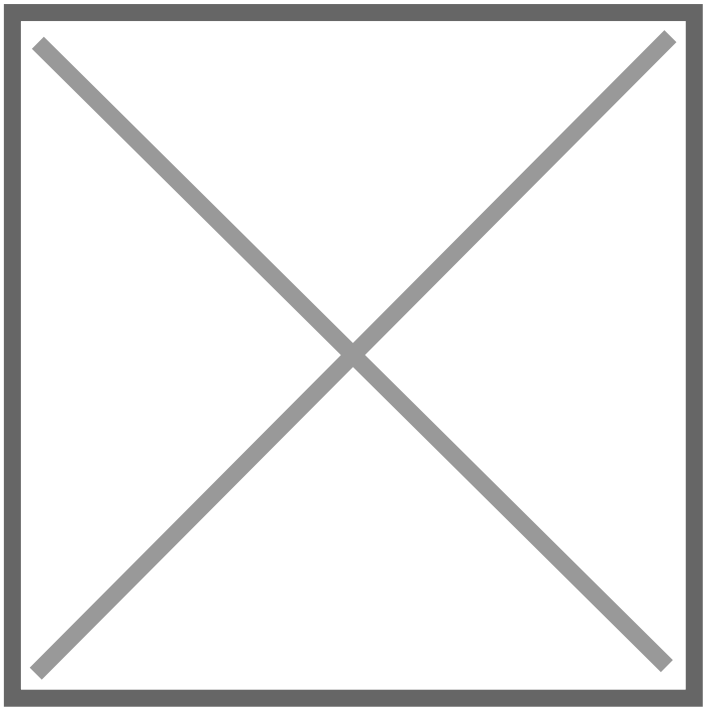
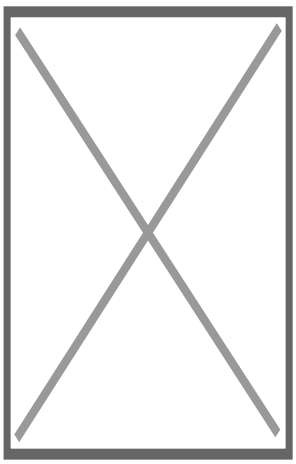
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Spinning a silken revolution

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India produces 18 percent of the world's silk as compared to 69 percent produced by China. In fact, India's present overall silk production falls short of even the domestic demand.



Realizing the need to improve sericulture practices and infuse modern technology into this agroforestry-based cottage industry, the Department of Biotechnology (DBT) in association with Central Silk Board (CSB), identified biotech techniques to increase productivity, enhance silk quality and improve host plants.

DBT initiated a focused program on seribiotechnology and so far over 60 R&D projects have been supported involving various leading institutes including IISc, Bangalore; NII, New Delhi; NBPGR, New Delhi; NCL, Pune; CDFD, Hyderabad; CCMB, Hyderabad; IIT, New Delhi; IIT, Kharagpur; MKU, Madurai and University of Delhi, Delhi along with various centers/institutions of CSB.

IPM Program:

At the Central Sericultural Research and Training Institute (CSRTI), Mysore, an Integrated Pest Management (IPM) package has been developed for the control of Uzifly (a dreaded pest of silk cocoons leading to large-scale destruction of silk) at field level. The implementation of IPM package resulted a suppression of 77 percent in Uzi infestation. Now the officers from 59 cocoon markets and State Sericulture Department of Karnataka have been trained in mass multiplication and release of parasitoid -Nesolynx thymus, which feed on the Uzi flies. Presently the parasitoid is being multiplied regularly in 20 major cocoon markets for release in markets and supply to sericulture farmers.

Silkworm as a bioreactor:

Apart from increasing silk productivity, efforts are being made to develop silkworm as a bioreactor for producing biomolecules of commercial importance. Expression of marker proteins (luciferase and green florescent protein) has been successfully achieved in cell lines and larval caterpillars of silkworm (Bombyx mori) employing recombinant Bm NPV vector harboring reporter genes. Studies are being conducted for production of a few veterinary vaccines using the system. The Rabies, PPRV (Petid de Pet Ruminant Virus) and Rinderpest viral antigen proteins have been expressed using the system and efforts are on for further scale up and testing studies.

Silkworm genome program:

An ambitious silkworm genome program has been initiated at the Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad to identify and map useful genes of silkworms using molecular techniques. This will helping in breeding better silk worms and developing transgenic silkworms with desired traits. About 400 different types of DNA markers have been developed in the silkworm.

The Andhra Pradesh State Sericulture Research and Development Institute in collaboration with CDFD has already developed three productive silkworm hybrids namely Swarnandhra, Hemavathy and Kalpatharuvu by adopting a combination of conventional selection, hybridization and DNA technologies. These hybrids give consistent silk cocoon yield and internationally graded raw silk.

India is now participating in Ã¢â?¬Å?International Consortium on Lepidopteran GenomicsÃ¢â?¬? along with seven other countries in which silkworm genomics is a major component. As part of Indian efforts, DBT has launched a program to develop EST (Expressed Sequence Tags) database on mulberry and non-mulberry silkworm (Muga and tropical Tasar) and also to attempt functional co-relationship of these ESTs with desirable characteristics in silkworm.

At IIT Kharagpur and NII, New Delhi, molecular biological studies on silk protein (fibroin and sericin) genes of non-mulberry silkworm have been carried out. Fibroin - a major protein from Eri, Muga and Tasar has been purified and characterized. Work is in progress to clone the whole fibroin gene from tasar silkworms genomic DNA library. A new and novel type of double stranded segmented RNA cytoplasmic polyhedrosis virus infecting tasar silkworm has been identified at IIT, Kharagpur. This will lead scientists to develop control measures against cytoplasmic viral disease affecting tasar silkworm.

At CSRTI, eight molecular RFLP (Restriction Fragment Length Polymorphism) markers linked to cocoon shell character have been identified for the first time in the world. Cocoon shell character in silkworm is a primary determinant of the silk yield. The results have opened up prospects for utilizing the identified molecular markers for successful application of directional breeding in silkworm for generating improved races with high silk yield.

Mulberry genome mapping:

Targeting the host plant, mulberry, a prototype of web enabled DNA database has been developed for the first time in the world encompassing DNA fingerprinting studies carried out on more than 150 genotypes including 48 selected elite genotypes. Efforts have been initiated for construction of framework molecular linkage map of mulberry, which will be helpful in mapping and identification of useful genes in mulberry. At Delhi University the transient expression of a marker gene in various explants from different commercially important genotypes of mulberry have been shown. The first transgenic mulberry plant with marker gene has already been developed. This has opened up possibilities for the production of transgenic mulberry clones with desired traits in the future. Work has been recently initiated for developing transgenic mulberry with drought and salinity tolerance.

Rolly Dureha