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COMPENSATION INORGANIC NITROGEN FERTILIZER NEEDS OF BARLEY BY ORGANIC MANURE

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ABSTRACT

Barley is one of the major cereal crops cultivated in new reclaimed sandy soils. In order to decrease nitrogen pollution in barley fields, an trail was conducted to compensate barley inorganic nitrogen needs by organic manure under newly reclaimed sandy saline soils in North Nile Delta during 2011/2012 and 2012/2013 seasons at Experimental Station Farm, Faculty of Agriculture, Mansoura University, Egypt. A strip-plot design with four replicates was used. The vertical plots were occupied with three barley cultivars (Giza 129, Giza 130 and Giza 131). While, the horizontal-plots were devoted to five combination treatments of inorganic nitrogen and poultry manure *i.e.* 100% inorganic nitrogen, 75% inorganic nitrogen + 25 % poultry manure, 50% inorganic nitrogen + 50 % poultry manure, 25% inorganic nitrogen + 75 % poultry manure and 100 % poultry manure.

The results indicated that Giza 131cultivar surpassed other studied cultivars (Giza 129, Giza 130 cultivars) in all studied characters and recorded the maximum values in both seasons. Application of 75% inorganic nitrogen plus 25% poultry manure combination treatment recorded the highest values of all studied characters, followed by 100% inorganic nitrogen fertilizer, then 50% inorganic nitrogen and 25% poultry manure combination treatment, 25% inorganic nitrogen and 75% poultry manure combination treatment, and lastly 100% poultry manure only in both seasons.

On the basis of the results obtained, maximum grain and straw yields of barley resulted by fertilizing Giza 131 cultivar with 75% inorganic nitrogen beside 25% poultry manure under sandy saline soils in North Nile Delta.

Keywords: Barley, Cultivars, Varieties, Inorganic nitrogen, Organic fertilizers, Poultry manure, Chicken manure, Growth, Yield, Grain quality.

INTRODUCTION

Barley (*Hordeum vulgare* L.) is one of the most important cereal crops in arid and semi-arid areas *i.e.* Egypt and all over the world. In Egypt, the total cultivated area of barley reached about 192 780 feddan and the total production exceeded 107 000 tons (FAO, 2015). Barley considered the fourth in total cereal production in the world after wheat, rice, and maize. Barley can replace wheat as the prevailing crop, due to its tolerance to drought and salinity. Barley is more productive under adverse environments than other cereal crops (Alazmani, 2014).

Sowing the suitable cultivar is important factor to enhance growth, grain yield and grain quality of barley. In this connections, by many investigators indicating that there are significant differences due to barely genotypes in growth, yield, yield components and quality due to the differences in genetic structure and their interaction with environmental conditions prevailing during growing season (Rashid and Khan, 2008 and Ryan *et al.*, 2009). In this concern, Alam *et al.* (2007), Ali (2011) and Mousavi *et al.* (2012) stated that growth, yield and yield components as well as protein yield were significantly differed due to various barley cultivars.

Barley is very sensitive to deficient nitrogen and very responsive to nitrogen fertilization. The most important role of nitrogen in plant is its presence in the structure of protein and nucleic acids, which are the most important building and information substances from which the living material or protoplasm of every cell is made. Moreover, nitrogen application may influence the amount formed chlorophyll. In turn, this influences cell size, leaf area and photosynthetic activity. Excessive nitrogen causes lush succulent growth, resulting in greatly increased danger of lodging, delayed maturity and greater susceptibility to diseases and pests. Alam *et al.* (2005) indicated that growth and dry matter accumulation were increased with highest dose of nitrogen. Increasing nitrogen fertilization increased leaf area, tillers formation, leaf area index and leaf area duration and this led to much greater production of dry matter and grain yield. Many workers all over the world concluded that using nitrogen fertilizer in suitable needed levels could improve growth, yield and its components as well as quality of barley. In this connection, Aslam *et al.* (2000), Ali (2011), Shafi *et al.* (2011) and Anbessa and Juskiw (2012) stated that using nitrogen fertilizer at the rates of 55 to 70 kg N/ha recorded maximum growth parameters, grains number and weight/spike, 1000-grain weight and grain yield/ha. Moreover, Rashid and Khan (2008), Ryan *et al.* (2009) and Alazmani (2014) reported that the highest grain yield/ha of barley was recorded from nitrogen fertilizer at the rate of 90 kg N/ha. In addition, Turk *et al.* (2003) and Mousavi *et al.* (2012) revealed that the highest averages of growth, yield and its attributes of barley were recorded under application of 120 – 150 kg N/ha.

Mineral sources of nitrogen fertilizer, especially NO_3, accumulate more NO_3 and NO_2 ions within the plant tissue, which represented a serious problems for human health because their absorption into the blood. It may oxidize Fe^{++} of hemoglobin to Fe^{+++} and producing methemoglobin, which cannot transport oxygen. Toxicity of NO3 may be due to the formation of carcinogenic N-nitrous compounds by reaction with amino compounds.

Application of organic manures to agricultural fields is usually used to increasing soil organic matter and fertility as well as improvement of the soil physical structure (Mohamed Amanullah *et al.*, 2006). Moreover, it increasing water holding capacity of soil and reducing the amount of synthetic fertilizer needed for crop production (Blay *et al.*, 2002). Organic manure had positive effects on growth and yield of barley, in this connection, Ofosu-Anim and Leitch (2009) showed that organic manure application significantly increased plant height, chlorophyll content of leaves, dry matter accumulation and nutrient uptake by plants. Ghanbari *et al.* (2012) and Sary *et al.* (2014) reported that the different proportions of organic manure fertilizer treatment significantly affected grain yield and yield components of barley plants.

Rashid and Khan (2008), Ryan *et al.* (2009), Shafi *et al.* (2011), Anbessa and Juskiw (2012) and Mousavi *et al.* (2012) indicated that growth, yield and its attributes as well as grain quality of barley significantly affected by the interaction between nitrogen fertilizers and cultivars. Effects of the combined application of organic manures and inorganic fertilizers in enhancing soil fertility and barley yield have been reported. In this concern, Ghanbari *et al.* (2012) concluded that use of 50% cattle manure with 50% mineral nitrogen fertilizer produce suitable growth, yield and its components of barley.

The purpose of this investigation was to compensate barley inorganic nitrogen needs by organic manure under newly reclaimed sandy saline soils conditions in North Nile Delta.

MATERIALS AND METHODS

Two field experiments were conducted at the Experimental Station Farm at Kalabsho and Zayian region, Faculty of Agriculture, Mansoura University, during 2011/2012 and 2012/2013 seasons. The experimental location (Kalabsho and Zayian region) lies in North West Dakahlia Governorate, 31.5° North and 32.31° East and certainly 3.5 km South from the international high way adjustment of the Mediterranean sea, North Nile Delta, Egypt. Moreover, the annual rainfall is about 120 mm distributed as 80% in winter, 10% in autumn and 10% in spring. Maximum temperature is about 40 °C and minimum is about 7 °C. The objective of this study was to compensate barley inorganic nitrogen needs by organic manure under newly reclaimed sandy saline soils in North Nile Delta.

The experiments were carried out in a strip-plot design with four replicates. Each experiment included fifteen treatments comprising, three cultivars and five inorganic nitrogen and poultry manure combination treatments.

The vertical-plots were assigned to three barley cultivars *i.e.* Giza 129, Giza 130 and Giza 131. The studied Egyptian barley cultivars were obtained from Barley Research Section, Field Crops Research Institute, Agricultural Research Center, Giza, Egypt.

The horizontal-plots were allocated to five inorganic nitrogen and poultry manure combination treatments as follows:

1. 100% of inorganic nitrogen only.
2. 75% of inorganic nitrogen + 25% of poultry manure.
3. 50% of inorganic nitrogen + 50% of poultry manure.
4. 25% of inorganic nitrogen + 75% of poultry manure.
5. 100% of poultry manure only.

All doses of inorganic nitrogen and poultry manure calculated on the base of recommended dose of nitrogen (100 kg N/fed) under the conditions of newly reclaimed sandy saline soils in North Nile Delta. The inorganic nitrogen fertilizer in the form of ammonium nitrate (33.5 % N) as previously mentioned levels was applied in four equal doses prior every irrigation and finished before heading. The organic fertilizer in the form of poultry manure was added after soil preparation to the experimental units at the previously mentioned doses on soil surface and then turned over via hack. Chemical analysis of poultry manure used in this study was presented in Table 1.

Experimental unit area was 3 X 3.5 m with an area of 10.5 m^2 *i.e.* 1/400 feddan. The soil in the summer season was uncultivated in both seasons. The soil of experimental site was sandy in texture with an electrical conductivity (EC) of 8.6 dS/m, pH of 8.45 and organic matter 0.60 over both seasons. The experimental field was well prepared through two ploughings, compaction and then divided into the experimental units with dimensions as previously mentioned. Calcium superphosphate (15.5 % P_2O_5) was applied during soil preparation at the rate of 200 kg/fed. Barley seeds at the rate of 75 kg/fed were sown by using broadcasting Afir method on the first week of December in both seasons. Potassium sulphate (48 % K_2O) at the rate of 75 kg/fed was broadcasted in one dose before the second irrigation. The common agricultural practices for growing barley according to the recommendations of Ministry of Agriculture were followed, except the factors under study.

Table 1: Chemical analysis* of poultry manure in both seasons.

Poultry manure	2011/2012	2012/2013
Available Nitrogen (%)	0.976	0.835
Available Phosphorous (%)	0.165	0.143
Available Potassium (%)	0.355	0.301
Organic matter (%)	42.22	39.85
pH	8.11	7.95
EC (ds/m^{-1})	0.88	0.79

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After 100 days from sowing, five plants were randomly taken from each plot to estimate the following growth characters *i.e.* total chlorophyll content (SPAD) in flag leaf assessed by SPAD-502 (Minolta Co. Ltd., Osaka, Japan) and flag leaf area (cm^2) determined by using Field Portable Leaf Area Meter AM-300 (Bio-Scientific, Ltd., Great Am well, Herefordshire, England) and plant height (cm).

At harvesting, one square meter was randomly selected from each plot to estimate the following yield and yield attributes characters *i.e.* number of spikes/m^2, spike length (cm), number of grains/spike, grains weight/spike (g) and 1000 – grain weight (g), Grain yield (ardab/fed) calculated by harvesting whole plants in each plot and air dried, then threshed and the grains at 13 % moisture were weighted in kg and converted to ardab per feddan (one ardab= 120 kg) and straw yield (t/fed) as well as crude protein percentage in grains (%) was estimated by the improved Kjeldahl – method according to A.O.A.C. (1990). Crude protein percentage was calculated by multiplying the total nitrogen values in barley flour by 5.75 and carbohydrates percentage in grains (%) estimated using the anthrone method as described by Sadasivam and Manickam (1996).

All obtained data were statistically analyzed according to the technique of analysis of variance (ANOVA) for the strip– plot design as published by Gomez and Gomez (1984) by using MSTAT statistical package (MSTAT-C with MGRAPH version 2.10, Crop and Soil Sciences Department, Michigan State University, USA). Least significant difference (LSD) method was used to test the differences between treatment means at 5 % level of probability as described by Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

1. Cultivars performance:

Significant differences among the three studied barley cultivars *i.e.* Giza 129, Giza 130 and Giza 131 were detected in total chlorophyll content, flag leaf area, plant height, number of spikes/m^2, spike length, number of grains/spike, grains weight/spike, 1000-grain weight, grain and straw yields, crude protein and carbohydrates contents in grains during the two growing seasons, except crude protein percentage in the first season only as shown from data in Tables 2 and 3.

Giza 131 cultivar surpassed other studied cultivars (Giza 129, Giza 130) in all above mentioned characters and recorded the highest values in the two growing seasons. However, Giza 130 cultivar ranked after Giza 131 cultivar concerning all studied characters in both seasons. Whereas, Giza 129 registered the lowest values of all studied characters under the environmental conditions of this study in both seasons.

It could be noticed that Giza 131 cultivars increased number of spikes/m^2 by 3.01 and 4.11%, grains weight/spike by 3.89 and 13.52%, 1000-grain weight by 5.32 and 10.18, grain yield/fed by 2.01 and 13.59% and straw yield/fed by 3.71 and 7.03% as compared with Giza 130 and Giza 129 cultivars over both seasons, respectively.

These findings might be attributed to the differences in their genetical constitution and their interaction with environmental conditions prevailing during growing season (Rashid and Khan, 2008 and Ryan *et al.*, 2009). These results are in agreement with those detected by Alam *et al.* (2007), Ali (2011) and Mousavi *et al.* (2012).

2. Effect of combined fertilization treatments:

From obtained results in Tables 2 and 3, combined application treatments of mineral nitrogen fertilizer and organic manure as poultry manure showed significant effect on all studied characters *i.e.* total chlorophyll content, flag leaf area, plant height, number of spikes/m^2, spike length, number of grains/spike, grains weight/spike, 1000-grain weight, grain and straw yields, crude protein and carbohydrates contents in grains in both growing seasons.

Application of 75% (from the recommended dose *i.e.* 100 kg N/fed, which gave 75 kg N/fed) inorganic nitrogen and compensate the rest of recommended dose (25% from the recommended dose) from poultry manure on the base of available nitrogen in each season in poultry manure significantly increased all studied characters and produced the highest values as compared with other studied combination treatments of inorganic nitrogen and poultry manure in both seasons. Using the combination treatment of 100% inorganic nitrogen only came in the second rank after application of 75% inorganic nitrogen + 25% poultry manure, where the differences between them were significant in both seasons, except total chlorophyll content in the second season and number of spikes/m^2 and protein percentage in the first season only. Fertilization barely plants with 50% of inorganic nitrogen in addition 50% of poultry manure came in the third rank and followed by fertilizing plants with 25% of inorganic nitrogen plus 75% of poultry manure with respect to all studied characters in both seasons. On the other hand, application of 100 % of the recommended dose from poultry manure alone gave the lowest values of all studied characters.

Table 2: Averages of total chlorophyll content, flag leaf area, plant height, number of spikes/m^2, spike length and number of grains/spike as affected by inorganic and organic fertilization treatments of some barley cultivars and their interaction during 2011/2012 and 2012/2013 seasons.

Characters / Treatments	Total chlorophyll content (SPAD)		Flag leaf area (cm^2)		Plant height (cm)		Number of spikes/m^2		Spike length (cm)		Number of grains/spike	
Seasons	2011/2012	2012/2013	2011/2012	2012/2013	2011/2012	2012/2013	2011/2012	2012/2013	2011/2012	2012/2013	2011/2012	2012/2013
A- Cultivars:												
Giza 129	42.10	42.60	26.19	25.72	80.96	82.04	371.8	380.6	9.36	10.32	42.57	45.27
Giza 130	43.62	44.41	27.34	30.24	83.61	85.16	375.2	381.8	9.66	11.06	43.94	46.61
Giza 131	45.19	46.05	28.86	31.65	87.10	89.56	384.1	386.3	10.52	11.49	45.62	49.06
LSD at 5 %	0.72	1.10	0.40	0.56	0.42	0.47	3.1	3.3	0.16	0.22	0.20	0.35
B- Inorganic and organic fertilization treatments:												
100% inorganic	46.28	47.44	28.66	32.35	85.76	87.55	388.8	389.7	10.60	11.93	47.11	47.35
75% inorganic + 25% organic	47.47	48.37	29.60	33.51	86.83	89.35	393.0	396.0	11.48	12.57	48.31	52.26
50% inorganic + 50% organic	45.25	45.25	27.92	31.12	84.65	86.02	383.7	388.3	9.58	10.50	45.92	48.18
25% inorganic + 75% organic	42.23	43.38	26.42	26.36	82.50	83.66	362.3	374.6	9.33	10.45	40.60	44.44
100% organic	36.95	37.31	24.73	22.67	79.71	81.33	357.4	365.9	8.23	9.34	38.27	42.66
LSD at 5 %	0.92	1.21	0.59	0.74	0.62	0.60	4.3	4.8	0.32	0.30	0.54	0.51
C- Interaction: A×B (F. test)	NS	NS	*	*	*	*	*	*	*	*	*	*

Table 3: Averages of grains weight/spike, 1000-grain weight, grain and straw yields, protein and carbohydrates contents in grains as affected by inorganic and organic fertilization treatments of some barley cultivars and their interaction during 2011/2012 and 2012/2013 seasons.

Characters / Treatments Seasons	Grains weight/spike (g)		1000-grain weight (g)		Grain yield (ardab/fed)		Straw yield (t/fed)		Protein (%)		Carbohydrates (%)	
	2011/2012	2012/2013	2011/2012	2012/2013	2011/2012	2012/2013	2011/2012	2012/2013	2011/2012	2012/2013	2011/2012	2012/2013
A- Cultivars:												
Giza 129	3.24	3.31	55.56	57.98	13.32	13.52	1.768	1.813	9.72	9.89	76.84	77.75
Giza 130	3.48	3.44	57.22	59.96	14.25	14.72	1.810	1.844	9.81	10.07	78.17	79.46
Giza 131	3.59	3.49	59.55	61.46	14.44	14.92	1.861	1.877	9.98	10.16	78.88	80.06
LSD at 5 %	0.06	0.08	0.99	0.71	0.17	0.33	0.020	0.021	NS	0.09	0.41	0.55
B- Inorganic and organic fertilization treatments:												
100% inorganic	3.46	3.35	61.72	62.78	14.76	15.01	1.848	1.853	10.25	10.39	80.51	81.35
75% inorganic + 25% organic	4.38	4.12	64.23	64.90	15.35	15.61	1.957	2.006	10.54	10.68	81.73	82.81
50% inorganic + 50% organic	3.22	3.30	60.80	61.97	14.42	14.61	1.794	1.817	10.08	10.19	79.14	80.26
25% inorganic + 75% organic	3.19	3.22	52.83	55.63	13.16	13.92	1.763	1.804	9.49	9.69	75.45	76.90
100% organic	2.93	3.07	47.65	53.70	12.33	12.81	1.702	1.742	8.83	9.25	72.98	74.15
LSD at 5 %	0.16	0.08	1.20	0.99	0.37	0.45	0.057	0.062	0.37	0.23	0.53	0.67
C- Interaction: A×B (F. test)	NS	NS	*	*	*	*	*	*	NS	NS	NS	NS

It could be observed that using the best combination treatment (75% inorganic nitrogen + 25% poultry manure) increased yield and its component characters *i.e.* number of spikes/m^2 (by 1.35, 2.20, 7.09 and 9.09%), grains weight/spike (by 24.79, 30.44, 32.63 and 41.85%), 1000-grain weight (by 3.72, 5.18, 19.12 and 27.83%), grain yield/fed (by 4.00, 6.65, 14.39 and 23.18%) and straw yields/fed (by 7.08, 9.74, 11.10 and 15.07%) as compared with using 100% of the recommended dose from inorganic nitrogen, 50% inorganic nitrogen + 50% poultry manure, 25% inorganic nitrogen + 75% poultry manure and 100% poultry manure only over both seasons, respectively.

These increases in all studied character due to using 75% inorganic nitrogen + 25% poultry manure may be ascribed to combine the desirable effect of inorganic nitrogen in increases leaf area, tiller formation, leaf area duration, photosynthetic activity and dry matter accumulation (Alam *et al.*, 2005) through it influence of chlorophyll formation, cell size and encouraging plants to uptake other elements consequently improving growth and yield components. In addition the role of organic nitrogen as poultry manure in improvement of soil physical structure (Mohamed Amanullah *et al.*, 2006), increasing water holding capacity of soil and reducing the amount of synthetic fertilizer needed for crop production (Blay *et al.*, 2002). It was worthy to mentioned that the reduction in growth, yield and its components as well as quality character due to the increase in ratio of organic manure in fertilization treatment might be attributed to lower availability and mineralization of nitrogen which released from poultry manure. These results are in compatible with those found by Ryan *et al.* (2009), Ghanbari *et al.* (2012), Mousavi *et al.* (2012), Alazmani (2014) and Sary *et al.* (2014).

3. Effect of interactions:

The interaction between barley cultivars and inorganic and organic fertilization treatments showed significant effect on flag leaf area, plant height, number of spikes/m^2, spike length, number of grains/spike, 1000-grain weight, grain and straw yields/fed and its quality in both growing seasons, vice versa concerning other traits as presented in Tables 2 and 3.

The highest values of flag leaf area (Fig. 1), plant height (Fig. 2), spike length (Fig. 4) and number of grains/spike (Fig. 5) were obtained from fertilizing Giza 131 cultivar with 75% of the recommended dose from inorganic nitrogen and the rest of the recommended dose (25%) from poultry manure in both growing seasons. This interaction treatments was followed by fertilizing Giza 131 cultivar with 100% of the recommended dose from inorganic nitrogen, and then fertilizing Giza 130 cultivar with 75% inorganic nitrogen + 25% poultry manure in both growing seasons. Ghanbari *et al.* (2012) came out similar results.

From obtained results graphically illustrated in Figs. 3, 6, 7 and 8 show that the highest values of number of spikes/m^2 (Fig. 3), 1000-grain weight (Fig. 6), grain yield/fed (Fig. 7) and straw yield/fed (Fig. 8) were obtained from fertilizing Giza 131 cultivar with 75% of the recommended dose from inorganic nitrogen and the rest of the recommended dose (25%) from poultry manure in both growing seasons. The second best interaction treatments between both studied factors was fertilizing Giza 130 cultivar with 75% inorganic nitrogen + 25% poultry manure, and followed by fertilizing Giza 131 cultivar with 100% of the recommended dose from inorganic nitrogen in both growing seasons. These results are in accordance with those stated by Ghanbari *et al.* (2012).

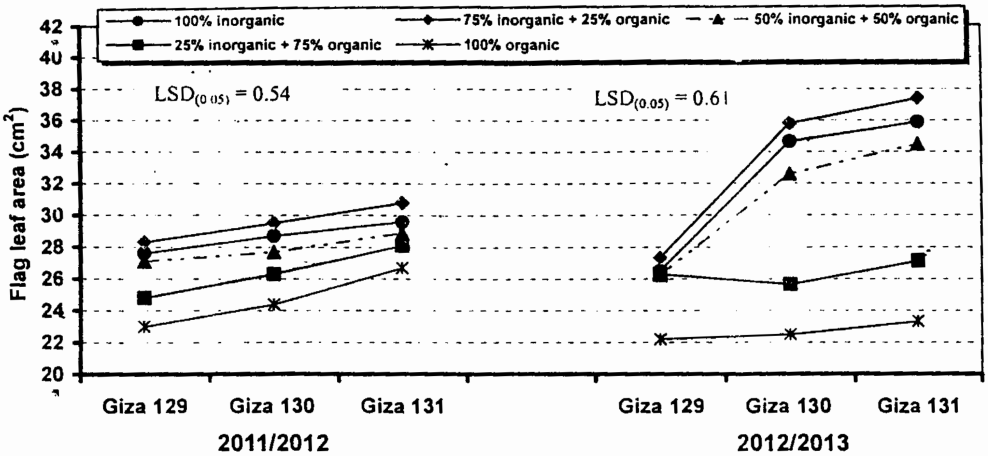

Fig. 1: Flag leaf area (cm^2) as affected by the interaction between inorganic and organic fertilization treatments and barley cultivars during 2011/2012 and 2012/2013 seasons.

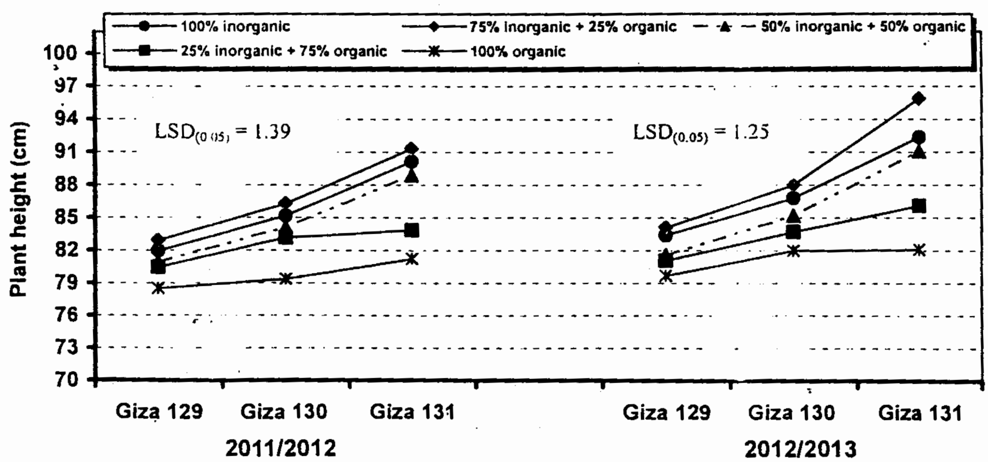

Fig. 2: Plant height (cm) as affected by the interaction between inorganic and organic fertilization treatments and barley cultivars during 2011/2012 and 2012/2013 seasons.

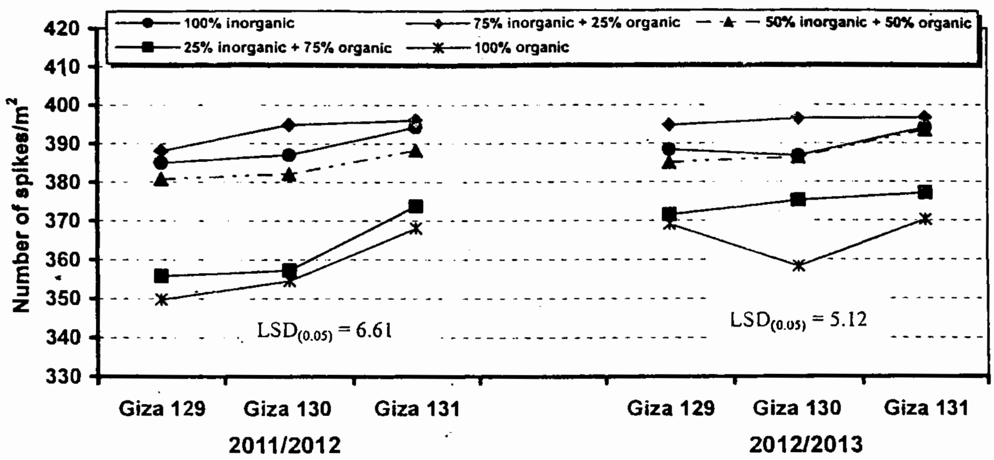

Fig. 3: Number of spikes/m^2 as affected by the interaction between inorganic and organic fertilization treatments and barley cultivars during 2011/2012 and 2012/2013 seasons.

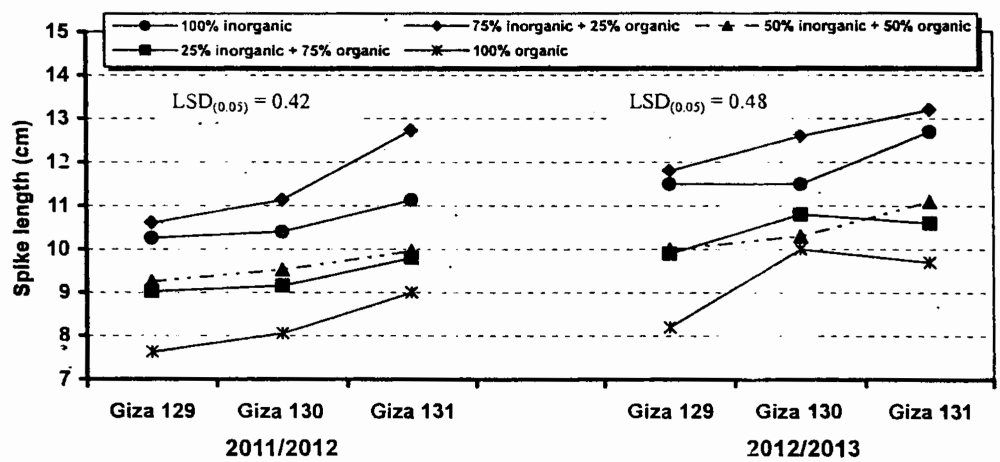

Fig. 4: Spike length (cm) as affected by the interaction between inorganic and organic fertilization treatments and barley cultivars during 2011/2012 and 2012/2013 seasons.

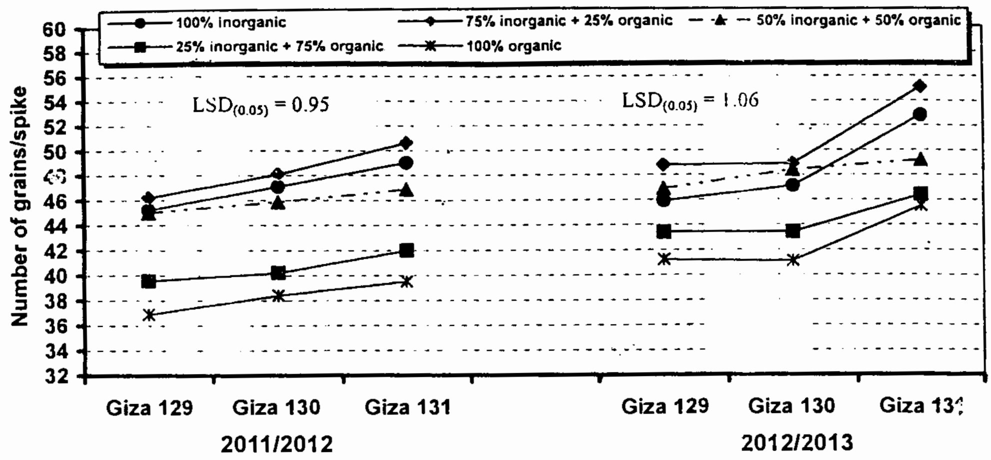

Fig. 5: Number of grains/spike as affected by the interaction between inorganic and organic fertilization treatments and barley cultivars during 2011/2012 and 2012/2013 seasons.

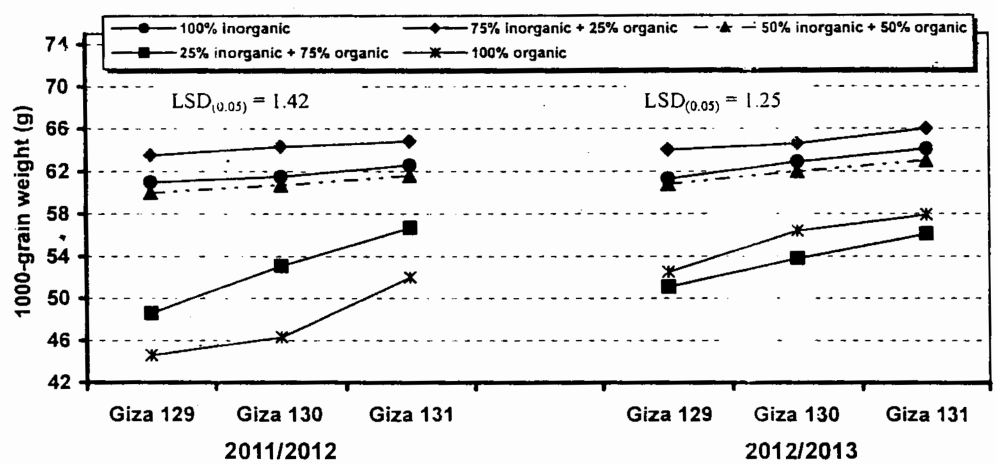

Fig. 6: Thousand grains weight (g) as affected by the interaction between inorganic and organic fertilization treatments and barley cultivars during 2011/2012 and 2012/2013 seasons.

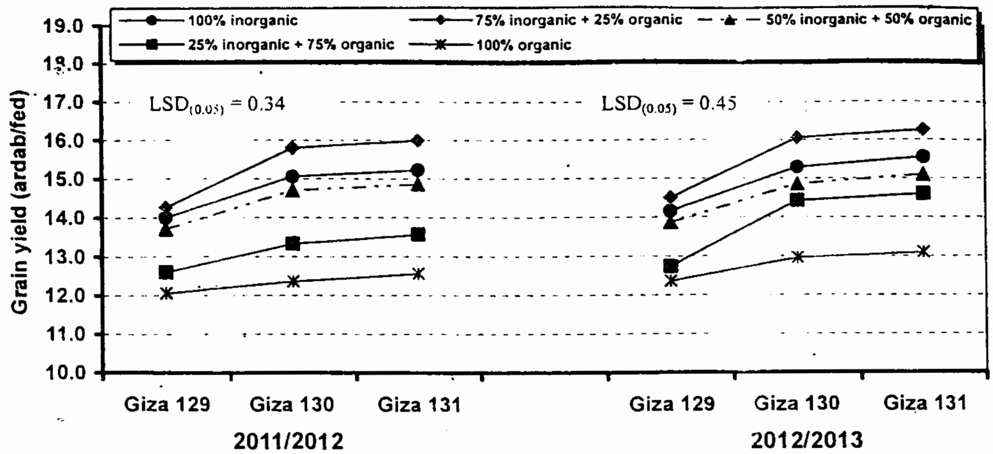

Fig. 7: Grain yield (ardab/fed) as affected by the interaction between inorganic and organic fertilization treatments and barley cultivars during 2011/2012 and 2012/2013 seasons.

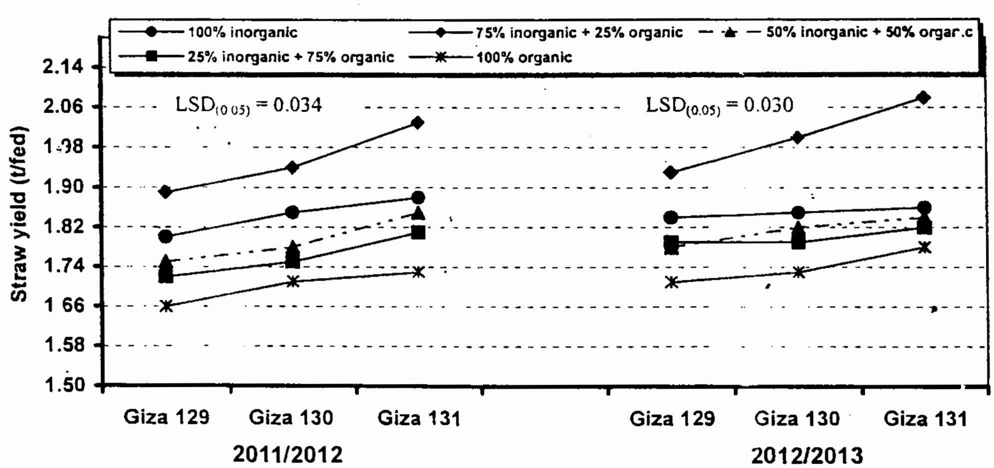

Fig. 8: Straw yield (t/fed) as affected by the interaction between inorganic and organic fertilization treatments and barley cultivars during 2011/2012 and 2012/2013 seasons.

CONCLUSION

It can be concluded that application inorganic nitrogen fertilizer in combination with poultry manure significantly enhanced growth, yield and its components and grain quality of barley. From obtained results, maximum productivity and grain quality of barley could be achieved through fertilizing Giza 131 cultivar with 75% of the recommended dose from inorganic nitrogen and the rest of the recommended dose (25%) from poultry manure. This treatment may be recommended when taking into consideration the economic costs and environmental pollution with nitrite and nitrate. Also, Giza 131 cultivar might be suitable for highest productivity of barley under the similar conditions.

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تعويض إحتياجات محصول الشعير من السماد النيتروجينـي المعـدنى بالسماد العضوي

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يعتبر محصول الشعير أحد محاصيل الحبوب الهامة المنزرعة في الأراضـي الرملية الملحية حديثة الاستصلاح. تهدف هذه الدراسة إلى تقليل التلوث النـاتج عـن اسـتخدام السماد النيتروجينى المعدني في الشعير. ولتحقيق هذا الغرض أجريت تجربتين حقليتين خلال الموسمين ٢٠١٢/٢٠١١ و ٢٠١٣/٢٠١٢ بمحطة البحوث والتجارب الزراعية بقلابشو وزيـان – كلية الزراعة – جامعة المنصورة – مصر، بهدف تعويض احتياجات محصول الـشعير مـن السماد النيتروجينى المعدني بإستخدام السماد العضوى (سبلة الدواجن). تم اسـتخدام تـصميم الـشرائح المتعامدة فى أربعة مكررات، حيث احتلت الشرائح الرأسية على ثلاثة أصناف من الشعير هـى؛ جيزة ١٢٩، جيزة ١٣٠ و جيزة ١٣١. في حين احتلت معاملات التداخل بين السماد النيتروجينى المعدني وسبلة الدواجن الشرائح الأفقية وهى؛ ١٠٠٪ سماد نيتروجينـى معـدنى ، ٧٥٪ سماد نيتروجينى معدنى + ٢٥٪ سبلة الدواجن ، ٥٠٪ سماد نيتروجينى معدنى + ٥٠٪ سبلة الدواجن ، ٢٥٪ سماد نيتروجينى معدنى + ٧٥٪ سبلة الدواجن و ١٠٠٪ سبلة الدواجن.

أشارت النتائج المتحصل عليها أن الصنف جيزة ١٣١ تفوق على بقية الأصناف الأخرى (جيزة ١٢٩، جيزة ١٣٠) في جميع الصفات تحت الدراسة في كلا الموسمين. حيث أدى تـسميد محصول الشعير بـ ٧٥% من السماد النيتروجينى المعدنى بالاضافة الى ٢٥٪ من سبلة الـدواجن إلى الحصول على أعلى القيم لجميع الصفات المدروسة. أما التـسميد بـ ١٠٠٪ مـن الـسماد النيتروجينى المعدنى فقط جاء في المرتبة الثانية بعد المعاملة السابقة، ثم التسميد بـ ٥٠٪ مـن السماد النيتروجينى المعدنى و٢٥٪ من سبلة الدواجن، والتسميد بـ ٢٥٪ من السماد النيتروجينـى المعدنى و٧٥٪ من سبلة الدواجن، وأخيرا ١٠٠٪ من سبلة الدواجن فقط في كلا الموسمين.

توصى نتائج الدراسة بأنه يمكن الحصول علي أعلى القيم لمحصول الحبوب والقش من تسميد الشعير صنف جيزة ١٣١ بـ ٧٥% من السماد النيتروجينى المعدنى بالاضافة الى ٢٥٪ من سبلة الدواجن تحت ظروف الأراضى الرملية الملحية حديثة الإستصلاح بشمال الدلتا.