RESPONSE OF SUPERIOR GRAPEVINES GROWN UNDER MINIA REGION CONDITIONS TO SPRAYING WHEAT SEED SPROUT EXTRACT AND NANO-BORON

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ABSTRACT

This investigation was conducted over two seasons of 2016 and 2017 to elucidate the impact of single and combined applications of wheat seed sprout at 0.5 to 2% and nano-boron at 0.025 to 0.1 % in fruiting of Superior grapevines. The selected vines received three sprays at growth start, just after berry setting and one month later. Carrying out three sprays of wheat seed sprout at 0.5 to 2 % and/or nano-boron at 0.025 to 0.1% substantially improved main shoot length, surface area, N, P, K, B, yield, cluster weight and dimensions, berry weight, while reduced shot berries % and total acidity % relative to the control treatment. The promotion on growth, yield and berries quality was in proportional to the increase in concentrations of wheat seed sprout and nano-boron. A slight effect on these parameters was observed with increasing concentrations of wheat seed sprout from 1 to 2 % and nano-boron from 0.05 to 0.1 %. Using wheat seed sprout extract was preferable than using nano-boron in this respect. Combined application was superior than using each material alone in this connection. Carrying out three sprays at growth start, just after berry setting and one month later of a mixture of wheat seed sprout at 1% and nano-boron at 0.05 % was necessary for promoting yield and berries quality and at the same time reducing shoot berries of Superior grapevines grown under Minia region.

Keywords: Wheat seed sprout extract, nano-boron, yield, shot berries quality, Superior grapevines.

INTRODUCTION

Recently many trials were established for amending different grapevine cvs trees with their requirements from different mineral and organic foods via natural extracts such as crop seed sprout extracts as a partial replacement of chemical fertilizers for depressing environment pollution.

Recent studies emphasized the beneficial effects of using extracts of seed sprout crops namely wheat, barley, fenugreek and rocket for alleviating the adverse effects of unsuitable environmental conditions and a

ll stresses around the vines on fruiting of fruit crops. Sprouting of seeds may alter the content and composition of proteins, fats and amino acids and enhance the biosynthesis of essential amino acids like glutamic acid, tryptophan and arginine, vitamins B & C and most essential macro and micro nutrients and makes them high avialble to fruit crops (Cazuola *et al*., 2004; Cairney, 2005; Biommerson, 2007 and Abdallah, 2008).

Seed sprout of various crops is beneficial in enhancing growth, yield and fruit quality of different fruit crops (El-Khawaga and Mansour, 2014; Ahmed and Habasy-Randa, 2014; Ahmed and Gad El-Kareem, 2014; Refaai, 2014; Mohamed, 2014a; Abd El-Rahman, 2015 and Mohamed, 2015).

Boron is considered an outstanding essential nutrients for fruit crops, since it is responsible for germinating pollen grains, building and translocation of sugars, biosynthesis and movement of hormones, enhancing uptake of water and various nutrients, tolerance of plants to various disorders and cell division (Pilbean and Kirkby, 1983; Nijjar, 1985; Dalbo, 1992; Blevius and Lukaszweski, 1998; Perical *et al*., 2001 and Ahmed *et al*., 2009).

In addition, boron application was very effective for promoting fruit setting, yield and fruit quality in various grapevine cvs (Shoeib and El-Sayed, 2003; El-Sawy, 2009; Abd El-Wahab, 2010; El-Kady-Hanaa, 2011; Ahmed *et al*., 2012; Abd Elaal, 2012; Mohamed- Ebtesam, 2012; Nikkhah *et al*., 2013; Abdelaal *et al*., 2013; Mohamed, 2014b; Akl *et al*., 2014; Farahat, 2017 and Khalil, 2017).

The objective of this study was testing the impact of wheat seed sprout extract and/or nano-boron on growth, vine nutritional status, yield and quality parameters of Superior grapevines.

MATERIALS AND METHODS

This investigation was carried out during 2016 and 2017 seasons on sixty uniform in vigour 10-years old Superior grapevines grown in a private vineyard located at Matay district, Minia Governorate where the texture of the soil is clay. The selected vines are planted at 2 x 3 m apart. Surface irrigation system using Nile water was conducted. Pruning was adjusted to 84 eyes /vine (on the basis of 6 fruiting canes x 12 eyes plus six renewal spurs x 2 eyes). Cane pruning with the assistance of Gable supporting system was followed. Winter pruning was carried out at the first week of Jan. during both seasons.

This study contained the following ten treatments arranged as follows:

- Control
- Spraying wheat seed sprout extract at 0.5 % (5 g/L)
- Spraying wheat seed sprout extract at 1.0 % (10 g/L)
- Spraying wheat seed sprout extract at 2.0 % (20 g/L)
- Spraying nano-boron at 0.025 % (0.25 g/L)
- Spraying nano-boron at 0.05 % (0.5 g/L)
- Spraying nano-boron at 0.1 % (1.0 g/L)
- Spraying wheat seed sprout extract at 0.05 % + nano-boron at 0.025 %
- Spraying wheat seed sprout extract at 1.0 % + nano-boron at 0.05 %
- Spraying wheat seed sprout extract at 2.0 % + nano-boron at 0.1 %

Each treatment was replicated three times, two vines per each. Both wheat seed sprout extract and nano-boron were sprayed three times at growth start (1st week of March), just after berry setting (2nd week of April) and one

month later (2nd week of May). Triton B as agent was added to all spraying solutions at 0.05% and spraying was done till runoff. Wheat seed sprout extract was prepared by sowing the seeds in open trays and left under shade conditions till ten days, then the sprout (15 cm height) were picked and the known weight was homogenized with distilled water using an electric blender for five minutes, filtrated and kept under 4^0C in the refrigerator till application. Boron was applied in the form of boric acid (17 % B).

Randomized complete block design (RCBD) was adopted where the experiment included ten treatments and each treatment was replicated three times, two vines per each. Analysis of soil (Cottenie *et al*., 1982) and wheat seed sprout (A.O.A.C. 2000) are shown in Tables (1a and 1b).

Table (1-a): Analysis of the tested soil

Constituents	**Values**
Sand %	6.1
Silt %	13.9
Clay %	80.0
Texture	Clay
O.M. %	2.80
pH (1:2.5 extract)	7.52
EC (1:2.5 extract) mm hoc/1cm 25^0C	0.91
$CaCo_3$%	1.09
Total N%	0.11
Available P (ppm)	4.0
Available K (ppm)	451

Table (1-b): Chemical analysis of wheat seed sprout

Constituents	**Values (mg/100gF.W)**
Aspartic acid	3.1
Arginine	3.9
Alanine	3.3
Glutamic acid	5.2
Thiamine (B_1)	3.0
Riboflavin (B_2)	3.0
Pyridoxine (B_6)	2.0
Vitamin E	0.52
K	641
P	580
Mg	316
Ca	288
Fe	211
Zn	216

During both seasons, the following parameters were measured:

- Vegetative growth aspects namely main shoot length and surface area (Ahmed and Morsy, 1999).
- Percentages of N, P and K and B (as ppm) on dry weight basis was rocorded in the twenty leaves from those leaves opposite to the basal clusters at(first week of june)(Balo *et al*, 1988 and Cottenie *et al*, 1982).and wood ripening coefficient(Bouard 1966)
- Yield/ vine (kg.). as well as cluster weight and dimensions (length & shoulder, in cm).
- Percentage of shot berries.
- Berry weight (g.) and dimensions (longitudinal and equatorial in cm).
- Percentages of T.S.S, reducing sugars and total acidity (as g tartaric acid/100 ml juice) (A.O.A.C., 2000).

Statistical analysis was done according to (Snedecor and Cochran, 1967). Treatment means were compared using new L.S.D. at 5 %.

RESULTS AND DISCUSSION

Wood ripening coefficient

. It is clear from the data in Table (2) that amending the vines with wheat seed sprout extract at 0.5 to 2.0 % or nano-boron at 0.025 to 0.1 % significantly was very effective in wood ripening coefficient over the control. The reduction was associated with increasing concentration of nano-boron. increasing concentration of wheat seed sprout extract was significantly in increasing wood ripening coefficient. The highest increase on wood ripening coefficient was observed due to using each material alone rather than using both materials together. Increasing concentrations of wheat seed sprout extract from 1 to 2 % and reduce concentrations nano-boron from 0.1 to 0.05 % significant increasing on wood ripening coefficient. The lowest values of wood ripening coefficient (0.65 & 0.63) were recorded on the vines that treated with both materials at lower concentrations during both seasons, respectively. The highest values (0.92 & 0.90) were recorded on on the vines that treated with Nano boron at 0.025 % during 2016 and 2017 seasons, respectively

- **Main shoot length and surface area:**

It is clear from the data in Table (2) that subjecting Superior grapevines to wheat seed sprout extract at 0.5 to 2.0 % and/or nano-boron at 0.025 to 0.1% had significant stimulation on the main shoot length and surface area comparing to the control treatment. Spraying wheat seed sprout extract was significantly superior than treating with treating with nano-boron in enhancing such two growth traits. Significant differences on such two growth traits were observed among all treatments expect among the higher two concentrations of wheat seed sprout extract namely 1 and 2% as well as nano-boron namely 0.05 and 0.1 %. Combined applications were significantly very effective in enhancing such two growth aspects over the application of each

material alone. The maximum values of main shoot length (136.3 & 138.3 cm) and surface area (21.30 & 20.40 m^2) were observed due to using both materials together at higher concentrations. The untreated vines produced the lowest values. These results were true during both seasons.

Fruit set%

It is clear from the data in Table (2) that subjecting Superior grapevines to wheat seed sprout extract at 0.5 to 2.0 % and/or nano-boron at 0.025 to 0.1% had significant stimulation on **Fruit set%** comparing to the control treatment. Spraying wheat seed sprout extract was significantly superior than treating with treating with nano-boron in enhancing such two growth traits. Significant differences on such two growth traits were observed among all treatments expect among the higher two concentrations of wheat seed sprout extract namely 1 and 2% as well as nano-boron namely 0.05 and 0.1 %. Combined applications were significantly very effective in increase fruit set % over the application of each material alone. The maximum values of **Fruit set%** (14.13 & 13.80 %) were observed due to using both materials together at higher concentrations. The untreated vines produced the lowest values. These results were true during both seasons.

- **Leaf content of N, P, K and B:**

Data in Table (3) clearly show that single and combined applications of wheat seed sprout extract at 0.5 to 2.0 % and nano-boron at 0.025 to 0.1% significantly was followed by enhancing nutrients namely N, P, K and B over the control treatment. There was a gradual promotion on these nutrients with increasing concentrations of wheat seed sprout extract and nano-boron. Increasing concentrations of wheat seed sprout extract from 1 to 2 % and nano-boron from 0.05 to 0.1 % had unsignificant promotion on these nutrients. Using wheat seed sprout extract significantly enhanced all nutrients except B that tended to enhance with Application of nano-boron than using wheat seed sprout extract. Using both together was significantly superior than using each alone in this respect. The maximum N (2.11 & 2.16 %), P (0.203& 0.212 %), K (1.61 & 1.66 %) and B (29.0 & 29.2 ppm) were observed on the vines that received a mixture of wheat seed sprout extract at 2 % and nano-boron at 0.1 %, during both seasons, respectively. The lowest values were recorded on untreated vines. Similar results were announced during 2016 and 2017 seasons.

- **Yield and cluster aspects:**

*Data in Table (*4) obviously reveal that yield expressed in weight and number of clusters/vine (in the second season) as well as weight, length and shoulder of cluster significantly were improved in response to treating the vines with wheat seed sprout extract at 0.5 to 2.0 % and/or nano-boron at 0.025 to 0.1 % relative to the control treatment. Treating the vines with wheat seed sprout extract was significantly preferable than using nano-boron in

improving yield and cluster aspects. The promotion was related to the increase in concentrations of both materials. A slight promotion was observed as yield and cluster aspects among the higher two concentrations of wheat seed sprout extract namely 1 & 2 % and nano-boron namely 0.05 and 0.1 %. Therefore, it is advised from economical point of view to treat Superior grapevines with wheat seed sprout extract at 1 % plus nano-boron at 0.05 %. Under such promised treatment, yield per vine reached 10 & 14.9 kg while in the untreated vines yield reached 7.9 & 7.9 kg during 2016 and 2017 seasons, respectively. The percentage of increment on the yield due to using the promised previous treatment over the check treatment reached 66.6 and 88.6% during both seasons, respectively. These results were true during both seasons. Number of clusters per vine in the first season was significantly unaffected.

- **Percentage of shot berries:**

It is evident from the data in Table (4) that amending the vines with wheat seed sprout extract at 0.5 to 2.0 % and/or nano-boron at 0.025 to 0.1 % significantly was very effective in controlling shot berries % over the control. The reduction was associated with increasing concentration of each material. Using wheat seed sprout extract was significantly favourable than using nano-boron in reducing shot berries %. A great reduction on shot berries % was observed due to using both materials together rather than using each material alone. Increasing concentrations of wheat seed sprout extract from 1 to 2 % and nano-boron from 0.05 to 0.1 % failed to show significant reduction on such undesirable phenomenon. The lowest values of shot berries (2.7 & 2.7 %) were recorded on the vines that treated with both materials at higher concentrations during both seasons, respectively. The highest values (8.1 & 8.0 %) were recorded on untreated vines during 2016 and 2017 seasons, respectively. Similar trend was noticed during both seasons.

- **Physical and chemical characteristics of the berries:**

It is reveal from the data in Table (5) that using wheat seed sprout extract at 0.5 to 2.0 % and/or nano-boron at 0.025 to 0.1 % significantly was very effective in improving berries quality in terms of increasing berry weight and dimensions, T.S.S. % and reducing sugars % and decreasing total acidity % relative to the control treatment. Using wheat seed sprout extract was significantly favourable than using nano-boron in this respect. The promotion on berries quality was significantly associated with increasing concentrations of each material without significant promotion on quality parameters among the higher two concentrations of each material. The best results with regard to quality of the berries were observed due using both materials together at medium concentrations namely 1 % for wheat seed sprout extract and 0.05 % for nano-boron. These results were true during both seasons.

DISCUSSION:

The beneficial effects of wheat seed sprout on fruiting of Superior grapevines might be attributed to its positive action on enhancing the tolerance of plants to biotic and abiotic stresses. It's had higher content from specific proteins, fats, amino acids (glutamic acid, tryptophan and arginine), vitamins B & C and most essential macro and micro nutrients (Cazuola *et al*., 2004; Cairney, 2005 and Abdallah, 2008).

The promoting effect of wheat seed sprout extract on growth, vine nutritional status, yield and fruit quality was emphasized by the results of El-Khawaga and Mansour (2014; Ahmed and Habasy-Randa (2014); Refaai (2014); Abd El-Rahman (2015) and Mohamed (2015).

Boron is considered on outstanding essential nutrients for fruit crops, since it is responsible for germinating pollen grains, building and translocation of sugars, biosynthesis and movement of hormones, enhancing uptake of water and various nutrients, tolerance of plants to various disorders and cell division (Pilbeam and Kirkby, 1983; Nijjar, 1985; Dalbo, 1992; Blevius and Lukaszweski, 1998; Perica *et al*., 2001 and Ahmed *et al*., 2009).

These results are in harmony with those obtained by Shoeib and El-Sayed, (2003); Abd El-Wahab, (2010); El-Kady-Hanaa, (2011); Ahmed *et al*., (2012); Abd El-Aal, (2012); Mohamed- Ebtesam, (2012); Nikkhah *et al*., (2013); Abdelaal *et al*., (2013); Mohamed, (2014b); Akl *et al*., (2014); Farahat, (2017) and Khalil, (2017).

Conclusion:

Carrying out three sprays at growth start, just after berry setting and one month later of a mixture of wheat seed sprout at 1% and nano-boron at 0.05 % was necessary for promoting yield and berries quality and at the same time reducing shot berries of Superior grapevines grown under Minia region conditions.

Table (2): Effect of single and combined applications of wheat seed sprout and nano-boron on wood ripening coefficient, main shoot length, Surface area and o Fruit set % of Superior grapevines during 2016 & 2017 seasons.

Treatment	wood ripening coefficient		Main shoot length (cm)		Surface area $(m)^2$		Fruit set%	
	2016	2017	2016	2017	2016	2017	2016	2017
Control	0.76	0.74	121.0	122.3	16.50	16.17	8.37	7.77
Wheat seed sprout at 0.5 %	0.78	0.76	127.0	128.3	17.33	16.97	8.77	8.33
Wheat seed sprout at 1.0 %	0.81	0.79	129.9	131.2	17.27	17.00	9.00	8.77
Wheat seed sprout at 2.0 %	0.86	0.84	130.0	131.3	18.20	18	9.67	9.3
Nano boron at 0.025 %	0.92	0.90	123.0	124.4	17.50	17.03	10.53	10.17
Nano boron at 0.05 %	0.88	0.86	124.9	126.2	17.63	17.37	11.67	10.90
Nano boron at 0.1 %	0.68	0.66	125.0	126.3	18.03	17.70	12.20	11.70
Both at low conc.	0.65	0.63	133.0	135.9	18.87	18.53	12.57	12.00
Both at medium conc.	0.73	0.71	136.0	138.0	20.00	19.67	13.10	12.27
Both at high conc.	0.72	0.70	136.3	138.3	21.30	20.40	14.13	13.80
New L.S.D at 5%	0.03	0.03	**1.1**	**0.8**	**0.33**	**0.33**	**0.33**	**0.33**

Table (3): Effect of single and combined applications of wheat seed sprout and nano-boron on leaf content of N, P and K (as %) and B (as ppm) of Superior grapevines during 2016 & 2017 seasons

Treatment	Leaf N %		Leaf P %		Leaf K %		Leaf B (ppm)	
	2016	2017	2016	2017	2016	2017	2016	2017
Control	1.60	1.64	0.119	0.130	1.11	1.15	24.0	23.7
Wheat seed sprout at 0.5 %	1.85	1.89	0.152	0.163	1.37	1.41	24.6	24.3
Wheat seed sprout at 1.0 %	1.92	1.97	0.163	0.175	1.44	1.48	25.2	24.9
Wheat seed sprout at 2.0 %	1.93	1.98	0.166	0.176	1.45	1.49	25.3	25.0
Nano boron at 0.025 %	1.67	1.71	0.130	0.139	1.17	1.21	26.2	25.9
Nano boron at 0.05 %	1.75	1.79	0.140	0.151	1.25	1.29	27.0	27.0
Nano boron at 0.1 %	1.76	1.80	0.141	0.152	1.26	1.30	27.1	27.1
Both at low conc.	2.01	2.06	0.189	0.201	1.52	1.56	28.0	28.1
Both at medium conc.	2.10	2.15	0.201	0.211	1.60	1.65	28.9	29.1
Both at high conc.	2.11	2.16	0.203	0.212	1.61	1.66	29.0	29.2
New L.S.D at 5%	**0.06**	**0.05**	**0.006**	**0.008**	**0.04**	**0.05**	**0.5**	**0.4**

Table (4): Effect of single and combined applications of wheat seed sprout and nano-boron on yield as well as No. of clusters/vine, weight, length, width of cluster and the percentage of shot berries of Superior grapevines during 2016 & 2017 seasons.

Treatment	No. of clusters/vine		Cluster weight (g.)		Yield/vine (kg.)		Cluster length (cm.)		Cluster shoulder (cm.)		Shot berries %	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Control	22.0	22.0	360.0	361.2	7.9	7.9	21.0	20.9	10.8	11.0	8.1	8.0
Wheat seed sprout at 0.5 %	22.0	28.0	400.0	401.3	8.8	11.2	24.6	24.7	12.6	13.0	6.0	5.9
Wheat seed sprout at 1.0 %	22.0	30.0	411.9	413.0	9.1	12.4	25.2	25.3	13.2	13.6	5.0	4.9
Wheat seed sprout at 2.0 %	22.0	30.0	412.0	413.3	9.1	12.4	25.3	25.4	13.3	14.2	4.9	4.8
Nano boron at 0.025 %	22.0	24.0	473.0	374.2	8.2	9.0	21.6	21.6	11.3	11.6	7.5	7.4
Nano boron at 0.05 %	22.0	26.0	385.0	386.1	8.5	10.0	22.3	22.3	12.0	12.2	7.0	6.9
Nano boron at 0.1 %	22.0	26.0	386.0	387.1	8.5	10.1	22.4	22.5	12.1	12.3	6.9	6.8
Both at low conc.	23.0	32.0	424.0	425.3	9.8	13.6	26.0	25.9	14.0	14.8	4.0	3.9
Both at medium conc.	23.0	34.0	436.0	437.3	10.0	14.9	26.7	26.8	14.7	15.3	3.0	2.9
Both at high conc.	23.0	34.0	436.9	438.0	10.0	14.9	26.8	26.7	14.9	15.4	2.7	2.7
New L.S.D at 5%	**NS**	**2.0**	**11.1**	**10.9**	**0.8**	**0.9**	**0.6**	**0.5**	**0.4**	**0.5**	**0.4**	**0.4**

Table (5): Effect of single and combined applications of wheat seed sprout and nano-boron on as well as some physical and chemical characteristics of the berries of Superior grapevines during 2016 & 2017 seasons.

Treatment	Berry weight (g.)100 berry		Berry longitudinal (cm)		Berry equatorial (*cm*)		T.S.S. %		Reducing sugars %		Total acidity %	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Control	311	315	2.25	2.27	2.00	2.02	17.5	17.7	16.0	15.9	0.699	0.700
Wheat seed sprout at 0.5 %	357	363	2.44	2.44	2.20	2.22	18.6	18.9	17.3	17.5	0.618	0.616
Wheat seed sprout at 1.0 %	371	377	2.50	2.51	2.26	2.28	19.0	19.3	17.8	18.0	0.599	0.595
Wheat seed sprout at 2.0 %	372	379	2.51	2.52	2.27	2.29	19.1	19.4	17.9	18.1	0.597	0.593
Nano boron at 0.025 %	326	333	2.31	2.31	2.06	2.09	17.8	18.1	16.4	16.6	0.671	0.669
Nano boron at 0.05 %	341	348	2.37	2.38	2.12	2.15	18.2	18.5	16.9	17.1	0.641	0.639
Nano boron at 0.1 %	342	350	2.38	2.39	2.13	2.16	18.3	18.6	17.0	17.2	0.640	0.638
Both at low conc.	389	397	2.57	2.60	2.33	2.34	19.5	19.8	18.3	18.5	0.577	0.575
Both at medium conc.	415	425	2.64	2.66	2.40	2.41	20.0	20.3	18.6	18.9	0.557	0.555
Both at high conc.	416	426	2.65	2.68	2.41	2.42	20.1	20.4	18.7	19.0	0.556	0.550
New L.S.D at 5%	**0.13**	**0.14**	**0.05**	**0.05**	**0.04**	**0.04**	**0.3**	**0.3**	**0.3**	**0.4**	**0.018**	**0.016**

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استجابة العنب السوبيريور النامى تحت ظروف منطقة المنيا للرش بمستخلص نبت بذور القمح والبورون بنظام النانوبورن

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أجريت هذه الدراسة خلال موسمى2016 ، 2017 لبيان تأثير الاستخدام الفردى والمشترك لمستخلص نبت بذور القمح بتركيز ما بين 0.5 إلي % 2 والنانوبورن بتركيز ما بين 0.025 الي 0.1% علي الاثمار فى كرمات العنب السوبيريور ولقد تم رش هذه المواد ثلاث مرات فى بداية النمو الخضرى، بعد مرحلة عقد الثمار مباشرة وبعدها بشهر.

أدى رش الكرمات ثلاث مرات بمستخلص نبت بذور القمح والنانو -بورون فى الصورة الفردية والمشتركة الي تحسين طول الفرخ الرئيسي ومساحة المسطح الورقي والنيتروجين والفوسفور والبوتاسيوم والبورون وكمية المحصول ومتوسط وزن العنقود وابعاده ووزن الحبة وابعادها والنسبة المئوية للمواد الصلبة الذائبة والسكريات وانخفاض النسبة المئوية للحبات الصغيرة والحموضة الكلية وذلك مقارنة بمعاملة الكونترول وكان التحسن متوافقا مع الزيادة فى التركيز المستخدم من مستخلص نبت بذور القمح والنانو-بورون وكان هناك تأثير طفيف علي هذه المقاييس عند زيادة التركيز المستخدم منهما من 0.05 إلي % 0.1 للنانوبورون ومن 1 إلي % 2 لمستخلص نبت بذور القمح وكان استخدام مستخلص نبت بذور القمح مفضلا عن استخدام النانوبورون فى هذا الصدد وكان الاستخدام المشترك افضل من الاستخدام الفردى لهاتين المادتين.

إن رش الكرمات ثلاث مرات فى بداية النمو الخضرى وبعد مرحلة عقد الحبات مباشرة وبعدها بشهر بمخلوط يتكون من مستخلص نبت القمح بتركيز 1% مع النانو بورون بتركيز % 0.05 يكون ضروريا لتحسين كمية المحصول وخصائص الجودة للحبات وفى نفس الوقت تقليل النسبة المئوية للحبات الصغيرة فى كرمات العنب السوبيريور.

الكلمات الدالة :مستخلص نبت بذور القمح -النانوبورون -كمية المحصول-خصائص الجودة للحبات -كرمات العنب السوبيريور.