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Review of *Drought Adaptation in Cereals* Edited by Jean-Marcel Ribaut

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Drought Adaptation in Cereals. Edited by Jean-Marcel Ribaut. New York: Food Products Press, 2006. xxi + 642 pp. Map, figures, color plates, tables, references, index. $89.95 cloth, $69.95 paper.

Perhaps the greatest challenge facing plant biologists this century is developing crop varieties tolerant to drought stress. A warming climate, more extreme weather patterns, and competing demands for limited water supplies will likely combine to increase the frequency and severity of periods of drought, particularly in the Great Plains. Against that backdrop, this volume provides the valuable service of summarizing the state of the art of drought adaptation research involving the world's most important group of crops, the cereals. Editor Jean-Marcel Ribaut of the Generation Challenge Program has enlisted leading authorities on abiotic stress tolerance to author 17 chapters grouped into sections on drought, plant development and environmental interaction, plant improvement in selected cereals, and metabolic and gene expression response to water stress.

For readers engaged in drought tolerance improvement programs, the chapters dealing specifically with barley, maize, rice, sorghum, and wheat may be the most relevant. Covering crop physiology, genetics, and breeding history, each chapter is distinctly organized and written, reflecting both the differences among the crop species and the authors' experience. Although my current research focuses on wheat, I found all of the crop-specific chapters informative and relevant, given the close genetic relationships among the cereals. For example, the chapter on rice, which is not a Great Plains crop, was useful for its treatment of functional genomic approaches.

A recurring theme of the book is the search for secondary traits that are heritable, easily measured, and correlated with yield performance under drought stress. Among those receiving considerable attention are root growth and development, osmotic adjustment, and carbon isotope discrimination. Unfortunately, the track record to date for secondary traits is not overly encouraging; a trait that shows promise for predicting tolerance in one environment or population will often show no relationship or even a negative correlation in another situation. To their credit, the authors do not gloss over these discrepancies, but summarize the experimental results in all their complexity and contradictions.

Shortcomings include some inconsistencies and redundancies among chapters, perhaps inevitable with this many authors. A central gallery of 18 pages reproduces in color a variety of figures that appear in black-and-white format in specific chapters. While in some cases the color reproductions do offer additional information, in many others either the color provides no benefit, or the figures or their legends are too small to be legible. These are minor quibbles, however, in an otherwise excellent volume.

What sets this book apart from other works on drought tolerance is the breadth of its coverage, from economics to physiology to statistical modeling to genomics, as well as its emphasis on applying knowledge of drought adaptation to crop improvement. This is a book that I will keep close at hand on my bookshelf and recommend enthusiastically to students and colleagues interested in improving drought tolerance in cereal crops. **Patrick F. Byrne**, *Department of Soil and Crop Sciences, Colorado State University.*