research papers are highlighted along with historical publications in each area. Research has been done in a broad range of plant species so there is something of interest to everyone. When I finished reading it my mind was buzzing with new ideas to try out.

Jennifer Stephens

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Microbes for Legume Improvement. By M. S. Khan, A. Zaidi and J. Musarrat. New York: Springer (2010), pp. 534, £153.00. ISBN 978-3-211-99752-9.

This volume is interesting, but also frustrating. Its major strength is that the authors approach their topics from the point of view of developing countries, where various symbiotic and other microorganisms can be of greatest advantage. It is refreshing to see review chapters written by those less familiar to many in the developed world, revealing literature not easily available to some readers. The extent of information on tree legumes is also good – most such books concentrate on grain and forage species. The frustration lies in the considerable amount of repetition, both within and between chapters, with three on arbuscular mycorrhizas, three on plant growth promoting rhizobia and two on biofilms.

I enjoyed the historical approach on rhizobial taxonomy (Chapter 1). Chapter 2, discussing infection, erred in considering only root hair entry, even though it noted that *Aeschynomene* (crack entry infection) can be nodulated by rhizobia lacking *nod* ABC genes, essential for hair infection. Chapter 3 covers some of the same material better. Chapter 4 goes into proteomics and like its predecessors, groups nodules as either determinate or indeterminate, completely ignoring the variations within these groups. Of the mycorrhizal chapters, Chapter 10 is the most comprehensive. Chapter 14 on metal tolerance is useful and Chapter 15 on legume-microbial interactions in stressed environments is good. Major grain legumes (soybean, common bean, cowpea and groundnut (peanut)) are covered in Chapter 18, but other legumes better adapted to saline and dry environments (some noted in Chapter 14) are not covered. The final chapter (20) looks at the potential uses of nodulated legumes for management of plant diseases, but misses out successes such as the use of *Desmodium intortum* and other legumes to control *Striga* in Africa. An index would have been useful.

Janet Sprent

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Glyphosate Resistance in Crops and Weeds. Edited by V. K. Nandula. Hoboken NJ, USA: John Wiley & Sons (2010), pp. 321, £66.95. ISBN 978-0-470-41031-8.

The importance of glyphosate in weed management in farming is undeniable. The development of glyphosate-resistant (GR) crops plus widespread development of conservation tillage has greatly increased its use, in some cases to the virtual exclusion of alternative treatments. A consequence has been the increasing development of GR in weed species.

This book provides a very useful review for researchers into GR crops and weeds, as well as to those involved in education and extension, and decision-making in the approval of GM crops. It exemplifies the complexities and consequences of resistance development in general.

The known sources of target and non-target site resistance to glyphosate are reviewed by several authors, and detailed examples are given for key crop and weed species. Tellingly, one author suggests that we have not yet seen the full capacity of weed adaptation to glyphosate. The development of multi-herbicide resistant crops allowing a wider range of weed control is discussed but the consequences of such developments are perhaps overlooked.

The economic and husbandry consequences of GR crop and weed development are also reviewed. Modifying crop management, rotation and cultivation and increasing use of alternative herbicides with different modes

of action to that of glyphosate are discussed, as is the need for improvements in extension and grower education.

The nature of such a review from 16 contributors tends to lead to some repetition, and the editor could have improved the order of contributions. However, the area is well covered and allows readers to develop their own views.

Ken Davies

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Biofuels from Agricultural Wastes and Byproducts. Edited by H. P. Blaschek, T. C. Ezeji and J. Scheffran. Ames, IA: Wiley-Blackwell (2010), pp. 262, £125.00. ISBN 978-0-8138-0252-7.

Comprising 11 chapters, the first of which is an introduction, this slim but expensive volume provides an authoritative overview on biofuel production somewhat different from the excellent Wikipedia article on biofuels. In pointing out that the technical potential of biogenic wastes and residues worldwide is around 80 exajoules, and that utilization of lignocellulosic feedstocks offer environmental and economic benefits, the editors justify the rationale for investments in biofuel science and technology. The 25 contributors collectively encompass key aspects of biofuel production in the following 10 chapters.

Chapter 2 describes emerging technologies in the production of ethanol and valuable byproducts. Chapter 3 deals with butanol production from inexpensive lignocellulosic feedstocks. Chapter 4 focuses on practical aspects of anaerobic digestion of slurries and solid wastes to produce methane. In Chapter 5, the major bottleneck in biomass conversion to biofuels, namely deconstruction of the plant cell wall to liberate glucose for fermentation, is addressed in a superb article by reviewing the roles of cellulases, other glycosidic hydrolases and cellulosomes (multienzyme complexes). In Chapter 6, glycerol, a waste byproduct of biodiesel, oleo-chemical and bioethanol production, is shown to be capable of being processed by fermentation into fuel and reduced chemicals using microorganisms such as *Escherichia coli*.

Chapters 7, 8 and 9 concentrate on the practicalities of farm-to-factory supplies of lignocellulosic feedstocks, converting existing dry-mill ethanol operations to create biorefineries and the economics of agricultural residues for processing. Hydrothermal liquefaction to convert biomass into crude oil and detoxification of lignocellulose hydrolysates are the topics of the final two chapters.

John R. Hillman

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Economics and Ecosystems. Efficiency, Sustainability and Equity in Ecosystem Management. By L. Hein. Cheltenham, UK: Edward Elgar (2010), pp. 224, £59.95. ISBN 978-1-84844-065-4.

To construct a readable book from a PhD thesis is a rare achievement. To do so by bringing some clarity to the role that economics plays in ecosystem management is even more impressive. This is a book that sparks ideas: seemingly intractable topics are unravelled and put together in logical order. It will also be useful for teaching: I will be recommending it to my 'Economics for Agricultural and Environmental Sciences' class.

The book starts with two 'economic' chapters – the first covers efficiency, ecosystem services and valuation of services. The second outlines what the author, perhaps unfortunately, calls a 'framework' (is this just another, *alternative* framework?) that puts forward a case for a combined environment / economic approach to quantifying the effects of different ecosystem management options. Three subsequent chapters demonstrate the framework in: i) forestry management, ii) eutrophication control and iii) rangeland management. There is some lack of precision in the second chapter about economic effects: the phrase '... establishing the amount of pollution loading where the pollution and abatement costs are minimised' is not a welfare maximizing economic result (ban nitrogen fertilizer in Bangladesh?). A better definition of economic efficiency is given in the final chapter, in the discussion of cost benefit analysis – 'the... efficient option is the option that provides maximum net