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APPLICATION OF MARKER ASSISTED SELECTION (MAS) TO IMPROVE THE EFFICIENCY OF THE CREA CITRUS BREEDING PROGRAM

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Citrus conventional breeding based on crossing is hampered by many factors, including a long juvenile phase, male and/or female sterility, and nucellar polyembryony. Consequently, the time needed from sowing to cultivar release can be 15-20 years. Since a few years, a set of molecular markers associated to agronomical traits has been developed. Specifically, markers linked to pulp anthocyanin pigmentation (TCS1 retrotransposon insertion upstream the Ruby gene), Alternaria brown spot resistance (SNP markers) and nucellar polyembryony (a Miniature Inverted repeat Transposable Element – MITE- in the promoter region of *Cit*RWP) are available and therefore can be used to speed up breeding programs.

Here we describe the application of MAS in the CREA mandarin breeding program. The purpose of the early selection is the generation of Alternaria-resistant pigmented mandarins. More than a thousand plants generated from 10 parent combinations were analysed at the Ruby locus to discard non-pigmented hybrids. All populations had 'Moro' blood orange or 'Sun red' mandarin as male parents, both heterozygous for TCS1. Segregation was as expected in the 'Moro' progenies (close to the 1:1 ratio), while we observed a distorted segregation towards pigmented individuals in the populations having 'Sun red' as male parent (with P values <0.05 for three populations analysed). All progenies generated from Alternaria - susceptible parents (like'Fortune' mandarin) were also analysed at the SNP08 locus (previously mapped at 0.4 cM from the Alternaria resistance gene) using High Resolution Melting (HRM) analysis to discard susceptible genotypes. Moreover, the analysis with the MITE markers for nucellar polyembryony is underway to identify new pigmented monoembryonic parents to be used for future hybridization programs.