GENETIC DETERMINISM OF GRAFT COMPATIBILITY IN APRICOT

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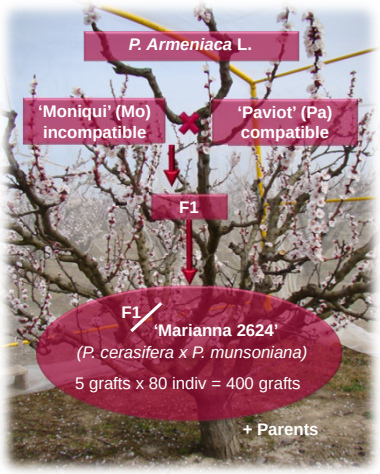
INTRODUCTION

Graft incompatibility is one of the most important problems for apricot rootstock breeding. 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. In this sense, little is known of gene control of graft compatibility response in plants.

In order to obtain further insight into the genetic factors that control this trait, the main goal of this work was to perform a phenotypic evaluation and inheritance analysis of a population of 80 apricot seedlings obtained from a controlled intraspecific cross between the Spanish cultivar 'Moniqui' (female parent, incompatible) and the French cultivar 'Paviot' (male parent, compatible).



MATERIAL AND METHODS

Screening of graft compatibility on the progeny grafted onto the plum rootstock 'Marianna 2624' was based on anatomical symptoms.

Internal characterization of the graft union one year after grafting. (Figure 1)

(A) Compatible graft union.

(B, C) Phenotypic characteristics of graft incompatibility

- a- necrotic line
- b- bark discontinuity
- c- wood discontinuity

Phenotypic evaluation was performed as followed: Necrotic line, woody and bark discontinuity (scored between 0= absence and 5= maximum)

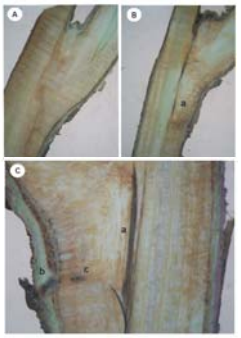


Figure 1. Anatomical symptoms

RESULTS AND DISCUSSION

The genetic control mechanisms of some agronomic traits such as tree development, flowering and ripening, pest and disease resistance, fruit quality and fruit production have been widely described in fruit trees (Salazar et al. 2014). However, there is almost not information about the genetic control of graft compatibility, probably because of the difficulties in evaluating the trait, since incompatibility may appear after several years after grafting. In this study, the phenotypic parameters observed in the F1 individuals revealed that the necrotic line, bark and wood discontinuities, are highly correlated (table 1) and play an important role in the development of the graft union. It is well known that localized graft incompatibility is characterized by anatomical alterations at the graft union area that does not prevent the initial growth of the tree during the first few years (Pina and Errea, 2005).

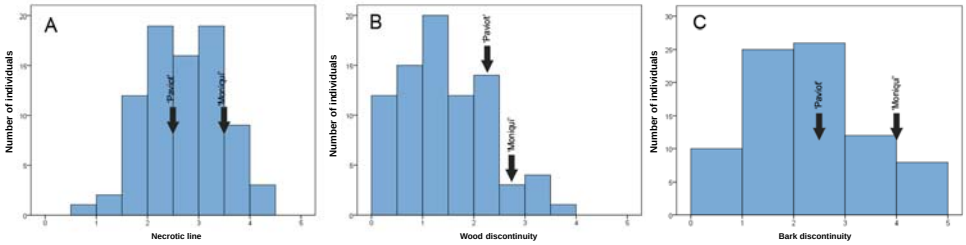


Figure 2. Distribution of 80 F1 individuals and parents grafted on 'Marianna2624' for three anatomical symptoms: A) necrotic line, B) wood discontinuity and C) bark discontinuity.

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 (Figure 2). 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.

Table 1. The Pearson correlation coefficients between the necrotic line, wood and bark discontinuities in the 80 F1 individuals and parents grafted on 'Marianna 2624'.

		Necrotic line	Wood discontinuity	Bark discontinuity
Necrotic line	Pearson correlation Sig. (bilateral)	1	,474** ,000	,601** ,000
Wood discontinuity	Pearson correlation Sig. (bilateral)	,474** ,000	1	,601** ,000
Bark discontinuity	Pearson correlation Sig. (bilateral)	,601** ,000	,601** ,000	1

References

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