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SECTION 23. Agriculture. Agronomy. The technique.

EVALUATING SOME CHARACTERS OF LEAVES , PHYSICAL AND QUALITY FRUITS OF THREE FIG, FICUS CARICA L., CULTIVARS OF SECOND CROP THAT HARVESTED AT TWO MATURITY STAGES

Abstract: *An experiment was conducted in a private orchard at Abbasyia , Najaf Governorate during the growing seasons of 2013 on fig cv. Aswod Diala , Waziri and Kadota to investigate the effect of variations on some characters of leaves leaf aria , total chlorophyll , number lobate , petiole length and physical and quality fruits of three Fig cultivars of second crop that harvested at two maturity stages was examined, including Fig quality attributes such as fruit weight ,Total soluble solids, , total sugar , vitamin C , titratable acidity (TA), percentage of carbohydrate , calcium pictate , firmness , and total cracking , antioxidant capacity on ripe fruits of fig . Results showed that cv. Kadota have the best result of studied characteristics a crew of antioxidant capacity at the year of experiment which were the highest rate at cultivar Aswod Diala compared with cultivar Waziri that gave lowest values at two maturity stage.*

Key words: *Evaluating some characters , physical and quality fruits of Fig.*
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Introduction

Fig trees (F. carica L.) are among the earliest cultivated fruit trees in the world (Solomon et al., 2006). Although its origin is not entirely known, F. carica is thought to have originated in western Asia and from there slowly spread through the Mediterranean region (Stover et al., 2007b). Figs were brought to America in 1520 by the Spaniards, and in 1769, they were introduced to California from Mexico. Figs are harvested worldwide on 419,000 ha with an annual production of over 1 million tons. The United States ranks sixth in the world's production, representing 4.6% of the total production (Food and Agriculture Organization, 2012). There are 5100 ha of figs in California, mainly in the San Joaquin Valley with yields triple the world's average yield. The main California cultivars are Calimyrna, Adriatic, Mission, Brown Turkey, and Kadota (Stover et al., 2007a). Until recently, fresh figs represented less than 5% of total fig production (Stover et al., 2007a); most of the California figs are destined for the driedmarket (Stover et al., 2007a) . However, during the period from 2002 to 2006, fresh fig production increased fourfold, constituting 16% of California's 2006 fig production (U.S. Department of Agriculture, 2007). This increase in fresh fig production is a consequence of increasing consumer demand for fresh quality produce of less familiar fruits (Stover et al., 2007a). In a preliminary survey of 1200 men and women conducted by Synovate, only 67% of the people surveyed were familiar with figs and only 55% with fresh figs. Of those surveyed, only 39% had ever eaten fresh figs, whereas 77% had eaten figs in cookies or bars (Synovate, 2004).California fresh fig production has increased, recently. As a result, there is now a market for cultivars with favorable fresh fig quality parameters and high consumer acceptance. Recent research demonstrated fig genotype and maturity stage influence fruit quality. Figs (Ficus carica L.) are a nutritious fruit rich in fiber, potassium, calcium, and iron (Chessa, 1997) with higher levels than other common fruits such as bananas, grapes, oranges, strawberries, and apples (Chessa, 1997; Michailides, 2003). Figs are free of sodium, fat-free, and, like other fruits, cholesterolfree. Additionally, figs are an important source of vitamins,

amino acids, and antioxidants (Solomon et al., 2006). Compounds with antioxidant properties such as vitamin C, tocopherols, carotenoids, and phenolics can alter the metabolic activation and detoxification / disposition of carcinogens, affect processes that modify the development of tumor cells (Kader, 2001), and avoid neurochemical and behavioral changes related with aging (Shukitt-Hale et al., 2007). Fig varieties with dark skin contain higher levels of polyphenols, anthocyanins, and flavonoids accompanied by higher antioxidant activity compared with fig varieties with lighter skin (Solomon et al., 2006). The large number of consumers unaware of figs, combined with positive consumer perception, indicates there is potential for development of a fresh fig market. However, most current California fig cultivars were selected for drying, and the growers have little fresh fruit handling experience. If a profitable fresh fig industry is to be developed in California, cultivar selection, fruit maturity, and postharvest technology during marketing should be evaluated to produce the quality fresh fig that will increase consumer consumption. Therefore, this work investigated some characters of levies, physical and quality fruits of three Fig cultivars grown in Iraq of second crop that harvested at two maturity stage .

Materials and methods

This study was conducted in a privat farm at Abbasiya / Najaf governorate for the 2013 season on fig trees cv. Aswod Diala , Waziri and Kadota , 4 at same size and growth trees for each cultivars were selected with 8 years of age , that planted on (5 x 5 m.) , they watered every five days , and fertilized by Nitrogenous and phosphatic in two periods in March and May of each year at a rate of 500 g. per tree , as well as by manur for the years . The experiment included 3 treatments with four replicates and the replicate one tree ,that harvested at second crop at first and full mature stage . It is a dopted according to Randomized Complete Block Design (RCBD) , and the results were statistically analyzed according to LSD test at the probability level of 5% (Al-Rawi and Khalf Allah , 2000) . Ten normal fruits were taken at random on 10/ 7/ 2013 from each tree for quality determination. The juice was extracted and the total soluble solids were determined by hand refract meter. Total chlorophyll in leaves mg / 100g ,Total and reducing sugar % and vitamin C mg /100 ml Juice according to (A.O.A.C , 1985) .Total carbohydrate in fruits determination according to(Joslyn , 1970) . Calcium pictate was determined according to (Rouhani and Basiri , 1976) . Firmness was measured on two sides of each fruit with an Effegi penetrometer (Model NI , McCormick Fruit Tech ,Yakima ,WA) Fitted with an 11.1mm tip . Antioxidant capacity was determined to previous work (Crisosto and Crisosto, 2001) . The percentage of total cracking were calculated during the months of July and August .

Results and discussion

1- Leaf aria , Total chlorophyll , Number lobate , Length petiole and Total yield .

Data in Table (1) shows that, a significantly differences between treatments in leaf aria , total chlorophyll , number lobate , length petiole and total yield and the Cultivar Kadota gave the highest rats of leaf aria , total chlorophyll , number lobate , length petiole and total yield they were (156.92cm^2 , 123.96 mg / 100 mg dry weight , 5 , 11.60cm and 19.85 Kg / tree) comparison with lowest rats in Cultivar Waziri (112.88cm^2 , 111.43 mg / 100 mg dry weight, 3 , 6.43cm and 14.43 Kg / tree) respectively . The leaf aria , total chlorophyll , number lobate and length petiole are genetic characters which involve in the relation of each of the three Cultivars . Kadota Cultivar of fig are epitasis on the other tow Cultivars, i.e Aswod Diala and Waziri in the rate of total yield. This increase was due to the increase in the leaf aria , total chlorophyll , number lobate and petiole length of leaf , particularly, petiole length which increase the space between leaves that results in the increase a movet of light to perpetrate to the lower leaf position which increase the leaf expose to light as much as possible, that reflect to an increase in photosynthesis, besides , the large area of leaf for Kadota Cultivar , which reflect its materials into the fruits and these factors due to decrease the percentage of dropping and cracking of fruits and then increasing production of trees .

2- Effect of maturity stage on fruits quality of fig cv. Aswod Diala , Waziri and Kadota .

Data in Table (2) shows that, total soluble solids, total sugar , percentage of carbohydrate , vitamin C, and Antioxidant capacity in fruits were increased significantly when fruits picked at full maturity comparison with first maturity in cv. Aswod Diala , Waziri and Kadota , also cv. Kadota gave the highest percentages of carbohydrate , total soluble solids, total sugar and vitamin C in fruits they were (16.43 % , 17.71 % , 16.24 % , 7.11 mg / 100 ml Juice) and (17.70 % , 16.92 % , 18.09 % and 8.01 mg / 100 ml Juice) in the fruits picked at first and full maturity respectively comparison with lowest rats (14.57 % , 12.50 % , 13.90 % and 6.13 mg / 100 ml Juice) and (15.32 % , 113.58 % , 14.38 % and 6.89 mg / 100 ml Juice) in cv. Waziri for the two mature stages respectively . The highest containing of Antioxidant capacity in fruits were found in cv. Aswod Diala for the two mature stages of second crop it was (3.38 and 3.85 mmol TE/g FW). Antioxidant capacity differed significantly between cultivars and between maturity stages . Waziri had the lowest antioxidant capacity (1.50 and 1.72 mmol TE/g FW). The higher antioxidant

capacity of cv. Aswod Diala which was almost double the others, is likely attributed to its dark skin color. Our fig antioxidant capacity values were similar to the ones reported for cultivars and a selection of strawberries (Battino and Mezzetti, 2006), higher than the ones recently reported for peaches and plums (Wang et al., 2008), and equal to or lower than some reported for blueberry cultivars (Bremer et al., 2008). Similar results were observed in six commercial fig cultivars with different skin colors ('Brown Turkey', 'Brunswick', 'Bursa', 'Chechick', 'Kadota', and 'Mission') growing

commercially under Israeli conditions (Solomon et al., 2006). Influence of genotype on antioxidant capacity has been reported in strawberries, apples, peaches, blueberries, and apricots (Bremer et al., 2008; Scalzo et al.,2005; Vizzotto et al., 2007). Thus, fig cultivars with dark skin contained higher levels of antioxidant activity compared with fig cultivars with lighter skin (Solomon et al., 2006). Increasing fruits from total soluble solids , total sugar , percentage of carbohydrate , vitamin C which results due to the fact that the cultivars had higher leave aria of vegetative growth and thus encourages the accumulation of carbohydrate meterials in fruits leading to increased content of these materials (Ferguson *et. al.* ,1999) .

3- Effect of maturity stage on chemical and physical characters of fig fruits cv. (Aswod Diala, Waziri and Kadota) of second crop .

Results indicated in Table (3) shows that the effect of maturity stage on chemical characters of fig fruits such as percentages of titratable acidity and calcium pictate and physical characters weight of fruit, firmness and percentage of total cracking in all cultivars . Calcium pictate and Firmness were reducing significantly in full maturity stage compared with first maturity stage in all cultivars . The cv. Kadota gave the highest percentages of calcium pictate , weight of fruit and Firmness , but lowest reslt in percentages of titratable acidity they were (3.01 % , 2.50 %) ,(45.90 , 49.83 g) , (0.401 , 0.387 Kg/cm^2) and (0.51 , 0.23 %) for the two mature stages respectively . The percentage of total cracking was decreased significantly when fruits picked at full maturity comparison with first maturity in cv. Aswod Diala , Waziri and Kadota . Also cv. Kadota gave the lowest percentage of total cracking (9.30 , 13.90 %) for the two mature stages respectively . The higher rates of percentage of total cracking in fruits of fig cultivar Waziri that reach to (17.60 , 20.54 %) in first and full maturity stage .The superior cv. Kadota which decreased titratable acidity and percentage of total cracking , and in the same times led to increase fruit weight , firmness and calcium pictate in comparison to other two cultivars which were Aswod Diala and Waziri .Kadota has these good traits because of having the best morphological characters of leaves which led to improve all parameters of fruits as shown in Table 1 .

Conclusion

It could be concluded from this experiment that the cv. Kadota have the highest result in fruit weight, Total soluble solids, , total sugar , vitamin C, percentage of carbohydrate, calcium pictate, firmness, and the lowest percentage of total cracking. The best containing of antioxidant capacity on ripe fruits of fig at cultivar Aswod Diala . The cultivar Waziri gave lowest values at two maturity stage

Table 1

Physical characters of leaves of fig cvs. (Aswod Diala , Waziri and Kadota) and Total yield for season 2013.

Cultivars	leaf aria cm^2	Total chlorophyll mg / 100g	Number lobate	Length petiole cm	Total yield Kg / tree
Aswod Diala	130.65	116.50	5	10.23	16.21
Waziri	112.88	111.43	3	6.43	14.43
Kadota	156.92	123.96	5	11.60	19.85
L . S. D. 0.05	9.45	3.36	0.7	3.12	2.61

Table 2

Effect of maturity stage on fruits quality of fig fruits cv. (Aswod Diala , Waziri and Kadota) of second crop for season 2013.

Cultivars	Maturity stage	% Total carbohydrate	% Total soluble solids	%Total sugar	Vitamin C mg / 100 ml Juice	Antioxidant capacity (mmol TE/g FW

Aswod Diala	First mature	15.19	13.75	15.00	6.88	3.38
	Full mature	15.98	14.17	15.76	7.25	3.85
Waziri	First mature	14.57	12.50	13.90	6.13	1.50
	Full mature	15.32	13.85	14.38	6.89	1.72
Kadota	First mature	16.43	15.71	16.24	7.11	1.44
	Full mature	17.70	16.92	18.09	8.01	1.82
L.S.D. 0.05		0.77	1.30	0.86	0.72	0.21

Table 3

Effect of maturity stage on chemical and physical characters of fig fruits cv. (Aswod Diala , Waziri and Kadota) of second crop for season 2013.

Cultivars	Maturity stage	% Titratable acidity	Weight of fruit (g)	% Calcium pictate	Firmness Kg/cm^2	% Total cracking
Aswod Diala	First mature	0.62	35.44	2.40	0.390	15.47
	Full mature	0.45	37.60	2.09	0.335	19.83
Waziri	First mature	0.65	28.19	2.11	0.321	17.60
	Full mature	0.52	31.57	1.89	0.248	20.54
Kadota	First mature	0.51	45.90	3.01	0.401	9.30
	Full mature	0.23	49.83	2.50	0.387	13.90
L.S.D. 0.05		0.18	3.22	0.28	0.036	2.53

References:

1. AL – Rawi , K. M. and A. M. Khalf Allah (2000) Design and Analysis of Agricultural Experiments . College of Agric. Univ. Mosel . Iraq .
2. Association of Officisal Analytical Chemist (1985) Official Methofds of Analysiks . 13th Ed. APAC . Washington . D. C. U. S. A.
3. Battino M, Mezzetti B (2006) Update on fruit antioxidant capacity: A key tool for Mediterranean diet. Public Health Nutr. 9:1099–1103.
4. Bremer V, Crisosto G, Molinar R, Jimenez M, Dollahite S, Crisosto CH (2008) San Joaquin Valley blueberries evaluated for quality attributes. Calif. Agr. 62:91–96.
5. Chessa I (1997) Fig, pp. 245–268. In: Mitra, S. (ed.). Postharvest physiology and storage of tropical and subtropical fruits. CAB International, Wallingford, UK.
6. Crisosto CH, Crisosto GM (2001) Understanding consumer acceptance of early harvested 'Hayward' kiwifruit. Postharvest Biol.Technol. 22:205–213.
7. Ferguson L, Michailides TJ, Shorey HH (1999) The California Fig Industry. Univ. California. U.S.A.
8. (2012) Food and Agriculture Organization. Data archives. FAOSTAT. 24 Nov. 2012.
9. Ibrahim AM (1996) Deciduous Fruit , Growth and Production . College of Agric. Univ. Alex. Egypt.
10. Joslyn AM (1970) Methods in food analysis, physical, chemical and instrumental methods of analysis. 2nd Ed., Academic Press. New York. London.
11. Kader A (2001) Importance of fruits, nuts, and vegetables in human nutrition and health. Perishables Handling Qrtly. 106: 4–6.

12. Michailides TJ (2003) Diseases of fig, pp. 253–273. In: Ploetz, R.C. (ed.). Diseases of tropical fruit crops.CABI, Wallingford, UK.
13. Scalzo J, Politi A, Pellegrini N, Mezzetti B, Battino M (2005) Plant genotype affects total antioxidant capacity and phenolic contents in fruit. Nutrition 21: 207–213.
14. Shukitt-Hale B, Carey AN, Jenkins D, Rabin BM, Joseph JA (2007) Beneficial effects of fruit extracts on neuronal function and behavior in a rodent model of accelerated aging. Neurobiol. Aging 28: 1187–1194.
15. Rouhani I, Bassiri A (1976) Changes in the physical and chemical characteristics of Shahani dates during development and maturity . Hort. Sci . 15
16. Solomon A, Golubowicz S, Yablowicz Z, Grossman S, Bergma M, Gottlieb H, Altman E, Kerem Z, Flaishman MA (2006) Antioxidant activities and anthocyanin content of fresh fruits of common fig (Ficus carica L.). J. Agr. Food Chem. 54:7717–7723.
17. Stover E, Aradhya M, Crisosto C, Ferguson L (2007) Overview of the California fig industry and new interest in varieties for fresh fruit. Proc. California Plant and Soil Conference: Opportunities for California agriculture, Sacramento, Calif. p. 169–175.
18. Stover E, Aradhya M, Ferguson L, Crisosto C (2007) The fig: Overview of an ancient fruit. HortScience 42: 1083–1087.
19. (2004) Synovate. Fig exploratory attitude and usage study. Presentation of results. Research reinvented. Prepared for Kraft Foods. Job number P979 .
20. (2007) U.S. Department of Agriculture. 2007. Noncitrus fruits and nuts 2006 summary. Agricultural statistics board. NASS, USDA. 29 Nov.
21. Vizzotto M, Cisneros-Zevallos J, Byrne DH, Ramming DW, Okie WR (2007) Large variation found in the hytochemical and antioxidant activity of peach and plum germplasm. J. Amer. Soc. Hort. Sci. 132:334–340.
22. Wang SY, Chen CT, Sciarappa W, Wang CY, Camp MJ (2008) Genetic improvement of fruits and vegetables. J. Agr. Food Chem. 56: 5788–5794.