

by somatic hybridization between diploid and haploid lines, and demonstrates the potential for haploid citrus production by induced gynogenesis in clementine. In this work we analysed the efficiency of induced gynogenesis by irradiated pollen in 'Wilking' mandarin (*Citrus reticulata*). Five doses of gamma irradiation of 'Meyer' lemon pollen were tested (0, 150, 200, 250, 300 Grays). Embryos were extracted from small seeds, obtained in immature fruits, and cultivated *in vitro*. The ploidy level of plantlets was determined by flow cytometry analysis. Irradiated pollen appeared to be efficient for gynogenesis induction in 'Wilking'. A relatively high number of haploids (7 plantlets) were obtained, essentially after hybridisation with 'Meyer' lemon pollen irradiated at 250 Grays. The ploidy level of all haploid plantlets was confirmed by chromosome counts, and molecular markers demonstrated their gynogenetic origin. These haploid lines should be useful for triploid breeding by somatic hybridisation, and also constitute interesting resources for genomic studies.

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Differences in ploidy levels of interploidal crosses progenies between diploids and tetraploid somatic hybrids in citrus

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One of the main objectives of citrus breeders is to obtain sterile mandarins that produce seedless fruits. Triploids are a response to these criteria. A way for triploid creation is sexual crosses between diploids and tetraploids. However, the scarcity of the natural tetraploid gene pool has been a restriction for using this method. Citrus somatic hybridisation via protoplast fusion allowed the creation of allotetraploid somatic hybrids that can be used as parents to generate triploid cultivars. Several crosses using diploids (female) and allotetraploid somatic hybrids (male) were conducted by CIRAD: a) 'Fortune' mandarin x ('Willow leaf' mandarin 'Star Ruby' grapefruit tetraploid somatic hybrid); b) 'Eureka' lemon x ('Star Ruby' grapefruit 'Corsican' citron tetraploid somatic hybrid); and c) 'Eureka' lemon x ('Mexican lime' 'Shamouti' orange tetraploid somatic hybrid). The majority of progenies were triploid from the 3 crosses (61-76%). However diploid and tetraploid progenies were also obtained in all of them. Molecular analysis of progenies with SSR markers revealed that tetraploids were issued from a diploid male gamete and an unreduced female gamete, while diploids could be issued from a haploid ovule and a haploid male gamete. This study reveals that ploidy variations were owed to meiotic dysfunction of either the tetraploid somatic hybrids or the diploid female parent.

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Gametic configuration and inheritance of SSR markers in tetraploid interspecific and intergeneric citrus somatic hybrids

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Citrus somatic hybridization has become an integral part of citrus improvement programs worldwide. More than 100 somatic hybrids have been created by CIRAD. Intra and interspecific somatic hybrids will be used mostly for the triploid scion breeding. Intergeneric somatic hybrids can have a direct application as rootstocks or be used as parents for sexual 'tetrazyg' breeding. To optimize the design of such breeding schemes, it is essential to have knowledge of the inheritance mode in such allotetraploid hybrids. The aim of the present study was to investigate the inheritance (disomic, tetrasomic or intermediate) in a citrus interspecific hybrid (*Citrus reticulata* x *Citrus limon*) and an intergeneric somatic hybrid (*C. reticulata* x *Poncirus trifoliata*). Two triploid populations were generated using the somatic hybrids as pollinators in crosses with the diploid 'Chandler' pummelo. The triploid progenies were genotyped with SSRs to infer the allelic constitution of the somatic hybrid gametes. A likelihood-based approach was used to estimate for each locus the proportion of disomic versus tetrasomic segregations. For the two somatic hybrids, intermediate inheritance was observed with a major tendency for tetrasomic segregation in the interspecific hybrid, but a tendency for disomic inheritance in the intergeneric hybrid. The implications of the observed inheritance mode for citrus breeding are discussed with special focus on heterozygosity restitution.