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Biotic and Abiotic Stress Tolerance in Plants: the Challenge for the 21st Century

BOOK OF ABSTRACTS

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Osb.) and 'Sunki Tropical' mandarin (*C. sunki* Hort. former. Tan.) rootstocks, or drought-sensitive 'Flying Dragon' trifoliate orange (*Poncirus trifoliata* L.), were used in this experiment. These plants were subjected to a progressive water deficit until their leaves reach the water potential of -1.5 to -2.0 MPa. After that, the plants were rewatered. To assess the damage caused by oxidative stress, the *in situ* accumulation of hydrogen peroxide (H_2O_2) was examined based on histochemical staining by 3,3'-diaminobenzidine (DAB) and the malondialdehyde (MDA) levels were measured as an indicator of membrane lipid peroxidation. Significant differences as to the growth parameters were observed among the different treatments and rootstock varieties, with plants grafted on 'Cravo' exhibiting the highest values of height and leaf area, followed respectively by 'Sunki Tropical' and 'Flying Dragon'. There was an increase in GPX and PPO activities in leaves of all plants under water stress, with plants grafted on 'Flying Dragon' showing the highest values than 'Cravo' and 'Sunki Tropical'. The results also indicated that plants grafted on 'Flying Dragon' accumulated higher levels of H_2O_2 and MDA in their leaves than those grafted on 'Cravo' and 'Sunki Tropical'. Collectively, the results suggest that the protection from oxidative stress induced by 'Cravo' and 'Sunki Tropical' rootstocks is an important mechanism involved in the drought stress tolerance.
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Influence of climate on mandarin fruit quality: comparative studies between Brazil and France cultural and environmental conditions

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Brazil is leader of concentrated and frozen orange juice production in the world. However, the extension of fresh orange and mandarin market could provide higher gains for the producers, as occurred in Spain and California (USA). Part of Spanish and Californian success is due to a marketing strategy centered on high quality fruits with aggregated value (bright orange color, easy-peeler fruits, balanced sugar/acidity, etc.). However, one of the difficulties in relation to mandarin quality is that it highly depends on genotype and cultivation area (climate and environment conditions): in tropical regions, the mandarin color and acidity are less intense, which could affect the consumer acceptance. To improve the understanding of fruit quality elaboration on tropical regions, our strategy first consist on phenotypic and molecular comparative studies of the same citrus varieties cultivated in Tropical (Bahia state, Brazil) and Mediterranean (Corsica, France) climates. We selected 45 citrus genotypes (36 mandarins and hybrids, 8 oranges and 1 grapefruit) presented in Embrapa (Bahia State, Brazil) and INRA-CIRAD (Corsica, France) germplasms, and we verified their genetic conformity by molecular analysis using 12 SSR markers. All oranges, the grapefruit and 14 mandarin varieties presented the same genetic background in both germplasms and have been selected for further biochemical, molecular and OMICs analysis. In parallel, in order to determine with precision the maturation phase for fruit harvesting (3 maturation stages), maturation curves (phenotypic analysis, total soluble solids and acidity) were obtained on the all or part of the 45 genotypes during 2012 and 2013 at Embrapa. Mature fruits were mainly obtained between November and February. The obtained data were also related with the climate records from the Experimental Station of Embrapa (temperature, atmospheric pressure, relative humidity, rain precipitations). These results are promising and important as prerequisite for subsequent deeper biochemical and molecular analysis of fruit quality determinism and genotype/environment interaction studies.
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