Introduction

Fruit taste is largely affected by the content of sugars and acids. Fructose is the sweetest tasting sugar. In commercial peach fruit, sucrose is the main sugar, followed by fructose and glucose which have similar levels. Interestingly low fructose accessions have been described in wild peaches\(^1\,^2\). Through an extensive profiling of metabolites and enzymatic activities, this study aims at i) describing sugar metabolism in peach fruit at different developmental stages and ii) comparing two genotypes with contrasted fructose/glucose ratios.

Materials and methods

Fruit samples were collected at 6 or 7 developmental stages respectively in 2010 and 2011. Three pools of 3 fruits were collected for each stage. Fruit mesocarp was cut in little pieces, immediately frozen in liquid nitrogen, ground to a fine powder and stored at -80°C. Twelve metabolites and 12 enzyme activities were measured by enzymatic methods\(^3\).

Hypotheses to explain ‘low fructose’ genotype: reduced synthesis and/or increased degradation

Main results

- Genotypic effect was observed for all metabolites
- Year effect was observed for sorbitol and citrate
- The enzyme activities were stable between genotypes and years

No difference was detected in the activities of the enzymes responsible for synthesis or degradation of fructose

Sugar metabolism is a highly regulated system in which a major perturbation in a central compound has only slight repercussions on other metabolites and on enzyme activities

Other explanations for the low fructose phenotype

- Differential affinities for substrate between iso-enzymes. In peach fructokinase has two isoforms with different affinities for fructose\(^2\).
- Limited fructose storage resulting in higher degradation. Fructose and glucose are stored in the vacuole. If fructose cannot be stored or if it ‘destocked’ to cytosol, it is more degraded than glucose.
- Differential consumption of the two hexoses for respiration, cell wall synthesis or other carbon compounds. First results suggest that the ‘low fructose’ genotype has more carbon than the ‘commercial’ genotype though there is no difference between the two genotypes for dry mass.