BOOK REVIEW

PHYSIOLOGICAL ECOLOGY OF FOREST PRODUCTION

by J. J. Landsberg
Academic Press, Orlando, Fl. 32887, U.S.A. 1986
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Dr Landsberg who wrote this book while Chief of the Division of Forest Research, CSIRO, Canberra, should be commended for his energy and motivation. The book is of a very high standard and is a good example for scientists in other fields of applied botany and crop science to emulate.

The basic aim of the book is to present, in a quantitative framework, current knowledge of the processes of growth of forest crops and to analyse how trees grow to predict their responses to environmental factors and management practices. Emphasis is placed on the use of models, i.e., formal and precise statements or hypotheses of the working of a system normally expressed in mathematical terms. Landsberg hopes that the large number of equations "will not deter foresters and forestry students". This book is refreshing in that the reader is not swamped by masses of factual and descriptive information, but rather concepts are explored. This review is particularly pertinent to readers of this issue of the *New Zealand Journal of Forestry Science* featuring a series of papers on the water use, radiation interception and carbohydrate metabolism, growth, and nitrogen nutrition of *Pinus radiata* stands; these papers provide the basic information required to develop mechanistic models.

The Introduction deals with the objectives and scope of the book. In the second chapter, on process rates and weather, Landsberg stresses that accurate prediction of the way forests respond to changes requires an understanding of and a need to quantify processes such as radiation interception, carbon assimilation and its partitioning, and nutrient and water uptake. The next chapter is concerned with the interaction between stand structure and microclimate. Chapters 4 and 5 are concerned with the carbon balances of leaves and of trees. Chapter 6, probably the least convincing, deals with nutrient dynamics and tree growth, and Chapter 7 with water relations. In the last chapter Landsberg briefly compares different types of models. The detailed physiological "bottom-up" type of model which synthesises the different physiological processes contributing to growth he claims is essentially a research tool. On the other hand, process-based "top down" models which use simplified formulations of the main physiological processes, he contends will provide alternatives to current conventional forest growth models.

The author has an easily readable style of writing. The organisation of the book is good with each chapter subdivided into short clearly defined topics, a concluding section to each chapter which re-iterates the salient points, and a list of symbols and definitions is given at the beginning. A minor criticism is that a few of the figures are very complex and tend to be confusing and the print size of at least one was almost illegible. The typographical errors are few and largely unobtrusive. Some chapters include worked examples as appendices which is an excellent idea. The literature covered is selective but gives good coverage to *Pinus radiata* and *Eucalyptus* species.

I recommend this book to forest scientists, students, and foresters who want to understand more about how tree crops grow, and those persons interested in predicting forest growth. Modern physiological ecology has reached the stage where a quantitative approach is necessary and the types of models discussed are essential tools to the application of this knowledge. This book provides an excellent introduction to those not familiar with this approach and a valuable refresher course for those of us developing these models.

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