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EFFECT OF FOLIAR SPRAY WITH GIBBERELLIC ACID AND AMCOTONE ON FRUIT SET, DROPPING, COMPONENT YIELD AND FRUIT QUALITY OF WASHINGTON NAVEL ORANGE TREES

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ABSTRACT

The present study was carried out during 2007 and 2008 on 15 years old Washington navel orange trees (*C. sinensis* Osbeck) grafted on sour orange (*C. aurantium* L.) rootstocks. Trees were grown under north delta conditions.

The results could be summarized in the following points:

1) The trees which sprayed with 100 g amcotone /100 L+ 20 ppm (GA_3) gave the highest initial and final fruit set % and the lowest (June drop% and preharvest drop%) followed by the trees which sprayed with 50 g amcotone /100 L+ 20 ppm (GA_3) which obtained the second order in this regard in both studied seasons. Also, there are no significant effects on number sprayed doses in this respect.
2) The trees which sprayed with 100 g amcotone /100 L+ 20 ppm (GA_3) gave the highest {fruits number and yield (kg) /tree} followed by the trees which sprayed with 50 g amcotone /100 L+ 20 ppm (GA_3) which possessed the second order in this regard in both seasons. Also, the trees which sprayed with three doses (mid-March, late April and the beginning of August) obtained the highest {fruits number and yield (kg) /tree}.
3) Fruit shape (H/D ratio) was the highest in trees which sprayed with100 g amcotone /100 L+ 20 ppm (GA_3) followed by trees which sprayed with 100 g amcotone /100 L+ 15 ppm (GA_3) with insignificant effect of three treatments. Whereas, non-significant effects of the number of doses .
4) Physical properties of fruits under this study as { fruit weight (g), fruit size (cm^3) and fruit juice weight (g) } the highest values obtained in trees which sprayed with100 g amcotone /100 L+ 20 ppm (GA_3) followed by 50 g amcotone /100 L+ 20 ppm (GA_3).Moreover, trees which sprayed with three doses (mid-March, late April and the beginning of August) gave the highest values in this respect.
5) Regarding to the chemical properties of fruits which studied as (T.S.S. %, total acidity % and Vitamin C mg/100 ml juice) the treatments which sprayed with100 g amcotone/100 L+ 20 ppm (GA_3) gave the highest values followed by the trees which sprayed with 50 g amcotone /100 L+ 20 ppm (GA_3) . Also, the trees which sprayed with three doses (mid-March, late April and the beginning of August) gave the highest values in this respect .
6) Trees which sprayed with Amcotone/100L+20 ppm GA3 treatment gave the highest values of T.S.S. /acid ratio with insignificant effect when compared with other treatments under this study. Moreover, trees which sprayed with three doses (mid-March, late April and the beginning of August) gave the highest T.S.S. / acid ratio.

The recommendations:

It could be recommended that spraying “Washington” navel orange trees with100 g amcotone /100 L+ 20 ppm (GA_3) three times at (mid-March, late April and the beginning of August) gave the highest values of initial and final fruit set %, decrease of June and preharvest drop %, increase of yield as fruit number and weight (kg) /tree,

improvement fruit physical and chemical properties as {fruit weight (g) and size (cm^3) and fruit juice weight (g),TSS% , total acidity % ,Vitamin C. and TSS/Acid ratio }.

INTRODUCTION

In citrus the majority of the produced orange fruit abcise within two months anthesis. Certain cultivars required pollination and seed development for fruit set, while others cultivars can be set without pollination (seedless cultivars) whereas, a pollen stimulate fruit setting only (Erickson and Brannaman 1960).Washington navel orange trees (*C. sinensis* Osbeck) is one of the most important citrus varieties grown in Egypt. It confronts two serious problems of poor fruit set and heavy fruit drop and more sensitive to environmental stresses, particularly water stress and microclimate stability to agree that they may suffer in many years from excessive drop during May and June months, which is reflected with reducing effect on fruit set and yield (Azab, 1976).

However, the problem of June drop and pre-harvest fruit drop exists extensively in many Egyptian orchards, whereas, Washington navel orange is a parthenocarpic cultivar thus decrease yield and fruit quality. Young parthenocarpic fruits tend to be more easily to drop than young fruits from pollinated flowers (Schafer *et al*., 1999). Abd El-Ghany (2005) reported that, fruit drop before June drop (initial drop) occurred due to the competition among the fruit on the nutrients, water with truble in hormonal balance. Plant growth regulators (PGR) play an important role in the growth, flowering and fruit set of different crops, particularly gibberellic acid and naphthline acetic acid, since it encourage fruit set and reduce fruit drop in many citrus species and varieties (Babu & Lavania, 1986; Josan *et al*., 1997; Almeida *et al*., 2004; and Saleem *et al*., 2008).Growth regulating substances such as NAA has been used by some workers to control pre-harvest fruit drop in citrus and have reported very encouraging results. In addition, auxin may either delay or stimulate this process and ethylene acts as a trigger agent responsible for the expression of cell wall degrading enzyme according to Zacarias and Stead (2000).This control is essential for normal cell function and any malfunction of this regulation will lead to disruption of growth and cellular damage or death**.**

In citrus, massive abscission of developing ovaries, generally occurs shortly after anthesis. Cultural practices were tied to overcome this problem mostly including application of exogenous growth regulators (GA_3) (Talon *et al*.,2000). Navel orange fruits increased 20-30% spraying with GA_3 + Zn + Mn (Blanco *et al*., 1994). GA_3 was found to increase stem length as a result of enhancing cell elongation (Goodwin and Mercer, 1983). Giffillan *et al*., (1974) and Simit (1990) mentioned that GA_3 significantly affects tree yield and fruit quality. Desai *et al.*,(1991) resulted in increased average fruit weight and T.S.S and vitamin C concentration of fruit. It is well known that GA_3 significantly affect yield (Giffillan *et al*., 1974 and Simit 1990) and fruit quality (Didda, 1971, Lima and Davis 1984 and Ibrahim *et al*., 1994). El-Saida (2007) noticed that fruit weight, fruit volume, fruit shape, juice percentage and juice density of Valencia orange fruits significantly influenced by Gibberellin and

amcotone applications and reported that amcotone plus Ca-EDTA gave the highest fruit juice percentage of Valencia orange trees if compared to other treatments. While, he mentioned that amcotone plus Zn-EDTA treatment resulted in highest T.S.S/ Acid ratio. At last, Ibrahim *et al*.,(2011) found that spraying GA_3 three times a season at 10 ppm on Washington navel orange trees (beginning of flowering, full bloom and fruit set) gave the maximum fruit set, fruit retention percentages and reduced total drop percentages, but primary fruitlets and June fruit drop percentages were higher under GA_3 spraying treatments, when they added GA_3 and NAA at 10 ppm.

The present study was undertaken to see the effect of foliar sprays with amcotone and Gibberellic acid on fruit set, dropping, component yield and fruit quality of Washington navel orange trees.

MATERIALS AND METHODS

Plant material and treatments:

This investigation was carried out during 2007 and 2008 on 15 years old Washington navel orange trees (*C.sinensis* Osbeck) grafted on sour orange (*C. aurantium* L.) rootstocks. Trees were grown in private orchard situated at Aga region, Dakahlia governorate and were planted at 5x5 m a part. The trees were under basen irrigation system, fertilized with organic manure at a rate of 25 m^3 per feddan in November every two years , Calcium super phosphate (15% P2O2) was added during November at a rate of 1.00 kg per tree . Also, 200 kg per feddan ammonium nitrate (33.5% N) were added in three equal doses; at the beginning of March, mid-May and the beginning of August. Also, 100 kg per feddan potassium sulphate (48% K2O) were added in two equal doses; at the beginning of (March and August) and subjected to the same cultural practices usually done in the orchard.

The experiment was designed as a split-split plot arrangement of complete randomized blocks design. Eighty one of “Washington” navel orange trees were selected as uniform as possible. Three replicates were used for each treatment and every replicate was represented by single tree (9 chemical treatment × 3 times × 3 replicates = 81 experimental units) .The following foliar spray treatments (T) of the chemical substances :-

1 = Control (water only).
2 = 50 gm Amcotone /100 L.
3 = 100 gm Amcotone/100 L.
4 = 50 gm Amcotone /100 L +15 ppm Gibberellic acid (GA_3).
5 = 100 gm Amcotone /100 L +15 ppm Gibberellic acid (GA_3).
6 = 50 gm Amcotone /100 L + 20 ppm Gibberellic acid (GA_3).
7 =100 gm Amcotone /100 L + 20 ppm Gibberellic acid (GA_3).
8 = 15 ppm Gibberellic acid (GA_3).
9 = 20 ppm Gibberellic acid (GA_3).

(Table -1): Amcotone contents:-

Plant growth regulator	
Chemical name : Naphthayl acetic acid + 1- naphthayl acetamide	
Composition:	%
Naphthayl acetic acid (NAA) ~~~~~~~ acetamide (NAAM) Other additives	0.45 1.20 98.35
Total	100.00

All the chemicals were sprayed in 1 dose (mid-March), 2 equal doses (mid-March and late April) or 3 equal doses (mid-March, late April and the beginning of August). Each tree was sprayed with 8 liters of the spraying solution which was sufficient for a thorough coverage of the canopy and New Bio-film was used as a surfactant agent at 0.3ml/L for all the treatments including the control.

Blooming and fruit-set :-

Fruit set %, June drop % and fruit preharvest drop % were estimated .The percentage of fruit retention before June drop (initial fruit set % after petals fall at late March) and after June drop and at harvest time (final fruit set % at the mid-November) were calculated during both seasons. Effect of treatment on fruit drop percentage (June drop % at 1st July) and preharvest fruit drop percentage at mid-November were estimated in both seasons:-

1- Fruit set percentages (fruit retention) were calculated at fruit-setting stage (after petals fall)
as formula :-

$$\text{Initial fruit set \% at 1st April)} = \frac{\text{Number of setted fruits}}{\text{Total number of flowers}} \times 100.$$

$$\text{Final fruit set \% at 1st Augusts)} = \frac{\text{Total number of fruits}}{\text{Total number of flowers}} \times 100.$$

2- Fruit drop percentages were recorded at 1st July as follows:-

$$\text{June drop \%} = \frac{\text{Number of fruits which dropped}}{\text{Total number of fruits}} \times 100.$$

3- Preharvest fruit drop were recorded at 15th December as follows:-

$$\text{Preharvest fruit drop \%} = \frac{\text{Number of dropped fruits under tree}}{\text{Total number of fruits on tree}} \times 100 .$$

Yield and fruit quality:-

At harvest time 15 December of each experimental season fruit yield was recorded as number and weight per tree. A sample of ten fruits were

taken from each replicate tested for fruit weight (g), fruit size (cm^3), fruit shape index (height and diameter ratio), juice percent by weight, acidity percentage, total soluble solids (TSS) percentage, TSS/ acid ratio, ascorbic acid (V.C) as mg /100 ml juice. All these analysis were evaluated according to A.O.A.C. methods (1977).

Statistical analysis:-

All obtained data were subjected to analysis of variance according to Snedecor and Cochran (1980) and means were differentiated using least significant differences test (LSD) at 5 (%) level of probability.

RESULTS AND DISCUSSION

1- Initial fruit set%

Table (2) proved that all treatments significantly increased initial fruit set % compared with the control in both seasons. The trees of treatment which sprayed with 100 gm amcotone/100 L+ 20 ppm GA_3 gave the largest initial fruit set % as the values were (58.63%, 61.17% and 60.16%) in the first season and (63.17%, 62.80% and 64.15%) in the second season, respectively. The trees spray with 50 gm amcotone/100L + 20 ppm GA_3 obtained the second order without significant differences between them in the two studied seasons. The two best treatments which mentioned above significantly increased initial fruit set % than all experiment treatments in both seasons as show in Table (2).

(Table- 2): Effect of amcotone and Gibberellic acid spraying on initial fruit set % of Washington navel orange trees during 2007 and 2008 seasons

Dos(B) *Tr. ch.(A)		2007				2008			
		1	2	3	Av.	1	2	3	Av.
1		52.18	53.41	52.71	52.77	55.14	53.41	54.80	54.45
2		54.14	56.76	55.48	55.46	57.73	55.15	57.07	56.65
3		56.06	58.19	56.72	56.99	58.86	59.41	59.16	59.14
4		55.43	56.15	36.41	56.00	57.53	58.76	60.38	58.89
5		56.61	58.70	56.90	57.40	60.14	59.09	62.15	60.46
6		57.77	50.52	59.14	59.14	61.98	60.76	63.76	62.17
7		58.63	61.17	60.16	59.99	63.17	62.80	64.15	63.37
8		55.40	55.72	56.50	55.87	58.18	57.83	57.26	57.76
9		56.15	57.88	57.19	57.07	59.62	59.76	59.01	59.46
Mean		55.82	57.61	56.80		59.15	58.55	59.75	
LSD .05	A	1.48				1.67			
	B	1.23				1.37			
	AB	2.08				2.16			

***1= Control.**
2= 50 gm Amcotone/100L.
3= 100 gm Amcotone/100L.
4= 50 gm Amcotone/100L + 15 ppm (GA_3).
5= 100 gm Amcotone/100L +15 ppm (GA_3).
6= 50 gm Amcotone/100L + 20 ppm (GA_3).
7= 100 gm Amcotone/100L+20 ppm (GA_3).
8= 15 ppm (GA_3). T9=20 ppm (GA_3).

Initial fruit set % significantly increased compared with the control in both seasons for all experiment treatments. Also, it is evident that the trees which sprayed with two doses (mid-March and late April) gave the best

results in increase initial fruit set % than one and three doses added in the first season only, but in the second season, no significant differences were found between all sprayed doses used in relation to increase initial fruit set %.

The interaction between spraying with chemical treatments and number of spraying doses significantly increased initial fruit set % in the two studied seasons compared with the control.

2- Final fruit set%

The results of this investigation (Table, 3) point out clearly that all treatments significantly increased final fruit set % than the control in the two studied seasons. The trees of treatment which sprayed with 100 gm amcotone/100 L+ 20 ppm GA_3 gave the best final fruit set % as the values were (2.72%, 2.79% and 2.64%) and (2.70%, 2.69% and 2.71%) in the first and second seasons, respectively. On the other hand, the trees which sprayed with 50 gm amcotone/100L + 20 ppm GA_3 obtained the second order without significant differences between them in the both seasons. The trees which sprayed with 50 gm amcotone/100L + 15 ppm GA_3 possessed the third order in increased final fruit set % without significant differences compared with the two best treatments mentioned above which possessed the first and second order in this respect in the second season only.

There are no significant differences between all the number of sprayed doses used in relation to increase final fruit set % in the two studied seasons.

The interaction between spraying with chemical treatments and number of spraying doses significantly increased final fruit set % in the two studied seasons compared with the control.

(Table- 3): Effect of amcotone and Gibberellic acid spraying on final fruit set % of Washington navel orange trees during 2007 and 2008 seasons

Dos(B)		2007				2008			
*Tr. ch.(A)		1	2	3	Av.	1	2	3	Av.
1		1.95	2.03	2.06	2.01	2.06	1.89	2.11	2.02
2		2.36	2.35	2.35	2.35	2.34	2.42	2.33	2.36
3		2.48	2.41	2.48	2.46	2.46	2.55	2.42	2.48
4		2.43	2.43	2.48	2.45	2.43	2.50	2.53	2.49
5		2.52	2.58	2.67	2.59	2.59	2.59	2.64	2.61
6		2.69	2.64	2.62	2.65	2.65	2.67	2.69	2.67
7		2.72	2.79	2.64	2.72	2.70	2.69	2.74	2.71
8		2.21	2.38	2.41	2.33	2.45	2.34	2.49	2.43
9		2.39	2.55	2.50	2.48	2.57	2.41	2.58	2.52
Mean		2.42	2.46	2.47		2.47	2.45	2.50	
New	A	0.19				0.24			
LSD	B	0.14				0.18			
0.05	AB	0.21				0.26			

***1= Control.**
2= 50 gm Amcotone/100L.
3= 100 gm Amcotone/100L.
4= 50 gm Amcotone/100L + 15 ppm (GA_3).
5= 100 gm Amcotone/100L +15 ppm (GA_3).
6= 50 gm Amcotone/100L + 20 ppm (GA_3).
7= 100 gm Amcotone/100L+20 ppm (GA_3).
8= 15 ppm (GA_3). T9=20 ppm (GA_3).

3- June drop%

Data in Table (4) showed clearly that all treatments significantly decreased June drop% than the control in both seasons. The trees of treatment which sprayed with 100 gm amcotone/100 L+ 20 ppm GA_3 gave the least June drop % as the values were (88.93%, 89.32%% and 89.22%) and (88.23%, 88.11% and 87.35%) in the first and the second seasons, respectively. Also, the treatment which sprayed with 50 gm amcotone/100L + 20 ppm GA_3 obtained the second order without significant differences between them in the both studied seasons.

It is clearly that there were no significant differences between all the number of sprayed doses used in relation to decreased June drop % % in the two studied seasons.

The interaction between spraying with chemical treatments and number of spraying doses significantly decreased June drop % % in the two studied seasons compared with the control.

4- Preharvest drop%

It is evident from (Table 5) that all treatments significantly decreased preharvest drop % than the control in both seasons. The trees of treatment which sprayed with 100 gm amcotone/100 L+ 20 ppm GA_3 gave the least preharvest drop % as the values were (2.76%, 2.64% and 2.75%) and (2.65%, 2.63% and 2.61%) in the first and the second seasons, respectively. It is seen from the data that the treatment which sprayed with 50 gm amcotone/100L + 20 ppm GA_3 obtained the second order without significant differences between them in the both studied seasons.

It is clearly that there were no significant differences between all the number of sprayed doses used in respect of decreased preharvest drop % in both studied seasons.

The interaction between spraying with chemical treatments and number of spraying doses significantly decreased preharvest drop % in the two studied seasons than with the control.

The results are accordance with those found by Abd El-Ghany (2005), where reported that, fruits drop before June drop (initial drop) occurred due to the competition among the fruit on the nutrients, water and the defect in hormonal balance. Plant growth regulators (PGR) play an important role in the growth, flowering and fruit set of different crops, particularly gibberellic acid and naphthline acetic acid, since it encourage fruit set and reduce fruit drop in many citrus species and varieties (Babu & Lavania, 1986; Josan *et al*., 1997; Almeida *et al*., 2004 and Saleem *et al*., 2008). Growth regulating substances such as NAA has been used by some workers to control pre-harvest fruit drop in citrus and have reported very encouraging results. At last, Ibrahim *et al*., (2011) found that spraying 10 ppm of GA_3 at three times / season on Washington navel orange trees (beginning of flowering, full bloom and fruit set) gave the significant increase fruit set, fruit retention percentages and reduced total drop percentages.

(Table- 4): Effect of amcotone and Gibberellic acid spraying on June drop % of Washington navel orange trees during 2007 and 2008 seasons

Dos(B) / *Tr. ch.(A)		2007				2008			
		1	2	3	Av.	1	2	3	Av.
1		93.71	93.65	94.37	93.91	93.75	94.38	93.66	93.93
2		90.36	90.64	90.30	90.43	90.51	91.74	91.05	91.10
3		90.01	89.95	89.83	89.93	90.30	91.08	90.63	90.67
4		90.44	90.25	91.08	90.59	89.60	90.01	90.35	89.99
5		90.03	90.73	90.89	90.55	89.11	89.63	89.02	89.25
6		89.97	90.47	90.31	90.25	88.71	89.09	88.76	88.85
7		88.93	89.32	89.22	89.16	88.23	88.11	87.35	87.90
8		90.26	91.31	91.14	90.90	90.70	91.15	90.40	90.75
9		90.06	91.16	90.40	90.54	90.13	90.63	89.97	90.24
Mean		90.42	90.83	90.84		90.12	90.65	90.13	
New	A	1.66				1.57			
LSD	B	1.43				1.38			
0.05	AB	2.06				2.00			

***1= Control.**
2= 50 gm Amcotone/100L.
3= 100 gm Amcotone/100L.
4= 50 gm Amcotone/100L + 15 ppm (GA_3).
5= 100 gm Amcotone/100L +15 ppm (GA_3).
6= 50 gm Amcotone/100L + 20 ppm (GA_3).
7= 100 gm Amcotone/100L+20 ppm (GA_3).
8= 15 ppm (GA_3).
T9=20 ppm (GA_3).

(Table – 5): Effect of amcotone and Gibberellic acid spraying on fruit preharvest drop % of Washington navel orange trees during 2007 and 2008 seasons

Dos(B) / *Tr. ch.(A)		2007				2008			
		1	2	3	Av.	1	2	3	Av.
1		3.64	3.58	3.57	3.60	3.74	3.67	3.58	3.66
2		3.18	3.05	3.00	3.08	3.01	2.97	2.93	2.97
3		3.05	2.98	2.94	2.99	2.95	2.88	2.80	2.88
4		3.07	2.98	3.00	3.02	3.02	3.00	2.93	2.98
5		2.95	2.87	2.87	2.90	2.89	2.87	2.82	2.86
6		2.84	2.73	2.83	2.80	2.76	2.79	2.77	2.77
7		2.76	2.64	2.75	2.72	2.65	2.63	2.61	2.63
8		3.13	3.00	3.01	3.05	3.05	3.04	2.96	3.02
9		3.03	2.91	2.92	2.95	2.91	2.87	2.87	2.88
Mean		3.07	2.97	2.99		3.00	2.97	2.92	
New	A	0.24				0.22			
LSD	B	0.27				0.29			
0.05	AB	0.33				0.36			

***1= Control.**
2= 50 gm Amcotone/100L.
3= 100 gm Amcotone/100L.
4= 50 gm Amcotone/100L + 15 ppm (GA_3).
5= 100 gm Amcotone/100L +15 ppm (GA_3).
6= 50 gm Amcotone/100L + 20 ppm (GA_3).
7= 100 gm Amcotone/100L+20 ppm (GA_3).
8= 15 ppm (GA_3).
T9=20 ppm (GA_3).

Yield:-

1- Fruits number/ tree:

Table (6) clearly showed that all treatments significantly increased fruits number/ tree compared with the control in the two studied seasons. The trees of treatment which sprayed with 100 gm amcotone/100 L+ 20 ppm GA_3 gave significant increase of fruit number / tree as the values were (410.89, 420.87 and 415.52) and (435.46, 437.12 and 442.54) in the first and second

seasons, respectively. The data revealed also that the treatment which sprayed with 50 gm amcotone/100L + 20 ppm GA_3 obtained the second order without significant differences nearly between them in both seasons.

It is clearly showed that the trees which sprayed with three doses (mid-March, late April and the beginning of August) gave the biggest fruits number/ tree (377.41 and 411.99) in both seasons respectively, followed by the trees which sprayed with two doses (mid-March and late April) without significant differences nearly between them in the two studied seasons.

The interaction between spraying with chemical treatments and number of spraying doses significantly increased fruits number/tree in both studied seasons compared with the control.

(Table - 6): Effect of amcotone and Gibberellic acid spraying on fruits number/tree of Washington navel orange trees during 2007 and 2008 seasons

Dos(B)	2007				2008			
*Tr. ch.(A)	1	2	3	Av.	1	2	3	Av.
1	315.19	327.11	329.42	323.91	344.70	350.86	348.43	348.00
2	341.84	355.17	355.85	350.95	380.15	393.83	410.60	394.86
3	361.56	378.46	371.11	370.38	399.66	410.76	431.15	413.86
4	350.94	361.85	366.84	359.88	385.44	400.06	405.75	397.08
5	385.16	389.91	395.33	390.13	406.11	410.98	421.35	412.81
6	399.45	405.23	410.21	404.96	425.29	430.61	433.14	429.68
7	410.89	420.76	415.52	415.72	435.46	437.12	442.54	438.37
8	357.40	364.23	365.11	362.25	386.10	387.87	397.53	390.50
9	365.82	391.47	387.27	381.52	396.81	397.87	416.90	403.86
Mean	365.36	377.13	377.41		395.52	402.22	411.93	
New LSD 0.05 A	12.86				18.27			
New LSD 0.05 B	5.04				9.72			
New LSD 0.05 AB	8.31				11.07			

***1= Control.** **5= 100 gm Amcotone/100L +15 ppm (GA_3).**
2= 50 gm Amcotone/100L. **6= 50 gm Amcotone/100L + 20 ppm (GA_3).**
3= 100 gm Amcotone/100L. **7= 100 gm Amcotone/100L+20 ppm (GA_3).**
4= 50 gm Amcotone/100L + 15 ppm (GA_3). **8= 15 ppm (GA_3).** **T9=20 ppm (GA_3).**

2- Yield weight (kg/tree):

The present results in Table (7) proved that all experiment treatments significantly increased the yield (kg)/tree than the control in both studied seasons. The trees of the treatment which sprayed with100 gm amcotone/100 L+ 20 ppm GA_3 gave significant increase than all other treatments in the two studied seasons as the values were [103.00, 104.62 and 105.19 (kg)/tree] and [111.51, 117.84 and 115.46 (kg)/tree] in the first and second seasons, respectively, followed by the trees of the treatment which sprayed with 50 gm amcotone/100L + 20 ppm GA_3 which obtained the second order in this respect in both studied seasons.

The trees which sprayed with three doses (mid-March, late April and the beginning of August) gave the biggest yield (kg) / tree (88.53 kg) in the first season only with significantly increased than the other doses applied. Mean while, the treatment of trees which sprayed with two doses (mid-March and late April) and three doses(mid-March, late April and the beginning of August)

in the second season gave the best results (98.74 kg) and (97.53 kg) respectively, in this regard without significant differences between them.

The interaction between spraying with chemical treatments and number of spraying doses significantly increased yield (kg) /tree in both studied seasons compared with the control.

(Table – 7): Effect of amcotone and Gibberellic acid spraying on yield (kg) /tree of Washington navel orange trees during 2007 and 2008 seasons

Dos(B)		2007				2008			
*Tr. ch.(A)		1	2	3	Av.	1	2	3	Av.
1		60.08	61.37	68.49	63.31	72.79	79.58	73.6	75.32
2		71.20	75.72	79.67	75.53	86.51	93.83	89.58	89.97
3		79.34	86.04	86.52	83.97	93.84	97.89	98.48	96.74
4		76.61	76.18	80.99	77.93	92.47	93.22	91.18	92.29
5		87.49	89.95	95.87	91.10	97.45	101.24	101.27	99.99
6		96.32	100.42	101.58	99.44	105.49	107.48	109.18	107.38
7		103.00	104.62	105.19	104.27	111.51	117.84	115.46	114.94
8		74.97	79.28	86.00	80.08	87.49	94.76	94.27	92.17
9		84.94	90.07	92.46	89.16	98.76	102.78	104.75	102.10
Mean		81.55	84.85	88.53		94.03	98.74	97.53	
New	A	1.84				2.07			
LSD	B	1.36				1.81			
0.05	AB	2.64				2.94			

***1= Control.** **5= 100 gm Amcotone/100L +15 ppm (GA_3).**
2= 50 gm Amcotone/100L. **6= 50 gm Amcotone/100L + 20 ppm (GA_3).**
3= 100 gm Amcotone/100L. **7= 100 gm Amcotone/100L+20 ppm (GA_3).**
4= 50 gm Amcotone/100L + 15 ppm (GA_3). **8= 15 ppm (GA_3).** **T9=20 ppm (GA_3).**

Our results are agreement with those reported by Blanco *et al*., (1994) who found that Navel orange fruits increased 20-30% spraying with GA_3 + Zn + Mn. It is well known GA_3 significantly affects on tree yield [Giffillan *et al*., (1974) and Simit (1990)].

Fruit quality:-

1- Fruit shape (H/D ratio)

It could be observed from Table (8) that fruit shape in all experiment treatments increased than the control in the two studied seasons. The trees of the treatment which sprayed with100 gm amcotone/100 L+20 ppm GA_3 followed by the treatment which sprayed with 50 gm amcotone/100 L+ 20 ppm GA_3 and the trees of treatment which sprayed with100 gm amcotone/100 L+15 ppm GA_3 possessed the highest values in related of increase fruit shape (L/D ratio) without significant differences between the three mentioned treatments in both studied seasons.

There are no any significant differences between the three doses used in this respect in the two studied seasons.

The interaction between spraying with chemical treatments and number of spraying doses increased fruit shape (L/D ratio) in both studied seasons compared with the control.

2- Fruit weight (g)

Our results as show in (Table 9) showed that all experiment treatments increased fruit weight (g) compared with control in the two studied seasons. The trees of the treatment which sprayed with100 gm amcotone/100 L+ 20 ppm GA_3 gave the highest fruit weight (g) than all other treatments in both studied seasons as the values were [248.35, 248.65 and 250.73 (g)] and [253.82, 265.71 and 259.07(g)] in the first and second seasons, respectively, followed by the trees of the treatment which sprayed with 50 gm amcotone/100L + 20 ppm GA_3 which obtained the second order in this regard without significant differences between them in both studied seasons.

It is evident that the trees which sprayed with three doses of spraying (mid-March, late April and the beginning of August) gave the highest fruit weight (g) [231.07(g)] in the first season only with significantly increased than the two other doses applied. Meanwhile, the treatment of trees which sprayed with two doses (mid-March and late April) in the second season gave the best results [241.72(g)] in this regard with significant increase than the two other doses applied.

The interaction between spraying with chemical treatments and number of spraying doses significantly increased fruit weight (g) in both studied seasons compared with the control.

(Table – 8): Effect of amcotone and Gibberellic acid spraying on fruit shape (L/D ratio) of Washington navel orange fruits during 2007 and 2008 seasons

Dos(B)		2007				2008			
*Tr. ch.(A)		1	2	3	Av.	1	2	3	Av.
1		1.07	1.08	1.09	1.08	1.08	1.09	1.09	1.09
2		1.10	1.11	1.11	1.11	1.12	1.12	1.12	1.12
3		1.11	1.12	1.13	1.12	1.11	1.13	1.12	1.12
4		1.11	1.11	1.15	1.12	1.12	1.14	1.13	1.13
5		1.13	1.15	1.14	1.14	1.13	1.14	1.15	1.14
6		1.14	1.13	1.16	1.14	1.13	1.16	1.14	1.14
7		1.16	1.14	1.15	1.15	1.14	1.16	1.16	1.15
8		1.10	1.10	1.11	1.10	1.11	1.12	1.12	1.12
9		1.11	1.12	1.12	1.12	1.12	1.12	1.13	1.12
Mean		1.11	1.12	1.13		1.12	1.13	1.13	
New	A	0.04				0.04			
LSD	B	NS				NS			
0.05	AB	0.05				0.06			

***1= Control.**
2= 50 gm Amcotone/100L.
3= 100 gm Amcotone/100L.
4= 50 gm Amcotone/100L + 15 ppm (GA_3).
5= 100 gm Amcotone/100L +15 ppm (GA_3).
6= 50 gm Amcotone/100L + 20 ppm (GA_3).
7= 100 gm Amcotone/100L+20 ppm (GA_3).
8= 15 ppm (GA_3). T9=20 ppm (GA_3).

(Table - 9): Effect of amcotone and Gibberellic acid spraying on fruit weight (g) of Washington navel orange fruits during 2007 and 2008 seasons

Dos(B)		2007				2008			
*Tr. ch.(A)		1	2	3	Av.	1	2	3	Av.
1		190.63	187.41	201.83	193.29	205.40	214.81	205.36	208.52
2		205.36	210.39	215.74	210.50	221.47	236.11	225.14	238.40
3		220.08	224.70	230.45	225.08	235.19	243.91	236.10	236.24
4		215.48	210.36	220.78	215.54	225.46	231.18	222.17	226.27
5		227.17	230.70	241.50	233.12	237.50	243.56	237.98	239.68
6		238.64	247.83	245.18	243.88	245.62	252.16	249.65	249.14
7		248.35	248.65	250.73	249.24	253.82	265.71	259.07	259.53
8		213.33	214.86	235.54	221.24	228.15	238.19	227.14	231.16
9		220.15	227.40	237.85	228.47	247.01	249.88	240.63	245.84
Mean		219.91	222.48	231.07		233.29	241.72	233.69	
New	A	10.67				14.03			
LSD	B	4.09				5.17			
0.05	AB	6.37				8.41			

***1= Control.**
2= 50 gm Amcotone/100L.
3= 100 gm Amcotone/100L.
4= 50 gm Amcotone/100L + 15 ppm (GA_3).
5= 100 gm Amcotone/100L +15 ppm (GA_3).
6= 50 gm Amcotone/100L + 20 ppm (GA_3).
7= 100 gm Amcotone/100L+20 ppm (GA_3).
8= 15 ppm (GA_3). T9=20 ppm (GA_3).

3- Fruit size (cm^3)

It is obvious from Table (10) that all experiment treatments significantly increased fruit size (cm^3) than the control in both studied seasons.

(Table -10): Effect of amcotone and Gibberellic acid spraying on fruit size (cm^3) of Washington navel orange fruits during 2007 and 2008 seasons

Dos(B)		2007				2008			
*Tr. ch.(A)		1	2	3	Av.	1	2	3	Av.
1		196.30	193.15	208.3	199.25	211.17	201.09	215.36	209.21
2		214.39	218.38	226.87	219.88	229.19	226.42	232.25	244.85
3		228.76	291.76	237.54	234.14	243.68	239.98	250.90	241.47
4		223.17	219.41	228.90	223.83	233.24	227.3	237.05	232.53
5		236.48	238.10	249.46	241.35	246.66	247.00	255.37	249.68
6		244.96	255.92	254.08	251.65	253.14	261.96	262.15	259.08
7		256.67	258.03	257.36	257.35	259.90	264.18	264.15	262.74
8		219.48	223.65	230.13	224.42	238.68	232.16	238.14	236.33
9		229.64	235.08	245.81	236.84	251.11	244.07	253.48	249.55
Mean		227.76	237.05	237.61		240.75	238.24	245.43	
New	A	8.19				7.54			
LSD	B	4.61				5.04			
0.05	AB	12.32				14.02			

***1= Control.**
2= 50 gm Amcotone/100L.
3= 100 gm Amcotone/100L.
4= 50 gm Amcotone/100L + 15 ppm (GA_3).
5= 100 gm Amcotone/100L +15 ppm (GA_3).
6= 50 gm Amcotone/100L + 20 ppm (GA_3).
7= 100 gm Amcotone/100L+20 ppm (GA_3).
8= 15 ppm (GA_3). T9=20 ppm (GA_3).

The trees of the treatment which sprayed with100 gm amcotone/100 L+20 ppm GA_3 gave the highest fruit size (cm^3) than all other treatments in both studied seasons as the values were [256.57, 258.03 and 257.36 (cm^3)] and

[259.90, 264.18 and 264.15(cm^3)] in the first and second seasons, respectively, followed by the trees of the treatment which sprayed with 50 gm amcotone/100L + 20 ppm GA_3 which obtained the second order in this regard without significant differences between them in the two studied seasons.

It is clearly show that the trees which sprayed with three doses (mid-March, late April and the beginning of August) gave the largest fruit size (cm^3) compared with the two other doses applied in both studied seasons.

The interaction between spraying with chemical treatments and number of spraying doses significantly increased fruit size (cm^3) in both studied seasons compared with the control.

4- Juice percent by weight (g)

It could be observed clearly from Table (11) that all experiment treatments significantly increased fruit juice weight (g) than the control in the two studied seasons. The trees of the treatment which sprayed with100 gm amcotone/100 L+20 ppm GA_3 gave more fruit juice weight (g) than all other treatments in both studied seasons as the values were [209.35, 208.65 and 220.63(g)] and [210.82, 225.34 and 221.87(g)] in the first and the second seasons, respectively, followed by the trees of the treatment which sprayed with 50 gm amcotone/100L + 20 ppm GA_3 which possessed the second order in this respect in the two studied seasons.

It is obvious that the trees which sprayed with three doses (mid-March, late April and the beginning of August) gave abundantly fruit juice weight (g) [197.61(g)] in the first season only with significantly increased than the two other doses applied. Meanwhile, the treatment of trees which sprayed with two doses (mid-March and late April) in the second season gave the best results [201.39(g)] in this regard with significant increase than the two other doses used.

The interaction between spraying with chemical treatments and number of doses spraying significantly increased fruit juice weight (g) in both studied seasons than with the control.

5- T.S.S %

It could be concluded from the data in Table (12) that all experiment treatments significantly increased T.S.S.% than the control in both studied seasons. The trees of the treatment which sprayed with100 gm amcotone/100 L+20 ppm GA_3 gave the highest T.S.S.% than all other treatments in both studied seasons as the values were (12.51, 12.62 and 12.68%) and (12.67, 12.71 and 12.73) in the first and second seasons, respectively, followed by the trees of the treatment which sprayed with 50 gm amcotone/100L + 20 ppm GA_3 which possessed the second order in this regard without significant differences between them in the two studied seasons.

As for, effect the number of sprayed doses on T.S.S.%, it is clearly show that the trees which sprayed with three doses (mid-March, late April and the beginning of August) gave the highest T.S.S.% (12.37 and 12.46%) in the first and second seasons, respectively. There are no significant differences compared with the two other doses added in both studied seasons.

The interaction between spraying with chemical treatments and number of spraying doses significantly increased T.S.S % in both studied seasons compared with the control.

(Table – 11): Effect of amcotone and Gibberellic acid spraying on fruit juice weight (g) of Washington navel orange fruits during 2007 and 2008 seasons

Dos(B)		2007				2008			
*Tr. ch.(A)		1	2	3	Av.	1	2	3	Av.
1		159.63	146.41	162.63	156.22	165.10	174.80	165.16	168.35
2		170.36	170.39	185.74	175.50	181.47	200.64	185.47	189.19
3		180.08	187.73	203.75	190.52	193.19	213.18	201.67	202.68
4		180.48	170.36	190.58	180.47	195.46	181.99	192.77	190.07
5		190.17	185.30	211.56	195.68	200.50	195.86	207.98	201.45
6		204.34	207.83	215.18	209.12	205.62	212.66	219.93	212.74
7		209.35	208.65	220.63	212.88	210.82	225.34	221.87	219.34
8		176.35	174.84	185.55	178.91	188.05	198.59	187.94	191.53
9		183.65	191.40	202.89	192.65	207.01	209.47	200.63	205.70
Mean		183.82	182.55	197.61		194.14	201.39	198.16	
New	A	6.35				4.97			
LSD	B	2.77				3.19			
0.05	AB	7.56				6.64			

***1= Control.**
2= 50 gm Amcotone/100L.
3= 100 gm Amcotone/100L.
4= 50 gm Amcotone/100L + 15 ppm (GA_3).
5= 100 gm Amcotone/100L +15 ppm (GA_3).
6= 50 gm Amcotone/100L + 20 ppm (GA_3).
7= 100 gm Amcotone/100L+20 ppm (GA_3).
8= 15 ppm (GA_3). T9=20 ppm (GA_3).

(Table – 12): Effect of amcotone and Gibberellic acid spraying on T.S.S % of Washington navel orange fruits during 2007 and 2008 seasons

Dos(B)		2007				2008			
*Tr. ch.(A)		1	2	3	Av.	1	2	3	Av.
1		11.03	10.97	11.12	11.04	11.25	11.14	11.39	11.26
2		12.30	12.41	12.48	12.40	12.41	12.49	12.58	12.49
3		12.41	12.48	12.53	12.31	12.58	12.57	12.61	12.59
4		12.26	12.29	12.36	12.30	12.37	12.45	12.45	12.42
5		12.38	12.47	12.53	12.46	12.46	12.56	12.57	12.53
6		12.48	12.57	12.61	12.55	12.59	12.69	12.66	12.65
7		12.51	12.62	12.68	12.60	12.67	12.71	12.73	12.70
8		12.33	12.46	12.45	12.41	12.43	12.48	12.54	12.48
9		12.47	12.52	12.59	11.73	12.59	12.58	12.61	12.59
Mean		12.24	12.31	12.37		12.37	12.41	12.46	
New	A	0.42				0.46			
LSD	B	0.30				0.25			
0.05	AB	0.54				0.61			

***1= Control.**
2= 50 gm Amcotone/100L.
3= 100 gm Amcotone/100L.
4= 50 gm Amcotone/100L + 15 ppm (GA_3).
5= 100 gm Amcotone/100L +15 ppm (GA_3).
6= 50 gm Amcotone/100L + 20 ppm (GA_3).
7= 100 gm Amcotone/100L+20 ppm (GA_3).
8= 15 ppm (GA_3). T9=20 ppm (GA_3).

6- Total acidity

The obtained results in Table (13) revealed that all experiment treatments significantly increased total acidity % than the control in the two

studied seasons. The trees of the treatment which sprayed with100 gm amcotone/100 L+20 ppm GA_3 gave the highest total acidity % than all other treatments in both studied seasons as the values were (1.07, 1.09 and 1.07%) and (1.15, 1.16 and 1.14%) in the first and second seasons, respectively, followed by the trees of the treatment which sprayed with 50 gm amcotone/100L + 20 ppm GA_3 which possessed the second order in this regard without significant differences between them in the two studied seasons.

Concerning, effect the number of sprayed doses on total acidity %, it is evident that the trees which sprayed with three doses (mid-March, late April and the beginning of August) gave the highest total acidity % (1.12%) with significant increase than the two other doses used in the second seasons only, but no significant differences were found between all sprayed doses used in the first season as the values were (1.05, 1.05 and 1.04 %) at one, two and three doses add, respectively.

The interaction between spraying with chemical treatments and number of spraying doses increased total acidity % in both studied seasons compared with the control.

(Table – 13): Effect of amcotone and Gibberellic acid spraying on total acidity % of Washington navel orange fruits during 2007 and 2008 seasons

Dos(B)		2007				2008			
*Tr. ch.(A)		1	2	3	Av.	1	2	3	Av.
1		1.03	1.02	1.00	1.02	1.06	1.05	1.08	1.06
2		1.05	1.03	1.03	1.04	1.08	1.07	1.10	1.08
3		1.06	1.05	1.05	1.05	1.10	1.09	1.12	1.10
4		1.04	1.05	1.03	1.04	1.08	1.09	1.10	1.09
5		1.06	1.07	1.03	1.05	1.11	1.11	1.12	1.11
6		1.06	1.08	1.05	1.06	1.12	1.13	1.14	1.13
7		1.07	1.09	1.07	1.08	1.12	1.15	1.16	1.14
8		1.05	1.04	1.02	1.04	1.09	1.09	1.10	1.09
9		1.07	1.05	1.04	1.05	1.11	1.13	1.14	1.13
Mean		1.05	1.05	1.04		1.10	1.10	1.12	
New	A	0.04				0.04			
LSD	B	0.03				0.02			
0.05	AB	0.07				0.06			

***1= Control.**
2= 50 gm Amcotone/100L.
3= 100 gm Amcotone/100L.
4= 50 gm Amcotone/100L + 15 ppm (GA_3).
5= 100 gm Amcotone/100L +15 ppm (GA_3).
6= 50 gm Amcotone/100L + 20 ppm (GA_3).
7= 100 gm Amcotone/100L+20 ppm (GA_3).
8= 15 ppm (GA_3). T9=20 ppm (GA_3).

7- T.S.S. % /acid ratio

The present results in Table (14) showed that all experiment treatments significantly increased T.S.S. % / acid ratio than the control in the two studied seasons. The trees of the treatment which sprayed with 15 ppm GA_3 and the trees of the treatment which sprayed with 50 gm amcotone / 100 L gave the highest T.S.S. % / acid ratio than all other treatments in the two studied seasons without significant differences between them.

In relation to, effect the number of sprayed doses on T.S.S. % /acid ratio, it is clearly show that the trees which sprayed with three doses spraying (mid-March, late April and the beginning of August) gave the highest T.S.S.% /acid ratio (11.95) than the two other doses spraying used in the second seasons only, but no significant differences were found between all sprayed doses used in the first season only, but there are no significant increases in T.S.S.% /acid ratio between all sprayed doses used in the second season.

Concerning, effect the interaction between spraying with chemical treatments and number of spraying doses applied on T.S.S. % /acid ratio, it is evident that no significant increases were found in this respect in both studied seasons compared with the control.

(Table – 14): Effect of amcotone and Gibberellic acid spraying on T.S.S/acidity ratio of Washington navel orange fruits during 2007 and 2008 seasons

Dos(B) *Tr. ch.(A)		2007				2008			
		1	2	3	Av.	1	2	3	Av.
1		10.71	10.75	11.12	10.86	10.61	10.61	10.55	10.59
2		11.71	12.05	12.12	11.96	11.49	11.67	11.44	11.53
3		11.71	11.89	11.93	11.84	11.44	11.53	11.26	11.41
4		11.79	11.70	12.00	11.83	11.45	11.42	11.32	11.40
5		11.68	11.65	12.17	11.83	11.23	11.32	11.22	11.26
6		11.77	11.64	12.01	11.81	11.24	11.23	11.11	11.19
7		11.69	11.58	11.85	11.71	11.31	11.05	10.97	11.11
8		11.74	11.98	12.21	11.98	11.40	11.45	11.40	11.42
9		11.65	11.92	12.11	11.89	11.34	11.13	11.06	11.18
Mean		11.61	11.68	11.95		11.28	11.27	11.15	
New LSD 0.05	A	0.41				0.77			
	B	0.30				0.25			
	AB	0.57				0.84			

***1= Control.**
2= 50 gm Amcotone/100L.
3= 100 gm Amcotone/100L.
4= 50 gm Amcotone/100L + 15 ppm (GA_3).
5= 100 gm Amcotone/100L +15 ppm (GA_3).
6= 50 gm Amcotone/100L + 20 ppm (GA_3).
7= 100 gm Amcotone/100L+20 ppm (GA_3).
8= 15 ppm (GA_3). T9=20 ppm (GA_3).

8- Vitamin C

These results in Table (15) indicate that all experiment treatments significantly increased Vitamin C than the control in the two studied seasons. The trees of the treatment which sprayed with with100 gm amcotone/100 L+20 ppm GA_3 gave the highest and the trees of the treatment which sprayed with 50 gm amcotone / 100 L gave the highest Vitamin C than all other treatments in the two studied seasons as values were (56.19, 53.62 and 56.81 mg/100 ml juice) and (57.01, 55.13 and 58.76 mg/100 ml juice) in the first and second seasons, respectively, followed by the trees of the treatment which sprayed with 50 gm amcotone/100L + 20 ppm GA_3 which possessed the second order in this regard without significant differences between them in both studied seasons.

Regarding to, effect the number of sprayed doses on Vitamin C, it is clearly show that the trees which sprayed with three doses (mid-March, late April and the beginning of August) gave the highest Vitamin C (52.80 and

55.46 mg/100 ml juice) in the first and second seasons, respectively, than the two other doses added in the two studied seasons.

The interaction between spraying with chemical treatments and number of spraying doses applied on Vitamin C increased Vitamin C in both studied seasons compared with the control.

(Table - 15): Effect of amcotone and Gibberellic acid spraying on vitamin C mg /100 ml juice of Washington navel orange fruits during 2007 and 2008 seasons

Dos(B)		2007				2008			
*Tr. ch.(A)		1	2	3	Av.	1	2	3	Av.
1		42.09	41.19	45.47	43.52	46.07	44.42	48.17	46.22
2		49.93	47.97	52.07	49.99	52.84	50.69	54.79	52.77
3		51.69	49.01	53.00	51.23	55.12	53.47	56.43	55.01
4		50.15	48.42	52.08	50.22	53.14	51.25	55.07	53.15
5		53.46	50.99	54.07	52.84	54.94	54.13	56.54	55.20
6		53.87	52.48	55.67	54.01	56.21	55.08	58.04	56.44
7		56.19	53.62	56.81	55.54	57.01	55.13	58.76	56.97
8		49.13	47.16	52.13	49.47	53.09	50.87	55.04	53.00
9		52.00	49.07	53.87	51.65	55.17	53.91	56.34	55.14
Mean		50.95	48.88	52.80		53.73	52.11	55.46	
New	A	5.78				6.33			
LSD	B	3.17				2.94			
0.05	AB	6.18				5.43			

***1= Control.**
2= 50 gm Amcotone/100L.
3= 100 gm Amcotone/100L.
4= 50 gm Amcotone/100L + 15 ppm (GA_3).
5= 100 gm Amcotone/100L +15 ppm (GA_3).
6= 50 gm Amcotone/100L + 20 ppm (GA_3).
7= 100 gm Amcotone/100L+20 ppm (GA_3).
8= 15 ppm (GA_3). **T9=20 ppm (GA_3).**

Similar results were reported earlier by Giffillan *et al*., (1974) and Simit (1990) mentioned that GA_3 significantly affects fruit quality. Desai *et al.*, (1991) reported that GA_3 spraying resulted in increased average fruit weight and T.S.S and vitamin C concentration of fruit. It is well known that GA_3 significantly affect fruit quality (Didda, 1971, Lima & Davis 1984 and Ibrahim *et al*., 1994). El-Saida (2007) noticed that fruit weight, fruit volume, fruit shape, juice percentage and juice density of Valencia orange fruits significantly influenced by Gibberellin and amcotone applications and reported that amcotone plus Ca-EDTA gave the highest fruit juice percentage of Valencia orange trees if compared to other treatments. While, he mentioned that amcotone plus Zn-EDTA treatment resulted in highest T.S.S/ Acid ratio. At last, Ibrahim *et al*.,(2011) found that spraying GA_3 three times a year at 10 ppm on Washington navel orange trees (beginning of flowering, full bloom and fruit set) gave the maximum fruit set, fruit retention percentages.

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تأثير الرش الورقي بحامض الجبرالين والأموكتون على عقد وتساقط الثمار ومكونات المحصول والصفات الثمرية للبرتقال أبوسره

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أجريت هذه الدراسه خلال عامي 2007 & 2008 على أشجار البرتقال أبو سره واشنجطن مطعومه على أصل النارنج منزرعه بمزرعه خاصه تحت ظروف منطقة شمال الدلتا .

وتتلخص النتائج فيما يلي:

1- الأشجار المعاملة ب 100 جم أموكتون / 100 لتر + 20 جزء في المليون حامض الجبرالين أعطت أكبر عقد إبتدائي وعقد نهائي للثمار وأقل تساقط يونيه وتساقط ماقبل الجمع للثمار تليها في المرتبة الثانية الأشجار التي تم رشها ب50 جم أموكتون /100 لتر + 20 جزء في المليون حامض الجبرالين في كل من موسمي الدراسة ، أيضا لا يوجد تأثير معنوي بين دفعات الرش المستخدمه في هذا المجال.

2- الأشجار المرشوشه ب 100 جم أموكتون / 100 لتر + 20 جزء في المليون حامض الجبرالين أعطت أكبر عدد ثمار للشجرة وأكبر محصول ثمار بالكيلو جرام تليها في المرتبة الثانية الأشجار التي تم رشها ب 50 جم أموكتون / 100 لتر + 20 جزء في المليون حامض الجبرالين في كل من موسمي الدراسة ، أيضا الرش بثلاث دفعات (نصف مارس، آخر أبريل وأول أغسطس) أعطى أكبر عدد ثمار للشجرة وأكبر محصول للشجرة بالكيلو جرام.

3- شكل الثمرة (نسبة الطول/العرض) كان أكبر في الأشجار المرشوشه ب 100 جم أموكتون / 100 لتر + 20 جزء في المليون حامض الجبرالين (1.15) في كلا الموسمين يليها الأشجار المرشوشه ب 50 جم أموكتون / 100 لتر + 20 جزء في المليون حامض الجبرالين والأشجار المرشوشه ب 100 جم أموكتون / 100 لتر + 15 جزء في المليون حامض الجبرالين بدون إختلافات معنوية بين الثلاث معاملات في كل من موسمي الدراسة. أيضا لم يوجد تأثير معنوي بين عدد دفعات الرش الثلاث المستخدمه على شكل الثمرة في كلا الموسمين.

4- الصفات الطبيعية للثمار من ناحية وزن الثمرة بالجرام & حجم الثمرة سم ووزن عصير الثمرة بالجرام أعطت أعلى القيم في الأشجار التي رشت ب 100 جم أموكتون / 100 لتر + 20 جزء في المليون حامض الجبرالين يليها الأشجار التي تم رشها ب 50 جم أموكتون / 100 لتر + 20 جزء في المليون حامض الجبرالين في كلا موسمي الدراسة، ومن ناحية أخرى ، فالأشجار التي تم رشها بثلاث دفعات

(نصف مارس، آخر أبريل وأول أغسطس) أعطى أعلى القيم فيما يختص بالصفات الطبيعية السابق ذكرها.

5- الصفات الكيماوية للثمار من ناحية النسبة المئوية للمواد الصلبة الذائبة الكلية، النسبة المئوية للحموضة الكلية ومحتوى الثمرة من فيتامين ج بالجرام/ 100 مللي عصير أعطت أعلى القيم في الأشجار التي رشت ب 100 جم أموكتون / 100 لتر + 20 جزء في المليون حامض الجبرالين، يليها الأشجار التي تم رشها ب 50 جم أموكتون / 100 لتر + 20 جزء في المليون حامض الجبرالين في كلا موسمي الدراسة. أيضا الأشجار التي تم رشها بثلاث دفعات (نصف مارس، آخر أبريل وأول أغسطس) أعطى أعلى القيم فيما يختص بالصفات الطبيعية السابق ذكرها.

6- نسبة المواد الصلبة الذائبة الكلية إلى الحموضة أعطت أعلى القيم في الأشجار التي رشت ب 15 جزء في المليون حامض الجبرالين والأشجار التي تم رشت ب50 جم أموكتون بدون إختلافات معنوية بينهما في كل من سنتي الدراسة. ومن ناحية أخرى فالأشجار التي تم رشها بثلاث دفعات (نصف مارس، آخر أبريل وأول أغسطس) أعطت أعلى نسبة مواد صلبة ذائبة كلية إلى الحموضة.

التوصيات:

" يوصى برش أشجار البرتقال أبو سره واشنجطن نافل ب100 جم أموكتون /100 لتر + 20 جزء في المليون حامض الجبرالين بثلاث دفعات (نصف مارس، آخر أبريل وأول أغسطس) وذلك لزيادة العقد الإبتدائي والنهائي للثمار، وتقليل تساقط الثمار في يونيه وتساقط مل قبل الجمع، زيادة محصول الشجرة من ناحية عدد الثمار ووزن المحصول بالكيلو جرام، وتحسين الصفات الطبيعية للثمار من ناحية زيادة وزن الثمار وزيادة حجمها وزيادة وزن العصير بالثمرة. وكذلك تحسين الصفات الكيماوية للثمار من ناحية زيادة النسبة المئوية للمواد الصلبة الذائبة الكلية، والنسبة المئوية للحموضة الكلية وزيادة محتوى الثمار من فيتامين ج".

قام بتحكيم البحث

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