Interference of the own pollen in self-incompatible almonds on later cross-compatible pollination: Pollen tube growth and fruit set

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Interference of the own pollen in self-incompatible almonds on later cross-compatible pollination: Pollen tube growth and fruit set

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SUMMARY – The gametophytic nature of self-incompatibility in almond (*Prunus dulcis* Miller) is well known. When self-incompatible cultivars are self-pollinated, pollen tubes usually grow as far as the first half of the style but do not reach the ovary. Due to the proximity between the anthers and the stigma of each flower, the first pollen reaching the stigma is frequently its own pollen. The growth of its own pollen consumes the reserves of the style. If these reserves are used up, compatible pollen arriving from another cultivar later might not be able to grow along the style and reach the ovary, preventing fecundation and, consequently, fruit set. However, the results show that there is no clear effect of previous self-pollination of these self-incompatible almonds on later cross-compatible pollination. The fruit set was not affected.

Key words: Almond, *Prunus dulcis* Miller, gametophytic incompatibility, pollen interference.

RESUME – *"Interférence du propre pollen chez les amandiers auto-incompatibles sur l'ultérieure pollinisation croisée compatible : Croissance des tubes polliniques et fructification". La nature gamétophytique de l'auto-incompatibilité chez l'amandier (*Prunus dulcis *Miller) est bien connue. Lorsque des cultivars auto-incompatibles sont autopollinisés, les tubes polliniques généralement grandissent jusqu'à la première moitié du style, mais n'atteignent pas l'ovaire. En raison de la proximité entre les anthères et le stigmate de chaque fleur, le premier pollen qui atteint le stigmate est souvent le propre pollen. La croissance de son propre pollen consume les réserves du style. Si ces réserves sont épuisées, le pollen compatible arrivant plus tard d'un autre cultivar pourrait ne pas être capable de grandir le long du style et d'atteindre l'ovaire, ce qui empêcherait la fécondation et par conséquent la fructification. Cependant, les résultats montrent qu'il n'y a pas d'effet clair de l'autopollinisation antérieure de ces amandiers auto-incompatibles sur une ultérieure pollinisation croisée compatible. La fructification n'était pas affectée.*

Most-clés : *Amandier,* Prunus dulcis *Miller, incompatibilité gamétophytique, interférence du pollen.*

Introduction

In almond, the early reception of the a tree's own pollen by the stigma may limit the physical space available for the reception of compatible pollen but, more importantly perhaps, given the heterotrophic characteristic of pollen tube growth (Herrero and Dickinson, 1981), it may drain the reserves of the style (Herrero and Dickinson, 1979) and prevent the tubes of compatible pollen from developing and fecundating the ovule.

If things happen in this way, the problem will be accentuated by a limited presence of bees and pollenizers, factors that will contribute to a longer delay in the arrival of compatible pollen to the stigma.

In the present work, the results of pollinating self-incompatible varieties with compatible pollen at different times after self-pollination are studied.

Material and methods

Two almond varieties, Ramillete and Garrigues of known self-incompatibility (García, 1978) were studied.

Flowers in state D were emasculated in the field and laboratory and subsequently self-pollinated. At time 0, 5, 24 and 48 hours after self-pollination, they were pollinated with compatible pollen of Desmayo Largueta. At the same time, flowers of Ramillete and Garrigues were emasculated and 0, 5, 24 and 48

hours later, pollinated with pollen of Desmayo Largueta. In the field experiment the fruit set was determined after one and two months. In the laboratory, the flowers on branches in a 5% sucrose solution were pollinated and 72 hours after the compatible pollination, they were picked and fixed in FAA. Later, they were examined to determine the fate of the tubes. The number of tubes that reached the ovary and the percentage of penetrated ovaries was established.

Results

Field: in Figs 1 and 2, the fruit set results are shown for each variety and treatment. No difference was observed between treatments.

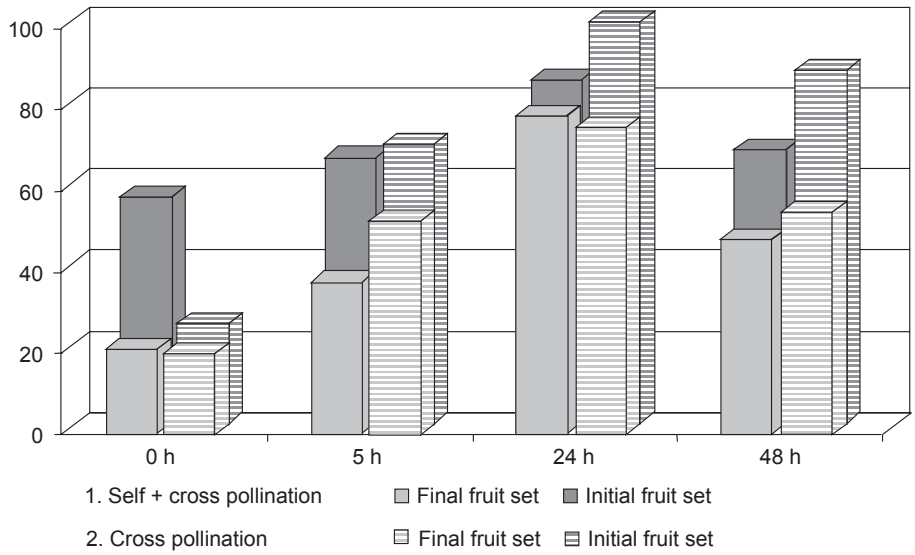

Fig. 1. Initial and final fruit set (%) for Ramillete cultivar after pollination with two different treatments. 1. Self-pollination at 0 hours and cross-pollination (with Desmayo Largueta) at 0, 5, 24 and 48 hours. 2. Cross-pollination (with Desmayo Largueta) at 0, 5, 24 and 48 hours.

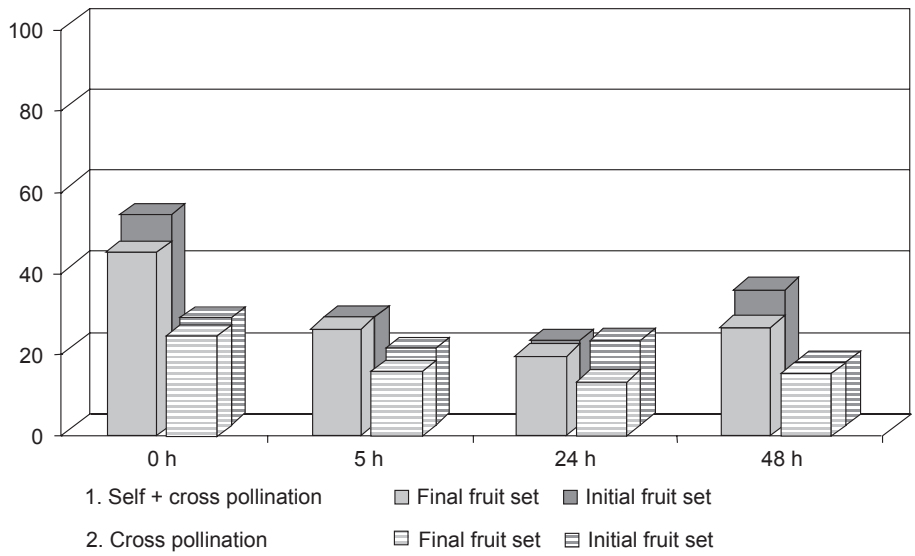

Fig. 2. Initial and final fruit set (%) for Garrigues cultivar after pollination with two different treatments. 1. Self-pollination at 0 hours and cross-pollination (with Desmayo Largueta) at 0, 5, 24 and 48 hours. 2. Cross-pollination (with Desmayo Largueta) at 0, 5, 24 and 48 hours.

Laboratory: Figure 3 shows the results obtained with Ramillete in the laboratory. A influence of the self-pollination treatment, regarding the number of tubes in the ovary and the percentage of penetrated ovaries, was observed.

In Fig. 4 data for Garrigues are presented. Unlike in the case of Ramillete, no clear difference was observed between treatments.

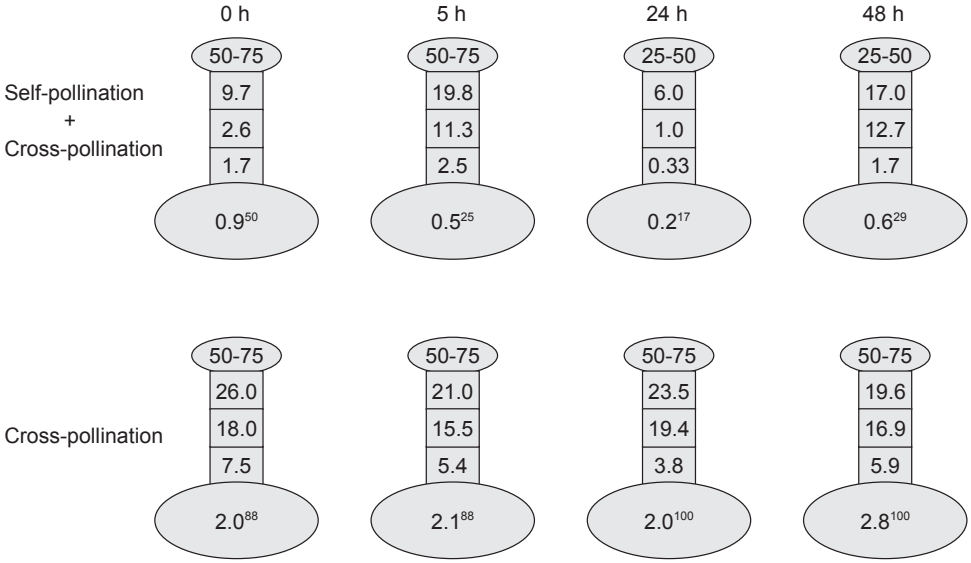

Fig. 3. Ramillete cultivar pollinated by two different treatments. 1. Self-pollination at 0 hours plus cross-pollination with Desmayo Largueta at 0, 5, 24 and 48 hours. 2. Cross-pollination with Desmayo Largueta at 0, 5, 24 and 48 hours. Number of grains of pollen in the stigma, number of pollen tubes in the first, second and third part of the style and in the ovary 72 hours after pollination with Desmayo Largueta. In the ovary the superscript indicates the percentage of penetrated ovaries.

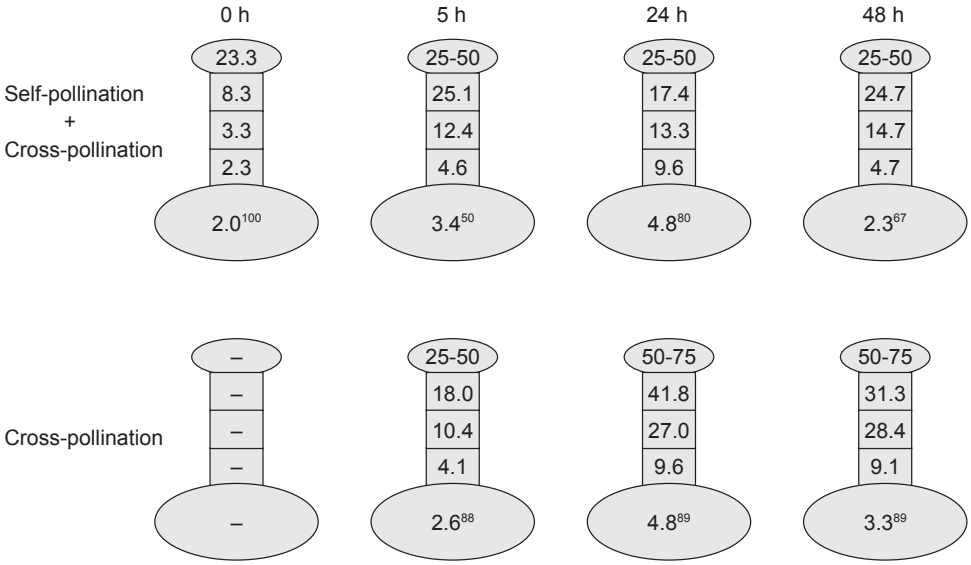

Fig. 4. Garrigues cultivar pollinated by two different treatments. 1. Self-pollination at 0 hours plus cross-pollination with Desmayo Largueta at 0, 5, 24 and 48 hours. 2. Cross-pollination with Desmayo Largueta at 0, 5, 24 and 48 hours. Number of grains of pollen in the stigma, number of pollen tubes in the first, second and third part of the style and in the ovary 72 hours after pollination with Desmayo Largueta. In the ovary the superscript indicates the percentage of penetrated ovaries.

It should be noted that the scarce presence of pollen in treatments at time zero (which indicates a low stigma receptivity at that moment) could influence the results. In this case the pistils would behave as if self-pollination had not taken place.

Discussion

Field results indicate that self-pollination at time zero had no influence on fruit set in flowers pollinated later with compatible pollen.

In the laboratory, the different results obtained with Ramillete and Garrigues, which showed different receptivity at the moment of emasculation, could be related with the different capacity to receive their own pollen at that moment.

The results with Ramillete seem to confirm the hypothesis that early self-pollination interferes in the effectiveness of later pollination, although to prove this, it will be necessary to carry out previous self-pollination when the stigma is fully receptive.

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