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REGULAR ARTICLE

Contribution to the study of some aspects of pollination in six varieties of apricot in the region of M'sila (Algeria)

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Abstract

The present work consists in contributing to the study of pollination. Field observations and tests were carried out on six varieties of apricot in the region of M'sila, "Pavit", "Boulida" "Alarbi","Tounsi","Ben sarmouk" and "Louzi rouge". For natural self-pollination, the branches were covered to avoid cross-pollination, and the fruit set was determined. Controlled pollination was carried out using pollen and pollen from the other trees that bloom at about the same time. The fruit set rate was determined after counting the fruits in relation to the number of blooming flowers. The rate of fruit set varies from one variety to another. Alarbi with 62.5%, Louzi with 69.7%, Tounssi with 56.5%, Bulida with 50.7%, Ben Sermouk with 23.2% and Pavit with 45.8%. The bagging rate of the bagged branch obtained at the end of the physiological fall did not show any significant differences between the varieties and ranged between 77.50% for Alarbi and 41.22% for Pavit. The results show that the number of fruits after manual crossing is zero for all crops. All varieties tested are self-compatible and no cross-compatibility group has been guessed on the tested growths, from self-pollination and inter-pollination.

Key words: Apricot; M'sila; pollination; self-compatible

Introduction

Apricot is an important fruit crop of the family Rosaceae family. In the last 20 years, world production has increased 85%, mainly due to the large plantings made in Asia (Turkey, Iran, Pakistan, Uzbekistan) and Africa (Algeria, Morocco, Egypt) (Zhebentyayeva et al., 2012). In Algeria, the apricot tree has a privileged place in the life of the farmers, considering the surface which it occupies and its importance in the national market, it is the most cultivated fruit species in front of the apple, the pear and the peach tree (ITAF, 2007). The apricot orchards, are one of the best wealth of Algeria. Apricot is grown in the region of M'sila decades; this is a very suitable species for arid climate of the region, dozens of cultivars whose origin remains unknown (Bahlouli et al., 2016).

Apricot is one of the first fruit trees to bloom, this early flowering makes it particularly sensitive to the climate, the spring frost has an impact on flowers and young fruits at the stage of fruit set and a rainy weather at the time of the blooming harms the pollination. The term pollination was only mentioned as a natural phenomenon which the

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producer did not have to worry about because all the cultivated cultivars were self-fertile. Nearly ten years after the conditions are totally different, the varietal calendar has been profoundly modified and the appearance of cultivars of American origin as cultivars or simply as broodstock, has introduced into the apricot orchard of today. In this case, characters of self-sterility. The quantitative and qualitative improvement of production has therefore often been associated with new difficulties, hence the need to consider pollination as an essential production technique. Cross-pollination has become an unavoidable constraint for many orchards.

The objective of this paper was to examine self-(in)compatibility using a biological method based on fruit set in controlled pollination under field conditions in six varieties of apricot (Alarbi, Tounsi red, Bensermouk, Pavit, Bulida, Louzi) to understand the aspects of pollination, the rate of self-pollination (self-compatibility) and cross-pollination (self-incompatibility) in the studied cultivars.

Materials and methods

This study was carried out at an experimental orchard (1ha) in KSOB region (M'sila in Northwest Alegria) on 20-year-old trees of six apricot cultivars : Louzi, Bulida, Pavit, Tounsi red, Arbi and Ben sermouk. In this study we selected a sample of 3 trees representative of apricot cultivars, and 3 branches for each apricot cultivar of different directions according to the 4 cardinal points.

The trees studied are arranged randomly, according to a total randomization type mono factorial (variety factor), the trees of borders are eliminated.

Self-(in)compatibility is determined by monitoring fruit set in controlled pollination under feld conditions, for each cultivar, branches with most flower buds in the balloon stage have been selected, then the open flowers and late buds have been removed, and the branches were covered, to avoid cross-pollination (Fig 1.). The bags were removed after 8 weeks and the set of fruits was determined.

The percentage of fruit set has been determined after counting the fruits (Fig.3) in relation to the number of flowers (Fig. 2) according to the report below:

*(Number of fruits / Number of blooming flowers)*100.*

The stage of fruit set is considered to be reached when more than 50% of the fruits have setted

Fig. 1. Natural pollination in Apricot (*Tounsi* cultivar).

Fig. 2. Apricot flowering stage (Bulida cultivar).

Fig. 3. Apricot fruit set (*Bulida* cultivar).

Controlled pollinations among the cultivars studied were carried out using the pollen and pollen of the other tree, which flower at about the same time. Before pollination, pollen was collected from all varieties by desiccating the anthers in a petri dish at room temperature. In the field, branches were chosen that had an average of 20 to 30 flowers in the balloon stage. The flowers have been emasculated to prevent self-pollination. After 8 weeks the fruit was counted and the percentage of fruit set was determined (Fig. 4).

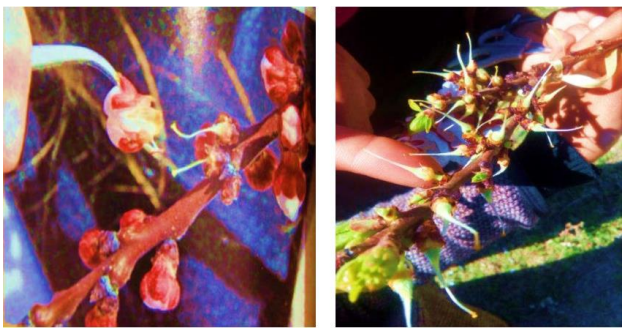

Fig. 4. Controlled pollinations and castration of flowers.

Results and discussion

Observation on natural pollination

Assisted pollination is a common method used to study the effect of different aspects of pollination on fruit set. There are previous studies on self-compatibility in apricot cultivars with fruit set following controlled pollination under field conditions (Kostina 1970; Nyújtó et al. 1985; Szabó and Nyéki, 1991).

The results of the counts on the natural pollination of apricot tree of the six cultivars studied are presented in the Table 1.

Table 1. Percentages of fruit set of apricot tree flowers covered in the six cultivars studied after self-pollination.

Cultivars	Percentages of fruit set
Bulida	43,70±1,86
Tounsi	52,92±1,30
Pavit	41,22±4,45
Alarbi	77,50±3,54
Louzi	60,28±2,10
Bensermouk	61,27±3,28

The fruiting rates of cultivars studied obtained at the end of the physiological fall showed no significant differences between the cultivars and ranged between 41.22% for the Pavit cultivar to 77.50% for the Alarbi cultivar.

The self-fertility of some clones surveyed in the KSOB area in Msila was confirmed by the passive self-pollination test. The results obtained are important and confirm the self-fertility of this plant material.

Controlled pollination in the field (Cross Pollination)

Cross pollination can be achieved by a distribution of unisexual flowers on two categories of individuals (cultivar), pollination between different flowers (allopollinization) can, more or less surely cause cross-pollination.

To verify the possibilities of cross pollination, five crosses were made between the Pavit variety (female cultivar) and four varieties (Bulida, Tounsi rouge, Bensermouk and Allarbi) as male cultivars.

The cross-pollination count results of the six cultivars studied are shown in the Table 2.

Table 2. Percentages of apricot fruit obtained of the six cultivars studied after cross pollination.

Cultivars	cultivars female	cultivars of pollen	Number of fruits	Percentage of fruit set (%)
Alarbi	*Pavit*	*Alarbi*	00	00
Pavit	*Pavit*	*Pavit*	06	60
Tounsi	*Pavit*	*Tounsi*	00	00
Bulida	*Pavit*	*Bulida*	00	00
Ben Sarmouk	*Pavit*	*Ben Sarmouk*	00	00
Louzi rouge	*Pavit*	*Louzi rouge*	00	00

The results show that the number of fruits set after manual crossing in the six cultivars is zero for all the tests. Reports show that pollination compatibility is an important factor affecting fruit set (Austin et al. 1996; McLaren & Fraser 1996; McLaren et al. 1996). Fruit set in the method of controlled pollination under field conditions has a disadvantage, which that the fruit set varies from year to year, depending on weather conditions (Milatović et al., 2010, 2013).

In dormant season, direct sun exposure is frequently met with the trees. McLaren et al. (1996) explained the relation between temperature exposure and blooming in trees. Lack of winter chilling is also an important factor increasing flower bud abscission (Brown 1958; Legave 1978). When there is a period of cool weather during the blooming season the anthers of some cultivars may dehisce before the petals open. In controlled crosses, when using a self-compatible female parent, all or part of the seedlings may not come from the cross but they may come from selfing (Llácer et al. 2008).

Conclusion

The main objective of this study was to highlight the behavior of the six cultivars Tounsi red, Pavit, Bensermouk, Bulida, Alarbi and Louzi in the KSOB region on pollination aspects through controlled pollinations tests.

We confirmed that the six cultivars studied of apricot tree are self-fertile, that is to say that the pollen is deposited on the stigmas of the flower which produces it, or of a flower of the same plant, and the pollen is then very little transported.

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