Eds. J. Prohens & M.L. Badenes
Modern Variety Breeding for Present and Future Needs (2008)
Editorial Universidad Politécnica de Valencia, Valencia, Spain.

Citrus tetraploid rootstocks are more tolerant to salt stress than diploid

Wafa Mouhaya [1], Thierry Allario [1], Gilles Costantino [2], Fernando Andrés [3], Manuel Talón[3], François Luro[2], Patrick Ollitrault[1], and Raphael Morillon[1]

[1] CIRAD UPR 75. Instituto Valenciano de Investigaciones Agrarias. 46113 - Moncada – Valencia, Spain (E-mail: morillon@cirad.fr)

[2] INRA, UR GEQA, de San Giuliano, 20230 San Giuliano, France

[3] Centro de Genomica. Instituto Valenciano de Investigaciones Agrarias. 46113 - Moncada – Valencia, Spain

ABSTRACT: Salt stress has a dramatic impact on the citrus industry by decreasing the growth of trees and fruit yield. We studied at the physiological and molecular level diploid and tetraploid citrus rootstocks when confronted to salt stress. Those tetraploid plants originate from the chromosome duplication in nucellar cells (somatic cells) of the apomictic diploid parent. Diploid and autotetraploid of Poncirus trifoliate (Pomeroy *Poncirus trifoliata*) and Willow-Leaf mandarin (*Citrus deliciosa*) were studied. The allotetraploid somatic hybrid FLHORAG1 which was obtained by electrofusion between Willow-Leaf mandarin and Pomeroy *Poncirus* protoplasts was as well investigated. Poncirus trifoliate is known to be a salt sensitive rootstock. Willow leaf mandarin is not used as a rootstock but was supposed to have a greater property of salt tolerance, similar to other mandarins such as Cleopatra mandarin. The anatomy of the leaf of diploid and tetraploid plants was first investigated. The stomatal area of tetraploid is 1.6 fold higher than the one of diploid plants. Stomatal density was also different between diploid and tetraploid. A 50 mM sodium chloride (NaCl) stress was performed for 9 weeks. Salinity caused leaf injuries and leaf fall in diploid of Poncirus while the tetraploid plants were not damaged. Autotetraploids and the allotetraploid FLHORAG1 acted like salt tolerant when compared to diploid plants. Sodium and chloride accumulation were similar for both diploid and tetraploid genotypes suggesting that root exclusion and/or accumulation of toxic ions in vacuoles is not the only way for salt tolerance. In order to characterize the molecular determinants mediating the salt tolerance of polyploids we investigated the gene expression profiles by using cDNA-AFLP technique. Contrasted gene expression profiles were detected between diploids and tetraploids as well as between control and stressed plants. Transcript Derived Fragments (TDFs) from contrasted profiles pattern were sequenced. 14 genes involved in osmotic adjustment, defense and signal transduction were isolated. The expression of some of those genes such as genes coding for the choline monooxigenase enzyme and the Group 5 late embryogenesis abundant protein (LEA5) and genes involved in the Abscissic Acid biosynthesis pathway are actually monitored by using Real Time PCR.