Assiut Journal of Agricultural Sciences 55(4) 2024 (189-200) Website: http://ajas.journals.ekb.eg/
ISSN: 1110-0486 / EISSN: 2356-9840 E-mail: ajas@aun.edu.eg

(Original Article)

Response of Ruby Seedless Grapevines to Application of Some Chemical Compounds

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DOI: 10.21608/AJAS.2024.312389.1390

Abstract

This study was carried out during 2018 and 2019 seasons to investigate the effects of foliar spraying six chemical compounds on some vegetative growth, yield, physical, and chemical characters of the berries. The examined compounds were GA3 at 10 ppm, hydrogen peroxide (H_2O_2) at 10 mM, salicylic acid at 5%, Mepiquat chloride at 200 ppm, micronutrients (A compound of Fe, Zn, Mn, Mo and B) at 0.1%, and free amino acids at 0.1% sprayed three times during the season. Grapevines treated with either compound increased growth, yield, and fruit quality compared to the control treatment. The best chemical compounds on some vegetative growth characters were GA3, followed by micronutrients, H_2O_2, and salicylic acid. As for the yield and cluster weight and dimensions, the best of chemical compounds was salicylic acid which significantly surpassed the remaining treatments, followed by micronutrients then Mepiquat chloride (MC) and free amino acids. The corresponding increment percentage for these treatments were found to be 48.24, 33.30, 25.59, and 24.51 % over the control, respectively.

The results of the current study suggested that spraying three times with salicylic acid at 5% recorded the best results concerning productivity and quality parameters.

Keywords: *Chemical compounds، Fruit quality ،Ruby seedless grapevines، yield.*

Introduction

Grapevine is considered the first major fruit cultivated throughout the world. Grapes are now grown on all major continents of the world as fresh fruit and processed products. Grapes and their products are a valuable source of carbohydrate fiber, potassium, and several vitamins, in addition to a wide array of phenolic compounds known as health beneficial compounds (Passingham, 2004). Grapes came third after citrus and mango crops because of its high return. Its cultivated area in Egypt was 16,404 feddans (1 feddan = 4200m^2) while the fruiting area was 178,485 feddans which produced 1,790,734 tons of fruits in 2022 (M.A.L. 2022). Egypt ranks thirty second nation in the world (FAO, 2018). Assiut governorate, where the present study was carried out, occupied late position of

Received: 19 August 2024/ Accepted: 22 October 2024/ Published online: 26 October 2024

grapevines cultivation and production. Assiut fruiting area of grape reached 2163 feddans producing about 27,634 tons fruits.

Micronutrients play important regulatory roles in activating various enzymes, biosynthesizing organic foods, vitamins, plant pigments, and hormones, promoting cell division, and facilitating water and nutrient absorption (Yagodin (1990); Belvins and Lukasweski (1998); and Mengel *et al.* (2001).

Amino acids are organic nitrogen compounds responsible that form building materials of protein biosynthesis by ribosomes, that catalyze the polymerization of amino acids. Ethylene, GA3, IAA, some plant pigments, and all organic materials in plants are formed with the aid of amino acids, vitamins, and enzymes. Amino acids also play a role in extending fruits shelf life and delaying aging (Hashimoto and Yamada, 1994).

Salicylic acid is widely used in organic synthesis, functions as a plant hormone, and is derived from the metabolism of salicin. Salicylic acid is a phenolic phytohormone involved in plant growth and development, photosynthesis, transpiration, nutrient uptake and transport. It also causes specific changes in leaf anatomy and chloroplast structure and involved in endogenous signaling that mediates plant defense against pathogens (Taiz and Zeiger (2002); Dat *et al.* (2007); Zahedi *et al.* (2013); Dimovaska *et al*. (2014) and Samra and Arafa- Sally (2015)).

Disclosed that using GA3 at 10- 40 ppm just after berry setting till the onset verasion stage had an obvious enhancement on weight and dimension of berry, cluster weight and the yield in the different grapevines cvs. Ahmed *et al.* (2005).

The target of this study was examining the effect of different chemical compounds GA3, H_2O_2, SA, Mepiquat chloride, micronutrients, and amino acids on growth and fruiting of Ruby seedless grape cultivar grown under Upper Egypt climatic conditions.

Materials and Methods

The present study was carried out through two seasons 2018 and 2019 on 26 years old Ruby seedless grapevines grown at the experimental orchards of the faculty of agriculture, Assiut Univ. Egypt. Where the soil has clay loam texture and with water is not less than two meters deep. Vines are spaced at 2.5 × 2.0 meters apart (850 vines per feddan).

The soil is clay and well drained and the essential physical and chemical properties of it are present in Table (1) according to Wilde *et al*., (1985).

Table 1. Some physical and chemical properties of the soil of the experimental orchard.

Soil property	Value	Soil property	Value
Sand %	15.43	Total N %	0.16
Silty %	33.22	DTPA extractable P ppm	21.61
Clay %	51.35	NH_4 OAC extractable K ppm	401.33
Texture	Clay	DTPA extractable Fe ppm	13.19
CaCO3 %	3.66	DTPA extractable Mn ppm	15.16
Organic matter %	1.32	DTPA extractable Zn ppm	2.35
pH (1:1 suspension)	8.1	DTPA extractable Cu ppm	2.11
ECE (ds /m^{-1})	2.69		

The selected vines (28 vines) were chosen as uniform in vigor, healthy, good physical conditions, free from insects' damages and diseases as possible and devoted to achieving this study. The chosen vines were pruned during the second week of January in both seasons. The experiment consisted of seven treatments; each treatment was applied to four vines including the standard treatment (control).

The vines were trained according to the head training system and pruned during the second week of January. Head pruning system was applied by leaving total bud load of 60 eyes/ vine (16 fruiting spurs x 3 eyes each and 6 replacement spur × 2 eyes). The chosen vines subjected to regular agriculture practices that are used in the vineyard, except of the tested treatments. These practices including the application of farmyard manure (F.Y.M.) ammonium sulphate (20.6% N) and calcium superphosphate (15.5% $P2O_5$) and potassium sulphate (48.0% K_2O). F.Y.M. (0.25 %N) was added once in the first week of January, calcium phosphate fertilizer was added once with farmyard manure. Potassium and nitrogen fertilizers were added at doses during the growing season. The other horticultural practices were carried out as usual.

This study tested the following seven treatments from some chemical compounds.

T1- Control.

T2- GA3 at 10 ppm.

T3- H_2O_2 at 10 mM

T4- Salicylic acid at 5%.

T5- Mepiquat chloride (MC) at 200 ppm.

T6- Micronutrients at 0.1% (mixture of Fe, Zn, Mn, Mo and B)

T7- Free amino acids at 0.1%

This experiment consisted of spraying GA3, Hydrogen peroxide (H_2O_2), salicylic acid, Mepiquat chloride, mixture of micronutrients (Fe, Zn, Mn, Mo and B) and mixture of amino acids (Alanine, Leucine, Cysteine, Glycine, Lysine, Methionine) with an exception of GA3, the previous spraying compounds were sprayed three times as growth starts (last week of March); just after berry setting

(the first week of May), and one month later (the first week of June). GA3 was sprayed when the cluster reached 8-10 cm long. Triton B as a wetting agent was added to all chemical compounds' solutions at 1.0 m/L and spraying was done till runoff.

The following parameters were measured during the two studies seasons:

1- Vegetative growth parameters

At the last week of July during both seasons, leaf length (cm), leaf width (cm), and shoot length (cm) were recorded.

2-Yield components

The yield of each vine expressed in weight (kg) was recorded, total yield weight (Kg/vine) and cluster weight (g)

3- Berry measurements: (physical properties)

-Berry length(cm)

-Berry diameter(cm)

-100 berry weight (g)

4- Berry chemical characteristics:

-TSS%

-Percentage of total acidity according to AOAC (2000)

-The ratio between TSS and acidity

-Percentage of reducing sugars in the Juice by using Lane and Eynon method (1965).

-Volumetric method as described in AOAC (2000)

The experiment used a randomized complete block design (RCBD) where each treatment included four replications. The combined analysis of the two seasons of study was done. As well as the differences between the two seasons of study were tested.

The difference between the treatment means were compared by using Duncan multiple range lest at 5% level of probability according to Steel and Torrie (1982)

Result

1-Some vegetative growth parameters:

Data presented in Table (2) showing the effect of chemical compounds treatments on some vegetative growth characteristics of Ruby seedless grapevines during 2018 and 2019 seasons

Table 2. Effect of chemical compounds on leaf size (leaf width and length) and shoot length (cm) of Ruby seedless grapevines during 2018 and 2019 seasons.

Treatments	Leaf width (cm)			Leaf length (cm)			Shoot length (cm)		
	2018	2019	Mean	2018	2019	Mean	2018	2019	Mean
T_1- Control	11.13	11.63	11.38^{AB}	11.88	12.25	12.7^{E}	56.33	45.75	51.04^{D}
T_2- GA 10 ppm	11.50	12.25	11.88^{A}	15.13	15.63	15.38^{A}	73.50	78.25	75.88^{A}
T_3- H_2O_2 10 mm	11.38	11.50	11.44^{AB}	14.13	12.88	13.51^{C}	62.38	66.25	64.32^{B}
T_4- salicylic acid 5%	11.13	11.63	11.38^{AB}	14.00	15.25	14.63^{B}	59.13	67.13	63.13^{BC}
T_5- Mepiquat chloride 200 ppm	10.13	10.63	10.38^{C}	13.88	11.50	12.69^{D}	52.50	58.25	55.3^{8D}
T_6- Micronutrient 0.1%	10.50	11.25	10.88^{BC}	13.63	14.38	14.01^{C}	71.13	76.00	73.57^{A}
T_7- free amino acids 0.1%	10.88	11.38	11.13^{B}	14.50	15.63	15.07^{AB}	51.50	63.63	57.57^{CD}
Mean	10.95^{a}	11.47^{a}	11.21	13.88^{a}	13.93^{a}	13.91	60.92^{a}	65.04^{a}	62.98

Means with the same letters are not significantly different based on LSD of 5%.

Leaf size (width and length) (cm)

Results of the effect of some chemical compounds spraying on leaf width and length (cm) are presented in Table (2). All treatments, with the exception of mepiquat chloride (MC) did not significantly differe comparing with control concerning leaf width. MC significantly was lower than the control. GA3 at 10 ppm produced the highest values (11.88 cm) of leaf width and significantly surpassed Mc, micronutrients (MN) and amino acids compounds.

Leaf length (cm) means showed that GA3 significantly exceeded all the treatments except of free amino acids. The results also revealed that all the treatments significantly exceeded the control. The best treatments in this respect were GA3 followed by amino acid and salicylic acid, while the control recorded the lowest value. The differences between the two years of study were not significant either for leaf width or length.

Shoot length (cm)

Table (2) showed that, with the exception of MC and amino acids, the remaining chemical compounds were significantly different compared to the control. GA3 and micronutrients recorded the highest shoot length with an insignificant difference between the two treatments followed by H_2O_2 and salicylic acid with an insignificant difference between them. The differences between the two studies seasons were not significant.

2-Yield components:

Yield per vine (kg)

The impact of various chemical compounds spraying on the yield per vine is shown in Table (3). It could be observed that the best treatment in this respect was salicylic acid spraying which surpassed significantly all the rest of treatments followed by micronutrients then MC and free amino acids. The yield / vine of abovementioned treatments was 15.18, 13.65, 12.86, and 12.75 kg, respectively. The corresponding increment percentage for this treatment was found to be 48.24, 33.30, 25.59, and 24.51% over the control, respectively. The 2nd year of study was significantly higher than the 1st one.

Table 3. Effect of chemical compounds on yield per vine (kg) cluster weight (g) and cluster length and width (cm) of Ruby seedless grapevines during 2018 and 2019 seasons.

Treatments	Total yield per vine (kg)			Cluster weight (g)			Cluster length (cm)			Cluster width (cm)		
	2018	2019	Mean	2018	2019	Mean	2018	2019	Mean	2018	2019	Mean
T_1- Control	8.95	11.53	10.24^{D}	365.33	367.97	366.65^{D}	21.38	22.33	21.86^{C}	20.13	23.00	21.57^{ABC}
T_2- GA 10 ppm	11.31	13.68	12.50^{C}	419.42	400.02	409.72^{C}	26.38	28.63	27.51^{A}	23.25	20.75	22.00^{AB}
T_3- H_2O_2 10 mm	10.82	13.34	12.08^{C}	433.08	445.07	439.08^{C}	26.18	22.00	24.09^{B}	21.18	20.75	20.97^{BC}
T_4- salicylic acid 5%	13.56	16.79	15.18^{A}	502.33	479.67	491.00^{A}	27.13	28.33	27.73^{A}	24.83	18.03	21.43^{BC}
T_5- Mepiquat chloride 200 ppm	12.45	13.26	12.86^{C}	480.65	442.00	461.33^{AB}	24.50	25.75	25.13^{B}	22.00	22.75	22.38^{ABC}
T_6- Micronutrient 0.1%	12.57	14.73	13.65^{B}	465.90	432.61	449.26^{B}	26.83	21.88	24.36^{B}	24.00	20.50	22.25^{A}
T_7- free amino acids 0.1%	12.43	13.07	12.75^{C}	478.03	384.33	431.18^{C}	25.50	22.00	23.75^{B}	24.00	17.00	20.50^{A}
Mean	11.73^{b}	13.77^{a}	12.75	449.25^{a}	421.67^{b}	435.46	25.41^{a}	24.42^{b}	24.92	22.77^{a}	20.40^{b}	21.58^{C}

Means with the same letters are not significantly different based on LSD of 5%.

Cluster weight (g)

Table (3) demonstrated that salicylic acid spraying was the predominant treatment over the rest of the treatments which produced cluster weight of 491.00 g and recorded an increment percentage of 33.92% over the control vines. MC and micronutrients also produced high cluster weight of 461.33 and 449.26, respectively, with no significant differences between them. They recorded 25.82 and 22.53% increment percentage more than control. The 1st year of study also was higher than the 2nd one.

Cluster length (cm)

The effect of some chemical compounds spraying on cluster length (Table 3) suggested that all the treatments significantly exceeded the control. Salicylic acid and GA3 have superiority in this respect. The differences between them were not significant. The rest of treatment also significantly surpassed the control but the differences between them were not significant. The 1st season of study was significantly higher than the 2nd one.

Cluster width (cm)

Table (3) showed that there were no significant differences between the treatments and the control. However, MC, micronutrients and GA3 recorded the highest values of cluster width.

3-Berry measurements

Berry length (cm.)

Table (4) showed that amino acids followed by both GA3, and salicylic acid recorded the highest berry length. Their values were 1.62 and 1.56 cm, respectively. The rest of the chemical treatments had insignificant effect. Also, the 1st year of study significantly exceeded the 2nd one.

Table 4. Effect of chemical compounds on berry size (length and diameter (cm) and 100 berries weight (g) of Ruby seedless grapevines during 2018 and 2019 seasons.

Treatments	Berry length (cm)			Berry diameter (cm)			100 berries weight (g)		
	2018	2019	Mean	2018	2019	Mean	2018	2019	Mean
T_1- Control	1.53	1.35	1.44^{C}	1.25	1.28	1.27^{D}	215.18	200.00	207.59^{D}
T_2- GA 10 ppm	1.65	1.46	1.56^{AB}	1.40	1.41	1.41^{AB}	238.95	232.00	235.48^{C}
T_3- H_2O_2 10 mm	1.48	1.49	1.49^{BC}	1.38	1.40	1.39^{ABC}	224.35	260.00	242.18^{BC}
T_4- salicylic acid 5%	1.61	1.50	1.56^{AB}	1.38	1.33	1.36^{BC}	269.68	262.25	265.97^{A}
T_5- Mepiquat chloride 200 ppm	1.64	1.38	1.51^{BC}	1.40	1.31	1.36^{ABC}	259.45	251.00	255.23^{AB}
T_6- Micronutrient 0.1%	1.62	1.34	1.48^{BC}	1.38	1.29	1.34^{C}	261.15	214.50	237.83^{C}
T_7- free amino acids 0.1%	1.73	1.51	1.62^{A}	1.44	1.40	1.42^{A}	272.63	251.75	262.19^{A}
Mean	1.61^{a}	1.43^{b}	1.52	1.38^{a}	1.35^{a}	1.36	248.77^{a}	238.79^{a}	243.78

Means with the same letters are not significantly different based on LSD of 5%.

Berry width (cm)

All chemical spraying (Table 4) significantly surpassed the control treatment. The highest values were recorded by spraying with amino acids and then GA3 and H2O2. They recorded 1.42, 1.41, and 1.39 cm, respectively. The differences between the two years of study were insignificant.

100 berries weigh (g.)

Table (4) shows the effects of the treatments on 100 berries weight of Ruby seedless grapes. The given data revealed that all the treatments significantly surpassed the control. The best treatments in this respect were salicylic acid, amino acid, and MC. The values of these treatments reached 265.97, 262.19, and 255.23g, respectively with no significant differences between them. The increment percentage of these treatments were 28.12, 26.30, and 22.95%, respectively. The 1st year of study was significantly higher than the 2nd one.

4-Chemical constituents

Acidity %

Concerning the effect of chemical compound on acidity % Table (5) showed that H_2O_2 and SA followed by MC recorded the lowest acidity % with no significant differences between them while free amino acids recorded the highest acidity % followed by GA3. The 2nd year of study significantly was higher than the 1st one.

Table 5. Effect of chemical compounds on some chemical characteristics of berries of Ruby seedless grapevines during 2018 and 2019 seasons.

Treatments	TSS%			Acidity%			TSS/acid ratio			Reducing sugars%		
	2018	2019	Mean	2018	2019	Mean	2018	2019	Mean	2018	2019	Mean
T_1- Control	21.50	17.43	19.47^{A}	0.34	0.41	0.38^{BC}	64.25	43.06	53.66^{BC}	19.75	16.13	17.94^{AB}
T_2- GA 10 ppm	20.00	18.25	19.13^{A}	0.38	0.40	0.39^{AB}	52.46	46.31	44.39^{CD}	18.00	16.88	17.44^{BC}
T_3- H_2O_2 10 mm	20.25	19.25	19.75^{A}	0.32	0.34	0.33^{D}	65.52	56.40	60.96^{A}	18.75	18.00	18.38^{A}
T_4- salicylic acid 5%	18.25	18.75	18.50^{B}	0.36	0.30	0.33^{D}	51.82	62.78	57.30^{AB}	17.13	17.75	17.44^{BC}
T_5- Mepiquat chloride 200 ppm	20.25	18.00	19.13^{B}	0.32	0.37	0.35^{CD}	63.21	49.00	56.11^{AB}	18.88	16.63	17.76^{AB}
T_6- Micronutrient 0.1%	19.25	19.25	19.25^{A}	0.32	0.35	0.34^{D}	60.08	55.72	57.90^{AB}	15.25	18.00	16.63^{D}
T_7- free amino acids 0.1%	19.25	16.90	18.08^{B}	0.40	0.40	0.41^{A}	47.97	44.16	44.57^{D}	17.88	15.57	16.82^{CD}
Mean	19.82^{a}	18.26^{b}	19.04	0.35^{b}	0.37^{a}	0.36	57.90^{a}	50.63^{b}	54.27	17.95^{a}	17.02^{b}	17.48

Means with the same letters are not significantly different based on LSD of 5%.

TSS%, TSS/ acid ratio and reducing sugars %

Table (5) revealed that H_2O_2 significantly surpassed the control. Although micronutrients, SA and MC treatments recorded higher than the control TSS%, TSS/ acid, and reducing sugars % but the differences were not significant.

Discussion

Many synthetic chemicals including growth regulators, antioxidants, micronutrients, amino acids have been widely used in vineyards to improve grape productivity and quality.

Gibberellic acid (GA_3) has been extensively used in table grape cultivars for different purposes. It's action mostly works on stimulation of cell elongation and division especially for seedless grapes. GA_3 is commonly used on grapes for cluster elongation, flower thinning to reduce berry set and increase berry size of seedless grapes. (Tomar (1999); Ahmed *et al.* (2005); El-Razek *et al.* (2015); Mohamed *et al.* (2019)).

The present study revealed that GA_3 had a positive effect on vegetative growth, cluster size, berry size, and weight. These results came in line with the previous works.

Hydrogen peroxide (H_2O_2) plays an important role in plants. At low concentrations, it improves tolerance against abiotic stresses (Khandaker *et al.,* 2012). Our results suggested that H_2O_2 stimulated the vegetative growth parameters, cluster size, and berry size. It also improves the berry quality in terms of acidity reduction and increases TSS and TSS/ acid ratio. Our results aree in accordance with that reported by El-Sayed and Mahfouze (2018) and Guo *et al.,* (2019). They demonstrated that H_2O_2 improves vegetative growth, ripening and berry quality of grapes.

Salicylic acid is a plant hormone that plays an essential role in various plant growth and development. SA induces the plant defense against biotic and abiotic stresses (Garcia-Pastor *et al.,* 2020). SA has been reported to induce various positive changes in treated grapevines e.g., vegetative growth, yield, and berry quality as well as resistance to various stress conditions. The results of the current study suggested that, among all the chemical treatments, SA was the most effective treatment on vine growth and fruiting. SA spraying had a significant effect on leaf size, yield, cluster weight, cluster size, berry size and weight as well as recording the lowest acidity % in the berry juice. These results are in agreement with that reported by Gad El-Kareem and Abd El-Rahman (2013), Loay and El-Boray (2018), and Abd-Elaal (2019). They found that SA significantly stimulated vegetative growth, increased yield, cluster and berry weight and improved berry quality of grapes.

Mepiquat chloride (MC) is a growth retardant used for reducing vegetative growth. The results of the current study observed that this treatment had a positive effect on yield, cluster and berry weight while it had little effect on the other studied characteristics. Previous studies (Duval and Golden (2005); Abdel-

Mohsen (2015) and Mertoglu*et al.* (2019)) found that MC had a positive effect on yield, cluster and fruit weight as well as increased the fruit set.

The most important roles of micronutrients in plants are enzyme activity and hormone synthesis. Investigators suggested that micronutrient application to grapevines increased cluster number/ vine, yield, cluster weight, berry size and weight, and improved berry quality (Shah *et al.* (2016); Shi *et al.* (2017); Abou-Zaid and Shaaban (2019); and Hosseinabad and Khadivi (2019)). Their findings came in line with the results of the present study.

Finally, amino acids are fundamental components of the protein synthesis process. The use of these compounds promoted yield, fruit quality, and vine growth in various grape varieties (Ahmed *et al*. (2011); Khan *et al*. (2012); Nagy and Pinter (2015); Belal *et al*. (2016); Bassiony *et al*. (2018); and El-Sayed *et al.* (2019)). This study is in line with the above studies.

References

Abd-Elaal, E. H. (2019). Spraying of garlic extract, fructose and salicylic acid accelerates bud burst and improves productivity and fruit quality of superior grapevines. J. Plant Product. Mansoura Univ. 10(3): 257-263.

Abdel-Mohsen, M. A. (2015). Enhancing the bearing capacity and quality of superior grapes via root pruning, ethephon and mepiquatchloride. Egypt J. Hort. 42(1): 407-420.

Abou-Zaid, E. A., and Shaaban, M. M. (2019). Growth, yield and berries quality in Red Roomy grapevines improved under different foliar application of Spirolina algae, zinc and boron. Middle East J Agric. Res. 8(2): 654-661.

Ahmed, F. F., Ibrahiem, A. A., Mansour, A. E. M., Shaaban, E. A., and El-Shamaa, M. S. (2011). Response of Thompson seedless grapevines to application of some amino acids enriched with nutrients as well as organic and biofertilization. Res. J. Agric. Bio. Sci. 7(2): 282-286.

Ahmed, M., Kaul, R. K., and Kaul, B. L. (2005). Effect of girdling, thinning and GA_3 on fruit growth, yield, quality and shelf life of grapes (*Vitis vinifera* L.) cv. "Perlette' ActaHortic. 696: 309-313.

Association of Official Agricultural Chemists (2000). Official Methods of Analysis. AOAC15th Ed. Published by AOAC Washington. D.C. USA, pp. 490-510.

Bassiony, S. S., Zaghloul, A. E., and Abd El-Aziz, M. H. (2018). Effect of irrigation levels with foliar spray of silicon, calcium and amino acids on "Thompson Seedless" grapevines. I- Yield and fruit quality. J. Product. and Dev. 23(3): 429-452.

Belal, B. E. A., El-kenawy, M. A., and Uwakiem, M. K. (2016). Foliar application of some amino acids and vitamins to improve growth, physical and chemical properties of Flame seedless grapevines. Egypt. J. Hort. 43(I): 123-136.

Dat, J. F., Capelli, N., and Van Breusegem, F. (2007). The Interplay Between Salicylic Acid and Reactive Oxygen Species During Cell Death in Plants. (Chapter in book p. 247- 276). In: Hayat, S. and Ahmed, A. (eds.) Salicylic Acid: A Plant Hormone. Springer Nature, Berlin, Germany.

Diomvaska, V., Petopulas, V. I., Salamovska, A., and Lieva, F. (2014). Flame seedless, grapevarty (*Vitis vinifera* l.) and different concentration of gibberllic acid (GA) Bulgaiian Journal of AgricSci. 20(1): 137-142.

Duval, J. R., and Golden, E. (2005). Effect of prohexidione-Ca and Mepiquat chloride on stolon production and yield of Florida grown strawberry (Fragaria x ananassa Duch). Small Fruit Review. 4(2): 2005.

El-Sayed, E. A., and Mahfouze, S. A. (2018). Finding safe and cheap exchanges to hydrogen cyanamide on "Flame Seedless grapevines. Alex. J. Agric. Sci. 63(3): 171-181.

El-Sayed, M. A., AbdElaal, A. M. K., Uwaldem, M. Kh., and Osman, N. H. A (2019). Trials for enhancing berries maturation and grapes quality of grapevine cultivar Flame Seedless grown under Minia region conditions. Researcher. 11(2): 10-16.

El-Razek, E. A., Yousef, A. R., and Abdel-Hamed, N. (2015). Effect of chelated Fe, Zn and Mn soil application with spraying GA_3 and ascorbic acid on growth, yield and fruit quality of "Flame Seedless" grapevines under calcareous soil conditions. Int. J. Chem. Tech. Res. 8(6): 441-451.

Gad El-Kareem, M. R., and El-Rahman, M. A. M. (2013). Response of Ruby Seedless grapevines to foliar application of seaweed extract, salicylic acid and roselle extract. HortSci. J. Suez Canal Univ. 1: 294-303.

Garcia-Pastor, M. E., Zapata, P. J., Castillo, S., Martinez-Romero, D., Guillen, F., Valero, D., and Serrano, M. (2020). The effects of salicylic acid and its derivatives on increasing pomegranate fruit quality and bioactive compounds at harvest and during storage. Frontiers in Plant Sci. 11: 668.

Guo, D. L., Wang, Z. G., Li, Q., and Gu, S. C. (2019). Hydrogen peroxide treatment promotes early ripening of Kyoho grape. Australian Journal of grape and Wine Research. 25(3): 357-362.

Hashimoto, T., and Yamada, Y. (1994). Alkaloid biosynthesis Molecular aspects. Ann. Res. Plant. Physiol. Plant. Md. Biol. Pp. 243-257.

Dat, J. F., Capelli, N., and Van Breusegem, F. (2007). The Interplay Between Salicylic Acid and Reactive Oxygen Species During Cell Death in Plants. (Chapter in book p. 247- 276). In: Hayat, S. and Ahmed, A. (eds.) Salicylic Acid: A Plant Hormone. Springer Nature, Berlin, Germany.

Hosseinabad, A., and Khadivi, A. (2019). The effect of microelements on qualitative and quantitative characteristics of *Vitis vinifera* cv. Thompson Seedless. Erwerbs-Obstbau. 16: 41-46.

Khan, A. S., Ahmad, B., Jaskani, M. J., Ahmad, R., and Malik, A. U. (2012). Foliar application of mixture of amino acids and seaweed (*Ascophylum nodoswn*) extract improve growth and physicochemical properties of grapes. Int. J. Agric. Biol. 14 (3): 385-388.

Lane, J. H., and Eynon, L. (1965). Determination of Reducing Sugars by Means of Fehlings Solutions with Methylene Blue as Indicator. A. O. A. C. Washington D. C., U.S.A.

Loay, A. A., and El-Boray, M. S. (2018). Improving fruit cluster quality attributes of' Flame Seedless' grapes using preharvest application of ascorbic and salicylic acid. Scientia Horticulturae. 233: 339- 348.

M.A.L.R. (2022). Ministry of Agriculture and Land Reclamation Publishers. Economic Affairs Sector, annual Reports of Statistical Institute and Agricultural Economic Research in Egypt.

Mengel, K., Kirkby, E. A., Kosegarten, H., and Appel, T. (2001). Principles of Plant Nutrition. International Potash Institute, Worblaugen –Bern Switzerland. (pp. 70-85).

Mertoglu, K., Evrenosoglu, Y., and Pdlat, M. (2019). Combined effects of ethephon and mepiquat chloride on late blooming, fruit set. And phytochemical characteristics of Black Diamond plum. Turki J. Agric. and Forestry. 43(6): 544-553.

Mohamed, A. K. A., El-Salhy, A. M., Mostafa, R. A. A., El-Mahdy, M. T., and Hussein, A. S. (2019). Effect of exogenous abscisic acid (ABA), gibberellic acid (GAs) and cluster thinning on yield of some grape cultivars. J. Plant Product. Mansoura Univ. 10(2): 101-105.

Nagy, P. T. and Pinter, T. (2015). Effects of foliar biofertilizer sprays on nutrient uptake, yield and quality parameters of Blaufrankish (*Vitis vimfera* E.) grapes. Communications in Soil Science and Plant Analysis. 46: 219-227.

Passingham, J. V. (2004). On the growing of grapevines in Tropic. Acta Hort. V.II Inter. Symp. on Temperate Zone Fruits in the Tropics and Subtropics. 65:39-44.

Samra, B. N., and Arafa- Sally, A. (2015). Effect of Gibberellic acid and Ethephon applications on berry color and quality of Flame seedless" grapes. J. Plant production, Mansoura Univ. 6(7): 1129-1138.

Shah, S., Khan, A., Khan, M.A., Farooq, M., Imran, M., Chattha, M. R., Farooq, K., and Gurmani, Z. (2016). Effect of micronutrients on growth and fruit yield of grape cultivar Flame Seedless. Int. J. Biol. Biotech. 13(3): 423-426.

Shi, P., Li, B., Chen, H., Song, C., Meng, J., Xi, Z., and Zhang, Z. (2017), Iron supply affects anthocyanin content and related gene expression in berries of *Vitis vinifera* cv. cabernet sauvignon. Molecules. 22: 283.

Steel, R. G. D., and Torrie, J. H. (1982). Principles and Procedures of Statistics. McGrow Hill Book Co., Singapore, 2 Ed 633pp.

Taiz, L., and Zeiger, E. (2002). Cytokinins. *In*: (L. Taiz and Zeiger, eds): plant physiology Benjamin/ Cummings, redwood city, CA. PP. 452- 472.

Tomar, C. S. (1999). Effect of gibberellic acid on bunchy berry and juice quality in Thompson Seedless grape. Advance in Horticulture and Forestry. (6): 35-38.

Wilde, S. A., Corey, R. B., lyer, J. G., and Voigt, G. K. (1985). Soil and Plant Analysis for Tree Culture. 3rd Ed. Oxford and 1BH Publishing Co., New Delhi, pp. 529-546.

Yagodin, B. A. (1990). Agricultural Chemistry. Mir. Publishers Moscow pp. 278-281.

Zahedi, H., Darvishuan, M., and Tohidi- Maghadam, H. R. (2013). The effects of foliar application of ascorbic acid (vitamins C) on physiological and biochemical changes of corn (*Zea mays* L.) under irrigation Withholding in different growth stages. Madrica Electronic Publication. 58: 195-200.

استجابة كرمات العنب الروبي سيدلس لاستخدام بعض المركبات الكيميائية

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الملخص

خلال موسمي 2018، 2019 تم اختبار تأثير الرش الورقي بستة مركبات كيميائية هي حمض الجبريليك بتركيز 10 جزء في المليون وبيروكسيد الهيدروجين 10 مليمول وحامض السلسليك بتركيز 5% وميبوكات كلوريد بتركيز 200 جزء في المليون وبعض العناصر الصغرى بتركيز 0.1% ومخلوط أحماض امينية بتركيز 0.1% على بعض صفات النمو الخضري والمحصول وجودة ثمار العنب الروبي سيدلس أدى معاملة الكرمات بأي من المركبات الكيميائية الى حدوث تحسن واضح في صفات النمو الخضري والمحصول وخصائص الجودة للحبات وذلك مقارنة بمعاملة الكونترول.

وكانت أفضل المركبات الكيميائية لصفات النمو الخضري هي حمض الجبريليك ثم يليها العناصر الصغرى وبيروكسيد الهيدروجين وحمض السلسليك اما بخصوص كمية المحصول ووزن وابعاد العنقود فكانت أفضل المركبات الكيميائية هي حامض السلسليك ثم العناصر الصغرى وميبوكات كلوريد والاحماض الامينية وكانت نسبة الزيادة في كمية المحصول لهذه المعاملات بالترتيب هي 48.24، 3.30، 25.59، 24.051 % على التوالي مقارنة بالكونترول اما بخصوص جودة الحبات فسجل حامض السلسليك والاحماض الامينية وبيروكسيد الهيدروجين أعلى جودة للحبات.

وبالتالي للحصول على محصول عالي وحبات ذات جودة عالية ينصح برش حامض السالسليك بتركيز 5% ثلاث مرات خلال موسم النمو.

الكلمات الدالة: *الجودة، العنب الروبي سيدلس، المحصول، المركبات الكيميائية*