



SERIBIOTECHNOLOGY

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During 1970s, biotechnology emerged as a new discipline, as a result of combination of biological science with technology.

The development and utilization of biological processes, forms and systems for obtaining maximum benefits to man and other forms of life.

Or

Biotechnology is the science of applied biological process.

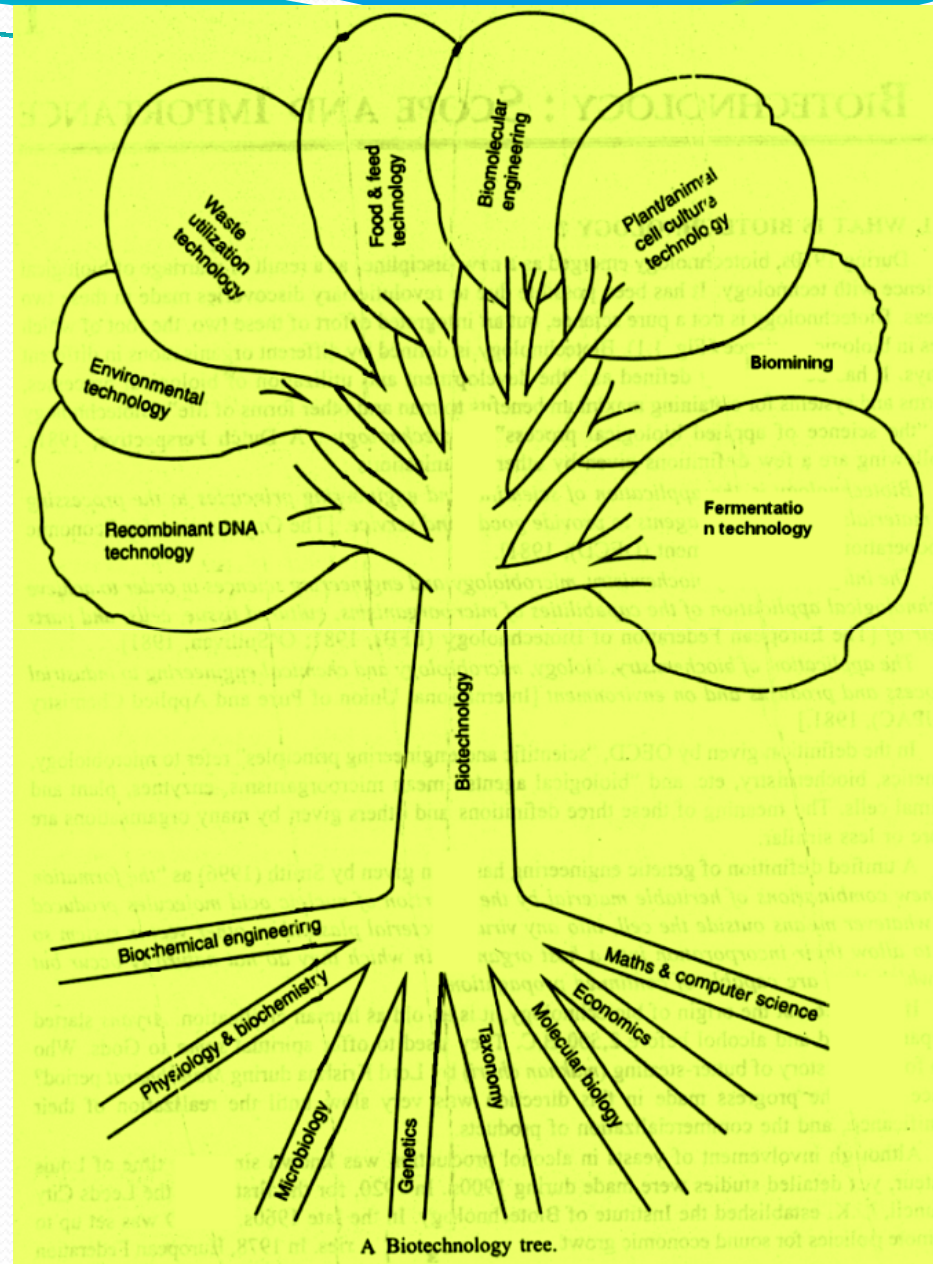
Or

Biotechnology is the application of scientific and engineering principles to the processing of materials by biological agents to provide goods and service.

- **The origin of biotechnology is as old as human civilization.**
- ***Aryans* started preparing curd and alcohol before 2,500 B.C. They used to offer spiritual *soma* to Gods.**
- **Who can forget the story of butter-stealing by Lord Krishna during *Mahabharata* period?**
- **Since then, the progress made in this direction was very slow until the realization of their significance, and the commercialization of products.**

- **Although involvement of yeasts in alcohol production was known since the time of Pasteur, yet detailed studies were made during 1900.**
- **In 1920, for the first time, the Leeds City Council, U.K. established the Biotechnology Institute.**
- **In 1978, European Federation of Biotechnology was established. Until 1970s, the efforts made by microbiologists, molecular biologists, geneticists, biochemists, medical scientists, biochemical engineers, agriculture scientists, virologists, etc. led to reach their respective disciplines to the zenith.**

In the following Biotechnology Tree a schematic view of the different branches of science to form biotechnology and their applications for mankind has been given.

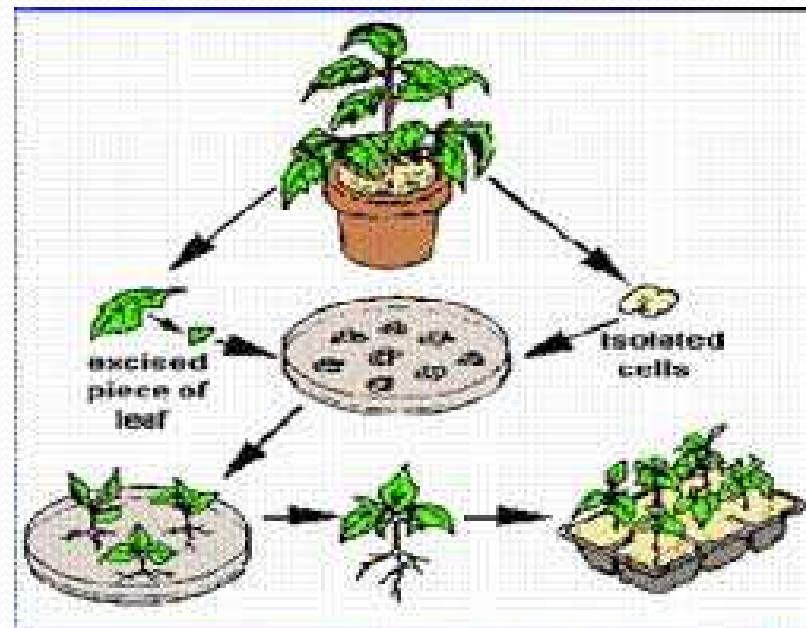


BIOTECHNOLOGY FOR CROP IMPROVEMENT

- The typical mulberry or any other crop improvement cycle takes 10-15 years to complete crop improvement stages. However application of technology reduces cost, time, labour, etc.,

The following techniques may be involved in the same

Micropropagation: The propagation of plants by growing plantlets in tissue culture and then planting them out. The technology ensures rapid, true-to-type, disease-free, round-the-year production of plant material. Micropropagation promises multiplication of rare, hard to propagate plants using any plant part whether or not used as propagation material conventionally.



Somaclonal and Gametoclonal variation:

Somaclonal and gametoclonal variation among the callus derived plant is a potent emerging aspect for broadening the genetic base and, thus, obtaining incremental improvement in the commercial cultivars. Using this technique, several million cells can be screened against various biotic and abiotic stress factors which are highly efficient.

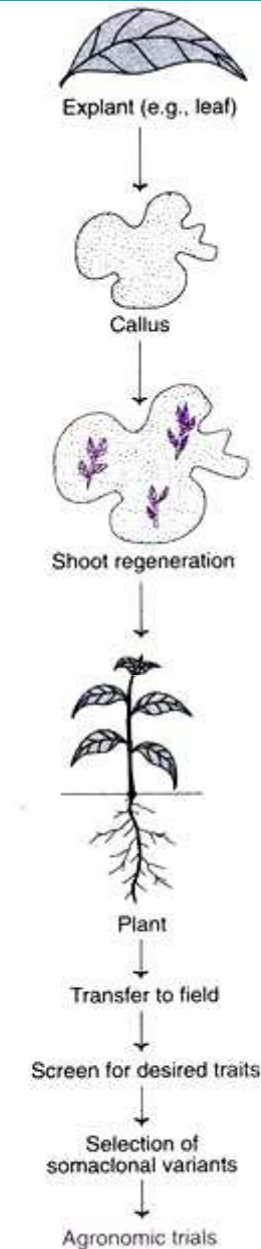


Fig. 46.1 : A diagrammatic representation of isolation of somaclones without in vitro selection.



- **Production of Disease and stress resistant plants:**

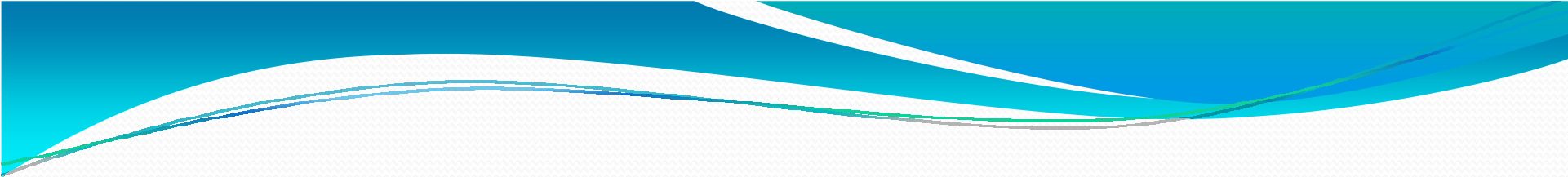
Using dual cultures technique disease and stress resistant plants can be evolved. Dual culture techniques are used for a variety of purposes, including assessing host-parasite interactions, screen the plants against variety of pathogens, *etc.*,



- **Production of haploids:**

- Haploids are defined as saphrophytes with gametophytic chromosome number and have been produced in a variety of plant species using a variety of methods.

- Although, the significance of haploids in genetics and plant breeding has been recognized for long time, with the advent of biotechnology it received renewed emphasis, so that the production of haploids become an important component of biotechnology programmes.



Embryo culture: Embryo culture, has given practical approach to obtain interspecific and intergeneric hybrids. Later, these hybrids can be multiplied by vegetative mode of propagation.

- **Transgenic plants:** Transgenic plants are plants that have been genetically engineered, a breeding approach that uses recombinant DNA techniques to create plants with new characteristics. *Eg.*, Disease resistance, Pest resistance, Stress resistant *etc.*,
- **Cell fusion and somatic Hybridization:** Development of hybrid plants through the fusion of somatic protoplasts of two different plant species/varieties is called somatic hybridization.

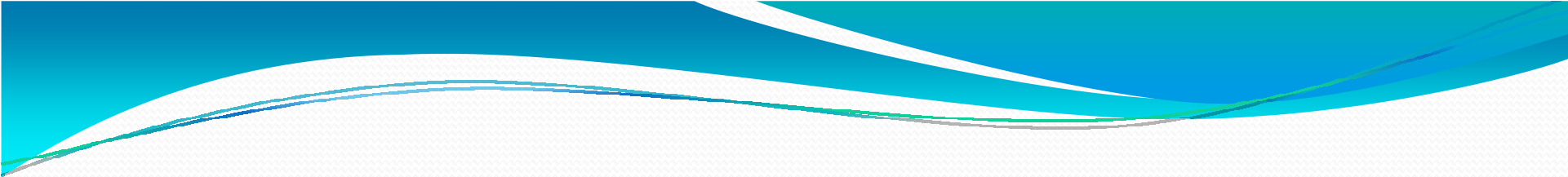


The Seribiotech Research Laboratory [SBRL]

Established during 1993 under the World Bank aided National Sericulture Project as per the advice of a high level committee headed by Prof. Lynn Riddiford, USA.

The following are the broad mandate of the laboratory.

a. To conduct research in frontier areas of modern biology and to seek potential applications of these work towards improving silk productivity.

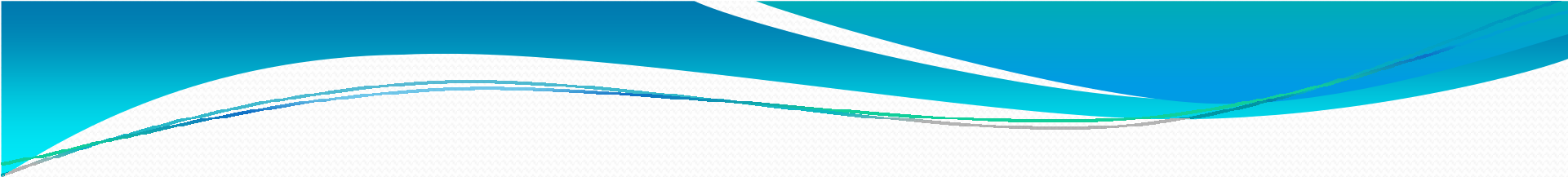


b. To interact with other institutions doing basic or applied research in areas related to sericulture and other allied areas.

c. To disseminate technology developed to the target groups through the other R & D constituents of CSB.

Functions of SBRL:

- **Silkworm Genomics:** Resistance to viral pathogens, regulation of diapause, regulation of yolk proteins, characterization of RNA dependent RdRp (RNA-dependent RNA polymerase) gene *etc.*,
- **Host Plant Genomics:** Identification of various mulberry species and other host plants, development of microsatellites for mulberry *etc.*,

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- **Proteomics:** Immune response proteins and their interactions, and silkworm transcriptome analysis under stress from pests like uzi fly *etc.*,
 - **Molecular Pathology:** Molecular characterization of various pathogens

Definitions

Genome: The complete set of genes.

Or Genetic material present in a cell or organism.

Or The haploid set of chromosomes in a gamete or microorganism, or organism.

Genomics: The study of genes and their function.

Proteome: The entire complement of proteins that is or can be expressed by a cell, tissue, or organism.

Proteomics: The study of proteomes and their functions.

Definitions continued

Transcriptome: The complete set of RNA transcripts produced by the genome at any one time.

Transcriptomics: The study of the transcriptome is termed transcriptomics.

Microsatellites: A set of short repeated DNA sequences at a particular locus on a chromosome, which vary in number in different individuals and so can be used for genetic fingerprinting.



THANK YOU