

## S1-25

### TETRAPLOIDISATION IS A COMMON PHENOMENON IN APOMICTIC CITRUS SEEDLINGS AFFECTED BY GENOTYPE AND ENVIRONMENTAL CONDITIONS

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Citrus species are mainly diploid ( $2n=2x=18$ ) and very few natural polyploid are encountered in the citrus gene pool. However, several reports of tetraploid seedlings occurrence from apomictic citrus have been done during the last century. Apomixis in citrus is determined by adventitious embryony from nucellar cells. The morphological homogeneity of tetraploid plants obtained from a same diploid genotype led to propose that tetraploid seedlings arise from chromosome doubling of nucellar cells. The interest of citrus breeder for tetraploid citrus plants, as progenitor to produce triploid seedless cultivars, increased a lot in the last 20 years. The objective of the present work was to confirm the genetic origin of tetraploid seedlings and to analyse the impact of genetic and environmental factors on the frequency of tetraploid production. The frequency of tetraploid plants was analysed by flow cytometry in seedlings of 21 genotypes of different genera and species. The identity of SSR profiles between tetraploid seedlings and mother diploid plants and the presence in a same seed of tetraploid and diploid nucellar embryos confirmed the origin of tetraploid embryos from chromosome doubling of nucellar cells. The frequency of tetraploid plants recovery was found dependant to the genotype and the environmental conditions. From seeds harvested in the same site of Valencia (Spain), the genotype producing the higher rates of tetraploid seedlings was 'Carrizo' citrange (18.5%) while no tetraploids were found for 'Salteñita' and 'Simeto' mandarins. The medium rate in the tested genotypes was 6.1%. Limited variation of tetraploid rate was observed among 'Carrizo' seeds harvested in Valencia over several years. To maximize the environmental variability, seeds of 'Carrizo' harvested in different Mediterranean (Valencia, Spain; Corsica, France) subtropical (California, USA; San José, Uruguay; Eastern Cape, South Africa) and tropical areas (Florida, USA; States of Bahia and Sao Paulo; Brazil) were studied at IVIA. Very important differences were found between sites (from 19.2% in Valencia to 0.9% in Bahia). Higher and lower rates were found respectively in Mediterranean and tropical areas suggesting a great impact of the environmental conditions in the rate of polyploidisation. We propose that the tropical and subtropical localisation of citrus origin and diversification areas is one of the important factors explaining the apparent inconsistency between (i) the high rate of tetraploidisation events observed in the marginal cold areas and (ii) the very limited role of polyploidy on cultivated citrus evolution and domestication.

Keywords: apomixis, tetraploid, environmental conditions, citrus