



Research Article

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The bud break, shoot growth and yield of fig cv. Kadota influenced by flaxseed oil, Groprograss and Thidiazuron

Abbas Mohsin Salman Al-Hameedawi

Department Horticulture, College Agriculture, University of Kufa, Iraq

ABSTRACT

This study was carried out on a private orchard at AL-Abbasyia. Najaf for the season 2015 on the fig trees cv. Kadota. The trees were spraying with three concentration of flaxseed oil, Groprograss and Thidiazuron at (1,2and 3%) for each above mentioned material on 1/3/2015. The result indicated that the percentage of bud break, number of days to bud break, leaf area, petiole Length, number of shoot, length of shoot, fruit weight, total yield, percentage of total cracking, percentage of total soluble solid (T.S.S), Vitamin C, fruit firmness and antioxidant capacity of fruits at maturity stage. Above time were increased with increase concentration of Groprograss and Thidiazuron. There was significant differences between these treatments. The concentration of Groprograss 3% gave the best results on vegetative growth, quality of fruits and Yield for the season of treatment.

Key words: Flaxseed oil, Groprograss and Thidiazuron, fig trees cv. Kadota.

INTRODUCTION

The fig *Ficus Carica* L., is one of the few deciduous species in the genus, and young trees of it are barely 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 (Ibrahim, 2010). Lateral buds are inhibited by terminal buds through par dormancy and therefore terminal buds are released more easily from dormancy (Naor et al., 2003). Fig cultivars generally have low chilling requirements and figs grown in hot desert areas with winter temperatures above 6° to 10°C, do not enter an end dormant period or shed their leaves (Flaishman et al., 2008). Buds on excised shoots of the fig cultivar Masui Dauphine were induced to break (80% bud break within three weeks) by heading back the shoots (at 25°C), even in the deepest phase of end dormancy (Kawamata et al., 2002). It is likely that local climatic conditions dictate the length of the dormant period (Flaishman et al., 2008). Figs can be grown in regions with little winter chilling, but bud break might be erratic and thereby compromise yield (Bantallo, 2014). Fig cultivars with higher chilling requirements would benefit from more winter chilling. While having potentially low chilling requirements, the fig cultivar displays strong apical dominance and epitomic growth. Various methods have been used to supplement chilling and to manipulate bud break in fruit trees. Hydrogen cyanamide (HC) has been used to induce bud break in fig (Lili & JinBao, 2003). Rates of 0.5 – 2.5% HC causes early, uniform bud break in fig (Bantallo, 2014). A rate of 3% Dormex has been used successfully to schedule bud break and fruit ripening over the season and the earliest treatment date was 15 December (NH), which resulted in bud break from 1 to 10 January. Earlier treatment dates resulted in the shortest time from application to bud break (15+ days) compared to later treatment dates (15 January) resulting in the longest time (30+ days) between treatment and bud break (Beek, 2015). Applications of 4, 6 or 8% mineral oil was effective in advancing and enhancing bud break in 'Hosui' pear (DeOliveira et al., 2008), while mineral oil at 4% plus 1% to 2% HC sufficiently breaks dormancy in apple trees (Sagredo et al., 2005). Hilmi (2014) noticed that, spraying of fig trees cv. Bursa Siyahı with a dose of 2% and 4% hydrogen cyanamide in 30 days before bud initiation increased the percentage of bud break, vegetative and fruiting growth and quality of fruits compared to control phase. This is also the period during which buds will resume growth if exposed to sufficiently high temperatures (Faust et al., 1997). According to Bantallo (2014), the best time

to apply HC is after the accumulation of some chilling, but before (1-5 weeks) the normal time of bud break, unlike other compounds which are more active at the bud swelling stage. Makta (2013) found Thidiazuron to be most effective to promote bud break in excised apple shoots before the initiation of end dormancy. The aim of this research was to investigate the effect of flaxseed oil, Hydrogen Cyanamide and Thidiazuron on Bud Break, Shoot Growth and Yield and quality fruits of fig cv. Kadota.

EXPERIMENTAL SECTION

The present study was conducted out during 2015 growing season on 10 years old of the fig cv. Kadota trees grown in an orchard located at AL- Abbasiya / Najaf governorate. The trees were planted at (5 x 5) m apart and received the same horticultural management. Thirty trees similar size and growth were selected and divided into 10 treatments with three replicates. It is a doped 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). Trees spraying on 1/3/2015 with three concentration of flaxseed oil, Groprogress, (it were solution of (H_2CN_2) 50% from the production of Green river company, India) and Thidiazuron at percentage of (1,2 and 3)% for three materials each one. Control treatment (sprayed with tap water). Spraying was done early morning until wetness was full addendum. Tween 20 was added at conc. of $1\text{cm}^3/\text{L}$ as spreader material. The vegetative and fruiting characteristics determination as the percentage of bud break, number of days to bud break, leaf area cm^2 , petiole length cm, shoot length cm, number of shoots, fruit weight gm, total yield Kg /tree, according to (Gerber, 2010). Ten normal fruits were taken at random on 15/ 7/ 2015 from each tree for quality determination. The juice was extracted and the total soluble solids (T.S.S) were determined by hand refractometer. Vitamin C mg /100 ml Juice and acidity according to (A.O.A.C, 1985). 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 of fruits was determined to previous work (Crisosto and Crisosto, 2001).

RESULTS AND DISCUSSION

1-Percentage of bud break: Data in Table (1) shows that, spraying trees with flaxseed oil, Groprogress and Thidiazuron led to significantly increased the percentage of bud break that gave the highest percentage 81.32% in the treatment Groprogress3% in comparison to the lowest percentage 48.16% in the control treatment. The reason of increasing the percentage of bud break lead to influence these materials in some physiological changes in the buds to burst, and the reason for this could be the re-instatement of apical dominance or the trees' inability to supply all of these buds with metabolites (Salim, 1996).

2-The number of days to bud burst.

Data in Table (1) indicate that, all treatments significantly decreased the number of days to bud burst compared to control treatment. The highest values in the control treatment it was 51.48 days, while the lowest 37.46 days in the treatment Groprogress 3%. These results are in agreement with the findings of Hofmann and Latzko (2013) that early application of HC caused earlier bud break of figs. Makta (2013) found that early application of Thidiazuron caused early bud break relative to the control.

3- The leaf area, Length petiole, number of shoot, length of shoot, fruit weight and total yield.

Results indicated in table (1 and 2) that, treating trees with flaxseed oil, Groprogress and Thidiazuron led to a significant increase in the rate of leaf area, length petiole, number of shoot, length of shoot, fruit weight and total yield of peel of trees which reached to the maximum values of (148.62 cm^2 , 12.57 cm , 8.70 , 22.36 cm , 45.89 gm and 28.23 Kg / tree) with the treatment of Groprogress 3% in comparison to the lowest values (136.22 cm^2 , 11.37 cm , 2.30 , 15.51 cm , 37.83 gm and 20.16 Kg / tree) in control treatment, respectively. The early application of flaxseed oil, Groprogress and Thidiazuron caused earlier bud break and vegetative and fruiting growth and harvest of the breba crop, while also increasing the number of breba figs, fruit weight and yield of trees (Hilmi, 2014).

4- The percentage of cracking, total soluble solid, acidity, vitamin C, firmness and antioxidant capacity of fruits.

Data in Table (2) shows that, spraying flaxseed oil, Groprogress and Thidiazuron led to decreased the percentage of cracking and a significant increase in the content of fruits from the percentage of total soluble solid, Vitamin C, Antioxidant capacity and fruit firmness compared to control treatment. The highest significance result were recorded in treatment of Groprogress3%, that gave the lowest percentage of cracking 7.41% and the highest percentage of total soluble solid, acidity, vitamin C, antioxidant capacity and firmness of fruits, they were (17.79%, 8.78 mg/100 ml Juice, 2.89 (mmol TE/g FW) and 0.482 Kg/ cm^2) comparison with (13.78%, 14.24%, 7.15 mg/100ml Juice, 1.34 (mmol TE/g FW) and 0.394 Kg/ cm^2) in control treatment respectively. The increase in chemical composition of fruit juice because of fruits treated with such materials led to increasing fruits from total soluble solids, Vitamin C,

antioxidant capacity and firmness of fruits which results due to the fact that this compound increase vegetative growth and thus encourages the accumulation of carbohydrate materials in fruits leading to increased content of these materials in fruit and increase in firmness of fruits and reduction the percentage of cracking(Jaldo *et. al.* , 2009).

Table 1 . Effect of spraying with flaxseed oil , Groprograss and Thidiazuron on vegetative growth and fruit weight of fig cv. Kadota

Treatments	% Bud Break	Number of days to bud break	Leaf area (cm ²)	Length petiole cm	Number of shoots	Length of shoots Cm	fruit weight gm
Control	48.16	51.48	136.22	11.37	2.30	15.51	37.83
Flaxseed oil 1%	50.35	49.50	136.27	11.78	2.55	15.64	37.98
Flaxseed oil 2%	54.67	48.35	136.40	11.73	2.40	16.06	37.96
Flaxseed oil 3%	59.15	48.19	136.35	11.98	2.75	15.93	38.14
Groprograss 1%	75.23	45.75	139.90	12.19	3.36	17.77	40.55
Groprograss 2%	79.58	40.68	142.15	12.35	5.18	19.45	43.68
Groprograss 3%	81.32	37.46	148.62	12.57	8.70	22.36	45.89
Thidiazuron 1%	62.59	48.62	137.75	11.62	3.00	16.24	48.62
Thidiazuron 2%	65.76	46.43	139.84	11.88	3.55	17.90	38.38
Thidiazuron 3%	68.80	43.55	141.86	12.12	4.85	20.61	40.16
L . S. D. 0.05	1.88	2.30	1.18	0.28	1.10	0.69	1.32

Table 2 . Effect of spraying with flaxseed oil , Groprograss and Thidiazuron on total yield and fruit quality of fig cv. Kadota

Treatments	Total yield Kg / tree	% Total cracking	% Total soluble sold	%Acidity	Vitamin C mg / 100 ml Juice	fruit firmness Kg/cm ²	Antioxidant capacity (mmol TE/g FW)
Control	20.16	13.78	14.24	0.230	7.15	0.394	1.34
Flaxseed oil 1%	21.70	12.75	14.57	0.232	8.09	0.441	1.40
Flaxseed oil 2%	21.33	11.79	14.90	0.230	8.11	0.436	1.59
Flaxseed oil 3%	22.47	11.99	15.13	0.231	7.95	0.467	1.63
Groprograss 1%	24.57	10.35	16.71	0.235	8.13	0.450	1.87
Groprograss 2%	26.85	8.59	16.96	0.233	8.24	0.461	2.55
Groprograss 3%	28.23	7.14	17.79	0.232	8.78	0.482	2.89
Thidiazuron 1%	23.46	12.17	15.04	0.228	8.02	0.453	1.68
Thidiazuron 2%	24.54	10.22	16.25	0.231	8.15	0.478	1.84
Thidiazuron 3%	24.90	9.43	16.87	0.230	8.46	0.465	2.48
L . S. D. 0.05	1.83	0.96	0.28	n.s	0.19	0.009	0.12

CONCLUSION

It could be concluded from this experiment that ,spraying trees with flaxseed oil , Groprograss and Thidiazuron led to increased 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 sold (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 . The concentration of Groprograss3% gave the best results on vegetative growth, quality of fruits and yield .

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