Assiut Journal of Agricultural Sciences 54 (1) 2023 (198-212) Website: http://ajas.journals.ekb.eg/
ISSN: 1110-0486 / EISSN: 2356-9840 E-mail: ajas@aun.edu.eg

(Original Article)

Effect of Foliar Application with Some Certain Natural and Chemical Compounds on Yield and Cluster Weight of Ruby Seedless Grape Cultivar

Alaa A.B. Masoud*; Aiman K.A. Mohamed; Iman A. Abou Zaid and Mohamed H. Abd El-Hakim

Department of Pomology, Faculty of Agriculture, Assiut University, Egypt

*Corresponding author email: alaa1000el@gmail.com
DOI: 10.21608/ajas.2023.173439.1198

Abstract

The investigation carried out during two successive seasons of 2018 and 2019 to study the effect of various natural plant extracts; synthetic chemicals and certain combinations on yield and cluster weight of Ruby Seedless grape cultivar. The natural plant extracts included Moringa, Fulvic acid, Chitosan, Turmeric extract, Aloe vera and Seaweed extract, while the synthetic chemicals were GA_3, Hydrogen peroxide (H_2O_2), Salicylic acid, Mepiquat chloride, Micronutrients and free amino acids. As well as certain combined treatments. The results revealed that most treatments significantly increased both yield and cluster weight. The best natural treatments in this regard were Chitosan extract; Seaweed extract and Fulvic acid while Salicylic acid recorded the best results of chemical compound. While; from the combination treatments, free amino acids + Fulvic acid produced the highest yield and cluster weight.

Keywords: *Plant extracts, Synthetic chemicals, Grapes, Yield and cluster weight*

Introduction

Grapes are suggested to be one of the most important fruit crops for local consumption and export. The total world area of grapevines reached 11.0 million ha. with a total production of 90.0-million-ton fruits per year (FAO, 2019). Berries are used in different industrial purposes such as making juice, raisins and other preservatives. They have higher nutritional value to their higher content of sugars, amino acids vitamins, organic acid, minerals especially potassium and plant pigments (Winkler et al., 1974; Weaver, 1976 and Coombe and Dry, 1992).

Grapes is considered the third position proceeded only by citrus and mango crops because of its high net return its cultivated area estimated by 187358 feddans and fruiting area of 133811 produced 1594782 tons of fruits in 2020 (M.A.L.R, 2020). On the other side, Egypt ranks the 32 positions in the world (FAO, 2019).

Assiut governorate where the present study was carried out occupied late position of grapevines cultivation and production. The fruiting area devoted for grape reached 2404 feddans producing about 30465 tons fruits.

Received: 09 November 2022/ Accepted: 15 January 2023/ Published online: 25 January 2023

Grapes are rich in vitamins such as vitamin C as well as vitamin B. It also contains protein estimated at about 8% and fat about 5% in addition to a group of elemental salts, which are potassium, calcium, phosphorus, iron and some vitamins. Grapes are in rich source of fiber, containing about 4.3%, and fiber is not considered a nutritional element, but it has been proven to have many health benefits, as it prevents constipation and regulates the level of glucose and cholesterol in the body to protect against bowel cancer as well. Grapes contain a good amount of sugars, making them a rich source of energy that the body needs to perform its various vital functions. It was found that eating 100 grams of grapes gives the body an amount of energy equivalent to about 68 calories, and this energy is mainly due to the combustion and representation of sugary substances in grapes, inside the body. Grapefruits have many therapeutic benefits, the important of which are sugars (glucose, fructose), organic acids, mineral salts, enzymes, and vitamins. Grapes are used for drugs for cuffing of gastrointestinal, diseases, urinary, respiratory diseases and cancer (Passingham, 2004).

The high temperature of Assiut region causing some problems in grape production and quality. Therefore, grape producers in such region using various horticultural practices to avoid these problems. The use of various chemical compounds is a common practice in grape vineyards. These compounds including growth regulators such as GA_3, ABA and MC. Antioxidants such as salicylic acid and citric acid are widely in grape vines for improving productivity and quality. These are other compounds including the essential nutrients and amino acids have been used for the same purposes.

More efforts were done to eliminate the use of synthetic substances throughout agricultural and horticultural practices for improving yield and fruit quality. Using natural plant extracts as safety agents for human and environment are the new alternative compounds which might be help in improving yield and berry quality. Plant extracts are characterized by their higher content of organ sulfur compounds, volatile components proteins, fats, tannins, nutrients, antioxidants and vitamins (Peter, 1999).

Therefore, these plant extracts are considered as a source of antioxidants and nutrients supplying the plants with their requirements from all antioxidants and nutrients. Their antioxidative properties appeared for preventing reactive oxygen species (Kirtikar and Basu, 1984; Botelho *et al*., 2007 and Bhanu *et al*., 2013). The beneficial effects of Moringa, Fulvic acid, Chitosan, Turmeric extract, Aloe vera and Seaweed on promoting the growth and yield of grapevines might be attributed to its higher content of sulfur containing compounds, amino acids and various volatile – sulfur in constitute of the three amino acids methionine, cysteine and cysteine and hence proteins. They play definite roles in enhancing the biosynthesis of GA_3, indoles, total carbohydrates, free water and most organic foods and reducing total phenols and ABA (Kubota *et al*., 1999 and Kubota *et al*., 2000).

Using plant extracts had beneficial effects on growth and fruiting of different fruit crops and this is attributed to the higher own content of antioxidant from phenolic compounds, plant pigments and other organic compounds (Osawa, 1994;

Reddy *et al*., 2000; Bruneton, 2001; Prakash and Majeed, 2003; Pons, 2003; Chowdhury *et al*., 2007; Bhadwaj *et al*., 2010; Hanafy *et al*., 2012, Akl *et al*., 2017 and Li *et al*, 2021).

On the other side, many chemical compounds including growth regulators, antioxidants, micronutrients and amino acids have been widely used for enhancing grape yield and quality for instance, GA_3 (Tomar, 1999; Ahmed *et al*., 2005 and Mohamed *et al*., 2019), Hydrogen peroxide (H2O2) (Khardaker *et al*., 2012 and Guo *et al*., 2019), Salicylic acid (SA) (Abdel-Aal and Abd El-Rahman, 2013 and Abd-Elall, 2019), Mepiquat chloride (MP-CL) (Abdel-Mohsen, 2015 and Mertağlu *et al*., 2019). Micronutrients (Shah *et al*., 2016 and Abou-Zaid and Shaaban, 2019), amino acids (Ahmed *et al*., 2011; Khan *et al*., 2012 and El-Sayed *et al*., 2019).

The target of this study was examining the effect of different plant extracts namely Moringa, Fulvic acid, Chitosan, Turmeric extract, Aloe vera and Seaweed extract. As well as the synthetic chemical compounds GA_3, H_2O_2, Salicylic acid, Mepiquat chloride, Micronutrients and amino acids on vine yield 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 Orchard of the Faculty of Agriculture, Assiut University, Egypt. Where the soil has clay loam texture and with water is not less than two meters deep. Vines are spaced at 2.0x2.5 meters apart (850 vines per feddan).

The selected vines (88 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 last week of December in both seasons. The experiment consisted of 22 treatments; each treatment comprised of 4 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 buds/vine (fruiting 16 spurs x 3 buds each and 6 replacement spur x 2 buds). 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% P_2O_5) and potassium sulphate (48% K_2O). Farmyard manure (0.25% N) was added once at the first week of January, 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.

Experimental work

This investigation was divided into three experiments as follow:

First experiment

This experiment included 7 treatments from various natural plant extracts.

The target of this was examining the effect of some plant extracts namely (Moringa extract, Turmeric extract, Fulvic acid, Chitosan, Aloe vera and Seaweed extract) on some vegetative growth characteristics, yield and berry quality of Ruby Seedless grapevines.

Plant extracts were sprayed three times at growth start (last March), just after berry setting (the first of May) and at one month later. Triton B as a wetting agent was added to all plant extracts solutions at 0.1% and spraying was done till runoff.

Second experiment

This experiment consisted of spraying Gibberellic acids (GA_3), Hydrogen peroxide (H_2O_2), Salicylic acid, Mepiquat chloride, mixture of micronutrients and mixture of amino acids. With the exception of GA_3, the previous spraying compounds were exercised three times at the same times of plant extracts spraying. While GA_3 was add when the cluster reached 8-10 cm. long.

Third experiment

Selected combinations of natural plant extracts and chemical compounds.
The treatment categories were found in the following Table

The 1st experiment	The 2nd experiment	The 3rd experiment
Control	Control	Control
Moringa 5%	GA_3 10 ppm	Chitosan 2% + Micronutrient 0.1%
Fulvic acid 2%	H_2O_2 10 mM	Turmeric 5% + Micronutrients 0.1%
Chitosan 2%	Salicylic acid 5%	Free amino acids 0.1% + Fulvic acid 2%
Turmeric 5%	Mepiquat chloride 200 ppm	H_2O_2 10 mM + Moringa 5%
Aloe vera 5%	Micronutrients 0.1%	Fulvic acid 2% + Moringa 5%
Seaweed 2%	Free amino acid 0.1%	Salicylic acid 5% + Aloe vera 5%
		Mepiquat chloride + Seaweed

The experiment was arranged in a randomized complete block design with four replicates, one tree each. The following parameters were measured during the two seasons studied.

The yield of each vine expressed in weight (kg) was recorded as well as the cluster weight (g):

1- Total yield weight (kg/vine): the yield of each vine was recorded

2- Cluster weight (g) was recorded

Experimental design

The experiment was arranged in a randomized complete block design (RCBD) where each treatment included 4 replications. The combined analysis of the two seasons of study was done. As well as the differences between the two seasons of study was tested. The differences between the treatment means were compared by using Duncan multiple range test at 5% level of the probability according to Steel and Torrie (1980).

Results

Yield weight (kg/vine)

Data presented in Table 1 demonstrated that all natural plant extract spraying significantly exceeded the control. The best treatments in this respect were chitosan and seaweed extract. They recorded 14.73 and 14.50 kg/vine, respectively with no significant differences between them. Fulvic acid and Aloe vera also produced higher yield/vine (13.62 and 13.07, respectively) with no significant differences between them. The increment percentages associated with the previous prevalent treatments were 45.55, 43.28, 34.58 and 29.15, over the control, respectively. The presented data also revealed that the 2nd season of study was significantly higher than the 1st one.

Table 1. Effect of natural plant extracts on total yield (kg/vine) and cluster weight (gm) of Ruby Seedless grape cultivars during 2018 and 2019 seasons

Treatments	Total yield/vine (Kg)			Cluster weight (gm)		
	2018	2019	Mean	2018	2019	Mean
Control	8.96	11.28	**10.12^{E}**	367.39	373.60	**370.50E**
Moringa 5%	10.72	11.99	**11.36^{D}**	439.16	400.02	**419.59D**
Fulvic acid 2%	12.08	15.15	**13.62^{B}**	483.35	505.52	**494.44A**
Chitosan 2%	12.85	16.61	**14.73^{A}**	476.08	487.30	**481.69AB**
Turmeric extract 5%	13.49	11.91	**12.70^{C}**	469.00	384.51	**426.76D**
Aloe vera 5%	14.06	12.07	**13.07^{BC}**	468.94	402.25	**435.60CD**
Seaweed 2%	13.75	15.24	**14.50^{A}**	479.17	435.33	**457.25BC**
Mean	**12.27^{b}**	**13.46^{a}**	**12.87**	**454.73a**	**426.93b**	**440.83**

Different superscripted letters within the column indicate statistically significant difference between the treatment means according to a Duncan's Multiple range test at 5% level.

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

The results of combined treatments are found in Table 3. Free amino acids + Fulvic acid exhibited the highest value of yield weight followed by turmeric extract + micronutrients, H_2O_2 + Moringa and then chitosan + micronutrients. The abovementioned treatments recorded 15.01, 14.33, 14.05 and 13.37 kg/vine, respectively. The increment percentages of such treatments were 45.73, 39.13, 36.41 and 29.81% more than the control, respectively. On the other side, the 2nd year of study significantly was higher than the 1st one.

Table 2. Effect of chemical compound on total yield (kg/vine) and cluster weight (gm) of Ruby Seedless grape cultivars during 2018 and 2019 seasons

Treatments	Total yield/vine (Kg)			Cluster weight (gm)		
	2018	2019	Mean	2018	2019	Mean
Control	8.95	11.53	10.24D	365.33	367.97	366.65D
GA_3 10 ppm	11.31	13.68	12.50C	419.42	400.02	409.72C
H_2O_2 10mm	10.82	13.34	12.08C	433.08	445.07	439.08BC
Salicylic acid 5%	13.56	16.79	15.18A	502.33	479.67	491.00A
Mepiquat chloride 200 ppm	12.45	13.26	12.86C	480.65	442.00	461.33AB
Micronutrient 0.1%	12.57	14.73	13.65B	465.90	432.61	449.26B
Free amino acids 0.1%	12.43	13.07	12.75C	478.03	384.33	431.18BC
Mean	11.73b	13.77a	12.75	449.25a	421.67b	435.46

Different superscripted letters within the column indicate statistically significant difference between the treatment means according to a Duncan's Multiple range test at 5% level.

Cluster weight (g)

Data presented in Table 1 showed that all the treatments significantly recorded higher values comparing with the control.

Table 1 showed that, Fulvic acid, Chitosan and Seaweed extracts gave the highest values of cluster weight. These treatments recorded 494.44, 481.69 and 457.25 (g) with increment percentages of 33.45, 30.01 and 23.41% over the control, respectively. The 1st year of study was significantly higher than the 2nd one.

The results found in Table 2 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 represented also high cluster weight (461.33 and 449.26, respectively) with no significant differences between them. They recorded 25.82 and 22.53% increment percentages more than the control. The 1st year of study also was higher than the 2nd one.

Table 3 showed that the best results of combined treatments were amino acids + Fulvic acid, H_2O_2 + moringa extracts, Turmeric extract + micronutrients and Chitosan + micronutrients. These prevalent treatments produced cluster weight of 510.81, 509.77, 489.28 and 485.93 (g), respectively. The differences between these treatments were not significant. The increment percentages of such treatments over

the control were 39.88, 39.59, 33.98 and 33.07%, respectively. These were no significant difference between the two seasons of study.

Table 3. Effect of some selected combined treatments on total yield (kg/vine) and cluster weight (gm) of Ruby Seedless grape cultivars during 2018 and 2019 seasons

Treatments	Total yield/vine (Kg)			Cluster weight (gm)		
	2018	2019	Mean	2018	2019	Mean
Control	9.22	11.38	10.30^{E}	367.82	362.54	365.18C
Chitosan + Micronutrient	12.02	14.72	13.37^{C}	481.18	490.67	485.93A
Turmeric + Micronutrient	12.40	16.25	14.33^{AB}	496.05	482.50	489.28A
Free amino acids +Fulvic	13.07	16.94	15.01^{A}	523.11	498.50	510.81A
H_2O_2 + Moringa	12.42	15.67	14.05^{BC}	497.29	522.25	509.77A
Fulvic +Moringa	9.79	13.04	11.42^{D}	391.79	431.25	411.52B
Salicylic acid + Aloe vera	10.90	13.13	12.02^{D}	436.05	375.00	405.53B
Mepiquat chloride + Seaweed	10.95	11.49	11.22^{D}	438.30	373.00	405.65B
Mean	11.35^{b}	14.08a	12.71	453.95a	441.96a	447.96

Different superscripted letters within the column indicate statistically significant difference between the treatment means according to a Duncan's Multiple range test at 5% level.

Discussion

Under regions with hot climatic conditions like Assiut region, grapes suffering from some problems. The vines under such hot weather face some stresses. These stresses reflect on yield depression, poor berry quality and uneven cluster coloration. Therefore, many efforts have been used for improving grape yield and fruiting. The horticultural practices that used in most of vineyards are application of plant extracts, growth regulators, antioxidants, amino acids and micronutrients.

At recent years, fruit growers have been attempted to use other alternatives instead of synthetic chemicals and fertilizers for improving grape cultivars. Accordingly, now various natural plant extracts are extensively using in vineyards. Investigators agreed upon the effectiveness of natural plant extracts for enhancing growth, yield and berry quality of grapes. For instance, Bassiony and Ibrahim (2016), Akl *et al*. (2017), Khan *et al*. (2020), Alsalhy and Aljabary (2020) confirmed that, Moringa extract had a considerable impact on yield and quality of grape cultivars. noted that Moringa leaves are rich in natural cytokinins, minerals, phytohormons and in organic salts which lead to increase the yield of plants when applied exogenously. Fulvic acid is similar to humic acid which they are produced by microbial degradation of plant matter in a soil with sufficient oxygen. Fulvic acid application has positive effects on growth, yield and quality of various grape cultivars (El-Boray *et al*., 2015; El-Kenawy, 2017; Ahmed *et al*., 2017; Mostafa *et al*., 2017 and Li *et al*., 2021).

Chitosan also has been used by investigators to stimulate growth and fruiting of grapes (El-Kenawy, 2017 and Refaai and Silem, 2021). Chitosan supplements

the plant with essential nutrients that promote the productivity (Malerba and Cerana, 2018). It also used to resist biotic and abiotic stresses of plants (Reddy *et al*., 2000).

The effectiveness of turmeric extract on grapes has been demonstrated by many workers. Abdel-Aal and Abd El-Rahman (2013), Akl *et al*. (2017), Abdel-Al *et al*. (2017), Refaai and Silem (2021) and El-Senosy *et al*. (2021) found that turmeric extract improved vine growth, yield and berry quality of grapes.

Aloe vera leaves contain bioactive compounds such as antioxidants. Application of Aloe vera was used on fruit trees to improve grape productivity and quality (Pessenti *et al*., 2022) or two extend the shelf life of grape under storage (Farahi, 2015 and Alberio *et al*., 2015).

Finally, seaweed extracts are natural fertilizers containing various nutrients, vitamins, amino acids and plant hormones. Seaweed extracts are used in grapevines for enhancing vine growth and yield of grape cultivars. Many investigators found that, the seaweed extract stimulated the vegetative growth and increased yield with better berry quality (Norrie and Keathley, 2005; Kok *et al*., 2010; Ahmed *et al*., 2013; Carvalho *et al*., 2019; Salvi *et al*., 2019; Taskos *et al*., 2019 and Pessenti *et al*., 2022).

The abovementioned studies were agreement with the results of current study. Under the conditions of the present study, our results suggested that, the natural plant extracts have positive effects on yield and cluster weight.

On the other side, many synthetic chemicals including growth regulators, antioxidants, micronutrients, amino acids etc., 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. Its 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 (Hopping, 1976; Varma, 1991; 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 yield and cluster weight. These results came on line with the above-mentioned studies.

Hydrogen peroxide (H_2O_2) plays an important role in plants. At low concentrations, it has a tolerant role against a biotic stress (Khandaker *et al*., 2012). Our results suggested that H_2O_2 stimulated cluster and berry weight. These results are accordant with that reported by El-Sayed and Mahfouze (2018) and Guo *et al*. (2019)

Salicylic acid is a plant hormone that plays an essential role in various plant growth and development. The main role of SA is it effects on inducing the plant defense against different biotic and abiotic stresses (García-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 treatments on vine growth and fruiting. SA spraying had a significant effect on yield and cluster weight. These results are in agreement with that reported by Gad El-Kareem and Abd El-Rahman (2013), Loay and El-Boray (2018) and Abd-Elall (2019). They found that SA significantly stimulated increased yield, cluster and berry weight of grapes.

Mepiquat chloride (Mp-Cl) is a growth retardant used for reducing the vegetative growth. The results of 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. The previous studies (Pod, 1981; 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 micronutrient in plant are that enzyme activity and hormone synthesis. Investigators suggested that micronutrient application to grapevines increased cluster number/vine, yield, cluster weight, berry size and weight (Shah *et al*., 2016; Shi *et al*., 2017; Abou-Zaid and Shaaban 2019). Their findings came on line with the results of the present study.

Finally, amino acids are basic ingredients in the process of protein synthesis. Using these compounds enhanced yield, fruit quality and vine growth of various grape cultivars (Ahmed *et al*., 2011; Khan *et al*., 2012; Nagy and Pintér, 2015; Belal *et al*., 2016; Bassiony *et al*., 2018 and El-Sayed *et al*., 2019). The present study came on line with the abovementioned studies.

Conclusion

The present study suggested that the natural extracts especially Chitosan, Seaweed extract and Aloevera recorded the best results concerning Yield, cluster and berry characteristics. While moringa extract gave the best berry quality. On the other side, Salicylic acid produced the best results among the chemical comparts. Accordingly, it could be recommended that to use the above-mentioned natural compounds and/or Salicylic acid in order to produce high yield with better berry quality.

References

Abdel-Aal, A.H.M. and Abd El-Rahman, M.A. (2013). The synergistic effects of using turmeric with some antioxidants on growth, vine nutritional status and productivity of Ruby Seedless grapevines. Horti Sci. J. Suez Canal Univ., 1: 305-308.

Abdel-Al, A.M.K.; Abada, M.A.M and Ibrhiem, H.A.E. (2017). Trials for solving the problem of poor berries colouration and improving yield of Crimson seedless grapevines. New York Sci. J., 10(12): 91-103.

Abd-Elall, 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 mepiquat chloride. 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 Spirulina algae, zinc and boron. Middle East J. Agric. Res., 8(2): 654-661.

Ahmed, F. F.; Refaai, M.M. and Abd El-Rahman, M.M.A. (2013). Using humic acid and seaweed extract for reducing mineral N fertilizers and improving fruiting of crimson seedless grapevines. Horti Sci. J. Suez Canal Univ., 1: 261- 267.

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". Acta Hortic., 696: 309-313.

Akl, A.M.M.A; Abada, M.A.M. and Gadalla, F.A. (2017). Effect of some plant extracts on growth and nutritional status of Flame Seedless grapevine transplants. J. Product. & Dev., 22(2): 323-337.

Alberio, G.R.A., Muratore,G. Licciardello, F. Giardina, G. and Spagna, G. (2015). *Aloe vera* extract as a promising treatment for the quality maintenance of minimally-processed table grapes. Food Sci. & Tech., 35: 299-306.

Alsalhy, B.F.J. and Aljabary, A.M.A.O. (2020). Effect of moringa leaves extracts and licorice roots on some growth characteristics and yield of grape (*Vitis vinifera* L.) cv. Halawany. Plant Archives, 20(2): 2616-2623.

Bassiony, S.S. and Ibrahim, M.G. (2016). Effect of silicon foliar sprays combined with moringa leaves extract on yield and fruit quality of "Flame Seedless" grape. J. Plant Product. Mansoura Univ., 7(10): 1127-1135.

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. & Dev., 23 (3): 429-452.f

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 (1): 123-136.

Bhadwaj, R.L.; Dhashora, L.K. and Mukherjee, S. (2010). Effect of neem leaf extract and benzyladenine on post harvest shelf-life of orange (*Citrus reticulate* Blanco). J. Adv. Dev. Res., 1 (1): 32-37.

Bhanu, P.; Priyanka, S.; Shilpec, Y.; Singh, S.C. and Dubey, N.K. (2013). Safety profile assessment and efficacy of chemically characterized (*Cinnamomum glaucescens*) essential oil against storage fungi, insect, aflatoxin secretion and as antioxidant. Food Chemical Toxicology, 43: 446-475.

Botelho, R.V.; Pavanello, A.P.; Pires, E.J.P.; Terra, M.M. and Muller, M.M.L. (2007). Effects of chilling and garlic extract on bud dormancy release Cabernet Sauvignon grapevine cuttings. Amer. J. of Enology and Vitic, 58 (3): 402-404.

Bruneton, J. (2001). Famacogenosia. Zaragoza, Ed. Acriba, P. 294-296.

Carvalho, R.P.; Pasqual,M. Silveira,H.R.O. Melo,P.C. Bispo,D.F.A Laredo R.R. and Lima L.A.S. (2019). "Niágara Rosada" table grape cultivated with seaweed extracts: physiological, nutritional, and yielding behavior. J. Appl. Phycology, 31(3): 2053-2064.

Chowdhury, M.N.A.; Rahim, M.A.; Khalequzzaman, K.M.; Humauam, M.R. and Alam, M.M. (2007). Effect of plant extracts and time of application on incidence of anthracnose, yield and quality of mango. Int. J. Sustain, Crop. Prod., 2 (5): 59-68.

Coombe, B.G. and Dry, R.R. (1992). Viticulture Vol. 2 practices VIII, pp. 376

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-Boray, M.S.; Mostafa,M.F., Shaltout, A.D. and Hassan, K.H. (2015). Influence of fulvic acid plus some microelements and microorganisms on yield and quality characteristics of superior seedless grapevines. J. Plant Product. Mansoura Univ., 6(3): 287-305.

El-Kenawy, M. A. (2017). Effect of chitosan, salicylic acid and fulvic acid on vegetative growth, yield and fruit quality of Thompson seedless grapevines. Egypt. J. Hort., 44(1): 45-59.

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.

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.; Abd-Elaal A.M.K.; Uwakiem, 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-Senosy, O.A.; Abada, M.A.M and El-Masry, S.M.A. (2021). Response of Flame Seedless grapevines grown under sandy soil to foliar spraying of some plant extracts. Egyptian-Arab J. Appl. Sci. & Tech., 1(2): 11-19.

FAO (2019). Food and Agriculture Organization of the United Nations, Production Year Book, Rome. Vol 66.

Farahi, M.H. (2015). The impact of *Aloe vera* gel as postharvest treatment on the quality and shelf life of table grape cv.'Askari'. Agri. Communications, 1(1): 30-36.

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. Hort Sci. J. Suez Canal Univ., 1: 294-303.

García-Pastor, M.E.; Zapata, P.J., Castillo, S., Martínez-Romero, D., Guillén, 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.

Hanafy, M.F.; Saadawy, F.M.; Milad, S.M.N. and Ali, R.M. (2012). Effect of some natural extracts on growth and chemical constituents of *Scheffera arboricola*. J. of Hort. Sci., Ornamental, plants, 4 (1): 26-33.

Hopping, M.E. (1976). Effect of bloom applications of gibberellic acid on yield and bunch rot of the wine grape 'Seibel 5455'. New Zealand J. Exp. Agric., 4(1): 103-107.

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 nodosum*) extract improve growth and physicochemical properties of grapes. Int. J. Agric. Biol., 14 (3): 385–388.

Khan, A.S.; Ibrahim, M. ; Basra, S.M.A. ; Ali, S. ; Almas, M.H. ; Azam, R.; Anwar, M., and Hasan, M.U. (2020). Post-bloom applied moringa leaf extract improves growth, productivity and quality of early-season maturing grapes (*Vitis vinifera*). Inter. J. Agric. & Biolo., 24: 1217-1225.

Khandaker, M.M.; Boyce, A.N. and Osman, N. (2012). The influence of hydrogen peroxide on the growth, development and quality of wax apple (*Syzygium samarangense*,[Blume] Merrill & LM Perry var. *jambu madu*) fruits. Plant Physiol. & Biochem., 53: 101-110.

Kirtikar, K.P. and Basu, B.D. (1984): Indian Medicinal; plants. Vol. IV Bishen Singh and Mohendropal sing. Dehre Dun pp.2417-2426.

Kok, D.; Bal, E. ; Çelik, S., Ozer,C. and Karauz, A. (2010). The influences of different seaweed doses on table quality characteristics of cv. Trakya Ilkeren (*Vitis vinifera* L.). Bulgarian J. Agric. Sci., 16(4): 429-435.

Kubota, N.; Matthew, M.A.; Takahugl, T. and Kliewer, W.M. (2000): Effect of garlic preparations, calcium and hydrogen cyanamides on bud break of grapevines grown in greenhouse. American J. of Enology and Viticulture (51): 409-414.

Kubota, N.; Yamane, Y.; Toriu, K.; Kawasu, K. and Higuchi, T. (1999): Identification of active substances in garlic responsible for breaking bud dormancy in grapevines. J. Jap. Soc. Hortic. Sci., 68: 1111-1117.

Li, W.; Yao, H., Chen, K., Ju, Y., Min, Z., Sun, X., ; Cheng, Z. ; Liao, Z. ; Zhang, K. and Y. Fang (2021). Effect of foliar application of fulvic acid antitranspirant on sugar accumulation, phenolic profiles and aroma qualities of Cabernet Sauvignon and Riesling grapes and wines. Food Chem., 351(129308): 1-15.

Lóay, 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. (2020). Ministry of Agriculture and Land Reclamation Publishes Economic Affairs Sector.

Malerba, M. and Cerana, R. (2018). Recent advances of chitosan applications in plants. Polymers, 10(2),118: 1-10.

Mertoğlu, K.; Evrenosoğlu ,Y. and Polat, M. (2019). Combined effects of ethephon and mepiquat chloride on late blooming, fruit set, and phytochemical characteristics of Black Diamond plum. Turki. J. Agric. & 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 (GA_3) and cluster thinning on yield of some grape cultivars. J. Plant Product. Mansoura Univ., 10(2): 101-105.

Mohamed, A.K.A.; Gouda, F.E.M.; Ibrahim, R.A. and Madkor, Y.M.A. (2017). Improve the yield and quality of Red Roomy and Thompson Seedless grape cultivars. Assiut J. Agric. Sci., 48 (2): 38-58.

Mostafa, M.F.M.; EL-Boray, M.S. EL. ; El-Baz, EL.T. and Omar A.S.M. (2017). Effect of fulvic acid and some nutrient elements on King Ruby grapevines growth, yield and chemical properties of berries. J. Plant Product. Mansoura Univ., 8(2): 321-328.

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

Norrie, J. and Keathley, J.P. (2005). Benefits of *Ascophyllum nodosum* marine-plant extract applications to Thompson Seedless grape production. X Inter Symposium on Plant Bioregulators in Fruit Product., 727 (6): 243-248.

Osawa, T. (1994). Plant antioxidant protective role against oxygen. Radical Species, C.T. 109 (10): 77-81.

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

Pessenti, I.L.; Ayub, R.A. ; Marcon Filho, J. ; Clasen, L.F. ; Rombaldi, C.C.V. and Botelho, R.V. (2022). Influence of abscisic acid, *Ascophyllum nodosum* and *Aloe vera* on the phenolic composition and color of grape berry and wine of'Cabernet Sauvignon'variety. Ciência Téc. Vitiv., 37(1): 1-12.

Peter, K.V. (1999). Information on turmeric and ginger. Indian species, 6 (2,3): 12-14.

Pons, L.I. (2003). Foto protection vegetal (11) of farm 22: 163-163.

Prakash, L. and Majeed, S. (2003). Multifunctional ingredients. The Noval face of natural, C, T: 118 (11): 41-47.

Reddy, M.V.B.; Belkacemi,K. R. ; Corcuff, Castaigne F., and Arul J. (2000). Effect of pre-harvest chitosan sprays on post-harvest infection by *Botrytis* cinerea and quality of strawberry fruit. Postharvest Biolo. & Tech., 20(1): 39-51.

Refaai, M.M. and Silem, M. (2021). Impact of spraying chitosan and turmeric extract on fruiting of Flame seedless grapevines. Egyptian-Arab J. Appl. Sci. & Tech., 1(2): 21-28.

Salvi, L.; Brunetti, C.; Cataldo, E.; Niccolai, A.; Centritto, M. F.; Ferrini, F., and Mattii, G.B. (2019). Effects of Ascophyllum *nodosum* extract on *Vitis vinifera*: Consequences on plant physiology, grape quality and secondary metabolism. Plant Physio. & Biochem., 139: 21-32.

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.; B. Li; Chen, H.; Song, C.; Meng, J.; Z. Xi 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. (1980). Principles and procedures of statistics: Biometrical approach Mc-Grow Hill Book company (2nd Ed) N.Y, pp: 631.

Taskos, D.; Stamatiadis, S. ; Yvin, J.C. and Jamois, F. (2019). Effects of an *Ascophyllum nodosum* (L.) Le Jol. extract on grapevine yield and berry composition of a Merlot vineyard. Scientia Horticulturae, 250: 27-32.

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.

Varma, S.K. (1991). Effect of dipping flower cluster in gibberellic acid on fruit set bunch and berry size yield and fruit quality in grapes (*Vitis vinifera* L.). Indian J. Agric. Res., 25 (1): 54-58

Weaver, R.J. (1976). Grape Growing. Univ. of Calif., Davis, pp. 160-174.

Winkler, A.J.; Cook, A.J.; Kliwer, W.M. and Lider, L.A. (1974). General Viticulture. Published by University of California Press, Barkley.

تأثير الرش الورقي ببعض المركبات الطبيعية والكيماوية على محصـــول صـــنف العنب روبي سيدلس

علاء عبد الجابر بدوي مسعود*، أيمن كمال أحمد محمد، إيمان عبد الحكيم أبو زيد، محمد حمدي عبد الحكيم

قسم الفاكهة، كلية الزراعة، جامعة أسيوط، أسيوط، مصر

الملخص

أجريت هذه الدراسة خلال موسمي 2018 و2019 لدراسة تأثير رش المستخلصات النباتية الطبيعية المختلفة؛ المواد الكيميائية وبعض المعاملات المركبة على المحصـــول (كجم / كرمة) ووزن العنقود لصـنف العنب روبي سـيدليس. وشـملت المسـتخلصـات النباتية الطبيعية المورينجا وحمض الفولفيك والشـيتوزان ومسـتخلص الكركم والصـبار والأعشـاب البحرية في حين كانت المواد الكيميائية الاصـــطناعية GA_3 وبيروكســيد الهيدروجين (H_2O_2) وحمض الســاليســيليك والميبيكوات كلوريد والمغذيات الدقيقة ومخلوط الأحماض الأمينية. بالإضـافة إلى بعض العلاجات المدمجة. كشـــفت النتائج أن معظم المعاملات زادت بشـــكل كبير من كل من المحصـــول ووزن العنقود. أفضـل المعاملات في هذا الصـدد كانت مسـتخلص الشـيتوزان ثم مسـتخلص الأعشـاب البحرية وحمض الفولفيك بينما سجل حمض الساليسيليك من كيماويات الرش أفضل النتائج في هذا الصـــدد. على الجانب الآخر. أنتجت الأحماض الأمينية الحرة + حمض الفولفيك أعلى محصـــول ووزن عنقود.