

## The Beneficial Effects of Some Humic Acid, EM1 and Weed Control Treatments on Fruiting of Superior Grapevines

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**Abstract:** This study was carried out during 2010 and 2011 seasons as a trial for controlling weeds and improving yield and quality in Superior vineyard by using various soil mulches namely black polyethylene sheets, rice straw and banana leaves, chemical control with glyphosate at 2 L/ fed. and hand hoeing three times as well as using EM<sub>1</sub> and / or humic acid each at 5 ml/ vine / year. Results revealed that supplying the vines with EM<sub>1</sub> and / or humic acid was very effective in controlling weeds as well as promoting growth, vine nutritional status, yield and fruit quality in relative to the control treatment. Killing weeds by mulching the soil with different mulches namely black polyethylene sheets, rice straw and banana leaves as well as chemical control and hand hoeing was favourable for controlling weeds and improving yield quantitatively and quantitatively rather than unweeded control. For controlling weeds and improving productivity in Superior vineyards, it is advised to use black polyethylene sheets as well as fertilization with EM<sub>1</sub> and humic acid each at 5 ml/ vine / year.

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**Key words:** Beneficial effects, Humic acid , weed control, Superior grapevines, mulching, promoting growth.

### 1. Introduction

Extension and improvement of the Egyptian grape industry demands overcoming all production problems. Weed competition is one of these chronic problems. It restricts growth directly and severely limits the ability of grapevines to respond to favourable nutritional and soil moisture conditions, resulting in poor growth and reduced yields (**Oran, 1988 and Tomasi *et al.*, 2001**). Controlling weeds by soil mulching, chemical control and hand hoeing was reviewed by **El- Shammaa and Hassan (2001); Erhart and Hartl (2002); Yao *et al.* (2005); Dilley (2007); Hansen (2005) and Linjian Jiang (2010)**. Previous studies showed that using EM<sub>1</sub> and humic was very effective enhancing soil fertility and uptake of elements (**Mengel, 1984; Higa , 1995 , Wood *et al.*, 1997 and Simon *et al.*, 1999**). The promoting effect of EM<sub>1</sub> on fruiting was supported by the findings of **Bogatyre (2000); Kannaiyan (2002), Farag (2006); Ahmed *et al.* (2012); Rabie and Negm (2012); El- Khafagy (2013) and Allam- Aida *et al.* (2012)**. The results of **Omar and Abd El-aal (2005) ; Saleh *et al.* (2006), Eman *et al.* (2008); Kabeel *et al.*(2008); Abada (2009); Abd El- Aziz (2011) and Mekawy (2012)** emphasized the

beneficial effects of humic acid on fruiting of different grapevine cvs.

Hereon, the present study was planned to evaluate the effect of Effective microorganisms (EM<sub>1</sub>), humic acid and some weed control treatments on controlling weeds invaded Superior vineyards and their side effects on some vegetative growth characters, vine nutritional status, yield and fruit quality of Superior grapevines in comparison with the unweeded control.

### 2. Material and Methods

This study was carried out during 2010 and 2011 seasons on 17 years old Superior grapevines grown at El- Kanater Agricultural Research Station, ARC, Qalubia Governorate. The texture of the soil is clay (Table 1). Winter pruning system was carried out in the first week of Jan. using cane pruning system leaving 72 eyes ( 6 fruiting canes x 10 eyes + 6 renewal spurs x two eyes). Planting distance was 1.75 x 2.0 meters. Surface irrigation was followed using Nile water. Except those dealing with the present treatments all the selected vines received the usual horticultural practices.

Table (1): Analysis of the tested soil:

Constituents	Values
<b>Particle size distribution</b>	
Sand %	5.2
Silt %	23.8
Clay %	71.0
Texture	Clay
pH ( 1 : 2.5 extract)	7.7
EC ( 1 : 2.5 extract ) mmhos/ 1 cm 25 <sup>o</sup> cm	0.79
Total CaCO <sub>3</sub> %	1.96
O.M. %	1.72
Total N %	0.07
P ppm (Olsen method)	4.2
K ppm ( ammonium acetate)	605.0
Mg ppm	6.0

This experiment included two factors ( A & B). The first factor (A) involved four treatments from humic acid & EM<sub>1</sub>. namely a<sub>1</sub>) control untreated vines, a<sub>2</sub>) application of humic acid at 5 ml / vine / year, a<sub>3</sub>) application of EM<sub>1</sub> at 5 ml/ vine/ year and a<sub>4</sub>) application of humic acid at 5 ml / vine + EM<sub>1</sub> at 5 ml/ vine/ year. While, the second factor (B) contained the following twelve weed control treatments:

b<sub>1</sub> Unweeded control

b<sub>2</sub> Mulching with black polyethylene sheets for one month

b<sub>3</sub> Mulching with black polyethylene sheets for two months

b<sub>4</sub> Mulching with black polyethylene sheets for 2.5 months

b<sub>5</sub> Mulching with rice straw for one month

b<sub>7</sub> Mulching with rice straw for two months

b<sub>5</sub> Mulching with rice straw for 2.5 months

b<sub>8</sub> Mulching with banana leaves for one month

b<sub>9</sub> Mulching with banana leaves for two months

b<sub>10</sub> Mulching with banana leaves for 2.5 months

b<sub>11</sub> Chemical control with glyphosate at 2 L/ fed.

b<sub>12</sub> Hand hoeing three times started at the middle of Mar. and at three week intervals (1<sup>st</sup> last weeks of April).

Therefore, this experiment included 48 treatments, each treatment was replicated three times, one vine per each.

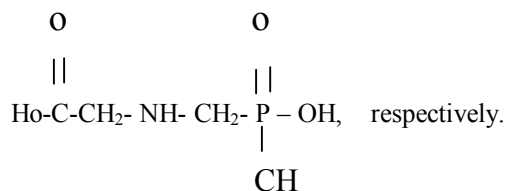
In mulching treatments, black polyethylene sheets (120 micron thick) were used to cover the area around vine ( 0.143 kg/ m<sup>2</sup>). Each sheet was 4 m and 120 m length. Rice straw and wide banana leaves mulches were setted in layer of about 15 cm height around vine trunk and under vine canopy (4.4 kg/ m<sup>2</sup>). Round up (glyphosate) as systemic post emergence herbicide at 2L / fed was applied at the middle of March and again at one month later and the used rate was added to 200 L water / fed.

The liquid stock culture of the EM<sub>1</sub> used in the study was supplied by Environ. Biotech. and contained a mixture of lactic acid bacteria *Lactobacillus plantarum*, *Candida utilis*, *Streptomyces albus*. EM<sub>1</sub> is available in a dormant state and requires activation before application and the activation was performed, as per the instruction

given by manufacturer. Activation involves the addition of 20 litres of water and 2 kilograms of Jaggery (pure cane sugar) to 1 litre of dormant EM<sub>1</sub>. The mixture was poured into a clean airtight plastic container with no air left in the container. The container was stored away from direct sunlight at ambient temperatures for 8 to 10 days. The gas was released from every day until fermentation completed. During the period of activation, a white layer of actinomycetes formed on the top of the solution accompanied by a pleasant smell and acidic pH within the range of 4.0.

Humogreen (10 % humic acid) as a source of humic acid was added once at 5 ml/ vine year via soil just after growth start.

Common and chemical names as well as chemical structure of the studied herbicide were round – up ( glyphosate ) , N- ( phosphonom ethyle) glycine and



This experiment was set up in a complete randomized block design in split plot arrangement where each treatment was replicated three times, one vine per each. The whole and subplots were the four treatments of EM<sub>1</sub> and humic acid and the twelve weed control treatments, respectively.

During both seasons the following parameters were carried out dry weight of weeds (g/m<sup>2</sup>), main shoot length (Ahmed and Morsy, 1999), leaf area (cm<sup>2</sup>), hydration ratio, total chlorophylls (mg/ 100 g F.W.) (according to Wettstein 1957 and Hiscox and Isralstam, 1979), leaf content of N, P, and K, in the leaves opposite to the basal clusters (according to Summer 1985, Cottenie *et al.*, 1985 and Wilde *et al.*, 1985), yield, cluster weight, berry weight (g.), T.S.S. % and total acidity % (A.O.A.C., 1995).

Statistical analysis was done using new L.S.D. at 5% (according to Mead *et al.* (1993).

## Results and Discussions

### 1- Total dry weight of annual weeds:

It is clear from the data in Table (2) that application of EM<sub>1</sub>, and / or humic acid each at 5 ml /vine significantly reduced total dry weight of annual weeds in relative to the check treatment. The reduction was attributed to using EM<sub>1</sub> rather than organic fertilization with humic acid. Using organic and biofertilization together was significantly preferable than using each alone in controlling weeds. Unorganic and unbiofertilization gave the maximum total dry weight of annual weeds. The minimum values were recorded when humic acid and EM<sub>1</sub> were applied together. These results were true during both seasons.

Results further reveal that controlling weeds by mulching the soil with black polyethylene, rice straw or banana leaves for one, two or 2.5 months, chemical control with glyphosate or hand hoeing for three times significantly was accompanied with depressing total dry weight of annual weeds in Superior vineyard in relative to unweeded control. The reduction was significantly associated with prolonging the periods of mulching (from one to 2.5 months). Mulching the soil with the three previous materials (black polyethylene, rice straw or banana leaves) was superior than chemical control and hand hoeing in reducing total dry weight of annual weeds. The best mulches in this respect was black

polyethylene, rice straw and banana leaves, in descending order. Hand hoeing three times surpassed chemical control in killing weeds. The maximum total dry weight of annual weeds (worst weed control treatment) was recorded on unweeded control. Mulching the soil with black polyethylene sheets for 2.5 months gave the best control of weeds i.e. the minimum values of dry weight of annual weeds.

Mulching the soil with black polyethylene sheets for 2.5 months in combined with fertilization with EM<sub>1</sub>, and humic acid each at 5ml/ vine/ year gave the lowest values and the best control of annual weeds. These results were true during both seasons.

### 2- Leaf area and hydration ratio:

Data in Tables (3 & 4) clearly show that single and combined applications of EM<sub>1</sub> and humic acid each at 5 ml / vine/ year resulted in significant promotion on both the leaf area and hydration ratio rather than the control treatment. Using EM<sub>1</sub> was significantly very favourable in enhancing such two parameters rather than using humic acid. The best results were obtained with using EM<sub>1</sub> and humic acid together. The lowest values were recorded on untreated vines.

All weed control treatments (mulches the soil with black polyethylene, rice straw or banana leaves, chemical control or hand hoeing) significantly was effective in enhancing the leaf area and hydration ratio comparing with unweeded control. Mulching with any materials was significantly preferable than chemical control and hand hoeing in enhancing such two parameters. Prolonging mulching periods from one to 2.5 months resulted in a gradual promotion on such two parameters. The best mulch was black polyethylene. Hand hoeing was superior than chemical control in promoting the leaf area and hydration ratio.

The maximum values were recorded when soil was mulched with black polyethylene sheets for 2.5 months besides fertilization with EM<sub>1</sub> and humic acid each at 5 ml /vine/ year. Unorganic and unbiofertilization besides unweeded control gave the minimum values. These results were true during both seasons.

### 3- Leaf chemical composition:

It is evident from the data in Tables (5, 6, 7 and 8) that supplying Superior grapevines with EM<sub>1</sub> and / or humic acid each at 5 ml/ vine significantly was followed by stimulating total chlorophylls as well as percentages of N, P and K in the leaves in relative to the control treatment. Using EM<sub>1</sub>, was superior than using humic acid in this respect. Combined application was significantly preferable than using each alone in enhancing these parameters.

Controlling weeds by mulching soil, chemical control or hand hoeing had significant promotion on total chlorophylls as well as nutrients namely N, P and K rather than unweeded control. Mulching the soil was superior than chemical control and hand hoeing in enhancing total chlorophylls and nutrients (N, P & K). The best mulch material was black polyethylene sheets followed by rice straw and banana leaves ranked the last position in this respect. Hand hoeing three times recorded the highest value rather than chemical control.

The maximum values were recorded when weeds were controlled by mulching with black polyethylene besides fertilization with EM<sub>1</sub> and humic acid. These results were true during both seasons.

#### 4- Yield and cluster weight:

Data in Tables (9 & 10) show that amending Superior grapevines with EM<sub>1</sub> and/ or humic acid each at 5 ml/ vine / year was accompanied with improving the yield and cluster weight in relative to the check treatment. The promotion was associated to using EM<sub>1</sub> rather than using humic acid. Combined application of EM<sub>1</sub> and humic acid was significantly favourable than using each alone in improving yield and cluster weight.

Killing weeds by mulching with different mulches (black polyethylene, rice straw or banana leaves), chemical control or hand hoeing significantly was responsible for improving yield and cluster weight rather than unweeded control. The promotion was significantly observed due to controlling weeds by mulching the soil, hand hoeing and chemical control, in descending order. Mulching the soil with black polyethylene gave the best results with regard to yield and cluster weight. Unweeded control gave the worst results.

The maximum yield (10.0 and 10.8 kg / vine during 2010 and 2011 seasons, respectively) was recorded when the weeds in the vineyard were controlled by mulching with black polyethylene besides fertilization with EM<sub>1</sub> and humic acid. Untreated vines produced yield reached 5.1 and 5.9 kg/ vine during both seasons, respectively. The percentage of increase on the yield due to using the previous promised treatment reached 96.08 and 83.05% over the check treatment during 2010 and 2011 seasons, respectively. Similar trend was noticed during both seasons.

#### 5- Quality of the berries :

Data in Tables (11 & 12 & 13) clearly show that fertilization with EM<sub>1</sub> and/ or humic acid each at 5 ml/ vine/ year caused significant promotion on quality of the berries in terms of increasing berry weight and T.S.S. % and reducing total acidity % in the berries rather than the control treatment. Using EM<sub>1</sub> was significantly preferable than using humic acid in improving fruit quality. Combine application was superior than using each alone in this connection.

Controlling weed through mulching, chemical control or hand hoeing was significantly very effective in enhancing fruit quality in terms of increasing berry weight and T.S.S. % and reducing total acidity. Mulching the soil with black polyethylene sheets, rice straw and banana leaves was significantly beneficial in improving fruit quality comparing to controlling the weeds chemically or handly. Black polyethylene sheets was the best mulches in this respect. Hand hoeing was superior than chemical control in improving fruit quality.

The best results with regard to fruit quality were obtained due to controlling weeds by mulching with black polyethylene besides fertilization with EM<sub>1</sub> and humic acid. These results were true during both seasons.

Table (2): Effect of some humic acid, effective microorganisms (E.M<sub>1</sub>) and weed control treatments on total dry weight of annual weeds (g.) /m<sup>2</sup> of Superior grapevines during 2010 and 2011 seasons.

Weed Control treatments (B)	2010					2011				
	Humic acid and EM <sub>1</sub> treatments (A)									
	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)
b <sub>1</sub> Unweeded control	450	409	203	169	<b>307.8</b>	361	327	163.5	138	<b>247.4</b>
b <sub>2</sub> Mulching with black polyethylene for one month	8.0	7.0	5.6	4.3	<b>6.2</b>	12.0	10.8	9.5	7.7	<b>10</b>
b <sub>3</sub> Mulching with black polyethylene for two months	4.4	3.9	3.4	3.0	<b>3.7</b>	8.2	11.1	6.9	6.0	<b>8.1</b>
b <sub>4</sub> Mulching with black polyethylene for 2.5 months	3.4	3.0	2.6	2.1	<b>2.8</b>	6.9	6.5	6.0	4.7	<b>6.0</b>

b <sub>5</sub> Mulching with rice straw for one month	13.3	11.2	8.6	7.3	<b>10.1</b>	17.2	15.1	12.0	10.8	<b>11.0</b>
b <sub>7</sub> Mulching with rice straw for two months	12.1	9.9	7.7	6.5	<b>9.1</b>	15.9	13.3	11.6	10.3	<b>12.8</b>
b <sub>5</sub> Mulching with rice straw for 2.5 months	9.8	7.7	6.4	5.2	<b>7.4</b>	13.8	1.2	9.9	8.6	<b>10.8</b>
b <sub>8</sub> Mulching with banana leaves for one month	30.5	29.2	27.5	25.8	<b>28.3</b>	34.4	33.1	31.0	28.8	<b>31.8</b>
b <sub>9</sub> Mulching with banana leaves for two months	27.5	24.5	22.0	19.8	<b>23.5</b>	31.4	28.4	25.4	23.2	<b>27.1</b>
b <sub>10</sub> Mulching with banana leaves for 2.5 months	23.7	20.6	17.6	15.0	<b>19.2</b>	27.1	23.7	21.5	19.8	<b>23.0</b>
b <sub>11</sub> Chemical control with glyphosate	21.5	19.8	17.6	15.5	<b>18.7</b>	25.8	24.1	21.5	16.8	<b>22.1</b>
b <sub>12</sub> Hand hoeing three times	17.2	15.5	13.3	11.6	<b>14.4</b>	20.6	18.9	16.3	14.2	<b>17.5</b>
Mean (A)	<b>51.8</b>	<b>46.8</b>	<b>27.9</b>	<b>23.5</b>		<b>47.9</b>	<b>61.4</b>	<b>28.0</b>	<b>24.1</b>	
New L.S.D. at 5%		A	B	AB			A	B	AB	
		1.8	0.9	1.8			2.0	1.2	2.4	

Table (3): Effect of some humic acid, effective microorganisms (E.M<sub>1</sub>) and weed control treatments on the average leaf area (cm<sup>2</sup>) of Superior grapevines during 2010 and 2011 seasons.

Weed Control treatments (B)	2010					2011				
	Humic acid and EM <sub>1</sub> treatments (A)									
	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)
b <sub>1</sub> Unweeded control	109.5	112	112.2	114.5	<b>112.1</b>	110.5	113.6	115.5	117.5	<b>114.2</b>
b <sub>2</sub> Mulching with black polyethylene for one month	121.0	122.3	123.0	124.9	<b>122.1</b>	123.9	125.0	126.9	128.3	<b>126.0</b>
b <sub>3</sub> Mulching with black polyethylene for two months	122.3	123.3	125.0	127.0	<b>124.4</b>	124.5	127.0	129.9	131.0	<b>128.1</b>
b <sub>4</sub> Mulching with black polyethylene for 2.5 months	123.9	125.5	128.0	129.3	<b>126.7</b>	125.6	129	131	134.9	<b>130.1</b>
b <sub>5</sub> Mulching with rice straw for one month	119.0	119.9	120.9	126.7	<b>121.6</b>	121.9	123.9	125.0	126.9	<b>124.4</b>
b <sub>7</sub> Mulching with rice straw for two months	120.0	121.0	122.7	129.3	<b>123.3</b>	122.9	125.5	127.8	129.0	<b>126.3</b>
b <sub>5</sub> Mulching with rice straw for 2.5 months	120.9	122.5	125.0	130.3	<b>124.7</b>	124.9	128.0	129.9	131.0	<b>1283.4</b>
b <sub>8</sub> Mulching with banana leaves for one month	110.2	112.0	112.5	115.4	<b>112.5</b>	111.1	111.9	113.9	118.2	<b>113.8</b>
b <sub>9</sub> Mulching with banana leaves for two months	111.0	112.6	113.6	117.7	<b>113.7</b>	111.9	112.9	115.1	119.5	<b>114.3</b>
b <sub>10</sub> Mulching with banana leaves for 2.5 months	112.1	114.3	116.2	120.0	<b>115.6</b>	112.9	115.0	117.5	121.5	<b>116.7</b>
b <sub>11</sub> Chemical control with glyphosate	115.0	117.2	118.3	123.0	<b>118.4</b>	115.6	118.0	120.7	123.0	<b>119.3</b>
b <sub>12</sub> Hand hoeing three times	118.0	120.3	122.5	125.0	<b>121.4</b>	120.5	121.0	123.9	126.9	<b>123.0</b>
Mean (A)	<b>116.9</b>	<b>118.6</b>	<b>120.0</b>	<b>123.4</b>		<b>119.3</b>	<b>120.9</b>	<b>123.4</b>	<b>125.6</b>	
New L.S.D. at 5%		A	B	AB			A	B	AB	
		1.6	1.1	2.2			1.0	1.1	2.2	

Table (4): Effect of some humic acid, effective microorganisms (E.M<sub>1</sub>.) and weed control treatments on water content of leaf (hydration ratio) of Superior grapevines during 2010 and 2011 seasons.

Weed Control treatments (B)	2010					2011				
	Humic acid and EM <sub>1</sub> treatments (A)									
	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)
b <sub>1</sub> Unweeded control	0.96	1.11	1.21	1.35	<b>1.15</b>	0.90	1.00	1.11	1.25	<b>1.06</b>
b <sub>2</sub> Mulching with black polyethylene for one month	1.11	1.26	1.38	1.47	<b>1.30</b>	1.18	1.27	1.41	1.51	<b>1.34</b>
b <sub>3</sub> Mulching with black polyethylene for two months	1.20	1.33	1.43	1.57	<b>1.38</b>	1.29	1.45	1.61	1.72	<b>1.51</b>
b <sub>4</sub> Mulching with black polyethylene for 2.5 months	1.29	1.42	1.22	1.68	<b>1.48</b>	1.40	1.51	1.62	1.75	<b>1.57</b>
b <sub>5</sub> Mulching with rice straw for one month	1.08	1.22	1.34	1.46	<b>1.27</b>	1.11	1.20	1.31	1.41	<b>1.25</b>
b <sub>7</sub> Mulching with rice straw for two months	1.19	1.29	1.42	1.56	<b>1.36</b>	1.23	1.33	1.44	1.57	<b>1.39</b>
b <sub>5</sub> Mulching with rice straw for 2.5 months	1.23	1.42	1.51	1.60	<b>1.44</b>	1.35	1.44	1.55	1.68	<b>1.50</b>
b <sub>8</sub> Mulching with banana leaves for one month	0.99	1.13	1.26	1.36	<b>1.17</b>	0.93	1.05	1.16	1.27	<b>1.10</b>
b <sub>9</sub> Mulching with banana leaves for two months	1.17	1.27	1.38	1.45	<b>1.31</b>	1.02	1.13	1.27	1.36	<b>1.19</b>
b <sub>10</sub> Mulching with banana leaves for 2.5 months	1.20	1.29	1.38	1.45	<b>1.33</b>	1.13	1.25	1.39	1.48	<b>1.31</b>
b <sub>11</sub> Chemical control with glyphosate	0.98	1.09	1.21	1.37	<b>1.16</b>	0.95	1.06	1.17	1.31	<b>1.12</b>
b <sub>12</sub> Hand hoeing three times	1.11	1.23	1.35	1.43	<b>1.28</b>	1.10	1.21	1.34	1.49	<b>1.28</b>
Mean (A)	<b>1.12</b>	<b>1.25</b>	<b>1.37</b>	<b>1.47</b>		<b>1.13</b>	<b>1.24</b>	<b>1.36</b>	<b>1.48</b>	
New L.S.D. at 5%		A	B	AB			A	B	AB	
		0.10	0.07	0.14			0.08	0.07	0.14	

Table (5): Effect of some humic acid, effective microorganisms (E.M<sub>1</sub>.) and weed control treatments on total chlorophylls (mg/ 100 gF.w) of Superior grapevines during 2010 and 2011 seasons.

Weed Control treatments (B)	2010					2011				
	Humic acid and EM <sub>1</sub> treatments (A)									
	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)
b <sub>1</sub> Unweeded control	46.4	50.4	54.1	57.2	<b>52.0</b>	49.2	53.1	56.9	60.3	<b>54.9</b>
b <sub>2</sub> Mulching with black polyethylene for one month	78.5	83.4	87.0	93.9	<b>85.7</b>	80.9	85.0	89.0	92.8	<b>86.9</b>
b <sub>3</sub> Mulching with black polyethylene for two months	82.9	87.5	92.0	95.8	<b>89.5</b>	85.8	89.7	92.0	96.9	<b>91.1</b>
b <sub>4</sub> Mulching with black polyethylene for 2.5 months	87.0	91.0	95.0	98.8	<b>92.9</b>	90.2	94.1	98.0	1.17	<b>96.0</b>
b <sub>5</sub> Mulching with rice straw for one month	65.9	70.4	74.4	78.5	<b>72.3</b>	68.9	73.0	77.6	81.4	<b>75.2</b>
b <sub>7</sub> Mulching with rice straw for two months	68.9	73.1	77.0	81.2	<b>75.0</b>	71.8	75.9	79.9	83.9	<b>77.9</b>



b <sub>5</sub> Mulching with rice straw for 2.5 months	72.4	76.4	80.7	84.9	<b>78.6</b>	75.4	79.6	84.6	88.4	<b>82.0</b>
b <sub>8</sub> Mulching with banana leaves for one month	50.1	55.1	59.5	52.9	<b>54.3</b>	52.5	55.6	58.6	61.6	<b>57.1</b>
b <sub>9</sub> Mulching with banana leaves for two months	52.9	58.5	61.0	65.1	<b>59.4</b>	55.6	58.2	63.9	65.7	<b>60.9</b>
b <sub>10</sub> Mulching with banana leaves for 2.5 months	55.2	61.9	65.0	69.8	<b>63.0</b>	59.0	62.9	66.4	70.3	<b>64.9</b>
b <sub>11</sub> Chemical control with glyphosate	57.9	61.9	66.2	70.4	<b>64.1</b>	59.9	63.8	69.8	74.1	<b>66.9</b>
b <sub>12</sub> Hand hoeing three times	61.6	66.4	71.6	75.7	<b>68.8</b>	62.9	66.9	71.9	76.2	<b>69.5</b>
Mean (A)	<b>65.0</b>	<b>69.6</b>	<b>73.6</b>	<b>77.0</b>		<b>76.0</b>	<b>71.5</b>	<b>75.7</b>	<b>79.4</b>	
New L.S.D. at 5%		A	B	AB			A	B	AB	
		1.0	1.1	2.2			1.1	1.3	2.6	

Table (6): Effect of some humic acid, effective microorganisms (E.M<sub>1</sub>) and weed control treatments on the percentage of N in the leaves of Superior grapevines during 2010 and 2011 seasons.

Weed Control treatments (B)	2010					2011				
	Humic acid and EM <sub>1</sub> treatments (A)									
	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)
b <sub>1</sub> Unweeded control	1.61	1.71	1.75	1.82	<b>1.72</b>	1.64	1.74	1.78	1.85	<b>1.75</b>
b <sub>2</sub> Mulching with black polyethylene for one month	2.00	2.10	2.18	2.21	<b>2.12</b>	2.02	2.17	2.20	2.25	<b>2.16</b>
b <sub>3</sub> Mulching with black polyethylene for two months	2.14	2.17	2.20	2.25	<b>2.19</b>	2.06	2.20	2.22	2.30	<b>2.19</b>
b <sub>4</sub> Mulching with black polyethylene for 2.5 months	2.17	2.21	2.24	2.28	<b>2.22</b>	2.09	2.23	2.25	2.34	<b>2.22</b>
b <sub>5</sub> Mulching with rice straw for one month	1.94	2.05	2.11	2.16	<b>2.06</b>	1.97	2.05	2.14	2.18	<b>2.08</b>
b <sub>7</sub> Mulching with rice straw for two months	1.98	2.07	2.13	2.18	<b>2.09</b>	1.99	2.09	2.16	2.20	<b>2.11</b>
b <sub>5</sub> Mulching with rice straw for 2.5 months	2.00	2.09	2.15	2.22	<b>2.11</b>	2.02	2.13	2.18	2.25	<b>2.14</b>
b <sub>8</sub> Mulching with banana leaves for one month	1.68	1.77	1.83	1.90	<b>1.79</b>	1.68	1.78	1.87	1.95	<b>1.82</b>
b <sub>9</sub> Mulching with banana leaves for two months	1.70	1.78	1.85	1.92	<b>1.81</b>	1.71	1.82	1.88	1.99	<b>1.85</b>
b <sub>10</sub> Mulching with banana leaves for 2.5 months	1.72	1.81	1.87	1.94	<b>1.83</b>	1.77	1.84	1.91	2.01	<b>1.88</b>
b <sub>11</sub> Chemical control with glyphosate	1.82	1.92	1.99	2.06	<b>1.94</b>	1.85	1.95	1.99	2.10	<b>1.97</b>
b <sub>12</sub> Hand hoeing three times	1.91	1.99	2.06	2.12	<b>2.02</b>	1.93	2.02	2.09	2.15	<b>2.04</b>
Mean (A)	<b>1.88</b>	<b>1.97</b>	<b>2.03</b>	<b>2.08</b>		<b>1.89</b>	<b>2.00</b>	<b>2.05</b>	<b>2.13</b>	
New L.S.D. at 5%		A	B	AB			A	B	AB	
		0.03	0.05	0.10			0.04	0.06	0.12	

Table (7): Effect of some humic acid, effective microorganisms (E.M<sub>1</sub>) and weed control treatments on the percentage of P in the leaves of Superior grapevines during 2010 and 2011 seasons.

Weed Control treatments (B)	2010					2011				
	Humic acid and EM <sub>1</sub> treatments (A)									
	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)
b <sub>1</sub> Unweeded control	0.14	0.16	0.18	0.20	<b>0.17</b>	0.15	0.17	0.19	0.21	<b>0.18</b>
b <sub>2</sub> Mulching with black polyethylene for one month	0.22	0.22	0.25	0.29	<b>0.24</b>	0.25	0.26	0.27	0.28	<b>0.26</b>
b <sub>3</sub> Mulching with black polyethylene for two months	0.25	0.25	0.27	0.30	<b>0.27</b>	0.28	0.30	0.31	0.32	<b>0.30</b>
b <sub>4</sub> Mulching with black polyethylene for 2.5 months	0.28	0.27	0.30	0.32	<b>0.29</b>	0.29	0.30	0.31	0.33	<b>0.31</b>
b <sub>5</sub> Mulching with rice straw for one month	0.21	0.24	0.27	0.29	<b>0.25</b>	0.24	0.25	0.26	0.27	<b>0.25</b>
b <sub>7</sub> Mulching with rice straw for two months	0.23	0.25	0.29	0.30	<b>0.26</b>	0.25	0.27	0.29	0.30	<b>0.35</b>
b <sub>5</sub> Mulching with rice straw for 2.5 months	0.25	0.28	0.31	0.31	<b>0.29</b>	0.26	0.28	0.30	0.31	<b>0.29</b>
b <sub>8</sub> Mulching with banana leaves for one month	0.15	0.16	0.18	0.19	<b>0.17</b>	0.18	0.19	0.20	0.21	<b>0.19</b>
b <sub>9</sub> Mulching with banana leaves for two months	0.16	0.17	0.19	0.20	<b>0.18</b>	0.20	0.22	0.23	0.24	<b>0.22</b>
b <sub>10</sub> Mulching with banana leaves for 2.5 months	0.18	0.19	0.20	0.21	<b>0.30</b>	0.22	0.24	0.25	0.26	<b>0.24</b>
b <sub>11</sub> Chemical control with glyphosate	0.19	0.21	0.23	0.26	<b>0.22</b>	0.20	0.21	0.22	0.23	<b>0.21</b>
b <sub>12</sub> Hand hoeing three times	0.21	0.23	0.26	0.28	<b>0.24</b>	0.22	0.24	0.25	0.26	<b>0.24</b>
Mean (A)	<b>0.20</b>	<b>0.22</b>	<b>0.24</b>	<b>0.26</b>		<b>0.23</b>	<b>0.24</b>	<b>0.25</b>	<b>0.26</b>	
New L.S.D. at 5%		A	B	AB			A	B	AB	
		0.02	0.04	0.08			0.02	0.03	0.06	

Table (8): Effect of some humic acid, effective microorganisms (E.M<sub>1</sub>) and weed control treatments on the percentage of K in the leaves of Superior grapevines during 2010 and 2011 seasons.

Weed Control treatments (B)	2010					2011				
	Humic acid and EM <sub>1</sub> treatments (A)									
	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)
b <sub>1</sub> Unweeded control	0.68	1.13	1.20	1.25	<b>1.06</b>	1.10	1.16	1.23	1.31	<b>1.20</b>
b <sub>2</sub> Mulching with black polyethylene for one month	1.42	1.47	1.52	1.55	<b>1.49</b>	1.49	1.55	1.60	1.64	<b>1.57</b>
b <sub>3</sub> Mulching with black polyethylene for two months	1.49	1.55	1.61	1.66	<b>1.58</b>	1.61	1.66	1.71	1.76	<b>1.68</b>
b <sub>4</sub> Mulching with black polyethylene for 2.5 months	1.55	1.60	1.66	1.69	<b>1.62</b>	1.62	1.67	1.72	1.75	<b>1.69</b>
b <sub>5</sub> Mulching with rice straw for one month	1.22	1.28	1.34	1.40	<b>1.31</b>	1.39	1.44	1.49	1.55	<b>1.47</b>
b <sub>7</sub> Mulching with rice straw for two months	1.31	1.38	1.44	1.47	<b>1.40</b>	1.44	1.48	1.53	1.58	<b>1.50</b>



b <sub>5</sub> Mulching with rice straw for 2.5 months	1.40	1.45	1.50	1.55	<b>1.47</b>	1.50	1.54	1.60	1.64	<b>1.57</b>
b <sub>8</sub> Mulching with banana leaves for one month	0.88	0.95	1.00	1.06	<b>0.97</b>	1.18	1.24	1.28	1.32	<b>1.58</b>
b <sub>9</sub> Mulching with banana leaves for two months	0.99	1.05	1.17	1.16	<b>1.07</b>	1.24	1.29	1.43	1.38	<b>1.31</b>
b <sub>10</sub> Mulching with banana leaves for 2.5 months	1.05	1.11	1.11	1.24	<b>1.14</b>	1.30	1.34	1.38	1.42	<b>1.36</b>
b <sub>11</sub> Chemical control with glyphosate	1.05	1.22	1.31	1.38	<b>1.24</b>	1.30	1.35	1.40	1.44	<b>1.37</b>
b <sub>12</sub> Hand hoeing three times	1.10	1.25	1.40	1.46	<b>1.67</b>	1.36	1.42	1.50	1.55	<b>1.46</b>
Mean (A)	<b>1.44</b>	<b>1.29</b>	1.58	<b>1.40</b>		<b>1.38</b>	<b>1.65</b>	<b>1.48</b>	<b>1.77</b>	
New L.S.D. at 5%		A	B	AB			A	B	AB	
		0.04	0.05	0.10			0.05	0.06	0.12	

Table (9): Effect of some humic acid, effective microorganisms (E.M<sub>1</sub>) and weed control treatments on the yield per vine (kg) of Superior grapevines during 2010 and 2011 seasons.

Weed Control treatments (B)	2010					2011				
	Humic acid and EM <sub>1</sub> treatments (A)									
	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)
b <sub>1</sub> Unweeded control	5.1	5.2	5.6	5.7	<b>5.4</b>	5.9	5.9	6.3	6.5	<b>6.1</b>
b <sub>2</sub> Mulching with black polyethylene for one month	7.6	7.9	8.2	8.4	<b>8.0</b>	8.9	9.5	9.8	10.0	<b>9.5</b>
b <sub>3</sub> Mulching with black polyethylene for two months	8.7	9.0	9.4	9.9	<b>9.2</b>	9.8	10.4	10.7	10.7	<b>10.4</b>
b <sub>4</sub> Mulching with black polyethylene for 2.5 months	9.2	9.6	9.8	10.0	<b>9.7</b>	10.2	10.5	10.7	10.8	<b>10.5</b>
b <sub>5</sub> Mulching with rice straw for one month	6.5	7.0	7.4	7.6	<b>7.1</b>	7.5	7.8	8.4	8.9	<b>8.1</b>
b <sub>7</sub> Mulching with rice straw for two months	7.6	8.1	8.4	8.6	<b>8.2</b>	7.8	8.3	8.7	9.1	<b>8.5</b>
b <sub>5</sub> Mulching with rice straw for 2.5 months	8.1	8.5	9.0	9.2	<b>8.7</b>	8.6	9.3	9.9	10.2	<b>9.5</b>
b <sub>8</sub> Mulching with banana leaves for one month	5.7	6.0	6.2	6.5	<b>6.1</b>	6.3	6.6	7.0	7.4	<b>6.8</b>
b <sub>9</sub> Mulching with banana leaves for two months	6.3	6.6	6.9	7.2	<b>6.7</b>	6.7	7.1	7.5	7.9	<b>7.3</b>
b <sub>10</sub> Mulching with banana leaves for 2.5 months	6.4	6.8	7.1	7.5	<b>7.0</b>	6.9	7.4	8.0	8.3	<b>6.7</b>
b <sub>11</sub> Chemical control with glyphosate	5.4	6.8	7.2	7.4	<b>6.7</b>	6.2	6.5	7.1	7.5	<b>6.8</b>
b <sub>12</sub> Hand hoeing three times	6.7	7.3	<b>7.7</b>	8.1	<b>7.4</b>	6.7	7.0	7.5	8.0	<b>7.3</b>
Mean (A)	<b>6.9</b>	<b>7.4</b>	<b>7.7</b>	<b>8.0</b>		<b>7.6</b>	<b>8.0</b>	<b>8.5</b>	<b>8.8</b>	
New L.S.D. at 5%		A	B	AB			A	B	AB	
		0.3	0.4	0.8			0.3	0.4	0.8	

Table (10): Effect of some humic acid, effective microorganisms (E.M<sub>1</sub>) and weed control treatments on the average cluster weight (g) of Superior grapevines during 2010 and 2011 seasons.

Weed Control treatments (B)	2010					2011				
	Humic acid and EM <sub>1</sub> treatments (A)									
	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)
b <sub>1</sub> Unweeded control	281	284	295	301	<b>290.2</b>	289	292	302	311	<b>298.5</b>
b <sub>2</sub> Mulching with black polyethylene for one month	360	371	384	395	<b>377.5</b>	369	380	391	399	<b>384.7</b>
b <sub>3</sub> Mulching with black polyethylene for two months	380	392	404	416	<b>398</b>	390	400	405	407	<b>400.5</b>
b <sub>4</sub> Mulching with black polyethylene for 2.5 months	400	412	415	416	<b>410.7</b>	392	405	407	408	<b>403</b>
b <sub>5</sub> Mulching with rice straw for one month	320	333	350	362	<b>341.2</b>	331	340	350	360	<b>345.2</b>
b <sub>7</sub> Mulching with rice straw for two months	335	350	364	375	<b>356</b>	341	351	361	370	<b>355.7</b>
b <sub>5</sub> Mulching with rice straw for 2.5 months	350	399	380	390	<b>371.5</b>	359	371	381	391	<b>375.5</b>
b <sub>8</sub> Mulching with banana leaves for one month	280	291	301	315	<b>246.7</b>	290	299	309	320	<b>304.5</b>
b <sub>9</sub> Mulching with banana leaves for two months	288	300	312	325	<b>306.2</b>	299	310	320	331	<b>315</b>
b <sub>10</sub> Mulching with banana leaves for 2.5 months	290	309	322	339	<b>315</b>	300	309	319	330	<b>314.5</b>
b <sub>11</sub> Chemical control with glyphosate	295	311	325	336	<b>316.7</b>	305	316	327	340	<b>322</b>
b <sub>12</sub> Hand hoeing three times	305	322	336	350	<b>328.2</b>	317	329	340	351	<b>334.2</b>
Mean (A)	<b>324</b>	<b>337</b>	<b>349</b>	<b>360</b>		<b>331.8</b>	<b>341.8</b>	<b>351</b>	<b>350</b>	
New L.S.D. at 5%		A	B	AB			A	B	AB	
		10.1	11.1	22.2			9.2	10.0	20.0	

Table (11): Effect of some humic acid, effective microorganisms (E.M<sub>1</sub>) and weed control treatments on the average berry weight(g.) of Superior grapevines during 2010 and 2011 seasons.

Weed Control treatments (B)	2010					2011				
	Humic acid and EM <sub>1</sub> treatments (A)									
	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)
b <sub>1</sub> Unweeded control	1.99	2.03	2.05	2.08	<b>2.03</b>	2.02	2.05	2.08	2.09	<b>2.06</b>
b <sub>2</sub> Mulching with black polyethylene for one month	2.26	2.30	2.32	2.33	<b>2.30</b>	2.29	2.32	2.35	2.38	<b>2.33</b>
b <sub>3</sub> Mulching with black polyethylene for two months	2.30	2.33	2.36	2.40	<b>2.34</b>	2.32	2.35	2.38	2.40	<b>2.36</b>
b <sub>4</sub> Mulching with black polyethylene for 2.5 months	2.32	2.36	2.40	2.46	<b>2.38</b>	2.35	2.38	2.41	2.44	<b>2.40</b>
b <sub>5</sub> Mulching with rice straw for one month	2.16	2.20	2.23	2.25	<b>2.21</b>	2.21	2.24	2.77	2.30	<b>2.25</b>
b <sub>7</sub> Mulching with rice straw for	2.18	2.21	2.23	2.25	<b>2.22</b>	2.24	2.27	2.30	2.33	<b>2.28</b>

two months										
b <sub>5</sub> Mulching with rice straw for 2.5 months	2.20	2.23	2.25	2.28	<b>2.24</b>	2.27	2.30	2.33	2.35	<b>2.31</b>
b <sub>8</sub> Mulching with banana leaves for one month	2.03	2.05	2.08	2.10	<b>2.06</b>	2.06	2.09	2.11	2.13	<b>2.10</b>
b <sub>9</sub> Mulching with banana leaves for two months	2.05	2.08	2.11	2.14	<b>2.09</b>	2.09	2.12	2.15	2.18	<b>2.13</b>
b <sub>10</sub> Mulching with banana leaves for 2.5 months	2.06	2.08	2.11	2.14	<b>2.10</b>	2.11	2.15	2.18	2.20	<b>2.16</b>
b <sub>11</sub> Chemical control with glyphosate	2.09	2.12	2.15	2.18	<b>2.13</b>	2.14	2.17	2.20	2.22	<b>2.18</b>
b <sub>12</sub> Hand hoeing three times	2.13	2.16	2.18	2.21	<b>2.17</b>	2.17	2.20	2.23	2.26	<b>2.21</b>
Mean (A)	<b>2.14</b>	<b>2.18</b>	<b>2.20</b>	<b>2.23</b>		<b>2.19</b>	<b>2.22</b>	<b>2.25</b>	<b>2.27</b>	
New L.S.D. at 5%		A	B	AB			A	B	AB	
		0.02	0.03	0.06			0.02	0.03	0.06	

Table (12): Effect of some humic acid, effective microorganisms (E.M<sub>1</sub>) and weed control treatments on the percentage of total soluble solids in the grapes of Superior grapevines during 2010 and 2011 seasons.

Weed Control treatments (B)	2010					2011				
	Humic acid and EM <sub>1</sub> treatments (A)									
	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)
b <sub>1</sub> Unweeded control	17.5	17.8	18.1	18.4	<b>17.9</b>	17.8	18.1	18.4	18.6	<b>18.2</b>
b <sub>2</sub> Mulching with black polyethylene for one month	20.2	20.5	20.8	21.0	<b>20.6</b>	20.6	20.9	21.2	21.5	<b>21.0</b>
b <sub>3</sub> Mulching with black polyethylene for two months	20.5	20.8	21.0	21.5	<b>20.9</b>	21.0	21.4	21.7	22.0	<b>21.5</b>
b <sub>4</sub> Mulching with black polyethylene for 2.5 months	20.8	21.0	21.3	21.4	<b>21.1</b>	21.3	21.5	21.8	22.0	<b>21.6</b>
b <sub>5</sub> Mulching with rice straw for one month	19.5	19.9	20.3	20.5	<b>20.0</b>	20.0	20.2	20.5	20.8	<b>20.4</b>
b <sub>7</sub> Mulching with rice straw for two months	19.8	20.1	20.4	20.6	<b>20.2</b>	20.2	20.5	20.8	21.0	<b>20.6</b>
b <sub>5</sub> Mulching with rice straw for 2.5 months	20.0	20.5	20.9	21.2	<b>20.6</b>	20.4	20.7	21.0	21.2	<b>20.8</b>
b <sub>8</sub> Mulching with banana leaves for one month	17.8	18.2	18.5	18.9	<b>18.3</b>	18.2	18.5	18.9	19.0	<b>18.6</b>
b <sub>9</sub> Mulching with banana leaves for two months	18.2	18.5	19.0	19.2	<b>18.7</b>	18.6	18.8	19.0	19.1	<b>18.9</b>
b <sub>10</sub> Mulching with banana leaves for 2.5 months	18.5	19.0	19.3	19.5	<b>19.7</b>	18.9	19.1	19.3	19.5	<b>19.2</b>
b <sub>11</sub> Chemical control with glyphosate	18.7	19.0	19.2	19.5	<b>19.1</b>	19.1	19.4	19.6	19.9	<b>19.5</b>
b <sub>12</sub> Hand hoeing three times	19.0	19.3	19.5	19.9	<b>19.4</b>	19.5	19.8	20.1	20.3	<b>19.9</b>
Mean (A)	<b>19.2</b>	<b>19.5</b>	<b>19.8</b>	<b>20.1</b>		<b>19.6</b>	<b>19.9</b>	<b>20.1</b>	<b>20.4</b>	
New L.S.D. at 5%		A	B	AB			A	B	AB	
		0.3	0.4	0.8			0.2	0.3	0.6	

Table (13): Effect of some humic acid, effective microorganisms (E.M<sub>1</sub>) and weed control treatments on the percentage of total acidity in the grapes of Superior grapevines during 2010 and 2011 seasons.

Weed Control treatments (B)	2010					2011				
	Humic acid and EM <sub>1</sub> treatments (A)									
	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)	a <sub>1</sub> Control	a <sub>2</sub> Humic acid	a <sub>3</sub> EM <sub>1</sub>	a <sub>4</sub> Both	Mean (B)
b <sub>1</sub> Unweeded control	0.701	0.691	0.680	0.671	<b>0.686</b>	0.711	0.701	0.581	0.671	<b>0.691</b>
b <sub>2</sub> Mulching with black polyethylene for one month	0.580	0.571	0.561	0.550	<b>0.565</b>	0.621	0.611	0.601	0.588	<b>0.605</b>
b <sub>3</sub> Mulching with black polyethylene for two months	0.560	0.550	0.439	0.528	<b>0.544</b>	0.611	0.601	0.588	0.572	<b>0.593</b>
b <sub>4</sub> Mulching with black polyethylene for 2.5 months	0.545	0.535	0.525	0.515	<b>0.530</b>	0.597	0.586	0.577	0.560	<b>0.580</b>
b <sub>5</sub> Mulching with rice straw for one month	0.605	0.595	0.581	0.571	<b>0.583</b>	0.671	0.667	0.652	0.641	<b>0.657</b>
b <sub>7</sub> Mulching with rice straw for two months	0.600	0.588	0.577	0.565	<b>0.582</b>	0.660	0.650	0.641	0.622	<b>0.643</b>
b <sub>5</sub> Mulching with rice straw for 2.5 months	0.589	0.577	0.567	0.555	<b>0.572</b>	0.641	0.631	0.620	0.611	<b>0.625</b>
b <sub>8</sub> Mulching with banana leaves for one month	0.685	0.675	0.665	0.655	<b>0.670</b>	0.701	0.682	0.671	0.661	<b>0.678</b>
b <sub>9</sub> Mulching with banana leaves for two months	0.670	0.660	0.650	0.641	<b>0.655</b>	0.691	0.681	0.671	0.661	<b>0.676</b>
b <sub>10</sub> Mulching with banana leaves for 2.5 months	0.654	0.641	0.631	0.622	<b>0.637</b>	0.681	0.671	0.651	0.641	<b>0.661</b>
b <sub>11</sub> Chemical control with glyphosate	0.650	0.637	0.627	0.615	<b>0.632</b>	0.671	0.661	0.650	0.640	<b>0.655</b>
b <sub>12</sub> Hand hoeing three times	0.634	0.618	0.605	0.591	<b>0.612</b>	0.650	0.639	0.627	0.615	<b>0.633</b>
Mean (A)	<b>0.622</b>	<b>0.611</b>	<b>0.600</b>	<b>0.590</b>		<b>0.659</b>	<b>0.648</b>	<b>0.636</b>	<b>0.623</b>	
New L.S.D. at 5%		A	B	AB			A	B	AB	
		0.009	0.009	0.018			0.009	0.010	0.020	

#### 4. Discussion:

Controlling weeds in vineyards was beneficial for protecting the trees from insects and diseases attack, competition on nutrients, light and water and root damage (Oren, 1988). Therefore, there are many methods of weed control including mulching, chemical control and hand hoeing. The beneficial effects of mulching for controlling weeds and improving yield and fruit quality of Superior grapevines might be attributed to its positive action on conserving soil moisture and changing temperature conditions of the soil and of the air lying just above soil, reducing of soil erosion and reflecting light of the appropriate spectrum (Tomasi *et al.*, 2001). These results are in agreement with those obtained by El-Shammaa and Hassan (2001), Erhart and Hartl (2002), Yao *et al.* (2005), Dilley (2007), Tesic *et al.* (2007), Derr (2008), Hansen (2005); and Linjian Jiang (2010).

The positive action of using EM<sub>1</sub> and humic acid in improving soil fertility in terms of increasing water retention soil aggregation, soil water content, organic matter, nutrient uptake and activity of microflora and reducing soil pH (Mengel, 1984; Higa, 1995; Wood *et al.*, 1997 and Simon *et al.*, 1999) surely reflected on enhancing growth and fruiting of Superior grapevines. These results are in harmony with those obtained by Bogatyre (2000); Kannaiyan (2002); Farag (2006); Ahmed *et al.* (2012); Rabie and Negm (2012); El-Khafagy (2013) and Allam-Aida *et al.* (2012) who worked on EM<sub>1</sub> as well as Omar and Abd Elaal (2005); Saleh *et al.* (2006), Eman *et al.* (2008), Kabeel *et al.* (2008); Abada (2009); Abd El-Aziz (2011) and Mekawy (2012) who worked on humic acid.

**Conclusion:**

For controlling weeds in Superior vineyards as well as improving yield quantitatively and qualitatively, it is advised to use black polyethylene soil mulch for 2.5 months besides fertilization with EM<sub>1</sub> and humic acid each at 5 ml/ vine/ year.

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