



## Investigation of Yield and Quality Performance of Some Peach and Nectarine Cultivars in Tokat Ecological Conditions

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### Abstract

The study was carried out in Tokat ecological conditions at Vasfi Diren Agricultural founding in 2011 and 2012 years. The peach rootstock GF677 (*Prunus persica* X *Prunus amygdalus*) were grafted with 6 peach (Redhaven, Elegant Lady, Monreo, Fair Time, Vesuvio and Vivian) and 4 nectarine (Big Top, Fantasia, Stark Red Gold ve Fair Lane) cultivars. Blooming date Marc-April, Harvested date July and September. Yield findings varied due to years. High yield found Fairtime and Fairlane peach cultivars and Fantasia nectarine cultivar. Fruit weight was found 140 between 200 g in peach cultivars and 90-170 g in nectarine cultivars.

Key words: Peach (*Prunus persica* L.), nectarine (*Prunus persica* var *nectarina*), yield, adaptation

## INTRODUCTION

Although, homeland of peach is chine, its spreaded in the world. Peach growing in about 80 countries in the world. Peach production is 22 million tones in the world. In the first place which production peach of chine is 12 million tones. In the sixth place which production peach of Turkey is 550 thousand tones. The important cities of peach production are Bursa, Mersin, İzmir, Çanakkale, Aydın, Samsun, Tokat and Amasya (Anonymus, [1]). Otherwise, no growing of nectarine in Tokat. Nectarine is introduce to growers because of high price and marketing easing.

A lot of adaptation studies have done in Turkey. For example, Ergün et al., [2] were found spreading varieties J.H.Hale, Redhaven and Earley Red in Bursa and Izmir Cities; Dixired, J.H.Hale and Cardinal varieties in Samsun. Besides, Kurnaz and Kaska[3] in Adana and Pozanti; Onal and Ercan [4] carried out on early, middle season, late and industrialized 62 peaches and 13 nectarines cultivars in Egean District; Demirsoy and Bilgener[5] carried out in Carsamba plain; Barut[6] carried out on Independence, Nectared 6 and Nectared 8 varieties in Bursa.

Objective of this study is the important characteristics have some peach and nectarine varieties that is adaptation.

## MATERIALS AND METHODS

6 peaches and 4 nectarines cultivars were used in this study, as below mentioned:

Peach cultivars: Redhaven(middle-season); Elegant Lady, Monreo and Fair Teime(late); Vesuvio and Vivian(Processing Cultivars).

Nectarine cultivars: Big Top, Fantasia and Stark Red Gold(middle-season); Fairlane (late).

The study was carried out in Tokat ecological conditions at Vasfi Diren Agricultural founding (altitude:557 m; latitude:40° 20' 27.4"; longitude:36° 08' 34.6") in 2011 and 2012 years. The peach rootstock GF677 (*Prunus persica* x *Prunus amygdalus*) were grafted with 6 peach and 4 nectarine cultivars. It was managed following Standard integrated pest management (IPM) without a stable irrigation and fertilization system. The experimental trial consisted of a completely randomised scheme of 2 plants, with one plant per block. The trees were spaced every 4 m in the row, with 4 m between the rows. Yearly dormant pruning (December) was combined with summer pruning (May) to form and maintain the vase tree form.

We determined blooming and harvest dates, yield(kg/tree), fruit weight(g), fruit dimensions(mm), flesh firmness(kg), total soluble solid(%), titre table acidity(%), pH and fruit skin colours(Kurnaz, [7]; Kaynaş ve Us, [8]).

## RESULTS AND DISCUSSION

Some ecological findings and blooming dates were showed as below in Tables 1 and 2.

Blooming generally early occurred second year from first year on cultivars (Table 2). 'Elegant Lady' and 'Vivian' bloomed earlier than the other cultivars. 'Monreo' was late blooming. For this reason, the second year that temperature dropped in throughout spring. After that temperature was higher (Table 1). Yield, fruit weight and fruit dimensions of Peach and nectarine cultivars data were taken as below in Table 3-6.

Fruit yield varied depending on year and cultivar in peach cultivars (Table 3). Yield difference of years were no significant and year x cultivars found important. But, fruit weight found important. 'Vivian processing cultivar' and 'Fairtime' table cultivar yielded more than the others in every two years. 'Monreo' and 'Fairtime' peach cultivars have large fruit in two years. 'Fairtime' is good cultivars due to yield and fruit weight.

Fruit yield varied depending on year and cultivar in nectarine cultivars (Table 4). 'Fantasia' and 'Stark Red Gold' cultivars yielded and large fruit more than the others in every two years. Its very important characteristic that 'Fairlane' is late harvested in every year.

Findings were varied ecology, cultivars and year to year. Both 'Monreo' and 'Fairtime' have large fruit in Tokat. Otherwise, both 'Fairtime' peach cultivars and 'Fairlane' nectarine cultivar yielded and late harvested in Tokat and the other growing areas, too (Tsipouridis et al., [9]; Fernáandez et al., [10]; Rakonjac and Živanović, [11]).

Flesh firmness, some chemical findings and skin colours were taken in Table 7 to 11.

Chemical findings were varied ecology, cultivars, practical treatment and year to year. Generally, Processing cultivars have higher TSS than the others cultivars. Fairtime that table peach cultivar has higher TSS than the others, also. TSS no more affected by treatments in this cultivar (Rakonjac And Živanović, [11]; Giorgi et al., [12]).

**Table 1.** Some ecological findings in blooming terms in Tokat ecological conditions\*

Ecological data	March		April		May	
	2011	2012	2011	2012	2011	2012
Average temperature(°C)	8.9	3.5	12.0	15.6	17.9	17.6
Montly Max. temperature(°C)	22.7	19.2	26.8	29.9	29.3	30.2
Average Max. temperature(°C)	24.0	9.1	27.0	23.8	33.2	24.8
Average Min. temperature(°C)	-5.4	-1.3	1.0	7.8	4.2	12.1
Average Relative Humidity(°C)	64.9	63.3	63.2	44.1	59.0	62.3
Montly Total Rainfull(mm)	69.5	44.3	73.5	14.8	59.1	114.7

\*: Soil-Water Research Foundation in 2011-2012 years, Tokat /Turkey

**Table 2.** Blooming dates in peach and nectarine cultivars in Tokat ecological conditions\*

Cultivars	Beginning of blooming		Full blooming		Late blooming		Harvest date	
	2011	2012	2011	2012	2011	2012	2011	2012
<b>Peach cultivars</b>								
Redhaven	31.03.	08.06.	07.04.	10.04.	14.04.	15.04.	01.08.	30.07.
Elegant Lady	28.03.	06.04.	06.04.	09.04.	12.02.	13.04.	23.08.	09.08.
Monreo	30.03.	10.04.	08.03.	13.04.	15.04.	17.04.	<b>09.09.</b>	<b>28.08.</b>
Fairtime	30.03.	08.04.	08.03.	10.04.	15.04.	15.04.	<b>26.09.</b>	<b>20.09.</b>
Vesuvio	28.03.	08.04.	04.04.	10.04.	09.04.	15.04.	23.08.	02.08.
Vivian	28.03.	06.04.	04.04.	09.04.	09.04.	14.04.	09.09.	14.08.
<b>Nectarine cultivars</b>								
Big Top	26.03.	10.04.	04.04.	15.04.	08.04.	18.04.	01.08.	17.07.
Fantasia	30.03.	10.04.	08.03.	15.04.	15.04.	18.04.	23.08.	14.08.
Stark Red Gold	30.03.	10.04.	08.03.	15.04.	13.04.	18.04.	23.08.	09.08.
Fairlane	30.03.	08.04.	08.03.	12.04.	15.04.	15.04.	<b>09.09.</b>	<b>05.09.</b>

\*: Very important data were found in 2012, such that whole prune species (like almond, plum, peach, mahaleb, sweet cherry, sour cherry, pear and pink term in apple trees) bloomed on time and took photographs.

Altitude:557 m; latitude:40° 20' 27.4"; longitude:36° 08' 34.6"

**Table 3.** Yield and fruit weight findings of peach cultivars in Tokat ecological conditions

Cultivars	Yield(kg/tree)		Average	Fruit weight (g)		Average
	2011	2012		2011	2012	
Redhaven	13.98	13.98	14.08 bc	163.12	138.19	150.65 bc
Elegant Lady	18.73	18.73	14.02 bc	168.88	146.39	157.63 bc
Monreo	9.38	9.38	8.38 c	182.01	199.40	190.70 a
Fairtime	23.75	23.75	18.54 ab	154.24	170.50	162.32 ab
Vesuvio	7.68	7.68	13.67 bc	141.93	103.32	122.62 c
Viviana	24.25	24.25	22.20 a	116.19	120.62	118.40 c
Average	16.29	14.00		154.395	146.40	
Year(NS), Cultivar*, Year x Cultivar*, NS: No significant ++: Means with same letter are not different at the p=0.05(*) and p=0.01(**)			Year(NS), Cultivar**, Year x Cultivar(NS), NS: No significant ++: Means with same letter are not different at the p=0.05(*) and p=0.01(**)			

**Table 4.** Yield and fruit weight findings of nectarine cultivars in Tokat ecological conditions

Cultivars	Yield(kg/tree)		Average	Fruit weight (g)		Average
	2011	2012		2011	2012	
Big Top	5.00	3.72	4.36 b	129.25	89.58	109.41 c
Fantasia	10.64	19.06	14.85 a	148.53	130.36	139.44 a
S.Red Gold	12.62	14.88	13.75 a	173.93	107.85	140.89 a
Fairlane	10.91	11.20	11.05 a	119.37	138.49	128.93 ab
Average	9.79 b	12.21 a		142.75 a	116.57 b	
Year*, Cultivar*, Year x Cultivar(NS), NS: No significant ++: Means with same letter are not different at the p=0.05(*) and p=0.01(**)			Year**, Cultivar**, Year x Cultivar**, NS: No significant ++: Means with same letter are not different at the p=0.05(*) and p=0.01(**)			

**Table 5.** Fruit diameter and length findings of peach cultivars in Tokat ecological conditions

Cultivars	Fruit diameter(mm)		Average	Fruit length (mm)		Average
	2011	2012		2011	2012	
Redhaven	70.82	62.91	66.86 b	71.57	64.59	68.08 a
Elegant Lady	43.53	66.25	54.89 d	37.76	65.26	51.51 c
Monreo	71.16	77.51	74.33 a	65.97	77.61	71.79 a
Fairtime	64.59	67.05	65.82 b	65.94	70.32	68.13 a
Vesuvio	38.13	58.79	48.46 e	34.29	58.47	46.38 d
Viviana	60.15	60.29	60.22 c	55.19	58.49	56.84 b
Average	58.06 b	65.46 a		55.12 b	65.79 a	
Year**, Cultivar**, Year x Cultivar**, NS: No significant ++: Means with same letter are not different at the p=0.05(*) and p=0.01(**)			Year**, Cultivar**, Year x Cultivar**, NS: No significant ++: Means with same letter are not different at the p=0.05(*) and p=0.01(**)			

**Table 6.** Fruit diameter and length findings of nectarine cultivars in Tokat ecological conditions

Cultivars	Fruit diameter(mm)		Average	Fruit length (mm)		Average
	2011	2012		2011	2012	
Big Top	63.63	53.77	58.70 a	59.74	52.81	56.27 b
Fantasia	37.87	63.18	50.52 b	40.72	65.83	53.27 b
S.Red Gold	42.56	57.79	50.17 b	41.73	62.21	51.97 b
Fairlane	59.00	61.01	60.00 a	60.26	66.18	63.22 a
Average	50.76 b	58.96 a		50.61 b	61.75 a	
Year**, Cultivar**, Year x Cultivar**, NS: No significant ++: Means with same letter are not different at the p=0.05(*) and p=0.01(**)			Year**, Cultivar**, Year x Cultivar**, NS: No significant ++: Means with same letter are not different at the p=0.05(*) and p=0.01(**)			

**Table 7.** Flesh firmness and Total soluble solid(TSS) findings of peach cultivars in Tokat ecological conditions

Cultivars	Flesh firmness(kg)		Average	TSS(%)		Average
	2011	2012		2011	2012	
Redhaven	6.55	3.13	4.84 bc	12.57	13.60	13.08 b
Elegant Lady	6.24	7.87	7.05 a	12.17	13.38	12.77 b
Monreo	5.78	5.45	5.60 b	11.21	13.40	12.30 b
Fairtime	7.80	6.45	7.12 a	15.28	16.03	15.65 a
Vesuvio	2.27	3.38	2.82 d	14.37	15.00	14.68 a
Viviana	3.11	4.82	3.96 c	12.30	13.66	12.98 b
Average	5.29	5.18		12.98 b	14.17 a	
Year(NS), Cultivar**, Year x Cultivar**, NS: No significant ++: Means with same letter are not different at the p=0.05(*) and p=0.01(**)				Year**, Cultivar**, Year x Cultivar(NS), NS: No significant ++: Means with same letter are not different at the p=0.05(*) and p=0.01(**)		

**Table 8.** Flesh firmness and Total soluble solid(TSS) findings of nectarine cultivars in Tokat ecological conditions

Cultivars	Flesh firmness(kg)		Average	TSS(%)		Average
	2011	2012		2011	2012	
Big Top	6.98	4.71	5.84 b	15.67	15.50	15.58 a
Fantasia	6.37	6.89	6.63 ab	12.53	12.63	12.58 b
S.Red Gold	6.29	8.54	7.41 a	14.90	14.32	14.61 bc
Fairlane	7.93	7.34	7.63 a	13.13	13.63	8.38 bc
Average	6.89	6.87		14.05	14.02	
Year(NS), Cultivar**, Year x Cultivar**, NS: No significant ++: Means with same letter are not different at the p=0.05(*) and p=0.01(**)				Year(NS), Cultivar**, Year x Cultivar(NS), NS: No significant ++: Means with same letter are not different at the p=0.05(*) and p=0.01(**)		

**Table 9.** Titretable acidity and pH findings of peach cultivars in Tokat ecological conditions

Cultivars	Titretable acidity(%)		Average	pH		Average
	2011	2012		2011	2012	
Redhaven	0.60	0.80	0.70 bc	4.53	3.58	4.06 b
Elegant Lady	1.35	1.05	1.20 a	4.19	3.65	3.92 b
Monreo	1.73	0.71	1.22 a	3.63	3.70	3.65 c
Fairtime	1.49	0.75	1.12 a	4.31	3.88	4.09 b
Vesuvio	0.85	0.47	0.66 c	4.52	4.20	4.37 a
Viviana	1.10	0.60	0.85 b	4.29	3.66	3.97 b
Average	1.19 a	0.73 b		4.25 a	3.78 b	
Year**, Cultivar**, Year x Cultivar**, NS: No significant ++: Means with same letter are not different at the p=0.05(*) and p=0.01(**)				Year**, Cultivar**, Year x Cultivar*, NS: No significant ++: Means with same letter are not different at the p=0.05(*) and p=0.01(**)		

**Table 10.** Titretable acidity and pH findings of nectarine cultivars in Tokat ecological conditions

Cultivars	Titretable acidity(%)		Average	pH		Average
	2011	2012		2011	2012	
Big Top	0.50	0.51	0.50 c	4.77	4.14	4.46 a
Fantasia	1.36	0.87	1.11 b	4.11	3.59	3.85 b
S.Red Gold	1.65	1.11	1.38 a	3.73	3.67	3.70 b
Fairlane	2.07	0.78	1.42 a	3.95	3.57	3.76 b
Average	1.39 a	0.81 b		4.14 a	3.75 b	
Year**, Cultivar**, Year x Cultivar**, NS: No significant ++: Means with same letter are not different at the p=0.05(*) and p=0.01(**)				Year**, Cultivar**, Year x Cultivar**, NS: No significant ++: Means with same letter are not different at the p=0.05(*) and p=0.01(**)		

**Table 11.** Ground skin colours of peach and nectarine cultivars in Tokat ecological conditions

Cultivars	Ground skin colours					
	Peach cultivars					
	2011			2012		
	<i>L</i>	<i>a</i>	<i>b</i>	<i>L</i>	<i>a</i>	<i>b</i>
Redhaven	67.94	15.43	49.68	73.38	0.45	65.63
E.Lady	70.87	1.04	45.39	65.52	-1.51	49.89
Monreo	76.74	-4.40	54.24	73.73	-2.30	50.66
Fairtime	84.37	-5.88	55.69	79.14	-1.56	62.17
Vesuvio	64.19	6.97	56.51	43.79	38.02	40.54
Viviana	74.14	94.07	68.40	69.98	1.86	59.83
Nectarine cultivars						
Big Top	53.31	33.23	39.03	67.49	7.98	58.63
Fantasia	58.84	-5.36	53.34	72.57	-3.85	54.96
S.Red Gold	72.12	-0.90	56.28	69.45	-3.02	55.32
Fairlane	77.41	-10.80	57.52	82.25	12.60	63.17

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