Journal of the American Pomological Society 71(2): 97-102 2017

Yield and Quality Characteristics of Several Table Apricot (*Prunus armeniaca* L.) Cultivars in the Silifke/Mersin Ecological

A. Bahar[1], and L. Son[2]

Additional index words: Turkey, fruit quality, earliness

Abstract

This research was conducted between 2009-2012 in Silifke, Turkey utilizing 8 different apricot cultivars, five from non-domestic origins 'Aurora', 'Ninfa', 'Bebeco', 'Precoce De Tyrinthe', 'Priana' and three from domestic origins 'Alyanak', 'Tokaloglu', 'Cagataybey'. In material cultivars some phenological and pomological characters such as flowering, yield, fruit weight, fruit dimensions, flesh/seed ratio, acidity and total soluble solids concentration (TSC) were examined. In terms of fruit yield, 'Ninfa'(21.37 kg/tree; 39.55 kg/tree; 45.81 kg/tree; 79.11kg/tree), 'Priana'(20.97 kg/tree; 36.08 kg/tree; 44.76 kg/tree; 77.61 kg/tree) and 'P.De Tyrinthe'(18.74 kg/tree; 31.52 kg/tree; 38.13 kg/tree; 64.58 kg/tree) were most productive in 2009-2012 respectively; 'Tokaloglu', 'Bebeco' and 'P.De Tyrinthe'had the largest fruit in all years. Due to their precocity and yield, 'Ninfa', 'Priana' and 'P.De Tyrinthe' were the most promising cultivars for the Silifke area.

Apricot (*Prunus armeniaca* L.) is grown around the world and in Turkey, and can be consumed as fresh or dried fruit. The total amount of apricot production in the world is more than 4,000,000 tons, and 811,609 tons are supplied by Turkey. Turkey is the largest producer of apricots in the world (Fao, 2015). Apricot can be grown in cold regions of Siberia, in subtropical North Africa, desert in Central Asia, in the humid climate of Japan and East China. Although Turkey is one of the leading countries and has expertise for production of dried apricot, the production of fresh apricot is quite small (Paydas et al., 1992; Bas et al., 2001). More than 80% of world trade in table apricots are early season. Mediterranean countries greatly benefit from this situation. Spain, Greece, Italy, France and Hungary are among the apricot leading exporting countries. Although Turkey is located in the same climate zone, there is almost no exportation of fresh apricots; most Turkish apricots are exported as dried product (Kaska, 2006).

Apricot cultivation in subtropical areas, decreases late spring frost risk (Rodrigo and Julian, 2006). Looking at the number of trees and the production of apricots in Turkey in recent years, adverse climatic events some years cause annual fluctuations in production. However, overall the number of trees and production of apricots are on a steady rise in Turkey (Durgac 2001). Apricots are grown almost everywhere in Turkey except the very moist areas near the Black Sea and in mountainous areas of Eastern Anatolia Region where the winters are too cold. Turkey ranks first in the world production of fresh and dried apricots (Anonymous, 2007). Mediterranean and Aegean regions have great potential for growing early table apricots but to achieve this it is important to increase the number of quality early-season cultivars. In recent years, due to adaptation of early and table apricots production in the Mediterranean region has rapidly increased.

In a study in Erdemli/Alata conditions, the cultivars 'Precoce De Colomer', 'San

[1] Silifke-Tasuca Vocational School, Selcuk University, Mersin, Turkey; askinbahar@selcuk.edu.tr
[2] Silifke School of Applied Technology and Management, Mersin University, Silifke-Mersin, Turkey
Corresponding author. Email: askinbahar@selcuk.edu.tr

Castrese', 'Boccucia', 'Sakit 2', 'Cigli' and 'Fracasso' were promising in terms of earliness and fruit quality (Ayanoglu and Saglamer, 1986). Aegean and Mediterranean regions have a high potential for cultivation of early and table apricot varieties. To achieve this potential, increasing of earliness, fruit quality and the long distance transport of cultivars have great importance (Onal et al., 1995).

The aim of this study was to evaluate the phenology, productivity, and fruit quality characteristics of several early and high quality table apricot types in the region of Silifke, Turkey.

Materials and Methods

The experiment was carried out between 2009-2012 in Silifke-Mersin, with 3 year-old 'Alyanak', 'Aurora', 'Bebeco', 'Cagataybey', 'Ninfa', 'Priana', 'Tokaloglu' and Precoce De Tyrinthe' apricot trees budded on wild apricot rootstock. Soil texture is sandy loam, medium in organic matter, with neutral pH, no soluble salt problem and sufficient total nitrogen. Trees were trained to a vase shape and spaced 4 m apart both between and in rows (625 trees/ha^{1}). In the trial there were 6 trees of each apricot cultivar. Trees were replicated three times with two trees per plot in a randomized complete block design.

Phenological observations. Dates for first bloom, full bloom, end of bloom and harvest were recorded. Date of full bloom was recorded as the date when 90% of the flowers were open and the harvest date was determined by visual observations and color changes (from green to yellow and red). The ripening period was the period between the first and the final harvest. Fruits were harvested at maturity based on appearance and taste, and 15 fruits were randomly sampled from each tree to evaluate fruit quality characteristics. Fruit diameter was measured with digital calipers, and fruit and seed weights, and flesh/seed ratios were recorded. Total soluble solids concentration (SSC) of the fruit juice were determined by hand refractometer, and titratable acidity (malic acid) was calculated by titrating fruit juice with 0.1 N NaOH). Yield per tree was obtained annually.

Statistical Analysis. The experimental design was completely randomized with six trees per cultivar, and 2 trees were treated as a replicate. Therefore, there were 90 fruits and three replicates per cultivar. Data were analyzed with analysis of variance and means were compared with Tukey's test using Costat software (Duzgunes, 1963).

Results and Discussion

Phenological observations. Harvest dates and phenological data are presented in (Table 1). Full bloom was earlier for 'Ninfa', 'Priana' and 'Precoce De Tyrinte' than the other cultivars (Table 1). The latest flowering cultivars were 'Cagataybey', 'Tokaloglu' and

Table 1. Average date of phenological stages of eight apricot cultivars (2009-2012).

Cultivar	First bloom	Full bloom	End of bloom	Harvest date
Alyanak	08 March	13 March	20 March	8 June
Aurora	11 March	19 March	26 March	12 May
Bebeco	01 March	4 March	10 March	5 June
Cagataybey	12 March	16 March	21 March	3 June
Ninfa	20 February	22 February	26 February	11 May
Priana	21 February	24 February	28 February	12 May
Tokaloglu	14 March	16 March	23 February	16 June
Tyrinthe	26 February	01 March	06 March	19 May

'Aurora'. These results correspond with those reported by Paydas et al. (1995) working in Adana conditions with the cultivars of 'Bebeco', 'Beliana', 'Canino', 'Feriana', 'Precoce De Colomer', 'Precoce De Tyrinthe', 'Priana' and 'Trewatt'. Time of maturity ranged from 11 May to 16 June (Table 1). 'Ninfa', 'Priana' and 'Aurora' ripened earliest, on 11 and 12 May respectively. These results are in accord with those of other studies done in Mut ecological conditions of Turkey (Son and Kuden, 2001). 'Bebeco', 'Alyanak' and 'Tokaloglu' were the latest ripening cultivars and matured on 5-16 June (Table 1). These findings are similar to the results of adaptation studies performed in different areas (Seferoglu and Gulsen, 2003; Ayanoglu et al., 1995).

Yield per tree (kg/tree). The difference between the varieties in terms of yield per tree was statistically significant at 5% level. 'Ninfa', 'Priana' and 'Precoce De Tyrinthe' were the most productive cultivars in all trial years, whereas 'Tokaloglu', 'Aurora' and 'Alyanak' ranked last in productivity in all years (Table 2). The yield differences between for 'Ninfa' and 'Priana' were statistically non-significant (Table 2). Our findings in terms of yield are in agreement with the those of Son and Kuden (2001). Also, Ayanoglu et al. (1995) and Son's (2004) research support results.

Fruit characteristics. Fruit characteristics differed significantly for the different cultivars (Tables 3-6). For fruit weight, 'Tokaloglu' (52 g), 'Bebeco' (51.3 g) and

Table 2. Average yield of eight apricot cultivars (kg/tree) (2009-2012).

Cultivar	2009	2010	2011	2012
Alyanak	5.98e	11.01d	12.54d	23.20e
Aurora	2.56f	4.63e	7.39e	15.58f
Bebeco	14.96c	25.02c	35.18b	60.45c
Cagataybey	12.59d	20.61c	31.39c	55.31d
Ninfa	21.37a	39.55a	45.81a	79.11a
Priana	20.97a	36.08a	44.76a	77.61a
Tokaloglu	2.14f	3.78e	7.35e	14.85f
Tyrinthe	18.74b	31.52b	38.13b	64.58b
LSD (P=0.05)	2.02	4.51	3.06	3.43

Means within columns followed by the same letter are not significantly different according to LSD, $P < 0.05$.

Table 3. Fruit quality characteristics of eight apricot (*Prunus armeniaca* L.) cultivars (2009).

Cultivar	Fresh Fruit weight (g)	Seed weight (g)	Flesh/Seed Ratio	SSC (%)	Acidity
Alyanak	42.41d	2.42cd	16.52d	16.20a	1.01e
Aurora	39.98e	2.40d	15.65e	15.86a	1.02e
Bebeco	51.55a	3.65b	13.11f	15.06bc	1.24b
Cagataybey	46.67c	2.37e	18.66b	15.33b	1.18c
Ninfa	43.36d	2.40d	17.04c	14.86c	1.02e
Priana	38.20f	2.35e	15.23e	15.13bc	1.02e
Tokaloglu	51.82a	3.82a	12.55g	14.13d	1.07d
Tyrinthe	49.36b	2.43c	19.26a	11.13e	1.46a
LSD (P=0.05)	1.42	0.02	0.47	0.36	0.03

Means within columns followed by the same letter are not significantly different according to LSD, $P < 0.05$.

'Precoce De Tyrinthe' (49.6 g) were superior to the others. These data agree with the results of Seferoglu and Gulsen (2003). The smallest fruits were obtained from 'Priana' and 'Aurora' (Tables 3-6). Fruit flesh/seed ratio was greatest for 'Precoce De Tyrinthe',

Table 4. Fruit quality characteristics of eight apricot (*Prunus armeniaca* L.) cultivars (2010).

Cultivar	Fresh Fruit weight (g)	Seed weight (g)	Flesh/Seed Ratio	SSC (%)	Acidity
Alyanak	43.84d	2.44c	16.91b	16.26a	1.01f
Aurora	40.33e	2.41e	15.71c	15.86b	1.02ef
Bebeco	51.37ab	3.66b	13.01d	14.93d	1.24b
Cagataybey	47.99c	2.38f	19.14a	15.40c	1.19c
Ninfa	43.88d	2.41de	17.15b	14.93d	1.03e
Priana	38.62f	2.36f	15.32c	15.04d	1.02ef
Tokaloglu	52.42a	3.83a	12.67d	14.06e	1.07d
Tyrinthe	50.20b	2.43cd	19.60a	11.07f	1.46a
LSD (P=0.05)	1.36	0.02	0.51	0.20	0.01

Means within columns followed by the same letter are not significantly different according to LSD, $P < 0.05$.

Table 5. Fruit quality characteristics of eight apricot (*Prunus armeniaca* L.) cultivars (2011).

Cultivar	Fresh Fruit weight (g)	Seed weight (g)	Flesh/Seed Ratio	SSC (%)	Acidity
Alyanak	44.10d	2.44c	17.03b	16.06a	1.01e
Aurora	40.88e	2.42d	15.89c	15.80a	1.02e
Bebeco	51.89b	3.67b	13.12d	14.80c	1.24b
Çağataybey	48.60c	2.38e	19.36a	15.33b	1.19c
Ninfa	44.87d	2.42d	17.51b	14.93c	1.03e
Priana	39.85e	2.37e	15.71c	15.06bc	1.03e
Tokaloğlu	53.11a	3.84a	12.81d	14.06d	1.07d
Tyrinthe	51.02b	2.45c	19.80a	11.13e	1.46a
LSD (P=0.05)	1.20	0.01	0.53	0.28	0.01

Means within columns followed by the same letter are not significantly different according to LSD, $P < 0.05$.

Table 6. Fruit quality characteristics of eight apricot (*Prunus armeniaca* L.) cultivars (2012).

Cultivar	Fresh Fruit weight (g)	Seed weight (g)	Flesh/Seed Ratio	SSC (%)	Acidity
Alyanak	44.17c	2.46b	16.95b	16.52a	1.01f
Aurora	39.21e	2.41b	15.26c	15.92b	1.02ef
Bebeco	50.39a	3.66a	12.77e	14.65f	1.24b
Cagataybey	46.58b	2.39b	18.49a	15.26c	1.16c
Ninfa	42.53d	2.41b	16.64b	14.72e	1.04e
Priana	36.65f	2.36b	14.53d	15.01d	1.01f
Tokaloglu	50.65a	3.83a	12.22e	13.99g	1.07d
Tyrinthe	47.82b	2.45b	18.52a	10.90h	1.46a
LSD (P=0.05)	1.63	0.23	0.58	0.04	0.02

Means within columns followed by the same letter are not significantly different according to LSD, $P < 0.05$.

Table 7. Fruit quality characteristics of eight apricot (*Prunus armeniaca* L.) cultivars (average of years)(2009-2012).

Cultivar	Fresh Fruit weight (g)	Seed weight (g)	Flesh/Seed Ratio	SSC (%)	Acidity
Alyanak	43.63d	2.44c	16.85b	16.26a	1.01c
Aurora	40.10e	2.41cd	15.63c	15.86b	1.02c
Bebeco	51.30ab	3.66b	13.00d	14.86d	1.24b
Cagataybey	47.46c	2.38d	18.91a	15.33c	1.18b
Ninfa	43.66d	2.41cd	17.09b	14.86d	1.03c
Priana	38.33e	2.36d	15.20c	15.06c	1.02c
Tokaloglu	52.00a	3.83a	12.56d	14.06e	1.07c
Tyrinthe	49.6bc	2.44c	19.30a	11.06f	1.46a
LSD (P=0.05)	1.31	0.03	0.52	0.23	0.03

Means within columns followed by the same letter are not significantly different according to LSD, $P < 0.05$.

followed by 'Cagataybey' and 'Ninfa' whereas 'Tokaloglu' had the lowest ratio (Tables 3-6), which confirmed previous work (Durgac, 1995). The highest SSC was obtained from 'Alyanak', it was followed by 'Aurora' and 'Cagataybey' in all trial years (Tables 3-6). The findings of Seferoglu and Gulsen(2003), and Son (2004) were similar to ours.

Conclusions

'Ninfa', 'Priana' and 'Aurora' were the earliest cultivars in the trial. Early maturing cultivars are very advantageous in terms of launching them in the market. But 'Aurora' had unacceptable low yields. 'P. De Tyrinthe' despite later maturation than 'Ninfa' and 'Priana' had a higher market value due to firmer fruit flesh and better appearance. Silifke's fruit growing potential is quite high because it is in an extremely convenient location for growing fresh apricots, but the region has low chilling. Desirable cultivar characteristics for the region include long shelf life, high yield and high fruit quality. According to the results of this study five cultivars have potential in the Silifke-Mersin region. 'Ninfa', 'Priana' and 'P. De Tyrinthe' are ealy and high-yeilding cultivars. 'Cagataybey' and 'Bebeco' ripen later, and have moderate yields, but produce large fruit with high SSC.

Literature Cited

Anonymous, 2007. VIII. Apricot five years development plan report of government statistic institute, 285p.

Ayanoglu, H. and M. Saglamer. 1986. The first results of apricot cultivars grown in the adaptation of Mediterranean coastline. Derim Magazine. Citrus Res. Inst. Publ. 3(1): 3-15.

Ayanoglu, H., N. Kaska, and A. Yildiz. 1995. Studies on the adaptation of early apricot varieties in the Mediterranean Region. Turkey II. Nat. Hort. Cong. 1:144-148.

Bas, M., Y. Erbil, and B. Erenoglu. 2001. Some of the first results obtained on adaptation of apricot varieties Marmara Ecology, Stone Fruits Symp, 25-28 Sept., 2001, Yalova. pp. 441-447.

Durgac, C., and N. Kaska. 1995. Research on efficiency, quality and earliness for apricot varieties in Adana ecological conditions. Turkey II. Nat. Hort. Cong. 3-6 Oct., 1995, in Adana. 1:154-158.

Durgac, C. 2001. Selection of apricots Sakit, Sakit Valley fruit growth conditions and determination periods of chilling, Adana, PhD Diss, University of Cukurova, Dept. of Horticulture, 126 p.

Duzgunes, O. 1963. Principles and methods in scientific research statistics. Ege University. Press, 375 p. FAO, 2015. Statistical database, www.fao.org; accessed July 08, 2015.

Kaska, N. 2006. Orchard management in apricots. Acta Hort. 717: 287-294.

Onal, M., S. Ozakman, and I. Ozkarakas. 1995. Promising Aegean Region conditions earliness and quality apricot (Prunus armeniaca L..) cultivars. II Nat. Hort. Cong. 1995, in Turkey. pp. 159-163.

Paydas, S., N. Kaska, A.A. Parker, and H. Gubbuk. 1992. Some of the new apricot varieties (*Prunus*

armeniaca L..) research on adaptation to ecological conditions of Adana, Turkey I. Nat. Hort. Cong. 13-16 Oct., 1992, in Izmir. pp. 465-471.

Paydas, S., N. Kaska, and C. Durgac. 1995. The research on yield and quality criterians of some apricot varieties in subtropical conditions. II Nat. Hort. Cong. 1995, in Turkey. pp. 149-153.

Rodrigo, J. and C. Julian. 2006. Spring frost damage in buds, flowers and developing fruits in apricot. Acta Hort. 717: 87-89.

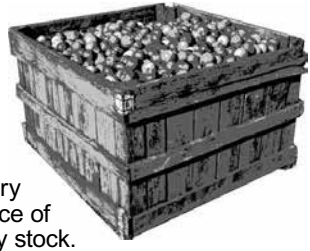
Seferoglu, H.G. and A. Gulsen. 2003. Growth performance of some apricot cultivars in Aydin ecology. Turkey IV. Nat. Hort. Cong. 08-12 Sept., 2003, in Antalya. 1:78-80.

Son, L. and A. Kuden. 2001. The research of some new apricot varieties on adaptation to ecological conditions in Mut. (University of Cukurova Faculty of Agriculture) C.U.Z.F Journal, 16: 93-98.

Son, L. 2004. Phenological and pomological characteristics of some table apricot varieties Bozyazi ecological conditions. C.U.Z.F. Journal, 19:43-48.

Begin well.

End well.



Adams County Nursery
recognizes the importance of
starting with quality nursery stock.
We know it is your goal to produce high quality fruit. We strive to produce quality trees for the commercial industry. Let us help you get started.
Begin with us. Begin well.

ACN INC.® SINCE 1905

Adams County Nursery, Inc. • Aspers, PA
(800) 377-3106 • (717) 677-4124 fax • email: acn@acnursery.com • www.acnursery.com