Crop, 2020 Lamberi Cluster:

Qty. of Seed Distributed (DFLs)	Hybrid	Source	No. of Rearers covered	No. of Villages covered	Cocoons harvested (Kg.)	Avg.Yield / 100 Dfls
4000	FC1 x FC2	SSPC Madanapalli	66	10	836.0	20.67

Other Activities:

- Monitored the field trial rearing undertaken under the research project entitled “Innovative approach for multiple cocoon crops and stabilization of autumn crop” (MOE-03001SI) during Spring, Summer and Autumn 2020 respectively.
- Monitored the raising of plantation at field level under On Farm Trial entitled “ Development of Agro based Model of Mulberry Tree Plantation”& 600 Mulberry plants of improved S146 variety were distributed among four sericulture farmers and tree type plantation was raised at the spacing of 8 x 8 feet.
- Technologies like use of plastic collapsible mountage in summer and autumn rearings, use of local mounting material, use of bed disinfectants etc were demonstrated to the beneficiaries during supervision of silkworm rearing at field level.
- Chawkie garden of 250 mulberry plants of improved Vishala variety was established in the REC farm with spacing 3 x 3 for CRC Lamberi.
- 2 acres of mulberry farm attached with REC was maintained by practing advocated cultural operations.
- The unit conducted 13 extension programmes covering 576 famers in the field areas of Lamberi
- One Resham Krishi Melawas organized by the unit with a participation of 152 farmers
- 03 Farmers Skill Training programmes under CBT were organized wherein 75 farmers were trained in three different batches with an intake of 25 trainees per batch.

Research Extension Centre, Ghumarwin

Reasearch Extension Centre, Ghumarwin monitored/suprvised cluster activites in association with the State Sericulute Department. Progress of the Spring and Autumn rearings 2020 in the cluster areas is as follows (Table-106 to 109):

- **Spring Rearing 2020:** During spring 2020, 71,500 DFLs were chawki reared and distributed among 966 farmers and a total of 30302.19 kg cocoons were harvested with an average yield of 42.38 kg/100 DFLs.
- **Autumn Rearing 2020:**During Autumn, 2020, 35000 DFLs were chawki reared and distributed among 700 farmers and a total of 10605.36 kg cocoons were harvested with an average yield of 30.30 kg/100 DFLs.

Table-106: Rearing performance under cluster Ghumarwin (Spring, 2020)

Qty. of Seed Distributed (DFLs)	Hybrid	Source	No. of Rearers covered	No. of Villages covered	Cocoons harvested (Kg.)	Avg.Yield / 100 Dfls
7900	NB4D2xSH6 (S)	DOI, Palampur	104	44	3265.6	41.34
4900	NB4D2xSH6 (A)	DOI, Palampur	66	25	2013.75	41.10
4400	SH6xNB4D2 (S)	DOI, Palampur	59	25	1885.35	42.85
3100	SH6xNB4D2 (A)	DOI, Palampur	43	25	1278.8	41.25
6300	NB4D2xSH6	SSPC, Udhampur	83	34	2647.7	42.03
8100	FC2xFC1	SSPC Dehradun	108	40	3445.54	42.54
4300	FC1xFC2	SSPC Dehradun	57	38	1776.85	41.32
5000	Single Hybrid	SSPC Vijeypura	68	38	2104.3	42.09
3100	Double Hybrid	SSPC Madanapalli	42	13	1307.45	42.18
1300	MANS4xCSR4	SSPC Chintamani	26	16	625.2	48.09
48400			**656**	**298/132**	**20350.54**	**42.05**

Table-107: Rearing performance under cluster Ghumarwin (Autumn, 2020)

Qty. of Seed Distributed (DFLs)	Hybrid	Source	No. of Rearers covered	No. of Villages covered	Cocoons harvested (Kg.)	Avg.Yield / 100 Dfls
8500	NB4D2xSH6	SSPC Dehradun	170	61	2581.600	30.73
500	SH6xNB4D2	SSPC Dehradun	10	6	148.500	29.70
3900	FC1xFC2	SSPC Dehradun	78	35	1160.100	29.74
5600	FC2xFC1	SSPC Dehradun	112	36	1693.870	30.25
18500			**370**	**138/90**	**5584.070**	**30.18**

Table-108: Rearing performance under cluster Sanghaswin (Spring, 2020)

Qty. of Seed Distributed (DFLs)	Hybrid	Source	No. of Rearers covered	No. of Villages covered	Cocoons harvested (Kg.)	Avg.Yield / 100 Dfls
3500	NB4D2xSH6 (S)	DOI, Palampur	46	11	1371.25	39.18
1100	NB4D2xSH6 (A)	DOI, Palampur	15	9	424.1	38.55
2800	SH6xNB4D2 (S)	DOI, Palampur	37	19	1126.15	40.22
5400	NB4D2xSH6	SSPC, Udhampur	72	29	2276.55	42.16
2400	FC2xFC1	SSPC Dehradun	33	9	1068.15	44.51
3900	Single Hybrid	SSPC Vijeypura	53	22	1868.35	47.91
4000	Double Hybrid	SSPC Madanapalli	54	25	1817.1	45.43
23100			**310**	**124/71**	**9951.65**	**43.08**

Table-109: Rearing performance under cluster Sanghaswin (Autumn, 2020)

Qty. of Seed Distributed (DFLs)	Hybrid	Source	No. of Rearers covered	No. of Villages covered	Cocoons harvested (Kg.)	Avg.Yield / 100 Dfls
7000	NB4D2xSH6	SSPC Dehradun	140	47	2133.290	30.48
500	SH6xNB4D2	SSPC Dehradun	10	3	155.350	31.07
3600	FC1xFC2	SSPC Dehradun	72	25	1059.300	29.42
5400	FC2xFC1	SSPC Dehradun	108	38	1673.350	30.99
16500			**330**	**113/90**	**5021.290**	**30.43**

Other Activities:

- 13 Extension Communication Programmes were organized in the field areas of REC Ghumarwin comprising of 06 Awareness programmes, 04 Technology Demonstration / Enlightenment programme and 03 Farmers Field Day programme covering 597 farmers.
- 03 Farmers Skill Training programmes under CBT were organized in three different batches with intake of 25 farmers each batch covering 75 farmers who were given training on different aspects of sericulture.
- The REC conducted three silkworm rearings successfully during Spring, Summer and Autumn season 2020 through the selected farmers in coordination with DOI, HP under the research project entitled "Innovative approach for multiple cocoon crops and stabilization of autumn crop" (MOE-03001SI).
- Monitored raising of mulberry plantation in field under OFT of RSRS, Jammu "Development of Agro based Model of Mulberry Tree Plantation" and 1500 Mulberry plants of improved variety arranged by DOI, HP raised through private kisan nursery were distributed among seven sericulture farmers of Kangra and Bilaspur district of HP and tree type plantation was raised at the spacing of 8 x 8 feet.

Research Extension Centre, Barnoti

Research Extension Centre, Barnoti, Kathua (J&K) was functioning since 2003, but under restructuring policy of Central Silk Board, the unit was closed in December 2020. During the year 2020-21, the unit continued to moniter the existing cluster at Dangara. The silkworm rearing progress at farmer level in the cluster area during Spring and Autumn, 2020 is as :

- **Spring Rearing 2020:**During Spring Crop 2020, a total of 50000 DFLs of CSR double hybrid, FC1x FC2, FC2xFC1, and MASN4 x CSR4 were reared by 556 farmers with a total harvest of 21347.00 kg with an average yield of 42.69 kg/100 DFLs (Table-110).

Table-110: Rearing performance under cluster Dangara (Spring, 2020)

Qty. of Seed Distributed (DFLs)	Hybrid	Source	No. of Rearers covered	No. of Villages covered	Cocoons harvested (Kg.)	Avg.Yield / 100 Dfls
28700	Double Hybrid	SSPC Udhampur	318	-	12179.000	42.400
20000	Double Hybrid	SSPC Vijayapura	218	-	8538.000	43.100
1500	MASN4 x CSR4	SSPC Chintamani	20	-	630.000	42.000
50000	-	-	**556**	**21**	**21347.000**	**42.690**

- **Autumn Rearing 2020:**A total of 1900 DFLs of Double hybrid were also distributed among 34 farmers under the Cluster promotion programme with a total harvest of 399.38 kg with an average yield of 21.02 kg./100 DFLs. In addition 2100 DFLs were taken up under the private CRC demonstration programme.

Other Activities:

- The unit organised a private Chawkie Rearing Centre in the village Dangara by involving a progressive farmer of the village namely Sh. Kullu Ram. The selected farmer with the technical/logistic support of REC Barnoti, successfully conducted the incubation and chawkie rearing of 2100 DFLs of FC1 x FC2 (Double hybrid) and the chawki reared worms were distributed among 46 farmers with a total harvest of 615.30 kg cocoons recording an average yield of 29.30 kg/100 DFLs.
- The REC conducted three silkworm rearings successfully during Spring, Summer and Autumn season 2020 through the selected farmers in coordination with DOI, HP under the research project entitled “Innovative approach for multiple cocoon crops and stabilization of autumn crop” (MOE-03001SI).
- 2.5 acre mulberry plantation (5900 plants) maintained with package and practices for production of quality leaf for silkworm rearing. Cleaning, weeding and irrigation in the farm carried out periodically.The leaf is used for chawkie rearing, departmental rearing and supplied to farmers for commercial rearing.

Old Khoon Cluster

CSB sub-unit was closed under restructuring programme during 2018, however, RSRS, Jammu continued to extend technical support to DOS, J&K in the field activities of Old Khoon cluster area of district Udhampur enlisted as under:

- **Spring Rearing 2020:**During Spring crop 2020, 30000 Dfls of bivoltine silkworm hybrid of different combinations from different sources were chawkie reared and distributed among 300 farmers in 09 villages of Ramkot area. A total of 14112.8 Kg of green cocoon were harvested with an average yield 47.04 kg/100 Dfls (Table-111).

Table-111: Rearing performance under erstwhile Ramkot Cluster (Spring, 2020)

Qty. of Seed Distributed (DFLs)	Hybrid	Source	No. of Rearers covered	No. of Villages covered	Cocoons harvested (Kg.)	Avg.Yield / 100 Dfls
2000	MASN4 x CSR4	SSPC Chintamani	25	--	1043.000	52.150
4500	Double Hybrid	DOS J&K	40	--	1693.000	37.620
6000	Double Hybrid	SSPC Udhampur	58	--	2582.000	43.030
17500	Double Hybrid	NSSO Bangalore	177	--	8795.000	50.250
30000	**--**	**--**	**300**	**09**	**14113.000**	**47.040**

- **Autumn Rearing 2020:** During Autumn 2020, 2000 Dfls of bivoltine silkworm hybrid were chawkie reared and distributed amongst 45 rearers in 07 villages of Ramkot area. A total of 432.600.00 kg of green cocoon were harvested with an average yield of 21.63 kg/100 DFLs.

Other Activities:

- Under the research project "Innovative approach for multiple cocoon crops and stabilization of autumn crop" (MOE-03001SI), three crop pattern was successfully implemented (Spring, Summer and Autumn season 2020) in field through the selected farmer in Ramkot area of Udhampur district monitored by RSRS Miransahib, Jammu.
- 04 Extension Communication Programmes were organized by RSRS, Jammu in association with DOS, J&K in the field areas of district Udhampur comprising of 01 Awareness programmes and 03 Technology Demonstration / Enlightenment programme covering 140 farmers.

Research Extension Centre Sub-Unit, Panchkula

The REC Sub-Unit, Panchkula continued to cater the extension needs of farmers who are practicing sericulture, covering Shivalik field areas only in District Panchkula, Ambala and Yumunanagar in Haryana State.

The REC provides the technological support & time to time technical guidance to sericulture farmers of Districts Panchkula, Ambala and Yumunanagar in Haryana State and conducted the extension communication programmes with the following work programmes:

- **Spring Rearing 2020:**A total of 2400 DFLs of bivoltine hybrids SH6 x NB4D2, NB4D2 x SH6 and FC1 x FC2 received from SSPC, Dehradun were chawkie reared at CRC, Fatehpur & Pinjore. The worms were distributed amongst 60 farmers covering 26 villages and recorded an average yield of 23.28 kg/100 DFLs. The spring commercial rearing could not be progressed up to the desired mark in view of strict restrictions on public movement imposed by the Govt. for containment of Coronavirus (Covid-19) pandemic as rearers were not allowed to go outside frequently to pluck the mulberry leaves for feeding to silkworm during 4th& final stage of rearing. Thus continued nationwide lockdown was the main constraint for not achieving the fixed targets and as such hampered the silkworm crop at commercial level (Table-112).

Table-112: Rearing performance of REC, Panchkula (Spring, 2020)

Qty. of Seed Distributed (Dfls)	Combination	No. of Farmers	No. of Villages	Total cocoon harvested (kg)	Yield/ 100 DFL (Kg.)
2400	SH6 x NB4D2 & reciprocal FC1 x FC2	60	26	558.720	23.28

- **Autumn Rearing 2020:** A total of 2100 DFLs of bivoltine hybrid NB4D2 x SH6 and SH6 x NB4D2 received from SSPC, Dehradun were chawkie reared at CRC, Fatehpur & Pinjore were distributed amongst 55 rearers in 30 villages. An average yield of 23.51 kg/100 DFLs was recorded (Table-113).

Table-113: Rearing performance of REC, Panchkula (Autumn, 2020)

Qty. of Seed Distributed (Dfls)	Combination	No. of Farmers	No. of Villages	Total cocoon harvested (kg)	Yield/ 100 DFL (Kg.)
2100	SH6 x NB4D2 & reciprocal	55	30	493.710	23.51

Other activities:

- A total of 9900 mulberry saplings of S-146 variety were distributed to 33 farmers through DOH in the new adopted field areas for raising the boundary plantation in order to maximize the mulberry foliage.
- 25 quantials of cutting material of S-146 improved variety were supplied to SSO, DOH, Panchkula for raising nursery by planting 40000 cuttings at departmental level.
- Regular cultural operations viz. weeding, digging, dressing of plants, pruning, application of vermicompost/FYM & chemical fertilizer, repairing of irrigation channels, bunds and irrigation were carried out during the period under report for proper growth and maintenance of 4.64 acre of mulberry garden at CRC, Fatehpur and Pinjore.
- A total of 25000 cuttings of improved mulberry cultivar S-146 planted during winter season of 2019-20 in the departmental nursery at Fathepur farm were properly maintained and raised saplings supplied to farmers through DOH, Haryana for maximizing the mulberry foliage at field level during January, 2021.
- The unit conducted 04 Technology Demonstration/Enlightenment Programme, 04 Awareness Programme, 02 Farmers Field Day during the year 2020-21 under ECP and covered 705 farmers, besides field demo. programmes were organized for on spot interaction with rearers to update their level of understanding in different aspects of sericulture under adopted field areas.
- Under CBT, the unit conducted 01 Farmers Skill Training Programme (FST) for 05 days during December, 2020 and covered 25 farmers as per drawn out programme.
- 05 Short Term Training Course cum Exposure visits under TOP for sericulture farmers organized by DOH, Haryana in collaboration with REC, CSB Panchkula during the year 2020-21, covering a total of 156 farmers for which all necessary training inputs, subject wise lectures and technical support were provided to DOH and made their training programmes successful.

Research Extension Centre, Basti

Research Extension Centre Basti provided technical support to the sericulture farmers through DOS in the 06 clusters located at Paraspur (Gonda), Kaptanganj (Basti), Gorakhpur, Dudahi (Kushinagar), Mahadeva (Bahraich) and Gauspur (Shravasti). The rearing performance is depicted in table-114.

Table-114: Rearing performance under 06 clusters (Spring & Autumn, 2020)

Name of the Cluster	Season	No. of Village covered	No. of Farmer covered	No. of DFLs supplied	Total cocoon yield (kg) green	Yield/ 100 DFLs (kg)
Paraspur Gonda	Spring	21	532	71800	43326.10	60.34
	Autumn	20	342	49200	27060.00	55.00
Kaptanganj Basti	Spring	28	368	58200	35036.40	60.20
	Autumn	30	310	25900	14414.30	55.65
Gorakhpur	Spring	18	255	30000	17580.00	58.60
	Autumn	08	175	20000	12040.00	60.20
Dudahi Kushinagar	Spring	27	212	30000	17015.00	56.72
	Autumn	27	167	20000	11319.00	56.60
Mahadeva Bharich	Spring	24	325	54500	32800.00	60.18
	Autumn	15	305	50000	30035.00	60.07
Gauspur Sravasti	Spring	24	270	50000	30004.00	60.01
	Autumn	10	185	37000	22207.00	60.02
Total	**Spring**	**142**	**1962**	**294500**	**175761.50**	**59.68**
	Autumn	**110**	**1484**	**202100**	**117075.30**	**57.93**

Other activities:

- The unit carried out routine regular survey for the diseases of mulberry plants in the operational area. It is revealed that there is a negligible incidence of disease and losses in the mulberry fields of the area. No severe pest infestation in mulberry field was recorded The farmers were educated about the control of the disease in their area. No Uzi incidence was recorded during the survey.
- The silkworm waste and mulberry waste leaves were used to prepare vermicompost at farmer level &farmers were trained during different Extension Communication program.
- Demonstration on importance of disinfectant (s) , method of disinfection, its preparation and application with the help of power sprayer was given tofarmers.
- The unit has conducted 04 Farmer Skill Training programmes covering 100 farmers & 01 Technical Orientation Programme covering 25 beneficiaries.
- The unit conducted 12 Extension Communication Programmes covering 921 farmers

Research Extension Centre, Bhadrasi

In view of the restructuring policy of Central Silk Board, the centre was closed in the month of December, 2020. The work carried out by the centre is summed up as:

- **Spring Rearing 2020**: During spring crop, 3200 DFLs after chawkie rearing were distributed among 40 farmers of 08 villages & a total production of 1396.800 kg cocoons was harvested with an average yield of 45.66 kg/100DFLs. The source of DFLs was SSPC NSSP, Dehradun through DOS UP (Table-115).

Table-115: Rearing performance of REC Bhadrasi (Spring-2020)

Season/Year	No. of DFLs reared	Combination	No. ofFarmers	Total Yied (kg)	Yield/ 100 DFLs (Kg)
Spring	3200	FC_2 X FC_1	40	1396.800	45.66

- **Monsoon Rearing 2020:**

Thechawki rearing of 2000 DFLs of Multi x Bi combination was reared and after successful chawki rearing the larvae were distributed among 30 farmers. The total production was 740.800 kg with an average yield of 37.45 kg/100 DFLs (Table-116).

Table-116:Rearing performance of REC Bhadrasi (Monsoon-2020)

Season/Year	No. of DFLs reared	Combination	No. ofFarmers	Total Yied (kg)	Yield/ 100 DFLs (Kg)
Monsoon	2000	Ni x BV	30	740.800	37.45

- **Autumn Rearing 2020:**

The chawki rearing of 2000 DFLs of bivoltine hybrids was conducted and after chawki rearing, the larvae were distributed among 30 farmers with the total production of 935.800 kg cocoons with an average cocoon yield of 46.77kg/100DFLs (Table-115).

Table-117: Rearing performance of REC Bhadrasi (Autumn-2020)

Season/Year	No. Of DFLs reared	Combination	No. ofFarmers	Total Yied (kg)	Yield/ 100 DFLs (Kg)
Autumn	2000	NB4D2 x SH6	30	935.800	46.77

Other activities:

- Mulberry garden of 1.85 acre was maintained as per the recommended package of practices.

Research Extension Centre, Haldwani

REC, Haldwani extended technical support to Department of Sericulture in the cluster areas *viz.* Thari-Gintigaon (Nainital) and Kopa- Chankpur (Udham Singh Nagar) of Uttarakhand. However, due to restructuring policy of Central Silk Board, the centre was closed during December, 2021. The activities undertaken by the centre are as follows:

- **Spring Rearing 2020 in assoation woth DOS Uttarakhand**

A total of 36700 DFLs reared by 750 farmers in the cluster Thari-Gintigaon (Nainital) and 5946.00 Kg green cocoons were harvested with an average yield of 16.20 kg/100 DFLs while in Kopa-Chankpur (Udham Singh Nagar) a total of 34800 DFLs reared by 510 farmers produced 5707.00 Kg green cocoons with an average yield of 16.40 kg/100 DFLs. The low average of cocoon yield/100 DFLs was due to COVID-19.

- **Autumn Rearing 2020 in association with DoS Uttarakhand:** A total of 34100 DFLs were reared by 1036 farmers in the cluster Thari-Gintigaon (Nainital) and produced 13467 Kg green cocoons with an average yield of 39.49 kg/100 DFLs whereas 35100 DFLs were reared by 860 farmers in the cluster Kopa-Chankpur (Udham Singh Nagar) produced 14478.900 Kg green cocoons with an average yield of 41.25 kg/100 DFLs.

Other activities:

- 10 training programmes under Sericulture Resource Centre were conducted *w.e.f.* 16-02-2021 to 20-02-2021 (5 days) & 24-02-2021 to 28-02-201 (5days) during the month of February, 2021, covering a total of 150 beneficiaries.
- 04 Technical Demonstration cum Enlightenment Programmes were conducted, under which 80 farmers were covered.

P4-BASIC SEED FARM, MANASBAL, KASHMIR (J&K)

The P4, Basic Silkworm Seed Farm is situated at the north bank of Manasbal Lake about 30 km from Srinagar Jammu and Kashmir. Originally Regional Research Laboratory (CSIR), Srinagar had a Drug Research Centre at this lake side land at Manasbal (J&K) which was later taken over by Sericulture Development Department, (Govt. of J&K) Srinagar. Central Silk Board, Govt. of India in the year 1984 established P3 Basic Silkworm Seed Farm on an area of 39 acres of land at Manasbal (Kashmir). From 2000-2021 onwards, four (04) silkworm races *viz.*, SH-6, NB4D2, CSR-2 and CSR-4 were maintained as parental stock of bivoltine silkworm races. Out of these, four silkworm races, three races were replaced by CSR-6, CSR-26 and CSR-27 in 2013 and seven more silkworm races *viz.*, Pam-114, Pam-115, Pam-116, Pam-117, CSR6, CSR-26 and CSR-27 were added for maintenance under breeder's stock. The fresh parental stock is being received from the breeder institutes after every two year to maintain the parameters as per the bench mark data.

Achievements / highlights:

- Maintenance of Breeders' Stock of thirteen silkworm races *viz.*, SH6, NB4D2, CSR2, CSR4, CSR6, CSR26, CSR27, CS6, Pam101, Pam114, Pam115, Pam116 and Pam117 in P3 were maintained.
- One (01) **Seri-cluster** is running under the station covering 190 sericulture farmers. 7652 kg of cocoon production was achieved by disseminating the new evolved technologies such as disinfection, chawkie rearing, leaf preservation, late age rearing and shoot rearing to the farmers.
- Maintenance of Temperate Mulberry Germplasm Bank (TMGB): Mulberry plantation of 83 genotypes / accessions is raised in 1.15 acre of land under this programme which was maintained as per norms.
- Farm up gradation Programme: Area of 0.25 acres land was brought under up gradation programme.
- Revenue Generation: An amount of ₹20,410/- (₹Twenty thousand, four hundred ten) only was generated as revenue by selling, auction of unserviceable dead articles, old and unwanted mulberry and rejected cocoons.
- The station has linkages with Sericulture Development Department of Govt. of Jammu & Kashmir for fulfilling their requirement of P-2 level silkworm seed.
- The station supplied Ten (10) dfls each SH6 & NB4D2 of P3-level to P3 NSSO, CSB, Majra Dehradun (UK) as per their indent.

Reserach Programmes and projects:

- Establishment of a safety backup with 55 mulberry accessions of cold & temperate mulberry varities.
- **Maintenance of Temperate Mulberry Germplasm Bank (TMGB)**:The station is maintaining 83 genotypes / accessions in 1.15 acre under dwarf type of plantation for the multiplication of breeding material. The plantation was maintained as per applied package of practices. The list of genotypes / accessions maintained at this station is given in table-118.

Table-118:List of mulberry genotypes / accessions maintained at P4 Manasbal.

#	Genotype/Accession	#	Genotype/Accession	#	Genotype/Accession
01	Almora Local	29	Ichihei	57	Punjab Local
02	AR-12	30	Ichinose	58	Rokokiyaso
03	AR-14	31	Italian Sernal	59	Senmetsu
04	ACC-48	32	Kasuga	60	Shimnouchi
05	ACC-67	33	Kanva-2	61	Sanish-5
06	ACC-77	34	Kokuso-13	62	Shrim-5
07	ACC-92	35	Kokuso-20	63	Shrim-8
08	ACC-99	36	Kokuso-21	64	Serpentaina
09	ACC-100	37	Kokuso-27	65	S-30
10	BR-2	38	Kairyoroso	66	S-36
11	BC-259	39	K2 x Kosin	67	S-41
12	Brantual Kashmir	40	Karionizamigashi (KNG)	68	S-54
13	Butatul	41	Kosin	69	S-146
14	C-4	42	Limoncina	70	S-799
15	Chinese White	43	Lajaward	71	S-1531
16	Chatatul Zangir	44	Mysore Local	72	S-1635
17	Chatatul	45	Muraiso	73	S-1708
18	Chinar Pati	46	*M.multicaulis*	74	T.sukasagwa

19	C-776	47	Mandalay	75	Tomeiso
20	C-1733	48	ME-27	76	TR-10
21	Exotica	49	ME-53	77	Togowase
22	English Black	50	ME-58	78	Victory
23	Enshatkasukwe	51	ME-129	79	Zagtul
24	FGDTR	52	MS-8	80	Zangbad
25	French	53	Vishalla	81	*Morus Nigra*
26	Female Local	54	Nadigam	82	PPR1 (S140)
27	Goshoerami	55	Obowase	83	Shivalik
28	Himachal Local	56	Okinowa		

Maintenance of Breeders' Stock of Newly Evolved F_1 Selections: The separate plantation of F1 selections (viz., S-106, S-140 and S-145) is maintained in an area of 0.25 acres with 200 plants in each selection (Total 600). It was maintained at a spacing of 3 ft. x 6 ft. under dwarf pattern to raise breeding stock for further multiplication and was maintained as per the package of practices under temperate climatic conditions.

Up gradation programme: under upgradation programme the station covered 0.25 acres of land by planting saplings of 11 top ranking breeding selections and is maintained as per package of practices.

Maintenance of Breeder's Stock (P3): The station maintained thirteen silkworm races *viz*, SH6, NB4D2, CSR2, CSR4, CSR6, CSR26, CSR27, CS6, Pam101, Pam114, Pam115, Pam116 and Pam117 as per norms. The rearing of these parents was conducted in cellular mode in spring, 2020. After 3rd stage 250 larvae were retained. The seed prepared in all the races and shifted to cold storage for hibernation. Performance of the races is given in tables 119 & 120.

Table-119:Performance of P3 silkworm rearing during spring, 2020

Race	**Fecundity**	**Hatching %**	**Yield / 10, 000 larvae brushed**		**Single cocoon wt. (gms.)**	**Single shell wt. (gms.)**	**Shell ratio %**	**Pupation rate**
			By No.	**By Wt.**				
SH6	588	97.56	9744	16.61	1.70	0.30	17.70	92.00
NB4D2	581	98.06	9864	15.51	1.53	0.29	18.69	93.00
CSR2	587	97.73	9888	15.30	1.48	0.28	18.75	93.00
CSR4	505	97.20	9800	15.93	1.57	0.29	18.75	92.00
CSR6	505	97.55	9672	14.50	1.49	0.29	19.62	92.00
CSR26	514	97.78	9864	14.78	1.48	0.28	19.20	9100
CSR27	527	97.33	9832	15.64	1.49	0.28	18.77	91.00
CS6	557	97.68	9848	16.42	1.61	0.29	18.18	94.00
Pam101	561	97.64	9768	16.07	1.58	0.30	19.18	92.00
Pam114	559	97.50	9824	16.49	1.64	0.30	18.57	91.00
Pam115	567	97.12	9768	15.63	1.61	0.30	18.49	93.00
Pam116	555	98.49	9744	16.04	1.61	0.29	17.90	93.00
Pam117	581	97.75	9784	15.64	1.56	0.30	19.02	93.00

Table-120: Top ranking parameters of P3 lines being maintained at P-4 Manasbal

Fecundity	Highest	SH-6	588
	Lowest	CSR-4	488
Hatching percentage	Highest	PAM-116	98.49
	Lowest	CSR-4	97.20
Yield/10,000 larvae brushed (By No.)	Highest	CSR-2	9888
	Lowest	CSR-6	9672
Yield/10,000 larvae brushed (By **Wt.)**	Highest	SH6	16.61
	Lowest	CSR-6	14.50
Single cocoon wt. (gms.)	Highest	PAM-114	1.64
	Lowest	CSR-2	1.48
Single shell wt. (gms.)	Highest	PAM-117	0.30
	Lowest	CSR2	0.28
Shell ratio %	Highest	CSR6	19.62
	Lowest	SH6	17.70

Revenue Generation Programme: An amount of Rs. 20410/- (Twenty thousand four hurndred ten only) was generated as revenue during the period.

POST COCOON TECHNOLOGY

During the period under report Post cocoon section of the institute has carried out following activites:

1. **Testing of raw silk samples:**

Table-121: Detailes of samples

#	Name of the organization	Raw – silk variety	Filature Type Limited /All test	Total
1.	M/S Govt. Silk Filature, Rambagh Srinag (Under Jammu & Kashmir Industries Dep	20/22 28/32	118 130	248
Total			248	248

2. **Average Test Performance of Raw – Silk Quality:**

Table-122:M/S Govt. Silk Filature Srinagar (Under J&K Industries Deptt.)

Target Denier	Average Size(Denier	Total No. of samples	Average Winding Breaks	Average Size deviation.	Average. Maximum deviation.
20/22	22.30	118	-	2.36	3.52
28/32	30.20	130	-	3.21	4.52

3. **Demonstration of Technologies at Reeler's level:**

- Demonstrated the technologies among the reeling units like use of pressing plate and three pan cooking as per CSTRI norms.
- Field visits to different reeling units of Kashmir valley was undertaken wherein the technical issues related to improvement of raw silk quality was discussed in detail and were advised to stick to the CSTRI norms while carrying out the reeling activities in letter and spirit. Besides general suggestions were also given regarding adoption of mixed reeling principles, changing of damaged porcelene bottons, increasing the length of crossury, keeping optimum temperature at re-reeling machinery to ensure the proper drying of sericene besides adoption of proper procedure for 03 pan cocoon cooking in order to ensure proper looening of sericine and reduce no. of breaks during the entire reeling operation, hence, generation of less silk waste and increasing the renditta of raw-silk reeled.

4. **FIELD PROGRAMME / AWARENESS PROGRAMME:**

During the said year under report 06 Awareness programmes and 60 field visits were conducted to different cocoon Markets and rearers were educated in detail what are the various step they have to take to ensure A grade cocoons they have been practically shown drying of cocoons under black cloth to avoid the damage to the silk by the direct falling of ultra violet rays besides the rearers are shown handling of green cocoons with extra care in willow baskets besides proper storage is also shown to the rearers. During the programme Director Sericulture Deptt., Srinagar, Additional Director SDD, Project Officer SDD, besides other Senior Officers of DOS and CSB was present.

5. **ASSESSMENT OF COCOON SAMPLES:** Assessed 25 experimental cocoon samples for post cocoon parameters received from Silkworm Breeding & Genetics section pampore and 65 from P4,Basic Seed Farm, Manasbal which were assessed and the report are submitted to the concerned station. In addition 03 nos' of mass experiential batches received from SBG were tested for analysis.

Table-123:Post Cocoon Analysis Data of Mono Cocoon Samples (P4 BSF Manasbal, (Spring- 2020)

Race/Batch	Avg. Filament Length (Mtrs.)	Total No. of Cocoons	Avg. Non-Filament Length (Mtrs.)	Wt. of 10 Cocoons (gms)	Total Wt. of Flt. In (gms)	Total wt of Silk waste in (gms)	Avg. Filt. Denier	Estimated Renditta	Estimated Reelability (%)
Spring 2020 Average 1-A	824	-	-	6.67	2.37	0.34	2.60	2.84	87
Average 2-A	821	-	-	6.11	2.27	0.31	2.49	2.70	88
Average 3-A	698	-	-	5.84	2.33	0.30	2.99	2.53	88
Average 4-A	697	2.2	429	4.81	2.11	0.23	2.75	2.78	90
Average 5-A	744	-	-	5.08	2.18	0.24	2.64	2.33	90
Average 6-A	875	-	-	4.95	2.13	0.24	2.20	2.32	88
Average 7-A	705	-	-	5.05	2.11	0.25	2.71	2.39	89
Average 8-A	753	1.6	499	5.94	2.44	0.30	2.92	2.44	89
Average 9-A	723	3.6	515	4.60	1.88	0.32	2.44	2.44	85
Average 10-A	776	01	389	5.12	1.98	0.34	2.32	2.58	86
Average 11-A	752	-	-	5.81	2.27	0.34	2.71	2.56	87
Average 12-A	839	1.60	494	5.24	2.21	0.38	2.38	2.55	86
Average 13-A	769	1.4	376	5.40	2.07	0.35	2.45	2.60	86

6. **DEMONSTRATION OF TECHNOLOGY:** 06 demonstration of Technology Programmes were organised, wherein a large number of rearers and reelers participated in these programmes. The participants were awared about various steps of raw silk testing and its importance. J&K produces bivoltine silk which is known all over the world for its shine and strength. The students were given a total picture of Sericulture industry of J & K. It was explained to them that this office acts as a quality control of raw silk for which silk testing is very important. The participants were informed that PCT Section of CSR&TI, CSB, Pampore caters to the testing needs of raw silk producing units of Kashmir valley. The participants were shown a multimedia presentation of activities of post cocoon sector and improved technology of CSTRI, Bangalore. The students, teachers, general public was taken around to laboratory and shown raw silk testing on spot. Incharge PCT Section, CSB, Pampore replied the queries of the participants. In the end, the participants were very thankful to CSB for organizing such programme which helps young students & general public to know importance of silktesting.

Silk Mark Organization of India (Srinagar Chapter)

The chapter has been entrusted the duty of popularising the Silk Mark scheme in its jurisdiction, Jammu and Kashmir. The main objective of the Silk Mark scheme is to ensure 100% purity in all silk products fixed with the Silk Mark tag. Annual targets are fixed for the chapter by the corporate office, SMOI, CSB Bangalore and maximum efforts are put in to achieve the set targets. During the year, as against a set target of five [5] Authorised user's, the chapter, enrolled a fresh Authorised User and encouraged four [4] existing authorised users to renew their license, for a period of next five years. The chapter sold 3000 Silk Mark, Hang Tag and Sew-in labels and imparted training to the new Authorised user. The office collected Ten [10] fresh subscriptions for the Silk Mark magazine. During the year, the chapter conducted 07 programmes, to create awareness regarding the Silk Mark scheme.

Table-124: Details of the programmes conducted by the chapter

#	**Particular**	**Achievement**	**Revenue Generated (Rs)**	**Remarks**
1.	Member/AUenrolment	-	-	Total 01/04*
2.	Labels Sold	3000	8000.00	
3.	Weaver Member Enrolled	01	1000.00	
4.	Gen visit	28	-	
5.	New Aus' sale person trained	02	-	
6.	Awareness programmes	07	-	
7.	Magazine Sold	10	3500.00	
8	Amazon on line Trading	05	25000.00	
Revenue Generated [Rs]			**37,500.00**	

INSPECTION WORK: The inspection work is need based and demand dependent. Although, the pre-shipment inspection of the natural goods meant for exports, is not compulsory, whenever an exporter approaches the office for inspection of silk goods on voluntary basis, services are provided. The inspection wing provides prompt, timely and quick services of inspection to the exporters, both at exporter's premises and in the office complex. During the year, the office received Three [03] applications from Silk carpet exporters for inspection on voluntary basis. In all 13 no of carpets, measuring 25.83 square Mtrs. and valued at [Rs 6,53,975/=] Rupees Six Lakh fifty three thousand Nine Hundred and Seventy Five only, were certified and passed for exports (Table-107).

Table-122:

#	Particular	Achievement	Revenue Generated (Rs)	Remarks
1.	No. of applications	03	900.00	Demand Dependent
2.	No. of Carpet labels Sold	13	650.00	
3.	Square Mtrs certified	25.83	-	
4.	FOB Value of the certificate Goods	6,53,975	-	
5.	No. of Tariff Certificates issued	02	700.00	
6.	No of blank forms sold	05	250.00	
7.	No.of handicraft /EEC certificate issued	02	700.00	
Revenue Generated			**3,200.00**	

Table-123: Reeling work

#	Particular	Achievement	Revenue Generated (Rs)	Remarks
1.	Raw Silk Testing	248	12400.00	
Revenue Generated			**12,400.00**	
G. Revenue Generated by PCT section,CSR&TI,Pampore		**53,100.00 (Rupees Fifty Three Thousand One Hundred only)**		

संस्थान एवम् अधिनस्थ इकाईयों का राजभाषा प्रगति विवरण

१.केन्द्रीय रेशम उत्पादन अनुसंधान एवं प्रशिक्षण संस्थान, पाम्पोर

केन्द्रीय रेशम उत्पादन अनुसंधान एवं प्रशिक्षण संस्थान, पाम्पोरद्वारा वर्ष 2020-21 में राजभाषा हिन्दी के प्रगामी प्रयोग एवं राजभाषा नीति के कार्यान्वयन से संबंधित निम्नलिखित कार्य किये गये।

1) राजभाषा अधिनियम, 1963 एवं नियमावली, 1976 का अनुपालन -राजभाषा अधिनियम, 1963 की धारा 3(3), के शतप्रतिशत अनुपालन सुनिश्चित करने के अलावा, 1976 के नियम 05 के अधीन हिन्दी में प्राप्त पत्रों के उत्तर हिन्दी और द्विभाषी में ही दिये गए तथा मूल पत्राचार एवं वार्षिक कार्यक्रम 2020-21 में निर्धारित लक्ष्य भी प्राप्त किया गया।

2) राजभाषा कार्यान्वयन समिति की बैठकों का आयोजन -वर्ष के दौरान विभागीय राजभाषा कार्यान्वयन समिति की तिमाही बैठकों का आयोजन निम्नानुसार किया गया एवं बैठकों में राजभाषा के कार्यान्वयन से संबंधित लिए गये निर्णयों पर अनुवर्ती कार्रवाई भी की गई।

तालिका -124 : **वर्ष के दौरान आयोजित राजभाषा कार्यान्वयन समिति की बैठकों का विवरण**

#	समिति की बैठक संख्या	तिमाही	अध्यक्ष	दिनांक
1	82वीं	अप्रैल - जून, 2020	डॉ. सुखेन रॉय चौधरी, निदेशक	20.06.2020
2	83 वीं	जुलाई-सितम्बर,2020	डॉ. सुखेन रॉय चौधरी, निदेशक	26.09.2020
3	84 वीं	अक्टूबर- दिसम्बर,2020	डॉ. सुखेन रॉय चौधरी, निदेशक	30.12.2020
4	85 वीं	जनवरी- मार्च,2021	डॉ सरदार सिंह, प्रभारी निदेशक	27.03.2021

तिमाही प्रगति रिपोर्ट -वर्ष के दौरान संस्थान द्वारा राजभाषा हिन्दी के प्रगामी प्रयोग संबंधी तिमाही प्रगति रिपोर्ट केन्द्रीय कार्यालय, बेंगलूरु, राजभाषा विभाग, नई दिल्ली एवं नराकास, श्रीनगर को निम्नानुसार भेजी गई। साथ ही राजभाषा विभाग को तिमाही प्रगति रिपोर्ट ऑन लाइन के माध्यम से भी भेजी गई एवं सभी तिमाहियों में पत्राचार का प्रतिशत वार्षिक कार्यक्रम के लक्ष्यानुसार रहा।

तालिका -125: **वर्ष के दौरान भेजी गयी तिमाही प्रगति रिपोर्टों का विवरण**

#	तिमाही	तिमाही प्रगति रिपोर्ट भेजने की दिनांक
1	अप्रैल - जून,2020	30.06. 2020
2	जुलाई - सितम्बर,2020	30.09. 2020
3	अक्टूबर - दिसम्बर,2020	31.12. 2020
4	जनवरी - मार्च,2021	31.03. 2021

4) हिन्दीपखवाड़ा / हिन्दी दिवस का आयोजन -संस्थान में दिनांक 01.09. 2020 से 14.09. 2020 तक हिन्दी पखवाड़े का आयोजन किया गया तथा पखवाड़े के दौरान हिन्दी प्रतियोगिताएं आयोजित की गयी जिसमें संस्थान के अधिकारियों एवं कर्मचारियों ने भाग लिया तथा दिनांक 14.09.2018 को हिन्दी दिवस का आयोजन किया गया जिसमें माननीय गृहमंत्री जी, संघ सरकार के संदेश का वाचन किया गया तथा प्रतियोगिताओं के विजेताओं को पुरस्कार भी वितरित किए गए।

5) **हिन्दी कार्यशालाओं का आयोजन -**संस्थान में नियमित रूप से प्रत्येक तिमाही में हिन्दी कार्यशालाओं का आयोजन किया गया। एवं राजभाषा हिन्दी के प्रयोग से संबंधित विषयों जैसे; टिप्पण लेखन, पत्र लेखनएवंसरल हिन्दी वाक्य रचना एवं राजभाषा विभाग द्वारा विकसित सूचना प्रौद्योगिकियों जैसे, लीला मोबाइल ऐप, ई-महाशब्दकोश, यूनीकोड एवं गूगल हिन्दी वाक् टंकण आदि विषयों पर प्रशिक्षण दिया गया।

तालिका-126: **वर्ष के दौरान निम्नलिखित हिन्दी कार्यशालाएँ आयोजित की गयी**

#	तिमाही	कार्यशाला के आयोजन की दिनांक	उपस्थित विशेषज्ञ
1	अप्रैल - जून, 2020	30.06.2020	डॉ. सुखेन रॉय चौधरी, निदेशक
2	जुलाई -सितम्बर,2020	26.09.2020	डॉ. सुखेन रॉय चौधरी, निदेशक
3	अक्टूबर-दिसम्बर,2020	31.12.2020	डॉ. सुखेन रॉय चौधरी, निदेशक
4	जनवरी- मार्च, 2021	27.03.2021	डॉ. भारतेन्दु कुमार पाठक, सहा. आचार्य, हि.वि., क. वि., श्रीनगर

6) **नगर राजभाषा कार्यान्वयन समिति (नराकास) एवं अन्य बैठकों में सहभागिता –**वर्ष 2020-21 के दौरान कोविड – 19 की वजह से **नगर राजभाषा कार्यान्वयन समिति (नराकास) की कोई भी बैठक नहीं हुई** ।

7) **राजभाषाप्रशिक्षण कार्यक्रम -**संस्थानके 01 कर्मचारियों को केन्द्रीय हिन्दी प्रशिक्षण संस्थान, राजभाषा विभाग, नई दिल्ली द्वारा संचालित हिन्दी पत्राचार पाठ्यक्रम में पंजीकृत किया गया ।

8) **हिन्दी में प्रकाशन-**वर्ष 2020-21के दौरान संस्थान के हिन्दी अनुभाग द्वारा वार्षिक रेशम तरंग पत्रिका का प्रकाशन किया गया ।

- राजभाषा समर्पित वार्षिक "रेशम तरंग" पत्रिका को संस्थान के रेशम कृषक मेल दिनांक 22.03.3021 को प्रकाशित किया गया ।
- क्षेत्रीय रेशम उत्पादन अनुसंधान केन्द्र, देहरादून के द्वारा आयोजित रेशम कृषक मेले मे उत्तराखंड में बाइ - वोल्टाइएन शहतूत रेशम कीट पालन की उन्नत तकनीकी" को प्रकाशित किया गया
- क्षेत्रीय रेशम उत्पादन अनुसंधान केन्द्र, जम्मू के द्वारा आयोजित रेशम कृषक मेले में पहाड़ी क्षेत्र में रेशम उत्पादन की उन्नत तकनीक को प्रकाशित किया गया।

9) विशिष्ठ उपलबधिया

- फ़ाइलों के आंतरिक प्रष्ठों पर प्रयोग किए जाने वाले द्विभाषी आदेशों व वाक्यांशों को छपवाया गया ।
- लिफ़ाफ़ों पर पते द्विभाषी मे लिखे गए व फ़ाइलों एवं पत्रशीर्षों को द्विभाषी रूप में छपवाया गया ।
- संस्थान एवं संस्थान की अधीनस्थ इकाइयों (क्षेत्रीय रेशम उत्पादन अनुसंधान केन्द्र, जम्मू व देहरादून) के द्वारा अधिकारियों व कर्मचारियों के वेतन पर्चियों को द्विभाषी रूप से जारी किया गया ।
- संस्थान एवं संस्थान की अधीनस्थ इकाइयों (क्षेत्रीय रेशम उत्पादन अनुसंधान केन्द्र, जम्मू व देहरादून) के द्वारा आयोजित रेशम कृषक मेलों में बैनर व पोस्टर को द्विभाषी रूप से जारी किए गए।

२. क्षेत्रीय रेशम उत्पादन अनुसंधान केंद्र जम्मू

क्षेत्रीय रेशम उत्पादन अनुसंधान केंद्र जम्मू द्वारा वर्ष 2020 21-में राजभाषा के प्रगामी प्रयोग एवं राजभाषा के लिए निर्धारित वार्षिक कार्यक्रम से संबंधित निम्नलिखित कार्य किए-:

1. **राजभाषा कार्यान्वयन समिति की बैठकों का आयोजन**वर्ष के अंतर्गत निम्नलिखित तीन हिंदी त्रैमासिक बैठकें और कार्यशालाएं : :आयोजित की गई तथा राजभाषा से संबंधित निर्णय लिए गए उन पर अनुवर्ती कार्रवाई की गई

तालिका127: वर्ष के दौरान आयोजित राजभाषा कार्यान्वयन समिति की बैठकों का विवरण

क्रम सं	बैठक आयोजन की तिमाही	अध्यक्ष	बैठक आयोजन की तिथि
1	अप्रैल से जून 2020	डॉ सरदार सिहडी-वैज्ञानिक ,	26.06.2020
2	जुलाई से सितंबर 2020	डॉ सरदार सिहडी-वैज्ञानिक ,	28.09.2020
3	अक्टूबर से दिसंबर 2020	डॉ शकील अहमद डी-वैज्ञानिक , (कार्यवाहक)	23.12.2020
4	जनवरी से मार्च 2021	डॉ शकील अहमद डी-वैज्ञानिक , (कार्यवाहक)	26.03.2021

2. **वर्ष के अंतर्गत तिमाही प्रगति रिपोर्ट की स्थिति :**

वर्ष के दौरान त्रिमासिक प्रतिवेदन निर्धारित कार्यक्रम के अनुसार केन्द्रीय रेशम उत्पादन अनुसंधान एवं प्रशिक्षण संस्थान , ,नगर राजभाषा कार्यान्वयन समिति जम्मू एवं उत्तरी क्षेत्रीय कार्यान्वयन कार्यालय ,बंगलौर ,केन्द्रीय कार्यालय ,पामपोर नई दिल् ,राजभाषा विभागली तथा पत्राचार का प्रतिशत (गई नई दिल्ली को ऑनलाइन माध्यम से भेजी ,राजभाषा विभाग) -:निम्नवत रहा

तालिका 128 वर्ष के दौरान पत्राचार का प्रतिशत :

क्रम संख्या	तिमाही प्रगति रिपोर्ट	हिन्दीद्विभाषी पत्राचार का प्रतिशत /
1	अप्रैल से जून 2020	90
2	जुलाई से सितंबर 2020	95
3	अक्टूबर से दिसंबर 2020	88
4	जनवरी से मार्च 2021	94

3. **हिन्दी कार्यशालाओं का आयोजन :**

पहली त्रैमासिक हिंदी कार्यशाला का आयोजन दिनांक को किया गया 2020 जून 29, जिसमें केंद्र के अधिकारियों एवं 12 कर्मचारियों ने भाग लिया। 19-कोविड" महामारी की स्थिति में हिंदी में डिजिटल प्रारुपण एवं पत्राचार हेतु इलेक्ट्रानिक उपकरणों के माध्यम से वॉयस टाईपिंग का अनुप्रयोग" विषय पर वैज्ञानिकडी एवं अध्यक्ष-, द्वारा मुख्य व्याख्यान दिया गया। दूसरी तिमाही हिंदी कार्यशाला दिनांक सितंबर 29,2020 को आयोजित की गई थी जिसमे केंद्र के 21 वैज्ञानिकों और 05 कर्मचारियों ने कार्यशाला मे प्रतिभाग किया। तृतीय त्रैमासिक हिंदी कार्यशाला को आयोजित की गई जिसमें 2020 दिसंबर 24 उत्तरी का हल एवं इस विषय पर च-कर्मचारियों के हिंदी ज्ञान सम्बंधित ऑनलाइन प्रश्नचर्चा आयोजित की गई थी, जिसमे डां . सुगध पांडेय, हिंदी प्राध्यापक, केन्दीय विद्यालय, मीरां साहिब, मुख्य व्याख्याता के रूप में आमंत्रित थे ।केंद्र के कुल 21 कर्मचारियों ने तीसरी तिमाही हिंदी कार्यशाला मे भाग लिया। चौथी तिमाही हिंदी कार्यशाला का आयोजन ऑनलाइन माध्यम

से किया गया जिसमें विषय पर श्री अशोक कुमार सिंह "स्रोतों का अनुप्रयोग कार्यालयी हिंदी एवं इसके बेब आधारित", प्रबंधक (राजभाषा), भारतीय रिजर्व बैंक, जम्मू के द्वारा मुख्य व्याख्यान दिया गया एवं इन बेब आधारित स्रोतों के माध्यम से हिंदी कार्य करने का अभ्यास कराया गया।

4. **हिन्दी पखवाड़ा :दिवस का आयोजन/**
दिनांक सितंबर 14 सितंबर से 1,2020 के दौरान हिंदी पखवाड़े का आयोजन किया गया, जिसमें कुल हिंदी प्रतियोगिताएं 04 आयोजित की गई;- मूल हिंदी कविता पाठ, निबंध लेखन, हिंदी शब्द और वाक्यों का अनुवाद तथा केंद्र के कुशल फार्म कार्मिकों के लिए हिंदी लेखन और सुलेख प्रतियोगिता आयोजित की गई। दिनांक सितंबर को हिन्दी दिवस का आयोजन किया गया 14 केन्द्रीय रेशम बोर्ड ,भारत सरकार एवं सदस्य सचिव ,जिसमें माननीय केन्द्रीय कपड़ा मंत्री के संदेशों का वाचन किया गया एवं विभिन्न प्रतियोगितायो के विजेताओ को पुरुस्कारों का वितरण किया गया।

३.क्षेत्रीयरेशमउत्पादनएवंअनुसंधानकेन्द्र,सहसपुर,देहरादून

क्षेत्रीय रेशम उत्पादन एवं अनुसंधान केन्द्र, सहसपुर द्वारा वर्ष 2020-21 के दौरान राजभाषाहिन्दी के प्रगामी प्रयोग एवं राजभाषा नीति के कार्यान्वयन से संबंधित वार्षिक रिपोर्ट|

1- **राजभाषा अधिनियम, 1963 की धारा के शत प्रतिशत अनुपालन :**राजभाषा अधिनियम,1963 की धारा 3(3),के शत प्रतिशत अनुपालन सुनिश्चित करने के अलावा,के अधीन हिन्दी में प्राप्त पत्रों के उत्तर हिन्दी और द्विभाषी में ही दिये गए 05 के नियम 1976 निर्धारित लक्ष्य भी प्राप्त किया गया। में 21-2020 तथा मूल पत्राचार एवं वार्षिक कार्यक्रम

2- **राजभाषा कार्यान्वयन समिति की बैठकों का आयोजन :** क्षेत्रीय रेशम उत्पादन एवं अनुसंधान केन्द्र, सहसपुर, देहरादून द्वारा वर्ष 20202-1 के दौरान विभागीय राजभाषा कार्यान्वयन समिति की तिमाही बैठकों का आयोजन निम्नानुसार किया गया एवं बैठकों में लिए गए निर्णय पर अनुवर्ती कार्यवाई भी की गयी |

तालिका:129

क्रमांक	समिति की बैठक संख्या	तिमाही	अध्यक्ष	दिनांक
1	124	प्रथम	डॉ बाबूलाल, वैज्ञानिक डी	29.06.2020
2	125	दिवतीय	डॉ बाबूलाल, वैज्ञानिक डी	07.09.2020
3	126	तृतीय	डॉ बाबूलाल, वैज्ञानिक डी	26.12.2020
4	127	चतुर्थ	डॉ सुरेन्द्र कुमार, वैज्ञानिक डी	22.03.2021

3- **तिमाही प्रगति रिपोर्ट :** वर्ष के दौरान केंद्र द्वारा राजभाषा हिन्दी के प्रगामी प्रयोग संबंधी तिमाही प्रगति रिपोर्ट केन्द्रीय कार्यालय, बैगलुरु, राजभाषा विभाग, नई दिल्ली एवं (राजभाषा विभाग को तिमाही प्रगति रिपोर्ट ऑनलाइन के माध्यम से भेजी गयी) नराकास, देहरादून को निम्नानुसार भेजी गयी। सभी तिमाही में पत्राचार का प्रतिशत वार्षिक कार्यक्रम के लक्ष्यानुसार रहा।

तालिका:129

क्रमांक	तिमाही प्रगति रिपोर्ट	तिमाही प्रगति रिपोर्ट भेजने की तिथि
1	अप्रैल – जून,2020	03.07.2020
2	जुलाई – सितम्बर 2020	06.10.2020
3	अक्टूबर – दिसम्बर 2020	07.01.2021
4	जनवरी – मार्च 2021	06.04.2021

4- **हिन्दी पखवाड़ा: दिवस का आयोजन/**केंद्र में दिनांक तक हिन्दी पखवाड़े का आयोजन किया गया 15.09.2020 से 01.09.2020 तथा पखवाड़े के दौरान हिन्दी प्रतियोगताएं आयोजित की गयी जिसमे केंद्र के अधिकारियों एवं कर्मचारियों नेभाग लिया तथा दिनांक को हिन्दी दिवस का आयोजन किया गया जिसमें माननीय मंत्री श्रीमती स्मृति ज़ुबिन ईरानी 14.09.2020,माननीय मंत्री,

वस्त्र मंत्रालय, भारत सरकार एवं श्री रजित रंजनओखंडियार, सदस्य सचिव व मुख्य कार्यपालक अधिकारी, केंद्रीय रेशम बोर्ड,बंगलोर, के संदेश का वाचन किया गया तथा प्रतियोगितायों के विजेताऔ को पुरस्कार भी वितरित किये गये।

5- **हिन्दी कार्यशालायों का आयोजन :** केंद्र में नियमित रूप से प्रत्येक तिमाही में हिन्दी कार्यशालाओं का आयोजन किया गया। जिसमें राजभाषा हिन्दी के प्रयोग से संबंधित विषयों जैसे राजभाषा अधिनियम 1963की धारा (3)3के अंतर्गत जारी कागजात के बारे में जानकारी, पत्र लेखन , हिन्दी अनुवाद, कार्यालय में प्रयोग किये जाने वाले हिन्दी शब्दों की जानकारी एवं गूगल हिन्दी आदि विषयों पर प्रशिक्षण दिया गया।

तालिका:130

क्रमांक	तिमाही	कार्यशालाकेआयोजनकीतिथि
1	अप्रैल–जून,2020	30.06.2020
2	जुलाई–सितम्बर2020	15.09.2020
3	अक्टूबर–दिसम्बर2020	28.12.2020
4	जनवरी–मार्च2021	23.03.2021

6- **निरीक्षण –** केंद्र द्वारा अधीनस्थ इकाईयों का राजभाषा कार्यान्वयन संबंधी निरीक्षण किया गया।

तालिका:131

क्रमांक	निरीक्षित कार्यालय का नाम	निरीक्षण की तिथि	निरीक्षणकर्ता का नाम
1	अनुसंधान प्रसार केंद्र, बस्ती, उत्तर प्रदेश|	14.12.2020	डॉ अशोक कुमार, वैज्ञानिक डी-
2	अनुसंधान प्रसार केंद्र, पंचकुला, हरियाणा |	22.03.2021	श्री आरसिंह.पी., वैज्ञानिकडी -

7- **नगर राजभाषा कार्यान्वयन समिति)न.रा.का.स (एवं अन्य बैठकों में ऑनलाइनसहभागिता** – वर्ष 21-2020के दौरान इस संस्थान द्वारा निम्नलिखित बैठकों में भाग लिया।

तालिका:132

क्रमांक	नगर राजभाषा कार्यान्वन समिति न.रा.का.स (बैठक के आयोजन की तिथि)	बैठक में भाग लेने वाले अधिकारी/कर्मचारी का नाम
1	23जुलाई 2020	डॉ बाबूलाल, वैज्ञानिक डी, डॉ के.के.राय वैज्ञानिक डी एवं निवेदिता खण्डूरी, वरिष्ठ तकनीकी सहायक
2.	10नवम्बर2020	डॉ बाबूलाल, वैज्ञानिक डी एवं निवेदिताखण्डूरी, वरिष्ठ तकनीकी सहायक

8- **हिन्दी में प्रकाशन –** अको एक रेशम कृषि मेला का आयोजन 08.03.2021 के दौरान इस कार्यालय द्वारा दिनांक 21-2020 वर्ष - वोल्टाइन शहतूती रेशम कीटपालन की उन्नत -उत्तराखण्ड में बाई" किया गया जिसमें समस्त कार्रवाई हिन्दी में की गई। मेले के दौरान पुस्तिका का प्रकाशन भी किया गया।"तकनीक

बकेंद्रीय रेशम उत्पादन अनुसंधान एवं प्रशिक्षण संस्थान -, पांपोर, श्रीनगर की हिन्दी पत्रिका रेशम तरंग"" में के० के० राय, वैज्ञानिक प्रकाशित किया गया "शहतूत बागान में पोषक तत्वों का प्रबंधन" डी द्वारा लेख जिसका शीर्षक-|

9- **ऑनलाइन वेबिनार में सहभागिता -**

तालिका:133

क्रमांक	ऑनलाइन वेबिनार आयोजित करने वाले कार्यालय का नाम	वेबिनार के आयोजन की तिथि	बैठक में भाग लेने वाले अधिकारी/कर्मचारी का नाम
1	लाल बहादुर शास्त्री रास्ट्रीय प्रशासनिक एकेडमी, मसूरी राजभाषा वेबिनार	25अगस्त 2020	डॉ० के० के० राय, वैज्ञानिकहिन्दी डी एवं नामित-अधिकारी श्रीमती निवेदिता खण्डूरी, वरिष्ठ तकनीकी सहायक एवं नामित हिन्दी कर्मचारी
2	ऑप्टो ईलेक्ट्रोनिक्स फ़ैक्टरी,	17दिसंबर	डॉ० के० के० राय, वैज्ञानिकडी एवं नामित हिन्दी -

	देहरादून की ओर से)नराकास कार्यालय (1-स्तर पर राजभाषा वेबिनार)	2020	अधिकारी श्रीमती निवेदिता खण्डूरी , वरिष्ठ तकनीकी सहायक एवं नामित हिन्दी कर्मचारी

LIBRARY

- The library has 1371 books on different subjects covering agriculture and allied subjects such as sericulture, meteorology, entomology, agronomy, soil science, pathology, extension, economics, statistics, animal husbandry, plant breeding, genetics and biotechnology etc.
- The library has annual associate membership in International Sericulture Commission
- The institute library subscribed Sericologia Journal for the year 2021.
- The library receives bimonthly magazine of Indian Silk published by Central Silk Board, Ministry of textiles, Govt. of India.
- It has also collection of Silk Mark Magazines published by Central Silk Board, Ministry of Textiles, Govt. of India.
- The library possesses copies of annual report, news letter, technological bulletins, technology descriptor, leaflets, folders, pamphlets and brochures are being well maintained for record and ready references.
- The institute library is referred by Central Silk Board (CSB) Scientists, research scholars and students of temperate sericulture research station and university of Kashmir.

RESEARCH PUBLICATIONS

A. RESEARCH PAPERS

International: 19

1. Akanksha Sharma, Vijayan Sambasivam, Pawan Shukla, Sakshi Rampuria, and Pulugurtha Bharadwaja Kirti (**2020**). "An *in vitro* generated variant of *Tephrosia villosa* defensin (α-TvD1) enhances biotic stress tolerance in transgenic tobacco. *Journal of Plant Pathology* 1-11. **NAAS Rating: 7.15; Impact Factor: 1.729.**
2. Arti Sharma, Palvi Sharma, Jyoti Thakur, Murali S and Kamlesh Bali (**2020**). Viral diseases of Mulberry Silkworm, *Bombyx mori* L. - A Review*Journal of Pharmacognosy and Phytochemistry*, Sp 9 (2): 415-423.
3. Bharath Kumar Neelaboina, Shivkumar, Mir Nisar Ahmad, Kiran R & Sukhen Roy Chowdhury (**2020**). Seasonal Variations in the Performance of Bivoltine Mulberry Silkworm (*Bombyx mori* L.) Breeds under Kashmir Climatic Conditions. ***SSR Inst. Int. J. Life Sci***.; 6(6): 2678-2686.
4. Carlo L. Seifert, Martin Volf, Leonardo R. Jorge, Tomokazu Abe, Grace Carscallen, Pavel Drozd, Rajesh Kumar, Greg P.A. Lamarre, Martin Libra, Maria E. Losada, Scott E. Miller, Masashi Murakami, Geoffrey Nichols, Petr Pyszko, Martin Šigut, David L. Wagner, and Vojtěch Novotný (**2020**). Plant phylogeny drives arboreal caterpillar assemblages across the Holarctic. *Ecology and Evolution*. https://doi.org/10.1002/ece3.7005**NAAS Rating: 8.39; Impact Factor 2.912**
5. Carlo L. Seifert, Martin Volf, Leonardo R. Jorge, Tomokazu Abe, Pavel Drozd, Rajesh Kumar, Greg P.A. Lamarre, Scott E. Miller, Masashi Murakami, Petr Pyszko, Martin Sigut, David L. Wagner, Vojtech Novotny (**2020).**Host plant specialisation mediates the effect of plant traits on the community composition of caterpillars. *Insect Conservation and Diversity*.**Impact Factor : 3.182**
6. Gulab Khan Rohela, Phanikanth Jogam, Mohammad Yaseen Mir, Aftab Ahmad Shabnam, Pawan Shukla, Sadanandam Abbagani & Azra Nahaid Kamili (**2020**). Indirect regeneration and assessment of genetic fidelity of acclimated plantlets by using SCOT and ISSR markers in *Morus alba* Cv. Chinese white. *Biotechnology Reports* (*Elsevier Journal*), 35: e00417 https://doi.org/10.1016/j.btre.2020.e00417.
7. Kiran Rudramuni, Shiv Kumar, Bharath K. Neelaboina, Mir N. Ahmad, Sukhen R.Chowdhury (**2021**). A typical voltinism in mulberry silkworm *Bombyx mori* L., 1758 (Lepidoptera: Bombycidae) races Barapat and Barapolu. *Entomological Communications*, 3, 2021: ec03001 doi: 10.37486/2675-1305.ec03001.
8. Mir Nisar Ahmad, Bharath Kumar Neelaboina, Shivkumar, Kiran R & Sukhen Roy Chowdhury (**2020**). Studies on Heterosis and Heterobeltiosis in Selected Quantitative Traits during Summer Season in Bivoltine Silkworm, Bombyx mori L. *SSR Inst. Int. J. Life Sci.*; 6(6): 2694-2703.
9. Murali, S. and Sardar Singh (2020). Evaluation and Identification of Superior Bivoltine Breeds of Silkworm, *Bombyx mori* L. during different Seasons at Jammu. *Research Journal of Agricultural Sciences*, 12(1): 17-22.
10. Murali, S. and Sardar Singh (**2021**). Studies on Nutrigenetic Traits of Silkworm, *Bombyx mori* L. for Determining Growth and Development for Identifying Parental Breeds for Breeding under Subtropical Region of North West India. *International Journal of Environment and Climate Change 11(3*): 26-37 NAAS Rating: 5.13
11. Murali, S. and Sardar Singh (**2020**). To Workout Nutrigenetic Traits for Silkworm, *Bombyx mori* L. by Absorption/Assimilation for Determining Growth and Development for Identifying Parental Breeds for Future Breeding during Spring Season under Subtropical Region of North West India.*Current Journal of Applied Science and Technology*, 39(22): 57-70. **NAAS Rating: 4.71**
12. Palvi Sharma, Arti Sharma, Jyoti Thakur, Murali S and Kamlesh Bali (**2020**). Mulberry as a Life Savior - A Review**.***Journal of Pharmacognosy and Phytochemistry*,9(2): 2445-2451.
13. Pandarinath S, Phanikanth J, Gulab Khan Rohela, Raghu E, Dulam S, Allini VR, Sadanandam A. Direct regeneration and genetic fidelity analysis of regenerated plants of *Andrographis echioides* (L.) - an important medicinal plant. 155: 112766.*Industrial Crops & Products* (*Elsevier Journal*) https://doi.org/10.1016/j.indcrop.2020.112766**NAAS Rating: 10.24; Impact Factor 5.645**

14. Rai, K.K.; Babu Lal.; Tripathi,P.M.; and Chaudhary, S.R..Evaluation of Economics of Shoot Rearing Technology under sub tropical conditions-A pilot study (2021). EPRA *International Journal of Agriculture and Rural Economic Research*, 9 (1) : 1-7.
15. Santoshkumar Magadum, Manju Bala, Preeti Sharma, Farzana Aziz, Rukhsana Kouser, Ashima Sharma, Lobzang Deskit,Jeewan Laland Sardar Singh (**2020**). Assessment of impact of different mulberry plantation systems on leaf quality parameters. *International Journal of Genetics.* 12(12): 794-797.
16. Santoshkumar Magadum, Preeti Sharma, Manju Bala, Rukhsana Kouser, Ashima Sharma, Lobzang Deskit, Farzana Aziz, Jeewan Lal and Sardar Singh (**2020**). Evaluation of different mulberry plantation systems for leaf yield and yield contributing characters. *International Journal of Current Microbiology and Applied Sciences*. 9(12): 3222-3229.
17. Shivkumar, Bharath Kumar Neelaboina, Mir Nisar Ahmad, Kiran R & Sukhen Roy Chowdhury (**2020**). Improvement of Qualitative and Quantitative Traits of Autumn Season Specific Lines/Breeds for Temperate Climatic Conditions of Jammu and Kashmir. *SSR Inst. Int. J. Life Sci.,* 2020; 6(6): 2717-2725.
18. Singh, V (**2020**). Economic Analysis of Silkworm Rearing and Cocoon Production. *Trends in Biosciences*. 13 (10): 627-630.
19. Tomokazu Abe, Martin Volf, Martin Libra, Rajesh Kumar, Haruka Abe, Hiroaki Fukushima, Roll Lilip, Juha-Pekka Salminen, Vojtech Novotny, Naoto Kamata, Masashi Murakami (**2020)**. Effects of plant traits on caterpillar communities depend on host specialisation. *Journal of Animal Ecology,* **NAAS Rating: 10.55; Impact Factor 5.091**

National: 14

1. Gulzar Ahmad Khan, Haroon Rashid, Mir Nisar Ahmad, Sukhen Roy Chowdhury (2020). Post-adoption analysis of sericulture technologies: Need of the hour. *Indian Silk*, September-October, Vol.11 (Old 59) No. 3:22-23
2. Gulzar Ahmad Khan, Muttanna, Haroon Rashid, Mir Nisar Ahmad, Sukhen Roy Chowdhury (2021). Extension initiatives of Central Silk Board: Challenges and way forward. *Indian Silk*, January-February, Vol.11 (Old 59) No. 5:20-22
3. Kumar, S., Babulal, Sardar Singh & S. R. Choudhary. Role of Extension Communication Programmes in the development of Sericulture in the area of Vikasnagar, Uttarakhand. Paper submitted and accepted for 15th Uttarakhand State Science & technology Congress, Dehradun 2020-21.
4. Lal Chand, DB Singh, KL Kumawat, K Madhav Rai, OC Sharma, Anil Sharma, Pawan Saini and AK Handa (2020) Genetic variability, correlation and path-coefficient studies among Persian walnut (*Juglans regia*) genotypes. Indian J. Agric. Sci. 90(5):28-33 **NAAS Rating: 6.21.**
5. Murali, S. and Sardar Singh (**2021**). Screening and Identification of Selected Bivoltine Breeds To Workout Nutrigenetic Traits by Conversion Efficiency of Mulberry Leaves for Determining Growth and Development of silkworm, *Bombyx mori* L. during Autumn Season under Subtropical Region of Jammu (J & K). *J. Exp. Zool.*, 24(1): 15-26. **NAAS Rating: 5.25**
6. Rai, K.K.; Pankaj Tewary.; Tripathi,P.M.; and Chaudhary, S.R. शहतूतपौधशाला) नर्सरी (कीअनुप्रयोगप्रणालीएवंरखरखाव. *IndianSilk*; | March-April -2019| Vol.9 (Old 57) No. 11-12: 44-47.
7. Rajesh Kumar and P. C. Pathania (2020).Redescription of *Acroclita vigescens* Meyrick (Tortricidae: Lepidoptera) feeding on *Cordia myxa* Linnaeus (Boraginaceae) in India. *Rec. Zool. Surv. India:*Vol. 120(2)/193–199, DOI: 10.26515/rzsi/v120/i2/2020/150901. **NAAS Rating: 4.82**
8. Sardar Singh and S. Murali (**2020**). Crop specific hybrid evaluation under subtropical condition of Jammu (Jammu & Kashmir). *J. Exp. Zool.,*23(2): 1299-1304. **NAAS Rating: 5.25**.
9. Singh R.P.; Sardar Singh & A. C. Juyal (2020). Soil status in North Western India through Soil Health Cards. Article accepted for publication in *Indian Silk*.

10. Singh, V (2021). An idea of transforming sericulture through non-government organization (NGO). *Vigyan Varta*. 2(3).33-36.
11. Singh, V and Singh, S. (2020). Impact of capacity building and training on silkworm rearers in Rajouri District of Jammu and Kashmir. *The Andhra Agricultural Journal*.67 (3): 247-250 **NAAS Rating: 3.61**.

B. Abstracts: 01

1. Singh, V (2020). Sericulture: An opportunity for doubling the income of farmers in hilly areas. Research paper published in SOUVENIR of international virtual conference on "role of basic and applied science in human well being, November 23-24, 2020 organized by G. B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand:110.

C. Book / Booklet/ Brochure: 01

1. "**Success Stories of Sericulture Farmers of North West India**" (Part-I) book published by the Diretcor (I/C), CSR&TI, Pampore and printed at Big sign printing press, Awantipora, Pulwama (J&K), Pages 1-48.

D. Book Chapter: 08

1. Gani M, Hassan T, Pawan Saini, Bhat K H, Gupta R K and Bali K (2021) Biosensor as a Potential Tool for On-Site Detection of Insect Pathogens. In: Pudake R N, Jain U, Kole C (eds) Biosensors in Agriculture: Recent Trends and Future Perspectives. Concepts and Strategies in Plant Sciences. Springer, Cham. pp: 465-493. DOI: https://doi.org/10.1007/978-3-030-66165-6_22. (Springer Publication)
2. Gulab Khan Rohela, Pawan Shukla, Pawan Saini, Rajesh Kumar, Vijayan Kunjupillai & Sukhen Roy Chowdhury (**2021**).Improvement of Mulberry (*Morus* spp.) by Protoplast Culture.In: MK Razdan and Dennis T. Thomas (eds),Mulberry: Genetic Improvement in Context of Climate Change. ISBN: 0367024993**.** *Taylor & Francis*, DOI: https://doi.org/10.1201/9780429399237 pp. 131-145.
3. Kumar S, R. P. Singh. Kisan shahtut nursery, virksharopan avain praband technique –. Pp. 20-24
4. Pawan Saini, Charan Singh, Pradeep Kumar, Santosh Kumar Bishnoi and Rose Mary Francies (2020) Breeding for Ideotype Designing. In: Classical and Molecular Approaches in Plant Breeding. Narendra Publishing House, pp: 160-176. (ISBN: 9789389235258)
5. Pawan Saini, Charan Singh, Pradeep Kumar, Santosh Kumar Bishnoi and Rose Mary Francies (2020). Breeding for Nutritional Quality Improvement in Field Crops. In: Classical and Molecular Approaches in Plant Breeding. Narendra Publishing House, pp: 200-264. (ISBN: 9789389235258)
6. Pawan Saini, Santosh Kumar Bishnoi, Charan Singh, Pradeep Kumar, Narender Negi, Rahul Phuke and Jogendra Singh (2020) Crop Plant Domestication, Plant Introduction and Plant Genetic Resources. In: Classical and Molecular Approaches in Plant Breeding. Narendra Publishing House, pp: 1-66. (ISBN: 9789389235258)
7. Pawan Saini, Sharon Nagpal, Pooja Saini, Arun Kumar and Mudasir Gani (2021) Microbial Mediated Zinc Solubilization in Legumes for Sustainable Agriculture. In: Verma A, Saini J K, Abd El-Latif Hesham and Singh H B (Eds.) Phytomicrobiome Interactions and Sustainable Agriculture. John Wiley & Sons Ltd. pp: 254-276. DOI:https://doi.org/10.1002/9781119644798.ch14. (Wiley Publication)

E. Popular Articles/Pamphlets / Bulletins:

1. Bharath Kumar Neelaboina, Shivkumar, Mir Nisar Ahmad, Kiran R & Sardar Singh. 2021 Development of bivoltine silkworm foundation crosses. Bulletin No:02, CSR&TI, Pampore publication.
2. Rai, K.K.; and Tripathi, P.M; शहतूतबागानोंमेंपोषकतत्वोंकाप्रबंधन, रेशमतरंग :PP.12-11 Published in *Resham Tarang* a Hindi magazine of CSR&TI, Pampore, Srinagar.
3. Rai, K.K.; Tripathi, P.M; and M. Shafi Mir,: Doon ghati ke aitihasikpariprekshya men shahtut ke vibhinn rogon ka vivran, unka niyantran tatha resham arthshashtra par prabhav, दूनघाटी के ऐतिहासिक परिपेक्ष्य में शहतूत केविभिन्न रोगों का विवरण,उनका नियंत्रण तथा रेशम अर्थशास्त्र पर प्रभाव: 'रेशम किरण पत्रिका' में प्रकाशन हेतु प्रेषित, A Hindi magazine of CSR&TI, Mysore.

4. Rai K. K, Nivedita Khanduri and M. Shafi Mir (2021). क्षेत्रीय रेशम उत्पादन अनुसंधान केंद्र द्वारा रेशम कृषि मेला 2021-में प्रकाशित बुकलेट उत्तराखंड में बाई-वोल्टाइन शहतूती रेशम कीटपालन की उन्नत तकनीक "में प्रकाशित लेख उत्तरावस्था रेशम कीटपालन तकनिकियाँ, Pp. 25-31.

F. WEBINARS / TRAININGS/ MEETINGS ATTENDED:

1. Resource person & guest speaker at University (s): 04

#	Event	Name of the Organizing University	Topic	Date of Event	Name of Resource person
1.	Webinar of Certificate Course on sericulture	G.B.Pant University of Agriculture & Technology, Pantnagar (Uttarakhand	Understanding the prospects of silk industry in India for promoting Agripreneurship"	7th Oct 2020	Dr. Sardar Singh, Scientist-D
2.	Webinar for students of B.SC(H) Zoology and B.SC life sciences	Aurobindo College, University of Delhi	"Sericulture: Silk Processing, Development & emerging prospects"	10th March 2021	Dr. Sardar Singh, Scientist-D
3	Special invited Lecture	Mysore University, Mysuru	"Wild silk moths diversity and its ex-situ and in-situ conservation in India"	10th Sept, 2020	Dr. Rajesh Kumar, Scientist-D
4	An invited Lecture	Shivaji University, Kolahpur	"Diversity and conservation of wild silkmoths and its importance to climate change"	08th Oct, 2020	Dr. Rajesh Kumar, Scientist-D

2. Online meetings for sericulture development & coordination :06

#	Meeting organising agency/deptt.	Topic	Date of Meeting	Name of the Scientist
1.	Meeting of Regional Offices of CSB under the chairmanship of Member Secretary CSB	Status of implementation of Silk Samagra in North West India.	24th Aug 2020	Dr. Sardar Singh, Scientist-D
2.	Meeting of Working Group	To finalize the scheme details for implementation of Sub Mission on Agro-Forestry (SMAF) Model in the Silk Sector by CSB in convergence with DAC&FW, MoA&FW, Govt. of India as member.	23rd Sep 2020	Dr. Sardar Singh, Scientist-D
3.	Coordination meeting under the chairmanship of Director of Sericulture, Govt. of UP	To provide needful technical inputs for mulberry plantation and other components.	28th Sep 2020	Dr. Sardar Singh, Scientist-D
4.	Meeting called by Central Silk Board under the chairmanship of Member Secretary, CSB.	To review Oak Tasar development in Uttarakhand.	29th Sep 2020	Dr. Sardar Singh, Scientist-D
5.	PMC meeting of Punjab State under the chairmanship of Director Horticulture, Govt of Punjab.	For finalization of proposals under Silk Samagra and to provide necessary inputs for the implementation of schemes.	29th Oct 2020	Dr. Sardar Singh, Scientist-D
6.	Meeting of Member Secretary CSB Bangalore with Chief Scientist CBRI Roorkee	To discuss the Low Cost Rearing House project in collaboration with CBRI, Roorkee entitled "Development of Ideal and Affordable silkworm rearing Houses for sericulture farmers of India"	3rd Nov 2020	Dr. Sardar Singh, Scientist-D

H. Trainings/Wokshops (Online) attended as participants: 21

#	Name of the Training	Date and Duration	Organized by	Attended by
1.	Extension management approaches for promotion of sericulture industry	10th – 11th Nov 2020	MANAGE, Hyderabad & Central Silk Board	Dr. Vinod Singh, Scientist-C
2.	Managerial skills for extension professionals	17th – 19th Nov 2020	MANAGE, Hyderabad	Dr. Vinod Singh, Scientist-C
3.	Online MOOCs programme on Agri Journalism	23rd – 27th Nov 2020	MANAGE, Hyderabad	Dr. Vinod Singh, Scientist-C
4.	Participatory training methods for effective learning	1st – 5th Dec 2020	MANAGE, Hyderabad	Dr. Vinod Singh, Scientist-C
5.	Video production and dissemination skills for agricultural extension and advisory services	14th – 18th Dec 2020	MANAGE, Hyderabad	Dr. Vinod Singh, Scientist-C
6.	Extension management approaches for promotion of sericulture industry	15th - 18th Dec, 2020	MANAGE, Hyderabad	Dr. Murali S, and Sh. Chhattar Pal Scientist-C
7.	Use of digital and electronic media for agricultural extension	21st – 23rd Jan 2021	MANAGE, Hyderabad and GBPUAT, Pantnagar	Dr. Vinod Singh, Scientist-C
8.	Extension management approaches for promotion of sericulture industry	10th to 13th Nov, 2020.	MANAGE, Hyderabad	Sh. Gulzar Ahmad Khan, Scientist-C
9.	Social skills for Extension Management	24th to 26th Nov, 2020.	MANAGE, Hyderabad	Sh. Gulzar Ahmad Khan, Scientist-C
10	Technologies to enhance bivoltine silk production in South India	24th Feb, 2021.	Central Sericultural Research & Training Institute, Mysuru.	Sh. Gulzar Ahmad Khan, Scientist-C
11	Farmer Producer Organizations (FPOs) - and Challenges	7th-14th Sept, 2020.	MANAGE, Hyderabad	Dr. Gulab Khan Rohela, Scientist-C
12	Orientation Training Programme on Strategies to Improve the Performance of Officers Involved in Soil Health Card Scheme	12th-14th Oct, 2020	MANAGE, Hyderabad	Dr. Gulab Khan Rohela, Scientist-C
13	Five days online training course on "Gel-based Proteomics	21st-25th June 2020;	Amazing Biotech Pvt. Ltd. Chennai	Dr.Pawan Saini, Scientist-C
14	Ten Days ICAR-NAHEP-CAAST online training on "Automation and Robotics in Agriculture"	22nd-31st July 2020	Punjab Agricultural University, Ludhiana	Dr.Pawan Saini, Scientist-C
15	National level online training program on "Statistical Data Analysis using R Software"	04th-11tth January 2021	Department of Agricultural Statistics, Sarat Chandra Sinha College of Agriculture (SCSCA), Assam Agricultural University, Dhubri, Assam in collaboration with Jorhat Extension Center of NIELIT Guwahati	Dr.Pawan Saini, Scientist-C
16	Virtual Workshop on Technologies to Enhance Bivoltine Silk Production in South India	24th Feb. 2021	CSR&TI, Mysore	Dr.Pawan Saini, Scientist-C
17	Indo-Swiss A 4 day course on Genetic Variant Analysis	09th-12th Mar, 2021	University of Zurich	Dr.Pawan Saini, Scientist-C
18	Risk Mitigation in Agriculture	17th to 24th Aug, 2020	MANAGE, Hyderabad	Dr. Muttanna, Scientist-B

#	Name of the Training	Date and Duration	Organized by	Attended by
19	Farmer Producer Organizations (FPOs)-issues & Challenges	07th to 14th Sept, 2020	MANAGE, Hyderabad	Dr. Muttanna, Scientist-B
20	Extension of women Entrepreneurial skills for Agriculture Development	28th to 30th Sept, 2020	MANAGE, Hyderabad	Dr. Muttanna, Scientist-B
21	Monitoring And Evaluation of Agriculture Projects	5th to 11th Oct, 2020	MANAGE, Hyderabad	Dr. Muttanna, Scientist-B
22	Risk Mitigation in Agriculture	17th to 24th Aug, 2020	MANAGE, Hyderabad	Sh. Satish Y, Scientist-B
23	Extension of women Entrepreneurial skills for Agriculture Development	28th to 30th Sept, 2020	MANAGE, Hyderabad	Sh. Satish Y, Scientist-B
24	Brainstorming workshop on Host plant improvement	5th Jan. 2021	CSR&TI, Berhampore	S. R. Choudhary, Babulal, Sardar Singh, Rajesh Kumar, Pawan Saini, Pawan Shukla, Gulab Khan Rohela
25	Brainstorming workshop on Biotechnology	22nd Dec. 2020	SBRL, Kodathi	Dr S. R. Choudhary

I. International Webinars/Web Conferences attended by Scientists: 14

#	Topic of seminar/ webinar	Organizer of the event	Organized on	Attended by
1	International webinar on "Intellectual property rights, an overview: myths & realities"	KLE's Science & commerce college, Navi Mumbai	6th June, 2020	Dr. Santosh Kumar Magadum, Scientist-C
2	International web-conference on "New trends in agriculture, environmental & biological sciences for inclusive development"	AEDS, Uttar Pradesh	21-22nd June, 2020	Dr. Santosh Kumar Magadum, Scientist-C
3	International webinar on "Challenges in agriculture and human health in emerging situation"	ISGBRD, Agra, Uttar Pradesh	22-23rd June, 2020	Dr. Santosh Kumar Magadum, Scientist-C
4	International virtual conference on "Recent trends in plant genetics and genomics"	VIT, Vellore, Tamil Nadu	7th July 2020	Dr. Santosh Kumar Magadum, Scientist-C
5	International web conference on "Climate smart agriculture for sustainable food & nutritional security"	BS College, Rohtas, Bihar & SURE, UP	10-11th Jul, 2020	Dr. Santosh Kumar Magadum, Scientist-C
6	International webinar on "OMICS in crop improvement"	Annamalai University, TN	21st Aug, 2020	Dr. Santosh Kumar Magadum, Scientist-C
7	"Ensuring food safety, Security and Sustainability through Crop Protection"	Bihar Agricultural University, Sabour, Bhagalpur, Bihar	05 – 06th Aug 2020	Dr. Murali S and Sh. Chhattar Pal,Scientist-C
8.	International virtual conference on "Role of Basic and applied sciences in human well-being"	G. B. Pant University of Agriculture and Technology, Pantnagar on	23-24th Nov 2020	Dr.Vinod Singh, Scientist-C
9.	"Emerging trends in extension and social sciences research"	Multi technology testing centre & vocational training centre, college of fisheries, central agricultural university (Imphal), ICAR-NAARM, Hyderabad and	10 -16th Jun 2020.	Dr.Vinod Singh, Scientist-C

#	Topic of seminar/ webinar	Organizer of the event	Organized on	Attended by
		ICAR-CTCRI, Kerala, India,		
10	International conference (virtual mode) on "Emerging Trends in Life Science"	Department of Biosciences and Sericulture, Sri Padmavathi Mahila Visvavidyalayam (Women's University), Tirupathi, Andhra Pradesh, India.	15th-16th Dec, 2020	Dr. Gulab Khan Rohela, Scientist-C
11	One day International Webinar on "Next Generation Genomics and Integrated Breeding for Crop Improvement (VII-NGGIBCI) *on* Genomics for food, health and nutrition	ICRISAT Hyderabad	14th May 2020;	Dr.Pawan Saini, Scientist-C
12	One day World Food Safety Day webinar on Pandemics and Hunger: Mainstreaming Millets for Addressing Food and Nutritional Security	Online; University of Hyderabad, Telengana	08th June 2020;	Dr.Pawan Saini, Scientist-C
13	Two days International E-Conference on Genetics and Plant Breeding Research in Post Covid-19 Era	Online; Dept. GPB, CCS University, Meerut	13th-14th June 2020;	Dr.Pawan Saini, Scientist-C
14	One day virtual symposium on "Application of Next Generation Data Analysis in Omics"	Online; School of Agricultural Biotechnology (SAB), Punjab Agricultural University(PAU), Ludhiana	26th Oct. 2020;	Dr.Pawan Saini, Scientist-C

J. National Webinars/Web Conferences attended by Scientists: 16

#	Topic of seminar/ webinar	Organizer of the event	Organized on	Attended by
1	National webinar on "Applications of biotechnological tools in crop improvement"	RVSKVV, Gwalior, Madhya Pradesh	10-11th June, 2020	Dr. Santosh Kumar Magadum, Scientist-C
2	National webinar on "Locust outbreak- a wake-up call to the Indian agriculture in challenging climatic scenario"	BAU, Sabour, Bihar	15th June, 2020	Dr. Santosh Kumar Magadum, Scientist-C
3	National webinar on "Bio-resources and technological tools for organic and eco-friendly farming"	SGRRU, Dehradun & FSF, Lucknow	23rd June, 2020	Dr. Santosh Kumar Magadum, Scientist-C
4	Virtual FDP on Fundamentals of research writing and publications	Reva University, Bengaluru	29th June to 3rd July, 2020	Dr. Santosh Kumar Magadum, Scientist-C
5	National webinar on "Experimental research in social science"	BAU, Sabour, Bihar	13th July, 2020	Dr. Santosh Kumar Magadum, Scientist-C
6.	National webinar on "Silk: Production, development and emerging trends in sericulture"	Sri. Aurobindo College, University of Delhi	10th March, 2021	Dr. Santosh Kumar Magadum, Scientist-C
7.	Integrated disease management in silkworms, *B. mori* - An Insight	Dept. of Studies in Sericulture Science, University of Mysore, Karnataka	18th Sep 2020	Dr. Murali S, and Sh. Chhattar Pal Scientist-C
8.	Choosing the Right Statistical tool for Social Science Research	PG Dept. of Commerce and Internal Quality Assurance Cell (IQAC) through Sri Bhuvanendra College, Karkala, Distt. Udupi.	08th Aug 2020	Dr. Murali S, Scientist-C

#	Topic of seminar/ webinar	Organizer of the event	Organized on	Attended by
9.	Strengthening the Immune System against COVID 19 through Agricultural Innovations	College of agriculture (Sri Karan Narendra agriculture university, Jobner (Raj.), India	29th July 2020	Dr. Murali S, Scientist-C
10.	Recent Trends in Plant Tissue Culture and Eco Biodiversity	Dept. of Botany and En science, Research Laboratory of Applied Biological Science, under the aegis of IQAC, DVS college of arts, Science and commerce, Shivamogga, Karnataka	14th Aug 2020	Dr. Murali S, Scientist-C
11.	Strategies for Writing good Research Article	Dept. of Commerce, Manipal Academy of Higher Education, Manipal in association with Indian Bureau of Administrators and Technocrats	30th Aug 2020	Dr. Murali S, Scientist-C
12.	Mechanization in Sericulture	Dept. of Studies in Sericulture Science, University of Mysore, Karnataka	2nd Sep 2020	Dr. Murali S, Scientist-C
13.	Wild Silk Moths Diversity and its Ex-situ and In-situ Conservation in India	Dept. of Studies in Sericulture Science, University of Mysore, Karnataka	10th Sep 2020	Dr. Murali S, Scientist-C
14.	Insect Systematics: its Importance, Challenges and Way Forward	ICAR- National Bureau of Agricultural Insect Resources, Bengaluru-Karnataka, India	29th Jan 2021	Dr. Murali S, Scientist-C
15.	Integrated Nutrient management in Mulberry	University of Mysore.	24th November; 2020.	Dr. Pawan Saini, Scientist-C Dr. Gulab Khan Rohela, Scientist-C, Dr. Pawan Shukla, Scientist-C
16	Two days National Webinar on "Applications of Biotechnological Tools in Crop Improvement"	RVSKVV, Gwalior, MP	10th-11th June 2020	Dr. Pawan Saini, Scientist-C

K. Award received by scientists of RSRS Jammu: 03

#	Name of Scientist	Description of award	Date	Given by
1.	Dr. Santosh Kumar Magadum, Scientist-C	"Young Plant Breeder Award"	21-22nd June, 2020	Agro-Environmental Development Society, Uttar Pradesh
2.	Dr. Vinod Singh, Scientist-C	"Certificate of Excellence in Reviewing"	2nd July .2020	International Journal Advances in Research
3.	Dr. Vinod Singh, Scientist-C	Best article award	31st March 2021	Vigyan Varta, an International e-magazine for science enthusiasts.

L. Vigilance Awareness Progarmme:

Vigilance awareness week was organized from 27.10.2020 to 02.11.2020 at the main institute and also at the nested units.

M. Celebration of constitution of India:

Constitutuion day was celebrated on 26th November, 2020 at the main institute and other nested units in North India. During the programme, deliberations were made on the importance of constitution and constitutional values.

N. Celebration of International Yoga Day:

International Day of Yoga was celebrated on 21.06.2020 at the main institute and also at the nested units to create awareness about the importance of YOGA practice in our daily life for improving the health and physical fitness.

RESEARCH ADVISORY COMMITTEE (FROM JULY 2020)

Prof. Nazir Ahmad Former Vice-Chancellor, University of Agriculture Science & Technology, Shalimar	**Chairman**
Dr. R.K Gupta Professor & Head, Sericulture Division of Entomology, Faculty of Agriculture SKUAST-Jammu, Main Campus, Chatha	**Member**
Dr. A K Roy Principal Scientist, Genetics Division, Indian Grassland & Fodder Research Institute, Jhansi- Uttar Pradesh,	**Member**
Dr. Bhagwati Charan Sharma, Professor & Head, Division of Agronomy, Faculty of Agriculture, SKUAST – Jammu	**Member**
Dr. M.A Khan Ex-Director, CSR&TI, Pampore, Central Silk Board,	**Member**
Director (Tech.) Central Silk Board, Bangalore – 560068	**Member**
Commissioner Industries (DOI), Himachal Pradesh	**Member**
Director, SDD, Jammu & Kashmir	**Member**
Director, DOS, Uttarakhand	**Member**
Director, DOS, Uttar Pradesh	**Member**
Director, DOH, Punjab	**Member**
Director, DOH, Haryana	**Member**
Director, CSR&TI, Pampore	**Member Convenor**

SCIENTIFIC & ASSOCIATED PERSONNEL

Dr. Sukhen Roy Chowdhary, Director (upto 31.01.2021)
Dr. Sardar Singh, Director (I/C) (w.e.f 01.02.2021)

Main Institute, Pampore

Host Plant Division

Host Plant Improvement Section
Dr. Rajesh Kumar, Scientist-D
Sh. Pawan Saini, Scientist-C (on E.O.L *up to* 04.09.2021)
Sh. Farooq A. Dar, Senior Technical Assistant

Host Plant Protection Section
Dr. Rajesh Kumar, Scientist-D
Dr. Sahadev Chouhan, Scientist-C
Sh. Farooq A. Dar, Senior Technical Assistant

Agronomy & Soil Section
Dr.Gulab Khan Rohela, Scientist-C
Mohd. Shafi Ganayee, Senior Technical Assistant
Mohd. Amin Bhat, Senior Technical Assistant

Farm Management Section
Dr.Gulab Khan Rohela, Scientist-C (*w.e.f* 01.04.2020 to 15.07.2020)
Sh. Gulzar Ahmad Khan (*w.e.f* 16.07.2020 to 31.01.2021)
Sh. Pawan Saini (*w.e.f* 01.02.2021)
Mohd. Shafi Ganayee, Senior Technical Assistant
Mohd. Amin Bhat, Senior Technical Assistant

BiotechnologyDivision

Host Plant Biotechnology
Dr. Ashok Kumar Kasukurthi, Scientist-D (*w.e.f* 27.01.2021)
Dr. Rajesh Kumar, Scientist-D (*upto* 22.01.2021)
Dr. Gulab Khan Rohela, Scientist-C
Dr. Pawan Shukla, Scientist-C
Smt. Zenab Jan, Senior Technical Assistant (*w.e.f* 23.01.2021)
Sh. Muneer Yousuf Rather, Senior Field Assistant (*upto* 22.01.2021)

Silkworm Biotechnology
Dr. Ashok Kumar Kasukurthi, Scientist-D (*w.e.f* 27.01.2021)
Dr. Rajesh Kumar, Scientist-D (*upto* 22.01.2021)
Dr. Gulab Khan Rohela, Scientist-C
Dr. Pawan Shukla, Scientist-C
Smt. Zenab Jan, Senior Technical Assistant (*w.e.f* 23.01.2021)
Sh. Muneer Yousuf Rather, Senior Field Assistant (*upto* 22.01.2021)

Project Monitoring Coordination & Evaluation Division

Dr. Rajesh Kumar, Scientist-D (*upto* 22.01.2021**)**
Dr.Haroon Rashid Ahmad, Scientist-D(*w.e.f* 23.01.2021)
Dr. Sahadev Chouhan, Scientist-C
Sh. Satish Y., Scientist-B
Sh. Muneer Yousuf Rather, Senior Field Assistant
Smt. Nida Mushtaq, Field Assistant

Statistics Section:
Sh. Satish Y., Scientist-B

ICT, Section:

Silkworm Division

Silkworm Improvement Section
Dr. Mir Nisar Ahmad, Scientist-D
Dr. Shiv Kumar, Scientist-C
Sh. N. Bharath Kumar, Scientist-C
Sh.Kiran.R, Scientist-B
Sh.Mohd Sultan Bhat, Senior Technical Assistant
Sh.Ab. Majid Bhat, Senior Technical Assistant (*up to* 28.02.2021)
Sh.Fayaz Ahmad Bhat , Senior Technical Assistant
Sh.M.Ashraf Hajam, Senior Technical Assistant
Smt.ImtiyazaAkhtar,Senior Technical Assistant

Post Cocoon Technology Section
Sh. Saadat Hamid Khan, Assistant Director (Insp)
Sh.Sheikh Altaf Hussain, Senior Technical Assistant
Sh.Mohd.Altaf Koul, Senior Technical Assistant

Silkworm Protection Section
Sh. N. Bharath Kumar, Scientist-C
Sh.Kiran.R, Scientist-B

Silkworm Rearing Management & Seed Technology
Dr. Mir Nisar Ahmad, Scientist-D
Dr. Shiv Kumar, Scientist-C
Smt.Zenab Jan, Senior Technical Assistant
Smt.NisaraAkhter, Senior Technical Assistant

SEEM Division

Extension & Publicity Section
Dr. Mir Nisar Ahmad, Scientist-D (*upto* 22.01.2021)
Dr.Haroon Rashid Ahmad, Scientist-D(*w.e.f* 23.01.2021)
Sh. Gulzar Ahmad Khan, Scientist-C
Sh. Inder Singh, Senior Technical Assistant

Trial of TechnoloySection
Dr. Mir Nisar Ahmad, Scientist-D (*upto* 22.01.2021)
Dr.Haroon Rashid Ahmad, Scientist-D(*w.e.f* 23.01.2021)
Sh. Inder Singh, Senior Technical Assistant

Economics & Social Studies Section
Sh. Gulzar Ahmad Khan, Scientist-C
Sh. Inder Singh, Senior Technical Assistant

Training Division

Capacity Building & Training Section
Dr. Rajesh Kumar, Scientist-D
Dr. Muttanna, Scientist-B
Sh. Farooq A. Dar, Senior Technical Assistant

Library Section

Dr. Pawan Shukla, Scientist-C (upto 22.01.2021)
Dr. Muttanna, Scientist-B (*w.e.f*23.01.2021)

Dr.Haroon Rashid Ahmad, Scientist-D(*w.e.f* 23.01.2021)
Sh. Satish Y., Scientist-B

Confidential Section:

Sh. Bhaskar Gupta, Stenographer-I

Maintenance Section:

Sh. Saadat Hamid Khan, Assistant Director (Insp) (*w.e.f* 8.7.2020)
Mohd. Shafi Ganayee, Senior Technical Assistant
Sh.Nazir Ahmad Malik, Upper Division Clerk (*w.e.f* 8.7.2020)
Sh. Ghulam Hassan Ahanger, Technician
Sh. Mohd. Yousuf Sheikh, Assistant Technician

Multitasking Staff:

Sh. Ghulam Mohd. Sheikh
Sh. Abdul Rashid Mir
Sh. Mohd. Sidiq Wani (upto 31.10.2021)
Sh. Manzoor Ahmad Mir
Sh. Mohd. Shafi Rather
Sh. Ghulam Mohd. Naikoo
Sh. Abdul Rashid Hajam
Sh. Mohd. Latief Khan
Sh. Bashir Ahmad Bhat
Sh.Sheikh Altaf Hussain, Senior Technical Assistant

Hindi Section:

Dr. Sahadev Chouhan, Scientist-C

Vehicle Section:

Dr. Rajesh Kumar, Scientist-D (w.e.f 08.07.2020)
Sh. Mushtaq Ahmad Rather, Staff Car Driver, Grade-I

Administration & Accounts Section

Sh. Fayaz Ahmad Malik, Assistant Director (A&A) (*up to* 31.05.2021)
Sh.Taslim Ansari, Assistant Director (A&A)
Sh.Subhash Chander, Assistant Superintendent (Admn)
Sh.Dara Singh, Assistant Superintendent (Admn)
Sh. Dipak Kumar Murmu, Assistant Superintendent (Admn) (*w.e.f.* 05.02.2021)
Sh.Rakesh Kumar Mishra, Upper Division Clerk
Sh.M.Ayub Khan, Upper Division Clerk
Sh.Nazir Ahmad Malik, Upper Division Clerk
Smt.Mehmooda Akhter, Upper Division Clerk
Sh.Fayaz Ahmad Wani, Upper Division Clerk
Smt. Jameela Akhtar Field Assistant

P-4, Basic Seed Farm, Manasbal

Scientific Staff:

Dr. Irfan Illahi, Scientist-D& Incharge

Technical Staff:

Sh. Ichpal Singh, Senior Technical Assistant
Sh. Zahoor Ahmad Bhat, Senior Technical Assistant
Sh. Abdul Hamid Bhat,Senior Technical Assistant
Sh. Zubaida Viqar, Senior Technical Assistant
Sh. Ishtiyaq Noor, Senior Field Assistant

Multitasking Staff:

Sh. Mushtaq Ahmad Shah
Sh. Bashir Ahmad Shaksaz

Regional Sericultural Research Station, Miransahib, Jammu

SCIENTIFIC STAFF:

Dr. Sardar Singh, Scientist-D& Incharge
Dr. Shakeel Ahmad, Scientist-C
Dr. Santoshkumar Magadam, Scientist-C
Dr. Murli S, Scientist-C
Sh. Chattarpal, Scientist-C
Dr. Vinod Singh, Scientist-C (w.e.f 01.07.2020)
Dr. Rita Singh, Scientist-B

TECHNICAL STAFF:

Sh. Janki Nath Bhagat, Sr.Technical Assistant (SG) (*Retired on* 30.06.2020)
Sh. Ashok Kumar Bawoor, Senior Technical Assistant
Sh. Hira Lal Raina, Senior Technical Assistant
Sh. Bachitar Lal, Senior Technical Assistant
Sh. Sanjiv Kumar Sharma, Senior Technical Assistant (*w.e.f*22.12.2020)
Sh. Yashpal Bhagat, Senior Technical Assistant
Sh. Tarsem Lal, Senior Technical Assistant
Sh. Kam Raj, Senior Technical Assistant
Sh. Chuni Lal, Senior Technical Assistant
Sh. Madan Lal, Senior Technical Assistant
Smt. Dalip Kour, Senior Technical Assistant
Sh. Madan Lal, Senior Technical Assistant
Sh. Sarbjit Singh, Senior Technical Assistant
Sh. Ajay Sharma, Senior Technical Assistant
Sh. Sanjay Kumar, Senior Technical Assistant
Smt. Malavati, Senior Technical Assistant

ADMINISTRATIVE STAFF:

Smt. Tulsi Koul, Superintendent (Admn.)
Sh. Anil Raina, Assistant Superintendent
Sh. Madhusudan Sharma, UDC
Sh. Jagmohan Singh, UDC
Sh. Ajay Malhotra, UDC
Sh. Kulwant Singh, UDC
Sh. Neeraj Bhagat, UDC
Sh. Rajendra Kumar Ganjoo, SCD(SG) (Retired on 31.05.2020)
Sh. Jeet Singh, SCD-I
Sh. Kourjit Singh, SCD-II
Sh. Lekh Raj, Assistant Technician
Sh. Shankar Singh, Multi Tasking Staff
Sh. Mahraj Krishan Raina, Multi Tasking Staff
Sh. Kamal Raj, Multi Tasking Staff
Sh. Shanti Saroop, Multi Tasking Staff
Sh. Guru Dayal, Multi Tasking Staff
Sh.Yash Paul, Multi Tasking Staff (Retired on 31.07.2020)
Sh. Depty Nath, Multi Tasking Staff
Sh.Paras Ram, Multi Tasking Staff
Sh.Mela Ram, Multi Tasking Staff
Sh. Madan Lal, Multi Tasking Staff
Sh.Tirathlal, Multi Tasking Staff
Sh. Bhagat Bui Nath, Multi Tasking Staff (Joined on 21.12.2020)
Sh.Balbir Raj, Multi Tasking Staff

Sh. Vikas Misri, Senior Field Assistant	

Regional Sericultural Research Station, Sahaspur, Dehradun

SCIENTIFIC STAFF: Dr. Babu Lal, Scientist-D & Incharge (*w.e.f*01-03-2020 to 13-01-2021) Dr. K. K. Rai, Scientist-D & Incharge (*w.e.f*14-01-2021 to 07-02-2021) Dr. Surendra Kumar Scientist-D & Incharge (*w.e.f* 08-02-2021 Shri R. P. Singh, Scientist-D **TECHNICAL STAFF:** Shri Dharmendar Panday, Senior Technical Assistant Shri S. K. Singh, Senior Technical Assistant Shri R. P. Godiyal, Senior Technical Assistant Smt. Chandrakala, Senior Technical Assistant Smt. Jyoti Krishali, Senior Technical Assistant Smt. Gunjan Ameta, Senior Technical Assistant Smt. Meenakshi Chadha, Senior Technical Assistant Smt. Niveditta Khanduri, Senior Technical Assistant. Smt. Vandna Rathore, Senior Technical Assistant Shri Shyam Sunder Mohan, Senior Technical Assistant Shri Mohd Shafi Mir, Senior Technical Assistant Shri Piyush, Senior Field Assistant **at Fateh Nagar, Rajasthan** Smt. Rekha Joshi, Senior Technical Assistant Shri Bheru Lal Jat, MTS Shri Kishan Lala Kala, MTS Shri Ram Singh Jhala, MTS	**ADMINISTRATIVE STAFF:** Shri. Sunder Lal, Assistant Superintendant Shri Mahideep Uniyal, Assistant Superintendant Shri R. K. Jain, Assistant Superintendant Shri Manooj Kumar, UDC Shri Uday Loyal, UDC Shri H. B. Sharma, SC Driver-I Shri Parmanand Sankha, SC Driver-I Shri Raj Kumar, MTS Shri Prem Pal, MTS (upto 28-02-2021) Shri Blaster Bhan, MTS Shri Gajendra Singh, MTS (Upto June, 2020) Smt. Nandini Sanadhya, MTS Smt. Pushplata, MTS

Research Extension Centres (RECs)

REC- Barnoti J&K)
[unit closed in Dec. 2020]

Dr. Surendra Kumar, Scientist-D (*upto*5thDecember 2020)
Sh. Sanjiv Sharma, Senior Technical Assistant (*upto* December, 2020)
Smt. Malkiat Kour, Senior Technical Assistant (upto December 2020)
Sh. Kamal Singh, Technical Assistant (Retired on 31.05.2020)
Sh. Anand Prakash, Senior Technical Assistant (*upto* December 2020)
Sh. Sukhdev Raj, Senior Technical Assistant (Transferred in Dec. 2020)
Sh. Jodh Raj, Multi Tasking Staff (Transferred in December 2020)
Sh. Bhagat Bui Nath, Multi Tasking (Transferred in December 2020)
Sh. Amarjeet, Multi Tasking Staff (Transferred in December 2020)
Sh. Bodh Raj, Multi Tasking Staff (Transferred in December 2020)

REC, Lamberi (J&K)
Dr.Vinod Singh, Scientist-C (up to 30.06.2020)
Smt.Neelam Kumari, Technical Assistant
Sh. Parvaz Ahmad, Technical Assistant
Sh.Parshotam Lal, Technical Assistant
Sh.Ram Lal, Technical Assistant
Sh.Puran Chand, MTS

Sub-REC, Panchkula, Haryana [Now closed)
Sh. F. A. Begh, Senior Technical Assistant
Smt. Sarojni Negi, Senior Technical Assistant
Sh. Deen Mohd. Senior Technical Assistant

REC- Haldwani (Uttarakhand)
[unit closed in Dec. 2020]

Dr. A. K. Kant, Scientist-D (upto June 2020)
Shri Tej Singh, Scientist-D
Shri R. C. Vidyarthi, Senior Technical Assistant.
Shri Manjeet Singh, Senior Technical Assistant
Shri Raj Narayan, Field Assistant

REC- Basti
Shri Ram Nagina, Scientist-D
Shri Jata Shankar Singh, Senior Tech. Assistant.
Shri Pranab Kumar Das, Senior Technical Assistant
Shri Kailash Nath, Senior Technical Assistant
Shri Ragubir Singh, Staff Car Driver
Shri Ashish Kumar Verma, Field Assistant.
Shri Guru Prasad, MTS

REC Sub-unit, Bhadrasi (UP)
[unit closed in Dec. 2020]

Dr. K.Ashok Kumar, Scientist-D
Shri Rakesh Babu, Senior Technical Assistant
Shri D. K. Vishwakerma, Field Assistant.
Shri Jokhu Ram, MTS
Shri Vijay Kumar Lal, MTS

ADMINISTRATIVE REPORT

EXPENDITURE 2020-21 – AT A GLANCE

Table-134: Expenditure booked under the following head of accounts at this Institute and its delegated units during year 2020-21

[Rs. In Lakhs]

S.No.	Head of Accounts	Paln Salaries	Plan SCSP	Plan STSP	Paln Recuring	Paln Capital	Total
1.	Salary & allowances	1110.10	417.30	34.20	-	-	**1561.60**
2.	Wage & EPF	367.13	104.05	-	21.94	-	**493.12**
3	7th CPC arrears of SFW / Farm Workers	-	-	-	-	-	-
4	Gratuity of SFW	14.55	15.68	-	-	-	**30.23**
5	Pension Gratuity	-	-	-	-	-	-
6	Gratuity & Retirement Benefits to Employees	309.21	93.59	-	-	-	**402.80**
7	Define Pension Cont.	17.12	2.30	-	-	-	**19.42**
8	Travelling Expenses	-	-	-	26.54	-	**26.54**
9	Contingencies	-	-	-	91.96	-	**91.96**
10	Assets	-	-	-	-	8.24	**8.24**
11	Recoverable advance	-	-	-	-	-	-
12	Advance deposited / **Advance to Supplier**	-	-	-	-	-	-
13	Released under R&D scheme	-	-	-	-	-	-
Total		**1818.11**	**632.92**	**34.20**	**140.44**	**8.24**	**2633.91**

Table-135: Revenue Generation during 2020 -21

#	Source of Revenue Generation	Physical (No.)	Revenue generated(Rs. in Lakhs)	
			Target	Achievement
8.1	**Patent (Technology)**	-	-	-
8.1.1	License Fee collected	-	-	-
8.1.2	Royalty collected	-	-	-
8.2	**Testing & Analytical charges (Sample)**			
8.2.1	Testing of Soil/water/FYM/ Leaf etc	Need based	--	-
8.2.2	Quality analysis/ testing of products	Need based	--	-
8.2.3	Testing of cocoons/silk yarn/fabric etc.	200/150	0.075	0.13400
8.3	Consultancy (Services)	--	--	00
8.4	Supply/ sale proceeds of cutting / Sapling/ seedling/ chawki worms/ cocoons/ Silk etc.			
8.4.1	Mulberry cutting	--	0.63	2.13896
8.4.2	Vanya host plant sapling/ seedling	--	--	**00**
8.4.3	Mulberry chawki worms	--	--	00
8.4.4	Mulberry Seed (DFLs)	--	--	00
8.4.5	Vanya seed (DFLs)	--	--	00
8.4.6	Cocoons	--	2.00	1.66771
8.4.7	Output from R&D Projects (Silk, fabric etc)	--	0.10	00
8.4.8	Others (please specify)			00
	Licence fee of staff quarter etc.	--	3.00	3.59199
	Sale of intercrop	--	0.75	1.51172
	Total		**6.555**	**9.16909**