

Mandarin quality

Influence of genotype-environment interaction on mandarin quality

ABSTRACT

The mandarin quality (color, taste) is highly dependent from genotype and environmental conditions; in tropical conditions, fruits are less colored and more acidic. On the other hand, most of the breeding programs to improve citrus quality are developed in the Mediterranean and little work is done on citrus breeding in the tropical and subtropical regions.

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Project leader : Fabienne Micheli

Project leader's institution : CIRAD

Project leader's RU : AGAP

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Funding : Labex

GOAL

To characterize the mandarin quality regarding the interaction genotype x environment, to attend the Citrus breeding programs from Brazil (Embrapa CNPMF) and from France (Cirad/INRA).

Specific objectives are to analyze biochemically and molecularly mandarins cultivated in both climates/environments and to identify genes/proteins differentially expressed and related to the physico-chemical characteristics of the fruit quality.

ACTION

Characterization of a Tropical citrus germplasm focusing on mandarin varieties and on qualitative and quantitative fruit phenotypic data. Some mandarin varieties presented phenotypic characteristic (e.g. skin and pulp color) adapted to in natura fruit market. One of them, the 'Ortanique' variety was deeply analyzed and showed a high carotenoid content;

Identification of identical citrus varieties between Mediterranean and Tropical germplasm (genetic conformity) and comparative analysis of fruit phenotypic characteristics between these varieties. Some of them presented contrasting phenotypes according to the culture region (e.g. color, acidity, essential oils);

Essential oil analyses between citrus cultivated in Mediterranean and Tropical climates revealed differential qualitative and quantitative compositions;

Molecular markers (SNPs) identified in genes (e.g. carotenoid- and sugar-related genes) involved in fruit

quality allowed a diversity analysis among Citrus. Mainly these markers were able to segregate mandarins from pummelos (inter-specific diversity) as well as inside each group (intra-specific diversity); Allele-specific expression of carotenoid genes revealed that the skin color regulation depends of the allele origin (mandarin vs pummelo parent); Epigenetic study showed that citrus fruit maturation not only depends on genetic factors, but also on environmental effect.

RESULTS

To use the SNP markers in citrus breeding programs both in Tropical and Mediterranean regions for selection of plants with high quality fruits. To deeply investigate the genetic and epigenetic mechanisms responsible for the fruit color and taste.