The Future of Applied Science

FSA

Article

Influence of Spraying Royal Jelly and Glutathione on Productivity and Berries Quality of Early Sweet Grapevines

Ali H. A.*; Hamdy I. M. Ibrahim and Mina Nabil Ibrahim Hanna

Hort. Dept. Fac. of Agric. Minia Univ., Egypt.

***Corresponding author:** ali.sayed1@mu.edu.eg

Future Science Association

Available online free at
www.futurejournals.org

Print ISSN: 2767-178X

Online ISSN: 2767-181X

DOI: 10.37229/fsa.fjas.2025.01.20

Received: 25 November 2024
Accepted: 1 January 2025
Published: 20 January 2025

Abstract: This research was conducted in a privet Farm located at West Mallawy Center-Minia Governorate, on 8-year-old Early Sweet grapevines in clay soil. To study the impact of foliar sprinkle with royal jelly and glutathione at various levels on Early Sweet grapevines. The results indicated that, the application of glutathione considerably enhanced the yield, cluster parameters, physical and chemical of berries in comparison to the use of royal jelly. The vines that got three sprays of royal jelly (400 ppm) and glutathione (1000 ppm) showed the highest values of parameters except acidity and shot berries% were decreased, and there were no significant differences between the vines that were sprayed with the same combination at 200 and 500 ppm, respectively. The vines that were not treated yielded the lowest values. These findings were the same throughout two seasons. It could be concluded that using middle concentration for both royal jelly and glutathione was the most effective treatments.

Key words: Royal jelly, glutathione, yield, quality and Early Sweet grapevines

1. Introduction

The grapevine (*Vitis vinifera* L.) is acknowledged as the most economically significant crop worldwide and holds the position of the second most important crop in Egypt. In Egypt, table grapes represent the most commonly cultivated grape varieties, all of which consist of European grape cultivars (**Mohamed *et al.*, 2019**). The designated area for grape cultivation amounted to 85,240 hectares, producing a total of 1,435,000 tons (**FAO, 2023**). Grapes are recognized as a significant horticultural commodity for export purposes. The volume of this product represents approximately 3% of total horticultural exports, while its export value comprises about 10%. The annual export volume of Egyptian grapes has achieved approximately 131 thousand tons, with projections indicating potential growth in the future (**M.A.L.R., 2019**).

The global marketing process for table grapes is significantly influenced by the quality of the berries. Producers frequently employ mineral fertilizers to improve fruit size, resulting in several health

concerns. Certain methods continue to be utilized because of their significant influence on the enhancement of fruit diameter, which in turn results in higher yield. Consequently, it is crucial to pursue safer alternative agricultural practices to attain this objective. The use of bio-stimulants acts as an enhancement to grape productivity while minimizing dependence on chemical fertilizers (**Masoud *et al*., 2024**).

Recent efforts have concentrated on identifying safe, natural materials for application in the horticultural sector to improve the growth and productivity of trees in challenging conditions. Recent studies emphasize the use of natural and environmentally sustainable stimulants to improve the yield and quality of Early Sweet grapevines. Bio-stimulants improve resource use efficiency, including fertilizers, nutrients, and water, by modulating biochemical, molecular, and physiological processes in plants. This leads to enhancements in photosynthesis, plant growth, quality, and resilience to biotic and abiotic stresses (**Zulfiqar *et al.,* 2019; Rouphael and Colla, 2020**).

Royal jelly is a nutrient-rich natural substance with significant potential applications in cosmetics, medicine, and health-promoting diets. This bee product contains essential components, including minerals (Mg, K, Ca, P, Fe, S, and Mn), proteins, hormones, lipids, flavonoids, neurotransmitters, and polyphenols, which contribute to the significant biological and therapeutic properties of Royal jelly (**Oršolić *et al.,* 2024**), as well as vitamins E, B5, B9, B6, and B12 (**Wang, 2016; Balkanska *et al.,* 2017**).

There is considerable interest in the external supplementation of vitamins and substances to enhance plant growth and development. This is because these products are natural. Glutathione (GSH) is a tripeptide made up of L-glutamyl, L-cysteinyl, and glycine, which is used in antioxidants and bio-stimulants that regulate reduction and oxidation processes within plant cells. Glutathione plays a unique role in plant growth and development, contributing to detoxification, oxidation balance, and cellular stabilization, functions that other antioxidants do not perform (**Noctor *et al*., 2012**). Furthermore, it safeguards the thiol groups in proteins, thereby inhibiting oxidative denaturation during stress conditions. It also serves as a substrate for glutathione S-transferase, glutathione peroxidases, and glutaredoxin, which are involved in floral development and plant defense signaling (**Rouhier *et al.,* 2008; Hasanuzzaman *et al.*, 2017**). The use of glutathione at different concentrations and frequencies significantly enhanced the quality and yield of various fruit crops (**Ahmed *et al.,* 2018; Dawood *et al.,* 2020**).

This research investigated the impact of varying concentrations of royal jelly and glutathione on the yield and fruit quality of Early Sweet grapevines in the Minia region.

2. Materials and Methods

2.1. Plant materials

This research was conducted in a privet Farm located at West Mallawy Center-Minia Governorate, on 8-year-old Early Sweet grapevines grafted onto Paulsen rootstock and planted at 2 m (between vine) x 3 m (between rows) in clay soil, irrigated by a surface irrigation system using Nile water. To study the impact of foliar sprinkle with royal jelly and glutathione at various levels on Early Sweet grapevines. The cane pruning system was implemented using the Gable shape supporting technique. The vine load for all the selected vines was modified to 6 fruiting spurs plus 10 eyes and 6 renewal spurs with 2 eyes, resulting in a total of 72 buds left on each vine. The chosen 30 vines were picked as homogeneous in vigor as feasible and dedicated to this investigation and received the standard horticulture techniques often employed in the vineyard.

The physical and chemical examination of the examined soil is detailed in Table A as per **Wilde *et al.* (1985).**

Table (A). Analysis of the tested soil

Soil / Years	Particle size distribution (%)				ECppm (1:2.5 extract)	pH (1:2.5 extract)	Organic matter %	$CaCO_3$ %
	Sand	silt	Clay	T. class				
2020 /2021	1.97	36.87	61.16	Clay	296	7.56	2.22	2.29
	Soil nutrients							
	Total N (%)	Available P (ppm)	Available K (ppm)	Zn (ppm)	Fe (ppm)	Mn (ppm)	Cu (ppm)	
	0.11	5.36	497.5	2.6	3.2	3.8	0.8	

2.2. Examined designs and treatments

The experiment consisted of ten treatments organized in a Randomized Complete Block design, with every treatment reproduced thrice, with one vine each replication, including the control treatment, applications of glutathione and royal jelly separately and in combination. The treatments were arranged as follows:

1) Control (spray with tap water).
2) Royal jelly (100 ppm).
3) Royal jelly (200 ppm).
4) Royal jelly (400 ppm).
5) Glutathione (250 ppm).
6) Glutathione (500 ppm).
7) Glutathione (1000 ppm).
8) Royal jelly (100 ppm) + glutathione (250 ppm).
9) Royal jelly (200 ppm) + glutathione (400 ppm).
10) Royal jelly (400 ppm) + glutathione (1000 ppm)

Royal jelly and glutathione were applied via spraying three times: at the onset of growth, immediately after berry setting, and one month thereafter. Chemical analysis of royal jelly presented in Table (B).

2.3. Measurements

Across the investigative seasons (2020 and 2021), the subsequent data were recorded:

- Characteristics of clusters and yield:

Four clusters /vine were harvested at the ripening stage to determine the following data: number of cluster/vine, cluster weight (g), cluster length (cm), cluster shoulder (cm). Yield (kg)/vine was assessed in kg for each tree/replicate by multiply the cluster number and weight and Berry setting (%) was computed as the following

$$\text{Fruit berry Setting \%} = \frac{\text{Number of berries /cluster}}{\text{Total number of flower /cluster}}$$

- Physical characteristic of the berry:

The shot berry proportion was calculated by dividing the percentage of berries in each cluster by the total number of berries in all clusters, then multiplying by 100: berry weight (g) and berry dimensions (longitudinal and equatorial).

- Chemical characteristics of berries according to (**A.O.A.C, 2000**): A hand-held refractometer utilized to measure TSS% in berries, titrating 5 ml of berry juice against 0.1 N NaOH with phenolphthalein determined the titratable acidity percentage. TSS/acidity ratio of berry juice was calculated and total sugar%.

Table (B). Royal jelly chemical analysis of according to Townsend and Lucas (1966)

Constituents	Values mg/ 100 g F.W.
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
Nutrients (ppm)	
K	220
Mg	105
Ca	112
Fe	50
P	118
S	44
Mn	32
Si	5
Vitamins (mg/ 100 g F.W.)	
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

2.4. Statistical analysis

All gathered data were systematically arranged into tables and subjected to statistical analysis following the technique of **Mead *et al.* (1993**), with treatment means compared utilizing the new LSD test at a significant level of 5%.

3. Results and Disscsion

3.1. Yield and cluster physical characteristics

The data in Table (1) indicated that the number of cluster/vine, weight, yield in kg /vine, berry setting %, cluster length, and shoulder of "Early Sweet" grapevines were significantly stimulated by the combination and solitary applications of glutathione and royal jelly at varying concentrations in comparison to the untreated treatment except in the first season in cluster number, the addition of both

didn't affect in the traits. The promotion was connected to the rise in dosages of glutathione and royal jelly. The combined applications were substantially more effective in improving these parameters than the use of each material independently. The application of glutathione considerably increased the number of cluster/vine, weight, yield in kg /vine, berry setting %, cluster length, and shoulder in comparison to the use of royal jelly. The vines that got three sprays of royal jelly (400 ppm) and glutathione (1000 ppm) showed the highest values, and there were no significant differences between the vines that were sprayed with the same combination at 200 and 500 ppm, respectively. The vines that were not treated yielded the lowest values. These findings were the same throughout two seasons.

The prior beneficial effects on growth after using royal jelly, vine nutritional status, berry setting, and cluster quantity per vine likely contributed to an increase in yield. The enhancement of the leaf's stimulatory influence on the production of photosynthetic pigments and the rate of net photosynthetic was linked to the influence of increasing fruit weight and yield per tree (**Hyel, 1951; Wang, 2016**). The elevated concentration of royal jelly, comprising proteins, sugars, vitamins, amino acids, and hormones, undoubtedly contributed to the improvement of fruiting characteristics. The optimal ratio of carbohydrates to nitrogen in Royal jelly correlated with an increase in fruiting buds, which may explain the rise in berry number per shoot. Additionally, the elevated water content in Royal jelly could enhance fruit weight in grams (**Hyel, 1951 and Wang, 2016**). These results are consistent with those found by **Abdel-Rahman *et al.* (2019); Mahfouz (2020); Ali and Ahmed (2023).**

The positive impact of glutathione on berry setting may be linked to its effects on growth, vine chemical content, and pigment production. The favorable the weight and dimensions of clusters and non-berry setting actions were credited with the yield increase. These findings concerning the influence of glutathione on yield, berry setting, and clusters weight and dimensions of align with previous findings of **El-Hadidy *et al.* (2022); Shoug (2022); Ali and Ahmed (2023).**

Table (1). Yield and cluster parameters of Early Sweet grapevines as influenced by foliar applying with royal jelly and glutathione throughout 2020 and 2021 seasons

Characteristics / Treatments	Cluster number/vine		Cluster weight (g)		Yield/vine (kg)		Berry setting %		Cluster length (cm)		Cluster width (cm)	
	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
Control	32	31	425.0	427.1	13.6	13.2	9.9	9.7	18.0	18.5	14.1	14.5
Royal jelly (100 ppm)	32	34	440.2	443.2	14.1	15.1	13.0	12.9	19.0	19.4	15.4	15.7
Royal jelly (200 ppm)	32	37	449.6	452.3	14.4	16.7	14.2	14.0	19.7	20.2	16.1	16.3
Royal jelly (400 ppm)	32	38	458.0	460.3	14.7	17.5	14.9	14.8	20.0	20.4	16.3	16.4
Glutathione (250 ppm)	32	36	450.2	452.2	14.9	16.3	14.1	14.0	19.6	20.0	15.9	16.3
Glutathione (500 ppm)	32	38	459.2	460.8	15.2	17.5	15.0	15.2	20.1	20.5	16.4	16.7
Glutathione (1000 ppm)	32	39	467.7	469.0	15.4	18.3	15.6	15.9	20.3	20.6	16.5	16.9
Royal jelly (100 ppm) + glutathione (250 ppm)	32	39	459.3	460.7	14.7	18.0	15.0	15.2	20.1	20.4	16.3	16.8
Royal jelly (200 ppm) + glutathione (500 ppm)	32	41	467.9	469.0	15.0	19.2	15.8	16.1	20.5	20.7	16.6	17.1
Royal jelly (400 ppm) + glutathione (1000 ppm)	32	42	476.3	477.1	15.2	20.0	16.5	16.9	20.8	20.9	16.8	17.3
New LSD at 5%	**N.S**	**2.0**	**8.6**	**8.3**	**0.4**	**0.9**	**0.8**	**0.9**	**0.4**	**0.3**	**0.3**	**0.3**

3.2. Berries physical characteristic

Table (2) illustrate the impact of royal jelly and glutathione applications on Early Sweet grapevines the berry shot percentage, average berry weight, equatorial and longitudinal during the 2020 and 2021 seasons either in individual or in combined applications. The data obtained demonstrated that the berry physical quality was considerably enhanced in comparison to the untreated treatment when the vines were supplied with royal jelly at a concentration of 100 to 400 ppm and/or glutathione at a concentration of 250 to 1000 ppm. As the concentrations of each material increased, shot berry% underwent a gradual decline and raise in average berry weight, equatorial and longitudinal. From an economic standpoint, it is imperative to utilize the middle rates of each material, as there were substantial variations in physical quality among all concentrations and materials, with the exception of the upper two concentrations of each material. In this regard, the combined results were more advantageous than the use of each material independently. In the reduction of berry shot % and increasing average berry weight, equatorial and longitudinal, glutathione is substantially more advantageous than royal jelly. Using royal jelly at 200 ppm and glutathione at 500 ppm resulted in the lowest berry shot % and highest average berry weight, equatorial and longitudinal from an economic perspective. The results were virtually identical in both seasons.

Royal jelly's advantageous effects on berry setting were ascribed to its crucial role in augmenting plant pigments, leaf area, and the absorption of macro and micronutrients. This impact was seen in the improvement of vine nutritional condition, which favored an increase in berry physical parameters. These outcomes are consistent with those found by **El-Sayed *et al.* (2017); Hussein (2019); Ali and Ahmed (2023).**

The influence of glutathione on promoting cell division along with its role in diminishing reactive oxygen species, may lead to a decrease in shot berries within clusters (**Mullineaux and Raasch, 2005**). The observed improvement in the physical parameters of berries may be ascribed to the beneficial influence of glutathione on increasing leaf area and promoting photosynthesis (**Mullineaux and Rausch, 2005**). The findings concerning the enhancing influence of glutathione on the physical parameters of berries align with those previously reported by **Saied (2019); El-Hadidy *et al.* (2022); Ali and Ahmed (2023).**

Table (2). Berries physical quality parameters of Early Sweet grapevines as influenced by foliar applying with royal jelly and glutathione throughout 2020 and 2021 seasons

Characteristics / Treatments	Shot berries %		Berry weight (g)		Berry longitudinal (cm)		Berry equatorial (cm)	
	2020	2021	2020	2021	2020	2021	2020	2021
Control	8.3	8.1	4.50	4.58	2.12	2.10	1.78	1.75
Royal jelly (100 ppm)	7.7	7.6	4.61	4.66	2.20	2.17	1.85	1.81
Royal jelly (200 ppm)	7.2	7.2	4.70	4.73	2.26	2.24	1.91	1.86
Royal jelly (400 ppm)	6.9	7.0	4.76	4.78	2.30	2.29	1.94	1.90
Glutathione (250 ppm)	7.3	7.2	4.69	4.73	2.26	2.24	1.89	1.86
Glutathione (500 ppm)	6.9	6.8	4.77	4.79	2.33	2.30	1.93	1.92
Glutathione (1000 ppm)	6.7	6.7	4.82	4.83	2.36	2.34	1.96	1.95
Royal jelly (100 ppm) + glutathione (250 ppm)	6.8	6.9	4.76	4.80	2.31	2.31	1.95	1.92
Royal jelly (200 ppm) + glutathione (500 ppm)	6.4	6.6	4.83	4.86	2.36	2.37	2.00	1.97
Royal jelly (400 ppm) + glutathione (1000 ppm)	6.1	6.4	4.89	4.91	2.40	2.42	2.02	2.00
New LSD at 5%	**0.4**	**0.3**	**0.07**	**0.06**	**0.05**	**0.06**	**0.04**	**0.05**

3.3. Chemical quality of berries

One can state from the data in Table (3) that administering royal jelly and/or glutathione to Early Sweet grapevines on three occasions at different concentrations caused a significant promotion on berry TSS%, TSS/total acidity, total sugar%, and reduction in acidity in contrast to the treatment under control. The advancement was commensurate with the rise in levels of royal jelly and glutathione. Notable variations in berries chemical quality were detected across the majority of concentrations, with the exception of the two highest concentrations for both materials. Consequently, the most effective treatment in this context was the applying of glutathione at 500 ppm. Utilizing glutathione is markedly more advantageous than employing royal jelly for the enhancement of berry chemical quality. Untreated grapevines yielded adverse outcomes in the traits. The combination proved to be more advantageous than utilizing each material independently in this regard. From an economic perspective, the combination of royal jelly at 200 ppm and glutathione at 500 ppm yielded the maximum percentage of berry TSS%, TSS/total acidity, total sugar%, and lowest in acidity. With the implementation of the proposed treatment, the total soluble solids percentage of the berries attained values of (20.4% -20.3%, 32.2-32.0, 16.5-16.4%) for berry TSS%, TSS/total acidity, total sugar%, and (0.634% for acidity) across both seasons, respectively. The control vine yielded (17.8-18.0%, 0.705- 0.702%, 25.2-25.6, and 14.5-14.7%) for berry TSS%, acidity, TSS/total acidity, total sugar%, in each of the two seasons, respectively. The outcomes exhibited remarkable consistency across both seasons.

Table (3). Berries chemical quality parameters of Early Sweet grapevines as influenced by foliar applying with royal jelly and glutathione throughout 2020 and 2021 seasons

Characteristics / Treatments	TSS%		Total acidity%		TSS/acidity ratio		Total sugar%	
	2020	2021	2020	2021	2020	2021	2020	2021
Control	17.8	18.0	0.705	0.702	25.2	25.6	14.5	14.7
Royal jelly (100 ppm)	18.9	19.0	0.685	0.680	27.6	27.9	15.2	15.3
Royal jelly (200 ppm)	19.5	19.5	0.668	0.663	29.1	29.4	15.7	15.6
Royal jelly (400 ppm)	19.8	19.7	0.653	0.650	30.3	30.3	15.9	15.7
Glutathione (250 ppm)	19.4	19.5	0.667	0.665	29.1	29.3	15.6	15.7
Glutathione (500 ppm)	19.9	19.9	0.651	0.648	30.6	30.7	15.9	16.0
Glutathione (1000 ppm)	20.2	20.1	0.637	0.634	31.7	31.7	16.0	16.1
Royal jelly (100 ppm) + glutathione (250 ppm)	20.0	19.9	0.650	0.649	30.8	30.7	16.2	16.0
Royal jelly (200 ppm) + glutathione (500 ppm)	20.4	20.3	0.634	0.634	32.2	32.0	16.5	16.4
Royal jelly (400 ppm) + glutathione (1000 ppm)	20.6	20.6	0.620	0.621	33.2	33.2	16.7	16.5
New LSD at 5%	**0.4**	**0.4**	**0.016**	**0.015**	**1.3**	**1.3**	**0.3**	**0.2**

Royal jelly's positive effects on fruit quality are primarily linked to its role in promoting the photosynthesis process and cell division (**Heyl, 1951).** Royal jelly is a natural substance rich in amino acids, vitamins, antioxidants, and high-energy phosphorus compounds (such as ATP and ADP), along with macro and microelements **(Bărnuţiu *et al.*, 2011; Ramadan & Al-Ghamdi, 2012; Wang, 2016**). These components can stimulate photosynthesis, potentially leading to increased sugar production that can be stored in berry tissues and enhancing the activity of essential plant enzymes such as invertase,

while also elevating total soluble solids and decreasing total acidity in grapevine juice. These outcomes concur with those acquired by **Ibrahim *et al.*, (2015); Hussein (2019); Ali and Ahmed (2023).**

The findings suggest that glutathione has a beneficial effect on berry quality by improving leaf pigments and total carotenoid levels in the berries, which is achieved through its role in boosting the photosynthesis process (**Mullineaux and Rausch, 2005**). The notable influence on vine nutritional status could offer a different perspective. The results obtained regarding the influence of glutathione on the chemical properties of berries were aligned with the findings of **Ahmed *et al.* (2018); El-Hadidy *et al.* (2022); Ali and Ahmed (2023).**

4. Conclusion

Under Minia governorate and comparable conditions, suppling Early Sweet grapevines with a mixture containing 200 ppm royal jelly and 500 ppm glutathione three times at the onset of growth, immediately after berry setting, and one month thereafter was the most effective treatment from an economic perspective for enhancing yield, and berry quality.

References

A.O.A.C., (2000). Association of Official Agricultural Chemists. Official Methods of Analysis 14th ed. Benjamin Franklin Station, Washington D.C.U.S.A., pp. 490-510.

Abdel-Rahman, M.A., Aly M. I., Hamdy I.M. I. and Hassan, A. G. (2019). yield and fruit quality of wonderful pomegranate trees (*Punica granatum* L.) as influenced by spraying royal jelly. Future J. Biol., 4 (2019), 1-10.

Ahmed, F., Abdelaal, A., El-Masry, S. E. and Metwally, M. (2018). Trials for improving the productivity and reducing shot berries in superior grapevines by using silicon and glutathione. *Journal of Productivity and Development*, *23*(1), 23-38.

Ali, H. A. and Ahmed, M. M. (2023). Improving of yield and fruit quality of Ferehy date palms by spraying royal jelly and glutathione under Siwa oasis conditions. The Future of Agriculture. DOI:10.37229/fsa.fja.2023.08.05.

Balkanska, R., Marghitas, L. A. and Pavel, C. I. (2017). Antioxidant activity and total polyphenol content of royal jelly from Bulgaria. Int. J. Curr. Microbiol. Appl. Sci., 6(10), 578-585.

Bărnuţiu, L. I., Mărghitaș, L. A., Dezmirean, D. S., Mihai, C. M. and Bobiș, O. (2011). Chemical composition and antimicrobial activity of Royal Jelly-REVIEW. Scientific Papers Animal Science and Biotechnologies, 44(2), 67-67.

Dawood, M. G., Sadak, M. S., Bakry, B. A. and Kheder, H. H. (2020). Effect of glutathione and/or selenium levels on growth, yield, and some biochemical constituents of some wheat cultivars grown under sandy soil conditions. Bulletin of the National Research Centre, 44, 1-11.

El-Hadidy, G. A. E. M., Mshrakyand, A. M. & Mahmoud, T. S. M. (2022). Effect of glutathione and some mineral nutrients on fruit cracking and quality in Washington navel orange. Int. J. Agric. Res., 17: 5-13.

El-Sayed, M. and Mohamed, A. (2017). Effect of foliar spraying royal jelly on growth and fruiting of Zebda mango trees grown under Aswan region conditions. Journal of Productivity and Development, 22(2), 267-285.

FAO (2023). Crops and livestock products. Accessed 4/8/2023. https://www.fao.org/faostat/ar/#data/QCL

Hasanuzzaman, M., Nahar, K., Anee, T. I. and Fujita, M. (2017). Glutathione in plants: biosynthesis and physiological role in environmental stress tolerance. Physiology and molecular biology of plants, 23, 249-268.

Hussein, M. A. M. (2019). Effect of spraying royal jelly on productivity of Flame seedless grapevines. MSc. Thesis, Fac. Agric. Minia Univ. Egypt.

Hyel, H. L. (1951). An observation suggesting the presence of gonadotrophic hormone in Royal Jelly. Science, 89: 590-591.

Ibrahim, H. I. M., Mansour, A. E. M. and Merwad, M. A. (2015). Impact of spraying some organic manure tea, seaweed extract and royal jelly on fruiting of Keitte mango trees. Int. J. Chem. Tech. Res., 8 (4), 2131-2141. 213.

M.A.L.R. (2019). Ministry of Agriculture and Land Reclamation Publishes. Economic Affairs Sector.

Mahfouz, A. G. H. (2020). Effect of spraying royal jelly on fruiting of Wonderful pomegranate trees. MSc. Thesis, Fac. Agric. Minia Univ. Egypt.

Masoud, A. A., Mohamed, A. K., Abdou Zaid, I. A., El-Hakim, A. and Mohamed, H. (2024). Effect of foliar application of some natural compounds on growth and fruiting of ruby seedless grapevines. Assiut Journal of Agricultural Sciences, 55(4), 177-188.

Mead, R., Curnow, R. N. and Harted, A. M. (1993). Statistical methods in Agricultural and Experimental Biology. 2nd Ed. Chapman & Hall, London pp. 10-44.

Mohamed, A. K., Ahmed-Amen, K. I., Shaaban, M. M., Gaser, A. S. and Abulfadl, E. A. (2019). Effect of spraying some compounds on berry quality and antioxidants content of three red grape cultivars. Journal of Sohag Agriscience (JSAS), 4(1), 17-34.

Mullineaux, P. M., & Rausch, T. (2005). Glutathione, photosynthesis and the redox regulation of stress-responsive gene expression. *Photosynthesis research*, *86*, 459-474.

Noctor, G., Mhamdi, A., Chaouch, S., Han, Y. I., Neukermans, J., Marquez-Garcia, B. E. L. E. N., Queval, G. and Foyer, C. H. (2012). Glutathione in plants: an integrated overview. Plant, cell & environment, 35(2), 454-484.

Oršolić, N. and Jazvinšćak J.M. (2024). Royal Jelly: Biological Action and Health Benefits. International Journal of Molecular Sciences, 25(11), 6023.

Ramadan, M. F. and Al-Ghamdi, A. (2012). Bioactive compounds and health-promoting properties of royal jelly: A review. Journal of functional foods, 4(1), 39-52.

Rouhier, N., Lemaire, S. D. and Jacquot, J. P. (2008). The role of glutathione in photosynthetic organisms: emerging functions for glutaredoxins and glutathionylation. Annu. Rev. Plant Biol., 59(1), 143-166.

Rouphael, Y. and Colla, G. (2020). Toward a sustainable agriculture through plant biostimulants: From experimental data to practical applications. Agronomy, 10(10), 1461.

Saied, H. (2019). Effect of spraying fish oil and glutathione on fruiting of Ewaise mango trees grown under sandy soil. Hortscience Journal of Suez Canal University, 8(1), 95-108.

Shoug, M. A. (2022). Response of Flame Seedless Grapevines to Foliar Application of some Micronutrients and Glutathione. Hortscience Journal of Suez Canal University, 11(1), 1-10.

Townsend, G. and Lucas, C. (1966). The chemical natural of royal jelly. Biochemical. J, 34, 1115-1162.

Wang, X. (2016). Studies of Molecular Mechanisms of Royal Jelly Mediated Health span Promotion in Caenorhabditis Elegans. PhD. Biological Science Clemson University.

Wilde, S. A., Corey, R. B., Lyre, I. G. and Voigt, G. K. (1985). Soil and Plant Analysis for Tree Culture. 3" d Oxford 8113M publishing Co. New Delhi, 96-106.

Zulfiqar, F., Casadesús, A., Brockman, H. and Munné-Bosch, S. (2020). An overview of plant-based natural biostimulants for sustainable horticulture with a particular focus on moringa leaf extracts. Plant Science, 295, 110194.

تأثير الرش الورقى بالغذاء الملكى و الجلوتاثيون على الإنتاجيه و صفات الجوده فى العنب إيرلى سويت

على حسن على - حمدى إبراهيم محمود - مينا نبيل إبراهيم حنا

قسم البساتين – كلية الزراعة – جامعة المنيا – مصر

الملخص العربى

أجريت الدراسه فى مزرعة عنب خاصة غرب مركز ملوى بمحافظة المنيا على كروم العنب "إيرلى سويت بعمر 8 سنوات" مزروعة فى تربه طينيه، لدراسة تأثير الرش الورقى بالغذاء الملكى و الجلوتاثيون تحت مستويات مختلفه. أوضحت النتائج أن الرش الورقى بالجلوتاثيون تفوق على الرش بالغذاء الملكى فى تحسين صفات المحصول و العناقيد و صفات الجوده الفيزيائية و الكيميائية. أظهرت الكروم التى تم رشها ثلاث مرات بتركيز 400 جزء فى المليون غذاء ملكى + 1000 جزء فى المليون جلوتاثيون أعلى القيم للصفات المدروسه و أقل القيم لكل من الحموضه و نسبة الحبات الصغيره فى العنقود و لم تسجل المعامله أى فرق معنوي مع التركيز الأقل 200 جزء فى المليون غذاء ملكى + 500 جزء فى المليون جلوتاثيون. و سجل نفس الإتجاه خلال كلا الموسمين و لذلك يمكن التوصيه بالرش ثلاث مرات بالتركيز المتوسط لمزيج كل من الغذاء الملكى و الجلوتاثيون حيث كانت من أكثر المعاملات فعاليه.

الكلمات المفتاحيه: غذاء ملكى، جلوتاثيون، محصول، صفات جودة و عنب "إيرلى سويت"