

GENETIC IMPROVEMENT OF TEAK (*TECTONA GRANDIS*) IN FOREST RESEARCH INSTITUTE : AN OVERVIEW

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Introduction

Teak (*Tectona grandis* L.f), king Timber of India, got top priority for the genetic improvement to identify and create new strains for specific purposes and suitable for different places. Since 1960 and onward it become a national movement in all the State Forest Departments. A lot of work was done in collecting information on differences within and between provenances/sources i.e. study of growth performance, flowering and fruiting, seed handling, creation of seed production areas, selection of plus areas, progeny trials, establishment of clone banks and creation of seed orchards. The salient features of the work done so far have been given in chronological order in the text as follows.

Salient Features of Work Done

The object of the long term breeding programme taken up by the Forest Genetics Section of Forest Research Institute, Dehra Dun is to produce superior varieties for growth of different types of Teak. The programme is described in stages, those of selection, propagation, testing and finally production of seed and plants of improved varieties. The details of a Teak seed orchard and seed production are outlined. It is concluded that conditions are very favourable for the application of selection

and breeding for improvement of Teak in India (Kedharnath and Matthews, 1962).

In Teak naturally occurring phyllotaxy variants i.e. whorl of three and alternate leaved somatic mutants are also found which may be important in breeding research (Kedharnath, 1963).

Individual tree variation in respect of fibre length was also studied in four different seed origins. Fibre length nearest the pith was very short and increased rapidly in first few rings and thereafter declined gradually. Significant differences occur in the relative length of the fibres of juvenile heart wood, adult heart wood and sap wood region. It would seem that one sample per tree, provided the tree is normal grown, would suffice for comparative studies (Kedharnath *et al.*, 1963).

Of the vegetative propagation methods it was found that cleft grafting and patch budding done in April and May gave maximum success in Dehra Dun (Rawat and Kedharnath, 1968).

Estimation of Genetic Parameter is very important in tree breeding work. Genetic correlations between stem girth and number of Internodes has been estimated (Kedharnath *et al.*, 1969).

The genotypic differences between trees can be often demonstrated if grafts made from such trees are grown on a fairly uniform site or in a replicated trial and their performance compared in respect of various characteristics such as growth, number of nodes and internodal length etc, so that best clones can be selected, (Kedharnath *et al.*, 1970).

Very high percentage of establishment of grafts 90% to 100% by budding has been reported in routine field grafting experiment (Rawat *et al.*, 1973).

Using 16 half-sib progenies of experimental material variance available intake in respect of height, stem girth, number of Internodes have been obtained (Lakshmi Kantham *et al.*, 1974).

Vegetative propagation using epicormic branches has been reported to be very successful by Mahmood Hussain *et al* (1976).

Gupta and Adarsh Kumar (1976) have given a vivid description of seeding and emptiness of Teak fruits by cutting tests using seeds of 23 sources of eight States. Emptiness was found to be 13-86% and generally filled fruits contained one seed only then 2 and 3, frequency of 4 seeded fruits was of rare occurrence.

Graft incompatibility has been reported in some clones by Emmanuel and Bagchi (1984).

Vakshasya and Rawat (1985) have experimented to evaluate period for budding the stumps and their field planting for the establishment for seed orchards.

Teak seeds were irradiated for 5-50 kr

from a cobalt 60 source. Seed germination and seedling parameters were studied, L.D.50 values were calculated Radicle was found to be most sensitive, chromosomal aberrations were found at 35 kr (Kapoor and Sharma, 1987).

Vakshasya *et al.* (1988) have also selected plus trees for specific traits e.g. best growth in Dehra Dun, frost resistance and wavy grain.

Variation studies in Model Teak Seed Orchard, New Forest, Dehra Dun (a First cycle seed orchard) were studied and on the basis of which best clones for Dehra Dun and places alike have been selected (Rawat *et al.*, 1992).

Macro-propagation by cutting, apart from cleft grafting and patch budding has been reported with high success by Nautiyal and Rawat (1994).

After a detailed study of all the Teak growing in New Forest and particularly in Forest Genetics Nursery and other experimental plots i.e. Germplasm Bank and Seed Orchard it was found that a lot of variation occurs within and between sources in different parameters particularly flowering and fruiting. Rainy season was found to be highly detrimental for seed setting. It was also established that Teak is a self pollinating species (Rawat, 1994).

A new concept for creation of seed production areas in Teak and like species which coppice profusely has been developed. This will be a cheaper and also easier method (Rawat *et al.*, 1995).

A detailed experiment was again carried out on grafting and budding to determine the time factor when maximum

success can be achieved in open field conditions. It was found that 21°C - 27°C temperature and R.H. between 45-62% are most suitable (Uniyal and Rawat, 1995).

Identification of provenances/sources on the basis of Genetic markers of leaf morphology is in progress.

SUMMARY

Teak was taken as a priority species for genetic improvement since the inception of Genetics Section, a Branch and now a Division, in FRI. Since then a lot of work has been done in the different aspects of this species and salient features of the same have been given in chronological order.

वन अनुसंधान संस्थान में सागौन का आनुवंशिकीय परिष्कार - उपरिदृश्य

एस०एल० शर्मा व एम०एस० रावत

सारांश

आनुवंशिकी अनुभाग, फिर शाखा और अब एक प्रभाग के रूप में व०अ० संस्थान में आरम्भ होने पर आनुवंशिक सुधार के लिए सागौन को पूर्वता जाति की तरह लिया गया था। तब से इस जाति के विभिन्न पक्षों पर काफी काम किया जा चुका है जिसकी मुख्य बातों को यहां कालानुक्रम से सूचित किया है।

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