

FOREST GENETICS AND TREE BREEDING

A. K. Mandal & G. L. Gibson (editors) 1998: Forest Genetics and Tree Breeding. CBS Publishers & Distributors, New Delhi, 268 pages. ISBN 81-239-0571-8.

Because most textbooks in forest genetics and tree breeding were written by European or North American authors, they are generally biased towards tree species of the temperate zone. This book is a compilation of 15 contributions written by 32 authors living in various parts of the Northern hemisphere. Maybe this fact, along with the fact that the book was published in India, caused that finally enough attention is paid to tropical trees.

First seven chapters cover the areas of tree improvement. MCKINLEY & VAN BUIJTENEN describe fundamental terms, concepts, and principles of tree breeding, as well as basic methods of selection. W.E. LADRACH explains the concept of provenance, the problems of practical realization of provenance tests, and describes the results achieved in the provenance research of the economically most important temperate and tropical tree species. The third chapter, entitled Systematic Tree Breeding, written by KANG, LASCoux & GULLBERG, belongs to the best elaborated ones in this book. It is devoted to the components of long- and short-term breeding programs, defines the resource, breeding, and production populations in tree breeding, as well as physical components of tree breeding systems: organization, breeding stock, information and techniques. In the fourth chapter, G.O.OTEGBEYE deals with the problems of progeny testing in forestry. He characterizes various mating designs, practical aspects of progeny tests, and provides statistical models for the estimation of variance components and genetic parameters like heritability and genetic gain. KHURANA & KHOSLA review the use of hybridization in forest tree improvement, including the methods of protoplast fusion. As compared with the other chapters, the part concerning seed orchards by EL-KASSABY & ASKEW is very short. The problems of mating system, pollen contamination, parental balance etc. could have been discussed in more detail, the literature on these topics is very extensive and both authors could have shared more of their rich experience in this area with the readers. VAN BUIJTENEN & ZOBEL deal with the genetics of wood properties, especially specific gravity, proportion of latewood, fiber length, chemical composition, and spiral grain, and discuss the possibilities of improving wood properties by breeding.

In the eighth chapter, PARK, BONGA & MULLIN discuss the advantages of clonal forestry (less attention is paid to the risks). As the authors state, clonal forestry itself is not a breeding method, but rather a means of mass propagating and

deploying genetically improved material. The techniques of vegetative propagation both *in vitro* and *ex vitro*, breeding strategies using vegetative propagation, methods for estimation of genetic gain, and problems of management of clonal material are discussed.

Very detailed is the chapter on cytogenetics by GILL & SINGHAL. They describe techniques for chromosomal studies, and discuss the problems of chromosomal evolution in forest tree species.

Further two chapters address specific problems of reproduction of tropical tree species. In the contribution by RADHAMANI, NICODEMUS, NAGARAJAN & MANDAL, the problems of floral phenology, floral and pollen biology, the process of pollination, and mating systems, are discussed. GANESHIAH & UMA SHAANKER deal with fruit and seed set in tropical trees.

A block of three chapters is devoted to isozymes. EL-KASSABY & RITLAND describe the isozyme technique, interpretation of banding patterns, and discuss the possible applications in genetic and breeding research. BERGMANN & HATTEMER provide a historical overview of isozyme studies, describe the biochemical and molecular genetic basis and genetic control of isozymes, as well as potentials and limitations of use of isozymes in forest genetics studies. MITTON reviews the possibilities of utilization of isozymes, and partially DNA markers, in tree breeding research. There are some duplicities occurring in these chapters, especially concerning the applications. DNA markers would deserve more attention, might be a separate chapter.

The last chapter, written by KARNOSKY, SHIN, PODILA, CHIANG & RIEMENSCHNEIDER, deals with biotechnology. Topics like *in vitro* culture, cryopreservation, and genetic mapping, are briefly discussed. More space is given to various aspects and practical applications of genetic engineering.

Despite the fact that both genetics and breeding are represented in the title, the whole book is generally oriented much more towards breeding than genetics, and more towards practical applications than theoretical fundamentals. Nevertheless, just this practical orientation can be of advantage for students, teachers, researchers, and forestry practitioners. An emphasis laid on tropical tree species makes it specifically useful for readers from this geographical zone.

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