

**PROCEEDINGS OF THE INSTITUTE LEVEL MONTHLY SEMINAR ON  
“APPLICATION OF BIOTECHNOLOGY IN FORESTRY AND ITS EXTENSION TO  
STATE FOREST DEPARTMENTS” HELD AT HFRI, SHIMLA ON 28.12.2018**

In the series of monthly seminar, a talk on the topic “**Application of Biotechnology in forestry and its extension to state forest departments**” under the thrust area “**Managing forests and forest products for livelihood support and economic growth**” was held on 28<sup>th</sup> December, 2018 at 2.30 PM which was delivered by Sh. Sunil Waman Bhondge, ACTO Genetics and Tree Improvement Division, HFRI, Shimla. The scientists, forest officers, technical officers, technical staff and other researchers were present during this seminar.

Dr. V.P. Tewari, Director, HFRI chaired the session of monthly research seminar. Dr. Rajesh Sharma, Group Co-ordinator Research welcomed the Director and all the participants present and highlighted the importance of the topic in the light of ongoing research activities on forest biotechnology.



Sh. Sunil Waman Bhondge gave a crisp and informative presentation on application of biotechnology and highlighted various issues confronting research challenges in the field of forest biotechnology viz., useful contributions of biotechnology in agricultural research, current status of forest biotechnology research, brief description of forest biotechnology studies under progress outside India, within ICFRE and in Himachal Pradesh, future applications of biotechnology to the foresters and forestry research and research needs.

He laid emphasis on how the biotechnological studies came into existence, what kind of research activities are under process in forest biotechnology discipline at world level. He informed that as per FAO report, most of the forest biotechnology works are restricted to laboratories of which only 1-5% are of commercial importance or field utility. He also explained about some useful contributions of biotechnology in agricultural crops such as embryo rescue of hybrid embryos, development of haploid plants by another culture/pollen culture/ovule culture, development of pure homozygous lines by chromosome doubling of haploid cells, micro-propagation of orchids, rapid clonal multiplication through meristem culture, recovery of virus and other pathogen free planting stock, germplasm conservation through cryopreservation, isolation of stable somaclonal variants for increased yield/abiotic and biotic stress resistance, marker assisted genetic variability studies, production of transgenics for insect/pest resistance, herbicide resistance, protection against viruses and storage protein improvements etc.

Presently, biotechnology is used for certain fields in forestry research (study is restricted to few specific genera only) such as mass multiplication, genetic transformation, germplasm conservation, stress resistance, modification of lignin, molecular characterization and tissue culture.

Sh. Bhondge also emphasized over the practical utility of the biotechnological research in forestry



sector, and explained the cases where biotechnology can play a key role in solving some confusing events of foresters and forestry research. Forest biotechnology studies will be a very powerful tool in future for hybrid purity check, clonal discrimination, timber and medicinal plant theft, species authentication, genetic fidelity, genetic variability for germplasm conservation, genetic assessment of plus trees selected on the basis of morphometric traits, disease free planting stock and *in-situ* conservation of threatened plant species.

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During the course of discussion, Dr. V.P. Tewari, Director, HFRI raised the issue of selection of specific genetic markers for specific study, use of particular parts as explants and development of cybrids. Further, he suggested for Genetics and Tree Improvement division of HFRI to contribute in such studies. He also stressed to make use of DST support to equip Genetics laboratory.

Sh. S.P. Negi, HOO added that HFRI can initiate such studies by starting tissue culture based works of threatened medicinal plants and their restoration in field.

Dr. Rajesh Sharma, GCR raised the issue that all the research activities for forestry species should be in programmed manner so that the findings could be taken up to the state forest departments for their implementation.

## Outcome of the seminar

### A. Identification of research needs

- 1.To develop cost effective protocols for tissue culture/micro-propagation of threatened/important forestry species of Western Himalaya
- 2.Molecular characterization to study complex genetic structures and relations of tree species
- 3.To develop certain mechanisms/protocols/physiological factors to identify the dioecious species at nursery stage
- 4.Development/identification of biotic/abiotic stress resistant lines by screening natural clones or by developing transgenic plants of desired traits
- 5.To develop protocols for the extraction of active ingredients from cell cultures of medicinal plants
- 6.To develop disease free planting stock of prioritized species by using tissue culture techniques
- 7.To develop germplasm banks for diverse genetic material for future use

### B. Formulation of Future strategies

It was discussed and unanimously agreed that in future HFRI should take up research keeping in view the followings objectives:

1. To establish separate well-equipped laboratory for molecular biology and tissue culture related studies
2. Prioritization of different forestry species for biotechnological interventions
3. To develop protocols for *In-vitro* studies of threatened plant species
4. Field testing of Tissue culture raised plants and *In-situ* conservation of threatened taxa
5. Studies on genetic variability, Molecular taxonomy and germplasm conservation of diverse genetic material

### **C. Future research directions discussed for implementation and opportunities for funding**

To initiate such activities at institute level, new project proposals should be submitted to various funding agencies such as DST, DBT, NMPB etc. for infrastructure development as well as for research purpose.

In the end, GCR thanked Director of the institute, presenter, and all others present for giving their valuable inputs.

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