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EFFECT OF SOME SOURCES OF ORGANIC FERTILIZERS ON GRAPE NUTRITION, YIELD AND FRUIT QUALITY OF FLAME SEEDLESS GRAPEVINES

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ABSTRACT

This study was carried out during 2003, 2004 and 2005 seasons to study the effect of some sources of organic fertilizers on yield, fruit quality and the residues of the nitrate and nitrite in berry juice of Flame Seedless grapevines growing in a clay soil under drip irrigation system in a private vineyard located at Dakahlia governorate.

Three organic manures (cattle, chicken or town manure) as a sources of organic N were examined at 40 N units/vine either alone or combined with N mineral fertilizer at the rate of 10 N/unit organic manure plus 30 N/units mineral fertilizer compared with the control (60 N/unit).

The results obtained in this investigation indicated that organic manures combined with the mineral N fertilizer significantly increased leaf area percentage, N, P and K in the leaves as compared with the mineral N fertilizer (control) or organic fertilizers alone. The best treatments were obtained from vines receiving chicken manure. Cattle manure however caused the lowest values of leaf area. Moreover, organic manures combined with mineral N fertilizers significantly increased yield, bunch weight and volume berry weight and volume and juice as well as TSS, TSS/acidity and total anthocyanin in the skin of berries decreased acidity in the juice. Also, organic manure treatments significantly decreased the residues of nitrate and nitrite in the juice of berries. Chicken manure as a local organic manure which is available in a low price was considered the best organic fertilizer with a good source of N, P and K improve yield, berry quality and reduce the residues of nitrate and nitrite in berry juice decreased environmental pollution. Data also indicates that, although the productivity of the vines fertilized with nitrogen mineral fertilizers and organic mineral fertilizer give the highest productivity as compared with organic fertilizers , except for the chicken manure with achieved the highest economic return due to the net increase due to the high prices given for the production of the crop organically fertilized only.

INTRODUCTION

Flame Seedless grape is one of the most popular cultivars grown in Egypt for local consumption and export. It is well known that fertilizers are important factors for increasing yield and berry quality of grapevines, especially nitrogenous fertilizers Keller (2005). After 1960,the quanties of chemical fertilizers has been increased. The heavy use of chemical products in agricultural has resulted in an increased level of environmental pollution.

Organic manures are considered as sources of essential nutrients necessary for plant growth (Yagodin, 1984) and Harhash and Abdel-Nasser (2000).

Using organic manures could improve soil porosity, soil structure, aeration, retention of moisture and are considered good sources of essential nutrients (EL-Nagar, 1996; Kaloosh and Koreish 1995 and Nassar, 1998).

Many investigators mentioned that adding organic manure as fertilizer to the soil increased yield and improved berry quality of grapevines Nijjar, (1985); Harhash and Abdel-Nasser (2000); Kassem and Marzouk (2002); Abd EL-Hady *et al*. (2003) and Belal, (2006).

The aim of this study was to determine the most suitable sources of organic manure (chicken, cattle and town manure) on yield, berry quality and nitrite and nitrate residues in the berries which cause serious health problem for the consumer. In the mean time the investigation aimed at Finding out the best organic manure which has a high productive efficiency Concerning fertilization of Flame Seedless grapevines.

MATERIALS AND METHODS

This study was carried out on mature Flame Seedless grapevines grown in a clay soil located at Dakahlia governorate, planted 2.5 x 3 meters apart and irrigated according to the drip system to the cardoon training system of 60 buds were per/vine. The vines received the normal agricultural practices as in the commercially grape orchards under Dakahlia conditions.

At the start of the experiment, soil samples were taken representing 3 layers.

Mechanical and chemical analyses of the soil are given in Table (1):

Soil depth (cm)	E.S (ds.m)	pH %	Available nutrient (ppm)					
			N	P	K	B	Mn	Zn
0-30	1.3	7.8	38	12	450	0.07	8.2	1.8
30-60	1.3	7.9	30	11	420	0.06	7.9	1.7
60-90	1.4	8.0	20	10	400	0.05	7.0	1.6

Soil depth (cm)	Coarse sand (%)	Particle size distribution			
		Fine sand (%)	Silt (%)	Clay (%)	Texture
0-30	0.3	23.50	25.3	45	Clay
30-60	0.3	24.70	26.2	46	Clay
60-90	0.2	25.60	26.4	47	Clay

The experimental design was split-plot. The vines were subjected to 7 treatments with 3 replicates 3 vines each. The treatments used in this study were as follows:

1- Control (60 unites of N\feddan).
2- Chicken manure (10 N/units) + 30 N/units as mineral.
3- Town manure (10 N/units) + 30 N/units as mineral.
4- Cattle manure (10 N/units)+ 30 N/units as mineral.
5- Chicken manure at (40 N/units).
6- Town manure at (40 N/units).
7- Cattle manure at (40 N/units).

Vines of the control received the same N treatments as 60 units/fed as recommended by the Ministry of Agriculture.

Ammonium sulfate (20.5 % N) as a source of mineral fertilizer was added at three times: 25 % at the growth onest, 50 % after berry set and 25

% after harvest. Organic manures were added only once at the beginning of growth .Chemical analysis of chicken, cattle and town manures are given in Table (2).

Table (2): The chemical analysis of used chicken, cattle and town manures.

Fertilizers	Organic matter	N %	P %	K %	Fe %	Mn (ppm)	Zn (ppm)
Chicken manure	63.2	2.50	1.14	1.9	6212	780	900
Cattle manure	60.7	0.75	0.50	0.4	5019	450	560
Town manure	40.3	1.07	0.60	0.5	3281	520	730

Field observations and laboratory measurements were achieved during this study as follows:

1- Average leaf area (cm^2/vine): this was estimated during the first week of May by picking twenty mature leaves from those opposite to the first cluster on the shoot, the leaf area was measured using the digital planimeter.

2- N, P, K content of leaves: the concentration of N, P and K in the petioles of leaves. Nitrogen content was determined according to micro-kjeldahl methods as described by Peregl, (1945). Phosphorus content according to Chapman and Pratt (1961) and potassium by using a flame photometer according to Brown and Lillelan (1946)

At harvest when TSS reached about 17-18 % average yield (kg per vine) was recorded in the filed.

Physical characteristics of bunches:

Bunch weight (gm), bunch volume (ml), 100 berry weight (gm), 100 berry volume (ml) and juice volume of 100 berries (ml).

Chemical characteristics of berries:

Soluble solids content (TSS %) was estimated by using a hand refractometer, total acidity percentage (expressed as g tartaric acid in berry juice) was determined according to the A.O.A.C. (1980), soluble solids content/acid ratio (TSS\acidity) and total anthocyanin content in berry skin (mg/g fw) was also estimated according to Hise *et al*., (1965).Also, nitrite and nitrate determination as methods of Singh (1988).

The obtained data of this study were statistically analyzed using the (N.L.S.D) according to Waller and Duncan(1969)

RESULTS AND DISCUSSION

Effect of different organic (sources) on:

1-leaf area:

Data presented in Table (3) show that all organic fertilizers as complementary to mineral N source significantly increased leaf area compared with mineral N alone (control) or organic fertilizers alone.

The maximum values were obtained on vines receiving 30 N \units mineral N source and 10 N\ units as chicken manure.

The obtained results may be due to fact that the decomposition of organic matter decreased the pH value and consequently nutrients in the soil became more available to vines or may be attributed to the increasing of photosynthetic rate as a result of more uptake of soil available nutrients, which cause an increase in growth and photosynthesis Mahmoud *et al*. (2000). Furthermore, application of cattle manure caused the lowest values of leaf area due to its poor contents of macro and micro nutrients.

Table (3): Effect of different organic (sources) and mineral of nitrogen fertilizer on Leaf area of Flame Seedless grapevines.

Treatments	Leaf area (m^2/vine)		
	2003	**2004**	**2005**
Control	128.13	128.60	128.77
Chicken manure 10 N\ units + 30N\units as Mineral	137.97	137.17	137.07
Town manure 10N\units +30N\units as mineral	135.76	135.15	136.54
Cattle manure10N\units + 30N \units as mineral	133.47	132.62	134.01
Chicken manure 40 N\units	131.58	130.92	131.34
Town manure 40N\ units	129.03	128.84	128.37
Cattle manure 40N\units	126.44	126.58	126.13
N. L.S.D. at 5 %	1.00	1.34	1.05

Similar results were reported by Darwish *et al*. 1996; Ragab and Mohamed (1999); Salama (2002); Abd EL-Hady *et al*. (2003); Abou Table (2004) and Abd EL-Hameed and Rabeea (2005) who reported that all combination of organic manure and minerals N fertilizer increased leaf area of Superior grapevines grown in the silty soil.

N, P and K content of leaf petioles:

Data in Table (4) indicated that organic manure fertilizer combined with N mineral fertilizers increased N, P and K content of leaf petioles as compared with the control that received 60 N units in the form of mineral fertilizer or organic fertilizer alone as 40 N units.

The obtained results are in accordance with those Darwish *et al*. (1996) on Roomy Red grapevines, Ezz (1999) on Thompson Seedless grapevines, Ragab and Mohamed (1999) on Flame Seedless grapevines, Harhash and Abd EL-Nasser (2000) on Flame Seedless grapevines and Kassem and Marzouk (2002) who revealed that the replacement of 50 % of the recommended rates of mineral N with organic fertilizer such as chicken, cattle and town manure significantly increased leaf mineral content of Flame Seedless grapevines.

Chicken manure as an organic fertilizer gave the highest values in this respect, while cattle and town manure alone gave the lowest values of N, P and K during the seasons of this study. This may be due to the poor contents of macro and micro nutrients as compared with chicken manure.

Table (4): Effect of different organic (sources) and mineral nitrogen fertilizer on `nitrogen, phosphorus and potassium content in leaves of Flame seedless grapevines

Treatments	N %			P %			K %		
	2003	2004	2005	2003	2004	2005	2003	2004	2005
Control	2.14	2.16	2.16	0.25	0.25	0.26	1.47	1.48	1.48
Chicken manure 10N\ units +30N\unit as mineral	2.74	2.66	2.60	0.35	0.36	0.37	1.70	1.68	1.70
Town manure10N\ units +30N\units as mineral	2.50	2.39	2.45	0.32	0.34	0.32	1.61	1.58	1.61
Cattle manure10N\ units + 30N \units as mineral	2.37	2.26	2.36	0.30	0.33	0.28	1.53	1.51	1.51
Chicken manure 40 N\units	2.30	2.24	2.24	0.27	0.28	0.29	1.51	1.49	1.49
Town manure 40N\ units	2.17	2.20	2.16	0.25	0.25	0.24	1.47	1.45	1.48
Cattle manure 40N\units	2.12	2.09	2.06	0.23	0.22	0.22	1.45	1.40	1.37
N. L.S.D. at 5 %	0.03	0.06	0.05	0.03	0.02	0.04	0.02	0.03	0.02

Effect of different organic (sources) on:

Yield:

Data presented in Table (5) show that adding organic manures combined with mineral N fertilizers significantly increased the yield \vine in compared with adding only 60 N-units/vine as mineral or 40 N-units/vine as organic N sources. The positive effect of adding organic manure with mineral N fertilizer on yield may be due to the role of organic manures in reducing soil pH resulting in higher more availability of nutritional elements; macro or micro elements (Wilde, 1988), or can be attributed to the increase in the leaf mineral content, this plays a big vital role in producing favorable balance between growth and fruit production which leads to increasing photosynthesis process.

These data agree with Martin (1988) on Roomy Red grapevines, EL-Morsy (1997) on Banaty grapevines, Ragab and Mohamed (1999) on Flame Seedless, Harhash and Abd EL-Nasser (2000) on Flame Seedless, Kassem and Marzouk (2002) and Abd EL-Maksood (2006) who reported that all combination between each organic nitrogen sources plus mineral nitrogen fertilization significantly increased the yield/vine as compared with mineral nitrogen fertilizer at the rate of 80 units\vine.

Data also revealed that chicken manure combined with 30-N/unit of mineral fertilizer gave the higher values than the other applied treatments. These results may be due to, the fact that chicken manure is rich in its contents of macro and micro nutrients than the other used manures.

2- Bunch weight and size:

Results of Table (5) revealed that adding organic manures combined with mineral N fertilizers significantly increased bunch weight and size in comparison with adding mineral fertilizers or organic manures fertilizers each alone.

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Table (5): Effect of different organic (sources) and nitrogen mineral fertilizer on yield, bunch volume and bunch weight of Flame Seedless grapevines.

Treatments	Yield (kg/vine)			Bunch volume (ml)			Bunch weight (g)		
	2003	2004	2005	2003	2004	2005	2003	2004	2005
Control	14.34	14.37	14.28	464.28	487.52	491.14	493.58	518.56	521.14
Chicken manure 10N\units+30N\units as mineral	16.72	17.03	16.94	616.10	641.30	611.62	647.10	667.58	642.24
Town manure10N\units +30N\units as mineral	15.34	15.51	15.65	535.08	533.51	533.63	563.41	561.61	562.55
Cattle manure10N\units + 30N mineral	14.62	14.77	14.51	479.78	482.28	498.71	507.78	511.40	527.17
Chicken manures 40 N\units	14.69	15.01	14.92	474.20	482.16	475.68	501.21	512.27	516.23
Town manures 40N\ units	13.70	13.68	14.14	423.75	440.35	439.98	453.64	468.61	469.17
Cattle manure 40N\units	12.90	12.85	12.86	385.01	383.47	419.36	413.50	411.99	449.54
N. L.S.D. at 5 %	0.35	0.37	0.40	11.06	12.40	18.31	11.17	13.30	17.52

The obtained results are in agreement with Martin (1988); Darwish *et al*. (1996); EL-Morsy (1997); and Ezz (1999) who reported that application of organic manures along with mineral nitrogen fertilizers increased both bunch weight and size. these results could be explained in view of that organic fertilizers contains high amount of available nutrient and humus compounds which improve soil aggregation and physical and chemical properties of the soil which enhance tree growth and hence increase both yield and cluster weight (Omran *et al*. 1998 and Nijjar, 1985).

Data also revealed that the highest values of cluster weight were obtained from chicken manures, while cattle and town manures gave the lowest values of cluster weight during the seasons of this study

Berry weight and size :

Data in Table (6) show that adding organic and mineral fertilizers significantly increased berry weight and size. Our data go in line with those obtained by EL-Morsy (1997); Ezz (1999); Ragab and Mohamed (1999). Moreover, chicken manure combined with N mineral fertilizer resulted in the highest increase in berry weight and size. These results may be due to that organic manure along with mineral nitrogen improved berry weight could be attributed to the effect of the nutrients of the vines which accelerated the formation of carbohydrates (ezz,1999)

Juice volume of the berries:

From data of Table (6) it is obvious that organic N manure combined with mineral N fertilizer significantly increased juice volume of the berries than the control and organic N alone, chicken manure combined with N mineral gave the highest values in this respect. It was found that juice volume of berries took the same trend found with weight and volume of berries.

Table (6): Effect of different organic (sources) and nitrogen mineral fertilizer on 100 berry weight and volume and juice volume of Flame Seedless grapevine.

Treatments	100 berry weight (g)			100 berry volume (ml)			100 berry juice volume (ml)		
	2003	2004	2005	2003	2004	2005	2003	2004	2005
Control	270.80	269.43	265.34	234.83	229.01	233.47	194.16	186.89	192.83
Chicken manure 10N\unit+30N\units mineral	304.29	310.36	312.65	269.55	280.35	280.23	230.24	237.56	240.45
Town manure 10N\units 30N\unit mineral	293.68	300.19	302.69	257.88	267.25	271.00	218.23	227.33	231.73
Cattle manure 10N\units + 30N mineral	283.42	290.80	292.46	245.57	258.37	260.65	207.30	219.54	225.99
Chicken manure 40 N\units	262.17	263.67	271.21	222.44	229.23	239.21	182.73	188.81	200.54
Town manure 40N\ units	251.88	249.62	258.34	210.92	216.98	224.73	171.12	176.62	185.37
Cattle manure 40N\units	240.35	244.59	250.16	201.57	211.69	218.95	163.45	175.58	181.93
N. L.S.D. at 5 %	6.65	4.84	2.45	7.0	5.23	3.21	7.39	5.35	3.21

Total soluble solids content, acidity and TSS/acid ratio:

It is apparent from the data of Table (7) that the organic fertilizer significantly increased total soluble solids content in berry juice decreased total acidity as compared with the control. These results go in line with EL-Morsy (1997); Ezz (1999) and Ragab and Mohamed (1999). Data also indicated that the highest TSS percentage resulted from the chicken manure as an organic fertilizer either alone or added with mineral fertilizer. These data may be due to the decomposition of chicken manure and its rich contents of macro and micro elements.

With regard to the effect on TSS/acid ratio the data revealed a trend similar be that of TSS.

Anthocyanin content of berry skin:

Data of Table (8) indicated that organic manures significantly increased total anthocyanin content of berry skin than the control (60 N-units) mineral nitrogen. Moreover, organic manures combined with N mineral fertilizers gave the highest values of this parameter.

(chicken manure was found to give the highest values than other organic manures in both seasons of the study. These results may be due to the chicken manure is rich in its content K, B and Mn than the other used treatments, Potassium, B and Mn are known to improve flavor and color of berries.

Table (7): Effect of different organic (sources) and of nitrogen mineral fertilizer on TSS, acidity and TSS/acid ratio of Flame Seedless grapevine.

Treatments	TSS %			Acidity %			TSS/acid ratio		
	2003	2004	2005	2003	2004	2005	2003	2004	2005
Control	17.8	17.9	17.6	0.847	0.806	0.741	21.04	22.49	24.77
Chicken manure 10N\units+30N\units as mineral	18.9	19.4	19.8	0.702	0.708	0.676	26.86	27.40	29.29
Town manure10N \units +30N\ units as mineral	18.5	18.2	18.9	0.757	0.798	0.767	24.46	23.15	24.71
Cattle manure 10N\units + 30N as mineral	18.2	18.2	18.3	0.735	0.774	0.769	24.71	23.51	23.82
Chicken manure 40 N\units	18.4	18.4	18.7	0.735	0.728	0.753	25.09	25.32	24.88
Town manures 40N\ unit	18.2	18.0	18.2	0.789	0.790	0.790	23.02	22.78	22.99
Cattle manure 40N\units	18.4	18.0	17.6	0.835	0.814	0.817	22.00	22.16	21.59
N. L.S.D. at 5 %	0.33	0.30	0.40	0.033	0.055	0.043	1.31	1.70	1.96

Table (8): Effect of different organic sources and mineral nitrogen fertilizer on anthocyanin content of berry skin in Flame Seedless grapes.

Treatments	Anthocyanin content (mg/g fw)		
	2003	2004	2005
Control	0.65	0.66	0.69
Chicken manure 10N\units+30N\units as mineral	0.93	0.90	0.95
Town manure10N\units +30N\unit as mineral	0.82	0.80	0.85
Cattle manure10N\units + 30N \units as mineral	0.79	0.76	0.80
Chicken manures 40 N\units	0.90	0.89	0.91
Town manure 40N\ units	0.73	0.75	0.75
Cattle manure 40N\units	0.69	0.70	0.75
N. L.S.D. at 5 %	0.04	0.05	0.06

Effect of different organic sources and mineral nitrogen fertilizer on residues of nitrate and nitrite in berry juice :

Data show in Table (9) revealed that the organic manure used either alone or in combination with mineral N fertilizer significantly decreased nitrate and nitrite residues in the juice of berries.

It is clear that chicken manure resulted in the lowest values of nitrate and nitrite residues during both seasons of the study as compared with control (mineral fertilizer or cattle and town manures. The obtained results are in agreement with Belal (2006) who mentioned that adding organic nitrogen sources gave the lowest values of nitrate and nitrite in grape berries of Thompson Seedless grapevines. All combinations between organic nitrogen plus mineral nitrogen fertilizer gave significant decrease in nitrate and nitrite contents in berry juice as compared with control (mineral nitrogen fertilizer) alone. The best treatment in this respect was in favour of chicken manure.

Table (9): Effect of different organic sources and mineral nitrogen fertilizer on nitrate and nitrite residues in berry juice of flame seedless grapevines

Treatments	Nitrate (ppm)			Nitrite (ppm)		
	2003	2004	2005	2003	2004	2005
Control	5.87	5.89	5.92	1.05	1.03	1.04
Chicken manure 10N\units+30N\units as mineral	4.92	4.86	4.85	0.82	0.82	0.82
Town manure10N\units +30N\units as mineral	5.11	5.09	5.09	0.86	0.86	0.86
Cattle manure10N\units + 30N \units as mineral	5.16	5.16	5.16	0.90	0.91	0.91
Chicken manures 40 N\units	4.55	4.55	4.65	0.79	0.80	0.79
Town manure 40N\ units	5.01	5.03	5.03	0.84	0.83	0.83
Cattle manure 40N\units	5.14	5.14	5.14	0.92	0.92	0.93
N. L.S.D. at 5 %	0.05	0.03	0.03	0.06	0.06	0.01

Organic nitrogen mineral in combination with mineral nitrogen fertilizer resulted in less accumulation of NO_3 than the mineral fertilizer when applied alone. The obtained results are in accordance with those reported by Harhash and Abd EL-Nasser (2000).

From the foregoing reisuts , it can be concluded that chicken manure can be considered as one of the best organic manure saving NPK, and some micro which nutrients, leaf area, yield and quality of Flame Seedless grapevine.

الجدارة الإنتاجية لبعض معاملات التسميد الآزوتى لمحصول العنب الفليم سيدلس

يتخذ معيار الجدارة الإنتاجية كأحد المعايير الأساسية لمقارنة وتصنيف المعاملات فى التجارب الزراعية ، للتعرف على المعاملات التى تتصف بميزة أو قصور نسبى ، ويتبين من مؤشرات الجدول رقم (١) أن متوسط إنتاجية الفدان لمعاملات التسميد الآزوتى بلغ حوالى : ١٦,٨٥ ، ١٥,٥٠ ، ١٤,٦٣ ، ١٤.٦٥ ، ١٣,٧٠ , ١٢,٦٢طن على الترتيب للمعاملات السمادية: الأولى ، الثانية,الثالثة ،الرابعة ، الخامسة ، السادسة يمثل كل منها نحو : ١١٨,٦ % ، ١٠٩,١ % ، ١٠٣. % ، ١٠٣,١ % ، ٩٦,٤ % ، ٨٨,٨ % على الترتيب من متوسط إنتاجية الفدان بالمزرعة (المقارنة) والمقدر بحوالى ١٤,٢١ طن للفدان ، مما يعنى معاملات التسميد : الأولى والثانية، الثالثة ، الرابعة قد حققت تفوقاً إنتاجياً يمثل نحو : ١٨,٦ % ، ٩,١ % ، ٣ % ، ٣,١% من متوسط إنتاجية الفدان المزرعى (المقارنة) ، بينما المعاملة السمادية الخامسة و السادسة قد حققت كل منها قصوراً نسبياً يمثل نحو ٣,٦ % ، ١١,٢ % على الترتيب.

جدول رقم (١) : بعض المؤشرات الإنتاجية والإقتصادية لبعض معاملات التسميد الآزوتى لمحصول العنب لمتوسط المواسم الزراعية خلال الفترة (٢٠٠٣-٢٠٠٥)

بيان / المعاملة/فدان	رقم المعاملة	الإنتاجية الفدانية: بالطن	الإنتاجية الفدانية: الرقم القياسى %	* الإيراد الكلى جنيه/فدان (١)	تكاليف التسميد جنيه/ فدان (٢)	فرق صافى عائد التسميد للمعاملة عن المقارنة: (١)-(٢)	فرق صافى عائد التسميد للمعاملة عن المقارنة: جنيه/فدان
٦٠ وحدة نتروجين (المزرعة)	المقارنة	١٤,٢١	١٠٠	١٤٢١٠	٢٤٠	١٣٩٧٠	----
١٠ وحدات نتروجين مخلفات دواجن + ٣٠ سماد معدنى	الأولى	١٦,٨٥	١١٨,٦	١٦٨٥٠	٢٦٠	١٦٥٩٠	٢٦٢٠
١٠وحدات نتروجين مخلفات مدن+٣٠ سماد معدني	الثانية	١٥,٥٠	١٠٩,١	١٥٥٠٠	٢٥٠	١٥٢٥٠	١٢٨٠
١٠وحدات نتروجين سماد ماشية +٣٠سماد معدني	الثالثة	١٤,٦٣	١٠٣,٠	١٤٦٣٠	٣٢٠	١٤٣١٠	٣٤٠
٤٠ وحدة نتروجين مخلفات الدواجن	الرابعة	١٤,٦٥	١٠٣,١	٢١٩٧٥	٥٦٠	٢١٤١٥	٧٤٤٥
٤٠ وحدات نتروجين مخلفات مدن	الخامسة	١٣,٧٠	٩٦,٤	٢٠٥٥٠	٥٢٠	٢٠٠٣٠	٦٠٦٠
٤٠وحدة نتروجين مخلفات ماشية	السادسة	١٢,٦٢	٨٨,٨	١٨٦٣٠	٨٠٠	١٧٨٣٠	٣٨٦٠

(*) متوسط العمر المزرعى ١٥٠٠ جنيه لطن المحصول المسمد عضوياً ، ١٠٠٠ جنيه لطن المحصول المسمد عضوياً ومعدنياً .

تصنيف الجدارة الإنتاجية لبعض معاملات التسميد الآزوتى لمحصول العنب :

يعتبر تحديد المعاملة السمادية ذات الكفاءة الإنتاجية المرتفعة لمحصول العنب من عوامل النجاح فى زراعة وإنتاج المحصول ، والفرض الإحصائى هنا هو عدم وجود فرق معنوى بين متوسط الإنتاجية للمعاملات السمادية لمحصول العنب الموضحة بالجدول رقم (١) ، هذا وقد إعتمد تحليل التباين على متوسط إنتاجية الفدان للمعاملة لثلاثة مواسم زراعية وهى : ٢٠٠٣ ، ٢٠٠٤ ، ٢٠٠٥ ويبين الجدول رقم (٢) تحليل التباين لمتوسطات الإنتاجية الفدانية للمعاملات السمادية.

جدول رقم (٢) : تحليل التباين لمتوسط إنتاجية الفدان لمحصول العنب لمعاملات التسميد الآزوتى المختلفة.

مصدر التباين	درجات الحرية D.F	مجموع مربعات الإنحرافات S.S	متوسط مربعات الإنحرافات M.S	نسبة (F) المحسوبة F. Ratio
بين المعاملات	٥	٣١,٧٥٨٦	٦,٣٥١٧	٤١٤٠٦٥**
داخل المعاملات	١٢	١,١٦٥٧	٠,٠٩٧١	
الإجمالى	١٧	٣٢,٩٢٤٣		

(**) معنوية عند مستوى ٠,٠١ .
المصدر : جمعت وحسبت من بيانات الجدول رقم (١).

هذا ويتبين من الجدول رقم (٢) أن الفروق بين متوسطات الإنتاجية للمعاملات السمادية معنوية جداً أى حقيقية ، ومن ثم فإنه يلزم عمل المقارنات الفردية بين مختلف تلك المتوسطات وفقاً لطريقة دنكان "Duncan Method" لإختبار أقل فرق معنوى بينها بالجدول رقم (٣) ،

جدول رقم (٣) : معنوية الفروق بين متوسطات الإنتاجية الفدانية للمعاملات السمادية لمحصول العنب بإستخدام طريقة "دنكان".

الإنتاجية الفدانية بالطن	١٦,٨٥	١٥,٥٠	١٤,٦٥	١٤,٦٣	١٣,٧٠	١٢,٦٢
نوع المعاملة	**الأولى**	**الثانية**	**الثالثة**	**الرابعة**	**الخامسة**	**السادسة**
١٠وحدات نتروجين مخلفات دواجن+٣٠سماد معدني	--	١,٣٥**	2.22**	٢,٢٢**	٣,١٥**	٤,٢٣**
١٠وحدات نتروجين مخلفات مدن +٣٠سماد معدني		--	٠,٨٧**	٠,٨٥**	١,٨٠**	٢,٨٨**
١٠وحدات نتروجين مخلفات ماشية+٣٠ سماد معدني			--	٠,٠٢	٠,٩٣**	٢,٠١**
٤٠ وحدة نتروجين مخلفات دواجن				--	٠,٩٥**	٢,٠٣**
٤٠ وحدة نتروجين مخلفات مدن					--	١,٠٨**
٤٠وحدة نتروجين مخلفات ماشيه						--
L.S.R 01		٠,٧٧٧	٠,٨١٩	٠,٨٤٢	٠,٨٥٦	٠,٨٧١
L.S.R. 05		٠,٥٥٤	٠,٥٨١	٠,٥٩٩	٠,٦٠٤	٠,٦١١

(**) معنوية إحصائياً عند مستوى ٠,٠١ .
المصدر : جمعت وحسبت من بيانات الجدول رقم (١).

العائد الإقتصادى لبعض معاملات السماد الآزوتى لمحصول العنب :

يعتبر العائد الإقتصادى من إستخدام الموارد الإنتاجية فى النشاط الزراعى هو الهدف الأساسى للمزارع نحو تحقيق أقصر ربح ممكن (صقر١٩٩٤,محى الدين واخرون١٩٩٧)، هذا ويتبين من الجدول رقم (١) أن معاملات التسميد الآزوتى بالتجربة قد حقق كل منها عائد إقتصادياً صافياً أعلى من نظيره لسماد المزرعة (المقارنة) ، وأن معاملات التسميد العضوى للأزوت قد إحتلت المراتب الثلاث الأولى ، إذ بلغ حوالى : ٧٤٤٥ ، ٦٠٦٠ ، ٣٨٦٠ جنيهاً للفدان لمعاملات ٦٠ وحدة أزوت عضوى مخلفات كل من : الدواجن ، المدن ، الماشية على الترتيب ، فى حين إحتلت معاملات التسميد المعدنى والعضوى المراتب الثلاث الأخيرة إذ تبين فرق الزيادة فى صافى عائد كل منها عن نظيره لسماد المزرعة (المقارنة) بلغ حوالى : ٢٦٢٠ ، ١٢٨٠ ، ٣٤٠ جنيهاً للفدان على التوالى لمعاملات السماد المعدنى والعضوى لكل من : ١٠ وحدات أزوت من مخلفات الدواجن + ٣٠ وحدة أزوت معدنى (المعاملة الثالثة) ، ١٠ وحدات أزوت مخلفات ماشية + ٣٠ سماد معدنى (المعاملة الخامسة) ، الأمر الذى يشير إلى أنه بالرغم من أن إنتاجية المحصول المسمد سماد أزوت معدنى وعضوى أعلى جدارة إنتاجية من السماد العضوى (الأزوتى) فقط ، إلا أن الأخير قد حقق عائداً إقتصادياً صافياً أعلى نظراً لإرتفاع السعر المزرعى لإنتاج المحصول المسمد عضوياً فقط ، هذا وبحساب معامل سبيرمان للرتب Spearman Rank Correlation بين ترتيب معاملات التجربة وفقاً لتكاليف التسميد الآزوتى ، والترتيب وفقاً لفرق صافى العائد لمعاملات التسميد بالمقارنة بالتسميد المزرعى (المقارنة) ، تبين أن معامل الإرتباط بلغ حوالى ٠,٦٦ ، مما يعنى أن قوة الإرتباط بين ترتيب كل من قمة تكاليف السماد الآزوتى وعائدها الإقتصادى بلغ حوالى ٦٠ % .

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تأثير إضافة مصادر مختلفة من الأسمدة العضوية على الحالة الغذائية والمحصول وجودة ثمار العنب الفيليم سيدلس

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****معهد بحوث الإقتصاد الزراعى – مركز البحوث الزراعية – وزارة الزراعة**

أجرى هذا البحث خلال الأعوام ٢٠٠٣ ، ٢٠٠٤ ، ٢٠٠٥ لدراسة تأثير بعض المصادر المختلفة من الأسمدة العضوية على الحالة الغذائية للاشجار والمحصول وجودة الثمار والأثر المتبقى من النيتريت والنترات فى عصير الحبات للعنب الفيليم سيدلس المزروع فى تربة طينية تحت نظام الرى بالتنقيط فى مزرعة خاصة بمحافظة الدقهلية.

أستخدم لهذه الدراسة ثلاث أنواع من الأسمدة العضوية وهى مخلفات الدواجن والماشية ومخلفات المدن كمصادر مختلفة للتسميد النيتروجينى العضوى ، بمعدل ٤٠ وحدة/شجرة إما منفرداً أو بمعدل ١٠ وحدة سماد عضوى + ٣٠ وحدة سماد كيماوى فى صورة سلفات نشادر وذلك مقارنة بالسماد المعدنى ٦٠ وحدة للشجرةوالتى تسمد به المزرعة عادة.

وقد أوضحت الدراسة أن التسميد العضوى مع التسميد المعدنى أدى إلى زيادة معنوية فى كل من المساحة الورقية ومحتوى الأوراق من عناصر النيتروجين ، الفوسفور والبوتاسيوم عن التسميد العضوى منفرداً أو التسميد المعدنى وكذلك وزن وحجم العنقود ، ووزن وحجم الحبات ، النسبة المئوية للماد الصلبة الذائبة الكلية فى عصير الحبات ومحتوى الأنثوسيانين فى قشرة الثمار.أدى أيضاً إلى إنخفاض الحموضة و المتبقى من النترات والنيتريت فى عصير الحبات. وكانت أفضل النتائج المتحصل عليها هى إستخدام سماد الدواجن حيث أنه أعطى أحسن نسبة فى محتوى الأوراق من العناصر الغذائية والمساحة الورقية وكذلك جودة الثمار مع إنخفاض فى محتوى الثمار من متبقيات النترات والنتريت والتى تعتبر مصدر ضار للصحة والبيئة.