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Effect of GA_3, Urea and Yeast Spraying on Fruiting of Flame Seedless Grapevines under Sandy Soil Conditions

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Abstract:

This investigation was carried out during three seasons i.e. 2010, 2011 and 2012 on Flame Seedless grapevines grown in sandy soil in El-Karnak vineyard for table grapes production, Luxor governorate, Egypt. Ten combined treatments of GA_3, urea and active dry yeast spraying at various stage of berry development were evaluated. The experimental vines were arranged in a complete randomized design with three replications per treatment, two vines each. From the results of this investigation it could be concluded that spraying with GA_3 seven times, once at pre-bloom (5 ppm), thrice at full-bloom (2.5, 5 and 7.5 ppm) and other thrice when the berry at (6 mm) pea stage (30, 30 and 20 ppm). As well as, combined spraying GA_3 four times once at pre-bloom and thrice at full-bloom plus 0.4% active dry yeast when the berry at pea stage to obtain heavy and less compact cluster and hasten the ripening with fairly good Flame Seedless berries quality. In addition, it could be used urea and yeast instead of GA_3 in grape production to overcome the adverse GA_3 effects especially for colored cultivars.

Keywords: Growth regulators, GA_3, urea, active dry yeast, grapevines, thinning.

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Introduction:

Grapes (*Vitis vinifera* L.) are considered the first major fruit crop in its production all over the world, for being of an excellent favour, nice taste and high nutritional value. In Egypt grapes rank second among fruit crops while citrus being the first. The total planted area attained about 188543 feddans with an average of 1378815 tons (Annual Statistical of the Ministry of Agriculture, 2012).

The merit of enhancing ripening and improving quality of early grapevine cultivars are clear for increasing the opportunity of exportation by using plant growth substances. The improving early grapes is very important either for local consumption markets or exportation to external markets. Plant growth substances play a major role in plant growth and development. GA_3 still used to increase cluster length, berry size and for thinning bunch berries in Seedless grape cultivars (Orth, 1990; Colapietra *et al*., 1995; El-Hammady *et al*., 1998; Marzouk and Kassem, 2002; Williams and Ayars, 2005; Selim, 2007 and Zoffoli *et al*., 2009).

Berry thinning has been used to obtain a good cluster with highest berry weight and fastest ripening. Bunch thinning is done as a regular cultural treatment or spray of chemicals at pre-bloom, peak bloom and fruit set stages. The practice is done to reduce cluster compactness and to improve the productivity and berry quality. The thinning necessary depended on the cultivar as well as sunshine, temperature and nutrient supply (Dhillon *et al*., 1992; Poni, 2003 and Ahmed *et al*., 2004).

Recently urea spraying at pre-bloom or full blood has been used to reduce the berry set percentage and consequently to induce berry thinning (Ahmed *et al*., 2004; El-Salhy *et al*., 2009 and Fawzi *et al*., 2014). The bio-fertilizer active dry yeast was enhanced grape yield and berry quality where, yeast contains some natural growth regulators, some important nutrients and some common amino acids (Moor, 1979; Idso *et al*., 1995; El-Salhy *et al*., 2011 and Fawzi *et al*., 2014).

The purpose of this study was to add more light on the effect of spraying GA_3, urea and active dry yeast on yield, clusters attributes and berry quality of Flame Seedless grape cultivar under sandy soil.

Materials and Methods:

The present work was conducted through three successive seasons of 2010, 2011 and 2012 on 60 uniform vigour seven years-old Flame Seedless grapevines. The vines were grown in El-Karnak vineyard for table grapes production-Luxor Governorate, Egypt. They grown in sandy soil at 2x3 meters apart under drip irrigation system with salty water 1500 ppm. All vines received the standard agricultural practices that are used in the vineyard including spraying dormex, soil fertilization, irrigation and pest control. The Spanish Barron system was used as a trellising system. The vines were cane pruned (68 eyes/vine were left, 10 canes x 6 buds/cane plus 4 renewal spurs with 2 buds). The pruning was done during the second week of January each season. Crop load at all vines was adjusted to 25 clusters/vine after berry set. The chosen vines were divided into ten different treatments including the control. The experimental vines were arranged in a complete randomized block design with three replications per treatment two vines each. Thus, the treatments were as follow:

1- Control (sprayed with water only).
2- GA_3 at 5 ppm sprayed when cluster length was about (10-12 cm) for elongation.
3- GA_3 at 2.5 ppm plus 1% urea when cluster length was about (10-12 cm) for elongation.
4- 2% urea sprayed when cluster length was about (10-12 cm) for elongation.
5- GA_3 four times spraying at 5 ppm for elongation followed by thrice GA_3 at 2.5, 5 and 7.5 ppm sprayed during full bloom (80, 100 and 120% of the flowers caps, dropped) during the successive three days, respectively for berry thinning.
6- GA_3 three times spraying, once at 5 ppm for elongation followed by twice GA_3 at 2.5, 5 ppm and 1% urea for berry thinning.
7- GA_3 at 5 ppm for elongation followed by 2% urea for berry thinning.
8- GA_3 seven times spraying, once at 5 ppm for elongation, followed by thrice GA_3 at 2.5, 5, 7.5 ppm for thinning and other thrice 30, 30, 20 ppm of GA_3 when berry diameter reached about 6 mm (pea stage) for sizing.
9- GA_3 sex times spraying, once at 5 ppm for elongation, followed by thrice 2.5, 5 & 7.5 ppm of GA_3 for berry thinning and then twice GA_3 at 15, 15 ppm and 0.2% yeast for sizing.
10- GA_3 four times spraying, once at 5 ppm for elongation followed by thrice 2.5, 5 & 7.5 ppm of GA_3 for berry thinning and then 0.4% yeast for sizing.

The substances used in this experiment were GA_3, urea and active dry yeast to study the impact of spraying them on yield, cluster attributes and berry quality. GA_3 (Gibberellic acid), and low biuret urea (46%) were prepared before spraying by dissolved the define amount in water based. Active dry yeast was prepared by dissolved the define amount in warm water (38°C) followed by addition of 0.3% Egyptian treacle (as source of sugar) and left for two hours before spraying for activating. All chemicals were sprayed at same date by using a hand sprayer to the runoff. The percentage of berry set was estimated by caging two cluster per vine in perforated white cheese bags after the first spraying. Such bags were removed for chemical spraying at blooming, the percentage of berry set was calculated as follow:

$$Berry set\,\% = \frac{No.\ of\ berries/cluster}{No.\ of\ total\ flowers/cluster}\ x\,100$$

At harvest time (when TSS of berry juice in the check treatment reached 13-14% brix), the clusters were harvested, weighed and yield/vine (kg) was recorded. Two clusters were taken at random from yield of each vine and the following characteristics were determined.

Cluster weight (g), cluster length (cm) and number of berries per cluster, then cluster compactness coefficient according to Winkler *et al*. (1974), as well as shot berries percentage.

In addition berry quality in terms of berry weight, TSS, total titratable acidity and reducing sugars % according to A.O.A.C. (1985), as well as total anthocyanin according to Markham (1982).

All obtained data were tabulated and statistically analysed according to Gomez and Gomez (1984) and Snedecor and Cochran (1990) using the L.S.D. test for distinguishing the significance differences between various treatment means.

Results:

1- Berry set percentage and yield:

Data presented in Table (1) shows the effect of spraying with GA_3, low biuret urea and active dry yeast on berry set percentage, shot berries percentage and yield of Flame Seedless grapevines in 2010, 2011 and 2012 seasons. The results took similar trend during the three studied seasons. It is obvious from the obtained data that the single or combined spraying of GA_3 and urea at full bloom significantly decreased the berry set percentage and shot berries percentage compared to untreated vine. The decrement percentage of berry set and shot berries percentage due to spray of GA_3 or urea single or combination compared to unsprayed one were attained 23.36, 25.48 & 25.02% and 76.11, 79.75 & 82.16% as an average of the three studied seasons, respectively. On other hand, single or combined GA_3 and active dry yeast spraying after berry set significantly increased the yield/vine compared to other treatments and unsprayed ones (control). GA_3 spraying suppressed the yeast spraying concerning yield/vine, but had insignificant differences compared to active dry yeast. The increment percentage of the yield was attained 27.33, 21.71 & 22.99% as an average of the three studied seasons, due to GA_3 (T_8), GA_3 plus active (T_9) and active dry yeast after berry set (T_{10}) follow GA_3 for elongation and thinning compared to untreated one (control), respectively.

2- Cluster characteristics:

The effect of tested treatments on cluster characteristics during the three studied seasons are shown in Tables (2 and 3). It is evident that all treatments improved the cluster traits. Using GA_3 or urea at pre-bloom significantly increased the cluster length, whereas, using them at full-bloom significantly decreased the berries number per cluster compared to untreated one (control), hence significantly decreased compactness coefficient of cluster and produced loose clusters. The increment percentage of cluster length was attained (16.09, 12.84 and 11.24% as an average of the three studied seasons) due to spray GA_3, GA_3 plus urea and urea at pre-blooming compared to untreated ones, respectively. On the other hand, the decrement percentage of berries number per cluster was attained 19.97, 22.74 and 18.47% as an average of the three studied seasons, due to spray GA_3, GA_3 plus urea and urea at full-blooming followed GA_3 spraying for elongation (T2), respectively. Hence, the corresponding decrement percentage of cluster compactness coefficient was 28.66, 31.10 and 27.32% as an average of the three studied seasons, respectively.

Moreover, spraying either GA_3 or active dry yeast after berry set singly or combination were increased the cluster weight compared to control or other treatments. Insignificant differences were observed between used GA_3 or urea for cluster elongation and berry thinning, as well as used GA_3 or yeast after berry set for sizing. The increment percentage of cluster weight was attained 27.48, 21.98, 23.61% as an average of the three studied seasons, due to GA_3, plus active dry yeast and yeast spraying after berry set, following GA_3 (T2) and GA_3 spraying at full blooming for berry thinning (T5), compared to untreated one (control), respectively. Therefore, it can be concluded that single or combined spraying of GA_3 or urea at berry blooming and full blooming, then following single or combined spraying of GA_3 or active dry yeast after berry set was the best tool to produce loose clusters with heavy weight.

3- Berry quality:

Data of various berry characteristics as affected by different studied treatments during 2010, 2011 and 2012 seasons are presented in Tables (3 and 4). The data indicated that GA_3 and urea spraying at pre-bloom and full bloom, and followed by GA_3 or active dry yeast spray after berry set significantly improved the Flame Seedless grapes quality in terms of berry weight, total soluble solids, reducing sugars and anthocyanin in berry skin compared to untreated ones. The increment percentage of berry weight was 57.87, 54.33 and 52.32% as an average of the three studied seasons, due to GA_3 (T_8), GA_3 plus active dry yeast (T_9) or active dry yeast sprayed after berry set (T_{10}) followed by GA_3 for elongation and berry thinning compared to untreated one (control), respectively. As well as, the corresponding increment percentage of total soluble solids was 2.31, 5.93 & 7.24%, respectively. Moreover, the increment percentage of anthocyanin in berry skin was 18.39 & 28.74% as an average of the three studied seasons, due to either GA_3 plus active dry yeast (T_9) or yeast (T_{10}) compared to GA_3 spraying (T_8), respectively. Using singly yeast spraying or GA_3 plus yeast for sizing had the highest berry weight and size with best chemical juice quality compared to GA_3 only. Therefore, it can be concluded that could be used active dry yeast as a tool for grape berry sizing instead of GA_3 to overcome the adverse effects due to GA_3 in grape production, i.e. delaying the berry ripening and reducing full coloration, especially with colored cultivars.

Table (1): Effect of GA_3, urea and yeast spraying on berry set %, shot berries % and yield of Flame Seedless grapevines during 2010, 2011 and 2012 seasons.

No.	Ch. / Treat.	Berry set %				Shot berries %				Yield kg/vine			
		2010	2011	2012	Mean	2010	2011	2012	Mean	2010	2011	2012	Mean
1	Control (water)	14.95	14.61	15.78	15.11	12.70	12.08	13.90	12.89	7.9	7.2	8.4	7.83
2	5 ppm GA_3	15.10	14.58	15.52	15.07	3.45	3.52	2.98	3.32	8.5	8.0	9.2	8.57
3	2.5 ppm GA_3 + 1% urea	15.31	14.86	15.49	15.22	3.40	3.28	3.17	3.22	8.6	7.9	9.3	8.60
4	2% urea	14.58	14.23	14.84	14.55	3.71	3.62	3.88	3.56	8.0	7.7	8.8	8.17
5	T_2 + 2.5, 5, 7.5 ppm GA_3	11.53	11.28	11.93	11.58	2.80	3.00	3.45	3.08	8.6	8.1	9.4	8.70
6	T_2 + 2.5, 5 ppm GA_3 + 1% urea	11.24	11.05	11.50	11.26	2.80	2.65	2.40	2.61	8.5	8.1	9.3	8.63
7	T_2 + 2% urea	11.20	11.35	11.45	11.33	2.40	2.35	2.16	2.30	7.9	7.7	8.9	8.17
8	T_5 + 30, 30, 20 ppm GA_3	11.78	11.30	11.83	11.64	2.50	2.30	2.36	2.39	9.7	9.3	10.9	9.97
9	T_5 + 15, 15 ppm GA_3 + 0.2% yeast	11.36	11.41	11.66	11.48	2.80	2.35	3.23	2.79	9.3	8.9	10.4	9.53
10	T_5 + 0.4% yeast	11.57	11.33	11.60	11.50	2.23	2.15	3.30	2.56	9.4	9.0	10.5	9.63
	L.S.D. at 5%	0.75	0.70	0.83		0.22	0.28	0.18		0.44	0.48	0.61	

T_2 (5 ppm GA_3 for cluster elongation)

T_5 (T_2 plus 2.5, 5, 7.5 ppm GA_3 for thinning)

T_8 (T_5 plus 30, 30, 20 ppm GA_3 for sizing)

Table (2): Effect of GA_3, urea and yeast spraying on cluster weight, No. of berries/cluster and cluster length of Flame Seedless grapevines during 2010, 2011 and 2012 seasons.

No.	Ch. / Treat.	Cluster weight (g)				No. berries/cluster				Cluster length (cm)			
		2010	2011	2012	Mean	2010	2011	2012	Mean	2010	2011	2012	Mean
1	Control (water)	314.3	288.5	335.0	312.6	136.2	131.7	133.3	133.7	16.0	16.32	16.51	16.28
2	5 ppm GA_3	338.6	317.7	366.8	341.0	137.1	133.8	134.3	135.1	18.8	18.91	19.00	18.90
3	2.5 ppm GA_3 + 1% urea	342.5	314.8	370.6	342.6	138.2	134.6	135.8	136.2	18.40	18.32	18.38	18.37
4	2% urea	322.0	305.9	342.3	323.4	132.6	130.3	128.2	130.4	18.03	18.15	18.16	18.11
5	T_2 + 2.5, 5, 7.5 ppm GA_3	343.4	324.5	376.3	348.1	107.2	108.1	105.8	107.0	18.60	18.18	18.14	18.31
6	T_2 + 2.5, 5 ppm GA_3 + 1% urea	337.8	323.0	369.5	343.4	104.2	102.2	103.5	103.3	18.33	18.25	18.40	18.33
7	T_2 + 2% urea	317.0	308.6	357.8	327.8	109.0	108.3	109.8	109.0	18.07	18.06	18.70	18.28
8	T_5 + 30, 30, 20 ppm GA_3	385.3	373.9	436.3	398.5	108.0	105.6	108.6	107.5	18.50	18.08	18.65	18.41
9	T_5 + 15, 15 ppm GA_3 + 0.2% yeast	371.0	354.5	418.4	381.3	105.0	102.5	105.8	104.4	18.27	18.10	18.25	18.21
10	T_5 + 0.4% yeast	377.4	361.5	420.2	386.4	108.8	106.4	110.0	108.4	18.20	18.15	18.30	18.22
	L.S.D. at 5%	16.69	15.87	19.88		5.47	6.18	5.88		0.73	0.85	0.89	

T_2 (5 ppm GA_3 for cluster elongation)

T_5 (T_2 plus 2.5, 5, 7.5 ppm GA_3 for thinning)

T_8 (T_5 plus 30, 30, 20 ppm GA_3 for sizing)

Table (3): Effect of GA_3, urea and yeast spraying on cluster compactness coefficient, 25 berries weight and TSS of Flame Seedless grapes during 2010, 2011 and 2012 seasons.

No.	Treat. \ Ch.	Compactness coefficient				25 Berries weight (g)				TSS %			
		2010	2011	2012	Mean	2010	2011	2012	Mean	2010	2011	2012	Mean
1	Control (water)	8.45	8.69	8.06	8.20	50.23	49.85	55.58	51.89	13.80	14.00	13.67	13.82
2	5 ppm GA_3	7.29	7.10	7.05	7.15	54.43	53.40	62.63	56.82	14.67	14.80	14.48	14.65
3	2.5 ppm GA_3 + 1% urea	7.47	7.37	7.40	7.41	55.77	52.85	64.51	57.71	14.67	14.60	14.50	14.54
4	2% urea	7.38	7.16	7.08	7.21	51.82	50.70	60.03	54.18	15.00	14.80	14.80	14.87
5	T_2 + 2.5, 5, 7.5 ppm GA_3	5.75	5.94	5.85	5.85	71.73	71.05	81.72	74.83	14.87	14.67	14.67	14.74
6	T_2 + 2.5, 5 ppm GA_3 + 1% urea	5.69	5.59	5.66	5.65	71.83	71.25	81.81	74.96	15.13	14.80	14.80	14.91
7	T_2 + 2% urea	6.03	5.98	5.88	5.96	65.32	64.60	73.95	67.96	14.80	14.82	14.90	14.84
8	T_5 + 30, 30, 20 ppm GA_3	5.88	5.81	5.85	5.85	79.52	77.38	88.86	81.92	14.25	14.18	14.00	14.14
9	T_5 + 15, 15 ppm GA_3 + 0.2% yeast	5.77	5.64	5.81	5.74	77.40	76.20	86.64	80.08	14.60	14.60	14.73	14.64
10	T_5 + 0.4% yeast	5.99	5.88	5.85	5.91	76.65	75.10	85.38	79.04	14.87	14.80	14.80	14.82
L.S.D. at 5%		0.33	0.38	0.41		2.93	2.39	3.56		0.58	0.39	0.45	

T_2 (5 ppm GA_3 for cluster elongation)
T_5 (T_2 plus 2.5, 5, 7.5 ppm GA_3 for thinning)
T_8 (T_5 plus 30, 30, 20 ppm GA_3 for sizing)

Table (4): Effect of GA_3, urea and yeast spraying on some chemical constituents of Flame Seedless grape berries during 2010, 2011 and 2012 seasons.

No.	Treat. \ Ch.	Titratable acidity %				Reducing sugars %				Anthocyanin mg/g			
		2010	2011	2012	Mean	2010	2011	2012	Mean	2010	2011	2012	Mean
1	Control (water)	0.49	0.52	0.50	0.50	10.64	10.93	10.73	10.77	0.90	0.92	0.98	0.93
2	5 ppm GA_3	0.50	0.51	0.50	0.50	11.34	11.60	11.62	11.52	0.94	0.96	1.02	0.97
3	2.5 ppm GA_3 + 1% urea	0.46	0.48	0.47	0.47	11.47	11.75	11.50	11.57	0.95	0.97	1.04	0.99
4	2% urea	0.46	0.47	0.46	0.46	11.68	11.83	11.76	11.76	0.99	1.02	1.08	1.03
5	T_2 + 2.5, 5, 7.5 ppm GA_3	0.46	0.48	0.47	0.47	11.65	11.95	11.75	11.78	0.96	0.96	1.02	0.98
6	T_2 + 2.5, 5 ppm GA_3 + 1% urea	0.45	0.46	0.46	0.46	11.93	12.11	11.70	11.91	1.02	1.05	1.11	1.06
7	T_2 + 2% urea	0.45	0.45	0.46	0.45	11.59	11.93	11.82	11.78	1.08	1.11	1.16	1.12
8	T_5 + 30, 30, 20 ppm GA_3	0.52	0.55	0.53	0.53	11.41	11.76	11.38	11.52	0.85	0.86	0.90	0.87
9	T_5 + 15, 15 ppm GA_3 + 0.2% yeast	0.48	0.50	0.48	0.49	11.36	11.60	11.58	11.51	0.94	1.07	1.08	1.03
10	T_5 + 0.4% yeast	0.45	0.46	0.45	0.45	11.85	11.80	11.75	11.73	1.08	1.11	1.16	1.12
L.S.D. at 5%		0.02	0.03	0.02		0.51	0.55	0.48		0.05	0.04	0.05	

T_2 (5 ppm GA_3 for cluster elongation)
T_5 (T_2 plus 2.5, 5, 7.5 ppm GA_3 for thinning)
T_8 (T_5 plus 30, 30, 20 ppm GA_3 for sizing)

Discussion and Conclusion:

GA_3 has been routinely used for Seedless grape production to increase berry and cluster weight, and cause thinning of clusters. The effect of GA_3 depends on date of treatments and concentration applied (Perez *et al*., 2000 and Casanova *et al*., 2009). GA_3 spraying at full bloom decreased berry set since its role in flower dropping, causing reduction of berry set induce a reduction of berries number of cluster (Lu *et al*., 1995; Dokoozlian and Peacock, 2001; Selim, 2007; El-Salhy *et al*., 2009 and Abu-Zahra, 2010). The positive action of GA_3 on stimulating cell elongation process, enhancing the water absorption and stimulating the biosynthesis of proteins which will lead to increase the cluster length, as well as, berry size and weight. GA_3 spraying three times was more effective in improving the cluster traits, since decreasing the berries number, whereas increasing length and weight of cluster consequently significantly decreased the compactness coefficient (Roper and Williams, 1989; Lu *et al*., 1995; El-Salhy *et al*., 2009 and Abu-Zahra, 2010).

The results are on line with those obtained by the investigators, Ezzahouani *et al*. (1985), Orth (1990), Lu *et al*. (1995), Dokoozlian and Peacock (2001), Selim (2007), El-Salhy *et al*. (2009) and Abu-Zahra (2010). They revealed that there is a potential benefit from GA_3 treated grapevine in the commercial production of Seedless grapes for its effective influence on yield and quality.

In addition, the positive action of urea as nitrogen source and producing new tissues that water and nutrients absorption induce more vegetative growth that shifted the balance of competition between reproductive growth and vegetative organs in favor of the latter. Nitrogen has many function in all division, the synthesis of proteins, protoplasm, enzymes and organic compounds as nucleoproteins, amino acid and chlorophyll (Nijjar, 1985). Low buiret urea differed significantly from control in term of fruit set and fruit thinning percentage. The reasons may be the interference with fertilization of the ovary of phytotoxicity in the peduncle region (Byers and Lyons, 1985; Guirguis *et al*., 1996 and Ahmed *et al*., 2004). There was a remarkable improving on berry quality expressed on increasing the berry weight, total soluble solids, reducing sugars and anthocyanin contents as berry thinning, such findings might be due to induce a decreasing of berries number which increasing the available amount of organic foods required for each individual berry hence induce advance the berry ripening. The results of urea on improving yield and berry quality of grapevines was supported by many authors such as El-Moursy *et al*. (1993), Abdel-Hady (1995), Ahmed *et al*. (2004), El-Salhy *et al*. (2009) and Fawzi *et al*. (2014).

Recently, active dry yeast was found to enhance grape yield and berry quality. Yeast has high content of mineral particularly, N, P and K, proteins, vitamin B and natural hormone, i.e. cytokinin and IAA. The improving effect of yeast application was attributed to axuins, hormones, vitamins, chelating agents and enzyme produced, which have stimulatory effects on cell division and enlargement, nutrient uptake, protein synthesis and improves net photosynthese (Moor, 1979 and Idso *et al*., 1995). These effects induce an improving of hormones and accumulation of carbohydrates consequently raising sugars and anthocyanin contents in berry induce advancing of the berry ripening. It known that the earliest production are the most important target for export and marketing. The results dealing with the effect of yeast spraying on grapevine fruiting are in harmony with those of Hassan (2002), Omran and Abdel-Latif (2003), El-Akkad (2004), Omran *et al*. (2005), El-Salhy *et al*. (2011) and Fawzi *et al*. (2014). They concluded that spraying yeast significantly improved of berry quality in terms of increasing the berry size, TSS, reducing sugars and anthocyanin contents and decreasing the total acidity then induce advance the berry ripening.

On the light of the previous results, it could be recommended that spraying of GA_3 four times, once at pre-bloom (5 ppm), thrice at full-bloom (2.5, 5 & 7.5 ppm) plus 0.4% active dry yeast when the berry diameters about 6 mm (pea stage), as well as GA_3 seven times, once at pre-bloom, thrice at full-bloom and thrice (30, 30 & 20 ppm) when the berry of pea stage. In addition, can be used 2% low biuret urea at pre-bloom and full bloom, as well as 0.4 active dry yeast when the berry at pea stage. Using urea and yeast more effective to overcome the adverse effective of using GA_3 at high concentration, i.e. delay the berry ripening and reduce full coloration. These treatments very necessary to produce heavy and less compact cluster and hasten the ripening as well as improving the weight, size, colouration and teaste of Flame Seedless berries. These advantage will eventually enable growers to obtain highly marketable surrounding and overseas markets.

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تأثير رش حمض الجبريليك واليوريا والخميرة علي إثمار شجيرات العنب الفليم اللابذري تحت ظروف التربة الرملية

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الملخص:

أجريت هذه الدراسة خلال ثلاثة مواسم متتالية ٢٠١٠، ٢٠١١، ٢٠١٢ علي شجيرات العنب الفليم اللابذري بمزرعة الكرنك لإنتاج عنب المائدة والتي تقع في محافظة الأقصر – جمهورية مصر العربية. بهدف دراسة تأثير رش حمض الجبريليك واليوريا والخميرة الجافة المنشطة علي المحصول وخصائص العناقيد والحبات. وقد تم رش حمض الجبريليك قبيل التزهير وأثناء اكتمال التزهير وعندما وصل قطر الحبات ٦ مم بينما تم رش اليوريا قبيل التزهير وأثناء اكتمال التزهير وتم رش الخميرة النشطة عندما وصل قطر الحبات ٦ مم.

ويمكن تلخيص أهم النتائج فيما يلي:

- أدي رش حمض الجبريليك في المراحل الثلاثة إلي زيادة معنوية في طول العنقود والمحصول مع نقص نسبة العقد وعدد الحبات والحبات الصغيرة وبالتالي تحسين صفات العنقود ووزن الحبات.
- سبب رش اليوريا قبيل التزهير وأثناء اكتمال التزهير حدوث زيادة معنوية لطول العنقود مع نقص معنوي في نسبة العقد وعدد الحبات والحبات الصغيرة وبالتالي تحسين صفات العنقود والصفات الكيميائية للحبات.
- أدي رش الخميرة في المرحلة الثالثة (قطر الحبات ٦ مم) عقب رش حمض الجبريليك في مرحلتي (قبل التزهير، اكتمال التزهير) إلي زيادة المحصول وتحسين خصائص الحبات الطبيعية والكيميائية.

من نتائج هذه الدراسة يمكن التوصية برش حمض الجبريليك في المراحل الثلاثة للحصول علي محصول عالي وعناقيد وحبات جيدة – كذلك يمكن استبدال رش حمض الجبريليك برش اليوريا وذلك لاستطالة العنقود وخف الحبات وبالمثل استخدام الخميرة بدلاً من حمض الجبريليك في المرحلة الثالثة وذلك لتلافي أضرار رش الجبريليك خصوصاً علي الأصناف الملونة (الفليم). وبالتالي الحصول علي محصول عال مبكر ذو عناقيد وحبات ذات خصائص ممتازة تتفق مع سوق التصدير والقدرة التنافسية بالأسواق الخارجية.