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Response of some Barley Cultivars Productivity and Available Soil Nutrients to Chicken Manure Rates under Sandy Soil Conditions.

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ABSTRACT

Field experiment was conducted at the Agricultural Faculty Experiment Farm of New Valley Branch, Assiut University at New Valley Governorate, Egypt, during 2014/2015 and 2015/2016 seasons to study the effect of chicken manure fertilizer rates (0, 3 and 6 ton.fed^{-1}) on yield and its components of some barley cultivars. The experimental design was randomized complete block design (RCBD) in split plot arrangement. The results indicated that Giza 123 and Giza 134 were superior the rest cultivars in almost studied traits. Increasing rates of chicken fertilizer from 0 to 3 or 6 ton.fed^{-1} resulted in an increase in all studied traits under this study except harvest index which was decreased. The interaction affects significantly biological yield and spike length in both seasons, while for grain yield was in the first season, and straw yield in the second season. The application of chicken manure by the rate of 3 or 6 ton.fed^{-1} reducing the mean values of soil pH and calcium carbonate ($CaCO_3$) content after the first and second seasons. On the other hand, the electric conductivity (EC) and organic matter (OM) levels were significant increased with increasing the level of chicken manure. The high level of chicken manure (6 ton.fed^{-1}) gave the highest mean values of N, P, and K after the first season than the second season.

Keywords: Barley cultivars, Available soil nutrients, Chicken manure.

INTRODUCTION

From cereal crops barley conceded world's most important crop for food and feed production. In Egypt, barley is one of the most successful crops in the New Valley Governorate and its importance and consuming is growing up. From another side of view, barley will be module for anyone researching, growing, or utilizing this important crop (Steven, 2010).

Chicken manure conceded as rich source of minerals and can be incorporated into many fertilizer programs. The successful management of manure is by matching the nutritional requirements of the crop with nutrients available. The value of chicken manure varies not only with its nutrient composition and availability, but also with management and handling costs (Zublena, *et al*., 1997). Application of chicken manure works as soil amendment and/or fertilizer (e.g. provides N, P and K) and can also increase the soil and leaf N, P, K Ca, and Mg concentrations (Duncan, 2005 and Agbede *et al*., 2008). Ghaly and Alhattab, (2013) reported that dried chicken manure can be used as a fertilizer source for plants because its high nitrogen, phosphorus and potassium contents as they are essential for plant growth. Dikinya and Mufwanzala, (2010) pointed that the utilization of chicken manure as an organic fertilizer is essential in improving soil productivity and crop production. Significant increase of nitrogen and phosphorus were observed following the addition of chicken manure. Mirvat Gobarah *et al*., (2015) concluded that by adding organic manure a significant increase in barley yield and its components occurred as compared with control treatment. Moreover, a higher grain and straw yields in addition to seed and harvest index were obtained with the application of 15 ton.fed^{-1} of chicken manure. Increasing organic manure from 0 to 15 ton.fed^{-1} increased significantly N, P, K and protein content of grains. Ofosu-Anim and Leitch, (2009) reported that plant height and dry matter production significantly increased by adding organic manures. As chicken manure's has high nitrogen content, it has long been recognized as one of the most desirable manures. In addition to enrich soil fertility, manures also could supply essential nutrients and serve as a soil amendment by adding organic matter, which helps improve the soil's moisture and nutrient retention (Davis, *et al*., 2015). Rasul, *et al*., (2015) pointed that the chicken manure is the most efficient one compared to sheep and cow manures. Akande and Adediran, (2004) found that soil N, P, K, Ca and Mg and nutrient uptakes increased induced application chicken manure at 5 tons ha^{-1}. The objectives of this study are to evaluate the productivity of four barley cultivars and their response to fertilization with different rates of chicken fertilizer as well as the effect of chicken fertilizer on some chemical properties of sandy soil.

MATERIALS AND METHODS

Field experiment was conducted at the Agricultural Faculty Experiment Farm of New Valley Branch, Assiut University at New Valley Governorate, Egypt, during 2014/2015 and 2015/2016 seasons to study the effect of chicken manure fertilizer rates (0, 3 and 6 ton.fed^{-1}) on yield and yield attributes of four barley (Hordeum vulgare, L.) cultivars (Giza123, Giza132, Giza133 and Giza134).

A randomized complete block design (RCBD) using split plot arrangement and three replications were used. The main plots were assigned to barley cultivars and the sub plots were assigned to chicken manure rates. The sub plot unit comprised 3.5 m length and 3 m wide (10.5 m^2 in area = 1/400 fed). chicken manure rates were added and were mixed with soil before sowing. Barley cultivars grains were sown by hand as the usual dry method of sowing at 20 and 15 October in the first and second season, respectively. Grains of barley cultivars were provided by the Field Crops Research Institute, Giza, Ministry of Agricultural and Land Reclamation, A.R.E. The physical and chemical analyses of soil field experiments were showed in Table 1.

The nitrogen fertilizers at the rate of 70 kg N.fed^{-1} (Ammonium nitrate 33.5 % form) was applied in two equal doses after 21 and 45 days, from sowing. 15 kg P_2O_5 .fed^{-1} (100 kg of calcium super-phosphate 15 % form) was applied as a basal application during soil preparation. All other cultural practices were carried out as recommended for barley production under dry condition zones. The preceding winter crop was alfalfa in both seasons.

At harvest, ten randomly tillers were taken from each sub plot as sample to determine plant height and spike length (cm); area was taken (1 m^2) from the center of each sub plot to estimate spikes weight and number/m^2 and 1000-grain weight. All plants in sub plots were harvested individually to determine biological, straw and grain yields $ton.fed^{-1}$ and harvest index (%). After that, the grains content of nitrogen and potassium as a percentage were determined using A. O. A. C. (1990). All obtained data were subjected to statistical analysis using the computer MSTAT-C statistical analysis, the analysis of variance was conducted as mentioned by Snedecer and Cochran, 1967. Means comparisons were done using Revised least significant differences (R.LSD) at 5% significant level.

Table 1. The physical and chemical analysis of soil field experiments.

Physical analysis	2014	2015	Chemical analysis	2014	2015
Sand (%)	89.55	87.46	Organic matter ($g.kg^{-1}$)	12.18	12.45
Silt (%)	6.35	6.83	Available N ($mg.kg^{-1}$)	55	58
Clay (%)	4.10	5.71	Available P($mg.kg^{-1}$)	3.96	3.92
Soil texture	Sand		Available K ($mg.kg^{-1}$)	148	152
			pH	7.95	8.01
			E.C. ($ds.m^{-1}$)	0.43	0.46
			Total $CaCO_3$ ($g.kg^{-1}$)	35.65	35.20

Chicken Manure source was the Poultry Department Farm of the Agriculture Faculty, Assiut University, New Valley Branch. Some physical and chemical characterization of chicken manure were showed in Table 2.

Table 2. Some physico-chemical characterization of chicken manure

Property	Value	Available micronutrients ($mg.kg^{-1}$)	
pH (1:2.5)	**7.41**		
E.C (dSm^{-1}) (1:2.5)	**3.92**		
Organic matter ($g.kg^{-1}$)	424.10	Fe	1125
Total-N %	2.78	Mn	173
Total-P %	1.97	Zn	47
Total-K %	2.54	Cu	21

Soil analysis

Surface soil samples (0-30 cm) were taken from each plot after the harvest of the barley yield in both seasons. The samples were bulked and air-dried for analysis. After the experiment, soil samples were taken again per plot for routine analysis as described by Carter (1993). The Soil pH was measured in a 1: 2.5 soil to water suspension using a pH meter (microprocessor ion analyzer model 901) according to Mclean (1982). Electrical conductivity (EC_e) was measured in the saturated soil paste extract using an electrical conductivity meter according to Jackson (1973). Total calcium carbonate was estimated using a volumetric calcium carbonate calcimeter (Nelson, 1982). Organic matter (OM) was determined by Walkley-Black dichromate digestion method (Jackson, 1973). Available N was determined by using extracting method by K_2SO_4 (1%) and Devard's alloy (Jackson, 1973). The soil available P was extracted using 0.5M $NaHCO_3$ at pH 8.5 as described by Olsen *et al*., (1954). Available potassium was extracted by ammonium acetate method and measured by flame photometry (Jackson, 1973).

RESULTS AND DISCUSSION

Soil chemical properties as affected by chicken manure:

The mean values of the 3 replicates of some soil chemical properties (soil pH, $CaCO_3$, EC, and OM) were presented in Figure 1. The results indicate that the additions of chicken manure at the rate of 3 or 6 $ton.fed^{-1}$, decreased the mean values of soil pH and $CaCO_3$ compared to the control. On the other hand, the EC and OM were significant increased with increasing the addition rate of chicken manure. Also, the first season was give the highest mean values of pH and $CaCO_3$ content than those of second one. But the mean values of EC and OM content were high in second season than first one. The applied of chicken manure to the soil at high level (6 $ton.fed^{-1}$) produced the lowest mean values of soil pH and $CaCO_3$ ranged from 7.88 to 7.73, and from 34.8 to 33.6 $g.kg^{-1}$, respectively after the first season, being 7.85 to 7.71, and 34.5 to 33.3 g/kg after the second one. On the other hand, the reduction of EC and OM values induced addition high level of chicken manure ranged from 0.47 to 0.61 $dS.m^{-1}$ and from 22 to 26 $g.kg^{-1}$ for EC and OM, respectively after the first season, being 0.5 to 0.65 $dS.m^{-1}$ and 23 to 30 $g.kg^{-1}$ after the second one. For the most part, the pH for the dirt chicken manure mixtures were observed to be neutral to slightly alkaline, which concurred with the outcomes by Lopez Masquera *et al*., (2008), also, the diminishment in the dirt pH may increment with time because of the microbial action or/and because of soil buffering limit (Youssef, 2011). Additionally, the increased organic acids and CO_2 evolution during the decomposition of the organic materials with increasing the level of application may cause few $CaCO_3$ in these soils (El-Desoky and Ragheb, 1993). The proportionally high values of EC in most the soil samples may be due to the higher salt level of chicken manure which was about 3.92 $dS.m^{-1}$ (Dikinya and Mufwanzala, 2010).

In all cases (that is, at application rate of < 3 $ton.fed^{-1}$ manure), the EC is lower than the critical value of 4 $mS.cm^{-1}$ and therefore suggesting no potential threat the productivity of the soils to crop growth. The organic matter content clearly increased with increasing the application level of chicken manure. These outcomes concur with those acquired by Ewees, (1998) who revealed that the organic wastes significantly increased the soil organic matter content and this content varied according to the added level of organic waste. In same duration, Adesodun *et al.,* (2005) had found that application of chicken manure to the soil increased soil organic matter and aggregate stability.

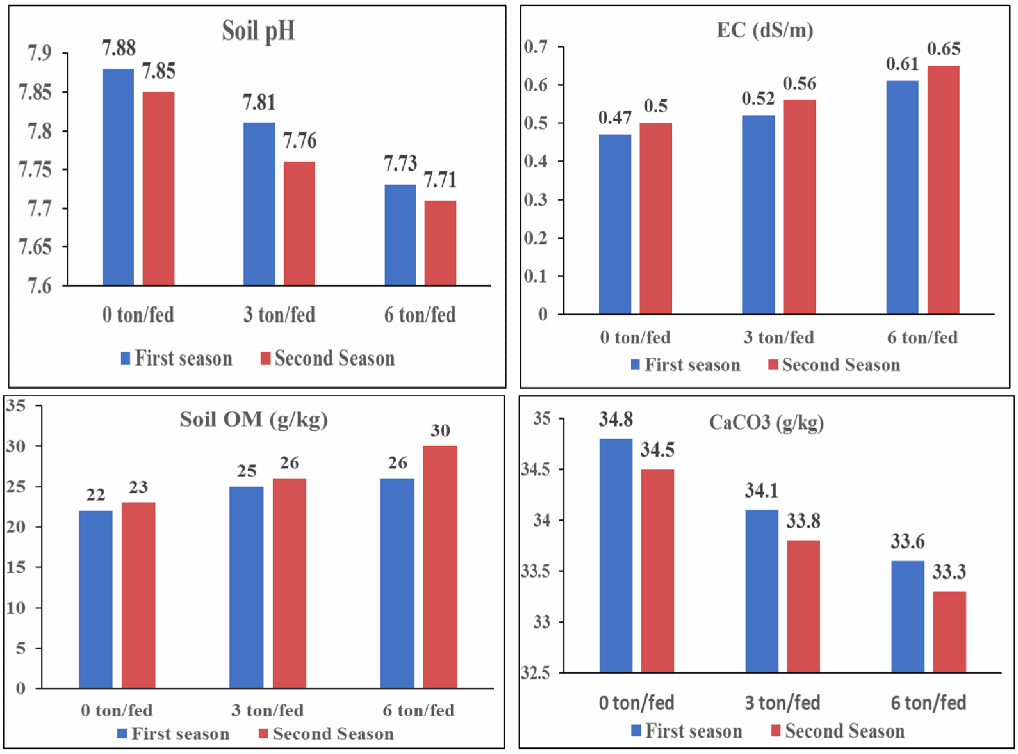

Fig. 1. Effect of chicken manure rates on some soil chemical properties in sandy soils after first and second.

Soil available macronutrients as affected by chicken manure:

In the present study, it might have been found that chicken manure additions at 3 or 6 ton.fed-1 increased available N, P, and K contents with increasing the level of chicken manure after first and second seasons as shown in Fig.2.

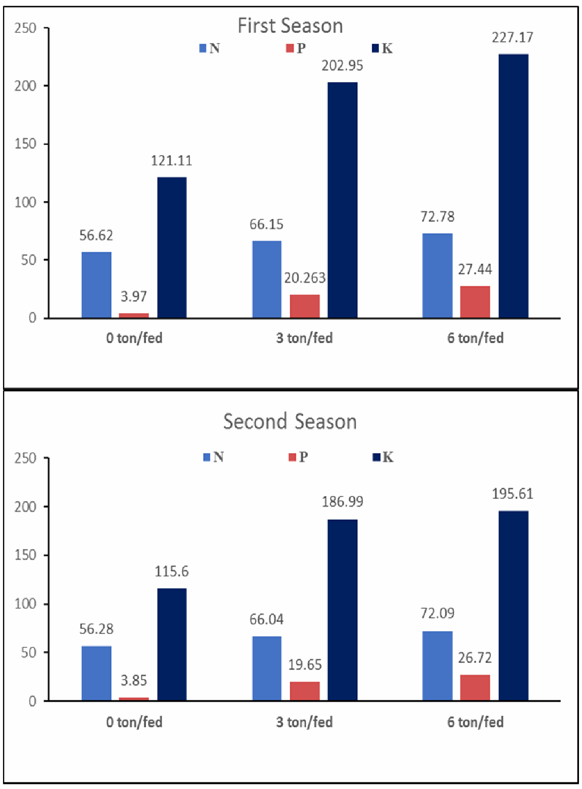

Fig. 2. Effect of chicken manure rates on available N, P, and K in sandy soils after the first and second seasons.

These results are in agreement with those obtained by Akande and Adediran, (2004). In most cases, the highest mean values of available N, P, and K contents were observed after first season, then it relatively reduction after second season. This may be due to lack of the sandy soil texture to retain these nutrients and the depletion of a large amount of chicken manure by the barley crop in the first season. Compared with the control, the 6 ton.fed^{-1} of chicken manure gave the highest mean values of available N, P, and K after both two seasons. After the first season, the application of chicken manure at level of 3 or 6 ton.fed^{-1}, the available macronutrients values increased from 56.62 to 66.16 and 72.78 mg kg^{-1}, and from 3.97 to 20.26 and 27.44 mg kg^{-1}, and from 121.11 to 202.95 and 227.17 mg kg^{-1} for N, P, and K, respectively. Meanwhile, after the second season, the values were proportionally decreased and ranged from 56.28 to 66.04 and 72.09 mg kg^{-1}, and from 3.85 to 19.95 and 26.72 mg kg^{-1}, and from 115.6 to 186.99 and 195.61 mg kg^{-1} for N, P, and K, respectively. These findings are an agreement with that have been reported by Sarwar *et al.,* 2010 and Adeleye *et al.,* 2010 they reported that chicken manure application resulted in an increase in total N, available P, exchangeable K. The proportionally increases of N and P contents is because of the nitrogenous compounds, for example ammonia found in the chicken manure which is released during decomposition (Dikinya and Mufwanzala, 2010). Also, the increases of available-P may due to the product ion of CO_2 and forming H_2CO_3 during organic matter decomposition, that cause to more P release in chicken manure (Dadhich *et al.,* 2011). Likewise, the increases of available K induced application chicken manure rates (3 or 6 ton.fed^{-1}) in both two seasons may be attributed to the organic acids which are produced from chicken manure decomposition in soil and influence on soil pH and consequently nutrients availability. The previous obtained result is an agreement with those obtained by Bhaskaran *et al.,* 2009 and Adeleye *et al.,* 2010.

Growth parameters of barley as affected by chicken manure:

The obtained results as shown in Table 3 reveal that studied barley cultivars were significantly differed in its plants height and spikes length as well as spikes number.m^2 at both seasons. Giza 123 *cv.* show superiority over other tested cultivars in the previous traits at the two seasons except, Giza 134 *cv* with regard to the previous traits spikes number.m^{-2} in 2015/2016. This superiority may be due to the genetic makeup and the ability of the cultivar to adapt.

Moreover, chicken manure shows significantly effect on all studied traits in Table (3). Plant height, spike length and number of spike.m^{-2} was increased gradually when chicken manure rate was increased up to 6 ton.fed^{-1} in both seasons. This may be due to the fact that increasing the rates of chicken manure as organic fertilization has led to the availability of the nutrients necessary for the good growth of the plant. These results are consistent with that achieved from Abbas *et al.*, 2012 and Rasul *et al.,* 2015.

Table 3. Effect of chicken manure fertilizer rates on plant height, spike length and leaves and spikes no./m^2 for some barley cultivars.

Traits	Plant height (cm)		Spike Length (cm)		Spikes Number/m^2	
Seasons	2014/2015	2015/2016	2014/2015	2015/2016	2014/2015	2015/2016
			Cultivars			
C_1 (Giza123)	101.80	102.71	7.05	7.21	406.78	429.11
C_2 (Giza132)	82.82	84.35	6.16	6.07	339.78	404.00
C_3 (Giza133)	89.39	91.40	6.29	6.24	335.22	343.11
C_4 (Giza134)	94.26	96.35	6.73	7.00	375.89	430.67
R.LSD at $_{0.05}$	11.62	11.46	0.70	0.50	43.59	46.22
			Chicken manure (ton.fed-1)			
P_0 (0 ton.fed-1)	84.51	86.40	6.01	6.03	328.00	374.83
P_1 (3 ton.fed-1)	94.11	95.62	6.77	6.86	377.83	402.50
P_2(6 ton.fed-1)	97.58	99.08	6.90	7.00	387.42	427.83
R.LSD at $_{0.05}$	5.47	5.46	0.33	0.28	36.85	42.68
			Interaction			
C_1P_0	97.80	99.89	6.94	7.09	380.67	414.00
C_1P_1	101.73	102.22	7.05	7.24	412.00	424.67
C_1P_2	105.87	106.02	7.16	7.30	427.67	448.67
C_2P_0	74.20	74.67	5.28	5.09	291.67	373.33
C_2P_1	86.20	87.18	6.47	6.50	360.33	400.00
C_2P_2	88.07	91.20	6.74	6.62	367.33	438.67
C_3P_0	75.73	77.80	5.38	5.37	287.67	330.67
C_3P_1	95.50	98.00	6.68	6.48	355.33	342.67
C_3P_2	96.93	98.39	6.82	6.85	362.67	356.00
C_4P_0	90.30	93.23	6.45	6.57	352.00	381.33
C_4P_1	93.00	95.10	6.86	7.20	383.67	442.67
C_4P_2	99.47	100.71	6.88	7.24	392.00	468.00
R.LSD at $_{0.05}$	--	--	0.85	0.72	--	--

The interaction effect was significantly on spike length in both season. The tallest spikes 7.16 and 7.30 cm were obtained from Giza123 cv. when it received chicken manure at rate of 6 ton.fed-1 in the first and second season, respectively while, the shortest spike 5.28 and 5.09 cm were recorded from Giza132 cv. with P_0.

Yield and its components of barley as affected by chicken manure:

The obtained results in Table 4 focus that significant differences among studied barley cultivars for 1000 grain weight in the both seasons. The heaviest 1000 grain were obtained from Giza123 *cv.* in both seasons. These differences may be due to differences in genetic makeup. Furthermore, the results in Table 4 and 5 point that barley cultivars under this study show significant differences in biological, grain and straw yields ton.fed^{-1} as well as harvest index%. Giza 123 and Giza134 cv. show superiority over other tested cultivars in the mentioned traits in the two growing seasons, where the highest yields were obtained. This is to be logic since the same cultivars show a superiority regarding plant height, spike length, number of spikes m^{-2} and 1000 grain weight and consequently surpassed with regard to mentioned traits.

Also, increasing chicken manure rates led to significantly increases in 1000-grain weight, biological, grain and straw yields ton.fed-1 in the two growing seasons. In Table 4, 1000-grain weight was increased gradually when chicken manure rate was increased. This increase may be due to vegetative growth increase and consequently, grain filling increase, similar results were obtained by Farhad *et al.,* (2009) and Rasul, *et al.,* (2015). The increase in biological yield was 32.43 and 48.98% in the first season while it was 13.87 and 25.77% in the second season for the rate of 3 or 6 tons chicken manure.fed^{-1}, respectively compared to control (0 ton.fed^{-1}). Grain yield ton.fed-1 increase by 24.36 and 41.67% in the first season and by 21.82 and 39.39% in the second season for the rate of 3 or 6 tons chicken manure/fed, respectively compared to control (untreated). Straw yield ton.fed^{-1} increase by 37.10 and 54.06% in first season and by 10.80 and 20.31% in the second season for the rate of 3 or 6 tons chicken manure.fed^{-1}, respectively compared to control (untreated). This is logic since the same chicken rates produced the highest mean values with regard to plant height, spike length, number of spikes m^{-2} and 1000 grain weight and consequently enhancement the mentioned traits as compared to untreated (control). Results on the same pattern with those recorded by Abbas *et al.,* (2012), Abd El-Aziz, (2013), Rasul *et al.,* (2015) and Brar *et al.,* (2015). Chicken manure rate increasing exhibited a significant effect on harvest index in the second season only. Harvest index decreased gradually when chicken manure rate was increased. This decrease may be due to straw yield increase more than grain yield with chicken manure increasing, the same results were almost recorded by Rasul *et al.,* (2015).

Biological yield (ton.fed^{-1}) was significant affected by the interaction in both season, where, the highest biological yields 7.93 and 7.76 ton.fed^{-1} for the first and second season, respectively which were obtained from Giza134 *cv.* when it received chicken manure at rate of 6 ton.fed^{-1}. Moreover, the interaction was affected significantly grain yield in the first season, only where, the highest grain yield of 2.94 ton.fed^{-1} was obtained from Giza134 *cv.* when it received chicken manure by the rate of 6 ton.fed^{-1}. While, the interaction had a significant effect on straw yield in the second season, only where, the highest straw yield 5.13 ton.fed^{-1} was obtained from Giza123 *cv.* with the control (untreated). The interaction effect did not exhibit any significant effect on 1000-grain weight and harvest index % in the both seasons.

Table 4. Effect of chicken manure fertilizer rates on biological, grain and straw yields (ton.fed^{-1}) and harvest index for some barley cultivars

Traits	1000-Grain weight (g)		Bio. yield (ton.fed^{-1})		Grain yield (ton.fed^{-1})		Straw yield (ton.fed^{-1})	
Seasons	2014/2015	2015/2016	2014/2015	2015/2016	2014/2015	2015/2016	2014/2015	2015/2016
				Cultivars				
C_1 (Giza123)	46.46	46.66	6.00	7.00	1.99	1.92	4.01	5.07
C_2 (Giza132)	40.41	40.64	4.90	6.02	1.75	2.04	3.16	3.97
C_3 (Giza133)	40.56	40.72	5.16	5.45	1.65	1.56	3.49	3.88
C_4 (Giza134)	42.21	42.07	6.36	6.67	2.23	2.42	4.10	4.25
R.LSD at $_{0.05}$	2.25	2.39	0.94	0.67	0.35	0.25	0.62	0.48
				Chicken manure (ton.fed^{-1})				
P_0 (0 ton.fed-1)	41.04	40.64	4.41	5.55	1.56	1.65	2.83	3.89
P_1 (3 ton.fed-1)	42.38	42.96	5.84	6.32	1.94	2.01	3.88	4.31
P_2 (6 ton.fed-1)	43.81	43.97	6.57	6.98	2.21	2.30	4.36	4.68
R.LSD at $_{0.05}$	2.17	1.48	0.52	0.50	0.25	0.26	0.38	0.31
				Interaction				
C_1P_0	45.19	45.27	5.42	6.95	1.95	1.82	3.47	5.13
C_1P_1	46.14	45.93	6.19	7.03	1.95	1.91	4.24	5.11
C_1P_2	48.03	48.79	6.40	7.01	2.08	2.04	4.32	4.98
C_2P_0	38.69	38.25	3.68	4.79	1.41	1.59	2.27	3.19
C_2P_1	39.84	41.47	5.21	6.25	1.99	2.11	3.22	4.14
C_2P_2	42.74	42.21	5.81	7.01	1.84	2.43	3.97	4.58
C_3P_0	38.81	38.36	3.25	4.33	0.98	1.12	2.20	3.21
C_3P_1	41.36	41.76	6.08	5.87	1.97	1.78	4.11	4.09
C_3P_2	41.50	42.03	6.13	6.15	1.99	1.79	4.14	4.35
C_4P_0	41.45	40.67	5.27	6.12	1.90	2.07	3.37	4.05
C_4P_1	42.19	42.67	5.89	6.13	1.85	2.23	3.93	3.90
C_4P_2	42.99	42.87	7.93	7.76	2.94	2.95	5.00	4.81
R.LSD at $_{0.05}$	--	--	1.33	1.23	0.57	--	--	0.74

Chemical composition of barley as affected by chicken manure:

Nitrogen and phosphorus uptake were differed significantly among barley cultivars in the second season only while, the differences among cultivars in potassium uptake was insignificant in both seasons (Table 5). Giza 134 *cv* recorded the highest nitrogen and phosphorus uptake values 5.70 and 0.36 respectively. These differences may be due to differences in genetic makeup.

Chicken manure rate exhibited a significant effect on N uptake, P uptake and K uptake in both season. In this context, N, P and K uptake were increased gradually when chicken manure rate was increased. These increases may be due to increased availability of nitrogen, phosphorus and potassium in the soil due to increased chicken manure rate, similar results were recorded by Akande and Adediran, (2004)

The interaction effect did not exhibit any significant effect on N, P and K uptake in both seasons.

Table 5. Effect of chicken manure fertilizer rates on harvest index (%) and N, P and K uptake of some barley cultivars

Traits	Harvest index (%)		N uptake $g.plant^{-1}$		P uptake $g.plant^{-1}$		K uptake $g.plant^{-1}$	
Seasons	2014/2015	2015/2016	2014/2015	2015/2016	2014/2015	2015/2016	2014/2015	2015/2016
Cultivars								
C_1 (Giza123)	33.33	27.50	4.32	4.38	0.30	0.30	2.48	1.88
C_2 (Giza132)	36.11	33.90	4.04	4.06	0.29	0.26	1.74	2.03
C_3 (Giza133)	31.92	28.53	3.74	3.22	0.26	0.26	2.04	1.81
C_4 (Giza134)	35.02	36.01	4.68	5.70	0.34	0.36	2.16	2.31
RLSD at $_{0.05}$	2.97	2.13	--	1.22	--	0.03	--	--
Chicken manure ($ton.fed^{-1}$)								
P_0 (0 ton.fed-1)	35.07	29.92	3.53	3.24	0.25	0.27	1.29	1.40
P_1 (3 ton.fed-1)	33.75	31.88	4.44	4.53	0.32	0.30	2.30	1.97
P_2 (6 ton.fed-1)	33.46	32.66	4.62	5.25	0.32	0.32	2.72	2.65
RLSD at $_{0.05}$	--	1.77	0.59	1.02	0.05	0.03	0.46	0.37
Interaction								
C_1P_0	35.78	26.20	4.01	3.86	0.27	0.24	1.69	1.31
C_1P_1	31.81	27.27	4.35	4.32	0.31	0.33	2.76	1.92
C_1P_2	32.40	29.03	4.61	4.95	0.32	0.34	2.99	2.41
C_2P_0	38.18	33.42	3.19	2.76	0.24	0.25	0.96	1.54
C_2P_1	38.26	33.69	4.42	4.32	0.32	0.25	2.04	1.92
C_2P_2	31.90	34.58	4.53	5.10	0.30	0.28	2.22	2.62
C_3P_0	30.88	26.13	2.82	2.02	0.20	0.27	1.23	1.22
C_3P_1	32.34	30.27	4.15	3.52	0.30	0.25	2.25	1.69
C_3P_2	32.53	29.20	4.25	4.13	0.29	0.25	2.63	2.51
C_4P_0	35.45	33.93	4.11	4.35	0.30	0.34	1.28	1.54
C_4P_1	32.60	36.28	4.84	5.94	0.36	0.36	2.14	2.34
C_4P_2	37.00	37.84	5.09	6.81	0.38	0.39	3.05	3.05
RLSD at $_{0.05}$	--	--	--	--	--	--	--	--

CONCLUSION

From the previous results the investigator recommend by sowing Giza 123 or Giza 134 barley cultivars fertilized by 6 $ton.fed^{-1}$ chicken manure to maximizing grain and straw yields under new valley conditions. Also, the application of chicken manure let to improving macronutrient to availability and reduced soil pH and calcium carbonate. These improvements led to significant increases in growth, yield and uptake of barley plants.

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استجابة انتاجية بعض أصناف الشعير والعناصر الغذائية الميسرة في التربة لمعدلات سماد الدجاج تحت ظروف الأرض الرملية

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أجريت تجربة حقلية في المزرعة البحثية لكلية الزراعة -جامعة أسيوط -فرع الوادي الجديد- محافظة الوادي الجديد، بجمهورية مصر العربية، خلال الموسمين 2015/2014 و 2016/2015 لدراسة تأثير معدلات سماد الدجاج (0 ، 3 و 6 طن / فدان) على المحصول ومساهماته لأربعة أصناف من الشعير. تم استخدام تصميم القطاعات الكاملة العشوائية وتم ترتيب المعاملات كقطع منشقة. وأظهرت النتائج تفوق الصنفين جيزة 123 و جيزة134 على بقية الأصناف في كل الصفات المدروسة تقريبا. وقد أدت زيادة معدلات سماد الدجاج من صفر إلى 3 أو 6 أطنان / فدان إلى زيادة في جميع الصفات تحت الدراسة باستثناء دليل الحصاد الذي انخفض. كان تأثير التفاعل بين الأصناف و معدلات التسميد معنويا على طول السنبلة ، الناتج البيولوجي خلال الموسمين و ناتج الحبوب في الموسم الأول، فقط وكذلك ناتج القش في الموسم الثاني، فقط. أدت إضافة سماد الدجاج بمعدل 3 أو 6 طن / فدان إلي تقليل رقم حموضة التربة و محتوى التربة من كربونات الكالسيوم ($CaCO_3$) بعد الموسمين الأول والثاني. ومن ناحية أخرى، زادت مستويات التوصيل الكهربائي (Ec) و محتوي التربة من المادة العضوية بشكل ملحوظ مع زيادة مستوى سماد الدجاج. أعطى المستوى العالي لسماد الدجاج (6 طن /فدان) أعلى متوسط قيم N و P و K بعد الموسم الأول من الموسم الثاني.