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Effect of Spraying Pota Crastal Compound and Vast Trivalioum Compound on Berry Setting, Yield and Berries Quality of Superior Grapes

Farouk, H. Abd El-Aziz *, Mohamed A.M. Abada ** and

Abd El Hafeez, Sh. Hassan*.

*Hort. Dept. Fac. of Agric. Minia Univ. Egypt.

**Viticulture Dept. Hort. Res. Instit. ARC, Giza, Egypt.

Abstract:

The present investigation was carried out in three successive seasons of 2019, 2020 and 2021 to examine the effect of spraying Pota crastal or Vast trivolium compounds each at 0.1% either once, twice or thrice on berry setting, yield and berries quality of Superior grapevines grownunder El-Minia region.

Spraying of Pota crastal or Vast trivolium compounds once, twice or thrice each at 0.1% was very effective in stimulating berry setting %, yield and both physical and chemical of berries compared to untreated. Using vast trivolium compound was favourable in enhancing berry setting %, yield and quality parameters rather than application of Pota crastal compound.

The promotion on berry setting %, yield and quality of the berries was associated with an increase in the number of spraying times from one to three times.

The best results with regard to berry setting % , yield and berries quality of superior grapevines grown under El- Minia region were observed due to treating the vines three times during each season at growth start, just after berry setting and at one month intervals with {ast trivolium compound at 0.1%.

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Keywords: Superior grapevines- Pota crastal compound- Vast trivolium compound- berry setting %– yield – quality- El Minia region

Introduction:

The drop of berry setting % as well as the problem of lots shot berries % in superior grapevines cv. Is suggested to be the major problems thatwere responsible for lowering the yield and marketing of such cvs. Malnutrition is considered the main reason for poor cropping. Usingbalanced nutritional compounds especially Pota crastal or Vast trivolium is accompanied with solving the problems of poor yield and shot berry % in different grapevines cvs. Nutrients (macro and micro) , amino acidsand seaweed extracts were responsible for enhancing the biosynthesis of plant pigments , proteins, fats, carbohydrates, enzymes, natural hormones,antioxidants, vitamins, cell division and water uptake (**Adriano, 1985 and Yagodin, 1990**).

Previous studies showed that micronutrients application resulted in great promotion on yield and fruiting of different grapevines cvs. (**Abd El-Hameed and Youssef, 2005; Abd El-Hafez, 2006; Amin, 2007; Mohamed- Ebtesam, 2012; and Abdelaal, 2012).**

The previous studies carried out by (**Ahmed and Abd El- Hameed (2003);Add El- Hameed and Abo El- Ez (2004); Abd El- Gaber-Nermean, (2009); El- Sawy (2009), Abd El- Wahab (2010); Ahmed *et al.*, (2011) and El- Kady –Hanaa (2011)** emphasized the beneficialeffects of using macronutrients on growth and productivity of different grapevine cvs.

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The main objective of this study was examining the effect of the stimulant compounds Pota crastal and Vast trivolium, on solving the problems of berry setting % and yield decline and the occurrence of shot berries in the clusters of superior grapevines grown under El – Minia conditions.

Material and Methods

This study was carried out during 2019, 2020 and 2021 seasons on Forty-two uniform in vigour 14- years old Superior grapevines.

The selected vines are grown in a private vineyard located at Al- Howarta village, Minia district, El- Minia Governorate – Egypt.

Where the texture of the soil is clay (Table 1) soil analysis was done according to the procedures that outlined by (**Chapman and Pratt, 1965 and Black *et al.*, 1965**).

The selected vines are planted at 2.0 x 3.0 meters apart (700 vines/ fed.) . The chosen vine were trained by cane pruning system leaving 96 eyes/ vine (six fruiting canes x 14 eyes plus six renewal spurs x 2 eyes). Using Gable supporting method, winter pruning was carried out at the second week of December in three seasons during surface irrigation system was followed using Nile water containing 175 ppm EC.

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Table (1) Analysis of the tested soil

Constituents	Values
Sand %	6.2
Silt %	19.8
Clay %	74.0
Texture	Clay
pH (1:2.5 extract)	7.98
EC (1: 2.5 extract) (dsm-1) 1cm /25^{o}C	0.93
O.M.%	2.22
$CaCO_3$ %	1.99
Total N %	0.11
Available P (ppm)	3.15
Available K (ppm)	428

Common horticultural practices such as fertilization, twice hoeings , irrigation, pinching and pest management were carried out as usual.

This study included the following seven treatments from application of Pota crastal and Vast trivolium each a 0.1% and frequencies.

1- Control (untreated vines).

2- Spraying Pota crastal compound at 0.1% once at growth start (1st week of Mar.)

3- Spraying Pota crastal compound at 0.1% twice at growth start (1st week of Mar.) and again just at berry setting (1st week of Apr.)

4- Spraying Pota crastal compound at 0.1% thrice at growth start (1st week of Mar.), again just at berry setting (1st week of Apr.) and one month later (1st week of May).

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5- Spraying Vast trivolium compound at 0.1% once at growth start (1st week of Mar.)

6- Spraying Vast trivolium compound at 0.1% twice at growth start (1st week of Mar.) and again just at berry setting (1st week of Apr.)

7- Spraying Vast trivolium compound at 0.1% thrice at growth start (1st week of Mar.), again just at berry setting (1st week of Apr.) and one month later (1st week of May).

Each treatment was of three replicates , two vine per each (42 vines)

Table (2): Analysis of Pota crastal:

Parameters	Values
Amino acids %	5.0%
Some vitamins %	1.0%
K2O %	36.0%
N %	5.0%
P %	2.0%
Some micro nutrients (Zn, Mn, B , Mo and Copalt)	2.0%

Table (3): Analysis of Vast trivolium

Parameters	**Values**	**Parameters**	**Values**
Amino acids %	3.0%	Mn %	1.0%
Algae seaweed extract %	4.0%	Mg%	2.5%
Total N %	7.0%	Boron %	0.25%
P %	6.0%	Cu %	0.2%
K_2O %	7.0%	Si %	0.2%
Fe %	1.5%	Copalt	0.01%

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Zn %	1.0%		

Randomized complete block design (RCBD) was adopted for carrying out statistical analysis of this study (**Rangaswamy, 1995**).

During three seasons, the following measurements were recoded:

- Percentage of berry setting

-Yield / vine (kg.)

-Number of clusters.

-Weight (g.), length and shoulder of clusters (cm.)

-Weight (g), longitudinal and equatorial of berry (cm.)

-Shot berry %.

-T.S.S. %, reducing sugars % (**Lane and Eynon, 1965**).

-Total acidity % (as g. tartaric acid/ 100 ml juice) (**A.O.A.C., 2000)**.

Statistical analysis was done, treatment means were compared using new L.S.D. at 5% (**Mead *et al.*, 1993**).

Results and Discussion

1-Percentage of berry setting, yield and cluster aspects

It is clear from the data in Tables (4, 5) berry setting %, yield expressed in weight as well as weight and length of cluster were significantly increased in response to application of compounds Pota crastal or Vast trivolium each at 0.1% once , twice or thrice as compared with non-application. There was a gradual promotion on such parameters with increasing frequencies of compounds., using Vast trivolium compound was preferable than using Pota crastal compound in improving berry setting %, yield , number of clusters/ vine as well as weight and lengthand shoulder of cluster.

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The best results with regard to berry setting %, yield and cluster aspects were obtained due to treating the vines three times with compound Vast triovolium at 0.1% under such promised treatment, yield per vine reached 10.3 , 13.6 and 14.4 kg , during 2019, 2020 and 2021 seasons, respectively. The untreated vines produced yield / vine reached 9.5, 9.4 and 9.7 kg. during the three seasons, respectively.

The percentage of increment of the yield/ vine in the promised treatment over the control treatment reached 8.4, 44.7 and 48.4 % during three seasons, respectively.

Similar trend was noticed during three seasons number of clusters pervine in the first seasons was unsignificantly affected.

2- Percentage of shot berries:

It is revealed from the obtained data in Table (5) that application of compounds Pota crastal or Vast trivolium each at 0.1% reduced the percentage of shot berries relative to the control treatment,. The reduction was clearly associated with increase in compounds frequencies. Using Vast trivolium was significantly superior to using Pota crastal in reducingsuch undesirable phenomenon.

The lowest values of shot berries (4.2. 4.1 and 4.0%) during three seasons, respectively were recorded on the cluster harvested from vines received three sprays of compound vast trivolium at 0.1%. The highest values of shot berries (6.6, 6.6 and 6.5%) during three seasons, respectively were recorded on the clusters of the vines that vines that untreated with compounds vast trivolium and Pota crastal. Similar trend was noticed during three seasons.

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3-Physical and chemical characteristics of the berries

Data in Tables (6, 7) clearly show that application of compounds Pota crastal or Vast trivolium each at 0.1% was significantly very effective in improving quality of the berries in terms of increasing berry weight, length and diameter, T.S.S. %, total sugars % and T.S.S./ acid ratio and reducing total acidity % comparing with non- application. The promotion on quality of the berries was associated with increasing frequencies of compounds. Application of compound Vast trivolium was favourable in improving quality of the berries comparing with using compound Pota crastal.

The best results with regard to quality of the berries were recorded on the vines that received three times with compound Vast trivolium at 0.1% . Similar results were announced during three seasons. Low fruit quality indices were observed on untreated vine. These results were true during three seasons.

Discussion

The previous positive of Amino acids, seaweed extracts and Macro and micro nutrients on growth , nutritional status of the vines and yield as well as physical and chemical characteristics of berries in different grapevines cvs might be attributed to antioxidative aspects, of these amino acids which play an important role in plant defense against oxidative stress induce by unfavouable conditions. Also, they are responsible for stimulating the biosynthesis of proteins, citokinins natural hormones like IAA, ethylene and DNA, RNA, cell division, organic food and the plant pigments (**Vianello and Meric, 1991; and Orth *et al.*, 1993**).

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These beneficial effects surely reflected on producing healthy vines. The present positive effects of amino acids on growth, nutritional status of the vines of superior grapevines are in agreement with those obtained by (**Amin, 2007**) on Red Roomy grapevines (**Sayed – Heba, 2010**) on Thompson seedless grapevines (**Abdelaal, 2012**) on Thompson seedless grapevines and (**Akl *et al.*, 2014**) on superior grapevines.

The beneficial effects of N, P, K, Mg, Fe, Mn, Zn, B and Co. on growth aspects, nutritional status of the vines , yield and berries quality might be ascribed to their essential roles in building amino acids, proteins, natural hormones, vitamins, organic acids, various enzymes, organic foods and plant cells. Their positive action on enhancing cell division and the tolerance of the vines to all unfavourable stress could add another explanation (**Nijjar, 1985; Miller *et al.*, 1990 and Mengel *et al.*, 2010)**.

The results with regarding the effect of macro and micro nutrients are concordance with those obtained by **Abd El- Wahab (2010)** on Superior grapevines **Ahmed *et al.*, (2011)** on Thompson seedless grapevines, **Akl *et al.*, (2014)** on Superior grapevines **Farahat (2017)** on early sweet grapevines and **Ebrahiem (2017)** on Flame seedless grapevines.

The positive action of seaweed extracts applications on growth aspects, nutritional status of the vines and yield as well as berries of quality of Superior grapevines was attributed to the following reasons. It has higher content of some macro and micro nutrients as well as vitamins B_1, B_2, B_6, B_{12} and natural hormones such as IAA, GA_3 and citokinins and some, antioxidant (**Kannaiyann, 2002 and Irizar- Garza *et al.*, 2003**).

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These results concerning the effect of seaweed extract on promotinggrowth and fruiting of Superior grapevines are accordance with those obtained by **Seleem – Basma and Ahmed (2008)** and **Gad El- Kareem and Abd El-Rahman (2013)** on Ruby seedless grapevines , **Farag, (2006) ; Abd El-Hameed *et al.*, 2010 ; El Saman, 2010 and Aly- Samar, 2015** on Flame seedless grapevines and **Tony, 2016** on Superior grapevines.

Conclusion

Carrying out three sprays of compounds Vast trivolium at 0.1% gave the best results with regard to berry setting, yield and berries quality of Superior grapevines grown under El Mina- region.

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Table (4): Effect of spraying pota crastal and vast trivolium on the percentage of berry setting , yield, number and weight clusters of Superior grapevines during 2019, 2020 and 2021 seasons.

Treatments	Berry setting %			No. of clusters per vine			Yield/ vine (kg.)			Cluster weight (g.)		
	2019	2020	2021	2019	2020	2021	2019	2020	2021	2019	2020	2021
Control (untreated vines)	10.5	10.8	11.0	25.0	25.0	26.0	9.5	9.4	9.7	380.0	375.0	375.0
Spraying pota crastal compound at 0.1% once	11.8	12.0	12.2	25.0	26.0	28.0	9.9	10.4	11.3	395.0	400.0	405.0
Spraying pota crastal compound at 0.1% twice	13.2	13.5	13.4	24.0	28.0	29.0	9.8	11.5	12.0	405.0	410.0	415.0
Spraying pota crastal compound at 0.1% thrice	14.6	14.8	15.0	24.0	29.0	30.0	9.8	12.0	12.6	410.0	415.0	420.0
Spraying vast trivolium compound at	14.0	14.2	14.5	24.0	28.0	29.0	9.8	11.5	12.0	405.0	410.0	415.0

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0.1% once												
Spraying vast trivolium compound at 0.1% twice	16.0	16.4	16.8	24.0	30.0	31.0	10.2	12.9	13.5	425.0	430.0	435.0
Spraying vast trivolium compound at 0.1% thrice	16.7	17.1	17.3	24.0	31.0	32.0	10.3	13.6	14.4	430.0	440.0	450.0
New L.S.D. at 5%	0.9	0.9	1.0	NS	1.8	1.9	0.3	0.4	0.5	9.5	11.8	11.5

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Table (5): Effect of spraying pota crastal and vast trivolium on cluster dimensions and percentages of shot berries % of Superior grapevines during 2019, 2020 and 2021 seasons.

Treatments	Cluster length (cm.)			Cluster width (cm.)			Shot berries %		
	2019	2020	2021	2019	2020	2021	2019	2020	2021
Control (untreated vines)	18.5	18.8	19.0	11.5	11.7	11.9	6.6	6.6	6.5
Spraying pota crastal compound at 0.1% once	19.9	20.2	21.0	12.8	13.2	14.0	5.8	5.7	5.7
Spraying pota crastal compound at 0.1% twice	21.5	22.0	22.5	13.0	13.2	13.5	5.3	5.2	5.1
Spraying pota crastal compound at 0.1% thrice	22.8	23.4	23.6	14.0	14.1	14.3	4.9	4.8	4.7
Spraying vast trivolium compound at 0.1% once	20.8	21.0	21.6	13.0	13.3	13.6	5.2	5.1	5.0
Spraying vast trivolium compound at 0.1% twice	22.8	23.3	23.6	14.3	14.5	14.7	4.6	4.5	4.4
Spraying vast trivolium compound at 0.1% thrice	24.2	25.6	26.0	14.8	15.0	15.3	4.2	4.1	4.0

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New L.S.D. at 5%	0.4	0.5	0.5	0.3	0.3	0.4	0.3	0.3	0.3

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Table (6): Effect of spraying pota crastal and vast trivolium on some physical characteristics of the berries of Superior grapevines during 2019, 2020 and 2021 seasons.

Treatments	Av. Berry weight (g.)			Av. Berry length (cm.)			Av. Berry diameter (cm.)		
	2019	2020	2021	2019	2020	2021	2019	2020	2021
Control (untreated vines)	3.22	3.25	3.25	2.20	2.25	2.25	2.10	2.15	2.14
Spraying pota crastal compound at 0.1% once	3.30	3.32	3.33	2.32	2.33	2.35	2.23	2.24	2.26
Spraying pota crastal compound at 0.1% twice	3.42	3.44	3.45	2.38	2.40	2.42	2.28	2.30	2.31
Spraying pota crastal compound at 0.1% thrice	3.46	3.48	3.49	2.45	2.50	2.50	2.36	2.41	2.41
Spraying vast trivolium compound at 0.1% once	3.41	3.43	3.45	2.35	2.40	2.40	2.26	2.31	2.32
Spraying vast trivolium compound at 0.1% twice	3.52	3.55	3.58	2.43	2.46	2.48	2.33	2.36	2.38
Spraying vast trivolium compound at 0.1% thrice	3.58	3.62	3.64	2.55	2.60	2.62	2.45	2.50	2.51

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New L.S.D. at 5%	0.06	0.07	0.07	0.03	0.04	0.04	0.02	0.03	0.04

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Table (7): Effect of spraying pota crastal and vast trivolium on some chemical characteristics of the berries of Superior grapevines during 2019, 2020 and 2021 seasons.

Treatments	TSS %			Reducing sugars %			Total acidity %			TSS/ acidity ratio		
	2019	2020	2021	2019	2020	2021	2019	2020	2021	2019	2020	2021
Control (untreated vines)	18.4	18.5	18.5	16.2	16.3	16.3	0.695	0.695	0.690	26.4	26.8	26.8
Spraying pota crastal compound at 0.1% once	19.3	19.6	19.7	17.1	17.3	17.4	0.675	0.665	0.660	28.6	29.4	29.8
Spraying pota crastal compound at 0.1% twice	20.0	20.2	20.4	17.9	18.0	18.2	0.665	0.660	0.650	30.0	30.6	31.3
Spraying pota crastal compound at 0.1% thrice	20.6	20.7	20.9	18.5	18.6	18.8	0.630	0.620	0.610	32.6	33.3	34.2
Spraying vast trivolium compound at	19.8	20.0	20.2	17.9	18.1	18.1	0.640	0.630	0.620	30.9	31.7	32.6

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0.1% once												
Spraying vast trivolium compound at 0.1% twice	20.9	21.0	21.1	18.8	18.9	19.0	0.600	0.595	0.585	34.8	35.3	36.0
Spraying vast trivolium compound at 0.1% thrice	21.2	21.3	21.4	19.0	19.1	19.2	0.580	0.570	0.565	36.5	37.7	37.9
New L.S.D. at 5%	0.3	0.4	0.5	0.2	0.3	0.3	0.013	0.014	0.015	1.1	1.2	1.3