

# Preface

Cereals are the most important food crops of the world and make an important component of daily diet of a major section of human population. Cereals are also an important source of fat-soluble vitamin E (an essential antioxidant), and contribute 20–30 % of the daily requirement of minerals. Cereals provide >60 % of food requirement of growing human population. In view of this, it is necessary that the plant breeders continue to work toward increased crop productivity of cereals using the latest knowledge and genomics-based technologies that are becoming available at an accelerated and unprecedented pace.

Cereal production witnessed a significant and steady progress during the last few decades. This has been possible partly through the development of high-yielding and input-responsive cultivars during the so-called green revolution period. Introgression of alien genetic variation from related wild species also contributed to this revolution. During the last two decades, starting in mid-1990s, genomics approaches (including molecular marker technology) have been extensively used not only for understanding the structure and function of cereal genomes, but also for accelerated improvement of available cultivars in all major cereals. In our earlier edited volume “Cereal Genomics” published in 2004, we tried to collect information generated till then in the subject area of cereal genomics. That volume served a useful purpose and was well received by cereal workers globally. However, major advances in the field of cereal genomics have been made during the last 8 years (2004–2012), thus making our earlier 2004 volume out-of-date. This made it necessary for us to have a fresh look on the present status and future possibilities of cereal genomics research and hence this volume, “Cereal Genomics II”. For instance, in 2004, except rice, no other cereal genome was sequenced, while now whole genome high quality or draft sequences of rice, maize, sorghum, barley, and that of the model grass species *Brachypodium distachyon* have become available and that of bread wheat should become available within the next 2–3 years. These genome sequences have become valuable resource for detailed analysis and improvement of cereals.

“Cereal Genomics II” has updated chapters on molecular markers, next generation sequencing platform and their use for QTL analysis, domestication studies, functional genomics, and molecular breeding. In addition, there are also chapters on computational genomics, whole genome sequencing and comparative genomics

of cereals. We believe that this book should prove useful to the students, teachers, and young research workers as a ready reference to the latest information on cereal genomics.

The editors are grateful to the authors of different chapters (Appendix I), who not only summarized the published research work in their area of expertise but also shared their unpublished results to make the articles up-to-date. We also appreciate their cooperation in meeting the deadlines and in revising their manuscripts, whenever required. While editing this book, the editors also received strong support from some colleagues (Appendix II), who willingly reviewed the manuscripts for their inclination toward the science of cereal genomics. Their constructive and critical suggestions have been very useful for improvement of the manuscripts.

The editors would like to extend their sincere thanks to colleagues and staff from their respective laboratories, who helped them to complete this important assignment. In particular, Manish Roorkiwal, B. Manjula, and Reyazul Rouf Mir helped RKV with the editorial work. The editors also recognize that the editorial work for this book has been quite demanding and snatched away from them some of the precious moments, which they should have spent together with their respective families. PKG is thankful to his wife Sudha Gupta and to the families of his son (Ankur) and daughter (Ritu) and RKV is thankful to his wife Monika Varshney and two kids (Prakhar and Preksha) for their support and help. RKV is also grateful to Dr. William Dar, Director General, ICRISAT for his guidance and support to complete the “Cereal Genomics II” volume. The cooperation and help received from Ineke Ravesloot and Jacco Flipsen of Springer during various stages of the development and completion of this project is duly acknowledged.

The book was edited during the tenure of PKG as NASI Senior Scientist at CCS University, Meerut (India) and that of RKV as Director, Center of Excellence in Genomics (CEG), ICRISAT, Hyderabad (India) and Theme Leader—Comparative and Applied Genomics (CAG), Generation Challenge Programme (GCP). The editors hope that the book will prove useful for the targeted audience and that the errors, omissions, and suggestions, if any, will be brought to their notice, so that a future revised and updated edition, if planned, may prove more useful.

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