

RELATIONSHIP BETWEEN FRUIT CRACKING AND SOME CHARACTERISTICS OF LEAVES, PHYSICAL AND QUALITY FRUITS OF FOUR FIG (FICUS CARICA L.) CULTIVARS

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ABSTRACT

An experiment was conducted in a private orchard at AL-Abbasyia, Najaf Governorate during the growing seasons of 2016 on fig cv. AswodDiala, Waziri, White Adriatic and Kadotato investigate the effect of leaf area, total chlorophyll, number lobate, deep lobate, petiole length, length of fruit, diameter of fruit, length petiole of fruit, weight of fruit, ostiolum diameter, % Total soluble solids, % titratable acidity, firmness, % dry matter in pulp, % dry matter in peel, % Calcium pectate, percentage of carbohydrate, percentage of N, P, K, Ca, Mg content in leaves and in fruits peel on percentage of total cracking of four Fig cultivars of second crop. Results showed that cv. Kadota have the best result of studied characteristics at the year of experiment. There was significant differences with correlations among leaves and fruits characters and the percentage of the nutrient N, P, K, Ca, Mg in leaves, fruits and percentage of total cracking of four fig cultivars.

KEYWORDS: Some Characters of Leaves, Fruits of Fig and Correlations with Cracking

INTRODUCTION

Fig trees (*F. carica* L.) are among the earliest cultivated fruit trees in the world and widely distributed in the subtropical regions of the world, even if its importance in the world-wide trade is still very limited (Solomon et al., 2006). It is especially in traditional systems, is known from time immemorial. It is accepted as a holy fruit together with olive (Hein, 2010). Although its origin is not entirely known, Figs thought to have originated in western Asia and from there slowly spread through the Mediterranean region (Stover et al., 2007). Fig fruits are infected by a number of physiological damages, and the foremost damage is crack, which its ratio increased due to the increase in nitrogen fertilizer (Ibrahim, 1996). Studies were conducted in different regions of the world to limit the damage. It was found that, some nutrients, such as Nitrogen, Potassium and Calcium have an important role in reducing this phenomenon (Flaishman et al., 2008). If those nutrients were added in limited concentrations, these will lead to organize fruit growth and create a state of water balance between epicarp and inside fruit tissues, and maintain fruit cell walls plasticity and firmness (Mitra, 1997). The study which was conducted by AL-Hameedawi (2015) to evaluating some characters of leaves, physical and quality fruits of three figs cultivars are (AswodDiala, Waziri and Kadota). The percentage of total cracking of cultivar AswodDiala was 18.83% while the cultivar Waziri was 20.54% and Kadota was 13.90% of second crop during the months of July and August. Fruit *splitting due to irregular irrigation practices or excessive rain during the maturation period* is accepted as a major fruit defect (Bottiet et al., 2003). Previous research work on different species of fig have revealed significant effects of plant nutrients and transpiration rates on fruit splitting (Aksoy and Akyuz, 1993). Increasing of

containing fruits of fig cv. AswodDiala from total soluble solids,, total sugar, vitamin C, percentage of carbohydrate, firmness lead to reducing type of cracking and total cracking on ripe fruits (AL – Hmeedawi and AL - Numani,2012).Therefore, this work investigated some characters of leaves, fruits and correlations with percentage cracking fruits of four fig cultivars of second crop.

MATERIALS AND METHODS

This study was conducted in a privat farm at Abbasiya / Najaf governorate for the 2016 season on fig trees cv. AswodDiala, Waziri, White Adriatic 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 manure for the years. The experiment included 4cultivarswith four replicates and the replicate one tree. 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% and Correlations 5 % with Total (Al-Rawi and Khalf Allah, 2000). The vegetative characteristics (leaf ariacm², total chlorophyll mg / 100 mg dry weight, number lobate, deep lobate cm, length petiole cm) determination according to (Hein, 2010). Ten normal fruits were taken at random on July and August / 2016 from each tree for physical and quality (length of fruit cm, diameter of fruit cm, length petiole of fruit cm, weight of fruit gm, ostiolum diameter cm, acidity%, percentage of dry matter in pulp and in peel and total carbohydrate in fruits determination according to (Ibrahim, 2010). 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. The percentage of total cracking were calculated during the months of July and August.

RESULTS AND DISCUSSIONS

- Leaf aria, total chlorophyll, number lobate, deep lobate, length petiole, length of fruit, diameter of fruit, length petiole of fruit, weight of fruit and ostiolum diameter.

Data in Table (1) shows that, a significantly differences were found in leaves and fruits characters among the four fig cultivars. There were the beige leaf aria, total chlorophyll, deep lobate, length petiole of leaves, length of fruit, diameter of fruit and weight of fruit they were (154.64cm², 124.16 mg / 100 mg dry weight,12.57cm,4.15cm,4.78cm and 48,95gm) in the cultivar Kadota, respectively. However, the beige deep lobate12.81cm and ostiolum diameter 4.76mm was in the cultivar AswodDiala. The lowest leaf aria, total chlorophyll, length petiole of leaves, length of fruit, diameter of fruit and weight of fruit they were (112.95cm², 112.63mg / 100 mg dry weight, 7.72cm, 3.43cm, 3.90 cm and 31.62 gm) in the cultivar Waziri, respectively. The cultivar Kadotagave the lowest rats of the deep lobate 7.38 cm and ostiolum diameter 4.12 mm. The number of lobate character was no significant among the four fig cultivars. The cultivar White Adriatic came after the cultivar Waziri in the traits under study. The reason that due to the genetic differences from leaves and fruits characters among the fig cultivars (Darjazi, 2011).The correlations among the parameters displayed significant relationships between fruit cracking, they were leaf aria $r=0.766^*$, total chlorophyll $r=0.766^*$,deep lobate $r=0.883^*$ and length petiole of leave $r=0.768^*$.The length of fruit, diameter of fruit and weight of fruit has no significant impact on percentage of fruit cracking they were ($r = 0.573$, $r = 0.634$ and $r = 0.767$).The negative impact of number of lobate $r = -0.337$ and ostiolum diameter $r = -0.860$.

- Total soluble solids, acidity, firmness, percentage of dry matter in pulp and in peel, calcium pectate, percentage of carbohydrate, length petiole of fruit and The percentage of total cracking.

Data in Table (2) shows that, the Kadota cultivar gave the highest average of the total soluble solids, firmness, percentage of dry matter in pulp and in peel, calcium pectate, percentage of carbohydrate, length petiole of fruit and the lowest percentage of total cracking they were (15.80%, 0.412 Kg/cm², 23.72 %, 30.12%, 2.71%, 17.80%, 4.24% and 13.61%) respectively comparison with lowest rats (12.71%, 0.275 Kg/cm², 20.16 %, 25.46%, 1.85 %, 14.24% and 2.93%) respectively, in the cultivar Waziri. The cultivar. AswodDiala and White Adriatic were in the middle of the other cultivars (Kadota and Waziri) for the above-mentioned traits. The cultivar which gives the highest leaves area surface will produce more tillers. These tillers synthesis more growth and leads to increase in length, diameter, fruits weight and improve the qualitative traits. Increasing the plant growth leads to increase roots growth and increase absorption the nutrients elements in which some of them are parts of chlorophyll which led to increase its quantity in leaves beside increasing hormone production (Ferguson *et. al.*, 1999). Among the analyses parameters, total soluble solids, firmness, percentage of dry matter in pulp and in peel, calcium pectate, and percentage of carbohydrate seem to be positive correlated with percentage of total cracking they were ($r = 0.787^*$, $r = 0.872^*$, $r = 0.897^*$, $r = 0.948^*$, $r = 0.896^*$ and $r = 0.997^*$) respectively. No significant correlation $r = 0.853$ on length petiole of fruit. The negative correlation $r = -0.558$ between titratable acidity and percentage of total cracking.

- Nutrient content in leaves and fruits peel.

Results indicated in Table (3) shows that, the Kadota cultivar gave the highest percentage of the nutrient content P, K, Ca, Mg in leaves they were (0.98 %, 2.23 %, 1.98% and 1.05%) **and in fruits peel** (1.98 %, 0.47 %, 3.68% and 0.33 %) respectively compared with the lowest percentage in leaves and fruits of fig cultivar Waziri and AswodDiala. The cv. AswodDiala gave the highest percentages of nitrogen in leaves and fruits. Increasing nitrogen nutrient lead to increasing total cracks in fruits. However, increasing P, K, Ca and Mg in leaves and fruits lead to reduction in fruits splittig (Jundi, 2003). The highest positive values correlation coefficient were among the percentage of total cracking and the percentage of the nutrient N, P, K, Ca, Mg in leaves and fruits they were ($r = 0.721^*$, $r = 0.796^*$, $r = 0.889^*$, $r = 0.845^*$, $r = 0.989^*$, $r = 0.748^*$ and $r = 0.8087^*$). The negative correlation $r = -0.847$ between percentage of nitrogen in leaves and percentage of total cracking.

CONCLUSIONS

It could be concluded from this experiment that the cv. Kadota have the highest result in leaves and fruits characters and the percentage of the nutrient N, P, K, Ca, Mg in leaves and fruits of fig at cultivar AswodDiala. While the cultivar Waziri gave lowest values.

**Table 1: Physical Characters of Leaves and Fruits ff Fig Cvs.
(Aswoddiala, Waziri, White Adriatic and Kadota) of Second Crop for Season 2016**

Cultivars	Leaf Area Cm ²	Total Chlorophyll Mg / 100g	Number Lobate	Deep Lobate Cm	Length Petiole of Leaf Cm	Length of Fruit Cm	Diameter of Fruit Cm	Weight of Fruit Gm	Ostium Diameter Mm
AswodDiala	131.58	117.73	5	12.81	11.83	3.77	4.65	36.70	4.76
Waziri	112.95	112.63	3	8.93	7.72	3.43	3.90	31.62	4.52
White Adriatic	135.32	117.96	5	8.50	11.64	3.95	4.56	39.85	4.20
Kadota	154.64	124.16	5	7.38	12.57	4.15	4.78	48.95	4.12
L. S. D. 0.05	8.71	3.82	n.s	1.11	2.46	0.30	0.18	2.19	0.35
Correlations 5%with Total cracking	0.766*	0.768*	-0.337	0.883*	0.768*	0.573	0.634	0.767	-0.860

**Table 2: Physical Characters of Leaves and Fruits of Fig Cvs.
(Aswoddiala, Waziri, White Adriatic and Kadota) of Second Crop for Season 2016**

Cultivars	% Total Soluble Solids	% Titratable Acidity	Firmness Kg / Cm ²	% Dry Matter in Pulp	% Dry Matter in Peel	% Calcium Pictate	% Total Carbohydrate	Length Petiole of Fruit Cm	% Total Cracking
AswodDiala	13.85	0.38	0.342	22.47	25.78	2.12	15.70	3.26	18.69
Waziri	12.71	0.40	0.275	20.16	25.46	1.85	14.24	2.93	20.43
White Adriatic	13.92	0.33	0.368	22.60	28.85	2.18	15.95	3.87	15.38
Kadota	15.80	0.27	0.412	23.72	30.12	2.71	17.80	4.24	13.16
L. S. D. 0.05	0.42	n.s	0.021	0.79	1.13	0.22	1.14	0.45	1.76
Correlations 5%with Total cracking	0.787*	-0.558	0.872*	0.897*	0.948*	0.896*	0.997*	0.853	

**Table 3: Leaves and Fruits Peel Nutrient of Fig Cvs.
(Aswoddiala, Waziri, White Adriatic and Kadota) of Second Crop for Season 2016**

Cultivars	Nutrient Content in Leaves % Dry Matter					Nutrient Content in Fruits Peel % Dry Matter				
	N	P	K	Ca	Mg	N	P	K	Ca	Mg
AswodDiala	0.87	0.92	1.64	1.92	0.95	0.68	1.10	0.35	2.46	0.24
Waziri	0.73	0.89	1.78	1.85	0.96	0.63	1.97	0.38	2.75	0.28
White Adriatic	0.81	0.95	1.99	1.80	0.88	0.65	1.68	0.39	3.23	0.20
Kadota	0.75	0.98	2.23	1.98	1.05	0.59	1.98	0.47	3.68	0.33
L. S. D. 0.05	0.03	0.06	0.15	0.04	0.01	0.04	0.07	0.02	0.019	0.03
Correlations 5% with Total cracking	-0.808*	0.307	0.721*	0.796*	0.663	0.889*	0.845*	0.989*	0.784*	0.808*

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