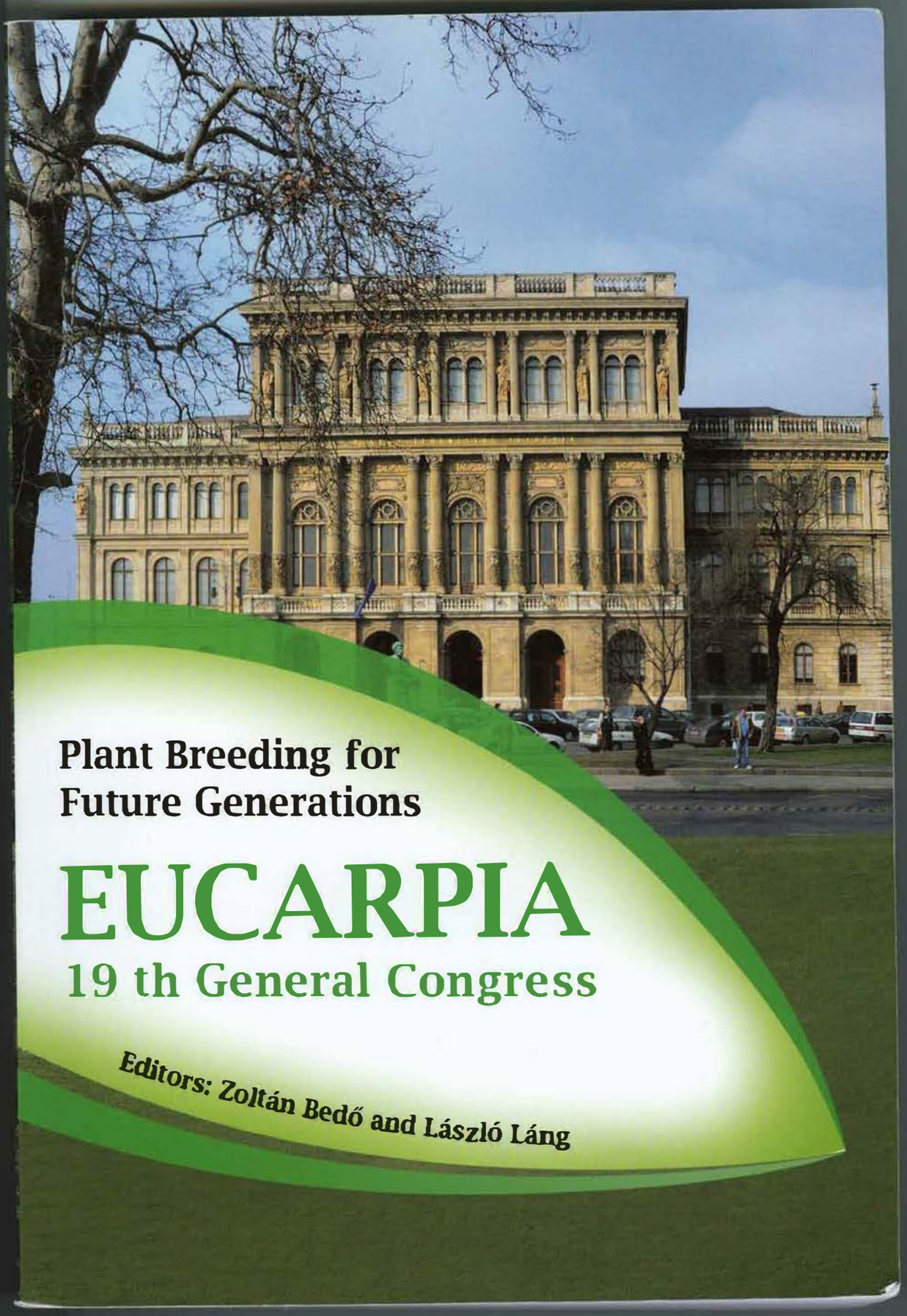

Plant Breeding for Future Generations

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DIFFERENCES IN THE GENETIC STRUCTURE OF CITRUS TRIPLOID HYBRIDS RECOVERED FROM 2X X 2X AND 4X X 2X SEXUAL HYBRIDIZATIONS

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Triploid breeding is now a central strategy to develop seedless mandarin cultivar requested by the fresh-fruit market. Citrus triploid plants can be recovered by 2x X 2x sexual hybridisations as a consequence of the formation of unreduced female gametes and by interploid hybridization (4x X 2x and 2x X 4x). Most of the 4x parents used are doubled-diploid.

The genetic structure of diploid gametes, and particularly the parental heterozygosity restitution at each *locus*, depends on the meiotic process by which they were originated. For unreduced gametes, second-division restitution (SDR) is the mechanism involved in 'Fortune' mandarin and supposed in clementines. With such mechanism, the rate of maternal heterozygosity restitution (MHR) varies among the *loci* in relation with the rate of single crossing over between the centromere and the considered *locus*. It ranges from 0% for *loci* very close to the centromere to a maximum value depending on the level of chromosome interference (100% with total interference and 66.6% without interference).

For doubled-diploid, the main difference is between disomic and tetrasomic inheritance. Different models of tetrasomic inheritance have been proposed but the range of heterozygosity restitution remains relatively strait, from 55.5%, under the model of maximum equational chromatid segregation and 66.6% under the random chromosome segregation. Total disomic inberitance leads to 100% of heterozygosity restitution.

The aim of this work was to compare the genetic structure of citrus triploid hybrids recovered from 2x X 2x and 4x X 2x sexual hybridizations using diploid and tetraploid clementine as female parents. Ninety two triploid hybrids recovered from each crosses were analyzed with the same 19 SSRs and 15 SNP markers. The genetic structure of the maternal diploid gamete was inferred from triploid genotypes. The averages of MHR were respectively 35% and 64% in 2x X 2x and 4x X 2x progenies. Variation of MHR between markers was much higher in 2x X 2x progenies than in 4x X 2x. For example, with the CiC1380-05 SNP marker MHR were 1% and 61% in 2x X 2x and 4x X 2x hybridizations respectively while for Mest 131 SSR marker MHR were 77% and 55% respectively. The obtained results confirm SDR mechanism in diploid clementines and indicate mostly tetrasomic inheritance in the doubled-diploid clementine and suggest that interploid hybridizations with doubled-diploid genotypes as female parents should be more efficient than 2x X 2x hybridisations for developing new triploid hybrids that are phenotypically close to the maternal diploid genitor. Conversely, 2x X 2x sexual hybridisation produce more polymorphic progenies, providing the opportunity to select new triploid cultivars within the perspective of market segmentation as a commercial strategy.