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The Synergistic Effect of Spraying Some Plant Extracts with Some Macro and Micro Nutrients of Thompson Seedless Grapevines

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Author's contribution

This whole work was carried out by author MKUA.

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ABSTRACT

During 2012 and 2013 seasons, Thompson seedless grapevines were treated three times with turmeric, garlic and onion extracts each at 0.05 to 0.1% as well as Zn, Fe and Mn in chelated form at 0.05 % and Cu in sulphate form at 0.025 % and NPKMg each at 0.1% either applied singly or in all possible combinations. the study focused on the effect of these treatments on growth, vine nutritional status, yield and fruit quality.

The results revealed that using turmeric extract was preferable than using the other two plant extracts (garlic and onion) in improving the leaf area, nutrients status, yield and fruit quality. In addition, spraying the four macronutrients surpassed the use of the four micronutrients in this respect.

For promoting yield of Thompson seedless grapevines quantitively and qualititively ,it is advised to spray the vines with turmeric extract at 0.05% besides all nutrients namely, NPKMg each at 0.1% , Mn, Zn, Fe at 0.05 % and Cu at 0.025% , three times.

Keywords: Some plant extracts; nutrients; Thompson seedless grapes; yield and fruit quality.

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1. INTRODUCTION

Recently, public health and environmental safety encourage the use of plant extracts for improving growth, nutritional status and productivity of fruit crops. The higher own content of these plant extracts from plant pigments phenolic compounds and essential oils seem to have syneryistic effects on fruiting of fruit crops [1,2] attributed the positive action of macro and micro nutrients on fruiting of fruit crops to their essential role on enhancing the biosynthesis of plant pigments and organic foods, vitamins, natural hormones, enzymes as well as enhancing the uptake of water and nutrients, cell division , movements of sugars and the resistance of fruit crops to different disorders.

[3]Mentioned that using Zn,Fe,Mn in chelated form at 0.05% and Boric acid at 0.05% improved leaf area and percentages of N,P and K in the leaves of Red Roomy grapevines. [4] Disclosed that spraying magnesium sulphate at 0.5% plus boric acid at 0.05% improved the shoot length on uptake of N,P,K and Mg and yield of Red Roomy grapevines. [5] Stated that yield and fruit quality of Red Roomy grapevines were greatly improved in response to spraying chelated Zn,Fe and Mn at 0.05% three times. Treating Red Roomy grapevines three times with boric acid at 0.1%, magnesium sulphate at 0.5% and chelated zinc at 0.05% increased cluster weight and dimension as well as fruit weight and total sugars% [6]. The same trend was noticed by [7] when sprayed Mg,Zn and B ; [8] when sprayed chelated - Zn at 0.05% and [9] who sprayed N,P,K,Mn,Zn and Fe.

Several authors were interested in exploring the effect plant extracts on growth and fruiting of fruit crops [10] found that using garlic and onion extracts was very effective in enhancing growth characters of citrus crops. [11] stated that spraying neem extracts three times was accompanied with controlling anthacnose of Taimour mango trees. [12] Stated that using neem leaf extract was responsible for prolonging shelf-life of oranges. [13] Found that spraying Taimour mango trees three times with turmeric extract at 0.1% resulted in improving leaf area N,P and K in leaves, yield and fruit quality . [14] Stated that using garlic, onion and turmeric extracts each at 0.1% gave the best results with regard to yield of Washington Navel orange trees. Three sprays of roselle and turmeric extracts each at 0.1% resulted in great promotion on fruit quality of Valencia orange trees. [15] Suggested that spraying roselle extract three times at 0.1% gave the best results with regard to yield of Ruby seedless grapevines. Recently; [16] mentioned that spraying turmeric extract thrice at 0.1% gave on obvious promotion on the yield of Sewy date palms.

This study was conducted to throw some lights on the beneficial effects of different plant extracts especially when applied in combined with various macro and micro nutrients on fruiting of Thompson seedless grapevines.

2. MATERIALS AND METHODS

This study was carried out during 2012 and 2013 seasons on one hundred and sixty–eight uniform in vigour 13- years old Thompson seedless grapevines grown in a private vineyard located at Estal village, Samalout district, Minia Governorate. Vines were spaces at 1.5x 3.0 m and grown in a clay soil (Table 1). Cane pruning using Gable supporting system was adopted to give 72 eyes per vine (72 eyes vine load) (6 fruiting canes x 10 eyes + 6 renewal spurs x 2 eyes). Surface irrigation system is used for irrigation.

This experiment included the following twenty- eight treatments from two factors (A & B). The first factor (A) consisted from the following seven treatments a1) untreated vines, a2) using turmeric extract at 0.05 %, a3) using turmeric extract at 0.1% , a4) using garlic extract at 0.05%, a5) using garlic extract at 0.1%, a6) using onion extract at 0.05% and a7) using onion extract at 0.1%. While the seconds factor (B) contained the following four treatments, b1) untreated vines with nutrients , b2) spraying Zn,Fe and Mn in chelated form at 0.05% as well as Cu in cupric sulphate form at 0.025%, b3) spraying the four macronutrients namely N,P,K & Mg together each at 0.1%. [5].

Table 1. Analysis of the tested soil

Constituents	Values
Particle size distribution:	
Sand %	14.0
Silt %	18.0
Clay %	68.0
Texture	Clay
pH(1: 2.5 extract)	7.66
O.M %	1.69
CaCO3%	1.77
Total N %	0.08
Available P (Olsen method) ppm	4.1
Available K (ammonium acetate) ppm	394
EDTA extractable micronutrients (ppm)	
Fe	7.1
Zn	1.99
Mn	4.8
Cu	1.94

(and a4) spraying all the previous macro and micro nutrients together. Each treatment was replicated three times, two vines per each. The three plant extracts namely turmeric, garlic and onion extracts as well as the eight nutrients were sprayed three times at growth start (1st week of Mar.), just after berry setting (mid. of April) and at one month later (mid. of May). Triton B as a wetting agent was added to all spraying solutions at 0.05%. Other horticultural practices were carried out as usual. Randomized complete block design in split – plot arrangement was followed, the seven plant extract treatments as well as the four micro and macro nutrients occupied the main and subplots, respectively.

In the last week of May, twenty leaves picked from leaves opposite to the basal clusters (according to [17]) for each vine were taken for measuring the leaf area (cm2) using the following equation outlined by [18].

Leaf area (cm2) = 0.45 (0.79 x maximum diameter) + 17.77.

In the dry pertioles leaf content of N, P, K and Mg (as percentages) and Zn, Fe and Mn (as ppm) were determined according to the procedures that outlined by [19].

In the fresh blades of these leaves chlorophylls a & b were determined for calculating total chlorophylls (as mg/ 100 g F.W.) according to the method outlined by [20]. When T.S.S. / acid in the berries of the check treatment reached 25 % (mid. of July) [21], yield expressed in number of clusters / vine and yield (kg.) was recorded. Five clusters from each vine were

taken for measuring cluster weight (g.) , berry weight (g), total soluble solids %, total sugars % and total acidity (as tartaric acid% / 100 ml juice (according to [22].

Statistical analysis was done using new L.S.D. at 5% for made all comparisons among the twenty eight treatment means according to [23].

3. RESULTS AND DISCUSSION

3.1 Leaf Area

It is clear from the data in table 2 that foliar application of the three plant extracts namely turmeric, garlic and onion each at 0.05 to 0.1% significantly resulted in an obvious promotion on the leaf area in the leaves in relative to the check treatment. The superiority of these plant extracts on enhancing the leaf area can be arranged descendingly as follows turmeric, garlic and onion in statistical analysis point of view. Increasing concentrations of each plant extract from 0.05 to 0.1% failed significantly to enhance the leaf area. The maximum values were recorded on the vines that treated three times with turmeric extract at 0.1%. The lowest values were recorded on untreated vines. These results were true during both seasons.

It is obvious from the obtained data that spraying macro and/ or micro nutrients was significantly very effected in enhancing the leaf area rather than non-application. Using macro nutrients was superior than using micro nutrients in this connection. Using macro and micro nutrients together gave the maximum values. Similar trend was noticed during both seasons. Spraying turmeric extract at 0.1% in combined with all macro and micro nutrients gave the maximum values. Control treatment (0.0 % plant extracts + 0.0 nutrients) gave the lowest values. Similar results were announced during both seasons.

3.2 Leaf Chemical Composition

Data in Tables (2 to 4) clearly show that foliar application of turmeric , garlic and onion extracts each at 0.05 to 0.1% significantly was accompanied with enhancing N, P, K, Mg, Zn, Mn, Fe and total chlorophylls in leaves rather than non-application. The stimulation was associated with increasing concentration of each plant extracts. Meaningless promotion was detected on there nutrients among the two concentrations namely 0.05 and 0.1% of each plant extracts. The highest values were recorded on the vines that sprayed with turmeric, garlic and onion extracts in descending order.

Single and combined applications of macro and micronutrients significantly was followed by enhancing N, P, K, Mg, Zn, Fe, Mn and total chlorophylls comparing with non-application. Using macro nutrients was significantly favorable than using micro ones. The maximum values were recorded on the vines that received all nutrients and turmeric extract at 0.1%. Similar results were announced during both seasons.

3.3 Yield and Cluster Weight

Table 4 shows that spraying turmeric, garlic or onion extracts each at 0.05 to 0.1% significantly was accompanied with improving the yield expressed in weight and number of clusters per vine (especially in the second season) and cluster weight in relative to the check treatment. The promotion was significantly associated with using turmeric, garlic and onion extracts, in descending order. Turmeric extract occupied the first position and onion extract

ranked the last position in this connection. Unsignificant promotion on yield and cluster weight was observed with increasing concentrations of each plant extract from 0.05 to 0.1%. The maximum values were recorded on the vines that sprayed three times with turmeric at 0.05% from economical point of view. Untreated vines produced the lowest values. The present treatments had no significant effect on number of clusters in the first season of the study. These results were true during both seasons.

Treating the vines with macro and / or micro nutrients significantly improved the yield and cluster weight in relative to the check treatment. Using macro nutrients was significantly preferable than using micro ones in improving the yield and cluster weight. Using all nutrients together was superior than using each group alone in this respect. The best results were obtained on the vines that received all nutrients together. Untreated vines produced the minimum values. The investigated nutrient treatments had no effect on the number of clusters per vine in the first season of study.

From economical point of view treating Thompson seedless grapevines with turmeric extract at 0.05% plus all nutrients (N, P, K, Mg, Zn , Fe and Mn) gave the best results with regard to yield. Under such promised treatment, yield per vine reached 9.6 and 12.9 kg while in the untreated vines reached 6.8 and 6.7 kg per vine during both seasons, respectively. The percentage of increase on the yield due to application of the promised treatment reached 41.2 and 88.1% in relative to the check treatment during both seasons, respectively.

3.4 Some Physical and Chemical Characteristics of the Grapes

Data listed in Table 5 clearly show that application of the three plant extracts (turmeric, garlic and onion) each at 0.05 to 0.1% significantly was significantly very effective in improving fruit quality in terms of increasing berry weight , T.S.S. % and total sugars % and reducing total acidity % in relative to the control treatment. Spraying turmeric extract was significantly preferable than using the other two plant extracts in improving fruit quality. Using onion extract occupied the last position in this respect. Similar results were announced during both seasons.

Foliar application of micro and / or micro nutrients significantly was followed by promoting fruit quality in terms of increasing berry weight, T.S.S. % and total sugars % and reducing total acidity% in relative to the check treatment. Spraying macro nutrients was superior than using micro ones in enhancing fruit quality. Using all nutrients together surpassed the application of each group alone in this respect. The best findings were obtained with using macro and micro nutrients together.

The best results with regard to quality of the berries were obtained with using turmeric extract at 0.05% besides all nutrients together. Unfavorable effects on fruit quality were observed on untreated vines. These results were true during both seasons.

The beneficial effects of garlic extract on fruiting of Thompson seedless grapevines might be attributed to its higher own content of many antioxidants such as organosulfur compounds such as sallylcysteine, allinin, diallydisulfide, diallytsulfide ajoene and allicin. Antioxidant action was determined by their ability to scavenge reactive oxygen species and inhibit the formation of lipid peroxidation. Also, these compounds had antioxidative, antibacterial, antiviral and antifungal effect [24,25,26].

Table 2. Effect of single and combined applications of some plant extracts and nutrients on the leaf area and percentages of N, P, and K in the leaves of Thompson seedless grapevines during 2012 and 2013 seasons

Plant extracts (A)	Leaf area (cm2)										Leaf N %									
	2012					2013					2012					2013				
	Nutrient treatments (B)																			
	Nil	Micro	Macro	Both	Mean (A)	Nil	Micro	Macro	Both	Mean (A)	Nil	Micro	Macro	Both	Mean (A)	Nil	Micro	Macro	Both	Mean (A)
Untreated vines	93.1	94.2	95.3	96.7	94.8	94.3	95.6	97.0	98.3	96.3	1.66	1.73	1.80	1.88	1.77	1.62	1.80	1.88	1.98	1.82
Turm. Ext. at 0.05%	96.6	97.7	98.8	101.1	98.6	101.3	103.0	105.6	109.0	104.7	2.05	2.12	2.20	2.36	2.18	2.11	2.19	2.28	2.40	2.25
Turm. Ext. at 0.1%	96.7	97.8	98.9	101.2	98.7	101.6	103.1	105.7	109.1	104.9	2.06	2.14	2.22	2.37	2.20	2.12	2.20	2.29	2.41	2.26
Garlic ext. at 0.05%	95.0	96.2	97.4	98.7	96.8	98.9	100.6	101.7	104.0	101.3	1.91	2.14	2.02	2.13	2.00	1.97	2.03	2.09	2.21	2.08
Garlic Ext. at 0.1%	95.1	96.3	97.5	98.8	96.9	99.0	100.7	101.8	104.2	101.4	1.93	1.98	2.03	2.15	2.02	2.00	2.03	2.10	2.22	2.09
Onion ext. at 0.05%	94.3	95.4	96.7	98.0	96.1	95.8	97.5	99.0	103.0	98.8	1.76	1.83	1.90	2.01	1.88	1.82	1.91	1.98	2.08	1.95
Onion ext. at 0.1%	94.4	95.5	96.8	98.2	96.2	96.0	97.6	99.2	103.3	99.0	1.78	1.85	1.92	2.02	1.90	1.83	1.92	1.99	2.09	1.96
Mean (B)	95.5	96.2	97.3	99.0		98.1	99.7	101.4	104.4		1.88	1.94	2.01	2.13		1.92	2.01	2.09	2.20	
New L.S.D. at 5%		A	B	AB			A	B	AB			A	B	AB			A	B	AB	
		1.1	1.0	2.7			1.3	1.1	2.9			0.06	0.05	0.13			0.05	0.04	0.11	
	Leaf P %										Leaf K %									
Untreated vines	0.14	0.17	0.19	0.23	0.18	0.16	0.19	0.21	0.27	0.21	1.33	1.39	1.44	1.55	1.43	1.35	1.41	1.47	1.57	1.45
Turm. Ext. at 0.05%	0.27	0.31	0.36	0.41	0.34	0.30	0.34	0.37	0.43	0.36	1.55	1.60	1.66	1.76	1.64	1.60	1.66	1.72	1.82	1.70
Turm. Ext. at 0.1%	0.28	0.32	0.37	0.41	0.35	0.60	0.34	0.38	0.44	0.37	1.56	1.61	1.67	1.77	1.65	1.61	1.66	1.72	1.83	1.71
Garlic ext. at 0.05%	0.22	0.25	0.29	0.34	0.28	0.25	0.28	0.32	0.38	0.31	1.47	1.53	1.60	1.71	1.58	1.52	1.57	1.64	1.75	1.62
Garlic Ext. at 0.1%	0.23	0.26	0.30	0.35	0.29	0.26	0.29	0.32	0.38	0.31	0.48	1.54	1.61	1.72	1.59	1.53	1.58	1.65	1.76	1.63
Onion ext. at 0.05%	0.18	0.21	0.24	0.28	0.23	0.21	0.24	0.27	0.33	0.26	1.40	1.46	1.52	1.59	1.49	1.46	1.52	1.59	1.69	1.57
Onion ext. at 0.1%	0.19	0.22	0.26	0.31	0.25	0.21	0.24	0.27	0.34	0.27	1.42	1.47	1.53	1.60	1.51	1.47	1.53	1.60	1.70	1.58
Mean (B)	0.22	0.25	0.29	0.33		0.24	0.27	0.31	0.37		1.46	1.51	1.58	1.67		1.51	1.56	1.63	1.73	
New L.S.D. at 5%		A	B	AB			A	B	AB			A	B	AB			A	B	AB	
		0.03	0.02	0.05			0.03	0.03	0.08			0.06	0.05	0.08			0.06	0.05	0.08	

Table 3. Effect of single and combined applications of some plant extracts and nutrients on percentage of Mg as well as the leaf content of Zn, Fe and Mn (as ppm) of Thompson seedless grapevines during 2012 and 2013 seasons

Plant extracts (A)	Leaf Mg %										Leaf Zn (ppm)									
	2012					2013					2012					2013				
	Nutrient treatments (B)																			
	Nil	Micro	Macro	Both	Mean (A)	Nil	Micro	Macro	Both	Mean (A)	Nil	Micro	Macro	Both	Mean (A)	Nil	Micro	Macro	Both	Mean (A)
Untreated vines	0.48	0.53	0.57	0.66	0.56	0.50	0.54	0.59	0.65	0.57	51.9	55.0	58.3	61.0	56.6	52.2	55.5	59.0	63.7	57.6
Turm. Ext. at 0.05%	0.67	0.72	0.76	0.84	0.75	0.69	0.73	0.77	0.83	0.76	64.9	68.9	71.9	76.9	70.7	66.0	69.3	73.3	78.9	71.9
Turm. Ext. at 0.1%	0.68	0.73	0.77	0.85	0.76	0.70	0.74	0.78	0.84	0.77	65.0	69.0	72.0	77.1	70.8	66.1	70.0	74.0	79.0	72.3
Garlic ext. at 0.05%	0.61	0.65	0.68	0.76	0.68	0.60	0.64	0.68	0.75	0.67	60.0	63.9	68.0	73.1	66.3	61.1	63.8	67.1	72.0	66.0
Garlic Ext. at 0.1%	0.62	0.66	0.69	0.77	0.69	0.61	0.65	0.69	0.76	0.68	60.9	64.0	68.2	73.3	66.6	61.6	64.1	67.5	72.3	66.4
Onion ext. at 0.05%	0.55	0.59	0.64	0.71	0.62	0.55	0.58	0.62	0.68	0.61	55.0	59.0	62.9	66.1	60.8	56.0	59.1	62.0	66.1	60.8
Onion ext. at 0.1%	0.56	0.60	0.65	0.72	0.63	0.55	0.59	0.63	0.69	0.62	55.6	59.3	63.0	66.3	61.1	56.1	59.2	62.3	66.5	61.0
Mean (B)	0.60	0.64	0.68	0.76		0.60	0.64	0.68	0.74		59.0	62.7	66.3	70.5		59.9	63.0	66.5	71.2	
New L.S.D. at 5%		A	B	AB			A	B	AB			A	B	AB			A	B	AB	
		0.05	0.04	0.11			0.04	0.03	0.08			2.5	2.1	5.6			2.3	2.0	5.3	
	Leaf Fe (ppm)										Leaf Mn (ppm)									
Untreated vines	53.5	57.0	60.1	66.2	59.2	55.0	58.3	62.2	66.3	60.5	41.8	45.3	49.0	55.0	47.8	42.0	45.0	49.0	52.0	47.0
Turm. Ext. at 0.05%	64.3	68.0	71.0	77.9	70.3	66.1	69.9	73.0	78.3	71.8	55.9	59.9	63.3	71.8	62.7	57.0	60.0	63.0	68.0	62.0
Turm. Ext. at 0.1%	6.44	67.7	70.8	76.8	59.9	66.1	70.0	73.3	78.8	72.1	56.0	60.0	64.0	72.0	63.0	57.1	60.1	63.3	68.3	62.2
Garlic ext. at 0.05%	60.1	63.1	66.0	71.3	65.1	61.9	65.0	68.3	74.0	67.3	51.3	55.0	58.0	64.3	57.2	52.5	56.0	59.0	64.3	58.0
Garlic Ext. at 0.1%	60.2	63.3	66.3	71.5	65.3	61.9	65.3	68.6	74.3	67.5	51.5	55.0	58.3	64.5	57.3	52.6	56.0	59.1	64.5	58.1
Onion ext. at 0.05%	56.6	59.0	62.2	68.0	61.5	58.3	61.9	65.0	70.0	63.8	45.9	49.0	52.0	58.3	51.3	47.0	50.3	54.0	59.0	52.6
Onion ext. at 0.1%	56.7	59.3	62.3	68.3	61.7	58.5	62.0	65.3	70.2	64.0	46.0	49.0	52.0	58.5	51.4	47.0	50.5	54.1	59.3	52.7
Mean (B)	59.4	62.5	65.5	71.4		61.1	64.6	68.0	73.1		49.8	53.3	56.7	63.5		50.7	54.0	57.4	62.2	
New L.S.D. at 5%		A	B	AB			A	B	AB			A	B	AB			A	B	AB	
		2.9	2.6	6.9			2.5	2.2	5.8			2.8	6.6	6.9			2.5	2.4	6.4	

Table 4. Effect of single and combined applications of some plant extracts and nutrients on total chlorophyll, yield and average cluster weight of Thompson seedless grapevines during 2012 and 2013 seasons

Plant extracts (A)	Total chlorophylls (mg/100 F)										No. of cluster / vine									
	2012					2013					2012					2013				
	Nutrient treatments (B)																			
	Nil	Micro	Macro	Both	Mean (A)	Nil	Micro	Macro	Both	Mean (A)	Nil	Micro	Macro	Both	Mean (A)	Nil	Micro	Macro	Both	Mean (A)
Untreated vines	24.1	25.1	27.1	30.1	26.6	25.5	27.0	29.1	31.1	28.2	23	23	23	23	23	23	24	25	23	25
Turm. Ext. at 0.05%	31.0	32.0	34.0	37.1	33.5	32.3	33.8	36.0	38.2	35.1	24	24	24	25	24	27	28	29	33	30
Turm. Ext. at 0.1%	31.3	32.4	34.2	37.2	33.8	32.5	34.1	36.2	38.3	35.3	24	24	25	25	25	28	28	29	33	30
Garlic ext. at 0.05%	28.3	29.3	31.4	34.6	30.9	30.1	31.6	34.8	37.0	33.4	24	24	24	24	24	25	26	28	29	27
Garlic Ext. at 0.1%	28.5	29.6	31.5	34.8	31.1	30.3	31.7	35.0	37.0	33.5	24	24	24	24	24	25	27	28	29	28
Onion ext. at 0.05%	26.1	27.2	29.2	32.3	28.7	28.0	29.5	31.7	34.0	30.8	23	23	23	23	23	24	26	27	29	27
Onion ext. at 0.1%	26.3	27.3	29.5	32.5	28.9	28.3	29.7	32.0	34.0	31.0	23	23	23	23	23	24	26	27	29	27
Mean (B)	28.0	29.0	31.0	34.1		29.6	31.1	33.5	35.7		24	24	24	24		25	27	28	30	
New L.S.D. at 5%		A	B	AB			A	B	AB			A	B	AB			A	B	AB	
		0.9	1.0	2.7			1.1	0.9	2.4			NS	NS	NS			2.0	2.0	5.3	
	Yield / vine (kg)										Average cluster weight (g)									
Untreated vines	6.8	6.9	7.2	7.4	7.1	6.7	7.2	7.8	8.3	7.5	295	299	311	322	307	291	301	311	320	306
Turm. Ext. at 0.05%	8.2	8.4	8.6	9.6	8.7	9.4	9.8	10.5	12.9	10.7	340	350	360	385	359	349	352	362	390	363
Turm. Ext. at 0.1%	8.2	8.4	9.0	9.7	8.8	9.8	9.8	10.5	12.9	10.8	341	352	361	387	360	350	353	363	391	364
Garlic ext. at 0.05%	7.7	7.9	8.2	8.2	8.0	8.1	8.7	9.7	10.2	9.2	321	331	340	342	334	325	335	345	351	339
Garlic Ext. at 0.1%	7.7	8.0	8.2	8.3	8.1	8.1	9.1	9.7	10.2	9.3	322	332	341	345	335	325	336	346	352	340
Onion ext. at 0.05%	7.1	7.4	7.6	7.8	7.5	7.3	8.2	8.8	9.8	8.5	310	320	330	340	325	306	316	327	337	322
Onion ext. at 0.1%	7.2	7.4	7.6	7.8	7.5	7.4	8.2	8.9	9.9	8.6	311	321	332	341	326	307	317	329	340	323
Mean (B)	7.6	7.8	8.1	8.4		8.1	8.7	9.4	10.6		320	329	339	352		322	330	340	354	
New L.S.D. at 5%		A	B	AB			A	B	AB			A	B	AB			A	B	AB	
		0.4	0.3	0.8			0.5	0.4	1.1			10.1	9.8	26.0			10.0	9.5	25.2	

Table 5. Effect of single and combined applications of some plant extracts and nutrients on some physical and chemical characteristics of the grapes of Thompson seedless grapevines during 2012 and 2013 seasons

Plant extracts (A)	Average berry weight (g.)										T.S.S. %									
	2012					2013					2012					2013				
	Nutrient treatments (B)																			
	Nil	Micro	Macro	Both	Mean (A)	Nil	Micro	Macro	Both	Mean (A)	Nil	Micro	Macro	Both	Mean (A)	Nil	Micro	Macro	Both	Mean (A)
Untreated vines	1.95	2.01	2.07	2.21	2.06	1.91	1.98	2.05	2.12	2.02	17.5	17.9	18.4	19.0	18.2	17.7	18.1	18.6	19.0	18.4
Turm. Ext. at 0.05%	2.18	2.25	2.33	2.45	2.30	2.13	2.20	2.27	2.39	2.25	19.4	19.9	20.4	21.0	20.2	19.5	19.9	20.2	20.7	20.1
Turm. Ext. at 0.1%	2.20	2.26	2.35	2.47	2.32	2.15	2.21	2.28	2.41	2.26	19.6	20.0	20.5	21.1	20.3	19.7	20.0	20.4	20.8	20.2
Garlic ext. at 0.05%	2.10	2.17	2.23	2.33	2.21	2.05	2.13	2.22	2.33	2.18	18.7	19.2	19.8	20.4	19.5	18.8	19.3	19.6	19.9	19.4
Garlic Ext. at 0.1%	2.11	2.18	2.25	2.34	2.22	2.06	2.14	2.23	2.35	2.20	18.8	19.3	20.0	20.5	19.7	18.9	19.4	19.7	20.0	19.5
Onion ext. at 0.05%	2.02	2.08	2.15	2.27	2.13	1.97	2.04	2.11	2.22	2.09	18.1	18.7	19.2	19.8	19.0	18.0	18.3	18.6	19.0	18.5
Onion ext. at 0.1%	2.03	2.10	2.16	2.30	2.15	1.98	2.05	2.12	2.23	2.10	18.3	18.8	19.3	19.9	19.1	18.1	18.4	18.7	19.1	18.6
Mean (B)	2.08	2.15	2.22	2.34		2.04	2.11	2.18	2.29		18.6	19.1	19.7	20.2		18.7	19.1	19.4	19.8	
New L.S.D. at 5%		A	B	AB			A	B	AB			A	B	AB			A	B	AB	
		0.06	0.05	0.13			0.07	0.06	0.16			0.4	0.3	0.8			0.4	0.2	0.5	
	Total sugars %										Total acidity %									
Untreated vines	16.1	16.4	16.7	17.2	16.6	16.2	16.6	17.1	17.8	16.9	0.700	0.681	0.660	0.641	0.671	0.701	0.681	0.660	0.621	0.666
Turm. Ext. at 0.05%	17.2	17.5	17.8	18.3	17.7	17.7	18.1	18.6	19.4	18.5	0.600	0.580	0.561	0.502	0.561	0.610	0.581	0.550	0.500	0.560
Turm. Ext. at 0.1%	17.2	17.6	17.9	18.4	17.8	17.8	18.2	18.7	19.5	18.6	0.598	0.577	0.560	0.500	0.559	0.609	0.580	0.549	0.499	0.559
Garlic ext. at 0.05%	16.8	17.2	17.6	18.1	17.4	17.1	17.6	18.3	19.0	18.0	0.641	0.622	0.601	0.580	0.611	0.651	0.631	0.600	0.562	0.611
Garlic Ext. at 0.1%	16.9	17.3	17.7	18.1	17.5	17.2	17.7	18.4	19.1	18.1	0.640	0.621	0.600	0.579	0.610	0.650	0.630	0.597	0.561	0.610
Onion ext. at 0.05%	16.4	16.7	17.0	17.5	16.9	16.6	17.0	17.5	18.0	17.3	0.671	0.651	0.639	0.601	0.641	0.681	0.660	0.641	0.600	0.646
Onion ext. at 0.1%	16.5	16.7	17.0	17.6	17.0	16.7	17.1	17.5	18.1	17.4	0.670	0.650	0.633	0.600	0.638	0.680	0.657	0.639	0.598	0.644
Mean (B)	16.7	17.1	17.4	17.9		17.0	17.5	18.0	18.7		0.646	0.626	0.608	0.572		0.655	0.631	0.605	0.563	
New L.S.D. at 5%	A		B		AB	A		B		AB	A		B		AB	A		B		AB
	0.3		0.2		0.5	0.4		0.3		0.8	0.017		0.015		0.040	0.016		0.014		0.037

The promoting effect of onion extract on growth and yield of Thompson seedless grapevines might be attributed to its higher own content from vitamins A, B, C, E, K and thiamine, riboflovine , volatile, oils and flavonids , that act as antioxiants protecting plant cells from death and enhancing cell division and the biosynthesis of organic foods [25].

The positive action of turmeric extract on fruiting of Thompson seedless grapevines could be ascribed to its own higher content of eugenol; limonene, protocatechuic acid, Thiamin-niacin, turmerone- caffeic acid, ascorbic acid- carotene- curcumin- coumaric acid- methoxy cinnamic acid, vanillic acid- riboflavin- terpineol- cymene zingiberene- Sesquiphellandrene, bomeal and curdioen that act as antoxidants [1].

These results with regard to the promoting effect of plant extracts on growth, nutritional status, yield and fruit quality of fruit crops are in concordance with those obtained by [27,15,16].

The great benefits of macro and micronutrients on fruiting of Thompson seedless grapevines might be attributed to their positive action on enhancing cell division, plant pigments, organic foods, enzymes, vitamins and natural hormones [2].

These findings concerning the promoting effect of nutrients on growth, vine nutritional status, yield and berries quality are in harmony with those obtained by [5,3,6,7,8].

4. CONCLUSION

The best results with regard to yield and berries quality of Thompson seedless grapevines were obtained due to spraying the vines three times with turmeric extract at 0.05% besides N, P, K, Mg, Zn, Cu, Fe, Mn.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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