

are side issues. European exploitation is the main threat to wildlife and once the book comes to deal with the practices of settlement it holds together reasonably well. Tussock burning and bush clearing are combined with the introduction of foreign birds and animals whose acclimatization has unexpected repercussions, some of them serious. The growing awareness of erosion and soil deterioration, the optimistic policy of "extermination" of noxious plants and animals, followed by the sobering realization of its fantasy, this is becoming a familiar story.

The whole theme of the book is in effect a warning against the arrogance that confidently throws a spanner into an intricate ecosystem.

N. L. ELDER

FORM AND DEVELOPMENT OF CONIFER ROOT SYSTEMS.

R. F. Sutton. *Technical Communication No. 7*, Commonwealth Forestry Bureau, Oxford. Published by Commonwealth Agricultural Bureaux, Farnham, England, 1969.

This publication can best be regarded as a digest of information on tree roots and root systems written for field foresters rather than for specialist tree physiologists (if such a breed of scientist exists). The book is in three sections: the first deals with the structure of root systems (27 pages), the second with root development (21 pages), and the last with major influences on root development (44 pages). The first section is possibly the most useful. Here the author discounts attempts by others to characterize root systems on any basis of species or genera and accentuates, instead, the great natural variability that one finds in root form. Depth of rooting and the form of the root system of any tree is mainly determined by the environment in which the tree grows, but different species do react in different ways to the same environment. Similarly, he suggests that damage from windthrow depends more upon site and silviculture than on species.

The second section of the book is a mixed bag. The first part of it provides a useful review that should be read by anyone who is planning an investigation of root systems or who is already involved in such work. It deals with methods of study and introduces the reader to the variety of techniques that have been developed, so should suffice to make him aware of the difficulties that can be encountered — no doubt one reason why comparatively little is known about root development. However, one finds few references to *Pinus radiata*, or indeed to conifers in general; to provide a reasonably comprehensive coverage of the subject, the author has made rather arbitrary selections from the literature on root development in non-coniferous and non-forest trees. This continues throughout the remainder of the book and references to such plants as corn, barley and peas rather belies the title selected. Any other writer attempting to cover the same subject would encounter similar difficulties. Far too many of the theories on tree growth have been gleaned from horticultural or agricul-

tural research and have been applied in forestry without confirmation of their relevancy.

The information given on root development is partly determined by a real poverty of literature on the subject, but is aggravated by the need to condense a broad discussion of problems into a brief publication. Failure to provide any worthwhile information on root growth after transplanting is excusable, for little has been published on the subject, but categorization of *Pinus* as a difficult genus to propagate using cuttings ignores the large changes which have taken place in this field in recent years, mainly through investigations in Australia and New Zealand, and of which the writer should have been aware.

The third section, which deals with influences affecting root development, is better regarded as an introduction to the subject, rather than as an accurate informative review. The style of writing becomes stilted in parts, and such a statement as "flooding inhibited oxidative catabolism of shoot synthesised auxins" (p. 50), though obviously lifted from someone else's text, is of little value, even to the informed reader. Here too the title misfits, for the author's review includes such plants as grapes, sunflowers, even carrots and parsnips! There are books on tree growth and physiology available that are easier to read and which cover environmental effects more comprehensively. Similarly, the section on plant growth regulators (hormones) is somewhat inadequate. Many of the ideas put forward are dated or are no longer valid. One feels the author has tried to spread too little butter on too much bread.

A brief section on the effects of undercutting and wrenching seedlings in the nursery puts forward only nebulous ideas on a subject which most nurserymen raising tree seedlings in this country would consider to be of fundamental importance for raising good planting stock. The effects of depth of planting, and of soil movement on root development are dealt with adequately, but the effects of ploughing and cultivation on root development are passed over too briefly. Again, these are subjects where a review serves mainly to indicate how little recorded information exists.

To summarize: the first 32 pages are the best part of the book, particularly for a reader who seeks a sound introduction to the subject; the remainder of the book also provides a useful reference, but should be read more critically.

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