Effect of Spraying Royal Jelly on Productivity of Flame Seedless Grapevines

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Abstract: During 2013 and 2014 seasons, Flame seedless grapevines treated with Royal Jelly at 0.0125 to 0.05% once, twice, or thrice as a trial for detecting the best concentration and frequency of the Royal Jelly that are responsible for obtaining an economical yield and producing better fruit quality of Flame seedless grapevines. Treating Flame seedless grapevines with Royal Jelly at 0.0125 to 0.05% caused a remarkable stimulation on all growth characters, leaf pigments, leaf content of nitrogen (N), phosphorus (P), potassium (K), magnesium (Mg), calcium (Ca), zinc (Zn), and iron (Fe), berry setting, yield and berries quality over the check treatment. The promotion was clearly associated with increasing concentrations and frequencies of Royal Jelly application. Negligible effects on these parameters were observed among the higher two concentrations namely, 0.025 and 0.05% and frequencies i.e., twice and thrice. For improving yield and quality of Flame seedless grapevines crawled under Minia region conditions, it is suggested to spray the vines twice with Royal Jelly at 0.025%.
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1. Introduction

Nowadays, more efforts had been encountered for using natural and friendly stimulants for improving yield and the fruit quality of Flame seedless grapevines.

Royal Jelly is secreted form the heads of queen bees form pollens, water and honey mixed with saliva, hormones, and vitamins. It contains higher amounts of proteins, lipids, fructose, glucose, sucrose, minerals such K, Mg, Ca, Fe, P, S, Mn and Si and vitamins such B_1& B_2& B_5& B_6& B_8& B_9, B_{12}, A,. C, D, K and E. Also, it contains gonadortophic and sex hormones (**Heyl, 1951** and **Nation and Robinson, 1991**).

Application of Royal Jelly was found by many authors to improve growth, yield, maturity and fruit quality in various fruit crops **(El-Maziny and Hassan, 1990; El-Shaikh, 2010; Al-Wasfy, 2013; Moustafa, 2013; Gad El-Kareem and Abada, 2014; Abada and Ahmed-Basma, 2015; Abd El-Aziz *et al.*, 2015;** and **Abd El-Rady, 2015)**.

The target of this study was examining the effect of different concentrations and frequencies of Royal Jelly on fruiting of Flame seedless grapevines crawled under Minia region conditions.

2. Material and Methods

This study was carried out during 2013 and 2014 seasons on sixty uniform in vigour 9-years- old Flame seedless grapevines. The selected vines are grown in a private vineyard located at Kom El-Arab village, Matay district, Minia Governorate, where the texture of the soil is clay (Table 1). Soil analysis was done according to the procedures that outlined by **Piper (1950)** and **Wilde *et al.*, (1985).**

The selected vines are planted at 2 × 3 meters apart. The chosen vines were trained by spur (short pruning) pruning system leaving 72 eyes/vine (15 fruiting spurs × 4 eyes plus six replacement spur / two eyes) using Gable supporting method. Winter pruning was carried out at the last week of December during both seasons. Surface irrigation system was followed using Nile water.

Table (1): Analysis of the tested soil.

Constituents	values
Sand %	4.0
Silt %	13.0
Clay %	83.0
Texture	Clay
O.M. %	2.41
pH (1:2.5 extract)	7.69
E.C (1: 2.5 extract) (mmhos/ ICM/ 25^0 C)	0.91
$CaCO_3$ %	1.55
Total N %	0.09
Available P (ppm/ Olsen)	5.9
Available K (ppm, ammonium acetate)	4.90

Except for those dealing with the present treatments (application of Royal Jelly), the selected vines (60 vines) received the usual horticultural practices that are commonly applied in the vineyard. Other horticultural practices such as twice hoeing, irrigation, pinching and pest management were carried out as usual.

This study consisted from ten treatments arranged as follows:

1- Control (Vines sprayed with water).
2- Spraying the vines with Royal Jelly at 0.0125% (0.125 g per liter), once at growth start (last week of March).
3- Spraying the vines with Royal Jelly at 0.0125% (0.125 g per liter), twice at growth start (last week of March) and again just after berry setting (1st week of May).
4- Spraying the vines with Royal Jelly at 0.0125% (0.125 g per liter), three times; at growth start (last week of March), just after berry setting (1st week of May), and at three weeks later (last week of May).
5- Spraying the vines with Royal Jelly at 0.025% (0.25 g per liter), once at growth start (last week of March).
6- Spraying the vines with Royal Jelly at 0.025% (0.25 g per liter), twice at growth start (last week of March) and again just after berry setting (1st week of May).
7- Spraying the vines with Royal Jelly at 0.025% (0.25 g per liter), three times; at growth start (last week of March), just after berry setting (1st week of May), and at three weeks later (last week of May).
8- Spraying the vines with Royal Jelly at 0.05% (0.5 g per liter), once at growth start (last week of March).
9- Spraying the vines with Royal Jelly at 0.05% (0.5 g per liter), twice at growth start (last week of March) and again just after berry setting (1st week of May).
10- Spraying the vines with Royal Jelly at 0.05% (0.5 g per liter), three times; at growth start (last week of March), just after berry setting (1st week of May), and at three weeks later (last week of May).

Each treatment was replicated three times, two vines per each. Royal Jelly was stored at 0°C until the time of use. It was solubilized in cold water just before use. The analysis of Royal Jelly is shown in Table 2. Triton B as a wetting agent was added to all solutions of Royal Jelly at 0.05%. Control vines (0.0%) were sprayed with Nile water containing Triton B. Spraying was done till runoff.

Table (2): Chemical Analysis of Royal Jelly (Townsend and Lucas, 1966).

Constituents	Values mg/ 100 g F.W.
Water	65.3
Dry matter	34.7
Portents	48.2
Carbohydrate	37.8
Lipids	10.4
Ash	2.0
Sugar	23.0
Glucose	4.0
Fructose	4.0
Sucrose	5.0
K	220
Mg	105
Ca	112
Fe	50
P	118
S	44
Mn	32
Si	5
Vitamins B_1	0.4
Vitamins B_2	0.3
Vitamins B_5	0.4
Vitamins B_6	0.3
Vitamins B_8	0.3
Vitamins B_9	0.4
Vitamins B_{12}	0.3
A	0.4
C	0.9
D	0.5
K	0.4
E	0.3
Essential amino acids	1100

Randomized complete block design (RCBD) was adopted.

To fulfil the objectives of this study, the following parameters were measuredduring both seasons:

1- Main shoot length (cm): at the last week of May, by averaging the length of ten shoots per vine (cm) and the average was recorded.
2- The average leaf area (cm^2) as outlined by **Ahmed and Morsy (1999)**.
3- Cane thickness (cm) and pruning wood weight (kg).Plant pigments: chlorophylls a & b and total chlorophylls and carotenoids were determined as mg/ 100 g F.W (**Hiscox and Isralstam, 1979** and **Von-Wettestein, 1957**).
4- Measurements of leaf content of N, P, K, Ca, Zn, Fe and Mg according to methods described by

Piper (1950), **Chapman and Pratt (1965), Summer (1985)** and **Wilde *et al.*,(1985)**.

5- Measurements of berry setting %.
6- Measurements of yield in terms of weight (kg) and number of clusters per vine, and the average weight of cluster (g).
7- Cluster dimensions (length and width, cm) and cluster compactness.
8- Physical properties of the berries including the percentage of berries colouration, average berry weight (g) and dimensions (longitudinal and equatorial, cm) as well as berry shape index value.
9- Chemical properties of the berries including: percentage of total soluble solids (T.S.S. %) in the juice, total acidity (as gram tartaric acid / 100 ml juice), ratio between T.S.S. and acid, percentage of reducing sugars in the juice (**A.O.A.C, 2000**).

The obtained data during the course of this study in both seasons were collected, tabulated and statistically analyzed. Treatment means were compared using new L.S.D. at 5% (according to **Snedecor and Cochran, 1967 and Mead *et al.*, 1993**).

3. Results and Discussion

1- Growth characters:

It is clear from the data in table (3) that treating Flame seedless grapevines once, twice or thrice with Royal Jelly at 0.0125 to 0.05% significantly was very effective in enhancing growth characters namely main shoot length (cm), leaf area (cm^2), pruning wood weight, and cane thickness comparing with the check treatment. The stimulation was significantly dependent on increasing concentrations from 0.0 to 0.05%, and frequencies from once to thrice of Royal Jelly. Increasing concentrations of Royal Jelly from 0.025 to 0.05% and frequencies from twice to thrice failed to significantly enhance these growth aspects. Treating the vines with Royal Jelly at 0.05% three times gave the maximum values. These results were true during both seasons.

The higher content of Royal Jelly from macro and micronutrient, amino acids, vitamins, antioxidants, plant pigments, natural hormones and organic foods (**Heyl, 1951; Townsend and Lucas, 1966, Nation and Robinson, 1991**) surely reflected on enhancing cell division and photosynthesis in favour of producing vigour plants.

These results are in accordance with those obtained by **Gad El-Kareem and Abada (2014)** and **Ahmed and Habasy-Randa (2014), Abada and Ahmed-Basma (2015), Abd El-Rady (2015)** and **Abd El-Aziz *et al.*(2015).**

2- Leaf chemical composition:

Data in Tables (3-5) clearly show that subjecting Flame seedless grapevines to Royal Jelly at 0.0125 to 0.05% once, twice or thrice resulted in significant promotion on chlorophylls a and b, total chlorophylls, total carotenoids as well as percentages of N, P, K, Mg, and Ca and both Zn and Fe (as ppm) in the leaves of Flame seedless grapevines comparing with the check treatment. There was a gradual stimulation on the leaf pigments and nutrients with increasing concentrations and frequencies of Royal Jelly applications. Increasing concentrations from 0.025 to 0.05% and frequencies of Royal Jelly application from twice to thrice failed significantly to show any promotion on these nutrients. The maximum values where recorded on vines that received three sprays of Royal Jelly at 0.05%. The untreated vines produced the lowest values. These results were true during both seasons.

The promoting effect of Royal Jelly on the leaf pigments and nutrients might be attributed to its higher content of plant pigments, Mg, N, P, K, Zn, Fe, Mn, and Cu as well as its promotive effect on enhancing uptake of water and root development (**Townsend and Lucas, 1966**).

These results are in harmony with those obtained by **Gad El-Kareem and Abada (2014)** and **Ahmed and Habasy-Randa (2014), Abada and Ahmed-Basma (2015), Abd El-Rady (2015)** and **Abd El-Aziz *et al.*(2015).**

3- Percentage of berry setting:

Data in table (6) obviously reveal that the percentage of berry setting was significantly improved in response to treating the vines once, twice or thrice with the Royal Jelly at 0.0125 to 0.05% over the check treatment. The promotion was correlated to the increase in concentrations and frequencies of Royal Jelly applications. Significant differences on such characters were observed among 0.0, 0.0125 and 0.025% concentrations and one and two applications. Increasing concentrations from 0.025 to 0.05% and frequencies from once to thrice had meaningless promotion. The maximum percentage of berry setting was observed on the vines that received three sprays of Royal Jelly at 0.05%. Under such treatment percentage of berry setting reach it 19.1 and 19.2% during both seasons, respectively. Percentage of berry setting in the control vines reached 13.9 and 13.3% during both seasons, respectively. These results were true during both seasons.

The positive action of Royal Jelly on berry setting was attributed to its essential effect on enhancing the leaf area, plant pigments and uptake of macro and micronutrients. Such effect was reflected on enhancing vine nutritional status in favour of increasing berry setting.

These results are in harmony with those obtained by **Gad El-Kareem and Abada (2014)** and **Ahmed and Habasy-Randa (2014), Abada and Ahmed-Basma (2015), Abd El-Rady (2015) and Abd El-Aziz *et al.* (2015).**

4- Yield:

It is evident from the data in table (6) that yield expressed in weight and number of clusters was significantly improved due to treating the vines once, twice or thrice with Royal Jelly at 0.0125 to 0.05% rather than non-application. There was a progressive increase on the end with increasing concentrations from 0.0 to 0.05% and frequencies from one to three sprays of Royal Jelly. Meaningless promotion on these yield parameters was detected when the Royal Jelly concentration was increased from 0.025 to 0.05% and frequency from twice to thrice. Therefore, from economical point of view, it is suggested to use Royal Jelly twice at 0.025% for producing higher yield. Under such promised treatment, yield reached of 9.5 and 12.7 Kg during both seasons, respectively. The untreated vines yielded 8.1 and 8.5 Kg during 2013 and 2014 seasons. The percentages of increase on the yield due to using the previous promised treatment over the check treatment reached 74 and 49.4% during 2013 and 2014 seasons, respectively. The Royal Jelly treatments had no significant effect on the number of clusters per vine in the first season of the study.

The previous positive action of Royal Jelly on growth, vine nutritional status, berry setting and number of clusters per vine surely reflected on enhancing the yield.

These findings are in agreement with those obtained by **Gad El-Kareem and Abada (2014)** and **Ahmed and Habasy-Randa (2014), Abada and Ahmed-Basma (2015), Abd El-Rady (2015)** and **Abd El-Aziz *et al.* (2015).**

5- Cluster weight and dimensions:

Data in tables (6 & 7) clearly show that spraying Flame seedless grapevines once, twice, or thrice at 0.0125 to 0.05% of Royal Jelly significantly was accompanied by improving weight, length, and width of cluster comparing to the check treatment. The promotion was dependent on increasing concentrations and frequencies of Royal Jelly applications. No significant promotion on weight and dimensions of cluster was observed among the higher two concentrations and frequencies of Royal Jelly. The heaviest clusters where borne on the vines that received three sprays of Royal Jelly at 0.05%.The lowest values were recorded on untreated vines. Similar results were observed during both seasons.

The promotion on cluster weight and dimensions in response to Royal Jelly application might be attributed to its previous positive effect on enhancing berry setting as well as the next effect of it on enhancing berry weight and dimensions.

These results are in harmony with those obtained by **Gad El-Kareem and Abada (2014)** and **Ahmed and Habasy-Randa (2014), Abada and Ahmed-Basma (2015), Abd El-Rady (2015)** and **Abd El-Aziz *et al.* (2015).**

6- Physical and chemical characteristics of the berries:

It is noted from the data in tables (7&8) that treating Flame seedless grapevines once, twice or thrice at 0.0125 to 0.05% significantly was very effective in enhancing quality of the berries in terms of increasing weight, longitudinal, and equatorial of berry, T.S.S. %, T.S.S./acid and reducing sugars and decreasing total acidity relative to the control treatment. The promotion on fruit quality was proportional to the increase in concentrations and frequencies of Royal Jelly applications. Insignificant promotion on fruit quality was attributed due to increasing concentrations from 0.025 to 0.05% and frequencies from twice to thrice. Therefore, the best results with regard to fruit quality were obtained due to treating the vines twice with Royal Jelly at 0.025% (since no significant difference appeared among 0.025 and 0.05% and two and three sprays in this respect). These results were true during both seasons.

The promoting effects of Royal Jelly application for the fruit quality was mainly attributed to its effect in enhancing cell division and photosynthesis process (**Hyel, 1951**).

These results are in agreement with those obtained by **Gad El-Kareem and Abada (2014)** and **Ahmed and Habasy-Randa (2014), Abada and Ahmed-Basma (2015), Abd El-Rady (2015)** and **Abd El-Aziz *et al.* (2015).**

7- Cluster compactness:

Data in table (7) clearly show that spraying Royal Jelly at 0.0125 to 0.05% once, twice or thrice significantly was favourablein enhancing cluster compactness over the check treatment in Flame seedless grapevines. The simulation was related to the increase in both concentrations and frequencies of Royal Jelly applications. A slight and insignificant promotion of cluster compactness was observed with increasing concentrations from 0.025 to 0.05% and frequencies from twice to thrice. Cluster compactness reached 3.9 due to treating the vines with Royal Jelly at 0.05% three times during both seasons. The untreated vines produced cluster compactness reached 2.0 during both seasons. These results were true during both seasons.

The increase in current cluster compactness due to Royal Jelly application might be attributed to its role in enhancing berry setting and berry weight as

previously mentioned, which is reflected on enhancing cluster compactness.

These results are in harmony with those obtained by **Gad El-Kareem and Abada (2014)** and **Ahmed and Habasy-Randa (2014), Abada and Ahmed-Basma (2015), Abd El-Rady (2015)** and **Abd El-Aziz *et al.* (2015).**

8- Percentage of berry colouration:

Percentage of berries colouration, as shown in table (7), significantly was improved owing to treating the vines once, twice or thrice with Royal Jelly at 0.0125 to 0.05% rather than non-application. There was a gradual advancement on colouration of berries over the check treatment. The promotion was related to the increasing concentrations and frequencies of Royal Jelly. The great enhancement of the colouration of berries was observed in the clusters obtained from vines treated with Royal Jelly three times at 0.05%. The lowest colouration was observed in untreated vines. These results were true during both seasons.

The beneficial effect of Royal Jelly on enhancing colouration of the berries might be attributed to its positive action on enhancing leaf pigments and total sugars as previously mentioned.

These results are in agreement with those obtained by **Gad El-Kareem and Abada (2014)** and **Ahmed and Habasy-Randa (2014), Abada and Ahmed-Basma (2015), Abd El-Rady (2015)** and **Abd El-Aziz *et al.* (2015).**

Table (3): Effect of different concentrations and frequencies of Royal Jelly on some growth characters and chlorophyll a in the leaves of Flame seedless grapevines during 2013 & 2014 seasons.

Royal Jelly Treatment	Main shoot length (cm)		Leaf area (cm2)		Pruning wood weight (Kg/vine)		Cane thickness (cm)		Chlorophyll a (mg/100 g F.W)	
	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
1- Control	125.0	126.6	121.0	1.30	1.33	1.00	1.01	5.00	4.99	125.0
2- Royal Jelly at 0.0125% once	127.0	128.6	122.4	1.41	1.44	1.06	1.07	5.16	5.18	127.0
3- Royal Jelly at 0.0125% twice	129.9	131.6	124.0	1.52	1.55	1.13	1.14	5.33	5.35	129.9
4- Royal Jelly at 0.0125% thrice	130.0	131.7	124.3	1.53	1.56	1.14	1.15	5.35	5.36	130.0
5- Royal Jelly at 0.025% once	132.3	133.9	126.7	1.70	1.73	1.22	1.24	5.50	5.55	132.3
6- Royal Jelly at 0.025% twice	135.0	136.6	128.0	1.81	1.83	1.29	1.31	5.61	5.67	135.0
7- Royal Jelly at 0.025% thrice	135.6	136.7	128.1	1.82	1.84	1.30	1.32	5.62	5.68	135.6
8- Royal Jelly at 0.05% once	132.4	134.0	127.0	1.71	1.74	1.23	1.25	5.51	5.56	132.4
9- Royal Jelly at 0.05% twice	135.6	137.0	128.0	1.82	1.84	1.30	1.31	5.62	5.68	135.6
10- Royal Jelly at 0.05% thrice	132.6	137.2	128.1	1.83	1.85	1.31	1.32	5.63	5.69	132.6
New L.S.D at 5%	1.1	1.2	0.8	0.80	0.90	0.03	0.03	0.11	0.12	1.1

Table (4): Effect of different concentrations and frequencies of Royal Jelly on chlorophyll b, total chlorophylls, total carotenoids and percentages of N and P in the leaves of Flame seedless grapevines during 2013 & 2014 seasons.

Royal Jelly Treatment	Chlorophyll b (mg/100 g F.W)		Total chlorophylls (mg/100 g F.W)		Total carotenoids (mg/100 g F.W)		Leaf N%		Leaf P%	
	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
1- Control	1.49	1.55	6.49	6.54	1.66	1.70	1.61	1.64	0.14	0.12
2- Royal Jelly at 0.0125% once	1.64	1.70	6.80	6.88	1.81	1.85	1.71	1.75	0.17	0.16
3- Royal Jelly at 0.0125% twice	1.66	1.84	6.99	7.19	1.92	1.96	1.82	1.86	0.20	0.21
4- Royal Jelly at 0.0125% thrice	1.67	1.85	7.02	7.21	1.93	1.97	1.83	1.87	0.21	0.22
5- Royal Jelly at 0.025% once	1.81	1.96	7.31	7.51	2.09	2.13	1.90	1.99	0.24	0.25
6- Royal Jelly at 0.025% twice	1.90	2.06	7.52	7.73	2.22	2.28	2.00	2.11	0.26	0.28
7- Royal Jelly at 0.025% thrice	1.93	2.07	7.55	7.75	2.23	2.29	2.01	2.12	0.26	0.28
8- Royal Jelly at 0.05% once	1.82	1.97	7.33	7.53	2.10	2.14	1.91	2.00	0.24	0.25
9- Royal Jelly at 0.05% twice	1.93	2.06	7.55	7.74	2.23	2.30	2.01	2.12	0.26	0.29
10- Royal Jelly at 0.05% thrice	1.94	2.08	7.57	7.77	2.25	2.31	2.02	2.13	0.26	0.29
New L.S.D at 5%	0.09	0.10	0.11	0.12	0.10	0.10	0.05	0.06	0.02	0.02

Table (5): Effect of different concentrations and frequencies of Royal Jelly on some nutrients in the leaves of Flame seedless grapevines during 2013 & 2014 seasons.

Royal Jelly Treatment	Leaf K%		Leaf Mg%		Leaf Ca%		Leaf Zn (ppm)		Leaf Fe (ppm)	
	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
1- Control	1.41	1.44	0.55	0.57	2.49	2.52	50.0	49.9	46.3	45.9
2- Royal Jelly at 0.0125% once	1.50	1.51	0.60	0.63	2.59	2.64	56.0	57.3	51.6	2.0
3- Royal Jelly at 0.0125% twice	1.57	1.58	0.64	0.69	2.71	2.74	62.0	63.2	55.9	56.3
4- Royal Jelly at 0.0125% thrice	1.58	1.59	0.65	0.70	2.72	2.76	62.4	63.9	56.3	56.7
5- Royal Jelly at 0.025% once	1.66	1.68	0.69	0.77	2.83	2.88	67.0	70.0	61..9	62.3
6- Royal Jelly at 0.025% twice	1.74	1.76	0.74	0.82	2.99	2.05	71.0	75.0	66.9	67.3
7- Royal Jelly at 0.025% thrice	1.75	1.77	0.75	0.83	3.00	2.07	71.9	75.3	67.0	67.5
8- Royal Jelly at 0.05% once	1.67	1.69	0.70	0.78	2.84	2.90	67.5	70.1	62.0	62.4
9- Royal Jelly at 0.05% twice	1.75	1.77	0.75	0.83	3.00	2.06	71.5	75.6	67.0	67.6
10- Royal Jelly at 0.05% thrice	1.76	1.78	0.76	0.84	3.02	2.08	72.0	75.7	67.3	67.8
New L.S.D at 5%	0.05	0.04	0.03	0.03	0.07	0.06	4.0	3.9	3.7	3.9

Table (6): Effect of different concentrations and frequencies of Royal Jelly on berry setting %, yield as well as weight and length of cluster of Flame seedless grapevines during 2013 & 2014 seasons.

Royal Jelly Treatment	Berry Setting%		No. of clusters/vine		Average cluster weight (g)		Yield (Kg)		Cluster length (cm)	
	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
1- Control	13.9	13.3	23.0	24.0	350.0	355.0	8.1	8.5	16.1	16.0
2- Royal Jelly at 0.0125% once	14.9	15.0	24.0	26.0	366.0	369.0	8.8	9.5	16.7	16.5
3- Royal Jelly at 0.0125% twice	16.0	16.1	24.0	28.0	380.0	379.0	9.1	10.6	17.5	17.3
4- Royal Jelly at 0.0125% thrice	16.3	16.3	24.0	28.0	380.0	380.0	9.1	10.6	17.6	17.4
5- Royal Jelly at 0.025% once	18.0	17.9	24.0	30.0	390.0	390.0	9.4	11.7	18.3	18.0
6- Royal Jelly at 0.025% twice	18.9	19.0	24.0	32.0	395.0	396.0	9.5	12.7	19.0	18.6
7- Royal Jelly at 0.025% thrice	19.0	19.1	24.0	32.0	396.0	396.0	9.5	12.7	19.1	18.7
8- Royal Jelly at 0.05% once	18.1	18.0	24.0	30.0	390.0	390.0	9.4	11.7	18.4	18.1
9- Royal Jelly at 0.05% twice	19.0	19.1	24.0	32.0	395.0	396.0	9.5	12.7	19.1	18.7
10- Royal Jelly at 0.05% thrice	19.1	19.2	24.0	32.0	395.0	396.0	9.5	12.7	19.2	18.8
New L.S.D at 5%	0.5	0.5	NS	2.0	13.0	13.1	0.6	0.7	0.5	0.4

Table (7): Effect of different concentrations and frequencies of Royal Jelly on width and compactness of cluster, berries colouration%, berry weight and berry longitudinal of Flame seedless grapevines during 2013 & 2014 seasons.

Royal Jelly Treatment	Cluster width (cm)		Cluster compactness (cm)		Berries colouration %		Berry weight (g)		Berry longitudinal (cm)	
	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
1- Control	10.5	10.4	2.0	2.0	64.0	63.9	2.56	2.60	2.05	2.06
2- Royal Jelly at 0.0125% once	11.1	11.0	2.4	2.5	67.5	68.0	2.71	2.76	2.15	2.17
3- Royal Jelly at 0.0125% twice	11.6	11.8	2.8	2.8	69.9	70.6	2.88	2.93	2.23	2.25
4- Royal Jelly at 0.0125% thrice	11.7	11.9	2.9	2.9	70.0	71.0	2.89	2.94	2.24	2.26
5- Royal Jelly at 0.025% once	12.3	12.5	3.3	3.4	73.0	74.6	3.09	2.16	2.34	2.36
6- Royal Jelly at 0.025% twice	12.9	13.0	3.8	3.7	76.0	77.0	3.30	2.40	2.41	2.42
7- Royal Jelly at 0.025% thrice	13.0	13.1	3.9	3.8	76.6	77.3	3.31	2.41	2.42	2.43
8- Royal Jelly at 0.05% once	12.4	12.6	3.3	3.5	73.1	74.7	3.10	2.17	2.35	2.37
9- Royal Jelly at 0.05% twice	13.0	13.1	3.8	3.8	76.2	77.3	3.31	2.41	2.41	2.43
10- Royal Jelly at 0.05% thrice	13.1	13.2	3.9	3.9	76.3	77.6	3.32	2.42	2.43	2.44
New L.S.D at 5%	0.4	0.4	0.3	0.3	1.0	1.0	0.14	0.15	0.05	0.06

Table (8): Effect of different concentrations and frequencies of Royal Jelly on some physical and chemical characteristics of Flame seedless grapevines during 2013 & 2014 seasons.

Royal Jelly Treatment	Berry equatorial (cm)		T.S.S. %		Total acidity%		T.S.S./acid		Reducing sugars %	
	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
1- Control	1.90	1.88	18.00	18.00	0.720	0.720	25.0	25.0	15.5	15.6
2- Royal Jelly at 0.0125% once	1.96	1.97	18.30	18.40	0.690	0.688	26.5	26.7	15.9	16.0
3- Royal Jelly at 0.0125% twice	2.03	2.04	18.70	18.90	0.650	0.648	28.8	29.2	16.5	16.6
4- Royal Jelly at 0.0125% thrice	2.03	2.05	18.80	19.00	0.649	0.646	29.0	29.4	16.6	16.6
5- Royal Jelly at 0.025% once	2.11	2.12	19.40	19.50	0.600	0.594	32.3	32.8	17.3	17.4
6- Royal Jelly at 0.025% twice	2.19	2.21	19.80	20.00	0.550	0.540	36.0	37.0	17.8	17.9
7- Royal Jelly at 0.025% thrice	2.20	2.22	19.90	20.00	0.548	0.538	36.3	37.2	17.9	18.0
8- Royal Jelly at 0.05% once	2.11	2.13	19.50	19.60	0.599	0.594	32.6	33.0	17.4	17.5
9- Royal Jelly at 0.05% twice	2.20	2.22	19.90	20.00	0.549	0.539	36.2	36.9	17.9	18.0
10- Royal Jelly at 0.05% thrice	2.21	2.23	20.00	20.00	0.546	0.537	36.6	37.2	17.9	18.1
New L.S.D at 5%	0.04	0.04	0.20	0.20	0.030	0.029	1.4	1.5	0.3	0.3

Conclusion:

For improving yield and quality of Flame seedless grapevines crawled under Minia region conditions it is suggested to spray the vines twice with Royal Jelly at 0.025%.

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