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Nota di contenuto

1 Utilization of rapeseed-mustard genetic resources for Brassica improvement -- 2 Recent advances in cytoplasmic male sterility (CMS) in crop Brassicas -- 3 Ancient and recent Polyploid evolution in Brassicas -- 4 Production and application of doubled haploid in Brassica improvement.-5 Tissue culture-mediated biotechnological advancements in genus Brassica -- 6 Genomics for Brassica quality improvement -- 7 Biofortification of Brassica for quality improvement. -8 Genetics and Genomic Approaches for Disease Resistance in Brassicas.-9 Arsenic toxicity and molecular mechanism of arsenic

Sommario/riassunto

Global population is mounting at an alarming stride to surpass 9.3 billion by 2050, whereas simultaneously the agricultural productivity is gravely affected by climate changes resulting in increased biotic and abiotic stresses. The genus *Brassica* belongs to the mustard family whose members are known as cruciferous vegetables, cabbages or mustard plants. Rapeseed-mustard is world's third most important source of edible oil after soybean and oil palm. It has worldwide acceptance owing to its rare combination of health promoting factors. It has very low levels of saturated fatty acids which make it the healthiest edible oil that is commonly available. Apart from this, it is rich in antioxidants by virtue of tocopherols and phytosterols presence in the oil. The high omega 3 content reduces the risk of atherosclerosis/heart attack. Conventional breeding methods have met with limited success in *Brassica* because yield and stress resilience are polygenic traits and are greatly influenced by environment. Therefore, it is imperative to accelerate the efforts to unravel the biochemical, physiological and molecular mechanisms underlying yield, quality and tolerance towards biotic and abiotic stresses in *Brassica*. To exploit its fullest potential, systematic efforts are needed to unlock the genetic information for new germplasms that tolerate initial and terminal state heat coupled with moisture stress. For instance, wild relatives may be exploited in developing introgressed and resynthesized lines with desirable attributes. Exploitation of heterosis is another important area which can be achieved by introducing transgenics to raise stable CMS lines. Doubled haploid breeding and marker assisted selection should be employed along with conventional breeding. Breeding programmes aim at enhancing resource use efficiency, especially nutrient and water as well as adoption to aberrant environmental changes should also be considered. Biotechnological interventions are essential for altering the biosynthetic pathways for developing high oleic and low linolenic lines. Accordingly, tools such as microspore and ovule culture, embryo rescue, isolation of trait specific genes especially for aphid, *Sclerotinia* and *alternaria* blight resistance, etc. along with identification of potential lines based on genetic diversity can assist ongoing breeding programmes. In this book, we highlight the recent molecular, genetic and genomic interventions made to achieve crop improvement in terms of yield increase, quality and stress tolerance in *Brassica*, with a special emphasis in Rapeseed-mustard.