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INDUCING YIELD PRODUCTIVITY AND NUTRIENTS CONTENT OF PEANUT PLANT GROWN ON SANDY SOIL UNDER ORGANIC FARMING

BY

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ABSTRACT

A field experiment was carried out at Ismailia Agriculture Research Station (SWERI) during summer season of 2005, to evaluate productivity and nutrients content of peanuts under organic farming. Treatments were represent all combinations of organic N (150 and 225 kg N/fed) and P fertilizer rates (0, 40, 60 and 80 kg P_2O_5/fed) in randomized complete block design with three replicates.

Results showed that application of organic farming can be achieved high peanut yield (straw, pod and kernel) as compared to the recommended rates of minerals fertilization under inorganic farming condition. The most promising treatment of straw yield could be: Those of (150 kg organic N + 60 kg P_2O_5/fed) which showed an increment of (+25.9%); (150 kg organic N + 80 kg P_2O_5/fed) with an increment of (27.6%) and (225 kg organic N + 60 kg P_2O_5/fed) with an increment of (+30.4%). The most promising treatment of pod yield could be: Those of (150 kg organic N + 60 kg P_2O_5/fed) which showed an increment of (9.97%) and (225 kg organic N + 60 kg P_2O_5/fed) with an increment of (+12.2%). The most promising treatment of kernel yield could be: Those of (225 kg organic N + 60 kg P_2O_5/fed) with an increment of (+14.0%) and (225 kg organic N + 80 kg P_2O_5/fed) with an increment of (+11.3%).

The maximum values of total income were achieved with (150 kg organic N + 60 kg P_2O_5/fed) of straw and pod yield but (225 kg organic N + 60 kg P_2O_5/fed) of kernel yield.

Most nutrients content of peanut plant organs increased under organic farming as compared to the recommended rates of mineral fertilization under inorganic farming, probably because the organic farming condition improved the efficiency of nutrients utilization by peanut plants.

Key word: Inducing, Peanut, Yield, Nutrients content and utilization, Organic farming.

INTRODUCTION

Organic farming may be defined as "an ecological production management system that promotes and enhances biological cycles and soil biological activity". It is based on minimal use of farm inputs and on management practices that restore, maintain and enhance ecological harmony. It differs among the alternative agriculture systems that allow only, the minimal use of pesticides, herbicides and chemical fertilizers inputs cause injury on ecological balance considered essential to maintain the long-term fertility of soil (Stockdale *et al*., 2001). Growers of organic farming system focus on using important techniques such as crop rotation, proper spacing between plants, incorporation of organic matter into the soil and using biological control to minimize pest and promote optimum plant growth (Alfoeldi *et al.*, 2002). Organic agriculture has been critized as low-yielding and low efficiency system, as compared with the conventional system in terms of efficient land use and utilization of resources (Trewavas, 2004). Several yield trials on comparisons between organic and conventional farming systems have shown lower yields of organic systems (Ryanet *et al.*, 2004).

Nitrogen management in agro-systems has been extensively studied due to the particular importance of this nutrient for crop yield and quality, as well as due to its potential negative impact on ecosystems. Rodrigues *et al.* (2006) showed that there are two main ways to supply crop N requirements in organic farming systems; (a) through introducing legumes in crop rotation and (b) through using organic amendments permitted in organic agriculture. Legumes must not only be able to fulfil their own N needs, by fixing atmospheric N_2, but they must also supply enough N for the succeeding crop. In many farming systems, legumes produce poor commercial returns unless they play a role as green manure. Rock phosphates for direct application are effective in acid soils. However, a minimum processing is required before their application in non-acid soils. Some alternative methods for improving low-grade rock phosphates are by partial acidulation (Biswas and Narayanasany, 1998); blending with water-soluble fertilizers (Xiong *et al.*, 1996) and compost enrichment (Biswas and Narayanasany, 2006).

The objective of the present work was devoted to maximizing yield of peanut under organic farming system by direct use of compost of agriculture residues (as source of organic N), compost enriched with rock phosphate (as source of phosphorus) as compared to the recommended rates of mineral fertilization under conventional farming system. Essential parameters including yields and yield components were evaluated.

MATERIALS AND METHODS

A field trial was conducted on a loamy sand soil at Ismailia Agricultural Research Station, by cultivating peanut (*Arachis hypogaea* L., cv Giza 5) in the summer season of 2005. Main and interaction effects of different rates of compost (as source of organic N) and rock phosphate (as source of phosphorus) on yield component and nutrient content of peanut plant were assessed. The experiment was carried out in a randomized complete block design, with three replicates. The compost was added by thorough mixing with the surface soil layer in a 10 metric ton/fed (150 kg organic N/fed) and 15 ton/fed (225 kg organic N/fed) for compost which combined with four P_2O_5 rates (0, 40, 60 and 80 kg P_2O_5/fed) in the form of rock phosphate (12 % P_2O_5) was applied. One K fertilization rate (24 kg K_2O/fed) in the form of feldspar (8 % K_2O). The N, P and K fertilization was run entirely through preparing the soil before planting, at the recommended doses of mineral N, P and K fertilization to act as a control treatment which the other organic treatments, could be compared.

The field of experiment was sampled before peanut planting to determine physical and chemical properties according to the standard procedures outlined by Cottenie (1980) (Table, 1).

Chemical properties of the compost and rockphosphate were measured according to the standard methods described by Cottenie (1980) and shown in (Table, 2). Plant samples were taken from mature peanut plants and recorded at harvest. Plant samples were dried at 65C° for 48 hrs, ground and wet digested using H_2SO_4: H_2O_2 method (Cottenie, 1980). The digests were then subjected to measurement of N using Micro-Kjeldahle method; P was assayed using molybdenum blue method (Chapman and Pratt, 1961), while K was determined by Flame Photometer.

Table (1): Some physical and chemical properties of the soil used.

Soil property	Value	Soil property	Value
Particle size distribution %		pH (1:2.5 soil suspension)	7.52
Coarse sand	69.9	ECe (dS/m)	1.26
Fine sand	14.2	Soluble ions (me/l)	
Silt	5.7	Ca^{++}	6.12
Clay	10.2	Mg^{++}	4.60
Texture	Loamy sand	Na^{+}	1.94
$CaCO_3$ %	2.50	K^{+}	0.12
Saturation percent	23.30	CO_3^{-}	nd
Organic carbon %	0.01	HCO_3^{-}	2.20
Available N (mg/kg)	9.3	Cl^{-}	4.98
Available P (mg/kg)	1.8	SO_4^{-}	5.60
Available K (mg/kg)	67.5	CEC (me/100 g soil)	6.50

Notes: (1) nd: not detected (2) extracts for available

Table (2): Some chemical properties of the organic compost and rock phosphate.

Source	pH (1:2.5)	N	P	K	Organic carbon	C/N ratio
		%				
Compost	6.65	2.11	1.36	2.27	33.8	1:16
Rockphosphate	7.60	0.42	12.0	0.11	nd	nd

nd: not detected

RESULTS AND DISCUSSION

1, Effect of organic N and P fertilization on yield and yield components of peanut plants.

Results (Table 3) indicate that increasing P fertilization rate under the two organic N rates (150 and 225 kg N/fed) increased both yield and yield components. The increase was marked under heavy P application with respect to straw, pod and kernel yields but slight with dry weight of stem, root and leaf as well as oil content of kernel. Such pattern may reveal some sort of synergistic effect between P application rate and organic N utilization of peanut crop. Such interaction effect continued acting with increasing organic N rate on P utilization by peanut crop. In other words the dual synergistic interaction effect was mutual for N and P. Dahroug and Gendy (1993) observed that the combined application of phosphate fertilizers and farmyard manure (FYM) together increased plant growth and yield of soybean, and concluded that phosphate fertilizers are particularly important for oil crop production.

However the average values of straw yield and stem dry weight were increased insignificantly and significantly, respectively, under lower organic N rate, compared with the higher one, when P fertilization rate increased. On the other hand the average values of pod and kernel quantity yield increased significantly under higher organic N rate compared with the lower rate when P fertilization rate increased, but the average values of kernel quality (100-kernel weight) and oil content of kernel as well as dry weights of root and leaf, increased, insignificantly under higher organic N rate compared with lower rate when P fertilization rate increased. Barbar (1984) showed that the addition of N fertilizer generally increases root-shoot ratio and pod yield of groundnut; adding that P is an important nutrient for all crops in general and legumes in particular. Sangeeta *et al.* (2006) reported that P has a vital role in energy storage, root development and early maturity of crop. The availability of soil P enhanced by addition of compost, presumably due to chelation of cations by organic acids and other decay products.

To compare the results of organic farming with those of mineral one, the results in show the followings:

1) Straw yield:

Data in Table (4) revealed that under the lower rate of added organic N (125 kg/fed), the straw yield was changed by about -11.4%, +0.18%, +25.9% and +27.6% versus -11.3%, +2.04%,+30.4% and +17.8% under the higher organic N rate (225 kg/fed), and P application at the rates of 0, 40, 60 and 80 kg P_2O_5/fed, respectively, as compared to the recommended rates of mineral fertilization under inorganic (conventional) farming.

The most promising treatments could be: Those of (150 kg organic N + 60 kg P_2O_5 /fed) which showed an increment of (+25.9%); (150 kg organic N + 80 kg P_2O_5 /fed) with an increment of (+27.6%) and (225 kg organic N + 60 kg P_2O_5 /fed) with an increment of (+30.4%). Translating these values into net income by taking into considerations the price of added fertilizer and expected price of yield, the calculations reveal that the net income for the three treatments could be: 920, 148 and 85 Egyptian pound for these treatments, respectively, the treatments of (150 kg organic N + 60 kg P_2O_5 /fed) followed by (150 kg organic N + 80 kg P_2O_5 /fed) and (225 kg organic N + 60 kg P_2O_5 /fed) could be recommended for obtaining the highest rate of income from the straw yield of peanut crop.

Table (3): Interaction effect between organic N and P fertilization rates on yield and yield components of peanut plant.

Compost (N)	Rock P_2O_5 kg/fed (P)									
	0	40	60	80	Mean	0	40	60	80	Mean
	Straw yield t/fed					Pod yield t/fed				
150	8.250	9.327	11.72	11.88	**10.30**	4.437	4.767	5.957	5.460	**5.155**
225	8.260	9.500	12.14	10.97	**10.22**	4.447	5.540	6.077	5.570	**5.408**
Mean	**8.255**	**9.414**	**11.93**	**11.43**		**4.442**	**5.154**	**6.017**	**5.515**	
L.S.D.0.5 N=0.146 P=0.263 NP=0.373						L.S.D.0.5 N=0.076 P=0.284 NP=0.401				
Mineral fertilization= 9.31						Mineral fertilization= 5.417				
	Kernel yield t/fed					100 kernel weight g				
150	3.610	3.910	4.710	4.690	**4.230**	95.16	97.38	100.1	95.34	**96.99**
225	3.743	4.360	4.997	4.880	**4.495**	96.65	94.46	101.6	101.0	**98.43**
Mean	**3.677**	**4.135**	**4.854**	**4.785**		**95.91**	**95.92**	**100.9**	**98.17**	
L.S.D.0.5 N=0.124 P=0.143 NP=0.202						L.S.D.0.5 N=4.541 P=2.467 NP=3.488				
Mineral fertilization= 4.383						Mineral fertilization= 92.56				
	Oil content %					Stem dry weight g/plant				
150	50.71	50.71	51.09	51.06	**50.89**	17.76	22.31	28.20	29.29	**24.39**
225	50.69	51.88	52.60	51.94	**51.78**	19.15	20.76	22.67	22.15	**21.18**
Mean	**50.70**	**51.30**	**51.85**	**51.50**		**18.46**	**21.54**	**25.44**	**25.72**	
L.S.D.0.5 N=1.222 P=1.385 NP=1.959						L.S.D.0.5 N=1.391 P=1.630 NP=2.305				
Mineral fertilization= 53.91						Mineral fertilization= 21.88				
	Root dry weight g/plant					Leaf dry weight g/plant				
150	2.397	2.790	2.820	2.783	**2.700**	28.31	29.61	33.83	36.86	**32.15**
225	2.460	2.980	3.230	3.450	**3.030**	30.85	31.55	33.56	37.47	**33.36**
Mean	**2.429**	**2.885**	**3.025**	**3.117**		**29.58**	**30.58**	**33.70**	**37.17**	
L.S.D.0.5 N=1.913 P=1.835 NP=0.186						L.S.D.0.5 N=1.222 P=1.385 NP=2.595				
Mineral fertilization= 3.693						Mineral fertilization= 37.18				

Note: ton: metric ton

Table (4): **Surplus (+) or deficit (-) values for yield relating the different organic fertilization treatments over or under those obtained by the mineral fertilization treatment.**

Treatment (kg/fed)		Yield (t/fed)		
Compost N	P_2O_5	Straw	Pod	Kernel
150	0	-11.4	-18.1	-17.6
	40	+0.18	-12.0	-10.8
	60	+25.9	+9.97	+7.64
	80	+27.6	+0.79	+7.00
225	0	-11.3	-17.9	-14.6
	40	+2.04	+2.27	-0.52
	60	+30.4	+12.2	+14.0
	80	+17.8	+2.82	+11.3

2) Pod yield:

Under the lower organic N rate (150 kg/fed), the pod yield was changed by about -18.1%, -12.0%,+9.97% and +0.79% versus -17.9%, +2.27%, +12.2% and +2.82% under the higher organic N rate (225 kg/fed), combined with P application at the rates of 0, 40, 60 and 80 kg P_2O_5/fed, respectively, as compared to the recommended rates of mineral fertilization under inorganic (conventional) farming.

Accordingly, the most promising treatments could be: Those of (150 kg organic N + 60 kg P_2O_5 /fed) which showed increments of (+9.97%) and (225 kg organic N + 60 kg P_2O_5 /fed) with an increment of (+12.2%). Translating these values into net income by taking into considerations the price of added fertilizer and expected price of pod yield, the calculations reveal that the net income for the two treatments could be: 6413 and 5989 Egyptian pound for these treatments, respectively, the treatments of (150 kg organic N + 60 kg P_2O_5 /fed) followed by (225 kg organic N + 60 kg P_2O_5 /fed) could be recommended for obtaining the highest rate of income from the pod yield of peanut crop.

3) Kernel yield:

Under the lower rate of organic N (150 kg/fed), the kernel yield quantity was changed by about -17.6%, -10.8%,+7.46% and +7.00% versus -14.6%, -0.52%, +14.0% and +11.3% under the higher organic N rate (225 kg/fed), due to P application at the rates of 0, 40, 60 and 80 kg P_2O_5/fed, respectively, as compared to the recommended rates of mineral fertilization under inorganic farming.

Finally, the most promising treatments could be: Those of (225 kg organic N + 60 kg P_2O_5 /fed) which showed increments of (+14.0%) and (225 kg organic N + 80 kg P_2O_5 /fed) with an increment of (+11.3%). Translating these values into net income by taking into considerations the price of added fertilizer and expected price of kernel yield, the calculations reveal that the net income for the two treatments could be: 8396 and 7011 Egyptian pound for these treatments, respectively, the treatments of (225 kg organic N + 60 kg P_2O_5 /fed) followed by (225 kg organic N + 80 kg P_2O_5 /fed) could be recommended for obtaining the highest rate of income from the kernel yield quantity of peanut crop.

2. Effect of organic N and P fertilization rates on N,P and K contents of peanut.

Results in (Table, 5) show that under the lower organic N rate, N content of root, stem, leaf and kernel were significantly increased by increasing P fertilization rate. Under the higher organic N, the N content of stem and root was significantly decreased by increasing P fertilization rate; which is probably attributed to N translocation to others organs of peanut plant, especially at maturity stage. Kumar and Rao (1991) recorded a decrease in N concentration by increasing P fertilization rate that was attributed to N mobilization from vegetative organs to seeds at the time of maturity. While N content of leaf and kernel increased with increasing P fertilization rate under the higher organic N rate. El- Habbasha *et al.* (2005) found that addition of 30 kg P_2O_5/feddan improved the growth and yield as well as N content in peanut plants.

Increasing of organic amendment from the low rate to the high rate increased N content values in peanut root, stem, leaf and kernel showing average values of 0.949, 1.859, 1.794 and 3.291%, respectively. The maximum N content of root and stem (2.097 and 1.007 %, respectively) occurred under the higher organic N rate and 2[nd] P fertilization rate (40 kg P_2O_5/fed), while the maximum N content of leaf and kernel (1.857 and 3.510%, respectively) occurred under the higher organic N rate + the highest P fertilization rate (80 kg P_2O_5/fed).

Under both two rates of organic N, increased the P content of all peanut organs (root, stem, leaf and kernel) mostly significantly under increasing P fertilization rate. P content values in peanut root, stem, leaf and kernel steadily increased as the rate of applied P increases, showing average values of 0.152, 0.118, 0.164 and 0.412%, respectively, under higher organic N rate as compared with lower applied organic N rate (average values 0.113, 0.111, 0.153 and 0.164%, respectively). The maximum P content of root, stem, leaf and kernel (0.153, 0.176, 0.184 and 0.443%, respectively) occurred under the higher organic N rate and highest P fertilization rate (80 kg P_2O_5/fed). Kamal (2001) applied 30m^3 farmyard manure + 31 kg P_2O_5 per feddan and obtained the highest yield values of both seeds and dry matter as well as P content of seasam.

Table (5): Interaction effect between organic N and P fertilization rate on nutrients content of root, stem, leaf and kernel of peanut plant at maturity stage.

Compost N (N)	Rock P_2O_5 kg/fed (P)														
	0	40	60	80	Mean	0	40	60	80	Mean	0	40	60	80	Mean
	Root														
	N%					P %					K %				
150	1.263	1.607	1.908	1.997	**1.694**	0.088	0.094	0.125	0.139	**0.111**	1.083	1.090	1.230	1.427	**1.207**
225	1.307	2.097	2.027	2.007	**1.859**	0.091	0.097	0.133	0.153	**0.118**	1.220	1.220	1.293	1.653	**1.346**
Mean	**1.285**	**1.852**	**1.967**	**2.002**		**0.089**	**0.096**	**0.129**	**0.146**		**1.152**	**1.155**	**1.262**	**1.540**	
L.S.D.$_{0.5}$ N=0.027 P=0.068 NP=0.097						**L.S.D.$_{0.5}$ N=0.002 P=0.012 NP=0.017**					**L.S.D.$_{0.5}$ N=0.006 P=0.039 NP=0.056**				
Mineral fertilization= 2.113						**Mineral fertilization= 0.125**					**Mineral fertilization= 1.453**				
	Stem														
	N%					P %					K %				
150	0.755	0.500	0.590	0.927	**0.693**	0.100	0.108	0.115	0.129	**0.113**	1.437	1.753	1.780	1.583	**1.638**
225	0.933	1.007	0.997	0.860	**0.949**	0.112	0.146	0.173	0.176	**0.152**	1.477	1.753	1.750	1.750	**1.682**
Mean	**0.844**	**0.754**	**0.794**	**0.894**		**0.106**	**0.127**	**0.144**	**0.153**		**1.457**	**1.753**	**1.765**	**1.667**	
L.S.D.$_{0.5}$ N=0.040 P=0.039 NP=0.056						**L.S.D.$_{0.5}$ N=0.005 P=0.012 NP=0.012**					**L.S.D.$_{0.5}$ N=0.029 P=0.039 NP=0.056**				
Mineral fertilization= 1.013						**Mineral fertilization= 0.174**					**Mineral fertilization= 1.397**				
	Leaf														
	N%					P %					K %				
150	1.480	1.737	1.773	1.833	**1.706**	0.125	0.148	0.167	0.174	**0.153**	0.980	1.313	1.333	1.310	**1.234**
225	1.710	1.780	1.830	1.857	**1.794**	0.143	0.155	0.174	0.184	**0.164**	1.113	1.433	1.363	1.233	**1.286**
Mean	**1.595**	**1.759**	**1.802**	**1.845**		**0.134**	**0.152**	**0.171**	**0.179**		**1.047**	**1.373**	**1.348**	**1.272**	
L.S.D.$_{0.5}$ N=0.022 P=0.012 NP=0.017						**L.S.D.$_{0.5}$ N=0.007 P=0.012 NP=0.017**					**L.S.D.$_{0.5}$ N=0.039 P=0.056 NP=0.079**				
Mineral fertilization= 1.497						**Mineral fertilization= 0.093**					**Mineral fertilization= 1.113**				
	Kernel														
	N%					P %					K %				
150	3.137	3.157	3.210	3.430	**3.233**	0.363	0.397	0.430	0.441	**0.408**	0.713	0.733	0.760	0.813	**0.755**
225	3.203	3.203	3.205	3.510	**3.291**	0.376	0.398	0.431	0.443	**0.412**	0.753	0.850	0.860	0.740	**0.851**
Mean	**3.170**	**3.180**	**3.208**	**3.470**		**0.355**	**0.398**	**0.431**	**0.442**		**0.733**	**0.792**	**0.810**	**0.777**	
L.S.D.$_{0.5}$ N=0.040 P=0.039 NP=0.056						**L.S.D.$_{0.5}$ N=0.002 P=0.012 NP=0.017**					**L.S.D.$_{0.5}$ N=0.014 P=0.012 NP=0.017**				
Mineral fertilization= 3.270						**Mineral fertilization= 0.414**					**Mineral fertilization= 0.977**				

Under the lower organic N rate, slight increase in K content of root and kernel occurred under increasing P fertilization rate applied; but K significant increase occurred in stem and leaf up to 3rd rate of P fertilization (60kg P_2O_5/fed). Under the higher organic N rate, slight increase in K content occurred in root and kernel under increasing P fertilization rate; also K content of stem and leaf decreased slightly under increasing P fertilization rate applied.

K content values in peanut root, stem, leaf and kernel steadily increased as the rate of applied P increases, showing average values of 1.682, 1.346, 1.286 and 0.851%, respectively, under higher organic N rate as compared with lower organic N rate (average values 1.638, 1.207, 1.234 and 0.735%, respectively). The maximum K content of root and kernel (1.653 and 0.940%, respectively) occurred under the higher organic N rate and highest P fertilization rate; but the maximum K content of stem (1.780%) occurred under the lower organic N (150 kg N/fed) and 3rd rate of P fertilization (60 kg P_2O_5/fed). The maximum K content of leaf occurred under the higher organic N (225 kg N/fed) and 2nd P rate (40 kg P_2O_5/fed).

Regarding the comparison between organic and conventional farming on nutrients content (N, P and K%) at maturity stage of groundnut plants results in (Table, 5) show that N content in stem and root, opposite to leaf and kernel, decreased under organic farming compared to conventional farming. However, both of P content in stem, root, leaf and kernel as well as K content in stem, root and leaf (opposite to kernel) increased under organic farming in comparison with the conventional farming. Adediran *et al*. (2004) reported that application of organic fertilizer highly improved the soil macronutrient status in comparison with mineral fertilization, so N, P and K content increased in cowpea at post harvest period.

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زيادة إنتاج المحصول والمحتوى من المغذيات لنبات الفول السودانى المنزرع فى الأراضى الرملية تحت ظروف الزراعة العضوية

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أجريت تجربة حقلية خلال الموسم الصيفى ٢٠٠٥ بمحطة البحوث الزراعية بالإسماعيلية لدراسة زيادة انتاجية المحصول والمحتوى من المغذيات لنباتات الفول السودانى النامية فى الاراضى الرملية تحت ظروف الزراعة العضوية ومقارنة ذلك تحت ظروف الزراعة التقليدية. وكانت المعاملات عبارة عن تداخل كميات من الكومبوست كمصدر للنيتروجين العضوى (١٥٠و ٢٢٥ كجم ن/فدان) وكميات من الصخر الفوسفات كمصدر للفوسفور (صفر، ٨٠،٦٠،٤٠ كجم فو٢أ٥/فدان).

تشير النتائج الى أنه بأستخدام اسلوب الزراعة العضوية امكن الحصول على محصول التبن و القرون وكذلك الحبوب اعلى من المتحصل عليه باستخدام الاسمدة المعدنية او ما يعرف بالزراعة التقليدية. حيث كانت المعاملات التالية تعطى اعلى محصول للتبن وهى ١٥٠ كجم ن/فدان + ٦٠ كجم فو٢أ٥/فدان ، حيث اعطت زيادة مقدارها (+٢٥,٩ %) ، ١٥٠ كجم ن/فدان + ٨٠ كجم فو٢أ٥/فدان والتى اعطت زيادة مقدارها (+٢٧,٦ %) و المعاملة ٢٢٥كجم ن/فدان + ٦٠ كجم فو٢أ٥/فدان اعطت زيادة مقدارها (+٣٠,٤ %). والمعاملتين التاليين اعطيتا اعلى زيادة فى محصول القرون وهما ١٥٠ كجم ن/فدان + ٦٠ كجم فو٢أ٥/فدان وكانت الزيادة مقدارها (+٩,٩٧ %) و٢٢٥كجم ن/فدان + ٦٠ كجم فو٢أ٥/فدان وكانت الزيادة مقدارها (+١٢,٢ %). بينما كانت المعاملة ٢٢٥كجم ن/فدان + ٦٠ كجم فو٢أ٥/فدان والمعاملة ٢٢٥كجم ن/فدان + ٨٠ كجم فو٢أ٥/فدان اعطيتا اعلى زيادة فى محصول الحبوب وهما (+١٤,٠ %) و (+١١,٣ %) على الترتيب.

وكانت اعلى قيمة للدخل الكلى يمكن ان تحقق لمحصولى التبن والقرون يمكن الحصول عليها بتطبيق المعاملة ١٥٠كجم ن/فدان + ٦٠ كجم فو٢أ٥/فدان بينما كانت المعاملة ٢٢٥ كجم ن/فدان + ٦٠ كجم فو٢أ٥/فدان تعطى اعلى قيمة للدخل الكلى لمحصول الحبوب.

وتشير النتائج الى انه تحت ظروف الزراعة العضوية يزداد محتوى معظم المغذيات النباتية داخل اجزاء النبات الفول السودانى المختلفة بالمقارنة تحت ظروف الزراعة التقليدية