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NEW VARIETY OF FIG RESISTING TO DRYNESS AND COLD TEMPERATURES COMPARED TO VARIETIES OF AL-NAJAF IN MIDDLE ARIA OF IRAQ

Abstract: This variety of fig was found in one of the mountains that located about 25 KM northeast country Mayame in Mashhad Governorate in Iran at 25 October 2018 .It was compared with three varieties of fig that grown in a private orchard in Abbasyia , Najaf Governorate they were Aswod Diala , Waziri and Kadota to investigate the effect of variations on some characters of leaves and fruits in the month October. Results showed that cv. Iranian have the best result of studied characteristics in the percentage of total soluble solids, vitamin C , titratable acidity ,total sugar , antioxidant capacity , firmness of fruits and length of fruit / diameter of fruit (fruit shape). Also it was gave the lowest rats of leaf aria , petiole length and ostiolum diameter of fruits compared with another three fig cultivars. The seedling fig trees cv. Iranian that planted in Abbasyia gave the highest rates of number leaves and length of seedling but it were lower leaf aria , percentage yellowness of leaves , percentage drop of leaves in the last of month November for season 2019 and resisting to cold temperatures and dryness comported with local seedling fig trees that grown in this location .

Key words: Fig *Ficus carica* L., dryness, cold temperatures.

Language: English

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Introduction

The fig trees cv. Aswad Diala, Waziri and Kadota were important in the middle section of Iraq . The fig trees are medium in size aria , fruits are medium to small size and the color is black to yellow green . The fruits are not good for drying in the variety of Aswad Diala and Waziri . Its belongs to normal fig group *Ficus carica* var.hortensis(AL – Hameedawi , 2015). 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., the fig tree is one of the oldest

cultivated plants in the world and the oldest species of fruit tree, could play an important role ,where it believed that its origin is Arabian peninsula and Spread to the subtropical regions (Stover et al., 2007). The common fig (*Ficus carica* L.) is a subtropical, deciduous fruit tree (Botti et al., 2003) belonging to the Eusyce subgenus of the Moraceae family (Mars, 2003). Figs are cultivated in most Mediterranean-type climates, Fig cultivars generally have low chilling requirements and figs grown in hot desert areas with winter temperatures above to 10°C, do not enter an end dormant period or shed their °6 leaves (Flaishman et al., 2008). The fig is one of the few deciduous species in the genus , and young trees of it are barely

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deciduous the rest period is so slight that new shoots will start very soon after the leaves are off or before all leaves are off, if there have been a few weeks of chilling weather (Gerber, 2010). Trees of fig cv. Aswad Diala cv. treated with and periods of irrigation was decreased the leaf area, total chlorophyll, shoot length, number of shoot, humidity of fruit, percentage of potassium, percentage of nitrogen, type of cracklings and total cracking and increased the firmness of fruit, calcium pectate, percentage of calcium, anthocyanine pigment in fruit peel, total soluble solid and vitamin C significantly compared to control treatment. (AL-Hameedawi et al., 2018). The pruning fig cv. Kadota and spraying with Zeatin treatments and their combination caused a significant increase in the leaf area, percentage of carbohydrates and nitrogen in the branches, number, length, diameter and number of fruit nodes of branches, the duration of the vegetative buds open until the fall of leaves and decreased the duration of fall of leaves until open the vegetative buds to another season compared with control treatment (AL-Hameedawi and AL-Shemmeriyi, 2012). A mature tree which has lost all of its leaves and becomes totally dormant can withstand much cooler temperatures than a rapidly growing tree at the time of first frost. Reduce watering in the fall of the year to reduce growth and encourage the onset of dormancy, spraying trees of fig cv. Kadota with flaxseed oil, Gropogress and Thidiazuron led to increase the percentage of bud break, number of days to bud break, leaf area, Length petiole, number of shoot, length of shoot, fruit weight, total yield, percentage of total soluble solid (T.S.S), Vitamin C, fruit firmness and antioxidant capacity of fruits and reduced the percentage of total cracking of fruits compared with control treatment (AL-Hameedawi, 2016). A fully dormant fig tree can withstand temperatures as low as 10 degrees. In areas where temperatures drop into the teens or twenties, additional cold protection is important for young trees (Jundi, 2003). Fig trees adapt to different soils, but the most appropriate are those of clayey-sandy texture, rich in organic matter and pH ranging from 6.0 to 6.8. In poorly drained soils, there might be root rots while in those excessively dry, plants remain under a resting state, developing few leaves and not producing fruits. Despite the irrigation importance for the achievement of greater yield and fruits of better quality (Synovate, 2004), there are few studies in the literature on the irrigation management of fig trees, (Kong et al., 2013). Leonel and Tecchio (2010) studied the effect of different irrigation levels on fig trees in the region of IlhaSolteira, São Paulo State and concluded that the applied levels promoted positive effects on the yield of ripe fruits, total yield, branch length, and length and diameter of ripe fruits, recommending the application of 75% of Class A pan evaporation. when evaluating the pruning effect,

either in the presence or absence of irrigation, from July to October, concluded that the irrigation practice promoted higher harvest numbers and expansion of the production cycle. Most fig tree roots are close to the soil surface and can easily dry out, for these reasons, apply water to the trees as drying develops. Irrigation the fig trees cv. Aswad Diala every 7 days in summer the gave the lowest growth vegetative and yield compared with control treatment (AL-Hameedawi, 2019). Some local cultivars of fig grown in Mashhad Governorate, Varamin city in Iran were Bidaneh, Paizeh, Zard, Siah bolol riz, Siah zoodras, Siah diras, Morabaii, Hallavi riz and Hallavi dourousht. In the phenological characteristics, fresh fruit weight ranged from 8.0 to 43.5 g. Fruit diameter ranged from 21 to 45 mm, the total amount of sugar ranged from 9.8 to 18.9%, the amount of total soluble solid ranged from 13.3 to 28.50%. In addition also skin color, internal color and skin cracks were investigated. This study suggests that Varamin fig germplasm is diverse. Cluster analysis also allowed to clustering of nine cultivars into two main groups at near 20 of dissimilarity level (Darjazi, 2011). The main objective of this investigation is to study some vegetative growth and fruits characterize of Iranian fig and compared to varieties of AL-Najaf.

Materials and methods

This study was conducted in one mountain that distance about 25 KM northeast country Mayame in Mashhad Governorate in Iran in 25 October 2018 on fig trees cv. Iranian, three at same size and growth trees were selected about 5 years of age, that planted creeping morphology form at rise 60 cm on (5 x 5 m). The trees were preservation of leaves and fruits despite on lowering temperatures which reached to 3C⁰ in this month and the temperatures of summer to go pass 40C⁰ and lower humidity and no rains during months (June, July and August), Table (2). The texture of the soil of mountains of this area is Sand Silt Clay the physical and chemical properties of the experimental soil are presented in Table (1). The mountains to rise about 300-600 m from level of valley (Figure 1 and 2). Most of plants of this area prickly alhagi and favash which planted in bottom of valley. There were no spring near from this shrubs. This variety was compared with three varieties of fig that grown in a private orchard at Abbasyia, Najaf Governorate they were Aswad Diala, Waziri and Kadota to investigate the effect of variations and location on some characters of leaves and fruits in October 2018. 3 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 phosphoric in two periods in March and May of each year at a rate of 500 g. per tree, as well as by manure for the years. The experiment included 3 treatments with three replicates and the replicate one tree. 18 hardwood

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cuttings every varieties of fig trees cv. Iranian, Aswod Diala , Waziri and Kadota 20-30 cm long and 0.7-0.9 cm thick taken from 1-2 year-old shoots in 4 February and planted in 14 February on two sides of stream with 3 replications 6 cuttings on replications in a private orchard at Abbasyia and irrigated every 15 days . This cuttings of fig trees cv. Iranian growing and reaching to 110 cm long at last of month November and leaves of this seedling remained green color compared with local seedling cv. Aswod Diala , Waziri and Kadota that grown in this location (Figure 3) . It is a doted according to Randomized Complete Block Design (RCBD) , and the results were statistically analyzed according to Duncan test at the probability level of 5% (Duncan , 1955) . Leaf aria cm², Number lobate,

Length petiole cm , Deep of lobate cm ,diameter of fruit cm ,length of fruit cm , length of fruit/ diameter of fruit (fruit shape) , according to (Ibrahim , 2010). Ten normal fruits were taken at random in 25-30/ 11/ 2018 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 FW ,%Total and reducing sugar , % Titratable acidity , and vitamin C mg /100 ml Juice according to (A.O.A.C , 1985) . Ostiolum diameter mm ,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) .

Table 1: Some physical and chemical properties of the soil of trees in country Mayame .

Clay%	40
Silt %	16
Sand %	44
Texture soil	Sand Silt Clay
pH	7.56
Ec dsm-1	0.84
Available N meg/l	1.22
Available P meg/l	1.15
Available K me mol/l	1.30
Available Mg me mol/l	1.78
Available Ca meg/l	1.32
Available Fe meg/l	6.4
Available Zn meg/l	0.55
CO ₃ HCO ₃ meg/l	3.76
SO ₄ meg/l	2.11
Na meg/l	1.90
Organic matter %	5.28

Table 2: The range of maximum , minimum temperatures, number days of rain and Number days of ice of Mashhad Governorate in years 2014- 2018.

	January	February	March	April	May	June	July	August	September	October	November	December
Max.Tem	12°C	12°C	17°C	22°C	28°C	33°C	37°C	34°C	33°C	23°C	16°C	13°C
Min.Tem	-4°C	-6°C	4°C	8°C	13°C	15°C	17°C	13°C	10°C	3°C	-1°C	-3°C
Number days of rain	8	2	7	5	8	0	0	0	0	2	5	7
Number days of ice	3	5	1	1	0	0	0	0	0	0	2	4

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Figure 1



Figure 2

Figure(1and 2) : Fig trees cv. Iranian in one mountain of country Mayame in Mashhad Governorate in Iran in 25 October 2018, the maximum temperatures was 11°C and minimum temperatures 3°C .



Figure 3: The seedling fig trees cv. Iranian that planted in a private orchard in Abbasyia , Najaf Governorate comported with local seedling fig trees with leaves became yellow color and dropping at 30 November 2019 ,the maximum temperatures was 22°C and minimum temperatures 7°C .

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Results and discussion

1- Leaf area , Total chlorophyll , Number lobate , Length petiole and Deep of lobate .

Data in Table (3) shows that, a significantly differences between treatments in leaf area , total chlorophyll , number lobate , length petiole and deep lobate and the Cultivar Aswod Diala gave the highest rates of leaf area , total chlorophyll, number of lobate, length petiole and deep lobate in leaves they were (160.85cm² , 122.90 mg / 100 mg wet weight, 5 , 11.62 cm and 7.79 cm) comparison with lowest rates (111.43 mg / 100 mg wet weight, 3 , 5.43 cm and 3.98 cm) respectively in cultivar Waziri . The leaf area , total chlorophyll , number lobate and length petiole are genetic characters which involve in the relation of each of the four cultivars (Salvatava, 2006) .

2- Total soluble solids , Vitamin C, Titratable acidity , Total sugar and Antioxidant capacity .

Data in Table (4) shows that, significant differences between cultivars Aswod Diala , Waziri , Kadota and Iranian in total soluble solids, vitamin C , percentage Titratable acidity, percentage total sugar and Antioxidant capacity in fruits . The highest containing of total soluble solids, vitamin C , percentage Titratable acidity, percentage total sugar and Antioxidant capacity in fruits were found in the fig cultivar Iranian they were (17.67 % , 8.30 mg / 100 ml Juice , 0.65 % , 17.33 % and 3.77 mmol TE/g FW) respectively comparison with lowest rats (15.45 % , 6.28 mg / 100 ml Juice , 0.37 % , 13020 % and 1.95 mmol TE/g FW) in cv. Waziri respectively . The higher antioxidant capacity of cv. Iranian which was almost double the others, is likely attributed to its dark skin color. The fig antioxidant capacity values than 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 Palestinian 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 , vitamin C and acidity which results due to the fact that the cultivars had higher leaf density of vegetative growth and thus encourages the accumulation of carbohydrate

materials in fruits leading to increased content of these materials .

3- Physical characters of fig fruits cv. (Aswod Diala , Waziri, Kadota and Iranian) .

Results indicated in Table (5) shows that , the cv. Iranian gave the highest percentages of length / diameter of fruit 0.904 , firmness 0.352 Kg/ cm² and lowest result in ostiolum . Also cv. Kadota gave the highest rates of weight of fruit 43.51 g, length of fruit 3.39 cm and diameter of fruit 4.45 cm . The lowest rates of (weight 28.46 g, length 3.12 cm ,diameter 3.52 cm and firmness 0.290 Kg/ cm²), in fruits of fig cultivar Waziri . The enhance of physical characters of fig fruits was due to the increase in the leaf area , total chlorophyll , number lobate and petiole length of leaf , particularly, petiole length which increase the space between leaves that results in the increase a moved 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 increase the physical characters of four cultivar fig fruits .

4-Leaf area , number of leaves , Length of seedling , percentage yellowness of leaves and percentage drop of leaves.

Data in Table (6) shows that, a significantly differences between cultivars in leaf area , number of leaves , length of seedling , percentage yellowness of leaves and percentage drop of leaves .The cultivar Iranian gave the highest rates of number leaves 26.18 and length of seedling 110.45cm but it was the lower leaf area 52.60 cm², percentage yellowness of leaves 2.25% and percentage drop of leaves 1.16% in the last of month November for season 2019 comparison with highest percentage yellowness of leaves 87.70% and percentage drop of leaves 62.22% in cultivar Waziri . Aswod Diala cultivar was the highest rates in leaf area 139.55cm² while, Kadota cultivar was middle between cultivars in percentage yellowness of leaves and percentage drop of leaves .The deferens between cultivars belonged to genetic characters of each of the four cultivars .

Conclusion

It could be concluded from this experiment that the cultivar Iranian fig have the best result of studied characteristics in the percentage of total soluble solids, vitamin C , titratable acidity ,total sugar , antioxidant capacity and firmness of fruits . Also it was gave the lowest rats of leaf area , petiole length and ostiolum diameter of fruits and the seedling resisting to cold temperatures and dryness compared with another three fig cultivars in middle aria of Iraq.

Table 3. Physical characters of leaves of fig cvs. (Aswod Diala , Waziri , Kadota and Iranian) for season 2018.

Cultivars	leaf aria cm ²	Total chlorophyll mg / 100g	Number lobate	Length petiole cm	Deep of lobate cm
Aswod Diala	160.85a	122.90a	5 a	11.62 a	7.79 a
Waziri	114.88 bc	111.43 cd	3 b	5.43 c	3.98 cd
Kadota	132.72 b	116.50c	3 b	10.23 ab	4.12 c
Iranian	70.19 d	120.58 ab	5 a	6.30 cd	6.26 ab

Table 4. fruits quality of fig cv. (Aswod Diala , Waziri , Kadota and Iranian) for season 2018.

Cultivars	% Total soluble solids	Vitamin C mg / 100 ml Juice	% Titratable acidity	%Total sugar	Antioxidant capacity (mmol TE/g FW)
Aswod Diala	15.91 c	7.53 bc	0.61 a	15.75bc	3.46 ab
Waziri	15.45 c	6.28 c	0.37 b	13.20 c	1.95 cd
Kadota	16.80 b	7.85 ab	0.44 c	16.12 b	2.17 c
Iranian	17.67 a	8.30 a	0.65 a	17.33 a	3.77 a

Table 5. physical characters of fig fruits cv. (Aswod Diala , Waziri , Kadota and Iranian) for season 2018.

Cultivars	Weight of fruit (g)	Length of fruit cm	Diameter of fruit cm	Fruit shape	Ostium Diameter mm	Firmness of fruit Kg/cm ²
Aswod Diala	36.80 b	3.24 ab	3.61bc	0.897 ab	4.57 a	0.315 bc
Waziri	28.46 d	3.12 bc	3.52 d	0.821 bc	4.16 bc	0.290 d
Kadota	43.51 a	3.39 a	4.45 a	0.761 cd	4.28 b	0.346 ab
Iranian	33.13 bc	3.30 ab	3.65 b	0.904 a	3.70 d	0.352 a

Table 6. Effect irrigation every 15 days on Physical characters of leaves of fig cvs. (Aswod Diala , Waziri , Kadota and Iranian) in 30 November for season 2019.

Cultivars	leaf aria cm ²	Number leaves	Length seedless cm	Percentage yellowness of leaves	Percentage of drop leaves
Aswod Diala	139.55 a	11.33 b	41.53 b	85.92 ab	47.19 b
Waziri	109.23 c	9.53 d	33.14 c	87.70 a	62.22 a
Kadota	121.15 b	13.41 c	39.03 bc	84.10 bc	42.37 c
Iranian	52.60 d	26.18 a	110.45 a	2.25 d	1.16 d

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