Pak. J. Bot., 49(2): 541-546, 2017.

IDENTIFICATION AND SELECTION OF SOME FEMALE FIG (*FICUS CARICA* L.) GENOTYPES FROM MARDIN PROVINCE OF TURKEY

MIKDAT SIMSEK[1*], ERSIN GULSOY[2], M ZEYDIN KIRAR[3], YUSUF TURGUT[4] AND BEDRIYE YUCEL[5]

[1]*Department of Horticulture, Faculty of Agriculture, Dicle University, 21280, Turkey*
[2]*Department of Horticulture, Faculty of Agriculture, Igdir University, 76000, Turkey*
[3]*Kayapinar District Municipality of Diyarbakir Province, 21070, Turkey*
[4]*Ministry of Food Agriculture and Livestock of Mardin Province, 47100, Turkey*
[5]*Science and Technology Application and Research Center, Dicle University, 12280, Turkey*
[*]*Correspondence author's e-mail: mikdat.simsekicle.edu.tr*

Abstract

Female fig genotypes in the Beyazsu region located between Nusaybin and Midyat districts (Mardin) in Turkey were selected using the weighted ranking method during years 2014-2015. Each selected genotype was identified. The total scores of the genotypes varied from 704 to 950. Fruit weight ranged from 47.68 to 72.68 g, ostiole width from 1.53 to 5.96 mm, total soluble solids (TSS) from 20.67 to 23.87% and acidity from 0.18 to 0.23%. All the genotypes had long petioles and green shoots. The leaf lobe shape was lyrate in two genotypes named MBSU16 and MBSU23, and latate in the rest of the genotypes. The tree growth habit was open in two genotypes named MBSU16 and MBSU24 but spreading in other genotypes. In conclusion, two genotypes MBSU11 and MBSU21 scored the highest in overall quality. These two genotypes should be preserved as genetic resources for future breeding programs.

Key words: *Ficus carica* L., Selection, Mardin.

Introduction

Fig (*Ficus carica* L.) is one of the world's oldest horticultural crops. It is indigenous to many areas, ranging from Asiatic Turkey to Northern India, and local genotypes are cultivated in most Mediterranean countries (Kuden, 1996). The fig fruit is well known for its attractive taste and nutritive value, and mostly consumed as fresh (Solomon *et al.*, 2010). Endemic to Turkey (Kuden & Tanriver, 1998), this plant can adapt readily to different soil and climatic conditions (Simsek, 2009a).

Turkey has been the prime fig producer for many decades, producing (298.914 tons) about one-fourth of all figs grown worldwide (1.115.849 tons). Egypt, Algeria, and Morocco also produce significant quantities of figs; 158.089, 117.100 and 101.989 tons annually, respectively (Anon., 2013). Table (fresh) figs are considered exotic in many European countries where they cannot be cultivated. Nevertheless, interest in fresh figs is increasing (Ozeker and Isfandiyaroglu, 1998).

Quite few Turkish scientists carried out identifications and selections of native fig populations from different areas, exhibiting different fruit, leaf, and tree characteristics (Aksoy *et al.*, 1992; Ilgin, 1995; Caliskan & Polat, 2008; Simsek, 2009b; Gozlekci, 2010; Simsek & Kuden, 2010; Simsek, 2011; Simsek & Kuden, 2011; Caliskan & Polat, 2012; Sezen *et al*., 2014).

Beyazsu region, located between Nusaybin and Midyat districts (Mardin) in Turkey (Fig. 1), has a distinctive microclimatic environment derived most likely the Beyazsu waterfall. Around the waterfall area, climatic conditions are similar to the conditions of Mediterranean region. In this microclimate, fruit trees such as pomegranate, figs, walnut, almond and mulberry and forest trees such as pine, poplar and sycamore flourish (Fig. 2).

To our knowledge, no fig selection studies have been reported in Bayaszu region. Thus the present study was undertaken with aim of 1) selection, 2) identification and 3) preservation of genetic resources of superior fig genotypes.

Material and Methods

A total of 54 table fig genotypes were studied in Beyazsu (Mardin) region of southeast Turkey in 2014 and 2015. The region is situated between $37^0 16' 3.23''$ N - $41^0 18' 4.60''$ E coordinates in North part and $37^0 5' 52.84''$ N – $14^0 42' 5''$ E coordinates in South part, with 350 to 1000 m attitude (Anon., 2016). Six superior female fig genotypes were selected, while other were eliminated using a weighted ranking method (Aksoy, 1991). Thirty fruits were randomly collected from each fig genotypes per year, placed immediately on ice, and stored at 0°C for further analyses. Titratable acidity and total soluble solids (TSS) were evaluated three times annually. pH and TSS data were obtained using pH meter and hand-held refractrometer, respectively. Titratable acidity was determined through titration with 0.1 M NaOH to an endpoint of pH 8.10. Fruit length and width, neck length, ostiole width, the fruit shape index, leaf width, leaf length, and petiole length, were measured digitally. Fruit weight was measured with digital balance with a sensitivity of 0.01 g. The fruit shape index was calculated by dividing fruit width by length. Morphological characteristics of tree, fruit and leaf of all genotypes were recorded to descriptors for fig (*Ficus carica* L.) (Anon., 2003). All data were subjected to analysis of variance with the aid of SPSS Inc (PASW Statistics 18).

Fig. 1. Beyazsu region (Mardin) in Turkey (Anon., 2016).

Fig. 2. A portion of Beyazsu region (Anon., 2016).

Results

According to weighted ranking method of selected female fig genotypes, the highest point score was 950 (MBSU11**)** and the lowest 704 (MBSU16). The notable point scores of MBSU21, MBSU23, MBSU27 and MBSU34 genotypes were 880, 794, 790 and 780, respectively. Significant fruit characteristics of superior fig genotypes from Beyazsu region are shown in Table 1. Fruit weight of fig genotypes and cultivars is an important variation. The fruit weight of fig accessions from Beyazsu region ranged from 47.68 g (MBSU27) to 72.68 g (MBSU11). The fruit width and length ranged between 46.94 mm (MBSU34) and 6.67 mm (MBSU11) and 44.03 mm (MBSU23) and 60.15 mm (MBSU11), respectively. The fruit shape index of genotypes in Beyazsu region ranged from 0.96 and 1.17. All the fig genotypes had a neck ranging between 4,04 mm (MBSU16) and 6.02 mm (MBSU21). The ostiole widths of the fruits were measured between 1.45 (MBSU16) and 5.96 mm (MBSU34). The soluble solids (TSS), pH, acidity and TSS/acidity of the fig fruit juice ranged from 20.67 (MBSU16) to 23.87% (MBSU23), from 4.73 (MSBU16) to 4.93 (MSBU11), from 0.18 (MSBU16 and MSBU21) to 0.23 (MSBU23) and from 102.33 (MSBU23 to MSBU27), respectively. The number of lobes in the leaf were 3 in four genotypes (MBSU11, MBSU21, MBSU27 and MBSU34) and 5 lobes in the remaining genotypes, the number of leaves per shoot from 10.04 (MBSU34) to 11.7 (MBSU23), leaf width from 20.4 (MBSU21) cm to 26.9 cm (MBSU23), leaf length from 23.1 cm (MBSU21) to 30.3 cm (MBSU34) and petiole length from 10.6 cm (MBSU21) to 13.9 cm (MBSU23) (Fig. 3). Significant botanic identification of superior fig genotypes from Beyazsu region are shown in Table 2. Fruit skin cracking was very minute in our selected fig genotypes. There was no difference in ease of peeling; all of the fig genotypes were easy to peel. Little variation was detected in skin cracking as the fig genotypes usually had no cracks.

Discussion

In this study, the results obtained related to the point scores of genotypes were different somewhat from the previous findings in Mardin province but not in the same area (Polat & Caliskan, 2008; Simsek, 2009a). The total points awarded in the cited works were 480–850 (Polat & Caliskan, 2008) and 532–894 (Simsek, 2009a). The reasons for such differences can be variations in genetic characteristics, climatic and soil conditions, and culture techniques (pruning, irrigation, and fertilization regimes).

In previous works, Sezen *et al.* (2014) reported fruit weight from 14.9 to 44.1 g on a large number of fig accessions sampled in Çoruh valley in Turkey. Gozlekci (2011) carried out a selection study on figs in Kemer and Alanya districts belongs to Antalya providence, found that fruit weight was between 14.7 and 60.5 g in Kemer district, while varied from 13.8 to 48.5 g in Alanya district. Previously fruit weights of fig accessions from Turkey and different countries showed great variability that varied from 9 to 134 g (Chessa & Nieddu 1990; Ilgin 1995; Kuden *et al.,* 1995; Bostan *et al.,* 1998; Aksoy *et al.,* 2003; Ferrara & Papa 2003; Karadeniz, 2003; Caliskan & Polat 2008; Simsek, 2009a; Simsek 2009b, Simsek and Kuden 2011; Sezen *et al.,* 2014). Sezen *et al.* (2014) reported fruit width between 29.3 mm and 45.9 mm and fruit length between 28.6 mm and 46.7 mm, respectively. Our fruit width and length results were between above literature and also our results are parallel to the findings of previous reports (Ilgin, 1995; Kuden *et al.,* 1995; Ozkaya, 1997; Kuden & Tanriver, 1998; Ferrara & Papa, 2003; Caliskan & Polat, 2008; Simsek, 2009a; Simsek 2009b; Simsek & Kuden 2011). Aksoy *et al.* (1992) reported that the fruit size (width and length) and fruit weight were considered as an important trait in the fresh consumed figs. Small fig fruits are used for canning, whereas big ones are consumed as fresh in general, particularly Mediterranean (Gozlekci, 2011) and Southeast Anatolia region in Turkey (Simsek, 2009b).

Gozlekci (2011) reported fruit shape index fig accessions were between 0.77 and 1.16. Fruit shape index of our fig genotypes were acceptable, similar to data in previous studies (Bostan *et al.,* 1998; Simsek, 2009a, b; Gozlekci 2011; Sezen *et al.,* 2014). The fruit shape index (width/length) is very important criteria especially for of packaging and transportation. All fig genotypes studied were commercially viable in terms of fruit shape.

Table 1. Some significant fruit characteristics of superior fig genotypes from Beyazsu region.

Genotypes	Fruit weight (g)	Fruit length (mm)	Fruit width (mm)	Fruit shape index	Neck length (mm)	Ostiole width (mm)	TSS (%)	pH	Acidity (%)	TSS/Acidity
MBS 11	72.68 ± 3.35	60.15 ± 3.09	66.67 ± 2.59	1.11 ± 0.08	5.57 ± 0.04	3.96 ± 0.17	22.60 ± 0.27	4.93 ± 0.15	0.19 ± 0.01	116.99 ± 4.76
MBSU16	46.27 ± 1.71	44.26 ± 1.35	51.89 ± 0.91	1.17 ± 0.02	4.04 ± 0.37	1.45 ± 0.12	20.67 ± 0.50	4.73 ± 0.23	0.18 ± 0.03	117.10 ± 20.58
MBSU21	58.78 ± 2.06	52.72 ± 3.90	50.88 ± 1.01	0.97 ± 0.06	6.02 ± 0.17	1.53 ± 0.18	22.13 ± 0.15	4.83 ± 0.15	0.18 ± 0.04	125.96 ± 27.49
MBSU23	51.43 ± 2.52	44.03 ± 5.46	51.39 ± 1.80	1.18 ± 0.10	4.39 ± 0.38	3.56 ± 0.38	23.87 ± 0.15	4.80 ± 0.10	0.23 ± 0.01	102.33 ± 3.11
MBSU27	47.68 ± 2.58	49.05 ± 6.30	50.71 ± 7.82	1.03 ± 0.06	5.78 ± 0.25	3.13 ± 0.27	21.63 ± 0.35	4.77 ± 0.21	0.21 ± 0.03	102.78 ± 14.37
MBSU34	49.58 ± 3.03	49.51 ± 5.86	46.94 ± 1.31	0.96 ± 0.09	5.84 ± 0.38	5.96 ± 0.15	22.90 ± 0.10	4.77 ± 0.15	0.19 ± 0.01	122.75 ± 3.40
Mean	54.40	49.95	53.08	1.07	5.27	3.26	22.30	4.81	0.20	114.65
SD	9.62**	6.86**	7.12**	0.11**	0.84**	1.59**	1.06**	0.16**	0.03**	15.99**
Max.	76.19	61.93	69.13	1.26	6.19	6.12	20.2	4.6	0.14	90.00
Min.	44.87	39.33	45.53	0.90	3.76	1.31	24.0	5.1	0.24	157.14

** Statistically significant at 0.01

Table 2. Some significant botanic ıdentification of superior fig genotypes from Beyazsu region.

	Genotypes and botanic identifications					
	MBSU11	**MBSU16**	**MBSU21**	**MBSU23**	**MBSU27**	**MBSU34**
1. Biological characters						
1.1. Beginning of fruit maturation	Early (20-31 July)	Very early (<20 July)	Early (20-31 July)	Very early (<20 July)	Very early (<20 July)	Early (20-31 July)
1.2. Full maturity	Mid-season (11-31 August)	Mid-season (11-31 August)	Mid-season (11-31 August)	Early (1-10 August)	Early (1-10 August)	Mid-season (11-31 August)
1.3. Harvest period	Long (41-60 days)	Very long (>60 days)	Long (41-60 days)	Very long (>60 days)	Medium (21-40 days)	Long (41-60 days)
1.4. Apical dominancy	Absent	Absent	Absent	Absent	Absent	Absent
1.5. Crop setting fruit (Breba)	Absent	Absent	Absent	Absent	Absent	Absent
1.6. Crop setting fruit (Main crop)	Present	Present	Present	Present	Present	Present
1.7. Crop setting fruit (Late crop)	Absent	Absent	Absent	Absent	Absent	Absent
2. Growth characters	**MBSU11**	**MBSU16**	**MBSU21**	**MBSU23**	**MBSU27**	**MBSU34**
2.1. Tree growth habit	Spreading	Open	Spreading	Spreading	Spreading	Open
2.2. Tree vigour	High	Intermediate	High	High	High	Intermediate
2.3. Relative degree of branching	Dense	Intermediate	Dense	Dense	Dense	Intermediate
2.4. Terminal bud colour	Green	Light green	Green	Light green	Light green	Green
2.5. Terminal bud shape	Spherical	Conical	Spherical	Conical	Spherical	Conical
2.6. Shoot colour	Green	Green	Green	Green	Green	Green
2.7. Shoot length	Long	Medium	Long	Long	Long	Medium
2.8. Shoot width	Thick	Medium	Thick	Medium	Thick	Medium
2.9. Tendency to form suckers	Medium	Medium	Medium	Medium	Medium	Medium
2.10. Burrknots quantity	Rare	Rare	Rare	Frequent	Frequent	Rare
3. Leaf characters	**MBSU11**	**MBSU16**	**MBSU21**	**MBSU23**	**MBSU27**	**MBSU34**
3.1. Leaf shape	Base cordate, three-lobed	Base calcarate, lobes lyrate	Base cordate, three-lobed	Base calcarate, lobes lyrate	Base cordate, three-lobed	Base cordate, three-lobed
3.2. The lobe shape	Latate	Lyrate	Latate	Lyrate	Latate	Latate
3.3. Density of hairs/spicules on leaf upper surface	Sparse	Dense	Sparse	Sparse	Dense	Sparse
3.4. Density of hairs or spicules on lower surface	None	None	None	None	Sparse	None
3.5. Leaf colour	Green	Light green	Green	Green	Green	Light green
3.6. Petiole colour	Green	Light green	Green	Green	Green	Light green
3.7. Petiole length	Long	Long	Long	Long	Long	Long
3.8. Tendency to form suckers	Medium	Medium	Medium	Medium	Medium	Medium
4. Fruit characters	**MBSU11**	**MBSU16**	**MBSU21**	**MBSU23**	**MBSU27**	**MBSU34**
4.1. Fruit shape	Oblate	Oblate	Globose	Oblate	Globose	Globose
4.2. Fruit width	Very large	Large	Large	Large	Large	Medium
4.3. Fruit length	Long	Short	Medium	Short	Medium	Medium
4.4. Fruit neck length	Medium	Short	Medium	Short	Medium	Medium
4.5. Ostiole width	Large	Medium	Medium	Large	Large	Very large
4.6. Drop at the eye	Absent	Absent	Absent	Absent	Present	Absent
4.7. Shape of the fruit stalk	Variously enlarged	Variously enlarged	Long and slender	Long and slender	Variously enlarged	Long and slender
4.8. Abnormal fruit formation	None	None	None	Scarce	None	None
4.9. Ease of peeling	Easy	Easy	Easy	Easy	Easy	Easy
4.10. Fruit skin cracks	Minute cracks	Minute cracks	Minute cracks	Minute cracks	Minute cracks	Minute cracks
4.11. Resistance to ostiole-end cracks	Resistant	Resistant	Resistant	Resistant	Resistant	Resistant
4.12. Abnormal fruit formation	None	None	None	Scarce	Scarce	None
4.13. Fruit skin ground colour	Light green	Light green	Yellow green	Green	Yellow	Yellow green
4.14. Fruit skin over colour	Absent	Absent	Other	Yellow	Green	Purple
4.15. Pulp internal colour	Pink	Amber	Pink	Amber	Red	Amber
4.16. Fruit cavity	Very small	Very small	Very small	None	Very small	Small

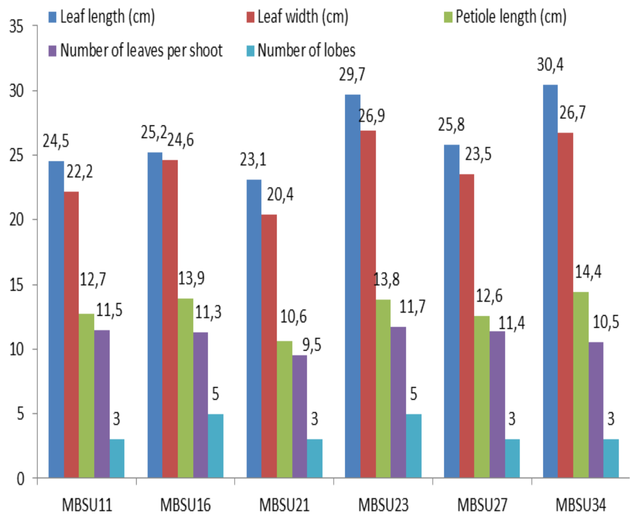

Fig. 3. Some significant leaf dimensions of superior fig genotypes from Beyazsu region.

Caliskan & Polat (2008) reported 1.0-8.9 mm long neck in the fruits of fig genotypes whereas Sezen *et al*. (2014) found longer neck, 2.77 mm-13.32 mm, No neck and short neck length in fig fruits is preferred by growers because damages may occur during harvest (Ozeker & Isfandiyaroglu, 1998; Simsek, 2009a, b).

Simsek (2009a) reported ostiole width ranging between 3.58 and 4.44 mm. A large ostiole width on fig fruit is an undesirable characteristic as pests and pathogens enter fig fruit easily (Can, 1993; Simsek, 2009b). Therefore, fig fruits with narrower ostiolum widths are preferred by consumers; the fruit are less susceptible to decays compered to fruit with wider ostiolum. Ostiole width was reported as 0.60−9.10 mm (Aksoy *et al.*, 1992), 2.44-3.90 mm (Simsek, 2009b), 2.25-8.93 mm (Gozlekci, 2011) and 2.56-6.70 mm (Sezen *et al.*, 2014) in different fig growing areas in Turkey. Our results are in accordance with above mentioned studies.

Soluble solids, pH, acidity and TSS/acidity of the fig fruit juice were previously reported as 20.1-27.4%, 4.5-5.4, 0.09-0.26% and 81.3-257.3, respectively (Caliskan & Polat, 2008) in Mediterrean region, and 18.25-23.43%, 4.67-6.04, 0.14-0.23% and 63.11-137.03, respectively (Simsek, 2009b) in Southeast Anatolia region. The TSS/acidity ratio is one of the important attributes in fruit taste (Karacali, 2002). Preferred ratio varies with the use of fig fruits, but ratios provide guidance in the genotypes and cultivars for specific uses (Can, 1993; Simsek, 2009b; Simsek & Kuden, 2011). Our results are in the range of acceptable values for table figs. Soluble solids, pH, acidity and TSS/acidity of fruit juice in fig genotypes are affected by genotypic diversity, maintenance requirements and ecological conditions (Simsek, 2009a). Our results on the leaf area and the number of leaves per shoot are similar to the works done by Polat & Ozkaya (2005) and Simsek (2009a). Fig leaf dimensions are very important determinants; photosynthetic production rises as the leaf area increases. Leaf dimensions of plants are affected by genetic characteristics, maintenance requirements, and ecological conditions.

Fruit skin cracking was very minute in our selected fig genotypes, which alsonoted by Ozeker & Isfandiyaroglu (1998) as well; the extent of cracking was less than that reported by Polat & Caliskan (2008). Easy peeling is a crucial criterion for commercial purpose. Thus, skin cracking, peeling and other morphological characteristics of our fig genotypes are acceptable, similar to the results of previous researchers (Polat & Caliskan, 2008; Simsek, 2009a, b; Caliskan & Polat, 2012; Sezen *et al.*, 2014). Fig morphological characteristics are affected by genetic features, maintenance requirements, and climatic and soil conditions.

Conclusions

The fig genotypes in Beyazsu region (Mardin) of Turkey were first selected then some fruit and leaf characteristics were identified. The present study revealed that there was a significant biodiversity on most of morphological characteristics among selected genotypes. It is necessary to develop new table fig cultivars to foster sustainable increase in fruit production, with consideration of maturation periods, fruit quality, and the preferences of fig consumers. In view of the total scores of the selected genotypes, MBSU11 and MBSU21 may be considered as the best genotypes for fresh consumption. These fig genotypes might be used for future breeding studies therefore their germplasms should be preserved. Moreover, adaptation studies for the two genotypes should be conducted for various ecological conditions.

References

Aksoy, U. 1991. Descriptors for Fig (*Ficus carica* and Related Ficus sp.). *Ege University, Faculty of Agriculture, Depertment of Horticulture,* Izmir-Turkey.

Aksoy, U., G. Seferoglu, A.Misirli, S. Kara, M. Duzbastilar, S. Bulbul, H.Z. Can and N. Sahin. 1992. Clonal selection in cv. Sarilop fig. *Processing 1st National Horticultural Congress. Izmir (in Turkish),* 1: 545-548.

Aksoy, U., H.Z. Can, A. Misirli and S. Kara. 2003. Fig (*Ficus carica* L.) selection study for fresh market in western Turkey. *Acta Hortic.*, 605: 197-203.

Anonymous. 2003. IPGRI, "Descriptors for Fig (*Ficus carica* L.)," International Plant Genetic Resources Institute (IPGRRI), Rome, Italy and International Center for Advanced Mediterranean Agronomic Studies (CIHEAM), Paris, 52 p.

Anonymous. 2013. FAO. http://www.fao.org/statisticaldatabase/updated. Accessed (January, 2016).

Anonymous. 2016. Google Earth Pro (GEP). Beyazsu (Mardin). Accessed (January, 2016).

Bostan, S.Z, A. Islam and A. Aygun. 1998. A study on pomological caracteristics of local fig cultivars in Northern Turkey. *Acta Hortic.*, 480: 71-73.

Caliskan, O. And A.A. Polat. 2008. Fruit characteristics of fig cultivars and genotypes grown in Turkey. *Sci. Hort.*, 115: 360-367.

Caliskan, O. and A.A. Polat. 2012. Morphological diversity among fig (*Ficus carica* L.) accessions sampled from the Eastern Mediterranean Region of Turkey, *Turk. J. Agric. For.*, 36: 179-193.

Can, H.Z. 1993. A study on the determination of some characteristics of selected table figs in Aegean region. *Ege University Graduate* School of Applied and Natural Science, (MSc Thesis), (in Turkish), Izmir, Turkey.

Chessa, I. and G. Nieddu. 1990. Caratteristiche del Patrimonio Genetico del Fico in Sardegna. *Agricoltura Ricerca*, 12: 9-48.

Ferrara, E. and G. Papa. 2003. Evaluation of fig cultivars for breba crop. *Acta Hortic.,* 605:91–93

Gozlekci, S. 2010. Selection studies on fig (*Ficus carica* L.) in Antalya province of Turkey. *Afr. J. Biotechnol.*, 9: 7857-7862.

Gozlekci, S. 2011. Pomological traits of fig (*Ficus carica* L.) genotypes collected in the west Mediterranean region in Turkey. *J. Anim. Plant Sci.,* 21: 646-652.

Ilgin, M. 1995. Fig selection in Kahramanmaras region and floral biology of selected types. Cukurova University, *Graduate School of Applied and Natural Science, (Ph.D. Thesis),* Adana-Turkey (in Turkish).

Karacali, I. 2002. Storage and marketing of horticultural products. *Ege University Agriculture Faculty,* Publication no: 494 (in Turkish).

Karadeniz, T. 2003. A study on some fruit characteristics and propagations of these by hardwood cuttings of local cultivars grown in Ordu (Turkey). *Acta Hortic.,* 605: 107-112.

Kuden, A.B. 1996. Mediterranean selected fruits ıntercountry network (mesfın) under the aegis of FAO. *Plant Resources of Fig.*

Kuden, A.B. and E. Tanriver 1998. Plant genetic resources and selection studies on figs in the east Mediterranean and south east Anatolia regions. *Acta Hortic.,* 480: 49-54.

Kuden, A.B., E. Tanriver and N. Kaska. 1995. Determination of some fig cultivars and clones for Cukurova region. *Proceedings of 2nd National Horticultural Congress,* 1: 663-667.

Ozeker, E. and M. Isfendiyaroglu. 1998. Evaluation of table fig cultivars in Cesme peninsula. *Acta Hortic.,* 480: 55-60.

Ozkaya, M. 1997. Selection studies on figs in Antakya region. Musstafa Kemal University, Graduate School of Applied and Natural Science, (MSc Thesis), (in Turkish), p. 150.

Polat, A. and M. Ozkaya. 2005. Selection studies on fig in the Mediterranean region of Turkey. *Pak. J. Bot.,* 37: 567-574

Polat, A.A. and O. Caliskan. 2008. Fruit characteristics of table fig (*Ficus carica*) cultivars in subtropical climate conditions of the Mediterranean region. New Zealand Journal of Crop *Hort. Sci.,* 36: 107-115.

Sezen, I., E. Sezai and S. Gozlekci. 2014. Biodiversity of figs (*Ficus carica* L.) in Coruh valley of Turkey. *Erwerbs-Obstbau*, 56: 139-146.

Simsek, M. 2009a. Evaluation of selected fig genotypes from south east Turkey. *Afr. J. Biotechnol*., 8: 4969-4976.

Simsek, M. 2009b. Fruit performances of the selected fig types in Turkey. *Afr. J. Agri. Res*., 4: 1260-1267.

Simsek, M. 2011. *A study on selectionand Identification of Table Fig Types in East Edge of Firat River. Asian Journal of Animal and Veterinary Advances,* 6: 265-273.

Simsek, M. and A.B. Kuden. 2010. *Selection of Fig Genetic Material under Diyarbakir Conditions. International Journal of Botany,* 6: 251-258.

Simsek, M. and A.B. Kuden. 2011. A research on some fruit properties of selected fig types in Diyarbakir Province. *Sci. J. Bingol University*, 1: 1-6.

Solomon, A., S. Golubowicz, Z. Yablowicz, M. Bergman, S. Grossman, A. Altman, Z. Kerem and M.A. Flaishman. 2010. EPR studies of $O_2^{\bullet-}$, OH, and $^1O_2$ scavenging and prevention of glutathione depletion in fibroblast cells by cyanidin-3-rhamnoglucoside Isolated from Fig (*Ficus carica* L.) fruits. *J. Agric. Food Chem.,* 58: 7158-7165.

(Received for publication 22 February 2016)