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# ASSESSMENT OF POLLEN QUALITY OF SOME APRICOT AND CHERRY CULTIVARS

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***Abstract***
*Stone fruits species are one of the most economically important fruits worldwide and Turkey. Turkey is the major producer country for apricot and cherry. Because of several problems (especially self-incompatibility) experienced in fertilization and fruit set, researches on pollen quality and fruit set may be essential. In present study, some pollen quality parameters of three apricot and three cherry cultivars were investigated. Apricot cultivars were 'CasnaDrenova', 'Ninfa' and 'Beliana', and cherry cultivars were '0900 Ziraat', 'Lapins' and 'Summit'. Pollen viability assessment was carried out using 1% 2, 3, 5 triphenyl tetrazolium chloride (TTC) test. Pollen germination capability was investigated with agar in petri method by using 1% agar and 15% sucrose. In apricot, the highest pollen germination level was obtained from 'Casna Drenova' with 38.63 %. The lowest germination level was assayed for 'Beliana'. There are any significant differences in pollen viability of cherry cultivars. Pollen germination of cherry cultivars was generally low. 'Lapins' was the best cherry cultivar for pollen germination with 17.56%. On the other hand, '0900 Ziraat' had the lowest value of pollen germination (7.01%). According to results, there was relatively high level of variation in pollen quality parameters of apricot and cherry cultivars.*

*Keywords: fruit set, stone fruits, pollen germination, pollen viability.*

## 1. INTRODUCTION

Stone fruits species are one of the most economically important fruits worldwide and Turkey. Among them, apricot (fresh and dry) and cherry (fresh) are the most common species. Origin of apricot is supposed to be Central Asia and China, and has long been cultivated in Eastern Asia. It is cultivated in warm temperate to subtropical regions of all continents (Hormaza et al., 2002; Ercisli, 2004). World apricot production is nearly 4 million tons and cherry production is 2.3 million tons (FAO, 2016). Turkey is the major producer country for apricot (20% of world production). Apricot has been widely cultivated throughout Anatolia since the ancient times for its edible fruits, but mostly in Eastern Anatolia. Apricot producing centers in Turkey are Malatya, Erzincan, Aras valley (Igdir-Kagizman), Mersin (Mut), Elazig, Sivas, Kahramanmaras, Kayseri, Nigde, Hatay and Nevsehir provinces (Ercisli, 2009).

Sweet cherry has high economic value because of attractive shape, nutritional and commercial features. Origin of sweet cherry is considered to be south Caucasus, coast of Caspian Sea and north-east Anatolia (Ozbek, 1978).Turkey is also dominating the sweet cherry production in the world. About 26% of world cherry production is provided by Turkey (FAO, 2016). The prominent



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provinces for sweet cherry production are İzmir, Konya, Manisa, Amasya, Afyonkarahisar and Denizli (TUIK, 2017).

Fruit set is one of the most important limiting factors for the yield of fruit trees. This often depends on good pollination and is the most important part of production (Martinez-Gomez et al., 2002). In pollination process, sufficient number of pollen to reach the top of the stigma and fertilization to occur. The insects realize pollination of apricot and cherries and major pollinator is the honeybees. Except from parthenocarpic fruit set, fruit formation requires pollination and fertilization. It is of great importance for plants to have healthy pollen development, viability and germination abilities for fertilization. Nonfunctional or weak pollen production is an inhibiting factor for fertilization. It was reported that pollen germination capacity depended on various conditions, like environmental factors or nutritional conditions of the species and cultivars used (Ercisli, 2007; Pal et al. 2015). On the other hand, many fruit species including sweet cherry (*Prunus avium*), almond (*Prunus dulcis*), apple (*Malus domestica*) and apricot (*Prunus armeniaca*) exhibit self-incompatibility (SI) and require pollination with pollen from compatible genotypes for stable fruit production (Yilmaz et al. 2016).

Several studies have been carried out about pollen viability and germination of apricot and sweet cherry cultivars because of its importance in fertilization. Asma (2008) reported that Roksana apricot cultivar had the least amount of viable pollen (41.5%) while Canino had the highest ratio (77.2%) of viable pollen. The genotypes had their highest germination rates at 20°C, whereas Roksana and Levent had the lowest germination rates (46.8 and 48.5%). Radicevic et al. (2013) investigated pollen germination of four sweet cherry cultivars. The highest percentage of germination was found in Regina whereas the lowest value was observed in Kordia cultivar. Pal et al. (2015) determined the highest pollen germination at the temperature of 20$^{o}$C after 24 hours of incubation and capacity of germination (90.09%) in 'Carmen' sweet cherry cultivar and the lowest capacity in 'Canada Giant' cultivar (42.39 %).

This study was conducted to determine pollen viability and germination of three apricot and three sweet cherry cultivars. Their pollination and fertilization capacities and possible pollinators were also determined.

## 2. MATERIALS AND METHODS

The present study was conducted with three apricot ('Casna Drenova', 'Ninfa', 'Beliana') and three sweet cherry ('0900 Ziraat', 'Lapins' and 'Summit') cultivars located at Erciyes University, Kayseri. Flower samples of cultivars studied were collected from three plants of each cultivar just before anthesis. Pollen viability assessment was carried out using 1% 2, 3, 5 triphenyl tetrazolium chloride (TTC) test (Norton, 1966). Pollen germination capability was investigated with agar in petri method (Stanley and Liskens, 1985). Pollen germination media included 1% agar and 15% sucrose. Pollen grains were distributed uniformly with a brush on the media poured petri. For pollen viability of cultivars, three lamella and five regions of each lamella were assayed. Number of viable (stained in dark red) and non-viable (not stained) pollens were investigated. At the same way, for pollen germination capability, three petri and five regions of each petri were assayed.

The study was carried out according to randomized design. Data were analyzed using JMP statistical software and means were grouped by using Tukey's test ($P < 0.05$).

## 3. RESULTS AND DISCUSSIONS

Pollen viability and germination showed significant differences for apricot and sweet cherry cultivars. Among the apricot cultivars, the highest pollen germination level was obtained from



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'Casna Drenova' with 38.6%. The lowest viability level was assayed for 'Beliana'. In general, pollen germination ratio was low in apricot cultivars (Figure 1).In two previous studies, higher pollen germination rates were reported. Bolat and Pirlak (1999) found pollen germination of some apricot cultivars as between 49.77-72.90% for 15% sucrose concentrations. Asma (2008) reported pollen germination of apricot genotypes as between 53.3-78.4% for 1% agar and 15% sucrose. Abaci and Asma (2014) assumed pollen germination rate of hybrid apricot genotypes as between 11.4-96.3%. On the other hand, the results of Acarsoy Bilgin and Misirli (2017) (11.67–28.44% of pollen germination) were consistent with the present findings. It was assumed that variable external factors such as humidity, temperature and ingredients of the substrate used for germination might have an effect on pollen germination (Gozlekci and Kaynak, 1998). At the same time, different ecological conditions and cultivars may also influence the pollen germination tests.

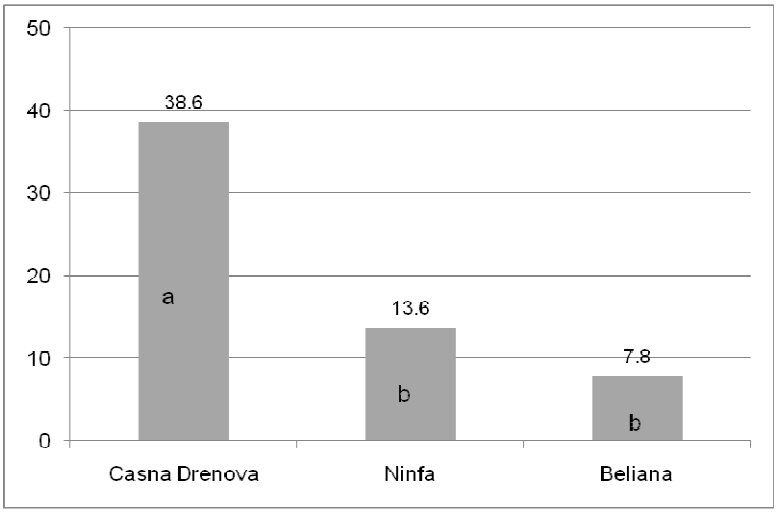


***Figure 1. Pollen germination levels of apricot cultivars (%)***

In sweet cherry, there were no differences among the cultivars for pollen viability. All cultivars showed medium level of viability (Figure 2). Vuletin Selak et al. (2014) found higher level of pollen viability (65-84%) for sweet cherry cultivars.

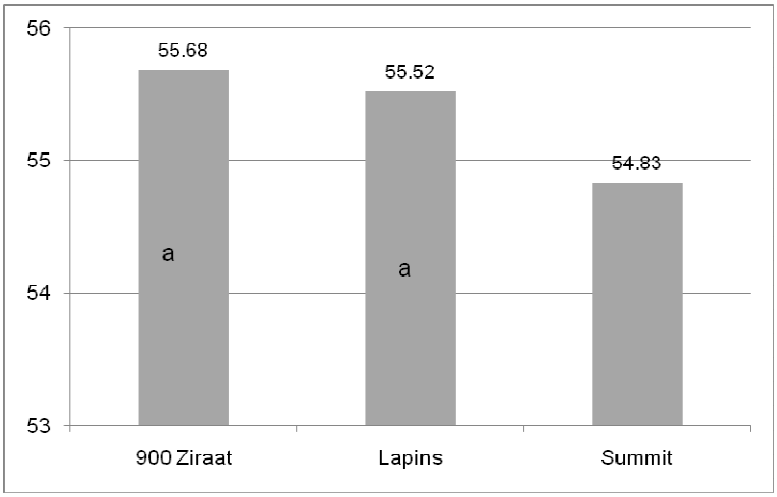


***Figure 2. Pollen viability levels of sweet cherry cultivars (%)***



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Pal et al. (2015) determined that the percentage of pollen viability of sweet cherry cultivars varied between 32-80%. Pollen germination of cherry cultivars was generally low (Figure 3). 'Lapins' was the best cherry cultivar for pollen germination with 17,6%. On the other hand, '0900 Ziraat' had the lowest value of pollen germination (7.01%). This cultivar is one of the major cherries produced in Turkey and has self-incompatibility characters. Cerovic et al. (1998) found higher pollen germination ratios (36.67-57.80%) than the present findings for four cherries. Radicevic et al. (2013) reported that the germination rate of sweet cherry cultivars varied as between 26-46%. Also, Bolat and Pirlak (1999) determined higher germination levels as between 47,92-57,38%. Differences between studies regarding to pollen viability and germination ratio of sweet cherries may be due to the use of different cultivars since generally different cultivars were examined in those studies.

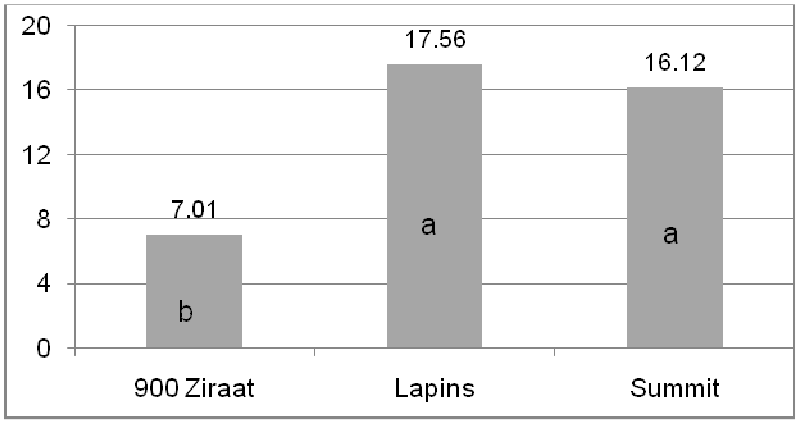


***Figure 3. Pollen germination levels of sweet cherry cultivars (%)***

## 4. CONCLUSIONS

Results of present study showed that there was generally high level of variation in pollen viability and germination of apricot and sweet cherry cultivars. It is very important to determine the quality of the pollen for the cultivars before to choose a pollinator and for hybridization studies. Knowledge of pollen viability and germination ratio of pollen may help to decide cultivars to be grown to get higher yield levels. This study may offer valuable information to further studies to be done with apricot and sweet cherry cultivars.

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