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Impact of Using Chicken Manure Tea and Ascorbic Acid As Substitutes for Mineral N Fertilizer on Fruiting of Superior Grapevines

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Abstract

During 2015 and 2016 seasons, Superior grapevines were fertilized with N (60 g N vine/ year) as 25 to 100% inorganic N with or without foliar application of chicken manure tea at 10 to 40% and ascorbic acid at 500 to 2000 ppm. The target was elucidating the effect of using poultry manure tea and ascorbic acid as alternatives to chemical N fertilizer on fruiting of the vines.

Using N as 50 to 75% inorganic N plus spraying chicken manure tea at 10 to 20% and ascorbic acid at 500 to 1000 ppm was very effective in stimulating all growth aspects, berry setting %, yield and cluster weight and dimensions over the application of N via inorganic N alone at 25 to 100%. leaf chemical constituents and quality parameters were obviously enhanced on the vines that received N as 25% inorganic plus spraying chicken manure tea at 40% and ascorbic acid at 2000 ppm

For promoting the yield of Superior grapevines, it is suggested to use N as 50% inorganic N plus spraying chicken manure tea at 20% and ascorbic acid at 1000 ppm three times. For improving quality of the berries , it is advised to use N as 25% inorganic N + spraying poultry manure tea at 40% and ascorbic acid at 2000 ppm three times.

Keywords*: Superior grapevines, inorganic N, chicken manure tea, ascorbic acid, yield, berries quality.*

Introduction

Nowadays, there is a widespread use of antioxidants. They are very effective in protecting plant cells from senescence and disorders (Robinson, 1973) as well as enhancing cell division, the biosynthesis of natural hormones such as IAA, GA_3 and cytokinins, nutrient and water uptake, photosynthesis, biosynthesis of plant pigments and proteins as well as the biosynthesis of alpha keta glutaric acid which is united with ammonia to form amino acids and proteins. Its role in enhancing the tolerance of plant to biotic and abitoic stresses did not neglect (Samuillah *et al.,* 1988; Foyer and Lelandias, 1993 and Singh, *et al.,* 2001).

Organic fertilization would permit a reduction in the use of agrochemicals. The positive action of these nature biostimulants are attributed to their higher own content of different nutrients, vitamins B, antibiotics, amino acids, organic matter, organic acid, and natural hormones such as IAA, GA_3 and cytokinins as well as its positive action on reducing soil pH and enhancing N fixation (Mengel and Kirkby, 1987 ; Simon *et al.,* 1999 and Arutiumjan, 1999).

Previous studies showed that using organic manures as a partial re-

placement of inorganic N was found by many authors to improve productivity of the vines (Madian, 2010, Abd El –Hameed *et al.,* 2010; Refaai, 2011; Ahmed *et al.,* 2011, El- Wany, 2015. Abdel Raheem *et al.,* 2015 and Tony, 2016).

The results of Abada (2014); Abd El–Wahab (2015); Ebrahiem (2015) and Mohamed *et al.,* (2015) emphasized the beneficial effects of ascorbic acid on fruiting of various grapevine cvs.

The target of this study was examining the effect of using poultry manure tea and ascorbic acid as partial replacements of inorganic N fertilizer on fruiting of Superior grapevines.

Material and Methods

This study was carried out during 2015 and 2016 seasons on thirty uniform in vigour 9 - years old Superior grapevines grown in a private vineyard located at El- Hawatra village, Minis district, Minia Governorate where the texture of the soil is clay, well drained and water table not less than two meters deep. All the selected vines are planted at 2 x 3 m apart. The chosen vines (30 vines) were pruned during the first week of January in both seasons using cane pruning method. The vines were trellised by Gable system. Vine load was 84 eyes for all the selected vines on the basis of 6 fruiting canes x 12 eyes plus 6 renewal spurs X two eyes. Surface irrigation system was followed using Nile water containing 160 ppm EC.

Table 1. Analysis of the tested soil:

Constituents	Values
Particle size distribution:	
Sand %	10.0
Silt %	21.5
Clay %	68.5
Texture	Clay
pH(1:2.5 extract)	8.05
EC (1 :2.5 extract) (dsm^{-1}) 1 cm / 25^{o}C.	1.03
O.M. %	1.88
$CaCO_3$ %	2.55
Total N %	0.10
Available P (Olsen, ppm)	2.22
Available K (ammonium acetate, ppm)	400

Except those dealing with the present treatments using (all sources of N), all the selected vines (30 vines) received the usual horticultural practices which are commonly used in the vineyard.

This study included the following ten treatments from inorganic N, poultry manure tea and ascorbic acid:

1. Application of the suitable N (60 g N/ vine) via 100 % inorganic N (179.1 g ammonium nitrate / vine / year) alone.
2. Application of the suitable N via 75 % Inorganic N (134.3 g ammonium nitrate / vine / year) alone.
3. Application of the suitable N via 75 % + spraying 10 % poultry

manure tea (10 kg /100 L water).

4. Application of the suitable N via 75 % inorganic N + spraying 10% poultry manure tea + spraying ascorbic acid at 500 ppm (0.5 g / L).
5. Application of the suitable N via 50 % inorganic N (spraying ammonium nitrate / vine/ year) alone.
6. Application of the suitable N via 50 % inorganic N + spraying 20 % poultry manure tea (20kg/ 100 L water).
7. Application of the suitable N via 50 % inorganic N + spraying 20 % poultry manure tea + spraying ascorbic acid at 1000 ppm (1.0 g / L water).
8. Application of the suitable N via 25 % inorganic N (44.8 g ammonium nitrate / vine/ year) alone.
9. Application of the suitable N via 25 % inorganic N + spraying 40% poultry manure (40 kg / 100 L water).
10. Application of the suitable N via 25% inorganic N + spraying 40% poultry manure + spraying ascorbic acid at 2000 ppm (2.0 g/ L water).

Each treatment was replicated three times, one vine per each. Ammonium nitrate (33.5 % N) as a source of inorganic N was divided into three equal batches as 45% at growth start (1st week of March), 20% before blooming (3rd week of Mar.) and 35% just after berry setting (3rd week of April). It was added in shallow holes 20 cm apart from the trunk and covered with moist soil. Poultry manure tea at 10 to 40 % was prepared by weighing 10 to 40 kg poultry manure per 100 liters water and left stand for three days then it was agitated continuously and was used in the fourth day. It was sprayed thrice just after growth start (1st week of Mar.), before blooming (3rd week of Mar.) and just after berry setting (2nd of Apr.). Analysis of poultry manure is shown in Table (2).

Table 2. Analysis of poultry manure

Parameters	Values
O.M. %	58.26
Organic carbon	27.90
pH (1 : 2.5 extract)	10.25
E.C. (ds/m) (1: 2.5 extract)	5.9
Total N %	2.5
Total P %	1.12
Total K %	1.21
Total Fe (ppm)	18.5
Total Zn (ppm)	43.22

Ascorbic acid was sprayed three times at growth start, (1st week of Mar.) just after berry setting (2nd week of Apr.) and at three weeks later (1st week of May). Triton B as a wetting agent was added at 0.05% and spraying was done till runoff.

Randomized complete block design (RCBD) was followed (Rangaswamy, 1995) where the experiment consisted of ten treatments, each

treatment replicated three times, one vine per each.

During both seasons the following parameters were recorded:

1- Vegetative growth characters namely main shoot length (cm) number of leaves/ shoot, leaf area cm^2 (Ahmed and Morsy, 1999).

2- Leaf chemical constituents namely chlorophylls a & b, total chlorophylls (as mg/ 100 g F.W.) (Von Wettstein, 1957; Fadl and Seri-El Deen, 1978) and percentages of N, P and K on dry weight basis (Wilde *et al.,* 1985 and Balo *et al.*, 1988).

3- Percentage of berry setting, yield expressed in weight (kg.) and number of clusters / vine/

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

5- Percentage of shot berries.

6- Some physical and chemical characteristics of the berries namely weight, longitudinal and equatorial of berry (cm), T.S.S. %, total sugars (A.O.A.C., 2000) by using Lane and Eynon method (1965), titratable acidity % (as g tartaric acid/ 100 ml juice) and T.S.S./acid.

All the obtained data were tabulated and statistically analyzed using New L.S.D. at 5 % for made all comparisons among the investigated treatment means (according to Rangaswamy, 1995 and Rao, 2007).

Results and Discussion

1-Some vegetative growth characteristics:

Data in Table (3) clearly show that shoot length, number of leaves / shoot and leaf area were remarkably stimulated in response to application of N as 50 to 75% inorganic N + spraying chicken manure tea at 10 to 20% + spraying ascorbic acid at 500 to 1000 ppm relative to using N as inorganic N at 25 to 100% alone. The highest values were recorded on the vines that fertilized with N as 50% inorganic N + spraying poultry manure tea at 20% + spraying ascorbic acid at 1000 ppm. The lowest values were recorded on the vines that fertilized with N as 25% inorganic N alone. (without spraying poultry manure tea and ascorbic acid). These results were true during both seasons.

2- Leaf chemical composition:

It is clear from the data in Tables (4 & 5) that leaf chemical constituents namely chlorophylls a & b, total chlorophylls, N, P and K were positively effected by using N as inorganic N plus spraying poultry manure tea and ascorbic acid comparing with using N via inorganic N alone. The promotion on these chemical constituents was in proportional to the reduction on the percentages of inorganic N from 100 to 25 % and at the same time increasing percentages of poultry manure tea from 0.0 to 40% and concentrations of ascorbic acid from 0.0 to 2000 ppm. Fertilizing the vines with N as 25% inorganic N plus spraying of poultry manure tea at 40% and ascorbic acid at 2000 ppm resulted in the highest values. These results were true during both seasons.

3- Percentage of berry setting:

It was positively affected by using N as 50 to 75% inorganic N plus spraying of poultry manure tea or ascorbic acid over the application of inorganic N alone. The highest values were recorded on the vines that fertilized with N as 50% inorganic N + spraying poultry manure tea at 20% and ascorbic acid at 1000 ppm. These

results were true during both seasons. (Table 6)

4- Yield/ vine and cluster weight, length and shoulder

As shown in Tables (6 & 7) there was a remarkable promotion on the yield expressed in weight and number of clusters / vine as well as weight, length and shoulder of cluster owing to using N as 50 to 75% inorganic N plus spraying poultry manure tea at 10 to 20 % and ascorbic acid at 500 to 1000 ppm over the application of inorganic N at 25 to 100% alone. The promotion was associated with reducing the percentages of inorganic N from 100 to 50% and increasing the percentages of poultry manure tea from 0.0 to 20% and concentrations of ascorbic acid from 0.0 to 1000 ppm. The maximum values were recorded on the vines that received N as 50% inorganic N + spraying poultry manure tea at 20% + spraying ascorbic acid at 1000 ppm. These results were true during both seasons.

5- Percentage of shot berries

It is reveal from the data in Table (8) that an obvious reduction on the percentage of shot berries was observed with reducing the percentages of inorganic N from 100 to 25% and at the same time increasing percentages of poultry manure tea from 0.0 to 40% and concentration of ascorbic acid from 0.0 to 2000 ppm. The lowest values were recorded on the vines that received N as 25% inorganic N plus spraying poultry manure tea at 40% and ascorbic acid at 2000 ppm. Fertilizing the vines with N as 100% inorganic gave the highest values. Similar trend was noticed during both seasons.

6- Physical and chemical characteristics of the berries

It is evident from the data in Tables (8 & 9) that fertilizing the vines with N as 25 to 75% inorganic N plus spraying poultry manure tea at 10 to 40 % and ascorbic acid at 500 to 2000 ppm was very effective in improving quality of the berries in terms of increasing berry weight and dimensions, T.S.S.%, total sugars % and T.S.S./acid and decreasing titratabe acidity % over the application of N via inorganic N alone. The promotion on fruit quality was related to the reduction on the percentages of inorganic N and at the same time the increase on the percentages of poultry manure tea and concentration of ascorbic acid. The best results with regard to quality of the berries were obtained due to using N as 25% inorganic N plus spraying poultry manure tea at 40% and ascorbic acid at 2000 ppm. Similar results were announced during both seasons.

Discussion

The promoting effect of ascorbic acid on fruiting of Superior grapevines might be attributed to its effective in protecting plant cells from senescence and disorders (Robinson, 1973) as well as enhancing cell division, the biosynthesis of natural hormones such as IAA, GA_3 and cytokinins, nutrient and water uptake, photosynthesis, biosynthesis of plant pigments and proteins as well as the biosynthesis of alpha keta glutaric acid which is united with ammonia to form amino acids and proteins. Its role in enhancing the tolerance of plant to biotic and abitoic stresses did not neglect (Samuillah *et al.,* 1988;

Foyer and Lelandias, 1993 and Singh, *et al.,* 2001).

The positive action of poultry manure on fruiting of Superior grapevines are attributed to their higher own content of different nutrients, vitamins B, antibiotics, amino acids, organic acid, and natural hormones such as IAA, GA_3 and cytokinins Also, they are responsible for enhancing organic matter and N fixation and reducing soil pH (Mengel and Kirkby, 1987; Simon *et al.,* 1999 and Arutiumjan, 1999).

These results are in agreement with those obtained by (Madian, (2010), Abd El –Hameed *et al.,* (2010); Refaai, (2011); Ahmed *et al.,* (2011), El- Wany, (2015); Abdel Raheem, (2015) and Tony, (2016) who worked on organic manures.

The results of Abada (2014); Abdel – Wahab (2015); Ebrahiem (2015) and Mohamed *et al.,* (2015) emphasized the beneficial effects of ascorbic acid on fruiting of various grapevines cvs.

Conclusion:

For promoting the yield of Superior grapevines, it is suggested to use N as 50% inorganic N plus spraying of chicken manure tea at 20% and ascorbic acid at 1000 ppm three times. For improving quality of the berries , it is advised to use N as 25% inorganic N + spraying poultry manure tea at 40% and ascorbic acid at 2000 ppm three times.

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تأثير استخدام شاى زرق الدواجن وحامض الاسكوربيك كبدائل للسماد النتروجيني المعدني على الاثمار فى كرمات العنب السوبيريور

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الملخص

خلال موسمى ٢٠١٥ ، ٢٠١٦ تم تسميد كرمات العنب السوبيريور بالنتروجين (٦٠ جرام/ الكرمة / السنة) على هيئة ٢٥ الى ١٠٠ % سماد نتروجينى غير عضوى مع أو بدون الرش الورقى لشاى زرق الدواجن بتركيز من ١٠ الى ٤٠% وحامض الاسكوربيك بتركيز ما بين ٥٠٠– ٢٠٠٠ جزء فى المليون وكان الهدف هو توضيح تأثير رش شاى زرق الدواجن وحامض الاسكوربيك كبدائل للاسمدة النتروجينية الغير عضوية على الاثمار فى كرمات العنب السوبيريور.

كان استخدام النتروجين على اساس ٥٠ الى ٧٥% سماد نتروجينى غير عضوى مع رش شاى زرق الدواجن بتركيز ما بين ١٠ الى ٢٠% وحامض الاسكوربيك بتركيز ما بين ٥٠٠ الى ١٠٠٠ جزء فى المليون فعالا جدا فى تحسين جميع صفات النو الخضرى والنسبة المئوية لعقد الحبات وكمية المحصول ووزن وطول وكتف العنقود وذلك بالمقارنة باستخدام النتروجين فى الصورة الغير عضوية فقط بنسبة ٢٥ الى ١٠٠% وكان هناك تحسن فى المكونات الكيميائية للورقة وخصائص الجودة للثمار فى الكرمات التى تم تسميدها بالنتروجين فى صورة ٢٥% سماد نتروجين غير عضوى جنبا الى جنب مع رش شاى زرق الدواجن بنسبة ٤٠% وحامض الاسكوربيك بتركيز ٢٠٠٠ جزء فى المليون.

لأجل تحسين كمية المحصول فى العنب السوبيريور فانه يقترح تسميد الكرمات بالنتروجين على هيئة ٥٠% سماد نتروجين غير عضوى مع رش شاى زرق الدواجن بتركيز ٢٠% وحامض الاسكوربيك بتركيز ١٠٠٠ جزء فى المليون ثلاثة مرات ولأجل تحسين الجودة للحبات فانه ينصح بتسميد الكرمات بالنتروجين على هيئة ٢٥% سماد نتروجينى غير عضوى مع رش شاى زرق الدواجن بتركيز ٤٠% وحامض الاسكوربيك بتركيز ٢٠٠٠ جزء فى المليون.

الكلمات الدالة: *العنب السوبيريور – السماد النتروجينى الغير عضوى – شاى زرق الدواجن– حامض الاسكوربيك– كمية المحصول– جودة الحبات .*

Table 3. Effect of using chicken manure tea and ascorbic acid as a partial replacement of inorganic N fertilizer on main shoot length, number of leaves / shoot and leaf area of Superior grapevines during 2015 and 2016 seasons.

Treatment	Main shoot length cm		No. of leaves per shoot		Leaf area $(cm)^2$	
	2015	2016	2015	2016	2015	2016
1-Using N as 100% inorganic N alone	111.0	112.8	17.0	16.9	108.9	110.0
2-Using N as 75% inorganic N alone	109.3	111.0	15.8	15.9	106.3	107.4
3-Using N as 75% inorganic N + 10% ch. M. tea (chicken manure tea)	117.9	119.7	21.0	20.9	116.0	117.1
4-Using N as 75% inorganic N + 10% ch. M. tea + 500 ppm ascorbic acid	120.0	121.8	22.9	22.8	118.3	119.5
5-Using N as 50 % inorganic N alone	107.0	108.9	14.6	14.5	104.3	105.5
6-Using N as 50 % inorganic N + 20% ch. M. tea (chicken manure tea)	124.0	125.8	24.0	23.9	119.6	120.7
7-Using N as 50 % inorganic N + 20% ch. M. tea + 1000 ppm ascorbic acid	127.9	129.9	26.0	25.9	122.3	124.9
8-Using N as 25% inorganic N alone	105.6	107.0	13.0	12.9	101.9	103.0
9-Using N as 25% inorganic N + 40% ch. M. tea (chicken manure tea)	112.9	114.9	18.2	18.1	111.0	112.3
10-Using N as 25% inorganic N + 40% ch. M. tea + 2000 ppm ascorbic acid	115.0	116.7	19.3	19.2	113.9	115.0
11-New L:.S.D. at 5%	1.1	1.2	1.0	1.0	1.1	1.1

Table 4. Effect of using chicken manure tea and ascorbic acid as a partial replacement of inorganic N fertilizer on chlorophylls a & b and total chlorophylls on the leaves (mg/ 100 g F.W.) of Superior grapevines during 2015 and 2016 seasons.

Treatment	Chlorophyll a (mg/ 100 g F.W.)		Chlorophyll b (mg/ 100 g F.W.)		Total chlorophylls (mg/ 100 g F.W.)	
	2015	2016	2015	2016	2015	2016
1-Using N as 100% inorganic N alone	2.7	2.9	0.7	0.4	3.4	3.3
2-Using N as 75% inorganic N alone	3.1	3.3	0.9	0.6	4.0	3.9
3-Using N as 75% inorganic N + 10% ch. M. tea (chicken manure tea)	5.3	5.4	2.3	2.1	7.6	7.5
4-Using N as 75% inorganic N + 10% ch. M. tea + 500 ppm ascorbic acid	6.0	6.1	2.6	2.4	8.6	8.5
5-Using N as 50 % inorganic N alone	3.7	3.6	1.1	0.9	4.8	4.5
6-Using N as 50 % inorganic N + 20% ch. M. tea (chicken manure tea)	6.4	6.7	3.0	2.8	9.4	9.5
7-Using N as 50 % inorganic N + 20% ch. M. tea + 1000 ppm ascorbic acid	7.0	7.8	3.3	3.1	10.3	10.9
8-Using N as 25% inorganic N alone	4.1	4.2	1.3	1.1	5.4	5.3
9-Using N as 25% inorganic N + 40% ch. M. tea (chicken manure tea)	7.4	8.9	3.6	3.4	11.0	12.3
10-Using N as 25% inorganic N + 40% ch. M. tea + 2000 ppm ascorbic acid	7.8	9.4	3.8	3.6	11.6	13.0
11-New L:.S.D. at 5%	0.3	0.3	0.2	0.2	0.4	0.4

Table 5. Effect of using chicken manure tea and ascorbic acid as a partial replacement of inorganic N fertilizer on the percentages of N, P and K in the leaves of Superior grapevines during 2015 and 2016 seasons.

Treatment	Leaf N %		Leaf P %		Leaf K %	
	2015	2016	2015	2016	2015	2016
1-Using N as 100% inorganic N alone	1.90	1.97	0.12	0.11	1.03	1.10
2-Using N as 75% inorganic N alone	1.77	1.84	0.14	0.13	1.11	1.18
3-Using N as 75% inorganic N + 10% ch. M. tea (chicken manure tea)	1.99	2.06	0.21	0.20	1.36	1.43
4-Using N as 75% inorganic N + 10% ch. M. tea + 500 ppm ascorbic acid	2.10	2.17	0.24	0.23	1.42	1.48
5-Using N as 50 % inorganic N alone	1.67	1.75	0.16	0.15	1.17	1.24
6-Using N as 50 % inorganic N + 20% ch. M. tea (chicken manure tea)	2.21	2.28	0.26	0.27	1.50	1.57
7-Using N as 50 % inorganic N + 20% ch. M. tea + 1000 ppm ascorbic acid	2.31	2.39	0.30	0.31	1.59	1.66
8-Using N as 25% inorganic N alone	1.59	1.67	0.19	0.19	1.31	1.37
9-Using N as 25% inorganic N + 40% ch. M. tea (chicken manure tea)	2.49	2.58	0.33	0.33	1.69	1.76
10-Using N as 25% inorganic N + 40% ch. M. tea + 2000 ppm ascorbic acid	2.61	2.70	0.35	0.36	1.75	1.82
11-New L:.S.D. at 5%	0.06	0.05	0.02	0.02	0.05	0.05

Table 6. Effect of using chicken manure tea and ascorbic acid as a partial replacement of inorganic N fertilizer on of Superior grapevines during 2015 and 2016 seasons.

Treatment	Berry setting %		No. of clusters % vine		Yield/ vine (kg.)	
	2015	2016	2015	2016	2015	2016
1-Using N as 100% inorganic N alone	12.0	11.7	20.0	25.0	7.6	9.5
2-Using N as 75% inorganic N alone	11.3	11.0	20.0	24.0	7.4	8.9
3-Using N as 75% inorganic N + 10% ch. M. tea (chicken manure tea)	14.5	14.2	21.0	26.6	8.6	10.9
4-Using N as 75% inorganic N + 10% ch. M. tea + 500 ppm ascorbic acid	15.2	14.9	21.0	28.3	8.7	11.7
5-Using N as 50 % inorganic N alone	10.6	10.3	19.0	22.0	6.8	7.9
6-Using N as 50 % inorganic N + 20% ch. M. tea (chicken manure tea)	15.9	15.6	21.0	30.0	8.9	12.7
7-Using N as 50 % inorganic N + 20% ch. M. tea + 1000 ppm ascorbic acid	16.6	16.3	22.0	31.5	9.6	13.7
8-Using N as 25% inorganic N alone	9.8	9.5	19.0	20.0	6.7	7.0
9-Using N as 25% inorganic N + 40% ch. M. tea (chicken manure tea)	12.8	12.5	20.0	25.5	7.8	9.9
10-Using N as 25% inorganic N + 40% ch. M. tea + 2000 ppm ascorbic acid	13.6	13.3	20.0	26.0	8.0	10.4
11-New L:.S.D. at 5%	0.7	0.8	NS	1.4	0.3	0.3

Table 7. Effect of using chicken manure tea and ascorbic acid as a partial replacement of inorganic N fertilizer on cluster characteristics of Superior grapevines during 2015 and 2016 seasons.

Treatment	Cluster weight (g.)		Cluster length (cm.)		Cluster shoulder (cm)	
	2015	2016	2015	2016	2015	2016
1-Using N as 100% inorganic N alone	381.0	379.0	20.5	21.0	10.0	9.9
2-Using N as 75% inorganic N alone	370.0	368.9	20.0	20.0	9.6	9.5
3-Using N as 75% inorganic N + 10% ch. M. tea (chicken manure tea)	410.0	409.0	22.4	22.3	11.0	10.9
4-Using N as 75% inorganic N + 10% ch. M. tea + 500 ppm ascorbic acid	415.0	413.0	22.9	22.7	11.3	11.2
5-Using N as 50 % inorganic N alone	360.0	358.0	19.4	19.4	9.1	9.0
6-Using N as 50 % inorganic N + 20% ch. M. tea (chicken manure tea)	425.0	423.0	23.6	23.5	11.7	11.6
7-Using N as 50 % inorganic N + 20% ch. M. tea + 1000 ppm ascorbic acid	436.0	435.9	24.1	24.0	12.1	12.1
8-Using N as 25% inorganic N alone	350.0	348.0	19.0	19.2	8.8	9.0
9-Using N as 25% inorganic N + 40% ch. M. tea (chicken manure tea)	391.0	389.0	21.3	21.2	10.3	10.3
10-Using N as 25% inorganic N + 40% ch. M. tea + 2000 ppm ascorbic acid	399.0	398.9	22.0	21.9	10.6	10.7
11-New L:.S.D. at 5%	9.0	8.8	0.4	0.4	0.3	0.3

Table 8. Effect of using chicken manure tea and ascorbic acid as a partial replacement of inorganic N fertilizer on the percentage of shot berries as well as berry weight and dimensions of Superior grapevines during 2015 and 2016 seasons.

Treatment	Shpt berries %		Berry weight (g.)		Berry longitudinal (cm.)		Berry equatorial (cm)	
	2015	2016	2015	2016	2015	2016	2015	2016
1-Using N as 100% inorganic N alone	11.0	11	3.72	3.80	2.30	2.26	2.04	2.06
2-Using N as 75% inorganic N alone	10.2	10.1	3.61	3.69	2.22	2.18	1.99	2.01
3-Using N as 75% inorganic N + 10% ch. M. tea (chicken manure tea)	8.0	7.9	3.80	3.89	2.41	2.37	2.10	2.12
4-Using N as 75% inorganic N + 10% ch. M. tea + 500 ppm ascorbic acid	6.8	6.7	3.90	3.99	2.45	2.41	2.15	2.17
5-Using N as 50 % inorganic N alone	9.6	9.4	3.52	3.60	2.12	2.08	1.95	1.97
6-Using N as 50 % inorganic N + 20% ch. M. tea (chicken manure tea)	6.0	5.9	3.97	0.7	2.53	2.49	2.19	2.21
7-Using N as 50 % inorganic N + 20% ch. M. tea + 1000 ppm ascorbic acid	4.1	4.0	4.11	4.21	2.60	2.56	2.25	2.27
8-Using N as 25% inorganic N alone	9.0	8.9	3.44	3.54	2.06	2.02	1.90	1.93
9-Using N as 25% inorganic N + 40% ch. M. tea (chicken manure tea)	3.8	3.6	4.25	4.36	2.66	2.62	2.30	2.31
10-Using N as 25% inorganic N + 40% ch. M. tea + 2000 ppm ascorbic acid	3.0	2.9	4.36	4.51	2.71	2.67	2.34	2.36
11-New L:.S.D. at 5%	0.7	0.8	0.04		0.05	0.06	0.04	0.04

Table 9. Effect of using chicken manure tea and ascorbic acid as a partial replacement of inorganic N fertilizer on the percentage of total soluble solids, total acidity and total sugars as well as T.S.S./ acid of Superior grapevines during 2015 and 2016 seasons.

Treatment	T.S.S. %		Titratable acidity %		Total sugars %		T.S.S. /acid	
	2015	2016	2015	2016	2015	2016	2015	2016
1-Using N as 100% inorganic N alone	17.1	17.0	0.795	0.794	15.4	15.3	21.5	21.4
2-Using N as 75% inorganic N alone	17.6	17.5	0.780	0.781	15.8	15.9	22.6	22.4
3-Using N as 75% inorganic N + 10% ch. M. tea (chicken manure tea)	19.0	19.1	0.710	0.711	17.1	17.0	26.8	26.9
4-Using N as 75% inorganic N + 10% ch. M. tea + 500 ppm ascorbic acid	19.4	19.5	0.692	0.693	17.5	17.6	28.0	28.1
5-Using N as 50 % inorganic N alone	18.1	18.1	0.760	0.760	16.3	16.3	23.8	23.8
6-Using N as 50 % inorganic N + 20% ch. M. tea (chicken manure tea)	19.9	18.8	0.671	0.672	17.0	17.0	29.7	29.5
7-Using N as 50 % inorganic N + 20% ch. M. tea + 1000 ppm ascorbic acid	20.3	20.2	0.651	0.652	18.3	18.4	31.2	31.0
8-Using N as 25% inorganic N alone	18.5	18.6	0.740	0.737	16.7	16.7	26.4	25.2
9-Using N as 25% inorganic N + 40% ch. M. tea (chicken manure tea)	20.6	20.9	0.630	0.631	18.6	18.7	32.7	33.1
10-Using N as 25% inorganic N + 40% ch. M. tea + 2000 ppm ascorbic acid	20.9	21.4	0.610	0.611	18.9	19.0	34.3	35.0
11-New L:.S.D. at 5%	0.4	0.4	0.017	0.014	0.3	0.3	0.6	0.7