Book review

What's cooking in rice genetics

Rice Genetics IV

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Rice Genetics IV is a publication of the plenary lectures at the Fourth International Rice Genetics Symposium, held in October 2000. In recent years, rice has been transformed into a model genetic system for cereals in particular, and monocotyledonous plants in general. This is because of its small genome size, the discovery of genome colinearity in the entire grass family, including all cereals, and relatively facile transformation systems.

The topics covered include classical and molecular genetics, biosystematics and evolution, genome sequencing and bioinformatics, functional genomics and genetic transformation. The first chapter provides a good overview of developments in rice genetics from the demonstration of Mendelian segregation in rice in 1908 to the genome sequencing and functional genomics programs that were initiated in the late 1990s. Two chapters describe recent advances in understanding the phylogeny, evolution and domestication of rice. An interesting chapter describes comparative genomics approaches, using rice genome information, to the study of cereals like wheat and maize that have complex genomes. A comprehensive account is provided about the isolation and use of microsatellite markers in rice genetics. In other chapters, the application of molecular marker technology for marker-assisted selection, QTL mapping and identification of the genetic basis of heterosis are discussed.

Several contributions describe the progress in the International Rice Genome Sequencing Project (IRGSP). A chapter on finishing genomic sequences is particularly informative and deals with strategies for tackling difficult to sequence regions of DNA. Other chapters

discuss important recent advances in functional genomics of rice, including the development of large numbers of transposon, retrotransposon and T-DNA insertion tagged lines.

Transgenic approaches to obtain resistance against certain biotic and abiotic stresses as well as increasing photosynthetic efficiency are described. The problems associated with silencing of transgene expression and possible ways of minimizing the same are covered. A very interesting chapter discusses the patterns of transgene organization in cereals and the insights they provide into the mechanisms that are involved in initial integration and subsequent regulation of expression of these genes.

Overall, this book is very informative and the various sections are well written. However, the chapters on QTL mapping and genetic basis of heterosis could have been simplified for a more general readership. The addition of some topics would have added value to the book. There is minimal discussion of the genetics of insect resistance and the application of insecticidal genes for developing resistance lines. The engineering of beta carotene synthesis in rice endosperm is a significant achievement that has escaped mention. A companion volume that is promised in the foreword might cover these and other gaps. A detraction from the high quality of layout is the asymmetrical printing of text in many of the early pages and the lack of clarity in an important figure on page 81. The causal agent of bacterial blight is now referred to as *Xanthomonas oryzae* pathovar *oryzae* and not *Xanthomonas campestris* (p 33).

In summary, this book is a must for the increasing numbers of researchers who use rice as a genetic system and is a very useful addition to the bookshelves of those who work on other cereals and plants.

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