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Evaluation of Performances of Fresh Market Apricot Cultivars and Selections in Coastal Regions of Turkey

S. Ulger, Ibrahim Baktir[1] and David G. Himelrick[2]

Abstract

Twenty foreign and domestic fresh fruit apricot cultivars (*Prunus armeniaca* L.) and selections were evaluated over eight years under Mediterranean climatic conditions at Antalya, Turkey. The accessions were evaluated for precocity, bloom and ripening dates and fruit quality. The foreign cultivars 'Jaubert Foulon', 'Precoce de Colomer', 'Cafona' and 'Canino ITA' along with the domestic cultivar 'Sakit 7 , and selections 07K14 and 01K11 were the most promising in terms of yield and earliness. Although 33K09 had somewhat lower yields, it was desirable because of its very early ripening. The tree canopies and fruit of foreign cultivars were generally larger than domestic ones, but soluble solids concentrations were lower.

Introduction

Turkey is one of the top apricot producing nations in the world with an annual production of around 271 MT (3). Most production is of drying type cultivars while fresh fruit cultivars are produced primarily in coastal regions on high southern slopes where damage from late spring frosts is infrequent. Apricot planting in the coastal region of Antalya has increased rapidly in recent years because of he competitive advantage of earliness of harvest. Turkey competes effectively with other Mediterranean countries in the fresh apricots exported to northern and central Europe. The regionalized production and cultural history of apricots reflect their restriction to special ecological conditions where fluctuating winter temperatures, late spring frosts and incidence of disease are minimized (4,5,9,10).

Chilling requirement could be a limiting factor for cultivars grown in the Turkish Mediterranean coastal region where annual chilling accumulation is about 300-600 hrs (8). Cultivar evaluations at various sites in Turkey have been valuable in selecting ecologically adapted cultivars. The cultivars 'Priana', 'Beliona' and 'Feriana' have been recommended for the Adana region (12), 'Precoce di Tyrinthos', 'Bulida' and 'Precoce de Colomer' in the Mersin region (1) and 'Fracasso', 'San Castrese', 'Preccoce di Tyrinthos', 'Sakit 2', 'Rouge du Rousillion', 'Palummella', 'Tardif de Bordaneil' and 'Jaubert Foulon' in Izmir (11).

The objective of this study was to evaluate productivity and fruit quality of several fresh fruit apricot cultivars and selections under the coastal ecological conditions in Antalya, Turkey.

Materials and Methods

This evaluation was conducted at the Research Station of Agricultural Faculty of Akdeniz University in Antalya, Turkey. The Research Station is located 3 km from the Mediterranean Sea at an elevation of 50 m above sea level. The soil type is clay loam with low organic matter and a pH of 8.5. Trees were arranged in a randomized block design with 5 m between trees and 6 m between rows. Each treatment contained three trees and was replicated three times. Supplemental irrigation was provided and standard fertilization practices were followed. Two-year old grafted trees were provided by the Alata Horticultural Research Station. The domestic cultivars

[1]Faculty of Agriculture, Department of Horticulture, University of Akdeniz, Antalya, Turkey.
[2]Department of Horticulture, Auburn University, Auburn, AL 36849.

Table 1. Blooming and ripening periods of apricot cultivars. Data are means for 1992 through 1996.

	February					March					April		May			June				July	
Cultivars	14	21	28	1	7	14	21	28	1	7	21	28	1	7	14	21	28	1	7		
Labib	a	-	-	-	b	-	-	-	-	c				d	-	-	-	-	-	-	e
Baya	a	-	-	-	b	-	-	-	-	c				d							
07 K 02				a	-	-	-	-	b	-	-	-	c	d	-	-	-	-	e		
07 K 03				a	-	-	-	b	-	-	-	c					d	-	-	e	
07 K 14				a	-	-	-	b	-	-	-	c					d	-		e	
Cafona				a	-	-	-	b	-	-	-	-	c					d	-		e
Sancastrese				a	-	-	-	-	b	-	-	-	c					d	.		e
07 K 09				a	-	-	-	-	b	-	-	-	c				d	-		e	
33 K 09				a	-	-	-	-	b	-	-	-	c		d	-	-				
Canino FRA				a	-	-	-	-	b	-	-	-	c				d	-	-		
Precoce de Colomer					a	-	-	-	-	b	-	-	-	c			d	-	-		
Silistre Rona					a	-	-	-	-	b	-	-	-	c	d	-	-	-	-	e	
Jaubert Foulon					a	-	-	-	-	-	b	-	-	-	c		d	-	-		
Canino ITA						a	-	-	-	-	-	b	-	-	c				d	-	-	e
Bebeco						a	-	-	-	-	-	b	-	-	c				d	-	-	e
01 K 11						a	-	-	-	-	-	b	-	-	c				d	-	-	e
Sakit 7							a	-	-	-	-	-	b	-	-	c				d	-	-	e
07 K 13							a	-	-	-	-	-	b	-	-	-	c			d	-	-	e
Sakit 2								a	-	-	-	-	-	b	-	-	-	c			d	-	-	e
Ambrosia													a	-	-	-	b	-	-	c				d

a: Beginning of bloom, b: full bloom, c: end of bloom, d: first harvest, e: last harvest

'Sakit 2' and 'Sakit 7' and selections 01K11, 07K02, 07K03, 07K09, 07K13, 07K14 and 33K09, along with foreign cultivars 'Ambrosia', 'Baya', 'Bebeco', 'Cafona', 'Canino FRA', 'Canino ITA', 'Jaubert Foulon', 'Labib', 'Precoce de Colomer', 'San Castrese' and 'Silistre Rona' were evaluated from 1988 to 1996. Growth and canopy development as well as bloom and ripening times, yield, seed weight, fruit size, and total soluble solids were examined. Data were subjected to analysis of variance with mean separation by Duncan's multiple range test.

Result and Discussion

'Labib' produced the largest trees while 07K02 produced smallest trees (Table 2). In general, tree size of domestic types was smaller than foreign cultivars. In the first year 'Labib' and 'Precoce de Colomer' both produced unusually long shoot growth of nearly 2 m. These growth rates decreased as the trees transitioned into flowering and fruiting.

As has been previously noted in other cultivars (8), inadequate chilling appeared to be a limiting factor in flowering and fruit set. This appeared to be especially true with 'Ambrosia', while 'Labib' and 33K09 scarcely flowered in the second year with no fruit set occurring. Beside the chilling requirement, genetical precocity could be another reason for low fruit set in 'Ambrosia' in the second year. Most cultivars began to flower in the third year with fruit set commonly occurring in the fifth year for cultivars such as 'Precoce de Colomer', 'Jaubert Foulon', 'Canino ITA', and 07K09. Moderate degrees of alternate-bearing were also experienced in these cultivars following a heavy fruiting year. There were notable differences among cultivars in the bloom period with 'Labib' beginning flowering around 12 Feb. Followed closely by 'Baya' (Table 1). 'Ambrosia' was the latest to flower with bloom occurring around 29 Mar. The flowering period of cultivars typically lasted from 10 to 17 days. As was typical of long

Table 2. Some fruit and fruit quality parameters of apricot cultivars. Data are means for 1992 through 1996.

Cultivars	Yield (kg/tree)	Fruit weight (g)	Fruit length (cm)	Fruit width (cm)	Seed weight (g)	Total Soluble solids (%)	Trunk cross sectional area in cm	Origin
Jaubert Foulon	63.50 a[z]	42.08 c	3.94 bc	3.79 bc	3.24 bc	13.00 fg	34.2 cd	F
Precoce de Colomer	56.42 b	44.77 b	4.26 a	3.77 bc	2.96 bc	12.63 g	46.7 b	F
Cafona	29.12 c	46.26 a	1.07 ab	3.92 ab	3.29 b	13.28 f	42.3 bc	F
Sakit 7	26.14 d	42.80 c	4.13 ab	3.83 b	2.76 cd	16.88 bc	34.7 cd	D
Canino ITA	20.15e	41.98 cd	3.87 c	3.80 bc	3.38 b	15.14 d	45.9 b	F
07 K 14	18.12 ef	31.45 f	3.46 de	3.63 c	2.35 de	15.84 cd	42.2 bc	D
01 K 11	17.98 f	22.18 hi	3.10 fg	3.01 ef	1.76 g	18.28 a	38.0 c	D
07 K 09	17.13 f	32.42 f	3.55 d	3.51 cd	2.71 cd	17.29 b	34.7 cd	D
Sakit 2	16.65 fg	28.38 g	3.45 de	3.25 d	2.24 e	17.55 b	36.8 c	D
33 K 09	16.34 g	19.21 i	2.87 g	2.95 f	2.19 ef	16.44 e	30.8 d	D
07 K 03	12.82 h	27.18 gh	3.56 d	3.43 d	2.04 f	12.20 b	45.6 b	D
Canino FRA	10.48 i	23.61 h	4.02 b	3.90 b	2.83 c	15.46 de	26.8 e	F
Bebeco	9.84 i	30.56 fg	3.66 ed	3.05 c	2.49 d	1.42 h	27.3 de	F
07 K 13	6.22 j	31.19 f	3.42 e	3.47 cd	3.13 bc	14.04 ef	27.4 de	D
San Castrese	5.89 jk	35.05 e	3.75 cd	3.60 c	3.44 ab	13.18 f	26.0 e	F
Silistre Rona	2.29 l	23.61 b	3.17 f	3.17 de	2.50 d	15.73 d	13.9 f	F
Labib	1.64 lm	39.95 d	3.91 c	3.87 b	2.71 cd	18.13 a	56.3 a	F
07 K 02	0.74 m	28.16 g	3.32 ef	3.22 d	1.77 g	17.79 ab	11.7 fg	D
Ambrosia	0.51 mn	35.78 e	3.19 f	3.10 e	2.57 d	12.63 g	25.1 e	F
Baya	0.32 n	33.10 ef	4.16 a	4.00 a	3.57 a	14.75 e	49.8 b	F

[z]Mean separation within columns by Duncan's multiple range test at $P \leq 0.05$.
F: Foreign cultivar, D: Domestic cultivar

term average temperatures for the area, no spring frost damage was experienced during the evaluation period. Harvest season also differed substantially among cultivars with 'Silistre Rona' and 33K09 ripening on 25 May and the latest cultivar 'Ambrosia' ripening on 6 July.

Most fruit was harvested by mid June with 'Silistre Rona' and 33K09 being the earliest with 'Baya' and 'Labib' ripening 15 to 20 days later. 'Sakit 2' and 'Ambrosia' were the latest ripening in late June and early July. Most fresh table-type apricots ripen between late May and mid-June under Antalya climatic conditions, which allows Turkish producers to enter the market 20 to 30 days earlier than growers in Italy and France (4,5). Although earliness of harvest is an important marketing and price consideration, high productivity is essential for acceptable economic returns. The highest yield was obtained from 'Joubert Foulon' with 63.5 kg per tree followed by 'Precoce de Colomer' with 56.42 kg, 'Cafona' with 29.1 kg and 'Sakit 7' with 26.1 kg (Table 2). In general, yield of the domestic cultivars was lower than that of foreign cultivars. Fruit thinning is not a common cultural practice in apricots, but it is usually done in peaches in Turkey.

Fruit size, fruit weight and seed weight and percent soluble solids varied among cultivars. The largest fruit were of 'Cafona' (46.3g), followed by 'Precoce de Colomer' (44.8g), 'Sakit 7' (42.8g), 'Jaubert Foulon' (42.1g), and 'Canino ITA' (42.0g). The highest seed weight was found in 'Baya' (3.6g) and the lowest in 01K11 (1.8g). The highest soluble solids content was found in 01K11 (18.3%), followed by 'Labib' (18.1%), 07K02 (17.8%) and 'Sakit 2' (17.6%). Total soluble solids were generally found to be higher in apricots of domestic origin. No disease problems were noted on any cultivar but 'Capnodis' (*Capnodis tenebrions* L.) and

Mediterranean fruit fly (*Ceratitis capitata* Widemann) damage occurred each year.

Previous studies in other Turkish production areas have recommended 'Precoce de Colomer', 'Jaubert Foulon', 'San Castrese', 'Canino', 'Cafona', 'Fracasso' and 'Sakit 2' for the Mediterranean coastal region (7). Based on earliness of harvest, high yield and desirable taste, Paydas and Kaska (12) recommended 'Priana', 'Beliana', 'Feriana', 'Precoce de Colomer' and 'Precoce di Tyrinthos' for the coastal region of Turkey.

In another study, Kaska et al. (6) recommended the local cultivars 'Sakid 2', 'Sakid 6' and 'Karacabey' and the foreign cultivars 'Roxana', 'Rouge du Roussillon', 'Screare', and 'Precoce de Colomer' for the Taurus Mountains. Ayanolu and Kaska (2) recommended 'Precoce di Tyrinthos' and 'Silistre Rona' for early ripening, 'Precoce de Colomer' and 'Canino' for their high yield, and 'Sakit 2' and 'Bebeco' for their fruit quality. In the present study, the two very early ripening cultivars 33K09 and 'Silistre Rona' had unacceptably low yields. Based on yield and general fruit quality, the following cultivars are suggested for the region: 'Jaubert Foulon', 'Precoce de Colomer', 'Cafona', 'Sakit 7' and 'Canino ITA'.

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Spur Leaves - Pears

Absorption of ^{13}C by fruit within 3 days of labeling was constant over the season however the total amount of ^{13}C in the spur decreased over the season. Components of the total amount of the ^{13}C were as follows: flesh 43.2%, core 5%, spur stem 5.6%, source leaves 5.4% and 40.8% respired or exported from the spur. Photosynthates fixed by the spur early in the rapid growth stage contribute more to the formation of starch and structural materials and less to soluble carbohydrates than do those fixed later. From Teng et al 2001 J. Hort.Sci. & Biotech. 76(3):300-304.