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SHORT TERM INFLUNCES OF ORGANIC AND INORGANIC FERTILIZERS ON NITARATE CONTENT AND SQUASH PRODUCTION

Hammad, S.A.; H.A. Meshref; T.M. El-Zehery and K.F. Fouda
Soil Sci. Dept., Fac. of Agric., Mansoura Univ., Egypt.

ABSTRACT

A field experiment was conducted on a sandy soil for winter season 2004 at the Agricultural Experimental Station, Kalapshoo, Dakahlia governorate, to study the combined effects of different types of organic materials (Corn straw, FYM and Mix) with three levels of them i.e. without addition, 14 and 28 ton /fed and three levels of mineral nitrogen fertilizers were used in this study i.e. without addition, 300 and 600 kg $(NH_4)_2SO_4$/fed. While potassium and phosphorus were added in two levels, P_1K_1=150 kg Ca $(H_2PO_4)_2$/fed + 50 kg K_2SO_4/fed and P_2K_2=300 kg Ca $(H_2PO_4)_2$/fed + 100 kg K_2SO_4/fed on plant content of nitrate and crop productivity. The treatments were arranged in a split split split plot design. The results obtained were as follows:

The individual and combined treatments of organic matter and inorganic fertilizers gave significant increase in shoot, root, yields and fruit of squash plant.

Concerning individual traits, there was significant increase in dry weight of shoot, root and fruit with adding FYM at the harvest. Whereas with organic levels it was noticeable that increase in dry weight of shoot, root and fruit with adding 28 ton.fed^{-1} organic manure. With increasing nitrogen fertilizer till double recommended doses.

The combined effect of results show that, the combination of double recommended dose of N + 28 ton.fed^{-1} of FYM fertilization treatments gave significant increase in dry weight, and nitrate content.

Concerning combined traits, there was a significant increase in fruit dry weight with adding 28 ton.fed^{-1} of organic manure + double recommended dose of nitrogen (N_2).

Organic manure and inorganic fertilizers gave significant increases in nitrate and nitrite contents, the highest value of plant NO_3^- content with adding 28 ton.fed^{-1} with double recommended doses of nitrogen fertilizer, the same influence of the farmer treatments was found with NO_2^- content.

So, it is recommended to add great amounts of organic and inorganic fertilizers to sandy soil for two benefits, firstly to give the plants their nutrients requirements, secondly to easies releasing nutrients in available forms through activating the decomposition process of organic matter. Also, we must be attentioned for vegetable crops and their contents of nitrate to prevent health hazard for human.

INTRODUCTION

Nitrogen is a costly and rate-limiting element in plant growth. Nitrogenous fertilizer accounts for 40% of costs associated with crops. Increasing the efficiency of nitrogen use would be cost-effective and would minimize problems of ground water contamination by excess nitrate application (Sheldrick, 1987).

From the standpoint of plant nutrition, NH_4^+, NO_2^- and NO_3^- are the most important and are produced from aerobic decomposition of soil organic matter or from the addition of N fertilizers. These three forms usually

represent 2 to 5% of the total soil-N. N_2O and NO are important forms of N lost through denitrification (Hammad, 1996 and Tisdale *et al.*, 1999).

Any excess N remaining is likely to be leached. Furthermore, additional inorganic N may become available if irrigation increases net N mineralization rates of soil organic matter (Polglase *et al.*, 1995). The accumulation of nitrate in plant parts is a natural phenomenon that occurs when the uptake of NO_3^- by the roots exceeds its reduction and subsequent assimilation within the plant. The amount, source and timing or N-application all govern the effect of N-fertilizer on NO_3^- accumulation (EL-Sissy, Laila, 2000).

Generally, application of organic resides is beneficial to crop as a source of essential nutrients such as N, P, and K, and micronutrients, and improve the soil properties, physically, chemically, microbiologically and soil fertility. (Giusquiani *et al.*, 1988).

Nitrogen losses through leaching are an important water quality issue. Combined manure and fertilizer N additions are a significant source of excessive soil NO_3–N (Jokela, 1992; Angle *et al.*, 1993). However, the effects of independent organic manure and fertilizer N applications, each applied at agronomically optimum rates, are more variable. There is evidence that organic manure increases NO_3–N leaching compared with fertilizer N applied at equivalent N rates (Roth and Fox, 1990; Jemison and Fox, 1994). This increase was attributed to mineralization of organic N, producing NO_3–N during periods without crop uptake. Alternatively, some studies show that organic manure reduces NO_3–N leaching compared with equivalent N rates from fertilizer (Sims, 1987;and Jokela, 1992). The additional organic C from organic manure may increase denitrification and macropores flow, or N mineralization rates may be synchronized with N uptake by the crop (Ma *et al.*, 1999).

Adams *et al.* (1994) suggested that organic manure should be applied in late spring or early summer, when crops and microorganisms are rapidly taking up N, to minimize winter NO_3–N leaching to ground water.

So nitrate is a wide spread contaminant of ground and surface waters worldwide. Also accumulation of nitrate in the environment spread in the recent years to be found in the plants in a free manner which could be harmful for human health.

The objectives of this study are:

Firstly, evaluate the effect of organic materials, inorganic fertilizers and their interactions on squash plant. Secondly study the effect of studied factors on content of nitrate and nitrite in squash plant, which leads us to further examination of balanced fertilization effects of organic and inorganic fertilizers on crop yield especially in sandy soils.

MATERIALS AND METHODS

A field experiment was conducted on a sandy soil during season 2004 at the Agricultural Experimental Station, Kalapshoo, Farm of Fac. Agric., Mansoura Univ., which belong to Belkass district, Dakahlia governorate, to study the combined effect of organic materials sources and

mineral nitrogen fertilizers rates on soil properties and plant composition. These effects were studied during successive growth stages of squash plant (30, 45 and 60 days) after planting in a split split split plot design. The interaction of different types of organic materials (Corn straw, FYM and Mix) with three levels of them (L_0=without addition, L_1=14 ton /fed and L_2=28 ton /fed. And three levels of nitrogen fertilizers were used in this study; N_0=control (without addition), N_1=300kg $(NH4)_2SO_4$/fed and N_2 = 600 kg $(NH_4)_2SO_4$/fed. Two levels of potassium and phosphorus; P_1K_1=150 kg Ca $(H_2PO_4)_2$/fed + 50 kg K_2SO_4/fed and P_2 K_2=300 kg Ca $(H_2PO_4)_2$/fed + 100 kg K_2SO_4/fed were used. Results in Table 1 show the physical and chemical properties of the experimental soil before planting.

Soil samples were sieved and routine analysis in the beginning of the experiment was done according to Hesse (1971) Mechanical analysis was determined according to the international pipette method as described by Piper (1950).

Table 1: Some physical and chemical properties of the soil before planting.

Soil properties	value	Soil properties		value
H.C, cm/h	135.00	pH value		7.8
BD, g/cm^3	1.65	EC, dSm^{-1}		0.41
RD, g/cm^3	2.74	O.C %		0.25
Total porosity%	39.78	O.M %		0.43
Coarse sand %	78.95	O.P, ppm		4.9
Fine sand %	14.41	$CaCO_3$%		1.43
Silt %	2.48	H.W %		0.81
Clay %	4.16	S.P %		25.61
Soil texture class	Sandy	Soluble cations, meq/L	Ca^{++}	2.20
Avi. NH_4, ppm	32.00		Mg^{++}	1.35
Avi. NO_3, ppm	30.00		Na^+	3.35
Avi. P, ppm	21.68		K^+	1.00
Avi. K ,ppm	123.93	Soluble anions, meq/L	CO_3^-	0.00
Total N, ppm	205		HCO_3	2.25
Total P, ppm	29.00		Cl^-	4.00
Total K, ppm	427.47		SO_4^-	1.65

Plant samples of leaves, stems and roots were taken at three stages (30, 45, 60 days after planting). Samples were oven dried at 70 ^oC till constant weight then grained to a fine powder and then 0.2 g was taken to wet digestion using a mixture of sulfuric and perchloric acids according to Jackson, (1967) to determine the percentage of total nitrogen which determined by Kjeldahl method as described by Hesse, (1971). Nitrate and nitrite were determined according to the method described by Singh (1988).

Organic materials were analyzed before cultivation to be added before planting by two weeks. Data in table 2 show the chemical properties of FYM and corn straw (organic materials).

Table 2: Some chemical properties of farmyard manure and corn straw.

Organic materials	Total N %	Total P, ppm	Total K, ppm	O.C %	C:N	O.M %	pH	EC, dSm^{-1}
FYM	0.81	27.396	567.16	15.38	19:1	26.53	6.4	2.45
Corn Straw	0.53	14.603	548.26	5.64	27:1	9.73	6.43	1.18

Organic materials analysis:

Electrical conductivity (EC) was determined in (1:10) organic material extract according to Jackson, (1967). pH value was determined in (1:10) extract according to Jackson, (1967). Total carbon (C %) content was determined according to Walkly & Black method as described by Hesse, (1971). Total nitrogen was determined using the conventional method of kjeldahl Jackson, (1967). Total phosphorus was determined calorimetrically by using spectrophotometer as described by Hesse, (1971). Total potassium was

Statistical analysis :

The statistical analysis of the experimental data was done according to the methods described by Gomez and Gomez, (1984) using LSD to compare the means of treatments values and Minitab software to gave the regression formula using the data means.

RESULTS AND DESSCUION

Effect of organic materials and inorganic fertilizers on squash dry weight.

Data in Table (3) show that adding FYM, corn straw and mixed between them to sandy soil leads to high significant increases in dry weight of squash plant after 30 days from planting, while it was significant only after 45 days from planting. At the harvest, these treatments obtained high significant increase in dry weight of shoots, while with roots and fruits, it was just significant.

The highest value of dry weight was found after 45 days from adding FYM. At harvest there was high significant increase in dry weight of shoots, and the highest value was occurred with FYM.

Also, there was significant increase in dry weight of roots and fruits by adding FYM at the harvest stage.

As for the effect of organic materials levels on dry weight of squash plant, there is high significant increase in dry weight after 30, 45 days from planting and at the harvest. The highest value of dry weight was found at plant age 45 days with 28 $ton.fed^{-1}$ organic materials. Moreover at the harvest the highest value was occurred in shoots with adding 28 $ton.fed^{-1}$ organic materials.

The effect of farmyard manure on plant dry weight may be due to adding organic manures which considered as a source of essential nutrients, such as N, P, K and also micronutrients as well as improving

physical, chemical and biological properties of the studied soil which reflected on the encourage of vegetative growth and root development. This leads to higher plant yield. These results are agreeable with those obtained by Gomaa (1982) on tomato and squash. Similar results were reported by Awad and Griesh (1992), Nakagawa et. al., (1992), Brito and Hadley (1993) and El-Zehery (2003).

Data in Table (3) stated that there was high significant increase in dry weight with adding nitrogen fertilizer at all growth stages. At harvest the highest value of dry weight was obtained with shoots at N_2 treatment. Moreover in roots and fruits the highest value was recorded with N_2 treatment.

These results could be due to the role of nitrogen for plant metabolism, i.e., protein synthesis, nuclic acids and chlorophyll content (Purekar *et al.*, 1992). Therefore, increasing nitrogen levels increased multiplication of cells which enhances the amount of metabolites necessary for building plant organs and consequently the vegetative growth of plants while,the increment in plant growth due to P could be interpretated as a reflection to its role in root proliferation and growth, photosynthesis, energy storage, cell division and enlargement. These results are in agreement with those obtained by Farag, (1984), Hegazi and Attia (2002), Singh *et al.*, (2000) and Ibrahim(2001).

Table 3 : Effect of organic sources, inorganic fertilizers and their levels on dry weight (g/plant) of squash plant at different growth stages during season 2004.

Treatments	dry weight of plant (g/plant)				
	Day after planting		At harvest (60 days)		
(A)Organic Sources	30 days	45 days	Shoot	Root	Fruit
FYM	7.81	8.35	19.09	3.52	8.19
Corn Straw	6.83	6.84	12.87	2.85	6.93
Mixed of them	7.16	7.28	15.41	3.29	6.98
F. Test	**	*	**	*	*
LSD at 0.05	0.30	0.50	0.08	0.03	0.06
(B)Organic Levels					
L_0	5.88	6.31	11.64	2.25	6.32
L_1	6.96	7.22	15.34	3.15	7.13
L_2	8.81	9.08	20.39	4.26	8.65
F. Test	**	**	**	**	**
LSD at 0.05	0.50	0.30	0.06	0.02	0.04
(C) N levels					
N_0	6.77	6.98	14.15	2.82	6.88
N_1	7.24	7.42	15.56	3.17	7.43
N_2	7.91	7.95	17.66	3.66	7.79
F. Test	**	**	**	**	**
LSD at 0.05	0.20	0.03	0.04	0.02	0.024
(D) PK levels.					
$P_1 K_1$	7.16	7.31	15.34	3.09	7.16
$P_2 K_2$	7.45	7.59	16.24	3.35	7.57
F. Test	**	*	**	**	**

The results in Table (3) indicate that PK fertilizers have high significant increase in plant dry weight production. The highest value of dry weight was occurred at 45 days with P_2K_2. At the harvesting time, there is high significant increase in dry weigh where the highest value was obtained with shoots at P_2k_2 treatment. Where as the highest value of root was found with adding P_2K_2 treatment**.** Moreover the highest value of fruits was occurred by applying P_2K_2 treatment.

The combined effect of organic materials, and inorganic fertilizers on squash dry weight:

Data in Table (4) show the combined effect of organic materials levels and nitrogen rates on dry weight. There is no significant increase in dry weight as a result of adding organic materials levels with nitrogen fertilizers rates. The highest values of dry weight (g/plant) were observed with the highest N level with 0, 14 and 28 ton.fed^{-1} organic materials, respectively. The highest value was found with adding 28 ton.fed^{-1} of organic materials levels + adding double recommended doses of nitrogen fertilizer rate (N_2).

Table 4 : Means of fruits dry weight of squash plant (g/plant) as affected by the combined effect of organic materials levels and nitrogen fertilizer rates during season 2004.

N-Treatments	Organic levels		
	L_0 (Control)	L_1	L_2
	dry weight (g/plant)		
N_0 (Control)	5.78	6.94	8.23
N_1	6.40	7.077	8.78
N_2	6.76	7.65	9.43
F. Test	NS		
LSD at 0.05	--		

Nitrogen fertilizer may increase the decomposition of soil organic matter, so it would increase the efficiency of native soil NPK, also the root growth maybe increased by the addition of N-fertilizers. The application of organic materials along with chemical fertilizers may be helpful in conserving the fertilizer N and in assuring its continued availability to subsequent crops. This result is in accordance with findings of Mahmoud and Abd El-Aziz, (1981) and Metwally and Khamis (1998).

The combined effect of organic materials, and PK fertilizers on squash dry weight:

Data in Fig (1) showed that the highest value was occurred with adding FYM + double recommended doses of phosphorus and potassium fertilizers. Also, it was observed that FYM gave the highest value of dry weight (g/plant) either with p_1k_1 or p_2k_2 treatments.

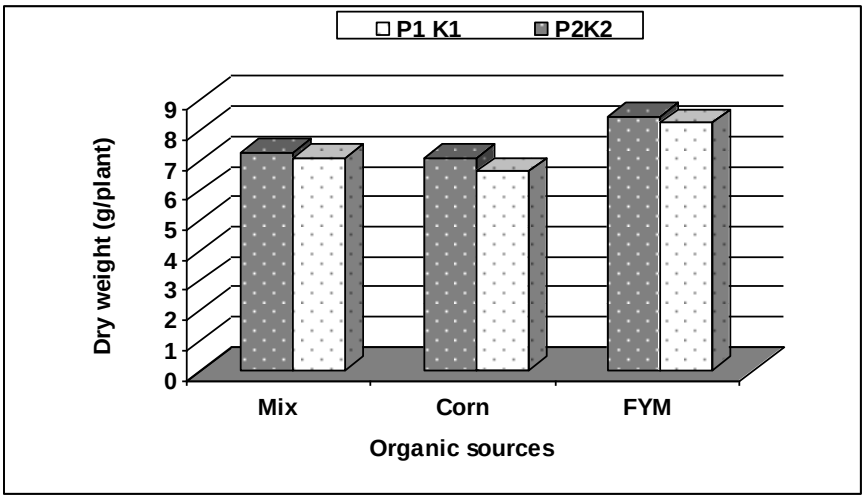

Fig 1: Means of fruits dry weight of squash plant (g/plant) as affected by PK fertilizers rates and organic material sources during season 2004.

Effect of organic materials, and inorganic fertilizers on plant NO_3^- content:

Data revealed that adding FYM, corn straw and mixing them to sandy soil has significant effect on some stages and non significant increase from other treatments on NO_3^- content of squash plant. At 30 days after planting there was no significant increase in NO_3^- content in squash plant, the highest value was found with adding FYM. While at 45 days after planting there was high significant increase in NO_3^- content, the highest value was occurred with FYM.

Data in Table (5) revealed that at the harvest there is highly significant increase in NO_3^- content, in shoot part the highest value was occurred with FYM, but in root there was no significant increase in NO_3^- content the highest value was found with adding corn straw, while in fruit part there is significant increase in NO_3^- content with corn straw.

Concerning the effect of organic levels on NO_3^- content in different stages of squash growth, data in Table 5 stated that there is high significant increase in NO_3^- content at 30 days after planting, the highest value was occurred with 28 ton.fed^{-1} compared with control, and also at 45 days after planting, where the highest value was found with 28 ton.fed^{-1} compared with control.

At the harvest the highest value was occurred with 28 ton.fed^{-1} in shoot, root and fruit. This increase in NO_3^- concentration could be due to that organic materials considered as a good source of plant nutrients and produce some substances which promoting plant growth leading to more absorption of available nitrogen. These results are in agreement with those obtained by Dominguez (1994) and Castro *et al.*, (1998).

Data in Table (5) found that NO_3^- contents at different plant growth stages obtained high significant increase by using N fertilizers. At 30 days after planting the highest value was occurred with double recommended doses of nitrogen fertilizer.

Table 5: Effect of organic materials sources, inorganic fertilizers levels, and their interactions on NO_3^- content (ppm) in plant parts at different plant growth stages during season 2004.

Treatments	NO_3^- contents of plant parts (ppm)				
	Day after planting		At harvest(60 days)		
(A)Organic Sources	30 days	45 days	Shoot	Root	Fruit
FYM	43.14	42.37	45.77	41.53	45.31
Corn Straw	40.84	40.30	42.60	41.68	47.24
Mixed	42.14	40.71	41.22	40. 50	45.66
F. Test	NS	**	**	NS	*
LSD at 0.05	--	0.06	0.05	--	0.02
(B)Organic Levels					
L_0	33.12	42.369	36.66	31.85	40.35
L_1	43.44	40.299	43.30	42.77	47.01
L_2	49.56	40.71	49.62	49.08	50.85
F. Test	**	**	**	**	**
LSD at 0.05	1.02	0.08	0.08	0.06	0.004
(C) N levels					
N_0	39.42	37.65	40.64	37.54	44.05
N_1	41.89	41.25	43.29	41.97	46.23
N_2	44.81	44.48	45.65	44.21	47.93
F. Test	**	**	**	**	**
LSD at 0.05	1.28	0.07	0.06	0.08	0.005
(D) PK levels					
P_1 K_1	41.36	40.11	42.47	39.42	44.81
P_2 K_2	42.72	42.14	43.92	43.05	47.33
F. Test	*	**	**	**	**

After 45 days from planting the highest value was found with double doses recommended of nitrogen fertilizers. At the harvest the highest value was found with double recommended doses of nitrogen fertilizers in shoot and also in roots and fruits parts compared to control (N_o). At 30 days after planting there is significant increase in NO_3^- content, the highest value was occurred with double recommended doses of phosphorus and potassium, while at 45 days after planting there is high significant increase in NO_3^- content. The highest value was found with P_2K_2 treatment.

At the harvest there is high significant increase at all stages of plant growth, the highest values were occurred with P_2k_2 treatment respectively in shoots, roots and fruits.

These increases may be attributed to nitrogen which is vital to the growth of plants. Under double recommended applications, most soil nitrogen especially in alluvial soils will be in form NO_3^- and plants may

absorb great quantity of nitrogen than its assimilation capacity, the difference between N-absorption and assimilation may be great as the unutilized nitrogen will be stored as nitrate in plant tissues. The present results are in agreement with the findings of Gabal (1980), Green world and Hunt (1986) and Pavlovic et.al., (1997).

Using ammonium sulfate fertilizer in combination with high levels of organic materials, more accumulation of NO_3^- was noticed, this phenomena may be due to the high available N release from this fertilizer, which increases the rate of N uptake by plants than its assimilation rate, particularly at the higher N fertilization rate.

El-Sissy, Laila (2000), Szwonek (1986) and Custic et. al., (1994) also came to the same conclusion.

The combined effect of organic materials, and inorganic fertilizers on plant NO_3^-content:

Data in Table 6 revealed that there was high significant increase in NO_3^- (ppm) as affected by the combined effect of organic materials levels and nitrogen fertilizers rates. The highest value of plant NO_3^- was observed with the highest N level with 0, 14 and 28 ton.fed^{-1} organic materials, respectively. Concerning combined effects, the highest value was found with adding 28 ton.fed^{-1} + double recommended doses of nitrogen fertilizer.

As shown in Fig (2) the highest value of NO_3^- was found by adding FYM with double recommended doses of phosphorus and potassium. Also, it was observed that FYM give the highest value of NO_3^- (ppm) either with p_1k_1 or p_2k_2 treatments.

Table 6:Means of NO_3^- content in fruit dry weight of squash plant (ppm) as affected by the combined effects of organic materials levels and nitrogen fertilizers rates during season 2004.

N -Treatments	Organic levels		
	L_0 (Control)	L_1	L_2
	NO_3^- in plant (ppm)		
N_0 (Control)	25.82	39.33	47.79
N_1	32.08	41.83	49.84
N_2	36.80	45.13	51.51
F. Test	**		
LSD at 0.05	1.41		

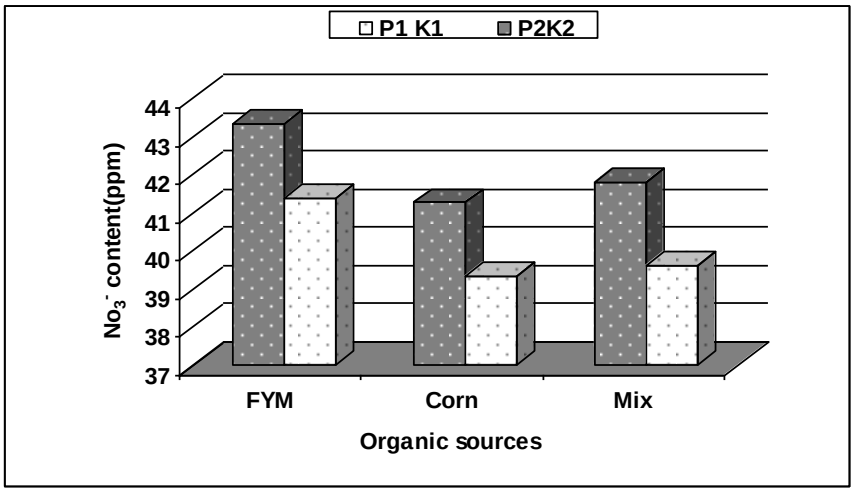

Fig 2: Means of NO_3^- content in fruit dry weight of squash plant (ppm) as affected by PK rates and organic sources during 2004 season.

Effect of organic materials, and inorganic fertilizers on plant NO_2^- content.

Data presented in Table (7) pointed out the effect of organic materials sources on NO_2^- content at different stages of squash plant growth. Data revealed that there is non significant increase in NO_2^- (ppm) at 30 days after planting, the highest value was occurred with adding FYM at 30 days after planting, while at 45 days after planting this increase is high significant. The highest value was found by adding FYM.

At the harvest in shoot part there is highly significant increase in NO_2^- (ppm), The highest value was found with FYM, but in root part there is significant increase in NO_2^- the highest value was occurred with FYM. On the other hand, there is high significant increase in NO_2^- in fruit part. The highest value was found with FYM.

Concerning the effect of organic materials levels on NO_2^- (ppm) in squash plant, data in Table (7) illustrated that there is high significant increase in all stages of squash plant. At 30 days after planting the highest value was occurred with 28 ton.fed^{-1}, At the harvest in shoot part the highest value was occurred with 40m^3.fed , and also in root and fruit parts the highest values were occurred with 40m^3.fed respectively compared with control.

The increase in NO_3^- concentration due to organic manures may be attributed to organic matter producing some substances which promoting plant growth leading to more adsorption of available nitrogen. Similar results were reported by Dominguez (1994) and Castro et al (1998).

Table 7: Effect of organic materials sources, inorganic fertilizers, its effects on NO_2^- content (ppm) of plant part at different plant growth stages during season 2004.

Treatments	No_2^- content of plant (ppm)				
	Day after planting		At harvest(60 days)		
(A)Organic Sources	30 days	45 days	Shoot	Root	Fuit
FYM	1.89	1.69	2.67	2.06	2.25
Corn Straw	1.82	1.94	1.69	1.94	1.94
Mixed	1.94	2.25	1.93	1.79	1.69
F. Test	NS	**	**	*	**
LSD at 0.05	--	0.01	0.003	0.07	0.01
(B)Organic Levels					
L_0	1.43	1.48	1.36	1.59	1.48
L_1	1.81	1.86	2.050	1.92	1.86
L_2	2.42	2.54	2.87	2.27	2.54
F. Test	**	**	**	**	**
LSD at 0.05	0.012	0.01	0.01	0.08	0.004
(C) N levels					
N_0	1.72	1.70	1.85	1.75	1.70
N_1	1.84	1.88	2.06	1.92	1.88
N_2	2.104	2.30	2.37	2.11	2.30
F. Test	*	**	**	**	**
LSD at 0.05	0.01	0.004	0.01	0.06	0.01
(D) PK levels					
P_1 K_1	1.82	1.77	2.00	1.81	1.77
P_2 K_2	1.95	2.15	2.18	2.04	2.15
F. Test	**	**	**	**	**

As for the effect of nitrogen fertilizer on NO_2^-content, the data in Table (7) showed that there is high significant increase in NO_2^-. At 30 days after planting the highest value was found with N_2 treatment compared to control and at 45 days after planting the highest value was occurred with N_2. At the harvest the highest value was occurred with N_2 treatment in shoot, and also the highest value in roots and fruits were occurred with N_2 treatment compared to the control.

Appling phosphorus and potassium fertilizers to the soil have a high significant increase in NO_2^- at different growth stages of squash plant. At 30 days after planting the highest value was occurred with P_2K_2 treatment.
At the harvest in shoot part the highest value was found with adding p_2k_2 treatment, and also in root and fruit parts the highest values were occurred with applying P_2K_2 treatment.

The combined effect of organic materials, and inorganic fertilizers on plant NO_2^- content.

As shown in Table (8) data showed a high significant increase in No_2^- as affected by the combined application of organic materials levels with nitrogen fertilizer rates. The highest value of plant NO_2^- (ppm)was observed with the highest N level with 0, 14 and 28 ton.fed^{-1} organic manure, respectively. The highest value was found with adding 28 ton.fed^{-1} of organic materials levels with double recommended doses of nitrogen fertilizers.

Table 8: Means of fruit NO_2^- content of squash plant (ppm) as affected by the combined effect of organic levels and nitrogen rates during 2004 season.

N -Treatments	Organic levels		
	L_0 (Control)	L_1	L_2
	plant NO_2^- (ppm)		
N_0 (Control)	1.22	1.90	2.64
N_1	1.44	2.19	2.88
N_2	1.65	2.40	3.37
F. Test	**		
LSD at 0.05	0.095		

The combined effect of organic materials, and PK fertilizers on plant NO_2^- content.

As shown in Fig (3) data showed that the highest value was found with adding FYM as combined with double recommended doses of phosphorus and potassium. Also, it was observed that FYM gave the highest value of NO_2^- (ppm) either with p_1k_1 or p_2k_2 treatment.

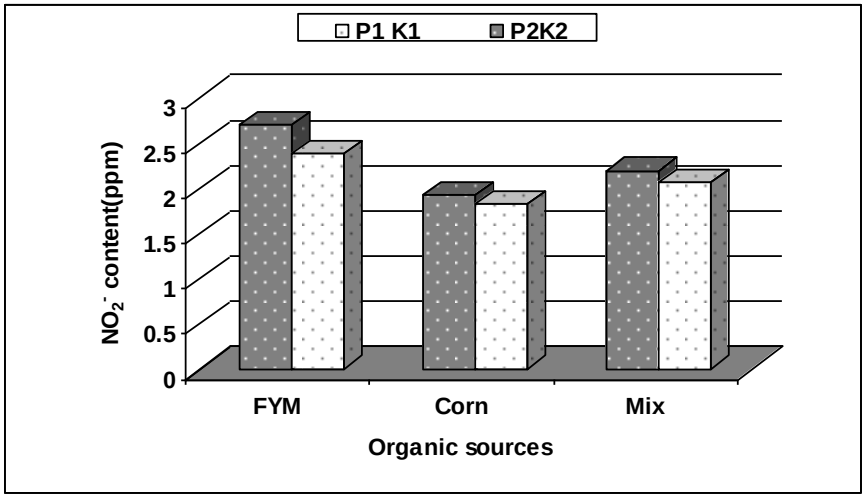

Fig 3: Means of NO_2^-content in fruit of squash plant (ppm) as affected by PK fertilizer rates and organic materials sources during season 2004.

Also, data show that these increases may be attributed to that organic material produce some substances which have a role in increasing availability of soil nutrients which led to more absorption of available nitrogen. The release of available N (NH_4^+ +NO_3^-) from organic materials sources was slow, steady and took along time. While, combination between organic and inorganic N resulted in greater values of apparent net N release

than those obtained when each applied singly. Similar results were recorded by Dominguez (1994) and Metwally and Khamis (1998). Also It may be due to application of corn straw which increased the reduction conditions beside its effects on increasing nitrate immobilization and the reduction of NO_3^- to NH_4^+ by microorganisms which is in accordance with findings of IRRI, (1984).

By using Minitab software, we have the following regression formula which show the interaction influences on total dry yield.

The expected equation to predicted the total yield was:

Total dry yield (g/plant) =6.69 + 0.0709 Total N – 0.159 NO_3 +0.121 NH_4

Finally, O.M had significant effect on N-forms that may be due to decomposition of O.M and release N forms.

CONCLUSION:

Results indicated that usage of organic material with different sources and huge amount would enrich poorly sandy soil. Also considering inorganic fertilizers, it is recommended to be added in a great amounts to this soil for obtaining two benefits, firstly inorganic fertilizers give the plants their nutrients requirements, secondly it helps microorganisms to easies releasing nutrients in available forms through activating the decomposition process of organic material.

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التأثير الزمنى القصير للأسمدة العضويةِ والمعدنية على محتوى النترات وانتاجية نبات الكوسة

سامى عبد الحميد حماد، حسن عبد الله مشرف، طارق محمد الزهيرى و كريم فكرى فودة
قسم الأراضى - كلية الزراعة - جامعة المنصورة - مصر0

تم اجراء تجربة حقلية على تربة رملية في محطة التجارب الزراعيةِ بقلابشو ، بمحافظة الدقهلية، فى فصلِ شتاء 2004 وذلك لِدراسَة التأثيرِ المشتركِ للأنواعِ المختلفةِ من الموادِ العضويةِ (قشّ ذرةِ، سماد المزرعة FYM ومخلوط منهما) بثلاثة مستويات هى بدون إضافةِ و 14 و 28 طَنّ/ فدان كذلك تم استخدام سماد نيتروجينى بثلاثة مستويات في هذه الدراسةِ كما يلى : بدون إضافةِ و 300 و600 كيلوجرام سلفات امونيوم/فدان. كذلك تم اضافة مستويان من البوتاسيومِ والفسفورِ معا ؛ الأول =150 كيلوجرام سوبر فوسفات احادى الكالسيوم +50 كيلوجرام سلفات بوتاسوم والثانى 300 كيلوجرام سوبر فوسفات احادى الكالسيوم +100 كيلوجرام سلفات بوتاسيوم وذلك باستخدام تصميم القطع المنشقة ثلاث مرات وتاثير هذة المعاملات على المادة الجافة لنبات الكوسة ومحتواه من النتراتَ والنيتريت وكانت النَتائِج كما يلى:

أعطتْ المعاملات الفرديةُ والتفاعلات المشتركةُ للمادة العضويةِ والأسمدة المعدنية زيادةِ معنوية في الأوراق والجذور والثمار لنبات الكوسة.

فيما يتعلق بالمعاملات الفرديةِ، كان هناك زيادةُ معنوية في الوزنِ الجافِ للأوراق والجذور والثمار عند الحصادِ مَع اضافة سماد المزرعة FYM كما يلى (19.09, 3.52 و8.19 جرام/ نبات) على التوالي. بينما لوحظ مع معدلات اضافة العضويةِ ان الوزن الجاف للأوراق والجذور والثمار وَصل الى (20.39 ، 4.26 و8.65 جرام/ نبات) على التوالي بإضافة 28 طَنَّ/فدان مادة عضوية. كذلك بزيَادَة معدل السماد النتروجينِ حتى ضعف الجرعة الموصّى بها ، أعطت القِيَمَ الأعلى للوزنِ الجافِ للأوراق والجذور والثمار (17.66 , 3.66 و7.79 جرام/نبات) على التوالي.

وفيما يتعلق بنَتائِج التفاعلات فانها توضح أنّ التفاعل المشترك بين النيتروجين المعدنى بمعدل ضعف الموصى به + 28 طَنّ /فدان مِنْ السماد المزرعى FYM أعطتْ زيادةَ معتوية في الوزنِ الجافِ لنبات الكوسة ومحتواها من النترات.

وكان من نتائج التفاعلات المشتركة ، حدوث زيادةُ معنويةُفي الوزن الجاف للثمار (9.43 جرام/ نبات) وذلك بإضافة 28 طَنَّ /فدان مِنْ المادة العضويةِ+ ضعف الجرعة الموصّى بها مِنْ النتروجينِ المعدنى.

كما اظهرت المادة العضويةُ والأسمدة المعدنية زيادةُ هامّةُ في محتوى النتراتَ والنيتريت بالنبات ، وكانت القيمة الأعلى لمحتوى النبات من النترات (51.51 ppm) كنتيجة لاضافة 28 طَنّ/فدان مادة عضوية + ضعف الجرعة الموصّى بها مِنْ النتروجينِ المعدنى ، كذلك ظهر نفس التأثير للمعاملة السابقة على محتوى النبات من النيتريت حيث وصل الى (3.37 ppm).

لذا، فانه يُوصي بإضافة كمياتِ كبيرة من الأسمدة العضويةِ والمعدنية إلى التربةِ الرمليةِ لإعْطاء النباتاتِ احتياجاتها من المغذيات ، وكذلك لتحسين وتيسير انطلاق العناصر الغذائية في صورة ميسؤة للنبات من خلال تَنْشيط عمليةِ تحلل المادة العضويةِ. كذلك يَجِبُ أَنْ نولى اهتمام وإنتباهاً لمحاصيلِ الخضر ومحتواها مِنْ النتراتِ لخطورتها على صحةِ الإنسانِ.