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RESPOSE OF SOME DURUM WHEAT CULTIVARS (Triticum *durum Desf., 2n=28*)TO MINERAL PHOSPHORUS AND ORGANIC MANURE AT SIWA OASIS CONDITIONS, EGYPT

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Two field experiments were conducted at Siwa Oasis during 2003/2004 and 2004/2005 in a split-split plot design in four replicates to study the effect of organic manure and mineral P inorganic farming system to raise soil ability for producing durum wheat crop. The experimental treatments comprised three organic treatments (namely poultry manure, sheep dung and composted farmyard manure) with the control and the manure was added at two different doses (10 and 15 m^3/fed.). These treatments interacted with the doses of mineral phosphorus fertilizer (15.5 and 31 kg P_2O_5 /fed.) with 3 durum wheat cultivars (namely Sohag 1, Bani sewef 1 and Bani sewef 3) from Agriculture Research Center and irrigated from artesian water (2200 ppm). Results showed that the increasing mineral phosphorus fertilizer from 15.5 to 31 kg P_2O_5 as (Calcium super phosphate) /fed. significantly increased yield and yield components in the two growing seasons. It was observed that Sohag 1cultivar was superior than Bani sewef 1 and Bani sewef 3 in both seasons. Wheat plant which fertilized by 15 m^3 poultry manure/fed. has been superior than other manures in all yield criteria in the two growing seasons. On the other hand, the effect of the second order interaction shows that with 31 kg P_2O_5 /fed. Fertilized Sohag 1 cultivar (as Calcium super phosphate) with the application of 15 m^3 poultry manure /fed. gave the highest grain yield and its components in the two growing seasons, hence, by using high rates of mixtures (mineral P fertilizer x poultry manure) was better than each one alone as a complementally or co-effect with durum wheat cultivar Sohag 1 under Siwa Oasis conditions.

Keywords: durum wheat cultivar, mineral phosphorus fertilizer, poultry manure, sheep dung, compost farmyard manure, yield and yield components.

Siwa Oasis region occupies, one of the major inhabited part of depressions in the western desert of Egypt. It is located at a distance of about 300 km to the south of the Mediterranean sea and about 65 km to the East of Egyptian-Libyan borders.

The depression extends along a distance of about 75 km from east to west at the northern limits of the great sand sea with a width varying from 5 km at west to 25 km at the East. Siwa Oasis is characterized by desert climate hot and dry summer and pleasant warm climate during winter. The average temperature ranges between 5.8 °C in January and 37.8°C in July. Annual precipitation is 10.5 mm/year and the maximum monthly precipitation is 2.75 mm/month as recorded during March. In the same time, the potential evapo-transpiration may rise up to the limits of 3000 mm /year, and sandy soil is characterized by their poor water-retaining potential that it is always suffering from the deficiency of essential plant nutrients as well as organic matter. Thus it has high demand for soil amendments and nutrient sources (Himida, 2002).

Durum wheat is suitable crop under Siwa Oasis conditions. The nutritional value of durum is much higher than that of bread wheat because of a better amino acid composition and more vitamins content, therefore, it is fine for flour and pasta making. The consumption figures of this crop show an increasing demand for durum wheat (El-Hosary *et al.*, 2000).

Phosphorus (P), is an essential element for plant growth and one of the most important nutrients (as nitrogen) limiting the crop production in many regions of the world. To improve of the P nutrition of plants, traditional approach is to apply large amounts of P fertilizers to soils. However, the use efficiency of applied P is generally very low; ranging between 10% to 30% in the year. Improving plant uptake of P from the soil is an important part of the management systems for low P soils and enhancement of use efficiency of the P fertilizers (McCoy, *et al.*, 1986). In an effect to increase fertilizer use efficiency and to reduce investment costs to cash-poor, subsistence-oriented farmers, P replacement has been advocated as an effective technique to increase of crop yield (Zhongqi *et al.*, 2003).

Organic manure may be a valuable resource of nutrition for plant growth (Barnett, 1994). Elements in poultry manure must be taken into consideration when formulating diets. New legislation limiting nitrogen and phosphorus effluents have brought about changes in poultry nutrition by seeking to optimize the utilization of both elements (Mohanna and Nys, 1999).

Application of organic manure to the sandy loam soil is usually considered as a better method for the soil amelioration. It has been confirmed that the combined application of organic manure and chemical fertilizer is a useful management manner for increasing soil fertility and maintaining high crop yield and quality (Duan *et al.,* 2004).

Unfortunately, as all these materials transported fresh and without any treatments, it also include weed seeds, pests, plant diseases, nematodes. etc... So, in many locations and after few years from the beginning of reclamation productivity tend to decrease. Meanwhile, preventing the knowledge of how benefit from the plant residues or wastes after removing the economical parts from field enlarge the pollution problem either if it remained in field or burned. The aim of this research is to study the effect of two doses of mineral phosphorus fertilizer plus six different rates of manure compared by check treatment with three durum wheat cultivars under Siwa Oasis conditions during the winter seasons of 2003/2004 and 2004/2005.

MATERIALS AND METHODS

Two field experiments were conducted at Siwa Agricultural Experimental Station of Desert Research Center, Siwa Oasis, during the winter seasons of 2003/2004 and 2004/2005, to study of the effect the mineral phosphorus fertilizers and organic manure on three durum wheat cultivars (*Triticum durum* Desf.) irrigated with artesian water (2200 ppm). Physical and chemical analysis of properties of the experimental site's soil is presented in tables (1a and 1b).

TABLE (1a). Physical analysis of Siwa Agricultural Experimental Station.

Characters / Seasons	% Sand	% Silt	% Clay	Soil Texture
2003-2004	80.06	10.87	09.07	Sandy loam
2004-2005	85.49	4.45	10.06	Sandy loam

TABLE (1b). Chemical analysis of Siwa Agricultural Experimental Station.

Characters / Seasons	pH	EC dS/m	Soluble cations (meq/100g)				Soluble anions (meq/ 100g)			
			K^+	Na^+	Mg^{++}	Ca^{++}	$SO4^{--}$	Cl^-	HCO_3^-	CO_3^-
2003/2004	8.30	1.13	0.64	7.17	0.95	2.55	3.97	4.96	2.38	--
2004/2005	8.35	1.27	0.83	11.43	0.45	3.76	5.90	9.00	1.57	--

Each experiment included fourty two treatments arranged in split-split plot design in four replicates. The treatments were the combination of three durum wheat cultivars (Sohag 3, Bani sewef 1 and Bani sewef 3) in main plot, two mineral phosphorus fertilizers (15.5 and 31 kg P_2O_5 / fed.) in sub-

plot and were added as 15.5 P_2O_5/fed., and three organic manure(poultry manure, sheep dung and compost farmyard manure) compared with the control and the manure added at 10 and 15 m^3/fed. in sub-sub plot applied before sowing and mixed with the upper layer (30 cm depth) of the spilt plots. The analysis of different manure in the experiments are listed in table (2).

TABLE (2). Chemical analysis of different organic manure in 2003/2004 (1st) and 2004/2005 (2nd) seasons.

Different manure	Compost farmyard manure		Poultry manure		Sheep dung	
Seasons	1st	2nd	1st	2nd	1st	2nd
pH	7.26	7.35	7.91	8.06	8.23	8.11
Organic matter %	33.32	30.38	59.83	58.38	51.27	47.04
Organic carbon %	18.79	17.66	34.78	33.94	29.81	27.35
Total elements %						
Nitrogen	0.63	0.56	2.31	2.19	1.07	0.95
Phosphorus	0.36	0.31	0.51	0.53	0.45	0.43
Potassium	0.83	0.86	1.01	0.96	0.94	0.83
Calcium	4.74	4.52	4.32	4.59	3.37	3.58
Magnesium	0.16	0.14	0.26	0.29	0.24	0.22
C/N ratio	29.83	31.54	15.06	15.50	27.86	28.79
EC dS/m	3.28	3.41	5.79	5.93	6.17	6.42
Soluble ions (mol/ L)						
Phosphorus	3.20	2.40	4.20	3.90	4.50	3.30
Potassium	11.90	14.80	13.80	14.90	12.20	13.90
Calcium	11.40	9.20	8.30	7.30	7.90	7.20
Magnesium	3.10	3.60	6.50	4.60	4.80	5.10
Sodium	6.20	5.30	25.60	31.10	35.10	33.80
SD kg/m^3	738	752	466	485	617	659

SD = Specific density

The different manures were collected from local farms. The plot area was 3.5x3m= 10.5 m2 containing 15 ridges (3.5 m length and 20 cm width). Wheat grain were sown on 17 of November, 2003 and 28 of November, 2004 at seeding rate of 80 kg/fed. for the two successive growth seasons, respectively . Grain of two wheat varieties were soaked with tap water for 12 hours then dried before planting. The normal cultural treatments were followed. At harvest, after 160 days, samples were chosen at maturity at random to determine plant height, cm; number of tillers/plant, spike length, cm; number of spikelets per spike and weight of 1000 grain, gm; number of spikes per m^2; biological yield, ton/fed.; grain yield, ton/fed.; straw yield, ton/fed. and harvest index (%) from the experimental plot i.e., 3.5x3m=10.5 m^2. Random samples taken for chemical analysis were used to determine

percentage of N and grain protein concentration by multiplying grain N concentration by 6.25 according to A.O.A.C. (1990).

Obtained data were analyzed statistically as a split-split plot design according to Snedecor and Cochran (1981) and LSD analysis at 5% were calculated to determine mean differences.

RESULTS AND DISCUSSION

A- Durum Wheat Yield and its Components

A-1 Durum wheat cultivar difference

Data in table (3) and fig (1) show that Sohag 1 cultivar was significantly superior than Bani sewef 1 or Bani sewef 3 cultivars in yield and its components in the two growing seasons except plant height. The highest grain yield of Sohag 1 than the other two cultivars may be due to the superiority of number of spikelets /spike, grain weight /plant, weight of 1000 grain, number of spikes/ m^2 and harvest index %. These results are agree with El- Hosary *et al.* (2000). They found that Sohag 1 cultivar produced the highest number of spikelets/spike followed by Sohag 3 and Sohag 2 cultivars, and it had the highest 1000 grain weight followed by Bani sewef 2, Bani sewef 1 cultivars, while the lowest value was recorded by Bani sewef 3 cultivar. These differences may be due to the low productivity of local durums (Bani sewef 1 and Bani sewef 3) and their susceptibility to lodging and rust diseases, along with their poor quality.

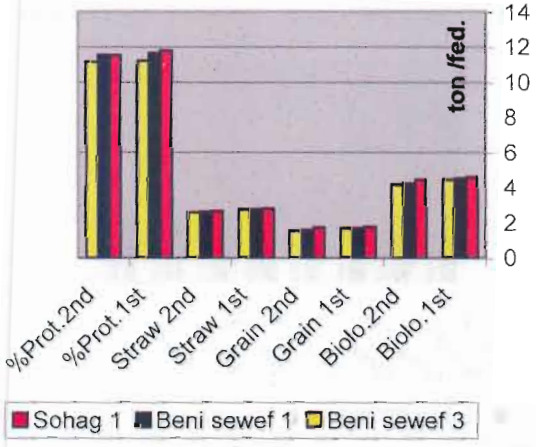

Fig (1). Durum cultivar differences in yield and percentage of protein in both seasons 2003/2004 (1st) and 2004/2005 (2nd).

TABLE (3). Cultivar differences in yield components of wheat plant in 2003/2004 and 2004/2005 seasons.

Wheat cultivars	Plant height (cm)	No. of tillers / plant	Spike length (cm)	No. of spiklets / spike	Grain weight / plant (gm)	Weight of 1000 grain (gm)	No. of spikes / m^2	Harvest index %
2003/2004 season								
Sohag 1	76.55	2.78	9.30	19.28	3.19	41.96	484.5	0.39
Beni sewef 1	78.41	2.74	9.03	18.12	3.04	40.93	444.1	0.38
Beni sewef 3	79.90	2.54	8.59	16.78	2.85	38.83	406.4	0.38
LSD at 5%	2.92	0.33	0.99	1.15	0.18	1.30	31.66	0.01
2004/2005 season								
Sohag 1	75.25	2.50	9.01	18.91	2.99	40.25	345.9	0.39
Beni sewef 1	76.94	2.44	8.33	17.67	2.92	39.00	331.5	0.38
Beni sewef 3	77.97	1.99	7.98	16.64	2.80	37.66	313.7	0.37
LSD at 5%	1.35	0.19	1.02	0.03	0.10	1.16	8.06	0.007

A-2 Effect of mineral phosphorus fertilizer

Increasing mineral phosphorus fertilizer rates from 15.5 to 31 P_2O_5/fed. significantly increased durum wheat yield and its components and percentage of protein content in the two growing seasons (Table 4 and Fig 2). These results may be due to the role of phosphorus as an essential elements for the physiological metabolism of crops and its concentration in wheat yield shows a small change with increased P fertilizer application rate. Abelson (1999), suggesting that the application of fertilizer plays a marked role in enhancing the P concentration in wheat. These results are confirmed with Duan *et al.* (2004), they suggested that the application rate of P fertilizer dosage level (35 kg P_2O_5 / ha) basically meets the requirements of wheat yield and P rate can significantly enrich the available content in soil with its increasing rate. Amrani *et al.* (2001) found that either using single large application of P or performing repeated applications should be considered.

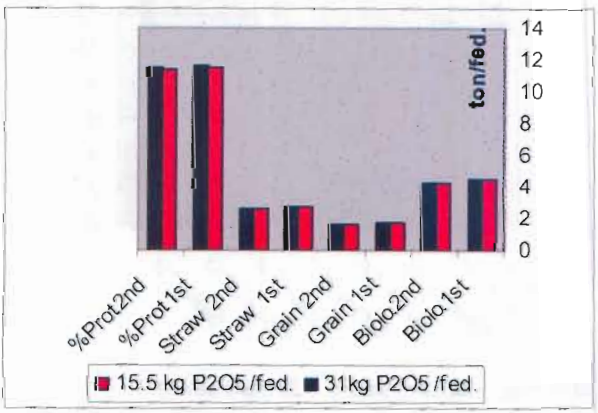

Fig (2). Response of durum yield and percentage of protein to mineral P fertilizer in both seasons (1st)2003/2004 and 2004/2005 (2nd).

TABLE (4). Response of durum wheat yield components to mineral phosphorus in 2003/2004 and 2004/2005 seasons.

Mineral P rates	Plant height (cm)	No. of tillers / plant	Spike length (cm)	No. of spiklets / spike	Grain weight / plant (gm)	Weight of 1000 grain (gm)	No. of spikes / m^2	Harvest index %
2003/2004 season								
15.5 P_2O_5/fed.	77.45	2.56	8.87	17.96	2.96	40.34	429.54	0.38
31 P_2O_5/fed	79.12	2.81	9.04	18.16	3.10	40.81	460.49	0.39
LSD at 5%	0.65	0.05	0.12	0.03	0.05	0.34	4.902	0.01
2004/2005 season								
15.5 P_2O_5/fed	75.78	2.22	8.38	17.68	2.86	38.84	313.15	0.38
31 P_2O_5/fed	77.66	2.41	8.53	17.79	2.95	39.11	347.62	0.38
LSD at 5%	0.19	0.08	0.05	0.02	0.01	0.84	6.55	0.001

A-3 Effect of different organic manure

Durum wheat plant fertilized with the application of 15 m^3 poultry manure /fed. produced significantly highest yield and its components other treatments, because it contains more inherent characteristics which render its application to soil advantage than does of other manures. These results were true in the two growing seasons Table 5 and Fig 3. This formation can be explained as the increasing of K^+ concentration in poultry manure than other manures. Fortunately K^+ is essential for plant growth and also the results were concealing with the relative abundance of N, K, P and Fe as shown in table (2).

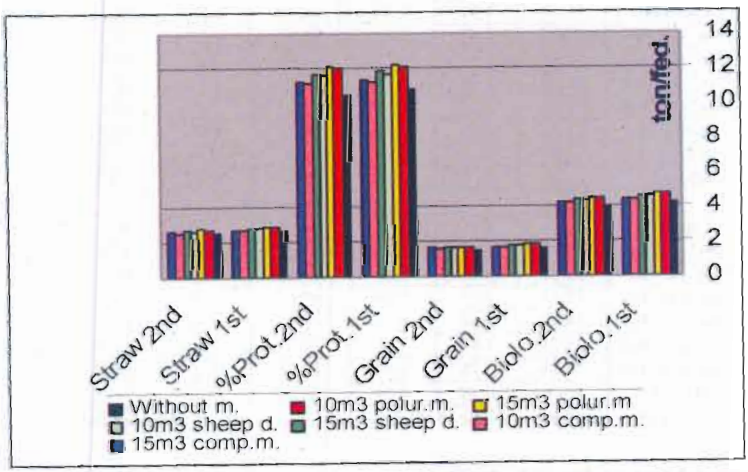

Fig (3). Response of durum yield and percentage of protein to organic manure in both seasons (1^{st}) 2003/2004 and 2004/2005 (2^{nd}).

In addition, role of the organic manure in reclaiming new and old lands is of highly significance as it represents the media for different reactions in soil i.e., biological, chemical and physical. So, the increase in organic manure will improve the characteristics of new land (Fortun *et al.*,

1997). For this reason, the traditional experience of farmers to transport the farmyard manure to the new adjacent lands is very common. Being more organic than other manures, poultry manure content a higher proportion of N. This has evidently led to a substantial decrease in its C/N ratio. Narrow C/N ratio plays a major role in increasing the mineralization of nutrients by soil micro-organisms (Tisdale and Nelson, 1971).

This poultry manure has a greater nutritive value than other manures, this, no doubt, adds to its merits as an organic fertilizer. It is evident that the addition of organic manures such as poultry manure to sandy soil will help in the storage of available soil water for plant growth. El Nadi *et al.* (1995) and Duan *et al.* (2004) who found that the application of organic manure is a most effective method to increase organic matter content in soil, but it needs a transform process from organic manure to organic matter, especially, in saline region where the unrecompensed sheep dung is difficult to transform into organic matter due to higher cellulose content therefore, organic manure can generally increase crop yield.

TABLE (5). Response of durum wheat yield components to different organic manure in 2003/2004 and 2004/2005 seasons.

Manure	Plant height (cm)	No. of tillers / plant	Spike length (cm)	No. of spiklets / spike	Grain weight / plant (gm)	Weight of 1000 grain (gm)	No. of spikes / m^2	Harvest index %
2003/2004 season								
Control	72.31	1.92	7.59	16.78	2.21	38.56	337.91	0.38
10m^3 pol./fed	82.33	3.42	9.45	18.59	3.38	41.32	516.42	0.39
15m^3 pol./fed	83.83	3.47	9.52	18.73	3.49	41.91	528.91	0.39
10m^3 she./fed	78.74	2.99	9.19	18.25	3.11	40.76	462.16	0.38
15m^3 she./fed	79.93	3.02	9.24	18.35	3.15	41.11	476.57	0.39
10m^3com./fed	74.97	1.98	8.83	17.82	2.88	39.96	385.14	0.38
15m^3com./fed	75.89	2.01	8.87	17.93	2.95	40.37	408.00	0.38
LSD at 5%	1.03	0.072	0.21	0.16	0.09	0.63	7.92	0.01
2004/2005 season								
Control	70.67	1.46	6.88	16.81	2.04	36.61	224.16	0.36
10m^3 pol./fed	81.28	2.98	8.97	18.08	3.24	40.11	404.42	0.38
15m^3 pol./fed	82.17	3.11	9.05	18.13	3.30	40.33	435.21	0.38
10m^3 she./fed	77.18	2.55	8.69	17.87	3.02	39.32	336.67	0.38
15m^3 she./fed	78.12	2.64	8.76	17.93	3.08	39.45	354.74	0.38
10m^3com./fed	73.33	1.67	8.37	17.64	2.80	38.59	272.24	0.38
15m^3com./fed	74.28	1.78	8.49	17.70	2.86	38.40	285.29	0.38
LSD at 5%	0.29	0.14	0.19	0.04	0.01	0.71	10.62	0.001

pol. = poultry manure, she. = sheep dung, com. = compost farmyard manure.

A-4 First order interactions

A-4-1 Performance of cultivars fertilized with mineral P

The response of the three durum wheat cultivars (Sohag 3, Bani sewef 1 and Bani sewef 3) to mineral P fertilizer was not significant on some durum wheat yield and its components in the two growing seasons, except those of number of spikelets per spike, number of spikes per m^2 and straw yield in the first season, number of tillers per plant, grain weight per

plant, biological and straw yields, in the second season. The promising treatment was Sohag 1 fertilized with 31P_2O_5 /fed. (Table 6).

Obtained results are in agreement with that observed by Zhu *et al.*(2001) who demonstrated that there is a considerable variation in P efficiencies (uptake, utilization and agronomic) between modern and old wheat cultivars, but no clear trend of change within the year of release for the cultivar was found.

TABLE (6). Performance of cultivars fertilized with mineral P in both seasons in 2003/2004 and 2004/2005 seasons.

Cultivar X P	No. of spiklets / spike	No. of spikes / m^2	Straw yield (ton/fed.)	No. of tillers / plant	Grain weight / plant (gm)	Biological yield (ton/fed.)	Straw yield (ton/fed.)
2003/2004 season				2004/2005 season			
Sohag 1X15.5 P_2O_5/ fed.	19.17	472.33	2.79	2.43	2.84	4.41	2.68
Sohag X 31 P_2O_5/ fed.	19.39	496.62	2.83	2.57	3.05	4.46	2.72
Beni sewef 1 X15.5 P_2O_5/fed.	17.99	427.07	2.75	2.37	2.88	4.21	2.62
Beni sewef X 31 P_2O_5 / fed.	18.26	461.19	2.79	2.52	2.95	4.27	2.66
Beni sewef 3 X15.5 P_2O_5/ fed.	16.74	389.23	2.72	1.85	2.75	4.13	2.59
Beni sewef$_3$ X 31 P_2O_5/ fed.	16.83	423.65	2.76	2.13	2.86	4.17	2.62
LSD at 5 %	0.06	8.49	0.013	0.13	0.01	0.041	0.013

A-4-2 Performance of cultivars fertilized with organic manure

The response of the three cultivars to different application of organic manure was significant on durum wheat yield and its components in the two growing seasons, except plant height, number of tillers per plant, weight of 1000 grain and percentage of protein in the first growing season, plant height and weight of 1000 grain in the second growing season. The promising treatment was Sohag 1 cultivar fertilized by 15 m^3 poultry manure/fed. (Table 7 a and b).

A-4-3 Effect of interaction between mineral P fertilizer and organic manure

The effect of the interaction between mineral P fertilizer and different application of organic manure was significant on some durum wheat yield and its components in the two growing seasons, except of plant height, spike length, number of spikelets/spike, grain yield, harvest index and percentage of protein in the first growing season and number of tillers/plant, spike length, weight of 1000 grain and percentage of protein in the second season. Among the organic manure, 15 m^3 poultry manure/fed. proved more effectiveness, with 31 P_2O_5 kg /fed. in grain. This treatment was significantly superior than the organic manure treatments. (Tables 8 a and b). These formation can be explained as the role of P mineralization from organic P in

the soil (as a poultry manure) and this idea is verified by McCoy *et al.* (1986).

A-5- Second order interactions

Performance of cultivars, fertilized with mineral P fertilizer and organic manure

The interaction among the wheat cultivars, mineral P fertilizer and organic manure showed no significant difference and it did not fixed any effect on the wheat yield and its components in each growing seasons except weight of 1000 grain and number of spike per m^2 in the first growing season and number of spiklets per spike, grain weight per plant, number of spikes per m^2, biological straw yield and harvest index in the second season. Maximum values were obtained from the application of $15m^3$ poultry manure to the Sohag 1 fertilized by 31 kg P_2O_5/fed. (Table 9).

TABLE (7 a). Performance of cultivars fertilized with organic manure in 2003/2004 season.

Cultivar X manure	Spike length (cm)	No. of spiklets / spike	Grain weight / plant (gm)	No. of spikes / m^2	Biological yield (ton/fed.)	Grain yield (ton/fed.)	Straw yield (ton/fed.)	Harvest index (%)
2003/2004 season								
Sohag1 X control	7.72	17.78	2.36	388.43	4.33	1.65	2.68	0.38
$10m^3$ pol./fed	9.84	19.99	3.56	537.52	4.78	1.88	2.91	0.39
$15m^3$ pol./fed	9.98	20.20	3.71	547.05	4.83	1.91	2.92	0.40
$10m^3$ she./fed	9.50	19.51	3.21	503.98	4.59	1.76	2.82	0.38
$15m^3$ she./fed	9.57	19.67	3 25	509.98	4.64	1.79	2.84	0.39
$10m^3$com./fed	9.02	18.86	3.01	441.57	4.41	1.67	2.73	0.38
$15m^3$com./fed	9.12	18.96	3.15	462.80	4.45	1.69	2 75	0.38
Beni sewef 1 X control	7.61	16.55	2.33	320.95	4.23	1.61	2.63	0.38
$10m^3$ pol./fed	9.46	18.68	3.38	520 35	4.73	1.84	2 89	0.39
$15m^3$ pol./fed	9.53	18.86	3 46	532.85	4.76	1.86	2.91	0.39
$10m^3$ she./fed	9.29	18.35	3.14	471 00	4.54	1.74	2.80	0.38
$15m^3$ she./fed	9.33	18.44	3.18	488.30	4.59	1.77	2.82	0.39
$10m^3$com./fed	8.93	17.92	2.87	375.28	4.34	1.65	2.68	0 38
$15m^3$com./fed	9.03	18 07	2.93	400 17	4.37	1.66	2.71	0.38
Beni sewef 3 X control	7.44	16.02	1.94	304.35	4.17	1.56	2.61	0.38
$10m^3$ pol./fed	9.03	17.09	3.21	491.38	4.62	1.78	2.83	0.39
$15m^3$ pol./fed	9.07	17.12	3.32	506.82	4.65	1.80	2.86	0.39
$10m^3$ she./fed	8.78	16.88	2.98	411.48	4.47	1.71	2.76	0.39
$15m^3$ she./fed	8.82	16.94	3.04	431.43	4.51	1.73	2.78	0.38
$10m^3$com./fed	8.56	16.69	2.70	338.58	4.29	1.63	2.66	0.38
$15m^3$com./fed	8.45	16.75	2.77	361.03	4.34	1.66	2 69	0.38
LSD at 5%	1.15	0.88	0.15	13.72	0.06	0.02	0.02	0.02

pol. = poultry manure, she. = sheep dung, com. = compost farmyard manure.

TABLE (7 b). Performance of cultivars fertilized with organic manure in 2004/2005 season.

Cultivar X manure	No. of tillers / plant	Spike length (cm)	No. of spiklets / spike	Grain weight / plant (gm)	No. of spikes / m^2	Biological yield (ton/fed.)	Grain yield (ton/fed.)	Straw yield (ton/fed.)	Harvest index %	Protein %
2004/2005 season										
Sohag1 X control	1.58	7.17	17.70	2.15	230.10	4.08	1.54	2.54	0.37	10.15
10m^3 pol./fed	3.10	9.58	19.34	3.36	436.18	4.59	1.80	2 79	0.39	12.13
15m^3 pol./fed	3 18	9.66	19.39	3.43	455.78	4.63	1.82	2.81	0.39	12.23
10m^3 she./fed	2.87	9.25	19.08	3.09	353.90	4.48	1.76	2.72	0.39	11.75
15m^3 she./fed	2.94	9.34	19.16	3.13	374.02	4.51	1.77	2.73	0.39	11.85
10m^3com./fed	1.84	8.98	18.83	2.88	275.65	4.36	1.73	2.63	0.39	11.33
15m^3com./fed	1.98	9.05	18.88	2.93	295.83	4.38	1.73	2.65	0.39	11.42
Beni sewef 1 X control	1.57	6.88	16.84	2.09	222.67	3.94	1.43	2.51	0.36	10.80
10m^3 pol./fed	3.10	8.91	17.97	3.23	414 43	4.39	1.66	2.73	0.38	12.03
15m^3 pol./fed	3.21	9.02	18.02	3.28	434.68	4.44	1.67	2.76	0.37	12.14
10m^3 she./fed	2 82	8.60	17.78	3.02	334.73	4.28	1.62	2.65	0 38	11.63
15m^3 she./fed	2.88	8.67	17.82	3.08	354.20	4.30	1.63	2.67	0 37	11.76
10m^3com./fed	1.71	8 27	17.60	2.83	275.30	4.15	1.58	2.57	0.38	11.22
15m^3com./fed	1.81	8.34	17.65	2.89	284.78	4.19	1.59	2.59	0.38	11.32
Beni sewef 3 X control	1.21	6.58	15.90	1.90	219.70	3.87	1.38	2.49	0.36	10.38
10m^3 pol./fed	2.74	8 41	16.93	3.13	362.63	4.39	1.62	2 68	0.37	11.68
15m^3 pol./fed	2.95	8.47	16.99	3.18	415.15	4.33	1.62	2.70	0 37	11.76
10m^3 she./fed	1 96	8.21	16.75	2.94	321.37	4.17	1.56	2.60	0.37	11 30
15m^3 she./fed	2.09	8.26	16.82	3.01	336 00	4.19	1.57	2.62	0.37	11.40
10m^3com./fed	1.44	7.85	16.50	2.69	265.77	4.07	1.52	2.54	0 37	10.69
15m^3com./fed	1.54	8.08	16.57	2.76	275.25	4.09	1.53	2.55	0.37	10.88
LSD at 5%	0.23	0.34	0.06	0.02	18.39	0.06	0.02	0 02	0.002	0.41

pol. = poultry manure, she. = sheep dung, com. = compost farmyard manure.

TABLE (8 a). Effect of interaction between mineral P fertilizer and organic manure in 2003/2004 season.

P X manure	No. of tillers / plant	Grain weight / plant (gm)	Weight of 1000 grain (gm)	No. of spikes / m^2	Biological yield (ton/fed.)	Straw yield (ton/fed.)
2003/2004 season						
15.5 P_2O_5/ fed. X control	1.92	2.16	38 51	329.10	4.22	2.63
10m^3 pol./fed	3.03	3.26	40.75	503.80	4.66	2.85
15m^3 pol./fed	3.08	3.38	41.80	517.10	4.71	2.87
10m^3 she./fed	2.97	3.05	40.57	446.10	4.49	2.77
15m^3 she./fed	2.99	3.10	41.03	462.20	4.53	2.79
10m^3com./fed	1.94	2.83	39.76	364.20	4.31	2.67
15m^3com./fed	1.98	2.89	39.94	384.40	4.34	2.68
31 P_2O_5/ fed. X control	1.93	2.25	38.61	346.70	4.26	2.65
10m^3 pol./fed	3.80	3.50	41.89	529.00	4.78	2.89
15m^3 pol./fed	3.85	3.61	42.01	540.70	4.79	2.91
10m^3 she./fed	3.01	3.16	40.95	478 20	4.58	2.81
15m^3 she./fed	3.05	3.20	41.20	490 90	4.62	2.84
10m^3com./fed	2.02	2.94	40.17	406.10	4.38	2.72
15m^3com./fed	2.05	3.01	40.83	431.60	4.44	2.75
LSD at 5%	0.10	0.12	0.88	11.16	0.05	0.02

pol. = poultry manure, she. = sheep dung, com. = compost farmyard manure.

TABLE (8 b). Effect of interaction between mineral P fertilizer and organic manure in 2004/2005 season.

P X manure	Plant height (cm)	No. of spiklets / spike	Grain weight / plant (gm)	No. of spikes / m^2	Biological yield (ton/fed.)	Grain yield (ton/fed.)	Straw yield (ton/fed.)	Harvest index %
2004/2005 season								
15.5 P_2O_5/ fed. X control	70.01	16.77	2.03	219.30	3.95	1.44	2.50	0.36
10m^3 pol./fed	80.23	18.03	3.19	373.20	4.40	1.68	2.72	0.38
15m^3 pol./fed	81.16	18.08	3.25	415 00	4.43	1 69	2.74	0.38
10m^3 she./fed	76.30	17.81	2.96	319.10	4.28	1.64	2.64	0.38
15m^3 she./fed	77.16	17.88	3.02	334.80	4.31	1 65	2.66	0.38
10m^3com./fed	72.31	17.58	2.76	259.20	4.17	1.60	2.57	0 38
15m^3com./fed	73 26	17.65	2.80	271.60	4.19	1.61	2.59	0.38
31 P_2O_5/ fed. X control	71.33	16.86	2.06	229.00	3.98	1.45	2 53	0.36
10m^3 pol./fed	82.32	18.13	3.29	435.70	4.46	1.70	2.78	0.38
15m^3 pol./fed	83.19	18.18	3.34	455.50	4.49	1 71	2.78	0.38
10m^3 she./fed	78 06	17.93	3.07	354.30	4.34	1.66	2.67	0.38
15m^3 she./fed	79.13	17.99	3.13	374 70	4 37	1 67	2.69	0.38
10m^3com./fed	74.36	17.71	2.85	385.30	4.23	1.63	2 59	0.38
15m^3com./fed	75.31	17.75	2.92	299.00	4.25	1.63	2 62	0 38
LSD at 5%	0.42	0.051	0.02	14.92	0.05	0.02	0.02	0 01

pol. = poultry manure, she. = sheep dung, com. = compost farmyard manure.

TABLE (9). Performance of cultivars fertilized with mineral P fertilizer and organic manure in both 2003/2004 and 2004/2005 seasons.

Treatments		Criteria	Weight of 1000 grain (gm)	No. of spikes / m^2	No. of spiklets /spike	Grain weight/ plant (gm)	No. of spikes/ m^2	Biological yield (ton/fed.)	Straw yield (ton/fed.)	Harvest index%
2003/2004 season					2004/2005 season					
Sohag1	15.5 P_2O_5/fed.	Control	39.69	376.70	17.65	2.12	224.8	4.03	2.50	0.38
		10m^3 pol /fed	42.76	529.90	19.29	3.28	417.5	4.51	2.72	0.39
		15m^3 pol /fed	42.88	538.20	19.34	3.38	434.8	4.54	2.74	0.39
		10m^3 she./fed	42.01	494.90	18.98	3.04	333.1	4.39	2.64	0.39
		15m^3 she./fed	42.90	500.30	19.09	3.08	353.1	4.42	2.66	0.39
		10m^3com./fed	40.88	423.70	18.78	2.89	255.8	4.28	2.57	0.40
		15m^3com./fed	41.09	442.80	18.83	2.88	276.2	4.31	2.58	0.40
	31 P_2O_5/ fed.	Control	40.00	400.20	17.75	2.18	235.4	4.07	2.53	0.38
		10m^3 pol./fed	43.06	545.10	19.38	3.43	454.8	4.57	2.76	0.39
		15m^3 pol./fed	43.17	555.90	19.44	3.48	476.8	4.60	2.78	0.39
		10m^3 she./fed	42.28	513.10	19.18	3.14	374.7	4.45	2.68	0.39
		15m^3 she./fed	42.67	519.70	19.22	3.19	393.9	4.48	2.69	0.39
		10m^3com./fed	41.39	459.50	18.88	2.93	295.5	4.35	2.59	0.40
		15m^3com./fed	42.59	482.80	18.93	2.97	315.4	4.36	2.62	0.40
Beni sewef 1	15.5 P_2O_5/fed.	Control	39.08	310.20	16.77	2.11	218.2	3.96	2.53	0.36
		10m^3 pol./fed	41.75	509.80	17.91	3.18	394.8	4.43	2.77	0.37
		15m^3 pol./fed	41.85	522.50	17.97	3.24	414.8	4.46	2.79	0.37
		10m^3 she./fed	40.91	451.10	17.74	2.98	315.3	4.31	2.69	0.37
		15m^3 she./fed	41.25	474.80	17.78	3.04	334.0	4.34	2.71	0.37
		10m^3com./fed	40.25	350.20	17.57	2.78	265.6	4.19	2.61	0.37
		15m^3com./fed	40.40	371.00	17.60	2.84	273.6	4.22	2.63	0.37

TABLE (9). Cont.

	31 P_2O_5/ fed.	Control	38.80	331.70	16.91	2.06	227.1	3.99	2.55	0.36
		$10m^3$ pol./fed	41.87	530.90	18.03	3.27	434.1	4.49	2.81	0.37
		$15m^3$ pol./fed	41.94	543.20	18.07	3.33	454.6	4.52	2.83	0.37
		$10m^3$ she./fed	41.43	490.90	17.82	3.07	354.1	4.37	2.73	0.37
		$15m^3$ she./fed	41.67	501.80	17.87	3.12	374.4	4.39	2.75	0.37
		$10m^3$com./fed	40.59	400.40	17.64	2.88	285.0	4.25	2.65	0.38
		$15m^3$com./fed	41.21	429.30	17.69	2.94	296.0	4.28	2.67	0.38
Beni sewef 3	**15.5 P_2O_5/fed.**	Control	36.75	300.40	15.87	1.85	214.8	3.87	2.49	0.35
		$10m^3$ pol./fed	37.74	471.80	16.89	3.09	307.1	4.32	2.71	0.37
		$15m^3$ pol./fed	40.68	490.50	16.94	3.14	395.3	4.34	2.73	0.37
		$10m^3$ she./fed	38.80	392.40	16.70	2.88	308.8	4.18	2.63	0.37
		$15m^3$ she./fed	38.94	411.50	16.76	2.94	316.2	4.21	2.65	0.37
		$10m^3$com./fed	38.14	318.70	16.40	2.65	256.3	4.06	2.55	0.37
		$15m^3$com./fed	38.34	339.30	16.51	2.68	265.0	4.10	2.57	0.37
	31 P_2O_5/ fed.	Control	37.04	308.30	15.92	1.94	224.6	3.91	2.52	0.36
		$10m^3$ pol./fed	40.74	511.00	16.98	3.16	418.1	4.38	2.75	0.37
		$15m^3$ pol./fed	40.92	523.10	17.05	3.22	435.0	4.42	2.78	0.37
		$10m^3$ she /fed	39.14	430.60	16 80	3.01	334.0	4.24	2.67	0.37
		$15m^3$ she./fed	39.25	451.40	16.87	3.08	355.8	4.27	2.69	0.37
		$10m^3$com./fed	38.52	358.50	16.60	2.73	375.2	4.13	2.59	0.37
		$15m^3$com./fed	38.68	382.80	16 64	2.84	285.5	4.15	2.61	0.37
LSD at 5%	1.53	19.32	0 09	0.03	25 85	0.02	0.03	0.005	LSD at 5%	1.53

pol. = poultry manure, she. = sheep dung. com. = compost farmyard manure.

CONCLUSION

According to the research results, Sohag 1 durum grown successively under Siwa conditions which fertilized with 31kg P_2O_5/fed. plus 15 m^3 poultry manure was given the highest dry matter yield.

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أستجابة بعض أصناف القمح الصلد للتسميد الفوسفاتي المعدني والتسميد العضوي تحت ظروف واحة سيوة فى مصر

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تم إجراء تجربتين حقليتين بمحطة سيوة التابعة لمركز بحوث الصحراء بواحة سيوة خلال موسمين زراعيين متتاليين(٢٠٠٣/٢٠٠٤) و(٢٠٠٤/٢٠٠٥) وذلك لدراسة تأثير مستويين مختلفين من السماد الفوسفاتي المعدني (١٥,٥ و ٣١ كجم فو٢أ٥ / فدان على صورة سوبر فوسفات الكالسيوم ١٥,٥ %) مع ثلاثة أنواع من الأسمدة العضوية المختلفة بمعدلين مختلفين (١٠ و ١٥ م٣ / فدان مخلفات دواجن ومخلفات أغنام و سماد الكومبوست) مقارنة بدون معاملة على ثلاث أصناف من القمح الصلد (سوهاج ١ و بنى سويف ١ و بنى سويف ٣) والذين تم ريهم من بئر بالمحطة تصل نسبة ملوحتة ٢٢٠٠ جزء في المليون وقد أوضحت الدراسة النتائج التالية :-

١- تفوق صنف سوهاج ١ على الصنفين الآخرين بنى سويف ١ وبنى سويف ٣ في صفات المحصول مكوناتة وكذا البروتين في كلا الموسمين .
٢- زاد محصول القمح ومكوناتة معنويا بزيادة التسميد الفوسفاتي المعدني من ١٥,٥ – ٣١ كجم فو٢أ٥ /فدان في كلا الموسمين .
٣- زاد محصول القمح سوهاج ١ ومكوناتة معنويا باستخدام سماد مخلفات الدواجن بمعدل ١٥ م^{٣} / فدان في كلا الموسمين.
٤- كان التفاعل بين التسميد المعدني الفوسفاتي وأصناف القمح معنويا في بعض صفات المحصول ومكوناتة حيث كانت أفضل معاملة هي صنف القمح سوهاج ١ والمسمد بالمعدل المرتفع من السماد المعدني الفوسفاتي ٣١ كجم فو٢أ٥ /فدان في كلا الموسمين.
٥- كان التفاعل بين نوعى التسميد المعدني الفوسفاتي معنويا في بعض صفات المحصول ومكوناتة حيث كانت أفضل معاملة هي التسميد المعدني الفوسفاتي بمعدل ٣١ كجم فو٢أ٥/فدان مع سماد مخلفات الدواجن بمعدل ١٥ م^{٣} / فدان في كلا الموسمين.
٦- كان التفاعل بين التسميد المعدني الفوسفاتي و العضوي والأصناف معنويا في بعض صفات المحصول ومكوناتة حيث كانت أفضل معاملة هي الصنف سوهاج ١و المسمد بمعدل ٣١ كجم فو٢أ٥ /فدان مع أضافه ١٥ م٣ / فدان من سماد مخلفات الدواجن في كلا الموسمين وذلك لتحسين خواص التربة الرملية بواحة سيوة وإعطاء محصول جيد من القمح الصلد.