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EFFECT OF ORGANIC MANURE SOURCES ON GROWTH, CHEMICAL CONTNTS AND YIELD OF PEA PLANTS UNDER SANDY SOIL CONDITIONS

El-Mansi, A. A.*, H. M. Arisha*, A. I. El-Kassas, and E. M. E. Nour****

***Hort. Dept. , Fac. Agric. , Zagazig Univ., Egypt**

****Plant Production and Protection (Vegetables), Fac. Inviron. Agric. Sci. El-Arish, Suez Canal Univ., Egypt**

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ABSTRACT : Two field experiments were carried out during the winter seasons of 2000- 2001 and 2001 – 2002 at El-Khattara Experimental Farm, Faculty of Agriculture , Zagazig University to study the effect of different organic manure sources viz, pressed olive cake (POC), farmyard manure (FYM), and chicken manure (ChM) on growth , plant chemical composition and yield and its components of pea plants under sandy soil conditions using drip irrigation system. Results indicate that application of ChM at the two rates (15 and 30 m^3 / fed.) and the combination between POC + ChM at a rate of 10m^3 POC + 5m^3 ChM were the favorable treatments for increasing root system parameters. Moreover, application of 15 or 30 m^3 ChM and the both combinations between POC and ChM (10m^3 POC + 5m^3 ChM and 20 m^3 POC+ 10 m^3 ChM) improved the vegetative characters , dry weight and photosynthetic pigments of pea plants. In general, the best results of minerals content and its uptake as well as yield and its components were recorded with application of 15 or 30 m^3 ChM followed by application 10 m^3 POC + 5 m^3 ChM and 20 m^3 POC + 10 m^3 ChM . Addition of organic manures as FYM , ChM and the combination between POC and FYM or ChM improved seed quality compared to application of POC alone and control treatment.

INTRODUCTION

Newly reclaimed soils are considered recently as the main area for agricultural extension. In such area vegetable production faces limiting factors. These newly reclaimed areas are sandy soils, calcareous soils, or saline affected soils. So, a very limited fertility, low retentive power of water, unfavorable physical conditions, land erosion and scarcity of water are all problems constraint vegetable production in such areas. With regard to the problems of sandy soil, the limiting factor is the physical properties of these soils, which lead to poor nutrient supply, low water holding capacity, leaching of nutrients, the ability to erosion and the scarcity of water resources. Improving soil physical conditions means soil conditioning. This is done using natural or artificial products. The aggregate effect of soil conditions and water – plant relationship may overcome most of the cultivation problems of sandy soils. Addition of organic manure is very important to improve soil physical chemical and biological properties. Riad (1982) calculated the organic manure requirements under Egyptian agricultural conditions as 170 million tons of FYM per year. The total amount of organic manures produced from different sources is about 88 million tons. Thus, there is a gab of about 82 million tons per year. On the other hand, there are organic wastes of agro– industrial products such as pressed olive cake becoming on environmental hazard. However, it can be used to cover a part of shortage in organic manures.

Different advantages of using manures to improve sandy soil conditions were reported by many researchers. Reynders and Vlassak (1982) reported that the farmyard manure contains many species of living organisms which release phytohormones (GA_3, IAA, CYT, etc.) that stimulate plant growth, absorption of nutrients and photosynthetic processes. El-Shafie and El-Shikha (2003) reported that addition of organic manure decreased soil pH due to formation of CO_2 and other organic acids during decomposition of organic fertilizer.

Organic manure increased plant dry weight (Osman, 1998), both leaves pigments and minerals contents and uptake (Nour, 1999) and yield and its components (Abd-Alla *et al.*, 1998 and Gabr, 2000).

Pea (*Pisum sativum* L.) is one of the important winter vegetable crops which had been grown successfully in the newly reclaimed soils. However, problems arises with these areas constraint its productivity in such areas. Therefore, this work aimed to study the effect of different manure sources on pea growth and yield.

MATERIALS AND METHODS

Two field experiments were carried out during the winter seasons of 2000 - 2001 and 2001 - 2002 at El-Khattara Experimental Farm, Faculty of Agriculture, Zagazig University to study the effect of organic manure sources viz, farmyard manure (FYM), chicken manure (ChM) and pressed olive cake (POC) on growth and yield of pea plants under sandy soil conditions using drip irrigation system.

Some physical and chemical properties of soil and applied organic manures were recorded in table 1 a and b.

This experiment included 11 treatments as follows:

1. A check treatment (without manure),
2. 15 m^3/fed. pressed olive cake (POC),
3. 30 m^3/fed. pressed olive cake (POC)
4. 15 m^3/fed. farmyard manure (FYM),
5. 30 m^3/fed. farmyard manure (FYM),
6. 15 m^3/fed. chicken manure (ChM),
7. 30 m^3/fed. chicken manure (ChM),
8. 10 m^3/fed. POC + 5 m^3/fed. FYM,
9. 20 m^3/fed. POC + 10 m^3/fed. FYM,
10. 10 m^3/fed. POC + 5 m^3/fed. ChM, and
11. 20 m^3/fed. POC + 5 m^3/fed. ChM.

These treatments were arranged in a randomized complete block design with three replications.

The source of farmyard manure and chicken manure was El-Khattara Animal Farm and the source of pressed olive cake was the Olive Oil Extractor of the Faculty of Environmental and Agricultural Sciences, El- Arish, Suez Canal University.

Table 1a. The physical and chemical properties of the soil

Property	1st season (1999- 2000)	2nd season (2000-2001)
Physical properties		
Sand (%)	96.23	95.72
Silt (%)	2.46	2.15
Clay (%)	1.31	2.13
Texture	Sandy	Sandy
Chemical properties		
pH	8.01	7.96
EC (dSm^{-1})	2.11	1.99
Total N%	0.12	0.13
OM (%)	0.04	0.06
Available N (ppm)	13.85	14.23
Available P (ppm)	13.16	13.44
Available K (ppm)	70.92	66.15

Soil samples was taken at 25 cm from the soil surface .

Table 1b. Some physical and chemical properties of different organic sources

Organic sources	2000-2001 season	2001-2002 season
Pressed olive cake(POC)		
O M (%)	49.67	48.13
Total N (%)	1.10	1.00
Total P (%)	0.16	0.16
Total K(%)	1.15	1.13
Farmyard manure (FYM)		
O M(%)	13.16	13.60
Total N (%)	0.75	0.78
Total P (%)	0.11	0.12
Total K(%)	0.16	0.65
Chicken manure (ChM)		
O M(%)	60.00	59.16
Total N (%)	2.50	2.32
Total P (%)	0.22	0.20
Total K(%)	0.92	0.96

Organic manures were put in the mide of the row, then covered and mixed with sand.

Seeds of pea *cv* Master were sown on October 30th in the two seasons of study. Seeds were washed successively and inoculated with root nodule bacteria (*Rhizobium leguminosareum*) at a dose of 5 gm/kg seeds.

Arabic gum 20% was used as adhesive agent. The inoculated seeds were left in a shade place for one hour before sowing for air-drying. The seeds were spaced in hills (two plants/hill) at 10 cm apart on both sides of dripper line. The distance between hills and the dripper lines was 5cm in each side. Plot area was 10.8 m^2. It contains three dripper lines (6 m long and 0.6 m wide). One dripper line (3.6 m^2) was used to measure vegetative parameters and the other two dripper lines (7.2 m^2) were used for yield determination. In addition, one dripper line was left between each two of the experimental units as a guard line.

All plots received equal amounts of nitrogen, phosphorus and potassium which were added as ammonium sulphate (20.5% N) at a rate of 150 kg, triple super phosphate (37% P_2O_5) at a rate of 120 kg and potassium sulphate (48.52% K_2O) at a rate of 115kg/feddan. One third of these amounts of fertilizers was added at soil preparation. The other two thirds were divided into eight equal portions and added weekly through irrigation water beginning at 10 days after complete emergence. The other normal agricultural treatments for growing pea plants were practiced.

Data recorded

Samples of ten plants from each experimental unit were randomly taken at 50 days after sowing and the following data were recorded:

1. Growth parameters

a. Root system: Main root length, and number of the first branches, number of the second branches and number of nodules/plant were determined according to Helal and Sauerbeck (1986).

b. Shoot growth: Stem length and numbers of both branches and leaves/plant were determined.

c. Dry weight: Different plant parts were dried at 70 °C till constant weight and dry weight of roots, nodules, total dry weight of roots (D.W. of roots + D.W. of nodules), stem, leaves, pods and

total dry weight/plant (total dry weight of roots + dry weight of stem + dry weight of both leaves and pods) were recorded.

2.Plant Chemical Composition

a. Leaf pigments

Ten disc samples from the fourth upper leaf from every experimental unit were randomly taken after 50 days after sowing to determine both chlorophyll a and b as well as carotenoids according to the method described by Wettestein (1957).

b. Plant chemical contents

Random samples of dry weight of roots, stem, leaves and pods were wet digested with sulfuric acid and percholoric acid (3:1) and chemical constituents of roots, stem, leaves and pods were determined as follows:

1. Nitrogen (%)

It was determined calorimetrically according to methods described by Bremner and Mulvaney (1982).

2. Phosphorus (%)

It was estimated colorimetrically according to Olsen and Sommers (1982)

3. Potassium (%)

It was determined using flame photometrically due to the method described by Jakson (1970).

3. Yield and Its Components

Green pods of each plot were harvested at maturity stage, counted and weighted in each harvest and the following parameters were calculated:

- Average number of pods/plant, average pod weight, individual plant yield (it was calculated by dividing total weight of pods/plot by number of plants/pot) and total yield/feddan.

Ten pods were randomly taken from the 2nd harvest from each plot and the following data were recorded :

- Average number of seeds / pod,
- Average fresh weight of seeds/ pod, and
- Shelling out percentage .

Shelling out (%) was calculated using the following equation :

$$\text{Shelling out (\%)} = \frac{\text{Average fresh weight of seeds/ pod}}{\text{Average pod fresh weight}}$$

4. Seeds Quality

A random sample of green seeds was taken at the second harvest to determine T.S.S. by Carl Zeis refractometer. Nitrogen, phosphorus and potassium in the dried green seeds were determined as described previously in the vegetative growth. The total carbohydrate was determined according to the method described by Michel *et al.* (1956).

5. Statistical analysis

The obtained data were subjected to statistical analysis of variance according to Snedecor and Cochran (1980) and means separation were done according to Duncan (1958).

RESULTS AND DISCUSSION

1. Plant Growth

a. Root system parameters

It is obvious from data in Table 2 that application of ChM at 15 or 30m^3 and 10m^3 POC + 5m^3 per fed. were favorable treatments for improving all root system parameters. The increments of root system resulted by application of organic manures may be caused by increasing soil acidity due to formation of CO_2 and other organic acids (El-Shafie and ElShikha , 2003). Also, organic manures promote microbial activity in soil and improve soil structure as well as increase water holding capacity that would stimulate root growth.

b. Morphological characters

Data in Table 3 reveal that application of chicken manure at 15 or 30 m^3 / fed. recorded the highest values of pea plant length in both seasons and number of both branches and leaves in the first season. On the other hand, application of 10m^3/fed. POC + 5m^3/fed. ChM and 20 m^3 POC + 10 m^3 ChM/fed. recorded the highest values of number of both branches and leaves in the second season. On the other hand, separate application of POC inhibited plant growth. The inhibition of plant growth resulting due to application of POC may be due to phytotoxicity rather than lacked of nutrition (Tesi *et al.*,1987).

The increments in plant growth may be due to the improving effects of organic manures which improve the physo-chemical and biological properties of sandy soil. So, it may increase soil exchange capacity, available mineral nutrients and this in turn resulted

Table 2: Effect of organic manure sources on root system of pea plants

Parameters / Treatments	Root system / plant				
	Main root length (cm)	1st branches length (cm)	No. 1st branches	No. 2nd branches	No. nodules
Organic manures (m^3/fed.)	**2000 – 2001 season**				
Control	11.83d	161.48f	31.00b	103.01e	4.163e
15 POC*	14.50c	230.0cd	47.00a	156.0ab	10.000bc
30 POC	14.75c	195.0e	46.00a	142.48cd	5.663de
15 FYM**	17.00ab	258.0bc	47.75a	150.00bc	8.000cde
30 FYM	17.24ab	287.0ab	52.50a	165.48a	15.480a
15 ChM***	16.91ab	300.0a	54.50a	163.48a	12.666ab
30 ChM	17.82ab	296.5a	50.00a	156.33ab	14.000a
10POC+ 5FYM	15.91bc	223.0de	46.75a	139.48cd	8.500cd
20POC+10FYM	16.16bc	220.0de	54.00a	133.48d	8.333cd
10POC+5ChM	18.50a	270.5ab	43.48a	168.50a	9.160bcd
20POC+10ChM	16.40abc	262.5b	39.66a	147.0bc	8.663cd
	2001 – 2002 season				
Control	11.53c	1555.5g	36.66f	108.0d	8.88e
15 POC*	15.80abc	275.0a	54.66a	151.7bc	13.16bcd
30 POC	15.22abc	178.5ef	44.99cde	139.8c	13.00cd
15 FYM**	16.22ab	197.2de	48.66bc	106.0d	13.667bcd
30 FYM	16.00ab	165.0fg	40.66ef	94.55d	11.887cde
15 ChM***	17.00a	233.5b	49.83b	171.7ab	15.77ab
30 ChM	18.00a	190.8de	42.83de	165.5ab	17.55a
10POC+ 5FYM	15.22abc	206.5cd	55.33a	143.3c	11.66cde
20POC+10FYM	16.00ab	163.3fg	46.49bcd	92.67d	9.667e
10POC+5ChM	18.00a	253.0ab	42.83de	185.0a	15.660ab
20POC+10ChM	18.22a	227.3bc	42.83de	136.7c	15.550ab

Values having the same alphabetical litters did not significantly differ at 0.05 level of significance according to Duncan's multiple range test.

* Pressed olive cake (POC) ** Farmyard manure (FYM)

*** Chicken manure (ChM)

Table 3. Effect of organic manure sources on morphological characters of pea plants

Parameters / Treatments	Morphological characters					
	Plant length (cm)	No. branches / plant	No. leaves /plant	Plant length (cm)	No. branches / plant	No. leaves/ plant
Organic manures (m^3/fed.)	2000 – 2001 season			2001 – 2002 season		
Control	33.00f	2.08bc	10.66d	31.22e	1.110bc	13.55cd
15 POC*	42.33cd	1.74bcde	12.83bcd	37.22d	1.00c	14.44bcd
30 POC	37.66e	1.66cde	12.00cd	38.44bcd	1.00c	15.33bcd
15 FYM**	40.50de	1.58de	14.50abc	41.55abcd	1.11bc	14.72bcd
30 FYM	44.00bcd	1.91bcde	13.83abc	44.80ab	1.11bc	14.00cd
15 ChM***	50.00a	2.16a	15.66ab	42.33abc	1.77ab	16.78abc
30 ChM	51.46a	2.19a	16.48a	46.83a	1.11bc	17.05ab
10POC+ 5FYM	45.50bc	1.74bcde	15.00abc	38.89bcd	1.66abc	15.33bcd
20POC+10FYM	42.50cd	1.49e	12.83bcd	38.44cd	1.11bc	15.33bcd
10POC+5ChM	43.50bcd	1.99bcd	14.00abc	42.33abc	2.22a	19.00a
20POC+10ChM	48.00ab	1.99bcd	15.50ab	41.44bcd	2.17a	18.22a

Values having the same alphabetical litters did not significantly differ at 0.05 level of significance according to Duncan's multiple range test.

* Pressed olive cake (POC) ** Farmyard manure (FYM) *** Chicken manure (ChM)

in stimulating plant growth. In addition, Frankenberger and Arshad (1995) reported that rhizosphere bacteria enhanced growth directly by producing phytohormones IAA, CYT and GA .

On the other hand, these results coincide with those reported by Hashimoto and Yomamato (1973) on common bean , Tesi *et al.* (1987) , Kostewicz (1993) on pole bean , Guu *et al.* (1995) on common bean , Nour (1999) on peas , Gabr (2000) on snap bean and El-Shafie and El-Shikha (2003) on faba bean .

2. Dry Weight

It's obvious from data in Table 4 that application of 15 m^3 or 30m^3 CHM, 10m^3 POC+5m^3 CHM and 20m^3 POC+10m^3 CHM/ fed. increased dry weight of all plant organs in both seasons except stem, total dry weight of roots + nodules, leaves dry weight and total plant dry weight, in the first season. The increments in dry weight may be due to the increase in plant growth.

Obtained results are in accordance with those reported by Browaldh (1992) on common bean and El-Fakharani (1997) who reported that dry weight of broad bean increased with increasing CHM or poultry manure from 10 to 20 ton/ ha. In this connection Omran *et al.* (1979), Ahmed *et al.*(1997) on groundnut, Abd –Alla *et al.* (1998) on common bean and Nour (1999) on pea reported that dry weight of horse bean, groundnut, common bean and peas increased with application of FYM. Kotb (1994) and Osman (1998) reported also that application of organic manure increased dry weight of pea plants compared to untreated control treatment.

3.Plant Chemical Composition

a. Photosynthetic pigments

Data in Table 5 reveal that application of organic manure sources and their combinations increased leaves pigments contents except application of POC alone. The highest values of chlorophyll a and b, in the first season, and chlorophyll a, b, total chlorophyll a+ b and carotenoids, in the second season, were recorded with application of 15, 30 m^3 ChM / fed. and the both combinations of POC + ChM.

Hseih and Hsu (1993) reported that use of manure increased soil acidity, organic matter, available P exchangeable Mg and extractable

Table 4. Effect of organic manure sources on dry weight of pea plants at 50 days after sowing

Parameters / Treatments	Dry weight / plant (gm)						
	Roots	Nodules	Total D. W. (roots+ nodules)	Stems	Leaves	Pods	Total D.W. of plant
Organic manures (m^3/fed.)	2000- 2001 season						
Control	0.1445e	0.0190b	0.1635de	0.415d	0.768d	0.500cd	1.846e
15 POC*	0.1566de	0.0271ab	0.1837cd	0.550cd	0.877d	0.350e	1.960e
30 POC	0.1410e	0.0201ab	0.1611e	0.550cd	0.670d	0.383de	1.764e
15 FYM**	0.1912ab	0.0251ab	0.2163b	0.680c	1.615bc	0.583bc	3.094d
30 FYM	0.1860b	0.0361a	0.2221ab	0.850b	1.815b	0.513cd	3.400cd
15 ChM***	0.2060a	0.0339ab	0.2399a	0.995ab	2.248a	0.675ab	4.158b
30 ChM	0.1900ab	0.0350a	0.2410a	1.140a	2.206a	0.786a	4.737a
10POC+ 5FYM	0.1558de	0.0272ab	0.1830cd	0.660c	1.496c	0.666ab	3.006d
20POC+10FYM	0.1670de	0.0221ab	0.1891c	0.700c	1.560c	0.673ab	3.122d
10POC+5ChM	0.1814bc	0.0221ab	0.2035bc	0.895b	1.710bc	0.702ab	3.510cd
20POC+10ChM	0.1914ab	0.0239ab	0.2153b	0.873b	1.658bc	0.793a	3.539cd

Table 4 . Cont.

Organic manures (m^3/fed.)	2001- 2002 season						
Control	0.1500de	0.0131b	0.1631f	0.400b	1.220c	0.320d	2.103e
15 POC*	0.1680bcde	0.0326a	0.2006abcd	0.520ab	1.190c	0.463cd	2.373de
30 POC	0.1450e	0.0240ab	0.1690ef	0.510ab	1.483bc	0.440cd	2.602de
15 FYM**	0.1800abcd	0.0169b	0.1969bcd	0.500ab	1.127c	0.616abc	2.439de
30 FYM	0.1850abc	0.0149b	0.1999abcd	0.550ab	1.097c	0.620abc	2.466de
15 ChM***	0.2000a	0.0187ab	0.2187a	0.630a	1.950ab	0.770a	3.568ab
30 ChM	0.2000a	0.0182ab	0.2182a	0.650a	2.00ab	0.746ab	3.614a
10POC+ 5FYM	0.1600cde	0.0217ab	0.1817def	0.560ab	1.620bc	0.750ab	3.117bc
20POC+10FYM	0.1710bcde	0.0187ab	0.1897cde	0.610a	1.473bc	0.516cd	2.788cd
10POC+5ChM	0.1800abcd	0.0257ab	0.2057ab	0.630a	2.403a	0.610abc	3.848a
20POC+10ChM	0.1910ab	0.0253ab	0.2163ab	0.650a	2.043ab	0.543bc	3.452ab

Values having the same alphabetical litters did not significantly differ at 0.05 level of significance according to Duncan's multiple range test.

* Pressed olive cake (POC) ** Farmyard manure (FYM) *** Chicken manure (ChM)

Table 5. Effect of organic manure sources on photosynthetic pigments of pea plants

Parameters / Treatments	Photosynthetic pigments (mg/gm dry weight of leaves)							
	Ch.a	Ch.b	Total (a+b)	Carotenoids	Ch.a	Ch.b	Total (a+b)	Carotenoids
Organic manures (m^3/fed.)	2000 – 2001 season				2001 – 2002 season			
Control	2.629de	2.345bcd	4.986cde	2.487d	2.704c	2.202f	4.906g	2.515d
15 POC*	2.350e	2.218cd	4.568e	2.885cd	2.711c	2.400e	5.111fg	2.759cd
30 POC	2.948cd	1.825d	4.701de	3.264abc	2.850bc	2.391e	5.214f	2.812bcd
15 FYM**	3.093abcd	2.815abc	5.907abc	3.113abcd	3.185bc	2.812c	5.997d	2.955abcd
30 FYM	3.358abc	3.004ab	6.361ab	3.303abc	3.307ab	2.973bc	5.280c	3.251ab
15 ChM***	3.358ab	3.202a	6.740a	3.546abc	3.395ab	3.179a	6.574b	3.288a
30 ChM	3.644a	2.971abc	6.615ab	3.702a	3.761a	3.215a	6.976a	3.413a
10POC+ 5FYM	2.872cde	2.473abc	5.345bcd	3.025abcd	2.960bc	2.561d	5.521e	3.013abc
20POC+10FYM	3.021bcd	2.811abc	5.832abc	2.916bcd	3.155bc	2.508de	5.663e	3.166abc
10POC+5ChM	3.063cde	2.736abc	5.799abc	3.644ab	3.315ab	2.931c	6.246cd	3.384a
20POC+10ChM	3.324abc	2.737abc	6.061ab	3.440abc	3.517ab	3.110ab	6.627b	3.336a

Values having the same alphabetical litters did not significantly differ at 0.05 level of significance according to Duncan's multiple range test.

* Pressed olive cake (POC) ** Farmyard manure (FYM) *** Chicken manure (ChM)

Mn and Zn, and this in turn may affect leaves pigments.

The obtained results are in confirmaty with those reported by Ahmed *et al.* (1997) on groundnut and Nour (1999) on peas. Gabr (2000) found that, applying the cattle manure (25 m^3/ fed.) + chicken manure (10m^3/fed.) to snap bean plants increased pod chlorophyll contents compared to cattle manure (50 m^3/fed.) or chicken manure alone.

b. Plant chemical contents

Data in Table 6 illustrate that in general, the highest contents of N, P and K in roots, stem, leaves and pods were recorded with application of 15m^3 ChM and 30m^3 ChM without differences between the combination between 10m^3 POC+5m^3 ChM and 20m^3 POC + 10m^3 ChM.

Data in Table 7 show that application of 15 or 30m^3 ChM/ fed. recorded the highest values of N, P and K and total uptake in roots, stem, leaves, pods followed by application of 10m^3 POC+5m^3 and 20 m^3 POC + 10m^3 ChM/ fed. in this connection.

The increments of minerals content as a result of ChM application may be attributed to the effect of microorganisms as azotbacter, Azospirillum, etc which fix N and release phytohormones as GA , IAA , CYT, etc. which stimulate plant growth and absorption of nutrients (Reynders and Vlassak, 1982). The high content of minerals uptake may be due to the increments in dry weight of pea plants as well as the high content of minerals.

Obtained results are in harmony with those reported by Deryugin *et al.* (1985), El-Fakhrani (1997) and El-Shafie and El-Shikha (2003) on faba bean who found that application of organic manures (FYM at 3% and 6% rates and CHM at 3% and 6% rates, w/w in pot experiment) increased NPK , Ca , Mg , Fe , Mn , Zn and Cu uptake , but chicken manure was superior to farmyard manure.

4. Yield and Its Components

Data in Table 8 show the effect of organic manure sources on yield and its components of pea plants. In general, it could be concluded that application of ChM at rates of 15 and 30 m^3/fed. were the best treatments, in both seasons, which increased yield and its components (pod length, number of pods / plant , pod weight, yield / plant, yield/ feddan, number of seeds/ pod and

Table 6. Effect of organic manure sources on chemical concentration (%) of pea plants

Parameters / Treatments	Concentration (%)											
	Roots			Stem			Leaves			Pods		
	N	P	K	N	P	K	N	P	K	N	P	K
Organic manures (m^3/fed.)	**2001 – 2002 season**											
Control	1.52d	0.122d	1.51d	1.41d	0.127d	1.45e	2.47e	0.184c	2.48e	2.97d	0.330d	2.64d
15 POC*	1.63cd	0.150ab	1.59cd	1.50cd	0.129cd	1.64de	2.65de	0.192c	2.65c	3.12bcd	0.307e	2.64d
30 POC	1.56d	0.125cd	1.52d	1.53bcd	0.148ab	1.62de	2.63de	0.210b	2.63cd	3.12bcd	0.323de	2.70d
15 FYM**	1.83bc	0.135bcd	1.67bcd	1.68bc	0.143bcd	2.02abcd	2.70cde	0.260a	2.71abc	3.28bcd	0.350c	2.77cd
30 FYM	1.82bc	0.145ab	1.60cd	1.76bc	0.156ab	2.08abc	2.75cde	0.280a	2.73abc	3.32abcd	0.370b	2.80cd
15 ChM***	2.06ab	0.162a	1.81ab	2.22a	0.166a	2.25ab	3.06ab	0.270a	2.78ab	3.46ab	0.380ab	3.00ab
30 ChM	2.16a	0.160a	1.88a	2.02ab	0.167a	2.20ab	3.25a	0.276a	2.80a	3.57a	0.385ab	3.07a
10POC+5FYM	1.76bcd	0.143abc	1.66bcd	1.69bc	0.150ab	1.87bcd	2.69cde	0.266a	2.53de	3.03cd	0.385ab	2.69d
20POC+10FYM	1.51d	0.140bcd	1.79ab	1.74bc	0.147bc	1.69cde	2.53e	0.264a	2.74abc	3.46ab	0.390a	2.82cd
10POC+5ChM	1.90abc	0.145ab	1.78ab	1.97ab	0.155ab	2.36a	2.87bcd	0.270a	2.67bc	3.37abc	0.365bc	2.83bcd
20POC+10ChM	1.94abc	0.145ab	1.70bc	1.91abc	0.154ab	2.03abcd	2.97abc	0.260a	2.50e	3.38abc	0.380ab	2.96bc

Values having the same alphabetical litters did not significantly differ at 0.05 level of significance according to Duncan's multiple range test.

* Pressed olive cake (POC) ** Farmyard manure (FYM) *** Chicken manure (ChM)

Table 7. Effect of organic manure sources on mineral uptake of pea plants

Parameters / Treatments	Mineral uptake (mg / plant)														
	Roots			Stem			Leaves			Pods			Total uptake		
	N	P	K	N	P	K	N	P	K	N	P	K	N	P	K
Organic manures (m^3/fed.)	2001 – 2002 season														
Control	2.489g	0.198d	2.470e	5.630f	0.0.509h	5.810c	30.09c	3.287d	30.20c	9.250f	1.057d	8.45f	47.72e	5.050e	46.92f
15 POC*	3.262ef	0.260bc	3.184de	7.803e	0.670g	8.510cd	31.50c	3.534d	31.50c	14.45e	1.415cd	12.22de	57.01de	5.879de	52.49ef
30 POC	2.644g	0.210cd	2.566de	7.800e	0.754f	8.240d	40.73b	4.437cd	40.73c	15.13de	1.423cd	11.39ef	66.28d	6.825d	63.32de
15 FYM**	3.639de	0.268bc	2.315bc	8.377de	0.715fg	10.10bc	30.47c	3.261d	30.51c	20.20bcd	2.149b	17.08bcd	62.68d	6.393de	61.01de
30 FYM	3.654de	0.289b	3.192bc	9.540cd	0.857de	11.470b	30.24c	3.257d	29.97c	20.63bc	2.294b	17.37bc	64.05d	6.608de	62.03de
15 ChM	4.500ab	0.353a	3.956a	14.07a	1.046ab	14.150a	59.73a	6.157b	54.35ab	26.68a	2.931a	23.06a	105.00ab	10.49b	95.52a
30 ChM	4.716a	0.349a	4.101a	13.11ab	1.085a	14.33a	64.83a	7.807a	56.11ab	26.52a	2.867a	22.97a	109.20a	12.11a	97.51a
10POC+ 5FYM	3.202ef	0.259bc	3.016cd	9.477cd	0.831e	10.490b	43.37b	5.022bc	40.98c	22.65ab	2.896a	20.24ab	78.67c	9.01bc	74.73bc
20POC+10FYM	2.851fg	0.266bc	3.402bc	10.62c	0.894d	10.310a	37.26bc	4.362cd	40.36c	17.85bcde	2.019b	14.52cd	68.57cd	7.534cd	68.59cd
10POC+5ChM	3.910cd	0.297ab	3.671ab	12.42b	0.974c	14.870a	68.83a	7.458a	64.66a	17.15cde	1.863bc	14.43cd	102.30ab	10.58b	97.63a
20POC+10ChM	4.189bc	0.312ab	3.679ab	12.45b	1.004bc	13.250a	60.54a	5.839b	51.09b	18.34bcde	2.062b	16.06bcd	95.51b	9.117b	84.07b

Values having the same alphabetical litters did not significantly differ at 0.05 level of significance according to Duncan's multiple range test.

* Pressed olive cake (POC) ** Farmyard manure (FYM) *** Chicken manure (ChM)

Table 8. Effect of organic manure sources on yield and its components of pea plants

Parameters / Treatments	Pod length (cm)	Pod width (cm)	No. pod/ plant	pod weight (gm)	No. seeds / pod	Seeds weight / pod (gm)	Shelling out (%)	Yield / plant (gm)	Yield (ton/ fed)
Organic manures (m^3/fed.)	2000- 2001 season								
Control	10.173d	1.310a	2.700b	5.933c	7.200d	3.067abc	51.69a	16.019d	1.660d
15 POC*	10.760bc	1.258a	3.417a	6.483b	7.767cd	3.223abc	49.71abcd	22.152ed	2.257cd
30 POC	10.687bc	1.210a	2.440a	6.737b	8.000bc	3.013c	48.15abcd	23.175c	2.467bc
15 FYM**	10.607cd	1.217a	3.797a	6.717b	7.767cd	3.040bc	45.25bcd	25.504bc	2.656bc
30 FYM	10.927bc	1.321a	3.960a	6.938ab	8.100bc	3.363abc	44.72cd	27.652bc	3.048abc
15 ChM***	11.170ab	1.269a	4.090a	7.457ab	8.767ab	3.447abc	46.22abcd	30.499ab	3.059abc
30 ChM	11.570a	1.301a	4.517a	7.863a	9.000a	3.480abc	43.62d	34.704a	3.621a
10POC+ 5FYM	10.870bc	1.311a	3.463a	6.787ab	8.067bc	3.437abc	50.64ab	23.503c	2.421bcd
20POC+10FYM	10.950bc	1.271a	3.693a	7.123ab	8.167bc	3.377abc	47.40abcd	26.305c	2.744bc
10POC+5ChM	11.080abc	1.231a	4.150a	7.067ab	8.567ab	3.537a	50.04abc	29.328ab	3.146ab
20POC+10ChM	11.100abc	1.225a	4.033a	7.157ab	8.500abc	3.500ab	48.90abcd	28.864bc	2.940abc

Table 8. cont.

Organic manures (m^3/fed.)	2001- 2002 season								
Control	10.000a	1.213a	2.861b	6.171b	7.225d	3.200e	51.85cd	17.379d	1.752e
15 POC*	10.811a	1.220a	3.500b	6.500ab	8.081c	3.700d	56.92bc	22.750cd	2.307d
30 POC	10.416a	1.300a	3.500b	6.700ab	7.919c	3.210e	47.91d	23.450bcd	2.460d
15 FYM**	10.350a	1.320a	3.660b	6.661ab	7.791cd	3.254e	48.85d	24.379bc	2.487d
30 FYM	11.010a	1.236a	4.120a	6.873ab	8.120c	3.920cd	57.03bc	28.316bc	2.992c
15 ChM***	11.200a	1.320a	4.300a	7.501ab	8.901a	4.400b	58.65abc	32.254a	3.403ab
30 ChM	11.301a	1.281a	4.401a	7.617a	9.023a	4.920a	64.59a	33.522a	3.537a
10POC+ 5FYM	10.315a	1.301a	3.510b	6.630ab	8.00c	4.100bcd	61.84ab	23.271bcd	2.428d
20POC+10FYM	10.511a	1.280a	3.480b	6.770ab	8.115c	4.117bcd	60.81ab	23.559bcd	2.486d
10POC+5ChM	11.117a	1.267a	4.171a	7.010ab	8.310bc	4.300bc	61.34ab	29.238ab	3.119bc
20POC+10ChM	11.000a	1.315a	4.230a	6.907ab	8.470b	4.220bc	61.09ab	29.216ab	3.031c

Values having the same alphabetical litters did not significantly differ at 0.05 level of significance according to Duncan's multiple range test.

* Pressed olive cake (POC) ** Farmyard manure (FYM) *** Chicken manure (ChM)

seeds weight/pod). The treatments that included the combination between ChM and POC at rates of 10 POC+ $5m^3$ ChM and $20m^3$ POC+$10m^3$ ChM fed. increased most of the previous parameters in the first season.

The increments of yield resulted by application of chicken manures may be due to their contents of antibiotics and nitrogen which improve the properties of sandy soil such as increasing soil acidity (El-Shafie and El-Shikha, 2003), organic matters, availability of nutrients, increase of nitrogen fixation, increase of rhizosphere microorganisms which release phytohormones, substances which lead to increase plant growth and dry matter accumulation, high content of minerals and that in turn increase the yield and its components. The obtained results could be confirmed by the data reported in Table 9 which illustrate high correlation among the yield per plant and per feddan and root system, dry weight of plant, total chlorophyll and N, P and K uptake in pea plants.

Similar results were reported by Khalil (1984), Muntean *et al.* (1984), Shahien (1996), Fayed (1998), Osman (1998) and Nour (1999) all of them worked on peas, Abd –Alla *et al.* (1998) and Gabr (2000) on common bean; Manios *et al.* (1985) on straw berry and El-Shafie and El-Shikha (2003) on faba bean .

5. Seed Chemical Composition

Data in Table 10 show that in general N,P,K, total carbohydrates, total protein and T.S.S. were increased with application of FYM at rates of 15 and 30 m^3/fed; ChM at rates of 15 and $30m^3$/fed. and all combinations between POC with FYM and ChM compared to application of POC alone or the control treatment.

These results are in harmony with those reported by Derar and Gendy (1994) on broad bean, Fayed (1998) on peas and El-Shafie and El-Shikha (2003) on faba bean. In addition, Soliman *et al.*(1991) found that application of FYM at a rate of 25 m^3/fed. did not significantly affect protein content in common bean seeds. Similar results were found by Nour (1999) who found that application of FYM at rates of 20 and 40 m^3/fed. did not reflect any significant effect on N, P, K, protein, T.S.S. and total carbohydrates of pea seeds.

Table 9. The correlation among some parameters of plant growth, chemical contents and yield of pea plants at 2001-2002 season.

	M.R.L.*	No. nodules	No. leaves	D.W. Root**	Total D.W./plant	Total Chl.	N uptake	P uptake	K uptake	No. Pods/plant	Yield/Fed.	Seed weight	Shelling out %
M.R.L.*	1												
No. nodules	0.9250 ***	1											
Plant length	0.8560 ***	0.7493 ***											
No. leaves	0.8152 ***	0.7569 ***	1										
D.W. Root**	0.8511 ***	0.8075 ***	0.6392 **	1									
Total D.W./plant	0.8084 ***	0.7639 ***	0.9333 ***	0.6896 **	1								
Total Chl.	0.8453 ***	0.8427 ***	0.9030 ***	0.8346 ***	0.8504 ***	1							
N uptake	0.8265 ***	0.8365 ***	0.8878 ***	0.7980 ***	0.9780 ***	0.9119 ***	1						
P uptake	0.7738 ***	0.7773 ***	0.8344 ***	0.6885 **	0.9602 ***	0.8724 ***	0.9770 ***	1					
K uptake	0.8227 ***	0.7916 ***	0.8893 ***	0.7207 ***	0.9843 ***	0.8886 ***	0.9913 ***	0.9780 ***	1				
No. Pods/plant	0.9119 ***	0.8549 ***	0.7137 ***	0.8991 ***	0.7889 ***	0.9264 ***	0.8492 ***	0.7886 ***	0.8294 ***	1			
Pod weight	0.7884 ***	0.8034 ***	0.6341 **	0.7941 ***	0.7893 ***	0.8544 ***	0.8849 ***	0.8764 ***	0.8737 ***	0.8901 ***			
Yield/Plant	0.8823 ***	0.8617 ***	0.7011 ***	0.8852 ***	0.8042 ***	0.8689 ***	0.8866 ***	0.8497 ***	0.8678 ***	0.9843 ***			
Yield/Fed.	0.8801 ***	0.8423 ***	0.7079 ***	0.8634 ***	0.8154 ***	0.8484 ***	0.8913 ***	0.8536 ***	0.8792 ***	0.9885 ***	1		
Seed weight	0.7242 ***	0.6175 **	0.6689 **	0.7655 ***	0.8382 ***	0.7657 ***	0.8894 ***	0.8986 ***	0.8511 ***	0.7721 ***	0.8226 ***	1	
Shelling out %	0.5624 *	0.3845	0.5720 *	0.6130 **	0.7201 ***	0.5660 *	0.6869 **	0.7439 ***	0.6833 **	0.5624 *	0.5900 **	0.9309 ***	1

* = Main Root Length.

** = Dry weight of roots (D.W. Roots + D.W. Nodules).

Table 10. Effect of organic manure sources on pea seeds chemical composition

Parameters / Treatments	N (%)	P (%)	K (%)	Total carbohydrates (%)	Total protein (%)	T.S.S (%)
Organic manures (m^3/fed.)	2001 – 2002 season					
Control	3.52b	0.315g	2.16d	56.33a	22.00b	11.00b
15 POC*	3.64b	0.370abc	2.52c	58.33a	22.75b	11.67ab
30 POC	3.89b	0.349def	2.50c	53.00a	24.31b	11.50ab
15 FYM**	4.06ab	0.335f	2.47c	53.33a	25.37ab	12.33ab
30 FYM	4.12ab	0.355cde	2.72ab	53.67a	25.75ab	12.50ab
15 ChM***	4.19ab	0.365bcd	2.78a	57.33a	26.18ab	13.00a
30 ChM	4.35ab	0.385a	2.81a	56.67a	27.18ab	13.00a
10POC+ 5FYM	4.21ab	0.340ef	2.53c	56.33a	26.31ab	12.17ab
20POC+10FYM	4.07ab	0.375ab	2.44c	55.00a	25.43ab	12.03ab
10POC+5ChM	4.39a	0.380ab	2.56bc	55.67a	27.43a	12.67a
20POC+10ChM	4.38ab	0.370abc	2.61ab	57.55a	27.37a	12.50ab

Values having the same alphabetical litters did not significantly differ at 0.05 level of significance according to Duncan's multiple range test.

* Pressed olive cake (POC) ** Farmyard manure (FYM) *** Chicken manure (ChM)

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تأثير الأسمدة العضوية على النمو والمحتوى الكيماوى والمحصول على نباتات البسلة تحت ظروف الأراضي الرملية

على أحمد عطية المنسى*، حامد محمد الهادى عريشة*، على إبراهيم القصاص ** والسيد محمد الطنطاوى نور**

*** قسم البساتين - كلية الزراعة - جامعة الزقازيق - مصر**

**** قسم الإنتاج النباتى ووقايته (خضر) - كلية العلوم الزراعية البيئية بالعريش- جامعة قناة السويس - مصر**

أجريت تجربتان حقليتان خلال شتاء موسمى ٢٠٠٠- ٢٠٠١ ، ٢٠٠١ - ٢٠٠٢فى مزرعة كلية الزراعة – جامعة الزقازيق بالخطارة لدراسة تأثير مصادر مختلفة من الأسمدة العضوية مثل مخلفات عصر الزيتون ، والسباخ البلدى ، وزرق الدواجن على النمو ، والتركيب الكيماوى، والمحصول ومكوناته لنباتات البسلة وذلك تحت ظروف الأراضى الرملية باستخدام نظام الرى بالتنقيط، وقد أوضحت النتائج أن استخدام زرق الدواجن بكلا المعدلين (١٥ ، ٣٠ م^{٣} / فدان)، وكذلك التوليفات بين مخلفات عصر الزيتون وزرق الدواجن بمعدل ١٠ م٣ مخلفات عصر الزيتون +٥ م^{٣} زرق دواجن كانت أفضل المعاملات لزيادة قياسات المجموع الجذرى.

كذلك أدى استخدام زرق الدواجن بمعدل ١٥ ، ٣٠ م^{٣}/فدان وجميع التوليفات بين مخلفات عصر الزيتون وزرق الدواجن (١٠ م^{٣} مخلفات عصر الزيتون + ٥ م^{٣} زرق دواجن ، ٢٠ م^{٣} مخلفات عصر الزيتون + ١٠ م^{٣} زرق دواجن) إلى زيادة النمو الخضرى، والوزن الجاف، وكذلك صبغات التمثيل الضوئى لنباتات البسلة.

فيما يتعلق بالمحتوى الكيماوى والممتص من العناصر المعدنية وكذلك المحصول فقد وجد بصفة عامة أن استخدام زرق الدواجن بمعدل ١٥ ، ٣٠ م^{٣} / فدان كانت أفضل المعاملات حيث أعطت أفضل النتائج، وتبعها فى ذلك استخدام ١٠ م٣ مخلفات عصر زيتون + ٥ م^{٣} زرق دواجن، وكذلك استخدام ٢٠ م^{٣} مخلفات عصر زيتون + ١٠ م^{٣} زرق دواجن، وقد حسن إضافة الأسمدة العضوية مثل السباخ البلدى وزرق الدواجن، وكذلك التوليفات بين مخلفات عصر الزيتون وكل من السباخ البلدى وزرق الدواجن جودة البذور، مقارنة باستخدام مخلفات عصر الزيتون منفردة وكذلك معاملة الكنترول.