



Practical manual on Plant Cytogenetics

Ram J. Singh, CRC Press, December 2017, 320 Pages, 74 Color & 100 B/W Illustrations, ISBN 9781498742979 (hardback), LCCN 2017036705/-CAT# K26824, <https://doi.org/10.1201/9781498742986>, CRC Press, Boca Raton, FL 33487-2742, Hardback Print £92.0, ebook £57.50

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Plant cytogenetics is the backbone of genetics in explaining the structure and behavior of genetic principles at the nucleus, cell, and organism levels, including the association of linkage groups. The keyword “chromosome” has been in existence for over 130 years. Its study has contributed a plethora of information in understanding the principles of genetics, their applications in evolutionary/developmental biology, including the genetic improvement for qualitative and quantitative traits. All this has been made possible through the progressive technical advances reached in elucidating the fine structure of chromosomes, the delineation of chromosome segments, epigenetic marks, chromosome behavior in somatic and differentiated tissues, reproductive organs, and in natural and synthetic hybrids. Whereas, the development of the so-called “squash and smear” technique made tremendous impact in understanding chromosome evolution and identification of linkage groups in the early half of twentieth century, the advent of banding techniques in the 1970s and fluorescence in situ hybridization in the 1980 revolutionized chromosome biology, and has led to the rejuvenation of interest in this fascinating area, and particularly in plant cytogenetics. Keeping in line with the advances in chromosome techniques, several books detailing experimental protocol were written in the 1960s through to the early 1980s, notably by C.D. Darlington, A.K. Sharma & A. Sharma. However, fine technical advances made thereafter remained scattered in the literature. Ram J. Singh, having vast experience in plant cytogenetics spanning over 5 decades, has experienced these technical advances. His book, *Plant Cytogenetics* (3rd edition published in 2016), has aptly

taken up the task to amass an up-to-date account of chromosome techniques.

Taking historical developments into account, the author lucidly presents laboratory practices in a simple style providing step-by-step fine technical details that realize reproducible results. The book is divided into 12 chapters. Beginning with the Introduction, the other 11 chapters are devoted to progressive advances in laboratory protocols providing minute details about: conventional methods for handling the chromosomes, smear technique, fluorescence in situ hybridization including MC-FISH, GISH, Fiber FISH, immunodetection, flow cytometry and chromosome sorting, pollen staining, cell division, chromosomes in reproduction, and karyotype analysis. Due emphasis is given to cytological methods for associating genes with chromosomes, structural chromosome changes for locating genes, and wide hybridization. The latter chapter is primarily based on the author’s own work to underpin the significance of plant cytogenetic tools in resolving issues relating to wide hybridization from the utilitarian view point.

The subject area of the book is quite important, delving into the growing applications of cytogenetics in plant breeding and genomics. Unfortunately, the interest of students in understanding the cytogenetic mechanisms and cytogenetic applications in crop improvement is diminishing due to the lack of dedicated teachers and limited technical expertise available.

The most renowned cytogeneticist and agriculturist of the time, Prof. G.S. Khush, has written a Foreword for this book with much praise, saying that this manual will serve as a standard reference for cytogeneticists for years to come. In my view, an easily understandable experimental protocol at the classroom level presented through this manual is likely to rejuvenate interest in this fascinating subject the world over for graduate students and teachers alike. I believe that this book should be a must in all the labs and classrooms interested in practicing chromosome techniques.

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