RESPONSE OF TWO BARLEY CULTIVARS TO MINERAL AND ORGANIC NITROGEN FERTILIZERS

OMAR, A. M.,[1] KH. A. AMER [2] and RANIA A. KHEDR[2]

1. *Agronomy Dep., Faculty of Agriculture, Kafrelsheikh University.*
2. *Barley Dep., Field Crop Res. Institute, ARC, Egypt.*

Abstract

In the present investigation a field experiment was conducted at Sakha Agricultural Research Station , Kafr-Elsheikh Governorate during two successive growing seasons 2007/2008 and 2008/2009. There was to study the effect of nitrogen and or compost rates on yield and its components as well as seed quality of the two barley cultivars Giza 132 and Giza 2000. The treatments were (0, 15 , 30 , and 45 Kg N / fed and (15, 30, and 45 Kg N / fed. Compost and its combinations. The results of this study showed that Giza 132 gave the highest values for most traits except 1000-grains wt. concerning nitrogen fertilizers, increasing its level from 0 to 45 Kg N / fed. led to significant increase in all studied traits. The results also showed that the combination of 45 Kg N / fed. (mineral) + 15 Kg N /fed. (compost) gave the highest values of agronomic and quality traits.

It could be concluded that cultivation of Giza 132 under 45 Kg N / fed. + 15 Kg N / fed. Compost is recommend.

INTRODUCTION

Barley (*Hordeum vulgare* L.) is considered one of the most cereal crops having widely adaptability. It is more tolerant to drought , saline, alkaline and poor soils than other cereals. There is no doubt that mineral fertilizers are essential in most cropping systems for maximum yields to be realized specially nitrogen, which greatly contributes to improve grain yield and quality.

Organic manure also has better effects on chemical, physical and biological characteristics of soil and plant growth. The importance of organic manure is to limit mineral N pollution effect due to dentrification products that affect ozone. Also, using it will reduce production costs.

Among organic manure sources, compost, which is the most economical factor to increase soil organic matter content and provide plants with macro and micro nutrients.

A wide variation among barley cultivars in grain yield and its components as well as quality was reported by many investigators,, (Ahmed *et al.* 1998a, El-Hag 2001, Khedr 2004, Shahen 2005 and Genidy 2009).

Increasing rates of nitrogen fertilizer increased plant height, spike length, number of tillers / m^2 , number of grains / spike (Farag 2003, Khedr 2004, Abdalla 2004, and El-Lattief 2008). Increasing nitrogen and/or compost rates significantly increased biological, grain and straw yields, where 45 kg N/fed. (min.) + 15 kg N/fed. (compost) outyielded other treatments (Abd El-Maksoud *et al.* 2002, Masti *et al.* 2003, Mondol *et al.* 2005, Mondol *et al.* 2006, Genaidy 2009 and Ofosu- Anim J. and M. Leitch 2009).

MATERIALS AND METHODS

a field experiments was conducted at Sakha Agricultural Research Station , Kafr-Elsheikh Governorate during two successive growing seasons 2007/2008 and 2008/2009 to study the effect of nitrogen and or compost rates on yield and its components as well as quality of the two barley cultivars ,,Giza 132 and Giza 2000.

A split –plot design with four replicates was used, the main plots were randomly assigned to cultivars Giza 132 and Giza 2000 and the sub plots to different nitrogen rates (mineral ,compost and their combination) as follows:

1. Control (without fertilizers)
2. 15 kg N/fed. mineral(min).
3. 30 kg N/fed. min.
4. 45 kg N/fed. min.
5. 15 kg N/fed. compost
6. 30 kg N/fed. compost
7. 45 kg N/fed. compost.
8. 15kgN/fed.min+15kg N/fed. compost
9. 15kgN/fed.min.+30kgN/fed. compost
10. 30kgN/fed.min.+15kgN/fed.compost
11. 45kgN/fed.min.+15kgN/fed.compost

Results of soil analysis according to Piper (1950) are presented in Table 1.

Table 1. Soil structure and chemical analysis of the experimental field in 2007/2008 and 2008/2009 seasons.

Determination	Season	
	2007/2008	2008/2009
Physical Analysis:		
Sand %	19.1	16.2
Silt %	33.9	35.2
Clay %	45.2	48.6
Texture	Clay	Clay
Chemical Analysis:		
pH	7.8	7.9
EC (ds/m)	3.2	2.9
Available N (ppm)	48.0	59.3
Available P (ppm)	15.2	13.3
Available K(ppm)	289.7	261.3
Organic matter %	1.81	1.89

The organic manure (compost) with the above rates was added before barley sowing and its chemical analysis is presented in Table 2.

Table 2 . Chemical analysis of compost in 2007 /2008 and 2008 / 2009 seasons.

Determination	Season	
	2007/2008	2008/2009
pH	7.9	7.6
E.C (ds/m)	3.71	4.02
N %	1.65	1.78
P %	1	1.10
K %	0.99	1.30
Fe (ppm)	3012	1215
Mn (ppm)	258	256
Zn (ppm)	200	231
Wt. of m^3	530	510

Mineral nitrogen was added in the form of ammonium nitrate (33.5) % at two equal doses , the first at sowing irrigation and the second was added one month after sowing (second irrigation). Phosphorus in the form of super phosphate (15.5%) was incorporated in the soil at the rate of 15 kg P_2O_5 / fed. Sowing was carried out on 17 th and 20 th December in the two seasons of 2007/ 2008 and 2008/ 2009, respectively. The preceding crop was soybean (*Glycin max*, L) in the first season and cotton (*Gossypium barbadence*, L) in the second one. The sub –plot area was 4.2 m^2 including 6 rows with 3.5 m long and 20 cm apart (3.5x 1.2m).Seeds were sown at the rate of 43 and 40 kg/fed . (200 grains /m^2) for Giza 2000 and Giza 132, respectively. Other cultural practices were done as recommended at barley growing.

Studied Criteria

A. Earliness characters

A.1. Heading date : Number of days from sowing to 50% spike emergence for all plants / plot.

A.2.Maturity date:Number of days from sowing to 50% yellow stage of maturity for all plants/plot.

B.Growth characters

B.1. Flag leaf area (dm^2) : determined by measuring the flg leaf area of the main tiller using Area meter L_1-cor Model L_1-3000A.

B.2.Plant height (cm) : Plants were taken at random from each sub plot to determine plant height. It is measured in cm from the soil surface to the top of the spike of the main tiller.

C. Yield and its attributes

C.1. Number of spikes/m^2: It was estimated by counting all spikes per square meter.

C.2. Spike length (cm): 10 main spikes selected at random and measured and their average was calculated to express mean spike length in cm.

C.3. Number of grains/spike:Average number of grains in ten randomly chosen spikes, was estimated.

At harvest time, the central area from each sub plot was harvested to determine the following :

C.4. 1000-grains weight (g): A random sample of 1000-grains were taken from each sub plot , hand counted and weighted to record the mean grain weight.

C.5. Biological yield (t / fed): Recorded from all plants / plot harvested and converted to ton/fed.

C.6. Grain yield(t / fed.): Recorded from the grains of harvested plants/plot after threshing and then converted to ton /fed.

C.7. Straw yield (t/fed.): Calculated as follow: Biological yield Kg/fed.- Grain yield Kg/fed, then it was converted to ton/fed.

C.8 Harvest index %: Calculated as ratio of grain yield to biological yield at harvest according to the following formula:

Harvest index = (grain yield / biological yield) X100.

D. Grain Quality:

Crude grain protien content .The crude grain protein content was determined according to A.O.A.C.1980.

Statistical analysis :Analysis of variance was carried out for split plot design according to Gomez and Gomez (1984). Treatment means were compared by Duncan's Multiple Range Test (Duncan , 1955).

RESULTS AND DISCUSSION

The obtained data of the studied characters of the two cultivars as influenced by nitrogen and / or compost rates are explained as follow :

A. Earliness characters

Table 3 presented the overall means of heading and maturity date as affected by nitrogen and / or compost rates and their interactions on two barley cultivars during 2007/2008 and 2008/2009 seasons.

Results in table 3 show insignificant differences existed between the two cultivars in both seasons for heading and maturity date.

Concerning nitrogen and / or compost rates, data showed highly significant effect on the two criteria in both seasons. In general, increasing nitrogen rates increased vegetative growth period and hence delayed heading date and maturity date .

B.Growth characters

The overall mean values of flag leaf area and plant height of the two barley cultivars as affected by nitrogen and / or compost rates and their interactions during the two studied seasons are presented in Table 4.

B.1. Flag leaf area (dm^2)

Results of flag leaf area in Table 4 showed insignificant differences existed between cultivars in both seasons. Concerning the effect of nitrogen and /or compost rates, data showed highly significant differences in both seasons, where at 45 kg N/fed. (min.) +15 kg N / fed. (compost) gave the highest values for this trait, while the lowest ones were recorded for control treatment (without fertilizer) in both seasons.

Table 3. Overall mean values of earliness characters (days) of two barley cultivars as affected by N and / or compost rates and their interactions in normal soil in 2007/2008 and 2008/2009 seasons.

Cultivar (A)	Heading date(day)	Maturity date(day)	Heading date(day)	Maturity date(day)
	2007/2008 season		2008/2009 season	
F- test	NS	NS	NS	NS
Giza 132	94.5	123.49	91.9	121.10
Giza 2000	95.5	126.79	93.6	123.50
Treatment (B)				
F- test	**	**	**	**
1. Control (without fertilizers)	87.2 f	117.33 f	86.4 f	116.00 e
2. 15 kg N/fed. min.	92.2 de	122.33 de	90.2 e	119.70 d
3. 30 kg N/fed. min.	94.5 cd	124.66 cd	91.5 de	121.00 cd
4. 45 kg N/fed. min.	96.8 bc	127.0 b	97.0 ab	126.50 a
5. 15 kg N/fed. compost	90.2 ef	120.33 ef	90.2 e	119.70 d
6. 30 kg N/fed. compost	93.7 c-e	123.83 cd	92.7 de	122.20 cd
7. 45 kg N/fed. compost.	99.7 ab	129.83 ab	96.0 bc	125.50 ab
8.15kgN/fed.min+15kg N/fed. compost	91.3 de	121.5 de	90.4 e	119.80 d
9.15kgN/fed.min.+30kgN/fed. compost	99.0 ab	129.16 ab	93.7 cd	123.20 bc
10.30kgN/fed.min.+15kgN/fed.compost	98.2 b	128.33 b	93.7 cd	123.20 bc
11.45kgN/fed.min.+15kgN/fed.compost	102.0 a	132.16 a	99.0 a	128.50 a
Interaction A x B	NS	NS	NS	NS
CV %	3.15	2.39	2.90	2.50

*,** and NS indicate P<0.05, P<0.01 and not significant, respectively. Means within the same column for each factor designated by the same letter are not significantly different at 5% level according to Duncan's Multiple Range Test.

Table 4 . Overall mean values of flag leaf area (dm2) and plant height (cm) of two barley cultivars as affected by N and / or compost and their interactions in normal soil in 2007/2008 and 2008/2009 seasons.

Variety(A)	Flag leaf area (dm^2)	Plant height (cm)	Flag leaf area(dm^2)	Plant height (cm)
	2007/2008 season		2008/2009 season	
F- test	NS	*	NS	NS
Giza 132	0.312	105 a	0.289	103.6
Giza 2000	0.288	98.6 b	0.278	97.3
Treatment (B)				
F- test	**	**	**	**
1. Control (without fertilizers)	0.186 g	80.55 h	0.159 f	71.8 f
2. 15 kg N/fed. min.	0.259 e	93.11 fg	0.240 e	93.7 de
3. 30 kg N/fed. min.	0.308 cd	98.27 ef	0.280 d	105.0 bc
4. 45 kg N/fed. min.	0.362 b	116.16 b	0.354 b	116.8 a
5. 15 kg N/fed. compost	0.225 f	88.83 g	0.226 e	91.0 e
6. 30 kg N/fed. compost	0.273 e	94.83 fg	0.252 e	94.8 de
7. 45 kg N/fed. compost.	0.302 d	104.7 c-e	0.295 cd	102.0 cd
8.15kgN/fed.min+15kg N/fed. compost	0.284 de	100.6 d-f	0.253 e	98.8 c-e
9.15kgN/fed.min.+30kgN/fed. compost	0.332 c	108.0 cd	0.320 c	101.5 cd
10.30kgN/fed.min.+15kgN/fed.compost	0.371 ab	109.8 bc	0.352b	111.7 ab
11.45kgN/fed.min.+15kgN/fed.compost	0.393 a	124.83 a	0.389 a	118.2 a
Interaction A x B	NS	NS	NS	NS
CV %	8.36	6.35	9.04	7.38

*,** and NS indicate P<0.05, P<0.01 and not significant respectively. Means within the same column for each factor designated by the same letter are not significantly different at 5% level according to Duncan's Multiple Range Test.

Nitrogen caused higher photosynthesis and induced assimilation rate, metabolic activity, and cell division, so application of compost, enables the crop to increase leaf area. These results are in harmony with those reported by Khalil and Ali (2004), Shahen (2005) and Genaidy (2009).

B.2. Plant height (cm)

Data in Table 4 showed significant differences in the first season and insignificant differences in the second one between the two cultivars for plant height, where Giza 132 was taller than Giza 2000. These results are in harmony with those reported by Mustafa (2002), Abdalla (2004) , Khedr (2004)and Shahen (2005). Concerning nitrogen and /or compost rates, results revealed highly significant effect, in general, 45 kg N/fed. (min)+ 15Kg N /fed (compost) gave the tallest plants. These results may be due to the fact that N is the main constituent of protoplasmic protein which is required for stems and leaves and enhanced cell division and elongation that affected plant height. Also, the favorable effect of compost on the availability of nutrients in soil and thereby increased plant height. These results agree with those of Patil *et al.* (2008) Al-shallash (2008)and Genaidy (2009).

C. Yield and its attributes

Table 5 presented the overall mean values of number of spikes / m^2 and spike length (cm) of the two barley cultivars as affected by nitrogen and / or compost rates and their interactions during the two studied seasons .

C.1. Number of spikes/m^2:

In the first season, results showed significant differences between the two cultivars. The same trend was obtained in the second season with insignificant differences between them These results are in harmony with those reported by Mustafa (2002), Abdalla (2004) , Khedr (2004) and Shahen (2005). Concerning the effect of nitrogen and / or compost rates, results showed highly significant differences existed among them in both seasons, where 45 kg N/fed. (min). + 15kg N /fed. compost, 45 kg N/fed.min and 30 kg N/fed. (min.) + 15kg N /fed. (compost) gave the highest values for this trait.

This may be due to the favorable effect of compost on the availability of nutrients in the soil, which is associated with nitrogen that increases vegetative growth and encourage spike formation and cell division and hence increases number of spikes. These results are in harmony with those obtained by Farag (2003), Abdalla (2004), Khedr (2004) ,El-Lattief (2008) and Genaidy (2009).

C.2. Spike length (cm)

Results in Table 5 indicated significant differences in the first season and insignificant differences in the second season between the two barley cultivars, in

general Giza 132 gave longer spike than Giza 2000. These results are in accordance with those reported by El- Hag (2001), Mustafa (2002),Abdalla (2004), Khedr (2004) and Shahen (2005).

Table 5 . Overall mean values of number of spikes/m2 and spike length (cm) as affected by N and compost rates and their interactions in normal soil in 2007/2008 and 2008/2009 seasons.

Cultivar (A)	No spikes/m^2	Spike length (cm)	No spikes/m^2	Spike length (cm)
	2007/2008		2008/2009	
F- test	*	*	NS	NS
Giza 132	163.80 a	9.30 a	145.20	6.66
Giza 2000	141.50 b	5.70 b	137.90	6.30
Treatment (B)				
F- test	**	**	**	**
1. Control (without fertilizers)	108.0 e	5.56 g	96.0 e	4.50 e
2. 15 kg N/fed. min.	131.3 d	7.0 f	121.0 d	5.78 d
3. 30 kg N/fed. min.	155.3 bc	8.34 e	145.3 bc	6.28 cd
4. 45 kg N/fed. min.	178.0 a	9.71 b	175.0 a	7.61 b
5. 15 kg N/fed. compost	122.7 d	7.33 f	123.0 d	5.78 d
6. 30 kg N/fed. compost	145.0 c	7.95 e	126.7 d	6.22 cd
7. 45 kg N/fed. compost.	158.0 bc	8.95 cd	134.3 cd	6.61 c
8.15kgN/fed.min+15kg N/fed. compost	150.7 c	8.44 de	143.0 bc	6.61 c
9.15kgN/fed.min.+30kgN/fed. compost	169.0 ab	9.16 c	149.3 b	6.50 c
10.30kgN/fed.min.+15kgN/fed.compost	177.7 a	9.84 b	167.7 a	7.33 b
11.45kgN/fed.min.+15kgN/fed.compost	183.0 a	10.50 a	176.0 a	8.50 a
Interaction A x B	NS	NS	NS	NS
CV %	9.71	6.60	10.02	9.90

*,** and NS indicate $P<0.05$, $P<0.01$ and not significant, respectively. Means within the same column for each factor designated by the same letter are not significantly different at 5% level according to Duncan's Multiple Range Test.

Regarding the effect of nitrogen and / or compost rates, results showed highly significant differences among them in both seasons. In general 45 kg N/fed. (min.)+15 kg N /fed. (compost) gave the longest spikes (10.50 and 8.50 cm) in both seasons ,while the control treatments gave the shortest spikes (5.56 and 4.50cm) and ranked last in both seasons. The increase in spike length with increasing nitrogen may be attributed to the role of nitrogen in promots the vegetative growth and meristimic activity during growth. Also applying compost gives favorable effect on availability of nutrients in soil and that also promotes the vegetative growth and increases spike length. Such findings agree with those of Farag (2003), Khalil and Ali (2004), Abdalla (2004), Khedr (2004), Shahen (2005), El-Lattief (2008) and Genaidy (2009).

C.3. Number of grains/spike

Results in Table 6 showed the overall mean values of number of grains/spike of the two barley cultivars as affected by nitrogen and / or compost rates and their interactions.

Results showed significant differences existed between the two cultivars for this trait in the first season, and highly significant in the second, where Giza 132 gave the highest number of grains/spike. Result also showed highly significant differences among nitrogen and / or compost rates treatments for this criterion in both seasons.

Table 6 . Overall mean values of number of grains/spike and 1000- grains wt (g). as affected by N and compost rates and their interactions in normal soil in 2007/2008 and 2008/2009 seasons.

Cultivar (A)	No grains /spike	1000grains wt. (g)	No grains /spike	1000 grains wt. (g)
	2007/2008 season		2008/2009 season	
F- test	*	*	**	*
Giza 132	64.0 a	48.16 b	52.3 a	42.50 b
Giza 2000	51.7 b	53.59 a	48.3 b	46.18 a
Treatment (B)				
F- test	**	**	**	**
1. Control (without fertilizers)	41.76 f	45.24 d	44.7 f	39.79 f
2. 15 kg N/fed. min.	48.33 e	49.98 bc	48.7 c-e	44.23 cd
3. 30 kg N/fed. min.	56.66 bc	52.68 a	52.0 be	47.82 a
4. 45 kg N/fed. min.	66.33 a	51.59 a-c	56.4 a	46.18 a-c
5. 15 kg N/fed. compost	51.63 de	49.84 bc	46.4 ef	42.67 de
6. 30 kg N/fed. compost	55.13 b-d	52.50 ab	48.5 c-e	45.16 bc
7. 45 kg N/fed. compost.	59.66 b	53.96 a	51.6 bc	46.92 ab
8.15kgN/fed.min+15kg N/fed. compost	54.26 cd	49.74 c	47.6d ef	40.64 ef
9.15kgN/fed.min.+30kgN/fed. compost	67.0 a	52.48.ab	50.7 cd	46.58 a-c
10.30kgN/fed.min.+15kgN/fed.compost	67.16 a	51.76 a-c	51.6 bc	45.52 a-c
11.45kgN/fed.min.+15kgN/fed.compost	68.38 a	49.85 bc	54.6 ab	42.23 de
Interaction A x B	NS	*	NS	NS
CV %	7.27	5.79	6.22	4.82

*,** and NS indicate P<0.05, P<0.01 and not significant, respectively. Means within the same column for each factor designated by the same letter are not significantly different at 5% level according to Duncan's Multiple Range Test

In the first season 45 kg N/fed.(min) + 15 kg N / fed. (compost), 30 kgN/fed.(min) + 15 kg N / fed. (compost), 15 kg N/fed.(min) + 30 kg N / fed. (compost) and 45 kg/fed. (min.) gave the highest number for this criterion, while the in the second season, 45 kg N/fed.(min) gave the highest No grains / spike. It is clear that nitrogen promote growth and raised sink capacity and size which induce more grains/spike.

C.4. 1000-grains wt.(g)

Data of 1000-grains wt. in Table 6 showed that Giza 2000 gave heavier grains than Giza 132. Regarding the effect of nitrogen and / or compost rates on this trait, results showed highly significant differences existed among them in both season, where 30 kg N/fed. min. and 45 kg N / fed. compost gave the heaviest grains in both seasons, while control treatment(without fertilizer) gave the lightest ones in both seasons. This means that increasing nitrogen up to 30 kg N/fed. (min) or adding 45 kg N/ fed.(compost) increased significantly, 1000-grains wt. and that could be attributed to the role of N for increasing the synthesis of proteins formation and it's transferring to cell wall that manifested in enhancing the meristimic activities and thereby grain size.

The interaction between the two cultivars and nitrogen and / or compost rates had significant effect in the first season. Data in Table 7 showed that the heaviest grains were obtained at 30 kg N/fed. (min.),30 kg N/fed (compost),45 kg N/fed

(compost) and 15 kg N/fed (min.) +30 kg N/fed (compost) for Giza 2000 and at 45 Kg N / fed (compost) for Giza 132.

Table 7. Overall mean values of 1000-grains wt.(g) as affected by the interaction between cultivars and N and / or compost in 2007/2008 season.

Treatment	Cultivar	
	Giza 132	Giza 2000
	2007/2008 season	
1. Control (without fertilizers)	41.38 h	49.09d-g
2. 15 kg N/fed. min.	46.37 g	53.60 a-c
3. 30 kg N/fed. min.	48.85 e-g	56.52 a
4. 45 kg N/fed. min.	48.77 e-g	54.42 a-c
5. 15 kg N/fed. compost	47.6 fg	52.01 c-e
6. 30 kg N/fed. compost	48.66 fg	56.33 a
7. 45 kg N/fed. compost.	51.95 c-e	55.96 a
8.15kgN/fed.min+15kg N/fed. compost	49.46 d-g	50.02 df
9.15kgN/fed.min.+30kgN/fed. compost	49.53 d-g	55.41 ab
10.30kgN/fed.min.+15kgN/fed.compost	49.75 d-f	53.77 a-c
11.45kgN/fed.min.+15kgN/fed.compost	47.35 fg	52.33 b-d

Means designated by the same letter are not significantly different at 5% level according to Duncan's Multiple Range Test.

C.5 Biological yield (t / fed.)

Biological yield data of two barley cultivars as affected by nitrogen and / or compost rates and their interactions in 2007/2008 and 2008/2009 seasons are presented in Table 8.

Results showed insignificant differences existed between the two cultivars in the first season 2007/2008, while in the second one, Giza 132 highly significant out-yielded Giza 2000. The increases in biological yield may be attributed to the increases in plant height, yield components viz. No spikes / m^2 and No grains/spike and other characteristics of each cultivar. 45 kg N/fed. (min) + 15 kgN /fed. (compost) significantly outyielded other treatments. These results are in accordance with those reported by Khalil and Ali (2004), Abd El-Hady *et al.* (2006) , Patil *et al.* (2008), El-Lattief (2008), Genaidy (2009). and Ofosu- Anin and Leitch (2009).

C.6. Grain yield (t/ fed.)

Results of grain yield in Table 8 showed significant differences between the two cultivars, where Giza 132 outyielded Giza 2000. 45 kgN/fed.(min)+15kg N / fed. (compost) gave the highest values for this trait and ranked first. These results are in harmony with those reported by El-Koumy (1998), Khalil and Ali (2004), Mondol *et al.* (2005), Abd El-Hady *et al.* (2006), Mondol *et al.* (2006), El-Lattief (2008), Genaidy (2009) and Ofosu –Anim and Leitch (2009).

Table 8 . Overall mean values of biological yield (t / fed.) and grain yield (t / fed.) of two barley cultivars as affected by N and / or compost and their interaction in 2007/2008 and 2008/2009 seasons.

Cultivar (A)	Biological yield t/fed	Grain yield t/ fed.	Biological yield t/fed	Grain yield t/fed.
	2007/2008 season		2008/2009 season	
F- test	NS	*	**	**
Giza 132	3.73	1.23 a	3.15 a	1.18 a
Giza 2000	3.12	0.96 b	2.83 b	1.00 b
Treatment (B)				
F- test	**	**	**	**
1. Control (without fertilizers)	1.60 g	0.40 g	1.42 g	0.35 g
2. 15 kg N/fed. min.	2.00 f	0.57 f	2.17 f	0.71 f
3. 30 kg N/fed. min.	2.98 e	0.96 e	3.10 d	1.07 d
4. 45 kg N/fed. min.	4.79 b	1.72 b	4.10 ab	1.67 ab
5. 15 kg N/fed. compost	2.27 f	0.59 f	2.18 f	0.68 f
6. 30 kg N/fed. compost	3.06 e	0.84 e	2.66 e	0.91e
7. 45 kg N/fed. compost.	3.78 d	1.18 d	2.87 de	0.92 e
8.15kgN/fed.min+15kg N/fed. compost	3.18 e	0.96 e	3.03 d	1.08 d
9.15kgN/fed.min.+30kgN/fed. compost	4.21 c	1.39 c	3.28 e	1.27 c
10.30kgN/fed.min.+15kgN/fed.compost	4.63 b	1.62 b	3.91 b	1.57 b
11.45kgN/fed.min.+15kgN/fed.compost	5.18 a	1.86 a	4.23 a	1.73 a
Interaction A x B	NS	NS	NS	NS
CV %	11.50	13.37	7.91	9.80

*,** and NS indicate P<0.05, P<0.01 and not significant, respectively. Means within the same column for each factor designated by the same letter are not significantly different at 5% level according to Duncan's Multiple Range Test.

C. 6 Straw yield (t / fed.)

The overall mean values of straw yield as affected by nitrogen and / or compost rates are presented in Table 9.

In the two seasons insignificant differences existed between the two cultivars, where Giza 132 outyielded Giza 2000 with insignificant differences between them.

Concerning the effect of nitrogen and /or compost rates, results showed that 45kg N/fed.(min) + 15 kg N (compost) in the first season ranked first, while, in the second one 45 kg N/fed.(min) +15 kgN / fed. (compost), 30 kg N/fed.(min) +15 kg N / fed. (compost) and 45 kg N/fed.(min) gave the highest values and ranked first.

C. 8.Harvest index (%)

Table 9 presents the overall mean values of harvest index as affected by nitrogen and / or compost rates on two barley cultivars.

Significant differences were recorder between the two cultivar for this trait in both seasons, where Giza 132 gave higher harvest index percentage (31.54, 36.49%) than Giza 2000 (29.56 and 33.54%) in both seasons . These results are in agreement with those obtained by El-Hag (2001), Abdalla (2004), Khedr (2004) and Shahen (2005).

Table 9. Overall mean values of straw yield (t / fed.) and harvest index (%) of two barley cultivars as affected by N and / or compost and their interactions in 2007/2008 and 2008/2009 seasons.

Cultivar (A)	Straw yield (t/fed.)	Harvest index %	Straw yield (t/fed.)	Harvest index%
	2007/2008 season		2008/2009 season	
F- test	NS	*	NS	**
Giza 132	2.51	31.54 a	1.96	36.49 a
Giza 2000	2.18	30.50 b	1.83	33.54 b
Treatment (B)				
F- test	**	**	**	**
1. Control (without fertilizers)	1.20 g	25.22 f	1.06 e	24.53 d
2. 15 kg N/fed. min.	1.51 f	27.51e	1.46 d	32.40 c
3. 30 kg N/fed. min.	2.04 e	31.92 cd	1.93 b	35.81 b
4. 45 kg N/fed. min.	3.11 b	34.92 ab	2.47 a	40.25 a
5. 15 kg N/fed. compost	1.68 f	25.98 ef	1.48 d	31.37 c
6. 30 kg N/fed. compost	2.21 e	27.42 e	1.75 c	34.15 bc
7. 45 kg N/fed. compost.	2.61 d	31.04 cd	1.95 b	31.77 c
8.15kgN/fed.min+15kg N/fed. compost	2.22 e	29.84 d	1.94 b	35.40 b
9.15kgN/fed.min.+30kgN/fed. compost	2.82 c	32.75 bc	2.01 b	38.63 a
10.30kgN/fed.min.+15kgN/fed.compost	3.01 bc	34.92 ab	2.34 a	40.05 a
11.45kgN/fed.min.+15kgN/fed.compost	3.32 a	35.91 a	2.50 a	40.87 a
Interaction A x B	NS	*	NS	*
CV %	11.45	6.50	8.78	7.80

*,** and NS indicate P<0.05, P<0.01 and not significant, respectively. Means within the same column for each factor designated by the same letter are not significantly different at 5% level according to Duncan's Multiple Range Test.

Concerning N and / or compost rates, results showed highly significant differences existed among them in both seasons. In the first season, 45 kgN/fed (min)+15 kgN/ fed.(compost), gave the highest harvest index and ranked first, while in the second one, 45 kg N/fed.(min) + 15 kg N/fed. (compost), 45 kg N/fed.(min), 30 kg N/fed.(min) + 15 kg N/fed. (compost) and 15 kg N/fed.(min) +30 kg N/fed. (compost) gave the highest harvest index with insignificant differences among them. On the other hand, the control treatment (without fertilizer) gave the lowest percentage for this trait. Such results revealed that we can reduce the amount of mineral N by replacing partial amount with compost (organic fertilizer). These results are in harmony with those obtained by Khedr (2004), Shahen (2005) and Genaidy (2009).

The interaction between the two cultivars and nitrogen and / or compost rats were significant in 2007/2008 and 2008/2009 seasons. Data in Table 11 show that the highest percentage was obtained at 45 kg N/fed.(min) + 15KgN / fed. (compost) for Giza 132. On the other hand Giza 2000 recorded the highest percentage either at 45 kg N/fed.(min) + 15 Kg N/fed. (compost) or 30 kg N/fed.(min) + 30 kg N/ fed.(compost) with insignificant differences between them.

Table 10. Overall mean values of harvest index (%) as affected by the interaction between cultivars and N and / or compost in 2007/2008 and 2008 / 2009 seasons.

Treatment	cultivar			
	Giza 132	Giza 2000	Giza 132	Giza2000
	2007/2008 season		2008/2009 season	
1. Control (without fertilizers)	22.96 j	24.94 ij	28.05 i	21.0 j
2. 15 kg N/fed. min.	30.12 fg	24.90 ij	33.69 fg	31.11 g-i
3. 30 kg N/fed. min.	33.76 b-e	30.07 fg	37.63 b-e	33.98 fg
4. 45 kg N/fed. min.	36.09 ab	33.75 b-e	41.45 a	39.04 a-c
5. 15 kg N/fed. compost	27.16 hi	24.80 ij	34.30 e-g	28.43 i
6. 30 kg N/fed. compost	29.19 gh	25.65 ij	36.10 d-f	32.2 gh
7. 45 kg N/fed. compost.	31.05 e-g	31.03 eg	33.96 fg	29.58 hi
8.15kgN/fed.min+15kg N/fed. compost	31.09 e-g	28.58 gh	36.92 c-f	33.88 fg
9.15kgN/fed.min.+30kgN/fed. compost	33.22 c-e	32.27 d-f	38.14 a-d	39.11 a-d
10.30kgN/fed.min.+15kgN/fed.compost	35.42 a-c	34.41 a-d	40.16 a-c	39.93 a-c
11.45kgN/fed.min.+15kgN/fed.compost	36.84 a	34.79 a-d	41.02 ab	40.72 ab

Means designated by the same letter with each column at each season are not significantly different at 5% level according to Duncan's Multiple Range Test.

D. Grain Quality

Crude grain protein content (%)

Table 11 present the overall mean values of grain protein % as affected by nitrogen and/or compost rate and their interactions of the two barley cultivars during 2007/ 2008 and 2008 / 2009 seasons.

Data showed significant effect existed between the two cultivars for this trait where Giza 132 gave higher protein percentage (8.95 and 8.50%) than Giza 2000 (8.65 and 8.14 %) for the two seasons, respectively. These results are in accordance with those obtained by El-Hag(2001), Abdalla (2004), Khedr (2004) and Shahen (2005).

Regarding the effect of nitrogen and/or compost rates, results showed that in the first season 45 kg N/fed. (min.)+ 15 kg N/fed. (compost) gave the highest values and ranked first (10.65%), while in the second one 45 kg N/fed. (min.) + 15 kg N/fed. (compost) , 45 kg N/fed. (min.) and 30 kg N /fed. (min.)+ 15kg N/fed.(compost) gave the highest values (9.97, 9.93 and 9.71%) for the three treatments, respectively.

These results agree with those reported by Abd El-Maksoud *et al.* (2002), Khalil and Ali (2004), Abd El-Hady et al. (2006)and Patil et al. (2008).

CONCLUSION

From these results it could be recommended that using of 45 kg N/fed. (min.) + 15 kg N/fed. (compost) with cultivar Giza 132 was the best treatment to obtain high yield and its components , good quality of seeds , decreasing the environmental pollution and fertilizer costs and save fertility of soil for long time.

Table 11. Overall mean values of crude grain protein (%) of two barley cultivars as affected by N and / or compost and their interactions in 2007/2008 and 2008/2009 seasons.

Cultivar (A)	Protein % 2007/2008 season	Protein % 2008/2009 season
F- test	*	*
Giza 132	8.95 a	8.50 a
Giza 2000	8.65 b	8.14 b
F- test	**	**
Treatments (B)		
1. Control (without fertilizers)	7.02 i	6.66 e
2. 15 kg N/fed. min.	7.70 g	7.24 e
3. 30 kg N/fed. min.	8.67 e	8.22 c
4. 45 kg N/fed. min.	10.40 b	9.93 a
5. 15 kg N/fed. compost	7.48 h	7.00 e
6. 30 kg N/fed. compost	7.85 g	7.31 de
7. 45 kg N/fed. compost.	8.32 f	7.96 cd
8.15kgN/fed.min+15kg N/fed. compost	8.98 d	8.58 bc
9.15kgN/fed.min.+30kgN/fed. compost	9.46 c	8.95 b
10.30kgN/fed.min.+15kgN/fed.compost	10.32 b	9.71 a
11.45kgN/fed.min.+15kgN/fed.compost	10.65 a	9.97 a
Interaction A x B	NS	NS
CV %	2.98	3.19

*,** and NS indicate P<0.05, P<0.01 and not significant, respectively.

Means within the same column for each factor designated by the same letter are not significantly different at 5% level according to Duncan's Multiple Range Test.

REFERENCES

1. AbdAlla M. Maha. 2004. Influnce of nitrogen level and its application time on yield and quality of some new Hull-les barley. J. Agric. Sci. Mansoura univ. , 29 (5) 2201- 2216.
2. Abd El-Hady, M.A,, M.S. El-Habbal,, Nemat A. Noureldin and M.F. Hamed (2006).Response of Wheat Productivity and quality to bio-organic and inorganic fertilizers. Annals Agric. Sci,, Ainshams J. Agric. Res. Vol. 2 No. 29 : 435- 449.
3. Abd El- Maksoud, H.,,M.Azzazy and R. Abd El-AZIZ. 2002. Solid waste to compost and its manural effect on wheat growth Egypt. J. Soil. Sci. 42(2):267-275.
4. Ahmed, I. A ,, A.S. El-Gamal,, R.A. Abo-El-Enin,, A.A. El-Sayed,, A.A. El-Hag,, A.M.O. El-Bawab,, A.M. El-Sherbin,, M.A. El-Moselhy,, F.A. Asaad,, M.A. Megahed,, K.A. Moustafa,, M.M. Abd El Hamed,,M.M. Mahrous,, M.M. Noaman and R.A. Rizk. 1998a. Giza 123, A new barley variety for the newly reclaimed areas in Egypt, Egypt. J. Appl.Sci.13 (3) : 83-92.
5. A.O.A.C. 1980. Association of Official Agricultural Chemists. Official method of analysis, 13th Ed. A.O.A.C. Washington D.C.
6. Duncan, D. B. 1955. Multiple Range and Multiple f Test. Biometrics, 11: 1-24.

7. El-Lattief, E.A.A. 2008. Increasing bread wheat (Triticum aestivum,L.) productivity and profitability in the newly reclaimed lands through the integrated use of mineral,organic and biofertilizer.Alexandria-Journal-of-Agricltural-Research,53(1),, 47-54 .
8. Farag, A. M. H . 2003. Response of wheat plants to some treatments of soil leveling and fertilization wheat with both nitrogen and biological fertilizers. Ph.D. Thesis Fac. Agric. Mansoura Univ., Egypt.
9. Genaidy, M .S.A. 2009. Comparative study on organic and mineral fertilization for wheat crop in Northern Delta soils M.Sc.thesis,fac.Agric. kafr El –Sheikh univ., Egypt.
10. Gomez, K. A. and A. A. Gomez. 1984. Statistical Procedures for Agricultural Research. John Wiley and Sons, Inc., New York.
11. Khedr, Rania .A .A . 2004. Studied of some cultural practices on barley. M .Sc . thesis , Fac .Agric .Kafr El –Sheikh ,Tanta univ .,Egypt .
12. Khalil F. A. ,,and S.A. Aly. 2004 . Effect of organic fertilizers as substitutions of mineral nitrogen fertilizer applied at planting on Yield and quality of wheat Minufiya J.Agric.Res.vol.2 No.29,,435-44.
13. Masti, T. ,, A. S. Lithourgidis and A. A. Gagianas. 2003. Effect of injected liquid cattle manure on growth and yield of winter wheat and soil characteristics. Agron. J. 95 :592-596.
14. Mondol ,A.T.M.A.I,, A.R.M.Solaiman,, M.S.Islam,M.S.,,A.J.M.S. Karim and M.J.Rahman. 2005. Effect of nitrogen and compost on wheat productivity in the grey terrace soils. International Journal- of Sustainable-Agricultural-Technology 1(4):40-45.
15. Mondol,A.T.M.A.I,, R.A Begum ,,M.J.U. Sarker,, M.S. Haider and M.M. Rahman, 2006. Effect of phosphorus and compost on wheat productivity in the grey terrace soils. International Journal- of Sustainable-Agricultural-Technology-2(2):94-99.
16. Mustafa, K.H. 2002. Dialil cross analysis of some quantitive traits in barley. Zagazig J. Agric., Res. 29 (4) :1069-1079
17. Ofosu- Anim J. and M. Leitch. 2009. relative efficacy of organic manures in spring barley (Hordeum vulgare L) production. Australian J. of Crop Science.3 (1):13-19.
18. Piper, C. S. 1950 . Soil and Plant Analysis. Interscince Publisher. Inc. New york., USA.
19. Shahen, Alaa, M.A. 2005. Effect of some agricultural treatments on barley yield and its technological characters. M.SC. Thesis , Faculty of Agric., Kafr El-Sheiekh. Tanta Univ., Egypt.
20. Singh, R. 2003. Productivity and economics of wheat as influenced by variety and nutrient management in Western Rajasthan.Current-Agriculture. 2003,27 (1/2):89-91.
21. Patil, K. D,, D.S. Waggdhare,, A. R. Ranjun, and P. C.Bhosale. 2008. Yield and quality of wheat grains as influenced by conjoint use of manures and fertilizers in vertisol. Asian – Journal –of – soil Science , 3 (1) :130-132.

استجابة صنفين من الشعير للتسميد النيتروجيني المعدني و العضوي

عبد الحميد محمد عمر[١] ، خيرى عبد العزيز عامر[٢] ، رانيا انور خضر[٢]

١. *قسم المحاصيل – كلية الزراعة – جامعة كفر الشيخ*

٢. *قسم بحوث الشعير– معهد بحوث المحاصيل الحقلية*

أقيمت تجربة حقلية في محطة البحوث الزراعية بسخا- كفرا لشيخ خلال موسمي ٢٠٠٧/٢٠٠٨، ٢٠٠٨/٢٠٠٩. وذلك بهدف دراسة تأثير التسميد بالنيتروجين المعدني و العضوي علي صفات النمو والمحصول و الجودة لصنفين من الشعير (جيزة ١٣٢و جيزة ٢٠٠٠) و كانت المعاملات ((٠، ١٥، ٣٠، ٤٥ كجم ن/ فدان) (نيتروجين معدني))و ((١٥ ،٣٠، ٤٥ كجم ن/ فدان) (كمبوست)) و التفاعلات المختلفة بينهم. أظهرت النتائج تفوق الصنف جيزة ١٣٢ علي الصنف جيزة ٢٠٠٠ في معظم الصفات تحت الدراسة فيما عدا صفة وزن الـــ ١٠٠٠ حبة. وجد أيضا أن زيادة التسميد النيتروجيني من صفر إلي ٤٥ كجم ن /فدان أدي إلي زيادة معنوية في كل الصفات تحت الدراسة.

كما أوضحت النتائج أيضا أن المعاملة ٤٥ كجم ن / فدان (معدني) + ١٥ كجم ن / فدان (كمبوست) أعطت أعلي القيم للمحصول ومكوناته و كذلك جودة الحبوب.

وبالتالي يمكن أن نوصي بزراعة الصنف جيزة ١٣٢ مع استخدام المعاملة ٤٥ كجم ن / فدان (معدني) + ١٥ كجم ن / فدان (كمبوست)