BOOK REVIEW

GENETICALLY MODIFIED FORESTS. FROM STONE AGE TO MODERN BIOTECHNOLOGY

by Rowland D. Burdon and William J. Libby

Forest History Society Issues Series, Durham, North Carolina USA.
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The use of biotechnology in the manipulation of organisms such as forest trees is currently very topical and controversial. This book is an attempt at addressing the controversy by summarising the effects from human intervention in tree species from the Stone Age right through to modern day genetic modification. The aim is to inform and educate the general reader by demonstrating how and why genetic changes in tree species have come about, even through unintentional selection. There is a huge amount of information that this book has attempted to cover, and it is a useful reference for those seeking a general explanation and background to the "what, how, and why" of tree breeding, and its evolution to the modern approach, including both conventional tree improvement and molecular genetic approaches. As stated by the publishers, the book is intended for the general reader in order to educate managers, policy makers, or legislators on the issues and history of this subject. For those who want more, however, some suggested reading is provided at the back of the book.

The book is split into seven chapters. The first outlines some of the historical efforts to improve trees from the age of the hunter-gatherers to the twentieth century, all in six pages. The second chapter summarises the science behind tree breeding. Background covered includes the discovery of Mendelian genetics by Gregor Mendel in the nineteenth century, evolutionary processes that cause changes in trees through natural processes, and the patterns of genetic variation that are often used in the traditional manipulation of tree species. Conventional tree improvement is explained in a historical context in Chapter 3, covering particularly the pathway that this science has taken over the last century and drawing on the personal experience of both the authors. It is also a "Who's Who" of tree breeding in the earlier half of the nineteenth century. All the facets of a conventional breeding programme are summarised.

The book then moves into some of the more controversial areas, including the use of clones (Chapter 4) and biotechnology (Chapters 5 and 6). Clones, which are merely copies or cuttings of a tree, when planted on a large scale are known as

clonal forestry. Both the production of clones and clonal forestry are explained, their relative advantages and disadvantages, and how risks may be spread to ensure a healthy and productive forest plantation system.

Basic science background for understanding the processes involved in genetic engineering is explained in Chapter 5. This chapter helps to understand what DNA is, what biotechnology is, and its applications. In addition, the process of genetic transformation is outlined. Methods for genetic transformation, using biolistics or the crown-gall bacterium are explained in simple terms. This is followed by a section that debates the advantages, challenges, risks, and risk management associated with the technology of genetic transformation that provides a good overview of the current controversy surrounding this area. It is gratifying that Burdon and Libby also attempt to outline the social aspects of genetic transformation, although their small section is somewhat on the pro side. Nevertheless, some issues important for many cultures to consider are brought to the fore.

Concluding thoughts of the current and future directions in tree improvement are given in the final section, Chapter 7. This chapter discusses briefly the authors' views on biotechnology and its application in the context of the need to increase the world's wood production, while at the same time preserving the native forest resources and their multiple values.

The book draws on many specific examples that provide interest and/or specific information required for a deeper understanding of important issues, and draws particularly from the experience of the authors. Most of the examples are based on American tree species, although some eucalypts and spruce examples are included. This book covers a large amount of information and is intended as a general text to help dispel the myths and controversy surrounding genetic manipulation.

A glossary is also provided, helpful for the general reader at whom this book is targeted.

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