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Table Fig (*Ficus carica* L.) Selection in Mardin Province of Turkey

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Abstract: Turkey has great variations in distributions of wild fig forms as well as cultivated figs. Beşkonak village has a special importance with respect to the genetic resources of figs. This study was carried out during 2002-2003 in Beşkonak village of Derik county of Mardin province, which is located in the South East Anatolia Region of Turkey. Five different fig genotypes have the same name were selected in this research. According to the results of the weighted ranked method, 47-02-1 and 47-02-4 genotypes which had the highest scores (934 and 924) among the fig types were determined to be the best table figs. In the this study, fruit weight, fruit width, ostiolum width, TSS and titrable acidity of the genotypes were determined as 72.38-56.48 g, 61.35-46.73 mm, 5.15-2.35 mm, 23.53-18.12% and 0.26-0.20%, respectively. In general, these fig genotypes have been consumed to be fresh.
Keywords: *Ficus carica*, Fresh Consumption, Fruit Quality, Selection, Mardin

Türkiye'nin Mardin İlinde Sofralık İncir (*Ficus carica* L.) Seleksiyonu

Özet: Türkiye kültüre edilmiş incirlerin yanı sıra yabani incir formlarının yayılmasında büyük varyasyonlara sahiptir. Beşkonak köyü incir genetik kaynakları açısından özel bir öneme sahiptir. Bu çalışma Mardin'in Derik ilçesine bağlı Beşkonak köyünde 2002-2003 yıllarında yapılmıştır. Burası, Türkiye'nin Güneydoğu Anadolu Bölgesinde bulunmaktadır. Bu araştırmada, aynı isme sahip olan 5 farklı incir genotipi seçilmiştir. Tartılı derecelendirme metodu sonuçlarına göre, bütün incir genotipleri içinde en yüksek puana (934 ve 924) sahip olan 47-02-1 ve 47-02-4 genotipleri en iyi sofralık incirler olarak belirlenmiştir. Bu çalışmada genotiplerin meyve ağırlığı, meyve çapı, ostiol çapı, toplam kuru madde ve titre edilebilir asitliği sırasıyla 72.38-56.48 g, 61.35-46.73 mm, 5.15-2.35 mm, %23.53-18.12 ve %0.26-0.20 olarak bululmuştur.
Anahtar Kelimeler: *Ficus carica*, Taze Tüketim, Meyve Kalitesi, Seleksiyon, Mardin

1. Introduction

Turkey is an important genetic source for horticultural crops with varieties which have multiplied numerously during the centuries. Some temperate fruit species as well as figs are also originated in Anatolia (Özbek, 1978; Küden, 1995). North, West and South regions of Turkey contain rich fruit germplasm and the fig is one of the most important one among them (Aksoy et al., 1992; Küden and Tanrıver, 1997). Because of the wide adaptability of varieties to the soil and the climatic conditions, the fig is widely grown and extended to the South East Anatolia, the Aegean and the Mediterranean regions (Küden, 1995).

On the way of the extension of the fig to the neighbouring countries such as Caucasia, Caspian Sea, Iraq and Syria, a rich genotype population occurs in Anatolia. Therefore, South East Anatolia region has a special place of containing rich fig germplasm (Ilgın, 1995).

The total fig production of Turkey is 210.152 tons (Anonymous, 2007). Fig has long been cultivated in the dried form. In Turkey, a lot of the researches about the fig also have been directed towards dry fig culture. However, recently, the increased possibility for transportation and the developments in packaging for table fruits have led to an increase in the production and export of table figs (Ilgın and Küden, 1997) and there has been a big demand for fresh figs in the European markets. So, the fresh figs from Turkey should have a big market in the very near future (Polat and Ozkaya, 2005).

Bursa Siyahı is one of the best quality fresh fig cultivar grown in Turkey and there is an increase in its export (Çalışkan, 2003). In addition to Bursa Siyahı, there are many other good quality fresh cultivars (Polat and Ozkaya, 2005). The importance of fresh fig production and exportation tended the researches to find good quality fig cultivars. So, the fig selection studies have begun since 1990's with the experiments of Kaşka et al. (1990); Aksoy et al. (1992); Polat and Ozkaya (2005); Alper (2006); Calışkan and Polat (2008); Şimsek and Kuden (2008); Şimşek (2009a) and Şimşek (2009b). In the present study, the selection work has been continued in the Beşkonak village of Derik county of Mardin province to find out the best

table fig genotypes, with emphasis on the quality characteristics.

2.Materials and Method

This study was carried out during 2002 – 2003 in Beşkonak village of Derik county of Mardin province, which is located in the Southeast Anatolia Region of Turkey. Female fig trees growing in conditions with appropriate nutrition were surveyed and the selected genotypes were evaluated according to the fig descriptors of Aksoy (1991). Five fig genotypes were included in the study and their fruit qualities were determined. In this context, 30 fruits were randomly selected from the each fig tree in each year. Harvested fruits were immediately transferred to ice boxes and then stored at 0^0C. After that, they were analysed with 3 replication and 10 fruits in each replication for the each year. To provide positive contributions to the production and export of the fig, the quality evaluation of the genotypes was performed according to a weighted ranked method (Table 1). The data were subjected to analysis of variance using JMP 5.0.1. The means were separated by Tukey's test at 0.05.

The fruit weight was measured with a scale sensitive to 0.01 g. The fruit length and width, neck length and the ostiolum width were measured by a digital compass. The total soluble solids were determined with a hand-held refractometer. The titrable acidity was determined by titrating with 0.1 N NaOH to an endpoint of pH 8.10. The fruit shape index was calculated by dividing the width by length. The coordinates and the altitudes of the genotypes were determined with CPS tool.

3.Results and Discussion

During the research, five genotypes were selected with special emphasis on the fruit quality characteristics of the figs. Table 2 presents the important characteristics of the fig genotypes in two years. Considering two years mean results, the fruit weight, width and length, the fruit shape index, neck length, ostiolum width, TSS and titrable acidity of the these genotypes were determined statistically different from each other at 5% level.

The fruit weight is one of the most significant components for determining size of the fruits. According to the averages in two years, the fruit weight was found to be lowest at 56.48 g in 47-02-6 and highest at 72.38 g in 47-02-1 g. These results were found to be better than the those of Koyuncu (1997). He determined the fruit weight ranged between 9.00 g and 39.37 g. The fruit width was found to be lowest at 46.73 mm in 47-02-7 and highest at 61.35 mm in 47-02-6. These results were found to be higher than the results of Bostan and Islam (1999) and Küden et al. (2008). They determined the fruit width ranged between 42.00 mm and 51.00 mm, between 49.97 mm and 32.97 mm, respectively. The fruit length was found to be lowest at 34.80 mm in 47-02-5 and highest at 41.21 mm in 47-02-1. Controversy, the results in this study with respect to the fruit length were lower than the results of Şen et al. (1993). They determined the fruit length ranged from 39.00 mm to 72.00 mm. In addition, no neck was observed in 1 genotype (47-02-7) while the others had necks and the their neck lengths were changed between 3.25 mm in 47-02-6 and 6.17 mm in 47-02-4. Küden et al. (2008) found that the neck length changed from 4.80 mm to 9.00 mm and Ilgın (1995) found the neck length changed between 14.50 mm (462-1 Bardak) and 7.30 mm (462-6 Bardak). Similarly, both Küden et al. (2008) and Ilgın (1995) also found the neckless fig types. The fruits with neck that are too long one aren't desired by the table fig industry. The neck length, the fruit length and width can change according to the charactetistics of the genotypes, maintenance requirements and the ecological conditions.

In this study, the ostiolum width was changed between 2.35 mm in 47-02-5 and 5.15 mm in 47-02-4. These results were between the maximum and minimum values of Aksoy et al. (1992). They determined the ostiolum width changed between 9.10 mm and 0.60 mm. But, The maximum and minimum ostiolum values in the this study were lower than the those of Şahin et al. (1994). They determined the ostiolum width changed between 3.17 mm and 6.15 mm. A large ostiolum on the fig is an undesirable characteristic as pests and pathogens enter the fruit (Can, 1993). The fruit shape index was found to be lowest at 1.16 in 47-02-7 and highest at 1.58 in 47-02-6. These results were similar group to the results of all the Abbas types of Ilgın (1995). She determined the fruit shape index ranged from 1.20 to 1.40

of Abbas types. The fruit shape index can change according to the genetic characteristics. In addition, the peeling of skin of all the fig genotypes was observed to be ease and their fruit skin cracks were observed to be none. These observations in terms of the peeling of skin and the fruit skin cracks were perfect for the genotypes. In addition, the results were better than those of Şimsek and Küden (2008), Polat and Ozkaya (2005) and Ilgın and Küden (2007).

According to the averages in the two years, The TSS ratio of the selected fig genotypes was found to be lowest at 18.12% in 47-02-5 and highest at 23.53% in 47-02-1. These results were found to be better than the results of Koyuncu (1997). He determined the TSS ratio ranged from 11.90 % to 24.30 % in the fig type under Sanlıurfa conditions. For high quality table figs, TSS contents should be between 13.0% and 25.1% (Aksoy et al., 1992). In addition, the titrable acidity was found to be the lowest at 0.20% in 47-02-5 and highest at 0.26% in 47-02-1. These results were between the maximum and minimum values of Küden et al. (2008). They determined the titrable acidity ratio changed from 0.18% to 0.48% in 3 years experiment. High quality table figs with respect to the titrable acidity contents are best if they are between 0,226% and 0.300 (Aksoy et al., 1992). The reason for the difference between the results of this research in term of the titrable acidity can change according to the characteristics, harvested earlier or later and the ecological conditions of the genotypes.

According to the weighted ranked method, it was determined that all the fig genotypes had 100 scores of the peeling of skin and the fruit skin cracks and 54 scores of the fruit shape (average of years 2002-2003). These results about the scores of the peeling of skin and the fruit skin cracks were higher than the results of Polat and Ozkaya (2005). It is showed that the scores of the fruit weight and the total points of all the fig genotypes are in figure 1. The scores of the neck length, the ostiolum width, TSS and the titrable acidity of all the genotypes are shown in figure 2. In this context, the results about the scores of the neck length, the ostiolum width, the TSS, the titrable acidity and the total points were higher than those of Çalışkan (2003). The more the scores of the fig genotypes according to the weighted ranked method are high, the more the fruit qualities are good.

Names, origins, coordinates and altitudes of all the fig genotypes were shown in Table 3 in 2002. All the these genotypes was selected in Beşkonak village of Derik county of Mardin province. In this context, the local name of all the genotypes was Zerık. The coordinates of 47-02-1 were 37603070 E-4135219 N and the coordinates of 47-02-7 were 37603078 E-4135483 N. In addition, 47-02-7 had lowest altitude (544 m) and 47-02-1 had highest altitude (600 m).

4.Conclusions

Turkey is the world's largest fig producing country. She represents more than half of the world fig export. To increase in the fig export, in addition to transportation and packaging, its quality also should be good. The Southeast Anatolia region are one of the most important centres of table fig genotypes in Turkey. The fruit quality characteristics of the genotypes should be determined and the genotypes which hsve good quality should be export to increase revenue in Turkey. Additionally, the fig is a very important fruit species for the world. It can be consumed in several ways, can easily be propagated, is adaptable to various conditions and very nutritional for the consumers. In general, the selected fig genotypes have good quality according to the scores of the weighted ranked method. If figs which have good guality are taken into conservation, the world will get the opportunity to produce and consume this fruit and have their nutritional advantages, which is especially adventages for poorer parts of the world.

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Table 1. Evaluation of the selected fig genotypes according to the weighted ranked method

Characteristics	Total points	Classification and points			
Fruit weight	40	<20.0 g	0	20.1 -30.0 g	2
		30.1 -40.0 g	4	40.1 -50.0 g	6
		50.1 -60.0 g	8	> 60.0 g	10
Fruit shape index	9	I<0.9	8	I=0.9-1.1	10
		I>1.1	6		
Neck length	6	<5.0 mm	0	5.1-10.0 mm	10
		10.1-15.0 mm	6	>15.0 mm	2
Fruit skin cracks	10	none-little	10	medium	6
		high	0		
Peeling of skin	10	easy	10	medium	6
		difficult	0		
Ostiolum width	5	0.0-2.0 mm	10	2.1-4.0 mm	8
		4.1-6.0 mm	6	>6.1 mm	2
Total soluble solid content	10	< 13.0%	2	13.1-16.0%	4
		16.1-20.0%	10	20.1-25.1%	8
		> 25.1%	6		
Titrable acidity	10	< 0. 050%	0	0.051-0.125%	6
		0.126-0.225%	8	0.226-0.300%	10
		> 0.301%	4		
Total	100				

Table 2. The fruit characteristics of the selected fig genotypes (average of years 2002-2003)

Code no	Fruit weight (g)	Fruit length (mm)	Fruit width (mm)	Fruit shape index	Neck length (mm)	Ostiole width (mm)	TSS (%)	Titrable acidity (%)
47-02-1	72.38 a	41.21 a	56.41 b	1.37 b	5.29 b	2.91 c	23.53 a	0.26 a
47-02-4	66.20 b	37.28 bc	55.12 b	1.48 a	6.17 a	5.15 a	21.38 b	0.24 ab
47-02-5	56.82 c	34.80 c	53.13 c	1.53 a	5.58 b	2.35 d	18.12 d	0.20 c
47-02-6	56.48 c	38.80 ab	61.35 a	1.58 a	3.25 c	3.43 b	18.91 c	0.24 ab
47-02-7	58.08 c	40.44 a	46.73 d	1.16 c	0.00 d	2.76 c	19.32 c	0.22 bc

Mean separation within columns by Tukey's test at 0.05 level

Table 3. Names, origins, coordinates and altitudes of the selected fig genotypes in Mardin in 2002

Code no	Names	Origins	Coordinates	Altitudes (m)
47-02-1	Zerık	Beşkonak village	37603070 E-4135219 N	600
47-02-4	Zerık	Beşkonak village	37603165 E-4135349 N	584
47-02-5	Zerık	Beşkonak village	37602998 E-4135445 N	598
47-02-6	Zerık	Beşkonak village	37602975 E-4135225 N	570
47-02-7	Zerık	Beşkonak village	37603078 E-4135483 N	544

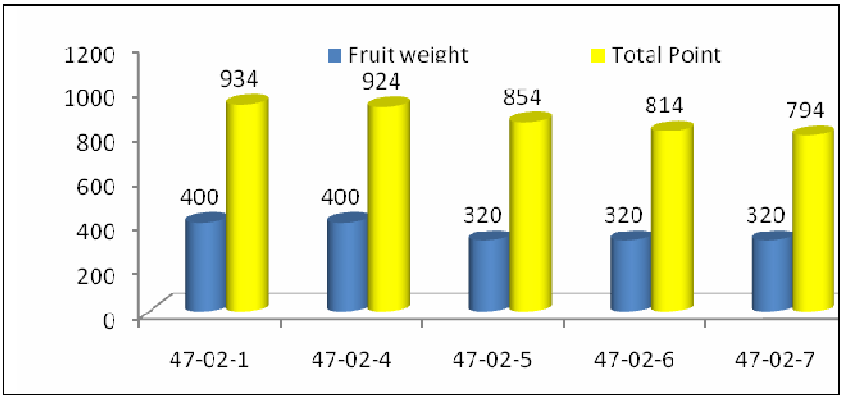

Figure 1. The scores of the fruit weight and the total point of all the fig genotypes (average of years 2002-2003).

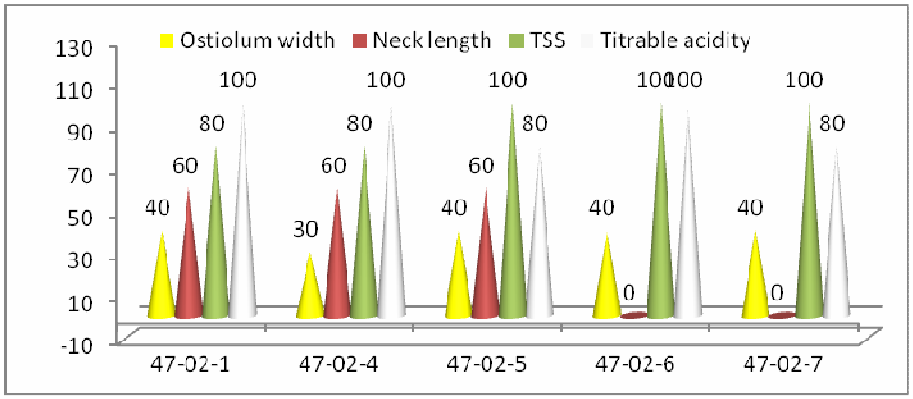

Figure 2. The scores of the neck length, the ostiolum width, the TSS and the titrable acidity of all the fig genotypes (average of years (2002-2003).