BOOK REVIEW

ADVENTITIOUS ROOT FORMATION IN CUTTINGS

Edited by T.D. Davis, B.E. Haissig, and N. Sankhla

Timber Press Inc., Oregon. 1988. 315 pages. ISBN 0-931146-10-0. US$39.95.

Vegetative propagation for forestry has been practised for centuries, particularly with *Cryptomeria japonica* in Japan, and there are now many successful programmes around the world covering a range of hardwood and conifer species, including poplars, willows, eucalypts, spruces, and pines. These programmes are often used for practising clonal forestry, although multiplication of scarce genetically-improved seed is also a justification for some programmes.

Successful rooting of radiata pine cuttings was reported as early as 1934 in New Zealand. Since then, there has been much interest in New Zealand and Australia in establishing radiata pine in clonal plantations, before the problems of maturation become apparent. Juvenile cutting methods are now being used for the multiplication of limited quantities of control-pollinated seed for propagation of the best families, and micropropagation methods are being used to establish clonal blocks. The use of vegetative propagation for the establishment of radiata pine forests of tested clones is being assessed now that solutions to maturation problems are being discovered.

With the wide interest in propagation of forestry species, it is not surprising that the broad principles for successful propagation are well understood. The importance of health of stock plants, choice of the right material, season for collection, and the environmental factors after setting—especially humidity and temperature—are often stressed. Because so many developmental and environmental factors are involved, and there are interactions between them all, successful propagation has often been an art rather than a science. This book is an attempt to introduce more science into this important topic.

The book comprises 22 chapters, written by 26 authors, and covers five general areas of Development, Physiology and Biochemistry, Growth Regulators, Environmental Considerations, and Future Outlook. Anatomical considerations are not covered, since there are recent reviews of this area. The editors have aimed at providing a comprehensive review of current knowledge on factors affecting root formation in cuttings, and they have been largely successful.

The section on Development includes chapters examining donor plant maturation, etiolation and banding effects, and genetic effects. These areas are covered well, although more discussion on what type of material is considered best would be useful. This is also covered later in a chapter on stock plant environment.

The section on Physiology and Biochemistry is very comprehensive, with chapters on mineral nutrition, carbohydrates, photosynthesis, enzyme activities, and water relations. These chapters give an excellent background on the importance of understanding the physiology and biochemistry behind adventitious root formation.

Many compounds have an effect on rooting, and there are seven chapters covering auxin metabolism, chemicals and formulations promoting rooting, effect of ethylene, gibberellins, shoot growth retardants and inhibitors, cytokinins, and polyamines. The importance of auxins for enhancing adventitious rooting has long been recognised, but other chemical factors are also involved, and these chapters give an excellent synopsis of the relevance of these.

Environmental considerations include chapters on the effect of stock plant environment, storage of unrooted cuttings, and environmental conditions affecting rooting. The importance of producing and setting suitable material and the control of environmental conditions to promote rooting are well covered. There is an excellent discussion on the use of more sophisticated environments including misting and fogging to determine optimum conditions for rooting.

The final chapters cover the use of bioassays and immunoassays, *Agrobacterium rhizogenes*, tissue-cultured plants, and future research directions.

Over-all, the book provides an excellent coverage of factors affecting adventitious rooting, and will be useful to both researchers and practitioners working with all plant species. Using the book, it is easy to discover the effect of any one factor on the rooting of cuttings from a range of species, although some readers may be frustrated by the lack of a species index. With so many internal and external factors interacting to affect successful rooting of cuttings, it is important to select the right combination for the desired species. There is too much diversity of fact and opinion at present to give any one magic combination, but this book does cover the factors that need to be considered. The relative importance of these will need to be integrated by the reader and evaluated in research experiments.

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