O-12

Inheritance and relationship of important characteristics for determination of graft compatibility in apricot

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Abstract

Given the relative importance of graft compatibility throughout the world, there is surprisingly little research dedicated to the study of this phenomenon. The large number of genotypes that can be combined by grafting produces a wide range of different physiological, biochemical and anatomical interactions when grafted, making selection progress slow in this research area. Important metabolic pathways have been identified as responsible for physiological failure in graft-incompatible rootstock-scion combinations, such as phenylpropanoid, cell wall biosynthesis or oxidative stress. However, little is known of the genetic control of graft compatibility in plants. In order to obtain further insight into the genetic factors that control this trait, the inheritance of the graft (in)-compatibility trait was studied in a population of 81 apricot seedlings obtained from a controlled intraspecific cross between the Spanish cultivar 'Moniqui' (female parent, incompatible) and the French cultivar 'Paviot' (male parent, compatible). Screening of graft compatibility on the progeny grafted onto the plum rootstock 'Marianna 2624' was based on anatomical symptoms. Bud take, growth, necrotic line and vascular discontinuity were observed during one year after grafting. The phenotypic parameters observed in the F1 individuals revealed that the necrotic line, discontinuities in the bark and wood, are highly correlated and play an important role in the development of the graft union and the establishment of vascular connections. Different histograms were also developed using average data for each F1 individuals grafted on 'Marianna 2624', showing a normal distribution for the three parameters measured related with graft incompatibility. Among the total number of F1 individuals evaluated, 16.04% of the descendants were found to be incompatible and 52.65% compatible. The remaining 11% descendants were admixed within the population at this time. The results obtained from this work highlight that graft compatibility is a complex agronomic trait. Knowledge of graft compatibility inheritance in other progenies will help cultivar and rootstock breeding and will contribute to understand the genetic mechanism of graft compatibility.

Keywords: correlations, inheritance, *Prunus armeniaca* L., rootstock breeding, rootstock-scion interaction