Breeding Major Food Staples

Plant breeding is a fast moving field. Although much of the information on latest advances must of necessity be found in journals and on the web, there is still a place for hard copy textbooks that can be used in courses and for reference. Editors Kang and Priyadarshan have provided just such a text in Breeding Major Food Staples, a comprehensive book that would be a valuable resource for upper division undergraduates and graduate students and as a refresher for anyone who needs to keep up in a general way with the field of plant breeding. The book taps into authorities in the major crops to describe the latest advances in breeding methods, biofortification, and bioinformatics/plant genomics. It is a useful contribution to our education resources.

A general topics section blends the classical plant breeding methods with the latest in molecular techniques. The editors put the potentials of genetics into current perspective with regard to available land, global population growth, and advances in agronomy, describing how crop improvement will add productivity, resilience, and profit to agricultural systems. The book was completed before many of the current crises in accelerating input costs, uncertain commodity prices, and food versus fuel, thus it does not cover some of the critical issues of today. There is historical treatment of breeding methods for cross- and self-pollinating crops, as well as the molecular aspects zone, an omission of winter wheat seems odd, but this is a book intended for a global audience, and the principles of breeding the dominant spring wheat can be applied to other types. The chapter on wide adaptation, improvements in yield, especially the incredible advances made in resistance. Adaptation to abiotic stresses and tillage systems, along with breeding for use and for quality factors are essential for any wheat-breeding programs. The chapter on rice has an important historical perspective since ancestors of modern rice traced to Gondwana, the separation into Asian and African species, and a lengthy review of methods used over the years. Breeding objectives are discussed, along with the future goals for this essential crop and similar techniques. A chapter on barley describes ecology, uses of the crop, followed by breeding methods including those involving farmers and selections and farm testing. Marker-assisted methods are also included.

The chapter on maize (called corn in this use of this term in the U.S. and India) provides a review of how breeding has changed this crop over the past century, including as well the agronomic, economic, and political factors that have accompanied this important crop. Maize has been a prototype genetic system for development of inbreds and has demonstrated a unique partnership in the U.S. between universities and private industry, and has strongly shaped the profile of cereal production in a wide number of countries far from the center of origin, especially in Asia and Africa.