

SOMATIC CELL GENETICS AND MOLECULAR GENETICS OF TREES

Somatic Cell Genetics and Molecular Genetics of Trees. M. Raj Ahuja, Wout Boerjan & David B. Neale (eds.). Kluwer Academic Publishers, Dordrecht, 1996, 287 pp., ISBN 0-7923-4179-1, price 130 USD

Kluwer's established Forestry Sciences series affiliated its new acquisition entitled *Somatic Cell Genetics and Molecular Genetics of Trees*. This proceedings is the result of papers presented at the joint meeting of the IUFRO WPs S2.04-07 and S2.04-06 held in Gent, Belgium, on September 26-30, 1995. The book is divided into four sections based on the subject interest and presents the comprehensive elucidation of molecular aspects underlying *in vitro* regeneration processes, foreign gene expression in recipient cells, monitoring genetic diversity and understanding genome organization as well as host responses under stress conditions.

The first section aimed at the somatic embryogenesis and regeneration contains ten contributions devoted to the latest developments in this field. Most of them deal with the biochemistry, cytogenetics, molecular genetics, and clonal technology of somatic embryogenesis in major model forest trees. New approach on root specific gene expression to investigate adventitious root formation is included. Review paper reporting on forest biotechnology priorities in plantation improvement closes this part.

Thirteen papers inserted into the transformation and gene expression section highlight new advances and approaches in this very rapidly growing field. Gene transfer techniques, first available in crop monocots and dicots, have become routinely applied in woody plants. Number of reporter and function-specific genes are being introduced into host cells of forest trees employing *Agrobacterium*-mediated DNA delivery and biolistic particle bombardment devices. One of the most exciting challenges in forest tree improvement is associated with the biochemical modification of lignin biosynthesis pathway. A reader is referred on three reports on efforts to reduce the lignin content in cell walls through genetic engineering using antisense insertion of lignin biosynthetic genes. Another important area of genetic engineering of forest trees is producing disease-resistant trees as reported in papers on transferring *Bacillus thuringiensis* insecticidal genes into poplars, and the goals to regenerate English elms resistant to Dutch elm disease, respectively. The last contribution in this section is aimed at engineer reproductive sterile transgenic trees to prevent transgene escape through pollen and seeds into the environment. The first step to clone poplar homologs to *Arabidopsis* and *Antirrhinum* floral homeotic MADS-box genes was undertaken.

The third section on molecular markers and genome mapping presents 11 papers on the current status of exploita-

tion of those markers in studies of genetic variation, genetic dissection of phenotypic traits, population studies, etc. New genes were isolated either by screening cDNA libraries or by cDNA sequencing and further characterized. A large set of molecular markers, such as restriction fragment length polymorphisms, random amplified polymorphic DNAs, amplified fragment length polymorphisms, single-strand conformation polymorphisms, single sequence repeats, and PCR-codominant markers has been developed. As described, they may be successfully utilized for mapping of genes for simply inherited Mendelian traits as well as quantitative trait loci for complex traits, or for detecting genetic polymorphisms and molecular differentiation among related species (case study on European oaks).

The last section on stress-related gene expression contains 4 contributions that elucidate host responses to environmental and hormonal cues at the molecular level. Those works are aimed at defence activities of oxygen radical scavenging enzymes (peroxidases, superoxide dismutases, glutathione reductases), induced expression of key flavonoid (chalcone synthase) and ethylene formation (1-aminocyclopropane-1-carboxylate oxidase) genes upon exposing seedlings to elevated atmospheric ozone and UV-B radiation, and transcriptional and post-transcriptional regulation of cDNA clones related to the water deficit stress. Norway spruce defence responses to fungal attack through the induction of pathogenesis-related proteins (chitinases, β -1,3-glucanases, chitosanases), and isolation of cDNA clones associated with the gene activation after fungal infection are also included.

Up-to-date information on molecular and somatic cell genetics of forest trees has been assembled here in one volume. Altogether, 38 papers describe novel findings in four main subject areas addressing the future directions to the plantation forestry, paper industry, pest management, or construction of gene maps for major forest trees. Specialists in forest biotechnology, forest genetics and tree breeding will find the volume an invaluable reference for its synthesis; other woody plant biologists will appreciate the volume for covering the latest developments in somatic cell genetics and molecular genetics. On its own, this proceedings is recommended to a broader community of biotechnologists and should not miss on shelves of forest geneticists.

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