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# Response of Thompson Seedless Grapevines to Foliar Sprays with $GA_3$ and some Natural Compounds

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## Abstract

The present investigation was carried out during 2019 and 2020 seasons to study the effect of $GA_3$ and some natural plant compounds on growth and fruiting of Thompson Seedless grapevines. The experiment was arranged in a randomized complete block design in which the study involved six treatments with three replications, one vine each.

Pruning wood weight, leaf area and total leaf chlorophyll were significantly increased by spraying either $GA_3$, humic acid, selenium, turmeric or roselle extracts compared to water sprayed ones (control). Spraying humic acid, turmeric or selenium were very effective on improving vegetative growth, yield/vine, and cluster traits. Moreover, these treatments significantly improved the berry quality in terms of increasing the berry weight, total soluble solids, reducing sugars of berries compared to unsprayed ones. The best results were obtained on the vines that sprayed with 0.1% humic acid or turmeric extract. No significant differences were obtained among humic acid turmeric or selenium spraying. It could be concluded that spraying humic turmeric or selenium at 0.1% three times annually was necessary to get high yield with good cluster and berry quality of Thompson Seedless grapevines. Moreover, such treatments more effective to overcome the adverse effect of using $GA_3$ i.e. delay the berry ripening and reducing full coloration of colored cultivars.

***Keywords:*** *Plant extracts, Turmeric, Roselle, Grapevines, Humic acid, Selenium.*

## Introduction

Grapevines (*Vitis vinifera* L.) production is one of the most valuable and economical fruit crops worldwide. The total world area of grapes reached 10.5 million ha with a total production of 89 million ton fruits (FAO, 2015). In Egypt grapes are an economically important crop and cultivated area reached 190486 feddan that produced about 1594781 tons of fruits. In addition, grapes considered as the most important export horticultural crop and its export value is about 10% while the quantity is about 3% of total horticultural export (MALR, 2019). Seedless grapes are attracting huge interest for their better eating quality and higher returns to the growers, but some of them have smaller in berry size, higher shot berries and lower cluster traits which might caused a trouble for marketing.

Increasing demand of grapes production requires a new developed strategy. Therefore, it was urgent require to find other co-effective solution able to increase yield and good fruit quality without increasing environmental pollution. In recent years, new strategies, methods, instruments and technologies have been studied in order to improve the agro-environmental performance in fruit

trees production. A potential tool to improve the sustainability of agricultural ecosystems is use plant biostimulants and natural products (Dimitri and Oberholtzer, 2006; El-Salhy *et al*., 2010 and Calvo *et al*., 2014). One solution is to use foliar spraying due to overcome nutrient deficiency, more precise, require fewer amounts, improve the uptake and efficient use of nutrient (Lasa *et al*., 2012 and Sabir *et al*., 2014).

Plant growth substance plays a major role in plant growth and development. Gibberelic acid as plant hormones regulates many different aspects of plant growth and development through the promotion of cell division and elongation as well as flowering indication (Thakur, 2016).

Humic acid use as plant biostimulants. These active natural compounds can enhance yield and fruit quality. Also, it improves nutrient efficiency, physiological performance and abiotic stress tolerance (Calvo *et al*., 2014; Canellas *et al*., 2015). Moreover, selenium activates many enzymes and enhance the biosynthesis of carbohydrates and proteins, as well as tolerance of trees to stresses (Jakovljevic *et al*., 2011).

Natural plant extracts as a natural products were used in many ways. These natural products were used for improving growth, nutritional status, production and as pesticides for public health and environmental safety. The higher content of plant extracts from phenolic and another chemical constituents seem to have synergistic effects on growth and fruiting of fruit trees (Paik and Chung, 1997 and Srivestava and Lal, 1997).

Roselle extract contains higher amount of organic acids, ascorbic acid, calcium oxalate, anthocyanins and hibicine hydrochloride (Raffaut, 1967). Also, turmeric extract had higher amounts of phenolic compounds, nutrients that stimulated the vegetative growth, yield and fruit quality (Pons, 2003 and Abdel and Aly, 2013).

Previous research confirms the importance of spraying some natural compounds on growth and fruiting of grapevines (Vargas *et al*., 2008; Abd El-Hameed, 2012; Uwakiem, 2014; Calvo *et al.*, 2014; Canellas *et al*., 2015; Gouda-Fatma El-Zahraaa, 2016; Masoud, 2017; El-Salhy *et al*., 2017 and Radwan *et al*., 2019).

Then, the aim of investigation was study the effect of natural products spraying on growth and fruiting of Thompson Seedless, grapevines.

**Materials and Methods**

The present work was executed during 2019 and 2020 seasons on Thompson Seedless grapevines grown at the experimental vineyard of the Faculty of Agriculture, Assiut University, Assiut, Egypt. Soil of the vineyard is clay texture, well drained and surface irrigation system used. The vines were 18 years old at the starting of this experiment and spaced at 2x2.5 meters apart. The vines trained according to the head system. Pruning was carried out on the 2$^{nd}$ week of January by leaving 12 fruiting spurs with 4 buds on each spur plus six replacement spurs with 2 buds each. Eighteen healthy vines, with no visual nutrient deficiency symptoms and at almost uniform in their vigor were chosen and divided into six different treatments including

the control. The treatments were as follows:

- Control (spraying water).
- Spraying $GA_3$ at 5, 10 and 20, 30 ppm.
- Spraying humic acid at 0.1%.
- Spraying selenium at 0.1%.
- Spraying turmeric extract at 0.1%.
- Spraying roselle extract at 0.1%.

Humita 25% (25% humic acid, 1% N, 4% $P_2O_5$ and 6% $K_2O$) and selenium dioxide (selenium 19.9%). $GA_3$, humic acid and selenium were prepared before spraying by dissolved the define amount in water based. Turmeric and roselle extracts were made by soaking 1 g powder of each one in one liter distilled water for 24 h at 25°C in a lighted room to give concentration of 0.1%. Solutions were filtered through cheesecloth after soaking, then the filtrate was taken to give the final water extract. The selected vines received three sprays from each substance the pre-bloom and fruit set phonological stage (1st week of March), (2nd week of April) and at three weeks later (1st week of May). Triton B as a wetting agent was used with all treatments and control as 0.5 ml/L. Spraying was done till runoff. The experiment was arranged in a randomized complete block design with three replications vine per each.

The following parameters were measured to evaluate the effects of different natural products spraying on growth, yield and berry quality.

**1- Some vegetative growth parameters:**

The average leaf area ($cm^2$): Twenty leaves for each vine from those opposite to basal clusters were measured according to the following equation that was reported by Ahmed and Morsy (1999) leaf area = 0.56 (0.79 x $w^2$) + 20.01, where, W = the maximum leaf width, as well as total chlorophylls by using chlorophyll meter (SPAD).

Weight of pruning wood (g) was estimated by weighing the removal one year old wood after pruning at the end of growing season.

**2- Yield components:**

The berry set percentage was calculated by caging two cluster per vine in perforated white cheese bags after the first spraying. These bags were removed for materials spraying at blooming and then caging. The berry set % was calculated as follow:

$$Berry\ set\ \% = \frac{No.\ of\ berries/cluster}{Total\ No.\ of\ flowers/cluster} \times 100$$

At harvest date, the yield per vine was recorded in terms of weight (kg).

**3- Cluster and berry characteristics:**

At harvest time, two clusters were randomly taken from the yield of each vine to determine the cluster and berry traits such as cluster weight and length as well as cluster compactness coefficient. Berry quality such as berry weight, reducing sugar percentage, total soluble solids % and total acidity % (expressed as gm tartaric acid per 100 ml juice) and berry properties were evaluated according to A.O.A.C. (1985). All the obtained data were tabulated and analyzed according to Gomez and Gomez, (1984) using L.S.D. test for distinguishing the significance differences between various treatment means according to Steel and Torrie (1980).

## Results

### 1- Effect on growth characteristics and leaf pigments:

Table 1 exhibit the effect of $GA_3$, humic acid as well as turmeric and roselle extracts spraying on some growth aspects of Thompson Seedless grapevines in 2019 and 2020 seasons. It is apparent from the existing data that results followed the same trend during the two studied seasons. Data cleared that all treatments significantly increased leaf area, weight of pruning wood and total chlorophyll in leaves compared to untreated vines. Spraying humic acid was resulted in more announced and highly significant increment in these studied traits compared to control. The maximum values were recorded on vines that sprayed with humic acid were 205.2 $cm^2$, 2.02 kg & 53.72% as an av. two studied seasons for leaf area, pruning wood weight and total chlorophyll in the leaves, respectively. On the other hand, the minimum values of these traits were recorded on spraying water vine, control 183.0 $cm^2$, 1.64 kg & 46.69% as an av. the two studied seasons, respectively.

**Table 1. Effect of $GA_3$ and some natural components spraying on some growth traits of Thompson Seedless grapevines during 2019 and 2020 seasons.**

| Charact. / Treat. | Leaf area ($cm^2$) | | | Pruning wood weight (kg) | | | Total chlorophyll | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2020 | Mean | 2019 | 2020 | Mean | 2019 | 2020 | Mean |
| 1- Control | 181.6 | 184.3 | 183.0 | 1.55 | 1.73 | 1.64 | 45.26 | 48.11 | 46.69 |
| 2- $GA_3$ | 192.3 | 196.1 | 180.7 | 1.82 | 1.98 | 1.90 | 49.18 | 51.27 | 50.23 |
| 3- Selenium | 194.8 | 196.1 | 195.8 | 1.83 | 2.00 | 1.92 | 49.48 | 52.88 | 52.02 |
| 4- Roselle extract | 192.9 | 196.8 | 194.5 | 1.82 | 2.03 | 1.93 | 49.85 | 54.18 | 51.18 |
| 5- Turmeric extract | 195.9 | 199.5 | 197.7 | 1.88 | 2.06 | 1.97 | 51.96 | 55.08 | 53.52 |
| 6- Humic acid | 203.8 | 206.6 | 205.2 | 1.94 | 2.10 | 2.02 | 52.19 | 55.25 | 53.72 |
| LSD | 10.47 | 11.19 | | 0.15 | 0.14 | | 3.62 | 2.98 | |

Hence the increment percentage of pruning wood weight 23.17%, leaf area 12.13%, total Chlo. 15.06% as an av. two studied seasons due to spray with humic acid compared to control. No significant differences were found either due to spray any of these treatments. Thus, it could be concluded that spraying with $GA_3$, humic, selenium, turmeric or roselle extract improved the vegetative growth and vigor of vine.

### 2- Yield and cluster traits:

Data present in Table 2 showed that spraying with humic acid and selenium as well as turmeric or roselle extracts an affected on berry set % but significantly increased the cluster weight and consequently yield weight/vine compared to spraying water ones (control). Also, $GA_3$ spraying significantly decreased the berry set% but significantly increased the cluster weight and yield/vine compared to control.

The highest values of cluster weight and yield weight/vine were recorded on vines that sprayed at 0.2% turmeric extract, whereas, the lowest ones were recorded on the vines that sprayed with water (control). No significant differences were found due to spray humic acid, selenium or turmeric.

The obtained yield weight was 12.91, 12.55, 11.38, 12.90, 13.29 and

10.44 kg/vine as an av. the two studied seasons due to spray the vines with $GA_3$, selenium, 0.1% roselle, 0.1% turmeric, humic acid and water sprayed ones (control), respectively. Hence, the percentage of increment on yield/vine due to spray with these treatments over control attained 17.15, 20.21, 9.01, 23.56 & 27.30% as an av. the two studied seasons, respectively.

**Table 2. Effect of $GA_3$ and some natural components on yield components of Thompson Seedless grapevines during 2019 and 2020 seasons.**

| Charact. / Treat. | Berry set % | | | Cluster weight (g) | | | Yield/vine (kg) | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2020 | Mean | 2019 | 2020 | Mean | 2019 | 2020 | Mean |
| 1- Control | 16.62 | 16.28 | 16.45 | 311.8 | 368.4 | 330.1 | 9.93 | 10.95 | 10.44 |
| 2- $GA_3$ | 13.11 | 13.66 | 13.39 | 386.5 | 428.9 | 407.7 | 11.58 | 12.86 | 12.23 |
| 3- Selenium | 17.14 | 16.69 | 16.92 | 399.3 | 441.8 | 420.6 | 11.91 | 13.20 | 12.55 |
| 4- Roselle extract | 17.05 | 17.14 | 17.10 | 362.9 | 399.4 | 381.2 | 10.85 | 11.90 | 11.38 |
| 5- Turmeric extract | 17.65 | 17.21 | 17.43 | 411.2 | 451.1 | 431.2 | 12.31 | 13.50 | 12.90 |
| 6- Humic acid | 18.13 | 18.34 | 18.24 | 422.1 | 463.4 | 442.8 | 12.66 | 13.91 | 13.29 |
| LSD | 1.29 | 1.85 | | 24.73 | 22.62 | | 0.66 | 0.71 | |

Data in Table 3 indicated that spraying $GA_3$, humic acid, selenium, turmeric or roselle extracts significantly increased the cluster length. On other hand, $GA_3$ spraying significantly decreased the number of berries compared to other treatment and control. Whereas, humic acid, selenium, turmeric or roselle extracts were in affected on this traits compared to control. Hence, all treatments spraying significantly decreased the compactness coefficient of cluster. No significant differences were observed among all spraying with any of the these treatments. The lowest cluster compactness coefficient 7.29 av. the two studied seasons was obtained due to spray with $GA_3$. Contrarily, the highest cluster compactness coefficient 10.96 was observed on water sprayed vines (control). Hence the corresponding decrement of cluster compactness coefficient was 33.49%.

**Table 3. Effect of $GA_3$ and some natural components spraying on Thompson Seedless cluster traits grapevines during 2019 and 2020 seasons.**

| Charact. / Treat. | Cluster length (cm) | | | No. berries/ cluster | | | Compactness coefficient | | | Shot berries % | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2020 | Mean | 2019 | 2020 | Mean | 2019 | 2020 | Mean | 2019 | 2020 | Mean |
| 1- Control | 20.9 | 21.1 | 21.0 | 221.6 | 238.8 | 230.2 | 10.60 | 11.31 | 10.96 | 7.93 | 8.35 | 8.14 |
| 2- $GA_3$ | 26.8 | 27.3 | 27.1 | 198.9 | 212.9 | 205.9 | 7.12 | 7.46 | 7.29 | 1.97 | 2.15 | 2.06 |
| 3- Selenium | 26.9 | 27.2 | 27.1 | 228.1 | 241.6 | 234.9 | 8.51 | 8.90 | 8.71 | 2.33 | 2.51 | 2.42 |
| 4- Roselle extract | 25.4 | 25.8 | 25.6 | 232.4 | 246.4 | 239.4 | 9.13 | 9.55 | 9.34 | 2.49 | 2.63 | 2.56 |
| 5- Turmeric extract | 26.3 | 26.6 | 26.5 | 236.4 | 248.5 | 242.5 | 8.97 | 9.31 | 9.14 | 2.38 | 2.49 | 2.44 |
| 6- Humic acid | 26.8 | 27.2 | 27.0 | 239.6 | 252.8 | 246.2 | 8.92 | 9.26 | 9.09 | 2.31 | 2.48 | 2.40 |
| LSD | 1.81 | 1.93 | -- | 18.3 | 20.1 | -- | 0.45 | 0.39 | | 0.21 | 0.19 | -- |

So, it could be concluded that spraying $GA_3$, humic acid, selenium, turmeric or roselle as a natural compounds three times annually maximized the yield and improved the cluster traits.

## 3- Berry quality:

Table 4 cleared that all spraying treatments significantly improved the berry quality in terms of increasing berry weight, total soluble solid % and reducing sugars % and decreas-

ing titratable acidity % compared to water sprayed ones (control). The best results regarding the berry quality was obtained on the vines that sprayed with 0.1% humic acid. No significant differences were obtained either due to spray humic acid or turmeric extract. The heaviest berry weight was 1.85, 1.72 & 1.69g found that on vines sprayed with $GA_3$, humic acid and turmeric extract, respectively. On other hand, the lightest ones was 1.44 g as an av. the two studied season was found on vines that water sprayed. Hence, the increment percentage of berry weight due to spray $GA_3$, humic acid and turmeric extract over water sprayed one (control) was 28.47, 19.44 & 17.36%, respectively. The increase in berry weight and size result an increase in packable yield.

**Table 4. Effect of $GA_3$ and some natural components spray on berry weight and juice chemical properties of Thompson Seedless grapes during 2019 and 2020 seasons.**

| Charact. / Treat. | Berry weight | | | TSS | | | Reducing sugars | | | Acidity % | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2020 | Mean | 2019 | 2020 | Mean | 2019 | 2020 | Mean | 2019 | 2020 | Mean |
| 1- Control | 1.42 | 1.46 | 1.44 | 18.8 | 20.1 | 19.5 | 15.2 | 15.3 | 15.3 | 0.492 | 0.480 | 0.486 |
| 2- $GA_3$ | 1.81 | 1.89 | 1.85 | 17.8 | 18.9 | 18.4 | 14.5 | 14.4 | 14.5 | 0.515 | 0.498 | 0.507 |
| 3- Selenium | 1.61 | 1.73 | 1.67 | 19.9 | 21.5 | 20.7 | 16.0 | 16.2 | 16.1 | 0.414 | 0.398 | 0.406 |
| 4- Roselle extract | 1.51 | 1.58 | 1.55 | 19.8 | 20.7 | 20.3 | 15.6 | 16.0 | 15.8 | 0.442 | 0.431 | 0.437 |
| 5- Turmeric extract | 1.65 | 1.73 | 1.69 | 20.2 | 21.6 | 20.9 | 16.0 | 16.3 | 16.2 | 0.405 | 0.401 | 0.403 |
| 6- Humic acid | 1.68 | 1.76 | 1.72 | 20.8 | 21.8 | 21.3 | 15.8 | 16.5 | 16.2 | 0.395 | 0.387 | 0.391 |
| LSD | 0.08 | 0.09 | -- | 0.63 | 0.68 | -- | 0.55 | 0.54 | -- | 0.014 | 0.016 | -- |

Also, the highest total soluble solids 21.3 & 20.9% as an av. the two studied seasons were observed on the vines that received humic acid and turmeric extract, respectively. Contrarily, the least values of total soluble solids 18.4 & 19.5% was recorded on the vines that sprayed with $GA_3$ and water sprayed vines (control), respectively. Hence, the increment percentage of TSS was attained 29.23 & 15.76 and 9.18 & 13.59% as an av. of the two studied seasons due to spraying humic acid or turmeric extract over the control or $GA_3$, respectively. Moreover, spraying humic acid or turmeric extract induce decrement percentage in titratable acidity 19.55 & 17.08% as an av. of the two studied seasons, respectively. As a conclusion, the best results with regard to growth and yield, as well as, cluster traits and berry quality of Thompson Seedless grapevines were obtained with spraying humic acid, turmeric or selenium at 0.1% three times annually.

## Discussion

$GA_3$ has been routinely used for Seedless grape production to increase berry and cluster weight as well as thinning of the clusters. The effect of $GA_3$ depends on date of application and the concentration used. $GA_3$ spraying at full bloom decreased berry set since its role on flower dropping, causing a reduction of berries number per cluster .The positive action of $GA_3$ on stimulating cell elongation process, enhancing the water absorption and stimulating the biosynthesis of proteins which will lead to increase the cluster length, as well as, berry size and weight, Roper and Williams, (1989); Lu *et al*. (1995); Perez *et al*. (2000), Selim (2007),

Abu-Zahra (2010), El-Salhy *et al*. (2010), El-Halaby *et al*., (2015) and Radwan *et al*. (2019).

Since ancient times, plant extracts such as roselle and turmeric were used in many ways. Applications of plant extracts as roselle and turmeric are promising in long run in fruit crop production (Srivastava and Lal, 1997).

Turmeric and roselle extracts contain a higher amount of different antioxidants as well as different nutrients these contents surely reflected on enhancing cell division, building organic foods and the tolerance of plants to biotic and abiotic stresses. The later could explains the positive effects of such plant extract on growth and fruiting of fruit trees (Paik and Chung, 1997; Pons, 2003 and Okigbo and Emoghene, 2003).

Humic acid had a positive effect on plant growth and fruit quality when applied at the pre-bloom and fruit set phonological stages. In order to improve the plant nutritional and physiological status, farmers may use commercial products based on humic substances. Results in the present study indicated that the foliar application with humic acid at a 0.1% could be integrated into a sustainable technology package for viticulture management. A concentration of 0.1% could represent the optimal humic acid application rate for grapevines, however, multi-location trials would be required to confirm this.

The beneficial effects of selenium might be attributed to its positive action on enhancing the tolerance of the trees to the biotic and abiotic stresses and the biosynthesis of carbohydrates and proteins. It is effective in reducing reactive oxygen species (ROS) since it considered as an important antioxidant protects the plant cells from death. Thereby, it is responsible for producing healthy trees able to produce more fruits (Nowak-Barbara, 2008 and Jakovljevic *et al*., 2011).

The beneficial effects of these natural compounds were to enhance cell division and elongate as well as the tolerance of plants to different stress. These effects surely reflected on enhancing growth and nutritional status of vines.

These results are in harmony with those obtained by Kubota *et al*. (2000), Vargas *et al*. (2008), Corrales-Maldonada *et al*. (2010), Ali-Mervat *et al*. (2012), Gadel-Kareem and Abdel-Rahman (2013), Abada (2014), Ahmed *et al*. (2014), Uwakiem (2014), Rizkalla (2016), Gouda-Fatma-El-Zahraa (2016), Mohamed *et al*. (2017), El-Salhy *et al*. (2017) and Popescu and Ropescu (2018).

The essential of these natural compounds on enhancing growth and vine nutritional status that shifted the balance of competition between growth and reproductive organs was in favor of the latter. In addition, the positive action of these extracts on stimulating the biosynthesis of sugars and plant pigments surely reflected on advancing maturity and promoting fruit quality. These results are in agreement with those obtained by Kubota *et al*. (1999), Ali-Mervat *et al*. (2012), Gadel-Kareem and Abdel-Rahman (2013), Abada (2014), Ahmed *et al*. (2014), Uwakiem (2014), Rizkalla (2016), Gouda-Fatma-El-Zahraa (2016), Mohamed *et al*. (2017), El-Salhy *et al*. (2017),

Popescu and Ropescu (2018), Radwan *et al*. (2019) and El-Salhy *et al*. (2019).

## Conclusion

On the light of the current results, it could be concluded that foliar application of humic acid, selenium or turmeric extract at 0.1%, three times at growth start, after berry set and three weeks later to get high yield and berries with fairly good quality. In addition, were effective to overcome the adverse effects using $GA_3$ i.e. delay the ripening and reduce full coloration, especially colored cultivars.

These advantages will eventually enable growers to obtained high marketable surrounding and overseas markets.

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# استجابة كرمات العنب طومسون اللابذرى للرش بحمض الجبريليك وبعض المركبات الطبيعية

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**الملخص**

أجريت هذه الدراسة خلال موسمين متتاليين هما ٢٠١٩ ، ٢٠٢٠ علي كروم العنب طومسون اللابذرى المنزرعة بالمزرعة البحثية بكلية الزراعة – جامعة أسيوط – مصر. بهدف دراسة تأثير رش حمض الجبريليك وبعض المركبات الطبيعية (حمض الهيوميك والسيلينيوم والكركم والكركديه) علي النمو الخضري والإثمار، حيث رشت المركبات بصورة فردية وبتركيزات ٠,١% لكل منهم ثلاثة مرات خلال فصل النمو. وقد أظهرت النتائج:

- أظهرت جميع معاملات الرش زيادة معنوية في وزن خشب التقليم ومساحة الورقة ومحتواها الكلي من صبغة الكلوروفيل مقارنة بالرش بالماء (معاملة الكنترول).
- سبب الرش زيادة معنوية في وزن المحصول / كرمة وتحسين لصفات العناقيد من حيث الوزن ومعامل التزاحم مقارنة بالكنترول.
- أوضحت المعاملات تحسناً معنوياً في صفات الحبات من حيث وزن الحبة ومحتواها من المواد الصلبة والسكريات مقارنة بثمار الكرمات المرشوشة بالماء (الكنترول).
- سجلت أفضل النتائج علي الشجيرات المرشوشة بتركيز ٠,١% من حمض الهيوميك والكركم والسيلينيوم ولم تسجل فروق معنوية بين استخدام أي مركب.

من نتائج هذه الدراسة يمكن التوصية بأهمية رش حمض الهيوميك أو السيلينيوم أو مستخلص الكركم بتركيز ٠,١% ثلاثة مرات في بداية النمو وبعد العقد وبعد ذلك بثلاثة أسابيع وذلك لتحسين النمو الخضري وبالتالي إنتاج محصول عال ذو خصائص عناقيد وحبات جيدة للعنب الطومسون عديم البذور. فضلاً عن استخدامها بديلاً لحمض الجبريليك في إنتاج العنب للتغلب علي بعض مشاكل استخدامه من حيث تأخير النضج أو قلة التلوين.