Impact Factor ISRA (India) = **1.344**
Impact Factor ISI (Dubai, UAE) = **0.829**
based on International Citation Report (ICR)

Impact Factor JIF = **1.500**
Impact Factor GIF (Australia) = **0.356**
Impact Factor SIS (USA) = **0.438**

SOI: 1.1/TAS DOI: 10.15863/TAS
International Scientific Journal
Theoretical & Applied Science

p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)

Year: 2015 **Issue:** 03 **Volume:** 23

Published: 30.03.2015 **http://T-Science.org**

Abbas Mohsin Salman Al-Hameedawi
Professor
College of Agriculture,
University of Kufa, Iraq
ali.alhameedawi@uokufa.edu.iq

SECTION 23. Agriculture. Agronomy. The technique.

EFFECT OF LENGTHS BRANCH ON BUD BREAK, MORPHOLOGICAL CHARACTERS OF LEAVES AND FRUITS OF THREE FIG, FICUS CARICA L., CULTIVARS OF SECOND CROP

Abstract: *An experiment was conducted in a private orchard at Abbasyia, Najaf Governorate during the growing seasons of 2014 on fig cv. Aswod Diala, Kadota and Waziri at 5 years old trees to investigate the effect of length branches of, 10-15 cm, 20-35 cm, 40-60 cm and more than 60 cm, that one year old on percentage of bud breaks, number and length of new shoots, leaf aria, number and depth of lobates, petiole length, number of fruits, length, diameter, shape, firmness and Ostiolum diameter of fruits and total yield / shoot for the four branches of three Fig cultivars of second crop. Results showed that the best result at length of branches 40-60 cm on percentage of bud breaks, number and length of new shoots, leaf aria, number and depht of lobates, petiole length, number of fruits, length, diameter, shape, firmness and Ostiolum diameter of fruits and total yield / shoot for all studied. The cultivar Kadota gave the highest rate of vegetative and fruiting characteristics and yield.*

Key words: *Length branches, morphological characters of leaves and fruits of three fig Cultivars.*
Language: *English*
Citation: AL-Hameedawi AMS (2015) EFFECT OF LENGTHS BRANCH ON BUD BREAK, MORPHOLOGICAL CHARACTERS OF LEAVES AND FRUITS OF THREE FIG, FICUS CARICA L., CULTIVARS OF SECOND CROP. ISJ Theoretical & Applied Science 03 (23): 1-4.
Soi: http://s-o-i.org/1.1/TAS*03(23)1 ***Doi***: http://dx.doi.org/10.15863/TAS.2015.03.23.1

Introduction

The common fig (*Ficus carica* L.) is a subtropical, deciduous fruit tree (Botti et al., 2003) belonging to the Eusyce subgenus of the Moraceae (mulberry) family (Mars, 2003; Watson & Dallwitz, 2004). Figs are cultivated in most Mediterranean-type climates (Flaishman et al., 2008) with the Mediterranean basin of primary importance (Şahin, 1998). Despite possibly being the oldest cultivated fruit species (Brown, 1994), a lack of information pertaining to production practices as well as the low number of fig cultivars available commercially, limit hectarages (Botti, 2003). 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., 2007). Common type figs produce their main crop from buds in the axils of leaves on the current season's growth (McEachern, 1996; Flaishman et al., 2008). Harvest may start in the middle of summer and can last several months, until the onset of winter. At the end of the growth period, trees enter into a dormant period preceded by leaf-drop. Fig buds require little or no winter chilling to break endo-dormancy (Ferguson et al., 1990) and growth resumes in early spring (Flaishman et al., 2008). Fig shoots have one vegetative and two reproductive buds per node, the shoot terminating in a vegetative bud (personal observation). AL – Hmeedawi, (2014) mentioned that, the pruning of fig trees cv. Kadota of one year old branches at level of (25, 50 and 75%) and removal of branches growing at wood more than two years old and unfruitful branches growing on one year old throwing of fruiting of second crops caused a significant increase in leaf aria and total chlorophyll contents, GA3, IAA, in leaves and longer, dimeter and number of branches and number of node,length of internodes and total carbohydrates percentage, N in branches.

In order to maximise yield of good quality fruit, the most productive shoot lengths (in terms of yield and fruit size) should be determined and strategies

devised to maximise the number of these shoots on trees. It is therefore important to study the phenological characteristics of a cultivar to establish optimum shoot characteristics. The objective of this research was to identify the most suitable types of shoots by selecting distinctly different N shoots on the tree and doing a detailed, comparative study of phenological processes such as bud break, shoot growth and yield for each shoot length category.

Materials and methods

The trial was conducted on fig cv. Aswod Diala, Kadota and Waziri trees during the 2014growing season in a 6-year-old commercial orchard in the Abbasyia, Najaf Governorate. The area accumulated 570.5 chill units from 1 May 2014 until 31 August 2014 according to the Daily Positive Chill Unit (Linsley-Noakes et al., 1995). The trees, on own roots, were planted in January 2008 at a spacing of 4 x 4 m. Four different branches length categories were selected and tagged per tree (10-15 cm, 20-35 cm,40-60 cm and more than 60 cm) at old one year of fig cv. Aswod Diala, Kadota and Waziri and using twelve single trees. The experiment included 4 treatments with four replicates and the replicate one tree,that harvested at second crop at 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). The vegetative characteristics determination according to (Hein, 2010). Ten normal fruits were taken at random on 2 / 7/ 2014 from each tree for determination fruiting characteristics and yield / shoot. Fruit shape it was measured throw the per cent of fruit length / fruit diameter. If the percentage was more than one, the fruit shape will be logituatal.If reaches the percentage one, the fruit shape will be circular. If the percentage less than one, the fruit shape will be pinto or saucer (West wood, 1992). Firmness was measured on two sides of each fruit with an Effigy penetrometer (Model NI, McCormick Fruit Tech,Yakima,WA) Fitted with an 11.1mm tip.

Results and discussion

1- Morphological characters of shoots and leaves.

Data in Tables (1) shows that, the percentage of bud breaks, number and length of new shoots were increased significantly with increase the length of branches. However the differences between branches length 40-60 cm and more than 6o cm had no significant effect for all cultivars. The cultivar Kadota gave the highest rate of the bud breaks percentage, number and length of shoots were (37.54%, 8.87 and 23.18 cm) in comparison with lowest rats in cultivar Waziri (30.38%, 8.34 and 16.73 cm). The leaf aria, number and depth of lobates, petiole length were increased a significantly with increase the length of branches and the highest rats of leaf aria and length petiole in cultivar Kadota which reach (139.27 cm^2 and 13.57 cm) in comparison with lowest rates in cultivar Waziri (118.28 cm^2 and 8.83 cm) on branches length 40-60 cm. The cultivar Aswod Diala gave the highest rates of the number and depth of lobates they were (5.00 and 13.22 cm) comparison with lowest rats in cultivar Waziri branch (3.00 and 8.83 cm) on branches length 40-60 cm. The long branches have high contents of carbohydrate materials and more hormones throw out the previous growth season this led to increase the highest percentage of bud breaks, number and length of shoots, leaf aria, number and depth of lobates and petiole length of leaves (Ferguson *et. al.*, 1999, Jundi, 2003).

2- Morphological characters of fruits.

Reuslts indicated in table (2) that, number of fruits, length and diameter were increased a significantly with increase length of branches for cultivar Aswod Diala, Kadota and Waziri for season 2014 and the differences between branches length 40-60 cm and more than 6o cm for all cultivars were increased insignificantly. The cultivar Kadota gave the highest rats of the number of fruits / shoot and diameter of fruits they were (11.43 fruits / shoot and 4.65 cm) comparison with lowest rats in cultivar Waziri (7.90 fruits / shoot and 3.91cm) on branches length 40-60 cm. Which the cultivar Waziri gave the highest rats of the length of fruits it was 4.15cm comparison with lowest rats in cultivar Aswod Diala 3.75cm. The rat of fruits shape were increased a significantly with increase length of branches for all cultivars and the highest rats 1.063 in cultivar Waziri that fruit shape will be logituatal comparison with lowest rats fruits shape 0.803 in cultivar Kadota that fruit shape will be pinto or saucer (West wood, 1992) on branches length more than 60 cm. The rat of fruits firmness and Ostiolum diameter of fruits and total yield / shoot were increased a significantly with increase length of branches for all cultivars and the differences between branches length 40-60 cm and more than 6o cm for all cultivars were increased insignificantly. The cultivar Kadota gave the highest rats of the fruits firmness and total yield / shoot they were 0.415 Kg/cm^2 and 412.22 g / shoot comparison with lowest rats in cultivar Waziri 0.375 Kg/cm^2 and 357.48 g / shoot. The rat of Ostiolum diameter of fruits were increased a significantly with increase length of branches for all cultivars and the highest rats 5.00mm in cultivar Aswod Diala comparison with lowest rats 4.20 mm in cultivar Kadota on branches length more than 6o cm. The long branches obtained the highest leaf area as mentioned in table 1. this gave the best manufacture of carbohydrate materials which transported to fruits and improve the

morphological characters of fruits. Over all, this processes led to increase in branch yield.

Table 1

The effect of one-year-old branch length on bud break, shoot growth and morphology of leaves of fig cv. Aswod Diala, Kadota and Waziri for season 2014.

Cultivars	Branch length category	Bud break%	Number of shoot	Shoot length cm	leaf aria cm^2	Number lobate	Deep lobate cm	Length petiole cm
Aswod Diala	10 -15 cm	18.24	1.16	10.90	130.62	5.00	10.14	9.60
	20 -35 cm	22.40	3.70	14.56	132.86	5.00	11.10	10.88
	40 -60 cm	32.70	6.57	17.85	136.30	5.00	13.22	12.72
	More than 60 cm	34.22	8.82	17.98	135.42	5.00	12.85	12.59
Kadota	10 -15 cm	23.50	1.17	12.70	135.90	3.00	7.94	10.19
	20 -35 cm	28.15	3.85	16.54	137.65	3.00	8.50	12.68
	40 -60 cm	35.90	6.91	22.84	139.27	3.00	8.92	13.57
	More than 60 cm	37.54	8.87	23.18	139.00	3.00	8.15	12.70
Waziri	10 -15 cm	12.50	1.12	8.48	111.87	3.00	7.22	6.50
	20 -35 cm	19.87	3.15	11.90	114.50	3.00	7.89	6.59
	40 -60 cm	28.41	5.75	16.25	118.26	3.00	9.00	8.83
	More than 60 cm	30.38	8.34	16.73	116.91	3.00	8.98	8.13
L.S.D. 0.05		4.10	1.45	2.70	2.09	n.s	0.85	0.63

Table 2

The effect of one-year-old branch length on morphological characteristics of fruits of fig cv. Aswod Diala, Kadota and Waziri for season 2014.

Cultivars	Branch length category	Number fruits per Shoot	Fruit Length cm	Fruit diameter cm	Fruit shape	Fruit firmness Kg/cm^2	Ostiolum diameter mm	Total yield g / shoot
Aswod Diala	10 -15 cm	2.10	3.60	4.24	0.859	0.370	4.79	101.90
	20 -35 cm	4.57	3.66	4.45	0.824	0.390	4.85	235.37
	40 -60 cm	10.35	3.75	4.64	0.808	0.402	4.90	390.78
	More than 60 cm	9.30	3.78	4.67	0.809	0.385	5.00	340.56
Kadota	10 -15 cm	2.30	3.66	4.34	0.843	0.387	3.78	113.60
	20 -35 cm	5.70	3.70	4.45	0.831	0.396	3.99	250.81
	40 -60 cm	11.43	3.77	4.65	0.810	0.415	4.14	412.22
	More than 60 cm	10.95	3.80	4.73	0.803	0.401	4.20	395.46
Waziri	10 -15 cm	1.78	4.00	3.80	1.052	0.359	3.91	90.89
	20 -35 cm	5.83	4.08	3.85	1.059	0.363	4.16	210.23
	40 -60 cm	7.90	4.15	3.91	1.061	0.375	4.53	357.48

	More than 60 cm	7.10	4.17	3.93	1.063	0.369	4.66	300.05
L.S.D. 0.05		3.92	0.03	0.04	0.009	0.018	0.11	60.91

Conclusion

It could be concluded from this experiment that the best result at length of branches 40-60 cm on percentage of bud breaks, number and length of new shoots, leaf area, number and depht of lobates, petiole length, number of fruits, length, diameter, shape, firmness and Ostiolum diameter of fruits and total yield / shoot for all studied and the cultivar Kadota gave the highest rate of vegetative and fruiting characteristics and yield.

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