

## “Bharat ka Amrut Mahotsav”

### ‘Forest Productivity Enhancement - *‘a virtual technical talk to Forestry students’*

As part of ‘*Bharat ka Amrut Mahotsav*’ announced by Government of India to commemorate 75<sup>th</sup> anniversary of India’s Independence, Division of Genetics & Tree Improvement, Forest Research Institute, Dehradun virtually organized a technical talk on the subject “Forest Productivity Enhancement”. The participating universities were **Forest Research Institute Deemed to be University, Dehradun, UK, Dr. Y.S. Parmar University of Horticulture & Forestry, Nauni, Solan, HP, Veer Chandra Singh Garhwali Uttarakhand University of Horticulture & Forestry, Bharsar, UK and Rani Lakshmi Bai Central Agricultural University, Jhansi, UP**. Nine experts and eminent scientists from different fields of forestry sciences from these Universities were delivered their talks followed by discussion. Students from all the participating universities were also connected virtually and took part in the informative technical session.

It is really privilege for Division of Tree Genetics and Tree Improvement of FRI, Dehradun to received assignment from Director General ICFRE discuss forest productivity and conservation on onset to celebrate Bharat ka Amrut Mahotsav by Government of India. When we look at forests as a whole, the different services these provide in the form of food, fodder, fuel, paper & pulp, their role in maintaining ecosystem balance and most important ‘oxygen’, the term ‘*amrut*’ seems to resonate very well with the concept of forests. Forests in true sense are the lifeline for survival of mankind and climate resilience. Hence, the technical talk was aimed to discuss the various factors that could lead to enhancement of productivity of our valuable forest resources.

The opening address by Dr. H S. Ginwal, Dean FRI University emphasized on the importance of forest productivity in Indian context with a historical background on how various activities done in the past linked to productivity enhancement of forest. In India, 40% of wood based demands are met through forest sector and a forest cover of only 25.26% is not sufficient to meet these demands. It was therefore pointed that demands and requirements of a huge population could only be met if we are able to increase forest productivity significantly. In order to achieve these goals, there is an immediate need to grow more in limited area since a large chunk of land is already under agricultural, industrial and residential uses. In case of forests, not only scientific tree improvement but also a productive land-use system is required to be set up in order to get maximum productivity gains. The talk also emphasized on the role of students as well as agricultural farmers in spreading awareness and proper package of practices for different forestry species. Significant achievements in the area of tree improvement began in the 1930s when Prof Champion established provenance trial of chir pine and proved inheritance of spiral grains. In the same year international provenance trail of *Tectona grandis* was established and these paved way for the future tree improvement programs in country. Hence the role of productivity enhancement was realized by our scientists way back but it still needs to be implemented in a directional and optimal way. For this sensitization of state forest departments to use approved and improved planting stocks is necessary in order to initiate plantation based programs and generate more yields.

In the next talk, Dr. Ajay Thakur explains high yielding cultivars developed by Division of Genetics & Tree Improvement, Forest Research Institute, Dehradun were briefed to the attendees.

The third talk was by Dr. Sanjeev Thakur, Head Tree Improvement and Genetic Resources, Dr. Y.S. Parmar University of Horticulture & Forestry, Nauni, Solan, H. P on the topic ‘Genetic improvement interventions for enhancing productivity in temperate and sub-tropical landscape’. He explained basics of tree improvement supported by their practical applications led by Dr. Y.S. Parmar University of Horticulture & Forestry, Nauni, Solan, H. P. Both silviculture & tree breeding, when combined together would lead to tree improvement. The process of development of genetically superior seed/ propagules was described in brief. It involves two aspects which are ‘Tree improvement cycle’ and ‘Development of hybrids’. In the tree improvement cycle, external populations are infused to broaden the genetic base and this step is crucial to maintain the diversity of the population. Hybrid development can be at intra- as well as inter-specific levels and involves development of F1 hybrids and generation of advanced breeding population. In the case of trees, factors which are crucial for a successful hybrid breeding and deployment involve crossability of species, feasibility of controlled pollination, viability of hybrid offspring, and costs of breeding and deploying hybrids. Also gains in different traits as obtained through hybrids or improvement of pure species is an important factor for overall success of program. He gave successful improvement programs in species like, poplars, salix, willow, *Pinus roxburghii*, *Grewia optiva*, *Morus alba*, and *Bauhinia variegata*.

The low productivity in forests could be due to several reasons such as grazing, fires, shifting cultivation, unequal distribution of rains and many others. In order to enhance productivity, efforts are required at silvicultural as well as genetic levels. Silviculture practices of pruning, drainage, weeding, site clearance etc. needs to be taken care of in order to maximize yields.

Dr. Manmohan Dobriyal, Professor Forestry from Rani Laxmi Bai Central Agricultural University explained the topic of ‘Forest productivity in agro-forestry, agriculture and forestry landscape’ by highlighting the importance of ecosystem services provided by forests and its inclusion into defining forest productivity. Ecosystem-basis of productivity should be considered as productive potential varies with the ecosystem conditions. He pointed that in natural forests the approach has been mainly limited to conservation without any silvicultural interventions and this is one of the reasons for low productivity of our forests. Agro-forestry has added advantage in such a case, as standard practices are to be followed for crops and these are simultaneously also applied to trees. Therefore in agroforestry landscape tree improvement becomes more pertinent to achieve the objectives of the practice. Only present need is to diversify the number of species so that farmers have more options to choose from. Additionally, factors like availability of precision silviculture practices, cash oriented nature of crops, biomass, availability of planting material, market for the produce, and cropping system type play a role in development of such models.

Dr. Arvind Bijlwan, Director Academics from Veer Chandra Singh Garwali University of Horticulture and Forestry, Bharsar Ranichauri explained important talk on the topic ‘Productivity in *agri-horti-silvi* system’ emphasized that in any of the *agri-horti-silvi* system the direct and indirect (ecosystem services) taken together along with monetary gains is the overall productivity. In such systems, it is essential to study and understand the tree-crop combination as well as management. Studies with species like rye, pea, walnut, peach, plum, *Grewia*, and *Melia* have shown that productivity in terms of *timber, fruit yield* as well as *crop produce* is considered and it has been found that 13-14% higher gains were achieved as compared to individual figures of each of the three factors. If indirect productivity (carbon sequestration, soil and water conservation, sustainable management etc.) is also taken into account the overall *agri-*

*horti-silvi* productivity is enhanced significantly. In nutshell, farmers should be encouraged towards planting trees as per the *agri-horti-silvi* system keeping in mind the overall productivity.

Dr. Ashok Kumar from FRI Dehradun explained about highly productive released variety ..... ‘Species improvement program: *Melia*, *Eucalyptus*, *Neem*’

Forest protection is another very important aspect for improvement of productivity and occurrence of pests and diseases therefore needs regular monitoring and management. The other two talks: ‘Improving forest productivity through bio-fertilisers’ by Dr. Vipin Prakash and ‘Disease, insect and pests management intervention to enhance productivity of forests’ by Dr. Amit Pandey and Dr. Uma focused on different factors which play essential role in protection of forests and enhance productivity. Application of bio-inoculants and bio-fertilisers was discussed in detail with various successful examples from forestry. Also, role of environment as a predisposing factor in forest tree disease occurrence was discussed and it was emphasized that factors that enhance the disease occurrence or disease progress are very important to be considered for an area where forest productivity or any improvement related program is to be initiated. Role of pheromones in management of forest insect pests could be revolutionizing if more tree specific and pest specific work is carried out and more options for tree species are identified. These talks emphasized on biological control of pathogens and pests for overall enhancement of forest productivity.

The programme was finished with vote of thanks to all by Dr. Ajay Thakur, Head, Genetics and Tree Improvement, FRI Dehradun.

