

CENTRAL SERICULTURAL RESEARCH AND TRAINING INSTITUTE (CSRTI), MYSORE

BRIEF HIGHLIGHTS OF RESEARCH AND DEVELOPMENT ACTIVITIES (2014-15)

CSRTI, Mysore undertook several R&D projects/activities covering mulberry and silkworm breeding, improvement, production and protection aspects, besides extension and training activities to address the needs of on-farm sectors of mulberry silk in Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Telangana, Maharashtra and Madhya Pradesh states. During the year, seven research projects were concluded and 16 new R&D projects were initiated. The salient achievements are as follows:

MULBERRY CROP IMPROVEMENT, PRODUCTION AND PROTECTION

- Four mulberry hybrids [No. 6, 12, 4 & 10] identified for final yield evaluation, which out-yielded the V1 [check] variety by over 15%
- Ninety-five fungal isolates from root rot infected samples were characterized through DNA profiling and Pathogenicity tests and the most virulent strain identified is being utilized for screening the mulberry accessions for resistance to root rot
- Two crop data for 57 characters in 16 varieties were recorded for the development of DUS guidelines for mulberry
- 550 hybrid seedlings (hybrid progeny of 14 crosses) were short-listed through artificial inoculation under progeny row trial for developing mulberry varieties resistant to root rot and root knot
- *Mulberry disease info* – a database for 22 mulberry diseases, which is a single window resource for effective disease management was developed
- All India Co-ordinated Experiment on Mulberry (AICEM) programme - yield data of four crops has been recorded for three test varieties (G4, C-2038, Suvarna-2) and two checks (Vishala & V1)
- Seed gardens for new mulberry varieties, G2 for chawki rearing (16 acres) and G4 for late age rearing (17 acres) were established to popularize the varieties and to take up plantation in about 300 acres in the field



- Suitable for young-age [chawki] silkworm rearing
- Yields 33% more chawki leaves than S36 and 20% more than V1
- Good rooting ability and easily propagated through cuttings
- Quick regeneration capacity
- Moderately resistant to leaf spot and leaf rust



- Suitable for late-age silkworm rearing
- Good rooting ability and propagation through cuttings
- Quick regeneration capacity
- Moderately tolerant to leaf spot & resistant to leaf rust and root rot
- Higher feed conversion efficiency

SILKWORM CROP IMPROVEMENT, PRODUCTION AND PROTECTION

- Bivoltine single hybrid, CSR16 x CSR17 was evaluated with 5.17 lakh dfls covering 2132 farmers of southern states and an average yield of 64.30 kg/100 dfls was recorded. The hybrid is proposed for further popularization in selected areas

- Productive bivoltine single hybrid with high cocoons shell (23-24%) and raw silk recovery (18.0-19.0%)
- Marked larvae with bluish white body
- Better returns for cocoon producer and reeler
- Cocoon yield: 65-70kg /100 dfls
- Better fibre quality: 2A~3A



- Three productive bivoltine hybrids viz., S8 x CSR16, SSBS 5 x SSBS 6 (single hybrids) and FC3 x CSR17 (three-way cross) were developed

- Productive bivoltine single hybrid with high cocoons shell (23-24%) and raw silk recovery (19-20%)
- Marked larvae with bluish white body
- Cocoon yield 70- 80. kg /100 dfls
- Better returns for cocoon producer & reeler
- Better fibre quality (2A~3A)



- Two BmNPV tolerant bivoltine hybrids, 21 x 35 (single) and 21x118 X 62x87 (double) were developed through marker assisted selection programme utilizing BmNOX protein
- Four thermo-tolerant silkworm lines were developed utilizing SSR markers (LFL0329 & LFL1123) associated with thermo-tolerance
- Four polyvoltine lines tolerant to high temperature and BmNPV were short-listed and are currently at F10 generation
- L14, polyvoltine silkworm breed producing international grade silk was improved for cocoon colour and size uniformity, survival (disease resistance/tolerance), productivity, and reduction in diapause and trimoulter behaviour. The field trial of hybrid with improved lines recorded cocoon yields up to 63kg/100 Dfls
- Cauvery Gold (L14 x S8), an improved crossbreed was developed through hybrid evaluation tests utilizing improved L14 lines and new bivoltine male components



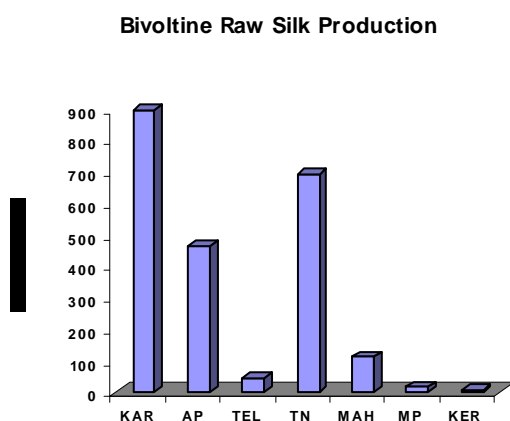
- Higher productivity & superior fiber quality
- Larvae are plain larvae and bluish white
- Greenish yellow cocoons, oval in shape having compact shell and good grains
- Higher raw silk recovery & raw silk content
- Internationally gradable silk: 2A~3A

- The expression of MetAP2 gene of *Nosema bombycis* was observed to be inhibited by Fumagillin and could be utilized for therapeutic control of pebrine infection in silkworm
- SERI DIS – web page for the data collection and monitoring of silkworm diseases in seed and commercial crops was developed and the programme is being conducted in southern States and Maharashtra

- Production and supply of biocontrol agents: *Nesolynx thymus* (411 lakhs) and ladybird beetles (1.25 lakhs)
- Tray washing cum disinfection machine was developed for efficient rearing tray washing and disinfection for the benefit of chawki rearing centers and farmers
- DBT sponsored Brainstorming session was organized (31.10.14) for developing network programmes for improvement of mulberry and silkworm through biotechnological approaches

EXTENSION

- 2241 MT bivoltine raw silk (about 60% of total raw silk production in the country) was produced in 106 clusters in Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Tamil Nadu, Telangana and Maharashtra. A total of 213.6 lakh DFLs were reared with an average yield of 68.2 kg /100 DFLs. Mulberry plantation was expanded by 20174 acres with 14505 farmers in clusters



State	Yield/100
Karnataka	65.23
Andhra Pradesh	66.40
Telangana	65.08
Tamil Nadu	75.54
Maharashtra	63.49
Madhya Pradesh	53.93
Kerala	75.88
Avg.	68.21

- Institute Village Linkage Programme (Seri Model Village) was re-initiated at 11 locations in Andhra Pradesh, Karnataka, Tamil Nadu, Tamil Nadu, Telangana and Maharashtra. Ten important technology interventions were made with the existing farmers under close supervision of extension officials from CSB and DOS. A total 3.59 lakh dfls of bivoltine hybrids were reared with farmers and 8.5% improvement in cocoon yield against the bench mark with an average yield of 62.3 kg/100 dfls was recorded
- Sericulture farmers' workshop was organized at Bidar (28th Jan 2015), in which new technologies and products were exhibited including release of mulberry variety, G2; silkworm double hybrid, G11 x G19; Tray washing cum disinfection machine; latest technology booklet; and pamphlets on new technologies. 1863 farmers from Northern Karnataka and adjoining states of Telangana and Maharashtra benefited from the workshop
- A total of 83,900 dfls were chawki reared (32 batches) and supplied to 194 farmers covering 65 villages through model CRC and the average yields ranged 67.4 - 81.5 kg/100 dfls
- 41220 sericulturists were sensitized for new technologies in mulberry cultivation, silkworm rearing and crop protection through 830 Extension Communication Programmes
- An entrepreneurial development programme sponsored by NRDC (National Research Development Corporation: Govt. of India) was initiated for the production and supply of cocoon harvesters developed by the institute

PATENTS AND COMMERCIALISATION

- Six patent applications (preparation of pupa powder, culturing of Cordyceps, use of spent silkworm moths, pupae for human food, preparation of pupae oil and preparation of silkworm powder) were submitted to National Biodiversity Authority for clearance
- Eight technologies viz., Poshan, Navinya, Ankush, Sampoorna, PVC chawki stand, cocoon harvester, chawki leaf chopper, hand operated silkworm separator were commercialized through NRDC with eight firms
- MOUs entered with the manufacturers of Samruddhi, Serimore, Sanitech Super for the commercial utilization after thorough technical evaluation
- Consultancy projects for validating the products/technology were initiated for SERI SWACCH and SERI FIT with manufacturers

HUMAN RESOURCE DEVELOPMENT

- 499 beneficiaries trained in 26 batches on Cocoon Handicrafts, Mulberry Cultivation and Seed Multiplication, Quality Bivoltine Cocoon Production, Commercial Chawki Rearing and Mulberry & Silkworm Diseases and Pest Management under Integrated Skill Development Scheme (ISDS), Ministry of Textiles, Govt. of India
- A total of 751 persons trained under structured and need based programmes including 51 entrepreneurs/CRC owners (3 months) and 76 entrepreneurs (one month) in CRC activities
- Orientation training programme in sericulture (one month) was organized for three Japan Overseas Cooperation volunteers (JOCV) working in Andhra Pradesh, Tamil Nadu and Karnataka
- Special training programme (six weeks) on Sericulture and Silk Industry sponsored by ITEC (Indian Technical & Economic Cooperation Programme), Ministry of External Affairs, Govt. of India was initiated with 14 trainees from Bangladesh, Philippines, Uganda, Thailand and Egypt

The achievements of Regional Research Stations (RSRS) and Regional Extension Centres (RECs) and their subunits in the validation of technology/products, extension communication, frontline demonstrations and training programmes are detailed below:

RSRS, ANANTAPUR

- Bivoltine Raw Silk Production Programmes
CPP: 48.89 lakh dfls of bivoltine hybrids were reared with 17,117 farmers and the average yield recorded was 65.4 kg/100 dfls; IVLP: 26,650 dfls of bivoltine hybrids were reared with 152 farmers and the average yield recorded was 56.8 kg/100 dfls and recorded an improvement of 8.34% against benchmark
- Transfer of Technology Programmes
1.43 lakh dfls of CSR16 x CSR17 were evaluated with 509 farmers and obtained an average cocoon yield of 64.04 kg /100 dfls; Uzi infestation was limited to < 4% from 25-40% by supplying the biocontrol agent, *N. thymus* (1119 sachets/539 farmers/31 villages); Plantation of new mulberry varieties (1977.6 acres/1264 farmers); Soil testing/analysis was conducted for 337 samples and soil correction measures were recommended; TOT programmes were also conducted on INM, Poshan, Navinya, IPM & composting (525 farmers)
- Extension Communication Programmes
Sericulture Farmers Workshops were conducted at Madakasira (800 farmers) and Warangal (600 farmers); 240 ECPs were conducted sensitizing 1700 farmers

- Training Programmes
1230 farmers were trained in 82 batches under TUP and 108 persons under ISDS

RSRS, CHAMARAJANAGAR

- R&D Projects
Seri-Lac culture model for income augmentation was carried out to assess the feasibility of lac production in mulberry plantation. First crop results indicate 200-250 Kg Lac/acre/year could be produced resulting in realizing an additional income of Rs.60000 – 75000
Tree mulberry cultivation (8'x8') irrigated with Affordable Micro-Irrigation Technology (AMIT) resulted in an increase in mulberry leaf yield, 3060 kg/acre as compared to bush plantation (2380 kg/acre). The income augmentation was upto Rs.116000/acre/year as against Rs.25000 under rainfed condition with bush plantation
- Transfer of Technology Programmes
Uzi infestation was limited to 4.14% from 10.06% by supplying the biocontrol agent, *N. thymus* (68 farmers); Reduction of tukra mealy bug infestation from 20% to 7.42% was achieved through *S.coccivora* beetle production and supply (77 boxes/ 54.5 acres)
- Training Programmes
180 farmers were trained in 12 batches under TUP and 59 persons under ISDS

RSRS, KODATHI

- Bivoltine Raw Silk Production Programmes
CPP: 77.29 lakh dfls of bivoltine hybrids were reared in 36 clusters and the average yield recorded was 66.41 kg/100 dfls; IVLP: 38800 dfls of bivoltine hybrids were reared and the average yield recorded was 61.23 kg/100 dfls and recorded an improvement of 12.79% against benchmark
- Transfer of Technology Programmes
36750 dfls of CSR16 x CSR17 were evaluated with 145 farmers and obtained an average cocoon yield of 61.53 kg /100 dfls; New mulberry plantation was taken up in 10133.6 acres with 6934 farmers; Soil testing/analysis was conducted for 214 samples and soil correction measures were recommended; TOT programmes were also conducted on INM, Poshan, Tukra, Navinya, IPM & composting (344 farmers)
- Extension Communication Programmes
244 ECPs were conducted sensitizing 9590 farmers
- Training Programmes
765 farmers were trained in 48 batches under TUP and 81 persons under ISDS

RSRS SALEM

- R&D Projects
Natural enemies of thrips collected from farmers' gardens of Karnataka and Tamil Nadu were deposited with NBAII for identification
- Bivoltine Raw Silk Production Programmes
CPP: 60.36 lakh dfls of bivoltine hybrids were reared in 28 clusters in Tamil Nadu and Kerala and recorded highest cocoon yields (75.4 kg/100 dfls) in the country; IVLP: 1,17,487 dfls of bivoltine hybrids were reared with 200 farmers and the average yield recorded was 71.1 kg/100 dfls and recorded an improvement of 12.9%.
- Transfer of Technology Programmes
OST revealed the superiority of new ICB (NDV6 x CSR51), single hybrid (D2 x D13) and double hybrid (DH3) over the control hybrids with regard to cocoon yield and improved silk quality; OFT of new productive bivoltine hybrid (S8 x CSR6) and NPV tolerant hybrid (MASN4 x CSR2) recorded an average yield of 82 kg and 65.2 kg/100 dfls, respectively;

Papaya mealy bug management was undertaken (486 units or 121500 nos.) by mass multiplication and supply of *Acerophagus papayae*; About 20 field problems in 43 villages were resolved; Mass multiplication of biocontrol agents: *Cryptolaemus* (48 units) and *Scymnus* (108 units) to control tukra; *Trichogramma* (157 cc) and *Bracon* (245 pockets) to manage leaf webber and *Chrysoperla* (66000 nos) for thrips were produced and supplied; Released *N. thymus* (222 pouches) for Uzifly management in rearing houses; Soil testing/analysis was conducted for 480 samples and soil correction measures were recommended; TOT programmes were also conducted on INM, Poshan, Navinya, IPM & composting (443 farmers)

- Extension Communication Programmes
Sericulture Farmers Workshops were conducted at Virudhnagar (750 farmers) and bivoltine workshop at Salem (250 farmers); 240 ECPs were conducted sensitizing 13066 farmers
- Training Programmes
1394 farmers were trained in 93 batches under TUP and 92 persons under ISDS
- Nine PhD students are registered for higher studies in Botany and Sericulture under Periyar University, Salem