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STUDIES ON BIO AND CHEMICAL FERTILIZATION ON SWEET POTATO (*Ipomea batatas, L)*
2-EFFECT OF SOME NITROGEN FERTILIZER SOURCES, RATES AND BIOFERTILIZER (NITROBIEN) ON CHEMICAL COMPOSITION OF TUBER ROOTS

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ABSTRACT

Two field experiments were performed at the Horticultural Research Farm of El-Bramoon (Dakahliya Governorate) during 1998 and 1999 seasons. This study aimed to study the effect of mineral nitrogen fertilizer levels, sources , biological fertilization and their interaction on chemical composition of sweet potato tuber roots.

The main results could be summarized as follows:

1. Application of Ca $(NO_3)_2$ fertilizer significantly increased reducing sugars contents, K, NO_2- and NO_3- contents in tuber roots as compared with $(NH_4)_2$ SO_4 fertilizer. In addition, $(NH4)_2$ SO_4 fertilizer had significant increases on total carotene content in tuber roots.
2. Inoculation of plants with biofertilizer (nitrobien) led to increase reducing sugars and total carotene contents in tuber roots and beside that significantly reduced NO_3-, and NO_2- concentrations in tuber roots comparing with the uninoculated ones.
3. Raising nitrogen fertilizer levels from 0 to 80 kg N/fed resulted in a significant increase in total soluble and reducing sugars, total carotene as well as N, P, K, NO_3- and NO_2- concentrations in both seasons.
4. The positive interaction between N-sources and biofertilizer have been observed, application of Ca $(NO_3)_2$ fertilizer with biofertilizer gave the highest values of total soluble sugars NO_3- and NO_2- concentrations in tuber roots comparing with $(NH_4)_2$ SO_4 with biofertilizer. Application of $(NH_4)_2$ SO_4 fertilizer with biofertilizer significantly increased total carotene content.
5. The interaction between nitrogen fertilizer rates and biofertilizer had significant effect on reducing sugars, K, NO_3- and NO_2- concentration.

Thus, it can be recommended that adding $(NH_4)_2$ SO_4 at 60 kg N/fed with biofertilizer (nitrobien) was the best treatment under the condition of this study for reducing mineral nitrogen fertilization, soil pollution and improving quality of tuber roots.

INTRODUCTION

Sweet potato (*Ipomea batatas, L.*) is considered a very important popular vegetable crop, it has been cultivated for both food and starch manufacture, while the foliage parts and other refuse are utilized in feeds.

NO_3–sources of fertilizer resulted in higher NO_3- and NO_2-concentrations in tuber roots of sweet potato than did ammoniacal sources (Lorenz, 1978).

From the nutritional point of view, accumulation of NO_3- or NO_2- in tuber roots of sweet potato represent a serious problem for human's health, because NO_3- or NO_2- absorbed into the blood and may oxidize F^{++} of hemoglobin to F^{+++} and hence producing methemoglobin, which cannot transport oxygen (Swann, 1975).

Chemical constituents in tuber roots of sweet potato were also affected by N-rates, there were several studies indicated that organic compositions and mineral element concentrations in tuber roots were influenced by the applied N-rates (Mascianica *et al*., 1985; El-Sayed, 1987; Patil *et al*., 1990 and Osaki *et al*., 1995).

Overcoming the problem of chemical fertilizers, which are generally represented in increasing costs and environmental pollution, can be achieved through using biofertilizers. Many investigators stated that plant growth and yields of sweet potato were greater by inoculation after planting with N_2-fixing bacteria of *Asospirillum or Azotobacter* (Mortley and Hill, 1990; Paula *et al.*, 1992 and Yassin *et al*., 1994).

The objective of this study was to determine the effects of biofertilizer (nitrobien), N-rates, N-sources and their interactions on chemical composition of sweet potato tuber roots.

MATERIALS AND METHODS

In the two field experiments, sweet potato plants cv. A-93 (American variety) were grown on clay loam soil at the Horticultural Research Farm of El-Bramon (Dakahliya Governorate) during the two successive summer seasons of 1998 and 1999, to study the effects of soil dressing with different nitrogen sources and rates, i.e., 0, 20, 40, 60 and 80 kg N/fed either single or in combination with biofertilizer (nitrobien) on the chemical constituents in tuber roots.

Randomized samples were obtained from the experimental soils pre and 30 days post application of biofertilizer to determine the physical and chemical contents according to the standard method described by Jackson (1967).

The experimental design and treatments:

The experimental design was spilt-split plot system with 4 replicates. The N-sources occupied the main-plots which were subdivided to 5 sub plots each contained one of the nitrogen levels, while the biofertilization treatments were assigned to the sub-sub plots. The sub-sub plot area was 17.5 m^2 which contained 5 rows, 5 m length and 0.7 m width.

The two sources of nitrogen, i.e. calcium nitrate (15.5 % N) and ammonium sulphate (20.5 % N) were applied in two equal doses 30 and 45 days after transplanting. While biofertilizer[1] (nitrobien) was supplied at 3

[1] **Nitrobien is commercial name of the biofertilizer in Egypt, it was taken from General Organization for Agriculture Equalization Fund (GOAEF), Ministry of Agriculture, Egypt. It contains live cells of efficient bacteria stains for nitrogen fixation in cultivated soils. The used biofertilizer activity was tested in Laboratories of Microbiology Department Faculty of**

Table (1): The physical and chemical analysis of the experimental soil during 1998 and 1999 seasons.

Physical and chemical properties		Pre-inoculation		Post-inoculation	
		1998	1999	1998	1999
Clay	%	61.37	62.21	61.06	61.97
Silt	%	19.51	19.35	20.44	20.23
Fine sand	%	14.17	13.79	13.04	12.76
Coarse sand	%	2.13	1.89	2.07	1.83
Organic matter	%	0.89	0.93	1.13	1.20
$CaCO_3$	%	1.90	2.07	1.56	1.78
Water holding capacity	%	63.17	59.14	60.48	62.51
E.C. (dsm-1 at 25°C	%	1.27	1.30	1.25	1.25
Total -N	%	0.17	0.15	0.22	0.19
Available-P	ppm	18.69	20.37	18.88	19.60
Exchangeable-K	ppm	567	579	581	586
Total soluble salts	%	0.43	0.51	0.45	0.47
pH (1:2.5 w/v)	%	8.1	7.9	7.8	7.7

kg/fed mixed with wet soft sand (1: 10 ratio) into the root absorption zone of plants after 15 days from transplanting.

Cultural practices:

The normal cultural practices for sweet potato commercial production were followed according to the instruction laid down by the Ministry of Agriculture (Egypt). The planting date was during the third week of April, in both seasons of this study. Nearly similar stem slips (cuttings), 20 cm length were manually planted on the third top of slope ridge at 25 cm apart. The harvesting times were done 160 days from transplanting in the two years.

All plants were fertilized with calcium superphosphate (15.5 % P_2O_5) and potassium sulphate (48 % K_2O) at 300 and 200 kg /fed, respectively. 50 % being applied at planting and 50 % one month later.

-Studied characteristics:

- Chemical constituents:

Uniform sized 5 tuber roots of each treatments were cleaned , dried, ground and analyzed to determine:

a- Starch, sugars and carotenoids determination:

- Starch content was determined according the method described by Morell (1941).
- Total soluble sugars was determined by using the method of Dubios *et al*. (1956).
- Reducing sugars were measured by using the method of Somogy (1952).

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- Total carotenoides were measured according the method described by Both (1958).

b- Concentrations of N, P, K, NO_3- and NO_3- :

- Total nitrogen (N), including NO_3- and NO_2- in ppm (determined by a modified method of Singh, 1988).
- Phosphorus (P) was determined by method of John (1970).
- Potassium (K) was determined by method of Brown and Lilleland (1946).

The obtained results were statistically analyzed and treatment means were compared by using least significant difference (L.S.D.) as reported by Sndecor and Cochran (1980).

RESULTS AND DISCUSSION

Chemical constituents in tuber roots:

One- Effect of N-rates:

Data in Tables (2 & 3) reveal that application of Ca $(NO_3)_2$ fertilizer as a N-source to sweet potato plant excrete significant increases on reducing sugars, K, NO_3- , NO_2- concentrations in tuber roots comparing with $(NH_4)_2$ SO_4 fertilizer in both seasons. In contrast, carotene content in tuber roots was significantly increased in both seasons with $(NH_4)_2$ SO_4 fertilizer than with Ca $(NO_3)_2$ fertilizer. However, starch content, total soluble sugars, N and P percents in tuber roots were not significantly affected by N-sources application in both seasons. Application of NO_3-N sources to sweet potato plants may result in higher NO_3- and NO_2- accumulation in tuber roots than did ammonical sources as stated by Lorenz (1978). Similar results were reported by Hammett *et al*. (1984), who found that reducing sugar content, K and NO_3- concentrations in tuber roots of sweet potato were increased with NO_3- -N than with NH_4 –N.

Two- Effect of biofertilizer:

In Tables (2 & 3) data show that inoculation of sweet potato plants with biofertilizer (nitrobien) significantly increased reducing sugars and total carotene content in tuber roots and led to significant reduce in concentrations of NO_3- and NO_2- as compared with the uninoculated plants in both seasons. However, biofertilizer application had no significant effects in both seasons on starch content, total soluble sugars, N, P and K concentrations in tuber roots. The obtained results agree with those of Kandasamy *et al*. (1988), who declared that dry matter and reducing sugars in tuber roots of sweet potato were increased by using N_2-fixing bacteria (*Azospirillum*) or VAM fungi either separately or together.

Three- Effect of N-rates:

Data in Tables (2 & 3) show that N-rates had significant effects on all studied contents, with exception of the starch. Total soluble sugars, reducing sugars and total carotene were significantly increased as the applied N-rates increased from 0 to 80 kg N/fed. Element concentrations show the same tendency. Increasing the applied N-rates from 0 to 80 kg N /fed significantly increased N, P, K NO_3- and NO_2- concentration in tuber roots of sweet potato. These increases might be due to the vital role of N as a main constituent of many organic compounds in plants. The obtained results are in accordance with those of Patil *et al*. (1990) and Lee *et al*. (1996).

Table (2): Organic compositions in tuber roots of sweet potato as affected by N-source; rates and biofertilizer (nitrobien) during 1998 and 1999 seasons.

Characters / Treatments	Starch content (%)		Total soluble sugars (%)		Reducing sugars (%)		Total caroten (mg/L)	
	1998	1999	1998	1999	1998	1999	1998	1999
N-Sources:								
$Ca(No_3)_2$	15.25	15.48	5.04	4.85	2.95	2.87	0.72	0.68
$(NH_4)_2So_4$	14.90	15.31	4.68	4.56	2.71	2.61	0.78	0.74
L.S.D. at 5%	N.S	N.S	N.S	N.S	0.02	0.03	0.01	0.03
N-rates:								
0 kg/fed.	14.37	14.76	4.09	4.13	2.41	2.31	0.53	0.50
20 kg/fed.	14.81	15.03	4.57	4.50	2.59	2.54	0.69	0.61
40 kg/fed.	15.14	15.36	4.98	4.76	2.82	2.79	0.77	0.73
60 kg/fed,	15.39	15.72	5.24	4.96	3.07	2.94	0.83	0.82
80 kg/fed.	15.68	16.13	5.41	5.16	3.25	3.13	0.92	0.89
L.S.D. at 5%	N.S	N.S	0.18	0.12	0.11	0.13	0.03	0.04
Nitrobien:								
With	15.19	15.58	4.95	4.88	2.91	2.85	0.79	0.77
Without	14.95	15.23	4.76	4.52	2.75	2.63	0.72	0.65
L.S.D. at 5%	N.S	N.S	N.S	N.S	0.04	0.05	0.03	0.03

Table (3): Chemical element concentrations in tuber roots of sweet potato as affected by N-source; rates and biofertilizer (nitrobien) during 1998 and 1999 seasons.

Characters / Treatments	N (%)		P (%)		K (%)		No_3^- (ppm)		No_2^- (ppm)	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
N-Sources:										
$Ca(No_3)_2$	3.79	3.17	0.59	0.65	2.12	2.19	51.50	44.09	0.48	0.39
$(NH_4)_2So_4$	3.91	3.45	0.66	0.75	1.98	2.01	45.72	41.03	0.43	0.29
L.S.D. at 5%	N.S.	N.S.	N.S.	N.S.	0.07	0.05	1.84	1.93	0.02	0.01
N-rates:										
0 kg/fed.	3.46	3.01	0.36	0.46	1.82	1.81	30.52	25.55	0.28	0.20
20 kg/fed.	3.61	3.18	0.54	0.61	1.91	1.96	38.47	32.26	0.39	0.26
40 kg/fed.	3.81	3.32	0.62	0.71	2.01	2.10	41.87	42.47	0.47	0.33
60 kg/fed,	4.00	3.46	0.76	0.84	2.19	2.25	57.14	49.86	0.52	0.40

80 kg/fed.	4.35	3.58	0.83	0.91	2.34	2.40	69.00	62.63	0.63	0.52
L.S.D. at 5%	0.15	0.12	0.05	0.07	0.09	0.08	2.15	2.09	0.05	0.02
Nitrobien:										
With	3.92	3.43	0.66	0.77	2.11	2.22	46.45	30.88	0.42	0.31
Without	3.77	3.20	0.59	0.64	1.99	1.98	50.75	46.24	0.49	0.37
L.S.D. at 5%	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	1.10	1.07	0.04	0.02

Four- Interaction effect between N-sources and biofertilizer:

Concerning the interaction effect of N-sources with biofertilizer (nitrobien) on chemical constituents in tuber roots of sweet potato, in Tables (4 & 5) there were significant increases in both seasons on total soluble sugars, NO_3- and NO_2- concentrations as a result of Ca $(NO_3)_2$ fertilizer application with biofertilizer, while using $(NH_4)_2$ SO_4 fertilizer with biofertilizer had significant increases in both seasons on total carotene content. Application of Ca $(NO_3)_2$ or $(NH_4)_2$ SO_4 with biofertilizer did not reflect any significant variations on starch content, reducing sugars, N, P and K concentrations in both seasons. Similar results were reported by Khasa *et al*. (1992).

Table (4): Organic compositions in tuber roots of sweet potato as affected by the interaction of N-sources × biofertilizer (nitrobien) during 1998 and 1999 seasons.

Characters		Starch content (%)		Total soluble sugars (%)		Reducing sugars (%)		Total caroten (mg/L)	
Treatments		**1998**	**1999**	**1998**	**1999**	**1998**	**1999**	**1998**	**1999**
N-Sources	Nitrobien								
$Ca(NO_3)_2$	With	15.36	15.65	5.15	4.98	3.05	2.97	0.75	0.74
	Without	15.14	15.32	4.93	4.72	2.85	2.77	0.69	0.62
$(NH_4)_2SO_4$	With	15.03	15.50	4.76	4.78	2.77	2.72	0.82	0.79
	Without	14.77	15.13	4.60	4.33	2.65	2.50	0.74	0.68
L.S.D. at 5%		N.S.	N.S.	0.21	0.15	N.S.	N.S.	0.04	0.04

Table (5): Chemical element concentrations in tuber roots of sweet potato as affected by the interaction of N-source × biofertilizer (nitrobien) during 1998 and 1999 seasons.

Characters		N (%)		P (%)		K (%)		NO_3^- (ppm)		NO_2^- (ppm)	
Treatments		**1998**	**1999**	**1998**	**1999**	**1998**	**1999**	**1998**	**1999**	**1998**	**1999**
N-Sources	**Nitrobien**										

$Ca(NO_3)_2$	With	3.85	3.25	0.62	0.73	2.18	2.32	49.15	41.22	0.44	0.35
	Without	3.72	3.08	0.55	0.57	2.07	2.06	53.82	46.95	0.52	0.43
$(NH_4)_2SO_4$	With	3.98	3.59	0.69	0.80	2.05	2.12	43.76	36.54	0.41	0.27
	Without	3.83	3.30	0.62	0.71	1.92	1.90	47.68	45.53	0.46	0.31
L.S.D. at 5%		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	2.35	2.22	0.04	0.05

e- Interaction effect between N-rates and biofertilizer:

As respect the interaction effect between N-rates with biofertilizer (nitrobien). It is clear from the data presented in Tables (6 & 7) that increasing the applied N-rates from 0 to 80 kg /fed with biofertilizer application caused increases on all contents. These increases were significant on reducing, total caroten content, K, NO_3- and NO_2- in both seasons. These results are in good accordance with those reported by Crossman and Hill (1987).

Table (6): Organic compositions in tuber roots of sweet potato as affected by the interaction of N-rates × biofertilizer (nitrobien) during 1998 and 1999 seasons.

Characters / Treatments		Starch content (%)		Total soluble sugars (%)		Reducing sugars (%)		Total caroten (mg/L)	
		1998	1999	1998	1999	1998	1999	1998	1999
N-rates	Nitrobien								
0 kg/fed.	With	14.53	14.87	4.24	4.30	2.47	2.40	0.57	0.54
20 kg/fed.		14.88	15.15	4.65	4.65	2.66	2.68	0.73	0.68
40 kg/fed.		15.22	15.64	5.06	4.91	2.87	2.87	0.81	0.79
60 kg/fed.		15.57	15.90	5.33	5.16	3.16	3.05	0.87	0.89
80 kg/fed.		15.77	16.32	5.48	5.38	3.37	3.23	0.94	0.94
0 kg/fed.	Without	14.20	14.65	3.95	3.97	2.35	2.21	0.50	0.46
20 kg/fed.		14.73	14.90	4.49	4.36	2.51	2.40	0.66	0.55
40 kg/fed.		15.05	15.08	4.90	4.61	2.76	2.70	0.73	0.66
60 kg/fed.		15.20	15.55	5.16	4.75	2.97	2.83	0.79	0.77
80 kg/fed.		15.59	15.96	5.34	4.93	3.13	3.03	0.89	0.84
L.S.D. at 5%		N.S.	N.S.	N.S.	N.S.	0.16	0.17	N.S.	N.S.

Table (7): Chemical element concentrations in tuber roots of sweet potato as affected by the interactions of N-rate × biofertilizer (nitrobien) during 1998 and 1999 seasons.

Characters / Treatments		N (%)		P (%)		K (%)		NO_3^- (ppm)		NO_2^- (ppm)	
		1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
N-rates	**Nitrobien**										
0 kg/fed.	With	3.51	3.08	0.38	0.53	1.84	1.91	29.10	23.40	0.26	0.17
20 kg/fed.		3.67	3.28	0.57	0.67	1.94	2.06	37.20	28.86	0.36	0.23
40 kg/fed.		3.88	3.43	0.66	0.75	2.06	2.24	46.00	36.91	0.43	0.29

60 kg/fed.		4.12	3.61	0.82	0.91	2.28	2.36	54.55	45.67	0.48	0.38
80 kg/fed.		4.41	3.73	0.87	0.97	2.43	2.55	65.50	59.55	0.59	0.47
0 kg/fed.	Without	3.40	2.94	0.35	0.40	1.79	1.70	31.95	27.69	0.30	0.22
20 kg/fed.		3.55	3.08	0.50	0.54	1.87	1.86	39.75	35.66	0.41	0.28
40 kg/fed.		3.74	3.21	0.57	0.66	1.95	1.96	49.75	48.03	0.50	0.37
60 kg/fed.		3.88	3.32	0.70	0.77	2.09	2.15	59.80	54.10	0.56	0.42
80 kg/fed.		4.29	3.43	0.80	0.85	2.26	2.25	72.50	65.72	0.67	0.57
L.S.D. at 5%		N.S.	N.S.	N.S.	N.S.	0.11	0.09	2.89	2.80	0.06	0.07

f- Interaction effect between N- sources and rates :

Data in Tables (8 and 9) show the interaction effect of N-sources with rates on chemical constituents in tuber roots of sweet potato. There were significant effects on total soluble sugars and total carotene content in both seasons, but no significant effects were found on starch content and reducing sugars in both seasons. In general, application of Ca $(NO_3)_2$ fertilizer at 80 kg N/fed had the highest starch, total soluble and reducing sugars in both seasons, while the highest values of total carotene content were obtained by using $(NH_4)_2$ SO_4 fertilizer at 80 kg N/fed.

Concerning the N, P, K, NO_3- and NO_2- concentrations in tuber roots of sweet potato as affected by the interaction between among N-sources and rates, it is clear that the plants received $(NH_4)_2$ SO_4 fertilizer at 80 kg N/fed gave the maximum N and P concentrations, while the plants fed on Ca $(NO_3)_2$ fertilizer at 80 kg N/fed exert significant increases on NO_3- and NO_2- concentrations in tuber roots comparing with $(NH_4)_2$ SO_4 fertilizer application in both seasons. These results are in harmony with those of Hammett and Miller (1982), Prasad (1989) and El-Gamiely *et al*. (1996) they reported that total sugars in tuber roots of sweet potato were increased with NO_3-N than with NH_4-N at the high N rates, while protein and carotene contents were increased with NH4-N than with NO_3- N as the applied N rate increased. In addition, Lorenz (1978) stated that NO_3- accumulation in tuber roots of sweet potato was increased with NO_3-N sources than with NH_4-N sources especially at the high applied rates (100 or 150 kg N/ha).

Table (8): Organic compositions in tuber roots of sweet potato as affected by the interaction of N-source × rates during 1998 and 1999 seasons.

Characters / Treatments		Starch content (%)		Total soluble sugars (%)		Reducing sugars (%)		Total carotene (mg/L)	
		1998	1999	1998	1999	1998	1999	1998	1999
N-Sources	N-rates								
Ca$(No_3)_2$	0 kg/fed.	14.33	14.80	4.28	4.26	2.45	2.40	0.53	0.49
	20 kg/fed.	14.87	15.05	4.62	4.68	2.67	2.64	0.65	0.60
	40 kg/fed.	15.39	15.45	5.19	4.91	2.90	2.97	0.72	0.70
	60 kg/fed.	15.66	15.49	5.49	5.07	3.25	3.08	0.80	0.79

	80 kg/fed.	16.00	16.23	5.61	5.31	3.44	3.26	0.88	0.84
$(NH_4)_2SO_4$	0 kg/fed.	14.40	14.71	3.91	4.00	2.37	2.21	0.54	0.51
	20 kg/fed.	14.74	15.00	4.52	4.32	2.50	2.44	0.74	0.62
	40 kg/fed.	14.89	15.27	4.77	4.61	2.73	2.60	0.81	0.75
	60 kg/fed.	15.15	15.55	4.99	4.84	2.88	2.80	0.86	0.86
	80 kg/fed.	15.36	16.04	5.20	5.00	3.06	3.00	0.95	0.94
L.S.D. at 5%		N.S.	N.S.	0.25	0.18	N.S.	N.S.	0.05	0.05

Table (9): Chemical element concentrations in tuber roots of sweet potato as affected by the interaction of N-source × rates during 1998 and 1999 seasons.

Treatments / Characters		N (%)		P (%)		K (%)		No_3^- (ppm)		No_2^- (ppm)	
		1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
N-Sources	N-rates										
$Ca(No_3)_2$	0 kg/fed.	3.43	2.99	0.34	0.42	1.82	1.89	30.60	26.38	0.28	0.21
	20 kg/fed.	3.59	3.08	0.48	0.56	1.94	2.00	40.30	33.61	0.40	0.30
	40 kg/fed.	3.75	3.14	0.58	0.64	2.09	2.20	51.10	44.01	0.51	0.38
	60 kg/fed.	3.90	3.28	0.70	0.78	2.30	2.36	59.35	50.12	0.54	0.47
	80 kg/fed.	4.25	3.35	0.82	0.85	2.45	2.50	76.15	66.30	0.67	0.59
$(NH_4)_2So_4$	0 kg/fed.	3.48	3.03	0.39	0.50	1.81	1.72	30.45	24.71	0.27	0.18
	20 kg/fed.	3.63	3.28	0.59	0.65	1.87	1.91	36.65	30.91	0.37	0.22
	40 kg/fed.	3.87	3.50	0.65	0.77	1.92	2.00	44.65	40.93	0.42	0.28
	60 kg/fed.	4.10	3.64	0.82	0.89	2.07	2.14	55.00	49.65	0.50	0.33
	80 kg/fed.	4.45	3.80	0.85	0.96	2.24	2.30	61.85	58.97	0.59	0.44
L.S.D. at 5%		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	2.61	2.73	0.05	0.06

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دراسات على التسميد الحيوى والكيماوى فى البطاطا
الجزء الثانى: تأثير بعض مصادر ومستويات التسميد النتروجينى والتسميد الحيوى (نتروبين) على التركيب الكيماوى لدرنات البطاطا.

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أجريت هذه الدراسة على محصول البطاطا (صنف 93) فى مزرعة بحوث البساتين بالبرامون ـ دقهلية خلال الموسمين 1998 ، 1999 بهدف دراسة تأثير وبعض مستويات مختلفة من التسميد النتروجينى منفردا أو مع السماد الحيوى (نتروبين) وكذلك التفاعل بينهما على المحتوى الكيماوى فى الجذور الدرنية. وقد وزعت المعاملات فى قطع منشقة مرتين فى أربع مكررات . ويمكن تلخيص أهم النتائج المتحصل عليها فيما يلى:-

1ـ أدى استعمال سماد نترات الكالسيوم إلى حدوث زيادة معنوية فى محتوى الجذور من السكريات المختزلة وتركيزات النترات والنتريت بينما أدى استعمال سماد سلفات إلى انخفاض محتوى النترات والنتريت وارتفاع محتوى الكروتين .
2ـ أدى تلقيح النباتات بالسماد الحيوى (نتروبين) إلى حدوث زيادات معنوية فى محتوى السكريات المختزلة والكاروتين الكلى فى الدرنات. وأدى أيضا إلى انخفاض محتوى الدرنات من النترات والنتريت .
3ـ أظهرت النتائج أن زيادة مستويات التسميد النتروجينى حتى 80 كجم نتروجين للفدان أدى إلى زيادة معنوية فى السكريات الكلية والمحتزلة وكذلك محتوى الدرنات من الكاروتين بالإضافة إلى زيادة كل من النسبة المئوية للنتروجين والفوسفور والبوتاسيوم وكذلك زيادة تركيز النترات والنتريت فى الجذور الدرنية.
4ـ سجل التفاعل بين سماد نترات الكالسيوم مع السماد الحيوى القيم العالية فى محتوى الدرنات من السكريات الذائبة الكلية وتركيزات النترات والنتريت مقارنة بسماد سلفات النشادر مع السماد الحيوى، كما زاد محتوى الدرنات من الكاروتين بالمعاملة الأخيرة.
5ـ أظهر التفاعل بين معاملات النيتروجين والسماد الحيوى تأثيرا معنويا على تركيز السكريات المختزلة والبوتاسيوم والنترات والنتريت فى الدرنات.

توصى الدراسة باستخدام سماد سلفات النشادر بمعدل 60 كجم للفدان مع تلقيح التربة بالسماد الحيوى (نتروبين) وذلك لخفض تكاليف الإنتاج وتفادى الضرر الناتج من تلوث البيئة وارتفاع تركيز النترات والنتريت فى الدرنات .