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Fruit Set and Yield of Apricot Cultivars under Subtropical Climate Conditions of Hatay, Turkey

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ABSTRACT

Apricot (*Prunus armeniaca* L.) is a species particularly prone to erratic fruit set, and its flower bud drop has been repeatedly reported in different cultivars and growing conditions. A number of potential causes have been explored, but a clear main cause remains elusive. In this study, fruit set was determined for 11 apricot cultivars ('Precoce de Tyrinthe', 'Feriana', 'Beliana', 'Priana', 'Bebeco', 'Early Kishinewski', 'Precoce de Colomer', 'Canino', 'Silistre Rona', 'Rouge de Sernhac' and 'Tokaloglu') grown on the coast of the Mediterranean region of Turkey from 2006 to 2008. Trees budded on apricot seedlings and planted 6×6 m in 1997. On four branches of each tree randomly selected from all four directions, blossom number, percentage of initial and final fruit set, and yield per tree were determined during the experimental period. Fruit set differed significantly depending on year and cultivar. Based on three-year averages, percentage of fruit set was highest on 'Tokaloglu' (14%), followed by 'Beliana' (8.8%) and 'Precoce de Tyrinthe' (8.2%). The lowest fruit set (2.3%) was in 'Early Kishinewski' and 'Canino'. High yields per tree were found in Tokaloglu' (29.1 kg), 'Precoce de Tyrinthe' (29.0 kg), 'Rouge de Sernhac' (27.9 kg), and 'Beliana' (23.0 kg). 'Tokaloglu', 'Beliana', 'Precoce de Tyrinthe', and 'Rouge de Sernhac' cultivars showed good performance for both fruit set and yield per tree under subtropical climate conditions. However, findings of this study also suggested that fruit set and fruit drops in apricots should be assessed together with total yield amounts by years. The influence of the cultivar on fruit yield was more determinant than the seasonal effect.

Keywords: Dormancy, Flowering, Productivity, *Prunus armeniaca* L.

INTRODUCTION

Apricot (*Prunus armeniaca* L.) is a species particularly prone to erratic productions and this behavior has been related to the narrow adaptability of this species (Layne *et al*., 1996). Thus, most apricot cultivars are highly specific in their ecological requirements and low yields are often obtained whenever cultivars are grown in other regions. Climatic adaptation is one of the main objectives in most apricot breeding programs (Hormaza *et al*., 2007), but the causes behind this low adaptability are not clear (Julian *et al*., 2007).

Irregularity of yield is one of the main problems in apricot varieties productivity which is often erratic. Climatological events prior to and during flowering are considered as the main determinant for fruiting success. However, problems related to poor yields are more pronounced in apricot than in other fruits and the causes are poorly defined. It is well known that many factors operating before flowering influence productivity. One of these is the number of flower buds produced (Alburquerque *et al.,* 2004). High temperatures during the chilling period have a negative effect on breaking of dormancy and shading of trees reduces the incidence of radiation and the temperature (Campoy *et al.,* 2010). Lack of winter chilling hours is

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also an important factor for increasing flower bud abscission (Legave, 1978). Apricot culture is greatly restricted by climatic conditions, especially related to chill accumulation in several growing areas with a significant influence on productivity (Guerriero and Bartolini, 1991). Temperature fluctuations in late winter and in early spring also affect the yield by causing the flower buds to soften. In addition, fruit set, fruit drops, and yield in apricots can be affected by a large number of environmental and physiological factors (Gülcan *et al*., 1995; Gradziel and Weinbaum, 1999; Rodrigo, 2000; Torricalles *et al*., 2000; Alburquerque *et al*., 2003; Alburquerque *et al*., 2004). Thus, causes of poor yield in many apricot varieties are currently unclear (Alburquerque *et al*., 2003). The yield in apricot production is closely related to fruit set and fruit drops. Regular high fruit set and low fruit drops are desired for apricot growing. There exists a limited information on fruit set and drops in apricots in the references although they affect the yield (Balta *et al*., 2007).

Turkey is the world's largest apricot producing country, both fresh and dried. Apricots are grown almost in all parts of the country, except in the very humid regions around the Black Sea and in the high plateaus of the East Anatolian Region (Polat, 1988; Polat and Çalışkan, 2010). Most production is drying cultivars whereas fresh apricot cultivars are produced primarily in coastal regions, especially in Mediterranean and Aegean Sea regions of Turkey (Polat and Yılmaz, 1987; Polat *et al*., 2004). In Turkey, apricot is grown in a wide range of climatic conditions. Weather is very cold during winter and very arid during summer in the main apricot growing areas, namely, Malatya, Erzincan, and Iğdır provinces. Apricots grown in these provinces are frequently damaged by late spring frost. However, in the semi-arid climate of Mediterranean region with hot summers and mild-winters frost damage is rare (Ercişli, 2009). Early apricot production is favored in the Mediterranean region of Turkey which lack spring frosts. In Turkey, strong market demand, along with the introduction of foreign cultivars, opens up promising possibilities to extend the cropping season to May and June (Polat *et al*., 2004; Polat, 2010). Breeding programs for the improvement of local cultivars together with the introduction of high-quality cultivars from the Greece, France, Italy, Spain, and USA are under evaluation.

Hatay, which is located in the eastern Mediterranean coast of Turkey, has the most suitable ecological conditions for growing table apricot. Apricot planting in Hatay area has increased rapidly due to the comparative advantage of earliness of harvest (Polat *et al*., 2004; Polat, 2010). Therefore, evaluation of early apricot cultivars have been carried out in the last decades to determine both fruit set and yield in Dörtyol, Hatay, in the eastern Mediterranean region of Turkey.

The aim of this study was to evaluate the percentages of blossom, initial and final fruit set, and yield parameters of ten foreign and one native apricot cultivars for their suitability for cultivation under subtropical climate conditions in Dörtyol (Hatay), Turkey.

MATERIALS AND METHODS

This study was carried out at the experimental orchard of the Department of Horticulture, Faculty of Agriculture, University of Mustafa Kemal, Dörtyol, Hatay, located on the East Mediterranean Coast of Turkey. Eleven apricot cultivars were budded onto apricot seedlings and planted with 6×6 m apart in 1997 in an orchard located on 36º 13' E, 36° 54' N, 198 m asl. Dörtyol has 521 winter chilling hours (below 7ºC) and 791 chill unit value (Yelmen, 2007). The cultivars tested included 'Precoce de Tyrinthe', 'Feriana', 'Beliana', 'Priana', 'Bebeco', 'Early Kishinewski', 'Precoce de Colomer', 'Canino', 'Silistre Rona', 'Rouge de Sernhac' and 'Tokaloglu'. In the

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experimental orchard, fruit thinning was not carried out and bees were not used for pollination. All experiments were carried out under orchard conditions.

The treatments were arranged according to a completely randomized design. The experiment was designed with five trees from each cultivar and each tree was considered as one replicate. For fruit set percentages of the cultivars, a branch was selected randomly from the four directions. Approximately 80-100 flower buds on branches were counted at the pre-blossom phase at each of these selected branches. Thus, 320–400 flower buds were found on each tree. The flower buds and flowers of each tagged branch were counted and blossom percentage was calculated by calculating the proportion of flowers to flower buds. At the end of blossoming, percent of initial fruit set was determined by dividing the number of fruits by the number of *flowers×100*. Percentage final fruit set was determined by taking the proportion of the number of fruits during the maturing period to the number of total flowers.Yield per tree was determined and productivity was calculated from the proportion of harvested fruit per total flower buds.

Data Analysis and Statistics

The analysis of variance was carried out according to Steel and Torrie (1980) using SAS (2005). Percentage values were transformed to arcsin, prior to analysis of variance. Mean separations were made by Tukey Honestly Significant Differences (HSD) test at 0.05 significant level.

RESULTS AND DISCUSSION

Climatic parameters varied from year to year. The yearly average temperature was 19°C, with 1,040 mm annual precipitation (primarily winter and spring) and relative humidity of 55%. The minimum temperatures were lowest in 2006 and 2007 (especially, January and December). In 2008, the minimum temperature did not fall below 0°C (Table 1). In general, late spring frosts during bloom did not cause problems with pollination in the three seasons but heavy rainfall occurred during bloom in 2006.

Considering the results collectively, it seems that blossoming, initial and final fruit set percentages in the 2006 were lower than those of 2007 and 2008 (Table 2). The highest blossoming and the initial and final fruit set rates were observed in 2008. The highest blossoming percentage was observed in 'Precoce de Colomer' (93.0%) and the lowest was observed in 'Early Kishinewski' (73.3%). Blossom percentages showed significant differences depending on the year. The highest blossom percentages were found in 2007 (90.8%) and 2008 (91.6%), while the lowest blossom percentage was found in 2006 (73.8%). Initial fruit set of cultivars over the three-year period averaged 3.7% ('Canino') to 20.7% ('Tokaloglu'). Initial fruit set percentages were 6.2% in 2006, 9.3% in 2007, and 10.7 % in 2008 (Table 2). 'Tokaloglu' had the highest final fruit set (14.0%), whereas 'Early Kishinewski' and 'Canino' had the lowest (2.3%). Final fruit set percentages had higher values in 2008 (10.4%) compared to the other two years, reflecting the lack of frost in 2008. The lowest fruit sets and yield per tree were probably due to heavy rainfall that occurred during the blossoming periods in 2006. The year-to-year variation and differences among cultivars seemed to indicate that there was a strong influence of climatic conditions and genotype on apricot fruit set, as found in other studies (Alburquerque *et al.,* 2004; Ruiz and Egea, 2008) and in different fruit species such as pear (Atkinson and Taylor, 1994; Atkinson and Lucas, 1996) or sweet cherry (Choi and Andersen, 2001; Garcia-Montiel *et al*., 2010).

Asma (2000) reported that fruit set percentages of apricot flower buds range from 31.6 to 46.9% and fruit set percentages in bearing shoots are higher in the flowers close to the shoot tip than those close to the

Table 1. Means of temperature, rainfall, and humidity in the experimental area, Dörtyol (Hatay), Turkey.

	Temperature (°C)			Rainfall (mm)	Humidity (%)
Month	Min.	Max.	Avg.		
			2006		
Jan.	–0.5	20.6	11.5	22.0	56.3
Feb.	0.2	22.2	11.7	175.7	55.7
Mar.	8.7	28.7	16.3	76.2	57.8
Apr.	10.1	34.8	18.6	101.9	55.2
May	10.8	34.2	21.1	98.0	50.7
June	16.0	36.9	25.7	7.8	49.6
July	20.5	33.5	28.0	4.9	62.1
Aug.	22.8	35.0	28.7	24.7	60.8
Sept.	19.0	35.0	26.0	140.8	59.7
Oct.	10.2	36.5	21.5	58.4	51.3
Nov.	0.6	27.7	14.3	88.8	48.5
Dec.	–0.8	19.9	11.3	197.5	68.0
			2007		
Jan.	–0.3	19.5	8.8	165.3	49.2
Feb.	3.0	23.2	13.3	65.9	42.8
Mar.	5.5	26.4	14.8	78.4	52.1
Apr.	9.0	25.1	16.7	155.3	67.9
May	12.7	35.3	20.8	74.1	57.1
June	15.7	39.4	25.5	24.5	52.9
July	20.8	37.0	28.0	80.8	58.0
Aug.	20.2	34.9	27.7	52.5	57.3
Sept.	17.7	36.2	25.2	79.6	55.7
Oct.	10.5	34.6	21.8	93.4	47.7
Nov.	8.3	28.5	17.2	102.4	45.4
Dec.	–2.2	23.3	9.3	64.2	55.4
			2008		
Jan.	2.8	21.3	12.0	83.9	59.0
Feb.	0.3	20.1	9.0	166.1	58.7
Mar.	2.7	23.2	11.9	148.4	51.0
Apr.	8.4	31.0	16.9	112.2	55.2
May	12	37.5	23.8	84.6	43.1
June	15	36.6	25.3	55.1	61.8
July	21.8	37.0	28.4	11.0	62.0
Aug.	21.6	36.3	29.2	0.1	58.4
Sept.	14.5	35.9	25.3	118.8	56.9
Oct.	5.7	31.4	21.7	94.6	58.2
Nov.	3.8	29.4	15.2	80.8	49.6
Dec.	0.7	21.4	11.3	130.5	54.9

base. McLaren *et al*. (1996) obtained fruit set values between 0.4 to 46%, in Sundrop apricot cultivar, and between 1 to 54% in Moorpark apricot cultivar in New Zealand. Rodrigo and Herrero (2002) reported 36 to 49% fruit set in 8 year-old trees of Moniqui apricot cultivar and they suggested that pre-blossom temperatures affected subsequent fruit set in apricot. Alburquerque *et al*. (2003) reported that Guillermo, a Spanish apricot cultivar, show fruit set between 2.0 and 24.7%, depending on growing place, irrigation treatment, and shoot type. Alburquerque *et al*.(2004) determined fruit set percentages of 6.5-28% in Bebeco, 23.2-30.7% in Palstein, 36.5-61.4% in Beliana,

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Table 2. Percentage blossoming, initial and final fruit set ratios of apricot cultivars grown in the Mediterranean climate in Turkey.

Cultivar	Year			Mean
	2006	2007	2008	
		Blossoming (%)		
Precoce de Tyrinthe	50.6 cd[a]	91.5 ab	89.0 bc	77.0 cd
Feriana	84.7 ab	91.2 ab	89.0 bc	88.3 abc
Beliana	81.8 ab	90.7 abc	89.9 abc	87.5 abc
Priana	57.4 c	90.5 abc	90.7 abc	79.7 bcd
Bebeco	73.0 b	95.0 a	86.7 c	84.9 a-d
Early Kishinewski	42.3 d	86.1 bc	91.5 abc	73.3 d
Precoce de Colomer	89.3 a	92.2 a	94.4 ab	93.0 a
Canino	82.9 ab	90.9 ab	92.2 abc	88.7 abc
Silistre Rona	89.8 a	82.0 c	95.3 ab	89.0 abc
Rouge de Sernhac	81.7 ab	90.5 abc	96.6 a	89.6 ab
Tokaloglu	77.5 ab	94.8 ab	92.3 abc	88.3 abc
Mean	73.8 B[b]	90.8 A	91.6 A	
		Initial Fruit Set (%)		
Precoce de Tyrinthe	13.5 a	10.5 b	11.9 abc	12.0 abc
Feriana	7.2 ab	7.3 b	7.8 bc	7.4 abc
Beliana	14.3 a	12.1 b	17.6 ab	14.7 ab
Priana	9.3 ab	6.7 b	13.9 abc	10.0 abc
Bebeco	0.0 c	7.4 b	7.5 bc	5.0 bc
Early Kishinewski	0.0 c	5.0 b	6.0 c	3.7 bc
Precoce de Colomer	4.0 abc	4.8 b	5.9 c	4.9 bc
Canino	0.0 c	6.1 b	4.8 c	3.7 c
Silistre Rona	7.0 ab	6.3 b	5.8 c	6.4 abc
Rouge de Sernhac	1.7 bc	10.0 b	11.6 bc	7.8 abc
Tokaloglu	10.7 a	26.4 a	25.0 a	20.7 a
Mean	6.2 B	9.3 A	10.7 A	
		Final Fruit Set (%)		
Precoce de Tyrinthe	6.9 a	9.0 b	8.7 ab	8.2 ab
Feriana	3.0 a	5.7 b	5.7 b	4.8 ab
Beliana	6.2 a	8.8 b	11.3 ab	8.8 ab
Priana	6.8 a	5.0 b	9.1 ab	7.0 ab
Bebeco	0.0 b	4.6 b	4.3 ab	3.0 ab
Early Kishinewski	0.0 b	3.2 b	3.7 b	2.3 b
Precoce de Colomer	1.0 ab	3.8 b	4.0 b	2.9 ab
Canino	0.0 b	3.8 b	3.2 b	2.3 b
Silistre Rona	0.9 ab	3.2 b	3.9 b	2.6 ab
Rouge de Sernach	1.7 ab	8.0 b	7.1 ab	5.6 ab
Tokaloglu	2.7 a	20.7 a	18.8 a	14.0 a
Mean	2.6 B	7.5 B	10.4 A	

[a] Means within a column followed by different lowercase letter are significantly at the 1% by Tukey test, [b] Different capital letters indicate significant differences (P< 0.05) between years.

1.1-5.4% in Goldrich, 22.1-66.4% in Priana, 4.7-18.6% in Bergeron, 3.8-10.4% in Colorao, 9.3-15.1% in Guillermo, and 1.4-8.7% in Pepioto apricot cultivar, depending on years. Reporting that fruit set percentages were affected by different irrigation treatments depending on years, Torricalles *et al*. (2000) observed fruit sets of 18-25% in 1994, 9-19% in 1995, 10-26% in 1996, and 9-19% in 1997 in the 9-year-old trees belonging to Bulida cultivar in Spain and they reported that water stress induced young fruit drop which led to lower fruit, final fruit set, and significantly decreased the yield. Based on the above studies, fruit set of some cultivars in the experiment was relatively low.

Previous studies have examined the influence of climate on fruiting with different results. In apricot, a negative effect of warm pre-blossom temperatures (25°C) on fruit set and yields was detected (Rodrigo and Herrero, 2002). Jackson and Hamer (1980) showed that high temperatures adversely affected flower quality and fruit-setting potential. Caprio and Quamme (1999) declared that high temperatures (≥ 27ºC) at bloom time in apple were also associated with poor production. They explained that this could be due to reduced pollination effectiveness and to a shorten ovule longevity. Therefore, low fruit set percentages in 2006 may be explained by high maximum and average temperatures during March.

Dormancy represents one of the major limiting factors for deciduous fruit tree production in warm area such as Dortyol, Hatay, Turkey. The breaking of dormancy mainly depends on the accumulation of winter chilling hours, which is also the factor determining the installation of dormancy in an initial phase (Crabbe, 1994; Crabbe and Barnola, 1996; Nageib *et al*., 2012). Incomplete dormancy release affects tree behaviors in three main ways: a late bud break, a low level of bud break, and lack of uniformity of leafing and bloom, resulting in a higher flower bud drop (Viti and Monteleone, 1995; Erez, 2002; Nageib *et al*., 2012). Flower bud drop has a negative effect on fruit production. Alburquerque *et al*. (2004) explained that, when flower bud number is low, the possibility of sufficient flowers surviving to produce a crop decreases. In our study, early blooming cultivars with less chilling requirements (such as 'Priana', 'Beliana' and 'Precoce de Tyrinthe') generally had a low flower bud drop and a higher percentage of fruit set. Alburquerque *et al*. (2004) indicated that the relation between chilling requirement and flower bud drop is inverse but the lack of a strong relationship. Küden *et al*. (1995) determined the chilling hour requirements of apricots 'Precoce de Tyrinthe', 'Feriana' and 'Beliana', (350 hours) and 'Priana' (250 hours). In other study, the chilling requirements of 'Precoce de Colomer' and 'Canino' were found as 750 chilling hours (Küden *et al*., 1992). These results showed that early apricot cultivars with lower chilling requirements ('Precoce de Tyrinthe', 'Feriana', 'Beliana', and 'Priana') had better fruit set and yield per tree in Dörtyol conditions, which has 521 chilling hours, whereas apricot cultivars with medium chilling requirements ('Precoce de Colomer' and 'Canino' and 'Early Kishinewski') did not display satisfactory performances. The data concurs to the results of Alburquerque *et al*. (2004). They explained that low flower bud production, high flower bud drop, and low fruit set were often recorded in mid- to late flowering cultivars. These traits subsequently led to poor yields. Early blooming varieties, which are frequently good producers, generally showed the highest flower bud density, medium flower bud drop, and high percentage of fruit set. The influence of the cultivar was more determinant than the seasonal effect on fruit yield.

Bud productivity showed similar results with the other parameters. 'Tokaloglu' was the most productive with 3-year average of 12.9% (Table 3). The productivity percentages for all the cultivars were generally higher in 2007 (mean of 6.0%) and 2008 (mean of 6.2%) compared with 2006. Yield per tree of all cultivars varied between 2.3 ('Silistre Rona') and 29.1 kg tree^{-1} ('Tokaloglu'). The highest average yield per tree was found in 2008 (25.4 kg tree^{-1}) while the lowest was found in 2006 (2.0 kg tree^{-1}).

In conclusion, 'Tokaloglu', 'Beliana', 'Precoce de Tyrinthe' and 'Rouge de Sernhac' cultivars showed good performance for both fruit set and yield per tree under subtropical climate conditions of Turkey. However, fruit/fruitlets drops and yield in apricot are reported to have been

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Table 3.Productivity and yield per tree of apricot cultivars grown in the Mediterranean climate in Turkey.

Cultivar	Year 2006	Year 2007	Year 2008	Mean
		Productivity (%)		
Precoce de Tyrinthe	3.6 ab[a]	8.2 b	7.7 c	6.4 b
Feriana	2.5 bcd	5.1 d	5.1 de	4.1 c
Beliana	5.1 a	7.9 bc	9.8 b	7.5 b
Priana	3.3 bc	4.6 de	6.9 cd	4.7 c
Bebeco	0.0 e	4.4 de	3.8 ef	2.6 d
Early Kishinewski	0.0 e	2.8 f	3.4 ef	1.9 d
Precoce de Colomer	1.2 ed	2.9 f	2.5 f	2.3 d
Canino	0.0 e	3.1 ef	3.1 f	1.9 d
Silistre Rona	2.7 bcd	2.3 f	2.8 f	2.6 d
Rouge de Sernhac	1.9 cd	6.7 c	5.6 d	5.0 c
Tokaloglu	2.7 bcd	18.3 a	17.6 a	12.9 a
Mean	2.1 B[b]	6.0 A	6.2 A	
		Yield per tree (kg tree^{-1})		
Precoce de Tyrinthe	4.3 ab	47.7 a	34.9 cd	29.0 a
Feriana	4.5 ab	8.4 cd	19.0 de	10.6 cd
Beliana	2.8 bc	30.3 b	36.0 bc	23.0 ab
Priana	1.7 cd	0.6 d	17.5 d	6.6 cd
Bebeco	0.4 d	26.7 b	15.6 e	14.2 bc
Early Kishinewski	0.0 d	9.5 cd	5.5 e	5.0 cd
Precoce de Colomer	1.8 cd	3.2 d	16.3 e	7.1 cd
Canino	0.3 d	1.1 d	15.0 e	5.5 cd
Silistre Rona	0.5 d	1.2 d	5.0 e	2.3 d
Rouge de Sernhac	0.3 d	20.0 bc	63.5 a	27.9 a
Tokaloglu	5.0 a	30.8 b	51.5 ab	29.1 a
Mean	2.0 C	16.3 B	25.4 A	

[a] Means within a column followed by different lowercase letter are significantly at the 1% by Tukey test,
[b] Different capital letters indicate significant differences (P< 0.05) between years.

affected by water stress conditions and irrigation treatments. Findings of this study also suggested that fruit set and fruit drops in apricots should be assessed together with total yield amounts by years. The influence on fruit yield of the cultivar was more determinant than the seasonal effect. This information should be useful to breeders for choosing the best parents for productivity.

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میوه بندی و عملکرد رقم های زرد آلو در شرایط آب و هوایی نیمه استوایی منطقه هاتی در ترکیه

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چکیده

زرد آلو (*Prunus armeniaca* L.) گونه ای است که به طور ویژه ای باردهی نامنظم دارد و ریزش غنچه گل های آن مکررا در شرایط مختلف وبرای رقم های متفاوت گزارش شده است . هر چند شماری از علل این پدیده بررسی شده اند ولی عامل اصلی هنوز نا شناخته است. در پژوهش حاضر، میوه بندی ۱۱ رقم زرد آلو (شامل 'Precoce de Tyrinthe', 'Feriana', 'Beliana', : 'Priana', 'Bebeco', 'Early Kishinewski', 'Precoce de Colomer', 'Canino', 'Silistre Rona', 'Rouge de Sernhac' 'Tokaloglu') در سواحل مدیترانه ای ترکیه بین سال های ۲۰۰۶ تا ۲۰۰۸ بررسی شد. دانهال ها زرد آلو در سال ۱۹۹۷ با فاصله 6x 6متری کاشته شده بودند. از هر درخت، روی چهار شاخه که به طور تصادفی از چهار جهت انتخاب شده بودند، تعداد شکوفه ها، در صد میوه بندی اولیه و انتهایی و عملکرد هر درخت در طی دوره مطالعه تعیین شد. نتایج نشان داد که میوه بندی تفاوت میکرد و به طور معنی داری وابسته به رقم و سال بود. بر پایه میانگین سه ساله بیشترین درصد میوه بندی روی رقم Tokaloglu(۱۴٪) بود و بعد از آن 'Beliana' (۸/۸٪) و 'Precoce de Tyrinthe' (۸/۲٪) قرار داشتند. کمترین میوه بندی (۲/۳٪) در 'Early

'Kishinewski' و 'Canino' رخ داد. عملکرد های بالا در Tokaloglu(۲۹/۱ کیلو گرم در هر درخت)، 'Precoce de Tyrinthe' (۲۹/۰ کیلوگرم)'Rouge de Sernhac' (۲۷/۹ کیلو) و 'Beliana'(۲۳ کیلو) بود. چهار کولتیوار اخیر از نظر میوه بندی و تولید میوه هر درخت در شرایط آب وهوایی نیمه استوایی خوب بودند. با این وجود، نتایج این پژوهش چنین اشاره دارد که میوه بندی و ریزش میوه زرد آلو می بایست همراه با عملکرد کل در هر سال ارزیابی شوند. در این مطالعه، اثر نوع رقم روی عملکرد میوه از اثر شرایط فصلی تعیین کننده تر بود.

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