

Book review

Rust Diseases of Willow and Poplar. Edited by M. H. Pei and A. R. McCracken. 2005. 288 pp. Hardcover. CABI Publishing, Wallingford, U.K. ISBN 0851999999. £75.00; \$140.00

Education in plant pathology exposes students to rust diseases using, in the main, examples drawn from agriculture, black stem rust of wheat and yellow rust of barley probably being the most widely used. In annual crops, these diseases cause massive losses. Their impact on forest trees can be equally spectacular, however, and the yield reductions seen in willow and poplar, particularly when cultivated as short rotation coppice plantations for biomass production can render the whole enterprise economically non-viable. As these trees are the amongst the fastest growing in temperate regions, they provide the most appropriate candidates for biomass production, and, as such, finding methods for the effective reduction of losses due to disease is of immense importance.

This book, edited by two very well-known pathologists involved in work on willows and poplars, provides a very thorough review of the current state of knowledge on rust diseases that attack these important tree species. Based on proceedings of a conference held in Northern Ireland in September 2003, there are 21 chapters covering all aspects of the biology, impact and control of rust diseases on willow and poplar, from taxonomy, through population biology, and host resistance, to disease management methods. Some 38 authors, all of international repute, have contributed to the book.

There is considerable focus on the molecular biology of *Melampsora* species in the first half of the book, including detailed classical taxonomic descriptions of members of the genus on willow and poplar. Methods for assaying host resistance and the potential use of transgenic plants for disease resistance are covered in four chapters, before the final seven chapters which address the complex issue of disease management (control would be too strong with current knowledge),

including the potential of biological control. Chris Mundt, from Oregon State University, provides an excellent review of the impact of host diversity on development of rust disease, based on his extensive experience with cereal rusts. Although not focused directly on rusts of the Salicaceae, the information gained from the work on cereals is of direct relevance to attempts to devise management techniques appropriate for perennial hosts.

It appears that, under current conditions, by far the most promising method for managing rust (and other pathogens) in short rotation coppice plantations of willow is the use of host varietal and cultivar mixtures. Excellent work on this approach, carried out in Northern Ireland, is reviewed in two chapters co-authored by Alistair McCracken, Malcolm Dawson and Diane Carlisle. They have shown that marked reductions in disease incidence and yield losses are possible, where optimum mixtures of varieties are used in field plantings. Although disease still occurs, and in some clones can be rather serious, the overall amount of disease can be much reduced. Although fungicides could be used to reduce the impact of rusts on willows and poplars in these plantings, it would be wholly inefficient and uneconomic to apply.

The final chapters examine the potential of two different possible biological control agents for reducing the impact of rust diseases. The hyper-parasitic fungi described can certainly parasitise *Melampsora* and other rust pathogens, and reduce fecundity, but it remains to be seen if they reduce spore numbers and fitness sufficiently to have a consistent negative impact on the development of disease in the field.

Given the importance of potential alternative sources of energy, and the likely high contribution of biomass in this field, the book is of particular importance and highly topical. Rust diseases are certainly amongst the most important limiting factors, if not the most important, in biomass production from short rotation willow and poplar coppice. If the book stimulates further research

funding from the relevant agencies, then it will have done its job. It should be read by anyone involved in biomass production, and will be the source book for initiating research projects within this field for many years to come.

STEVE WOODWARD
School of Biological Sciences
University of Aberdeen
Aberdeen, AB24 5UA
Scotland, U.K.