Minufiya J. Agric. Res. Vol. 33 No.6: 1483-1495 (2008) "http://www.mujar.net"

INFLUENCE OF PREHARVEST APPLICATION WITH ETHREL AND BIOLOGICAL OIL ON FRUIT QUALITY AND MATURATION OF CRIMSON SEEDLESS TABLE GRAPE.

H.E. El-Zayat and M.A.A. Mohamed
Fruit Handling Department, Hort. Res. Institute, Agric. Res. Center.
(Received: Sep. 29, 2008)

ABSTRACT: ***This investigation was carried out during two successive seasons (2006 and 2007) in a private farm "El-Tal El-Kaber" region, Ismailia Governorate., in order to test the validity of an Ethylene releasing biological oil (activated orange oil) to stimulate the red color of crimson seedless grape variety in comparison to the known releasing compound Ethrel.***
Some Crimson seedless grapevines were treated by Ethrel at 100, 200 and 400 ppm, and others by biological oil at 0.012; 0.025 and 0.05 %, in addition to the control sprayed only with water. Both materials were applied eleven weeks of fruit age after full setting. Fruit samples were taken during growth development, at spraying, and then weekly until fruit reached maturity stage, 91 days after full setting.
Total soluble solids and TSS / acid ratio increased continuously while berry firmness and total acidity decreased gradually with the progress of fruit age. Berry color changed directly from red green to greenish red and then to red.
Both Ethrel and biological oil applications significantly increased berry weight, berry firmness, TSS percentage, and anthocyanin contents of berry skin and decreased total acidity percentage of berry juice as compared with untreated vines.
Ethrel and biological oil preharvest spraying accelerated berry color changes, grape maturation and improved berry color at harvest.
The increase in the dose of Ethrel and biological oil resulted proportionally in an increase in the evaluated parameter.
It can be concluded that, preharvest spraying with both Ethrel at 400 ppm, and biological oil at 0.05 % was necessary for improving berry coloration and accelerating crimson seedless fruit maturation.
Moreover, biological oil (activated orange oil) treatments yielded approximately the same results as Ethrel and can be an alternative for Ethrel to improve crimson seedless coloration and enhancing fruit ripening.
Key words*: Grapes, Crimson, Ethrel, Biological oil, Firmness and TSS.*

INTRODUCTION

Fresh table grapes are grown successfully in Egypt, attaining a crop that exceeds one million tons, produced from about 350000 feddans. The most important grape varieties cultivated in Egypt are Thompson seedless, superior, flame seedless, king ruby, rumy red and crimson seedless.

The crimson variety is currently extending in surface cultivated in Egypt, it is a late seedless variety. That prolongs grape season till October\ November and can contribute greatly in exports potentials of Egypt. In the meantime its red berry clusters are attractive to consumers, and this grape contains recommended components for human nutrition, and its red color caused by the anthocyanins pigments is proven to be very beneficial for health as powerful antioxidants (Anderson, 2006).

The onset of grape berry ripening occurs at the end of the classic second development stage (lag phase), and it involves the accumulation of hexoses in berry vacuoles and colored anthocyanins in berry skin (Seymour *et al*, 1993).

It is a well known fact the grape red color stimulation may be encouraged by a climate of moderate day temperatures (20-23º C. degrees), with a certain temperature gap between day and night. Egypt has generally higher temperatures at fall, around 30-32º degrees, and that leads to a problem of incomplete grape berry red color and a non-uniformity of cluster red color. This constitutes a quality deficiency and lowers its possibilities in exportation.

Although that grape is a non climacteric fruit, it responds well to ethylene application for purposes of enhancement color development and anthocyanin formation when grape clusters are sprayed with ethylene releasing agent in the veraison stage and afterwards (Combe and Hall 1973, and Fernandez *et al*, 1992).

The main source of ethylene is a substance called Ethrel, which is manufactured by foreign companies and imported to be used in Egypt as it is widely practiced by Egyptian farmers to enhance red grape color.

Trying another material for ethylene generation, especially from a biological source will help in satisfying farmers' needs with a cheaper priced material. Activated orange oil was tried successfully in a precedent research and published work (Elzayat, 2005) as a source of ethylene gas. This source is available locally and may be exploited for this purpose at any time.

This research aims at testing the effectiveness of this biological substance, orange oil as a source of ethylene and hence to stimulate ripening and red color formation when applied on crimson grape variety.

MATERIALS AND METHODS

This investigation was carried out during the successive seasons of (2006 and 2007) in a private farm at "El-Tal El-Kaber" region, Ismailia Governorate.

Crimson Seedless grapevines chosen for this investigation were Six years old, trained according to cane pruning, nearly uniform in growth, planted in a sandy soil spaced 1.5×3 m, irrigated according to drip irrigation system.

All vines were subjected to the same horticultural practices already applied in the vineyard.

Seven treatments were applied eleven weeks after fruit set. Each treatment had six vines as three replicates, 2 vines per replicate. Ethrel was purchased from a scientific office in Cairo while orange oil was prepared according to El Zayat, 2005. The treatments included the following:-

1-Spraying with Ethrel at 0 (tap water, control), 100, 200 and 400 ppm.

2-Spraying with Biological oil at 0 (tap water, control), 0.012%, 0.025% and 0.05%.

The following estimates were carried out for evaluating the effect of different treatments:-

Dynamic of maturation: - at spraying, three vines were specified for sampling, a representative sample of two bunches were picked from each vine every week to determine berry color and firmness, TSS, total acidity percentage, TSS / acid ratio till maturity stage.

At harvest studies: - six bunches were taken at random from each treatment for carrying out the following determinations:-

*** Average berry weight.**

*** Berry color: - berry color was determined by using a Hunter color meter type (DP-900) for the estimation of L*, a*, b* value. Then Hue angles were estimated as described by McGuire, (1992).**

*** Average berry firmness:- berry firmness was estimated in 15 berries by lfra texture analyzer instrument using a penetrating cylinder of 1 mm of diameter to a constant distance 2 mm inside the skin of berry and by a constant speed 2 mm per sec. and the peak of resistance was recorded per gram / cm.**

*** Total soluble solids were estimated according to (A.O.A.C., 1980).**

*** Total acidity contents were measured according to (A.O.A.C., 1980).**

*** Total anthocyanin content: - according to the methods of Husia *et al* (1965).**

Shelf life studies:- six bunches were taken at random from each treatment at harvest and stored at room temperature for 48 hours for shelf life studies. At the end of shelf life period, physical and chemical properties were determined as mentioned before, a long with the determination of weight loss, decay and shatter percentage.

For statistics purpose, the complete randomized design was adopted: Data were statistically analyzed according to Snedecor and Cochran (1990) using the new LSD test at 5% level for comparison between means.

RESULTS AND DISCUSSION

1- Berry weight

Berry weight as shown in table (1) increased progressively with time after setting. After 77 days of age, at the start of the experiment, this weight was 2.9 gm and progressed to reach its maximum at the third picking date, for all treatments. It fluctuated around 3.5 – 4.1 gm at that stage in the first year, while in the second year, berry weight after 91 days of growth had less fluctuation among treatments and attained a range from 3.7 to 4.1 gm. Small

and insignificant differences were recorded between biological oil doses or between ethrel concentrations. In the same time, average weight berry of ethrel treatments was slightly ad insignificantly higher than oil treatments. Berry weight for ethrel treatments reached the value 3.9 gm against 3.8 gm for biological oil treated clusters at the third picking for both seasons.

Table (1): Effect of Ethrel and biological oil preharvest application with different doses on berry weight of crimson seedless grape at harvest during 2006 and 2007seasons.

Fruit Age (Days)	Bio oil					Ethrel doses					Means
	T1	T2	T3	T4	Means	T1	T2	T3	T4	Means	
First year											
77	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
84	3.1	3.0	3.4	2.9	3.1	3.1	3.5	3.5	4.1	3.5	3.3
91	4.0	3.8	4.1	3.5	3.8	4.0	4.1	3.6	4.1	3.9	3.9
Means	3.3	3.2	3.5	3.1	3.3	3.3	3.5	3.3	3.7	3.5	
Second year											
77	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
84	3.4	3.6	3.7	3.5	3.5	3.4	3.1	3.0	3.7	3.3	3.4
91	3.8	3.7	3.7	4.1	3.8	3.8	4.0	3.9	4.0	3.9	3.9
Means	3.5	3.6	3.6	3.7	3.6	3.5	3.5	3.4	3.7	3.5	

LSD values at 5 % level	Factors					
Season	A	B	C	a*b	a*c	b*c	a*b*c
1st season	NS	NS	0.21	0.34	NS	NS	NS
2nd season	NS	NS	0.17	NS	NS	0.35	NS

Abbreviations:-

Bio oil doses	T1 = Control	T2 = 0.012 %	T3 = 0.025 %	T4 = 0.05 %
Ethrel doses		T2 = 100 ppm	T3 = 200 ppm	T4 = 400 ppm
A = Preharvest Treatment		B = Doses		C = Fruit Age
a*b, a*c, b*c and a*b*c = second and multiple factors Interactions				

This is in accordance with those obtained by Leao *et al* (1999).

2- Berry firmness

Data in Table (2) indicated that, firmness value of grape berries decreased with progress in maturation. So while firmness value at start of the experiment (after 77 days of full setting) was 67.8 in the first year, the third picking date plus two days in ambient condition caused berries to be softer than all preceding picking dates regardless of the dose of ethylene releasing

agent used, as berry firmness recorded an approximate value of 30 gm / cm^2 for both treatments.

Table (2): Effect of Ethrel and biological oil preharvest application with different doses on berry firmness of crimson seedless grape at harvest during 2006 and 2007seasons.

Fruit Age (Days)	Bio oil					Ethrel doses					Means
	T1	T2	T3	T4	Means	T1	T2	T3	T4	Means	
First year											
77	67.8	67.8	67.8	67.8	67.8	67.8	67.8	67.8	67.8	67.8	67.8
84	54.1	51.8	45.9	38.7	47.6	54.1	47.8	43.4	36.8	45.5	46.6
91	38.1	36.5	33.8	30.7	34.8	38.1	33.9	31.0	29.1	33.0	33.9
91 +2	35.9	32.8	30.9	29.7	32.3	35.9	32.3	31.2	28.7	32.0	32.2
Means	49.0	47.2	44.6	41.7	45.6	49.0	45.4	43.3	40.6	44.6	
Second year											
77	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
84	24.3	23.6	23.0	22.6	23.4	24.3	23.8	21.6	21.8	22.9	23.1
91	20.8	18.6	18.4	17.9	18.9	20.8	18.0	17.4	16.4	18.2	18.5
91 +2	17.9	17.7	17.6	16.4	17.4	17.9	17.0	16.6	15.9	16.9	17.1
Means	23.0	22.2	22.0	21.5	22.2	23.0	21.9	21.1	20.8	21.7	

LSD values at 5 % level	Factors					
Season	A	B	C	a*b	a*c	b*c	a*b*c
1st season	NS	2.44	2.44	NS	NS	4.87	NS
2nd season	0.37	0.53	0.53	NS	NS	1.06	NS

Abbreviations:-

Bio oil doses	T1 = Control	T2 = 0.012 %	T3 = 0.025 %	T4 = 0.05 %
Ethrel doses		T2 = 100 ppm	T3 = 200 ppm	T4 = 400 ppm
A = Preharvest Treatment		B = Doses		C = Fruit Age
a*b, a*c, b*c and a*b*c = second and multiple factors Interactions				

While during the second year, data showed a less intense trend, and both treatments resulted in softer berries especially at the third picking date compared to control. Berries of the third picking date left two days in ambient conditions recorded an average value of 17.4 gm /cm2 for biological treatments and 16.9 gm / cm2 for ethrel treatments at the same stage, while untreated berries had almost similar values to those mentioned above. Firmness was influenced in a noticeable way by application of both ethylene releasing agents at the same picking date but after two days in ambient conditions differences between treatments and control were very limited.

This is in accordance with those illustrated by Hartmann (1988).

3- Berry color

Berry color as expressed in table (3) and taking hue angle as expression of the color intensity. It is clear that, the highest concentration coupled with the advance in age, yielded the highest red coloration of berries biological oil and ethrel were effective in stimulating grape maturation and therefore causing an increase in red color of berries. The highest biological oil treated grapes resulted in a hue angle of 30 after 91 days in the first season, while ethrel gave an average of 24.3 for the same treatments (by definition, the less hue angle, the more intense of rediness). After 2 days in ambient conditions color transformation was more intense to recorded 24.3 for the highest biological oil treated grapes and 21.9 for the same ethrel treatment at the same age. While untreated berries (0 doses, control) had the highest hue angle value (37) in comparison with all biological oil and ethrel doses. The same trend was observed in the second year and the highest doses resulted in more red coloration of berries in spite of red intensity was pronouncly less than the first year due to changing weather conditions and natural variability.

These results are in accordance with those mentioned by Tiku *et al* (1988) and Gaser *et al* (2000). Also these results prove the effectiveness of biological oil as an ethylene release agent.

4- Total Soluble Solids (T.S.S.) Percentage

It is evident from data illustrated in table (4) that T.S.S. percentage increased gradually with advance in maturation.

Preharvest treatments of biological oil and ethrel increased T.S.S. percentage of grape juice compared to control especially at harvest and after shelf life period (two days at ambient conditions) and at the highest doses for both seasons. In the first season, T. S. S. values were less than those of the second season, and reached the values of 18.8% and 18.9% for the highest dose of biological oil and ethrel, respectively after harvest plus two days in ambient conditions, while these values for the second season were 19.8% and 19.4%, compared to control values of 17.6% and 18.2% at the first and the second season, respectively.

Table (3): Effect of Ethrel and biological oil preharvest application with different doses on berry color (Hue angle) of crimson seedless grape at harvest during 2006 and 2007seasons.

Fruit Age (Days)	Bio oil					Ethrel doses					Means
	T1	T2	T3	T4	Means	T1	T2	T3	T4	Means	
First year											
77	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1	57.1
84	58.1	54.0	45.2	41.4	49.7	58.1	53.7	43.2	36.1	47.8	48.7
91	43.7	36.6	34.3	30.0	36.2	43.7	35.2	31.7	24.3	33.7	34.9
91 +2	37.0	32.2	28.3	24.3	30.4	37.0	31.7	26.3	21.9	29.2	29.8
Means	49.0	45.0	41.3	38.2	43.3	49.0	44.4	39.6	34.9	41.9	
Second year											
77	86.3	86.3	86.3	86.3	86.3	86.3	86.3	86.3	86.3	86.3	86.3
84	86.1	73.2	68.0	56.1	70.8	86.1	71.5	66.1	55.2	69.7	70.3
91	80.1	69.3	63.8	55.2	67.1	80.1	67.5	61.1	53.2	65.5	66.3
91 +2	74.7	68.5	57.8	50.5	62.9	74.7	66.1	60.7	48.6	62.5	62.7
Means	81.8	74.3	69.0	62.0	71.8	81.8	72.8	68.5	60.8	71.0	

LSD values at 5 % level	Factors						
Season	A	B	C	a*b	a*c	b*c	a*b*c
1st season	NS	4.36	4.36	NS	NS	NS	NS
2nd season	NS	2.75	2.75	NS	NS	5.50	NS

Abbreviations:-

Bio oil doses	T1 = Control	T2 = 0.012 %	T3 = 0.025 %	T4 = 0.05 %
Ethrel doses		T2 = 100 ppm	T3 = 200 ppm	T4 = 400 ppm
A = Preharvest Treatment		B = Doses		C = Fruit Age
a*b, a*c, b*c and a*b*c = second and multiple factors Interactions				

These results indicated a clear ripening enhancement effect for both biological oil and ethrel on crimson grape variety and the effectiveness of the biological agent in releasing ethylene and by ensequence a stimulation of the ripening.

These results are in line with those obtained by singla *et al* (1991) and Al-Dujaili (1989).

Table (4): Effect of Ethrel and biological oil preharvest application with different doses on Total Soluble Solids (T.S.S.) Percentage of crimson seedless grape at harvest during 2006 and 2007seasons.

Fruit Age (Days)	Bio oil					Ethrel doses					Means
	T1	T2	T3	T4	Means	T1	T2	T3	T4	Means	
First year											
77	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
84	17.0	17.2	17.4	18.1	17.4	17.0	17.4	17.7	18.4	17.6	17.5
91	17.3	17.4	18.0	18.2	17.7	17.3	17.9	18.1	18.6	17.9	17.8
91 +2	17.6	17.7	18.6	18.8	18.1	17.6	18.2	18.6	18.9	18.3	18.2
Means	17.2	17.3	17.7	18.0	17.6	17.2	17.6	17.8	18.2	17.7	
Second year											
77	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5
84	16.3	16.5	16.7	17.1	16.7	16.3	17.3	17.5	18.1	17.3	17.0
91	17.8	17.9	18.0	18.3	18.0	17.8	18.1	18.3	18.7	18.2	18.1
91 +2	18.2	18.6	19.3	19.8	19.0	18.2	18.9	19.1	19.4	18.9	18.9
Means	17.0	17.1	17.4	17.7	17.3	17.0	17.5	17.6	17.9	17.5	

LSD values at 5 % level	Factors						
Season	A	B	C	a*b	a*c	b*c	a*b*c
1st season	0.13	0.18	0.18	NS	NS	0.37	NS
2nd season	0.14	0.20	0.20	NS	0.28	0.40	NS

Abbreviations:-

Bio oil doses	T1 = Control	T2 = 0.012 %	T3 = 0.025 %	T4 = 0.05 %
Ethrel doses		T2 = 100 ppm	T3 = 200 ppm	T4 = 400 ppm
A = Preharvest Treatment	B = Doses		C = Fruit Age	
a*b, a*c, b*c and a*b*c = second and multiple factors Interactions				

5- Total acidity percentage

Total acidity percentage of juice as shown in table (5) did not differ greatly between treatments at each picking date either in the first or in the second season. While the date of picking affected greatly this percentage and juice acidity decreased for late pickings. Grape juice acidity after shelf life was the lowest for both preharvest treatments and for the highest dose, recording a range of values from 0.41% to 0.48% in both seasons while control grapes had a value between 0.55% and 0.54% in both seasons at the same time.

Progress of ripening is characterized by a decrease in acidity (Kays, 1991) and ethylene released by these studied agents was effective in enhancing these phenomena (Willis *et al*, 1981).

Table (5): Effect of Ethrel and biological oil preharvest application with different doses on Total acidity percentage of crimson seedless grape at harvest during 2006 and 2007seasons.

Fruit Age (Days)	Bio oil					Ethrel doses					Means
	T1	T2	T3	T4	Means	T1	T2	T3	T4	Means	
First year											
77	1.04	1.04	1.04	1.04	1.037	1.04	1.04	1.04	1.04	1.037	1.037
84	0.84	0.76	0.71	0.67	0.744	0.84	0.75	0.70	0.67	0.740	0.742
91	0.62	0.60	0.55	0.53	0.575	0.62	0.58	0.53	0.48	0.551	0.563
91 +2	0.55	0.52	0.47	0.44	0.493	0.55	0.49	0.46	0.41	0.476	0.485
Means	0.76	0.73	0.69	0.67	0.712	0.76	0.71	0.68	0.65	0.701	
Second year											
77	1.10	1.10	1.10	1.10	1.100	1.10	1.10	1.10	1.10	1.100	1.100
84	1.05	0.98	0.91	0.89	0.956	1.05	0.96	0.95	0.90	0.850	0.903
91	0.67	0.64	0.61	0.59	0.627	0.67	0.63	0.62	0.61	0.588	0.608
91 +2	0.54	0.54	0.51	0.48	0.518	0.54	0.52	0.51	0.45	0.420	0.469
Means	0.84	0.81	0.78	0.77	0.800	0.84	0.80	0.80	0.77	0.740	

LSD values at 5 % level	Factors					
Season	A	B	C	a*b	a*c	b*c	a*b*c
1st season	NS	0.082	0.082	NS	NS	0.163	NS
2nd season	NS	0.041	0.41	NS	NS	NS	NS

Abbreviations:-

Bio oil doses	T1 = Control	T2 = 0.012 %	T3 = 0.025 %	T4 = 0.05 %
Ethrel doses		T2 = 100 ppm	T3 = 200 ppm	T4 = 400 ppm
A = Preharvest Treatment		B = Doses		C = Fruit Age
a*b, a*c, b*c and a*b*c = second and multiple factors Interactions				

These results are supporting the effectiveness of the biological agent in stimulating ripening as a result of releasing ethylene.

These results are in harmony with those obtained by Leao *et al* (1999).

6- Anthocyanin content

Anthocyanin content increased gradually with advance in maturity. As a recorded in table (6) it had a value of 4.34 mg / 100 gm when picked at preharvest spraying with ethylene agents and increased gradually to reach 22.2 mg / 100 gm at harvesting date (90 days after full setting), while after two days in ambient conditions, the increase was more pronounced reaching 25.4 mg / 100 gm for biological oil treatments.

Table (6): Effect of Ethrel and biological oil preharvest application with different doses on berry bell anthocyanin (*mg /100 g*) content of crimson seedless grape at harvest during 2006 and 2007seasons.

Fruit Age (Days)	Bio oil					Ethrel doses					Means
	T1	T2	T3	T4	Means	T1	T2	T3	T4	Means	
First year											
77	4.3	4.3	4.3	4.3	4.34	4.3	4.3	4.3	4.3	4.3	4.34
84	7.3	8.3	14.3	15.4	11.33	7.3	10.4	14.6	20.0	13.1	12.20
91	11.9	12.8	18.8	22.2	16.41	11.9	15.2	19.8	25.9	18.2	17.30
91 +2	15.9	15.9	19.6	25.4	19.20	15.9	16.9	21.5	27.7	20.5	19.85
Means	9.9	10.3	14.3	16.9	12.82	9.9	11.7	15.1	19.5	14.0	
Second year											
77	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
84	4.9	7.3	7.8	8.6	7.16	4.9	7.7	8.4	9.5	7.6	7.40
91	8.7	11.4	17.4	21.7	14.80	8.7	13.7	20.9	22.8	16.5	15.67
91 +2	12.3	14.3	22.1	28.2	19.26	12.4	20.7	25.8	30.6	22.3	20.81
Means	7.23	9.01	12.6	15.4	11.05	7.2	11.3	14.5	16.5	12.4	

LSD values at 5 % level			Factors				
Season	A	B	C	a*b	a*c	b*c	a*b*c
1st season	0.34	0.48	0.48	0.67	0.67	0.95	1.34
2nd season	0.42	0.59	0.59	0.83	0.83	1.18	1.66

Abbreviations:-

Bio oil doses	T1 = Control	T2 = 0.012 %	T3 = 0.025 %	T4 = 0.05 %
Ethrel doses		T2 = 100 ppm	T3 = 200 ppm	T4 = 400 ppm
A = Preharvest Treatment		B = Doses		C = Fruit Age
a*b, a*c, b*c and a*b*c = second and multiple factors Interactions				

The same trend was observed for ethrel highest doses application which recorded 25.9 mg / 100 gm at harvesting date and 27.7 mg / 100 gm after two days in ambient conditions. Approximately similar results were concluded from the second season data. These results matched in a clear was hue angle measurements and both of them sustained a final conclusion indicating the effectiveness of both ethrel and biological oil as ethylene releasing agent and by ensequence in stimulating color formation of crimson grapes. Biological oil was as effective as ethrel in releasing ethylene and enhancing grape color of crimson seedless variety. Dokoozlian, *et al,* (1995) and Leao (1999) obtained similar results.

7- Total Spoilage during shelf life period

Total Spoilage (as expressed by the total of three factors, weight loss, decay and shatter percentage), these criteria were measured after the third picking date plus two days in ambient condition and represented in table (7) indicated that grape clusters treated with ethylene releasing agents, biological oil and ethrel caused the most elevated percentage of spoilage because of the ethylene effect in enhancing ripening phenomena, like berries softening and juiciness.

Table (7) : Effect of Ethrel and biological oil preharvest application with different doses on Physical and chemical properties of crimson seedless during shelf life (2 days at room temperature) after harvest of crimson seedless grape during 2006 and 2007seasons.

Fruit Age	Bio oil					Ethrel doses				
(Days)	T1	T2	T3	T4	Means	T1	T2	T3	T4	Means
	First year									
weight loss %	3.0	3.8	4.5	4.7	4.0	3.0	4.0	4.1	5.2	4.1
Decay %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shatter %	0.0	0.2	0.4	0.5	0.3	0.0	0.3	0.5	0.8	0.4
T. spoilage %	3.0	4.0	4.9	5.2	4.3	3.0	4.3	4.6	6.0	4.5
	Second year									
weight loss %	1.6	2.3	2.5	2.7	2.3	1.6	2.4	2.5	2.9	2.4
Decay %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shatter %	0.3	0.5	0.9	1.4	0.7	0.3	0.4	1.2	1.7	0.9
T. spoilage %	1.9	2.8	3.4	4.1	3.0	1.9	2.8	3.7	4.6	3.3

LSD values at 5 % level	Season					
	1st season			2nd season		
Factors	A	B	a*b	A	B	a*b
weight loss %	NS	1.09	NS	NS	0.886	NS
Decay %	NS	NS	NS	NS	NS	NS
Shatter %	NS	0.367	NS	NS	0.298	NS
T. spoilage %	NS	1.245	NS	NS	1.01	NS

Abbreviations:-

Bio oil doses	T1 = Control	T2 = 0.012 %	T3 = 0.025 %	T4 = 0.05 %
Ethrel doses		T2 = 100 ppm	T3 = 200 ppm	T4 = 400 ppm
A = Preharvest Treatment		B = Doses		a*b = Interactions

This stimulation of ripening is accompanied by more ability berries to spoilage factors as decay and shattering incidence. Control grape clusters had the least spoilage values in both seasons compared to all other treated clusters. Spoilage value increased progressively with the increases in biological oil or ethrel concentration, to reach its maximum for the highest dose (T4) recording 6% for the highest dose of ethrel and 5.2% in the case of the highest dose of biological substance in the first season, compared to 3% for control. While in the second season, total spoilage were 4.6 % and 4.1 % for ethrel and biological oil treatments, respectively compared to 1.9 % in untreated clusters (control).

REFERENCES

Al-Dujaili, J. A. H. (1989). The effects of girdling and ethephon treatments on ripening and yield quality and fruit characteristics of buhurzy grape cultivar (Vitis vinifera L.). Annals of Agricultural Science, Cairo, 34: 1, 675-687.

Anderson, O. M. (2006). Flavonoids; Chemistry, Biochemistry and applications. CRC- press, Bola-Raton FL.

Association of Official Analytical Chemists (1980). Official methods of analysis, the A.O.A.C., 13th Ed. Published by A.O.A.C. Washington, DC 20044, U.S.A.

Combe, B. G. and C. R. Hall (1973). The hormone sentient of ripening grape berries and the effects of growth substance treatments plant. Physiological. Sci, 629-634.

Dokoozlian, N., D. Luvisi, M. Moriyama and P. Schrader (1995). Cultural practices improve color, size of 'Crimson Seedless'. California Agriculture, 49: 2, 36-39.

Elzayat, H. E. (2005).banana ripening through ethylene production by natural substances. Annals Agric. Ain Shams Univer. Cairo. 50(2): 541-550.

Fernandez, L. J. A., V. Hidalgo, L. Almela and R. J. M. Lopez (1992). Quantitative changes in anthocyanin pigments of Vitis vinifera cv Monastrell during maturation. Journal of the Science of Food and Agriculture,58 (1) : 153-155.

Gaser, S. A.; F. E. Ibrahim and A. S. M. Wally (2000). Effect of Preharvest Applications of Gibberellic Acid Hand Thinning and Ethrel on Bunch Charateristics Quality of "Flame Seedless" Grape and Storability. Annals Of Agric.Sc., Moshtohor, Vol. 38(2): 1109-1120.

Hartmann, P. E. O. (1988). The effect of Ethephon sprays on the quality of Barlinka grapes. Deciduous-Fruit-Grower, 38: 6, 186-188.

Husia, C. L., B. S. Luh and C. D. Chichester (1965). Anthocyanin in free stone peaches. J. Food Sci.; 30: 5-12.

Kays, S. G. (1991). Postharvest physiology of perishable plant products. AVI Books- New York- 532 pp.

Leao, P. C. S., J. S. De Assis and J. S. De Assis (1999). Effects of ethephon on colour and quality of Red Globe grape in the Sao Francisco Valley. Revista Brasileira de Fruticultura, 21: 1, 84-87.

McGuire, R. G. (1992). Reporting of objective color measurements. HortScience, Vol. 27(12): 1254-1255.

Seymour, G. B. J., E. Taylor and G. A. Tucver (1993). Biochemistry of fruit ripening. Chapman and hall, London.

Singla, R. K., A. S. Chharia and M. S. Joon (1991).Effect of ethephon on ripening and quality in grape cultivars Perlette and Delight. International-Journal-of-Tropical-Agriculture, 9: 1, 45-48.

Snedecor, G. W. and W. G. Cochran (1990). Statistical methods. Oxford and J.B.H. Publishing Com. 7th Edition.

Tiku, A. K., B. L. Koul and R. Dhar (1988). Effect of preharvest application of ethephon on Thompson Seedless grapes. Advances-in-Plant-Sciences, 1: 2, 180-185.

Willis, H. H. H., T. Hlee, D. Groham, W. B. Mcglassom and E. G. Hall (1981). Postharvest- Avi publications-wesport- pp. 17.

تأثير معاملة العنب "كريمسون سيدليس" قبل الحصاد بمادة الاثيريل وأحد الزيوت الحيوية علي جودة ونضج الثمار

حمدي السيد الزيات و محمود علي أحمد محمد

قسم بحوث تداول الفاكهة – معهد بحوث البساتين – مركز البحوث الزراعية

الملخص العربى

أجريت هذه التجربة في موسمي ٢٠٠٦ و ٢٠٠٧م بأحدي المزارع بمنطقة التل الكبير بمدينة الاسماعيليه لاختبار فاعلية الزيت الحيوي المنتج لغاز الاثيلين (زيت البرتقال المنشط) من أجل تحسين اللون الأحمر لصنف عنب كريمسون لابذرى بالمقارنة مع مادة الاثيريل المعروفة بتوليدها لغاز الاثيلين.

عوملت أشجار عنب صنف كريمسون لابذرى بعد ١١ أسبوع من مرحلة عقد الثمار في معاملات منفصلة بتركيزات ٠(أشجار المقارنة بالماء)، ١٠٠، ٢٠٠، و٤٠٠ جزء / مليون من الايثريل وبتركيزات ٠(أشجار المقارنة بالماء)، ٠١٢،، % و ٠٢٥،% و ٠٥،، % من زيت البرتقال المنشط. أخذت عينات من عناقيد العنب عند المعامله ثم اعيدت بمعدل عينة اسبوعياً حتى وصول الثمار لعمر ٩١ يوم بعد العقد (الحصـاد).

وجد ان المعاملات سببت زيادة في المواد الصلبة الذائبة الكلية، ونسبة هذه المواد إلي الحموضة وزيادة محتوي الانثوسيانين في قشرة حبات العنب وانخفضت صلابتها وحموضة عصيرها مما يستنتج معه زيادة في النضج علي النقيض من عنب المقارنة الذي تطور بشكل عادي. وتسببت زيادة الجرعة المستخدمة من كلاً من الاثيريل والزيت الحيوي (زيت البرتقال المنشط) في زيادة طردية مصاحبة لها في قيمة محددات نضج العنب

أنتجت معاملة عنب كريمسون بكلاً من الايثريل والزيت الحيوي تقدماً في النضج وزيادة في اللون الأحمر المميز لحبات عنب الكريمسون وينصح باستخدام الزيت الحيوي كبديل للايثريل.