

Preface

So far, only a few dominant genic male-sterile mutants were found in crops. The spontaneous mutant first discovered in wheat is the Taigu genic male-sterile wheat, the fertility of which is controlled by a single dominant male-sterile gene. Because of its unique characteristics, it is of very importance in genetics and wheat breeding. Firstly, the sterile plants always give rise to one half sterile progenies and one half fertile ones, the former can set seeds by open-pollination, while the latter can produce seeds by selfing. As all know, open-pollination favors gene recombination, while selfing helps homogeneity and stability. Therefore, the sterile plants, like a gene acceptor, can receive the alien genes extensively and bring about gene recombination continually. The genic recombinants will become homozygous stable plants by selfing of their fertile segregates, and the best ones will be eventually selected as excellent varieties. This characteristic of the Taigu genic male-sterile wheat is very useful in conventional wheat breeding, recurrent selection and exploration of gene-pools. Secondly, its male abortion is thorough and stable. The sterile plants have widely open glumes and remarkably protruded stigmata during flowering stage, so that cross-fertility is high. This does not only increase effectiveness as a breeding tool, but also shows its potential value in utilization of heterosis in wheat. Thirdly, its sterility can be transferred to common wheat varieties and also expressed in extensive wheat genetic background carrying different genomic constitution of wheat-related species, which helps to develop even more extensive application of this dominant genic male-sterile material.

This book covers the following aspects:

1. The discovery of Taigu genic male-sterile wheat and some articles concerning the determination of the dominant gene, such as genetic analysis, cytological observation and location of the gene, etc.
2. The study of the mechanism of male abortion of genic male sterility, such as morphological and anatomical observations, cytochemical and biochemical analyses, etc.
3. Theory and method of the new breeding approaches, such as recurrent selection, establishing and developing the gene-pools, and utilization of the wild germplasms.

We hope that this book, published both in Chinese and in English will interest wheat breeders, biologists, university and college teachers and students. We also hope that this book will arouse exchanges of scientific ideas which will push forward the development of the breeding method of genic male-sterility, so as to open a new area in scientific researches.

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