Minufiya J. Agric. Res. *Vol.39 No. 4(1): 1343-1357 (2014)* "http://www.mujar.net"

RESPONSE OF SOME WHEAT GENOTYPES TO NITROGEN APPLICATION AND BIOFERTILIZER IN TWO DIFFERENT LOCATIONS

Soheir M.H. Abd- Allah[1] and Hanaa M. Abou Zaid[2]

[1] Wheat Research Department, Field Crop Research Institute, A.R.C., Egypt.

[2] Crop Science Department, Faculty of Agricultural. Damanhur University, Egypt.

(Received: Mar. 25, 2014)

ABSTRACT: *Four field experiments were carried out during the two successive growing seasons (2011/ 2012 and 2012/ 2013) at Etay El-Baroud Farm, El-Beheira Governorate and EL-Hammam Farm, Marsa Matrouh Governorate, to study the effect of Nitrogen fertilization treatments on some growth, yield and yield components of fifteen bread wheat genotypes. The study included four nitrogen fertilization treatments (75 kgN/ fed, 45 kgN/ fed + Microbein, 40 kgN/ fed and Microbein).*

The obtained results could be summarized as follow:

1- *The highest nitrogen level (75 kg N/ fed) significantly increased all studied characters for the fifteen bread wheat genotypes, however inoculation by Microbein only decreased all characters values in the two seasons at both locations.*
2- *The results showed that sids 12 cultivar often the earliest heading and maturity in the two seasons in both locations. Generally, Misr 2 cultivar had the tallest plants, however, Gemmeiza 11, had the tallest spikes in the two locations. Misr 1 and Giza 168 cultivars produced the highest grain yield at Etay-Baroud in the first and second seasons, respectively, and Gemmeiza 9 in the two seasons, while sids 13 gave the highest grain yield at EL-Hammam in the two seasons. Sakha 94 had the highest number of kernels/ spike in the two seasons at both locations, sids 13 cultivar had the heaviest grains at EL-Hammam and Gemmeiza 9 at Etay EL-Baroud, while line 2 produced the highest number of spikes/ m^2 in the two seasons at Etay EL-Baroud and Giza 168 at EL-Hammam. The highest harvest index values resulted from Gemmeiza 9 and Giza 168 at Etay EL-Baroud in the two successive seasons and Sakha 94 at EL-Hammam in the two seasons.*
3- *Concerning the interaction effects, Line 1 was the earliest heading at any of fertilizer treatments except 75 kg N/ fed equaled with sids 12 treated with 40 kgN/ fed or biofertilizer only in the first season at Etay EL-Baroud, however in the second season at EL-Hammam, all the studied genotypes inoculated with Microbein only were the earliest heading except Gemmeiza 11 and Sakha 94 cultivars. The tallest plants resulted from Misr 2 fertilized with 75 kg N/ fed in the two seasons at Etay EL-Baroud. The highest harvest index realized from Misr 1 and Sakha 94 fertilized with 75 kg N/ fed in the two seasons at EL-Hammam. Generally, the lowest grain yield resulted from inculated seeds by Microbein. Giza 168 cultivar fertilized with 75 kg N/ fed produced the highest number of kernels/ spike in the second season at Etay EL-Baroud and EL-Hammam in the two seasons, beside Sakha 94 in the two seasons at EL-Hammam.*

Key word: *Genotypes, Nitrogen fertilizer, Biofertilizer, Yield components and earliness.*

INTRODUCTION

Increasing wheat productivity is a national target, so Egyptian Ministry of Agriculture is trying to close the gap between wheat consumption and production. Increasing wheat yield per unit area can be achieved by breeding high yielding varieties and application of recommended cultural practices. Wheat cultivars differed in growth characters and yield and its components (Abdel-Ati and Zaki, 2006). Therefore, cultural practices should be customized for each cultivar.

Nitrogen is a major factor for determining crop productivity. Zakir *et al.* (2010) reported that increasing fertilizer level up to 90 kg N/

fed., significantly increased grain yield and straw yield, yield components (number of spikes/ m^2, number of kernels/ spike, 1000-kernel weight and number of spilekelets / spike), plant height, spike length and harvest index. Compared with lower fertilizer levels. Some farmers tend to apply more Nitrogen fertilizer than the recommended. This lead from the soil via leaching and nitrification-identification. Abedi *et al.* (2011) indicated that the highest value for grain, yield was obtained at 240 kgN/ ha when it was applied the through vegetative growth stages. Number of spikes/ m^2, number of grains/ spike and 1000- grain weight were significantly increased with no significant difference between 240 and 360 kg N/ ha. Environmental pollution especially by increasing chemical fertilizations is one of the most effective in the destruction of the biosphere components of soil.

In recent years, biofertilizers are good source of nutrients and increase organic matter in the soil. They may not only be active in N_2-fixation, but also in growth, yield increase as well as production of the growth regulators such as auxin, cytokinins, gibberellins, ….. etc., that increase the grain yield (EL-Kased *et al.,* 1996 and EL-Kalla *et al.*, 2002). With regard to the integrated approach of nutrient supply through chemical fertilizers and biofertilizers, that approach not only reduces the use of inorganic fertilizers but also is an environment friendly approach. Biofertilizer technology is practiced for increasing agricultural production, reduce the amount of chemical fertilizers and decrease the environmental pollution through seed inoculation by different types of bacteria (Abd EL-Ghany, 1994 and Metin *et al.,* 2010).

This work aimed to study the effect of different rates of nitrogen fertilization and biofertilizer application on the productivity of some local wheat genotypes in old and newly-reclaimed lands.

MATERIALS AND METHODS

These present investigation was carried out at two different locations, i.e., the experimental farm of Etay EL-Baroud Agriculture Research Station, A.R.C., EL-Beheira Governorate and the Experimental Farm of Alexandria University at EL-Hammam Region, West Alexandria City, Marsa Matrouh Governorate, North Western Coast of Egypt during the two successive growing seasons 2011/ 2012 and 2012/ 2013 to study the effect of nitrogen fertilization treatments on yield and yield components of fifteen bread wheat genotypes, ten cultivars, i.e., Misr 1, Misr 2, Sids 12, Gemmeiza 9, Gemmeiza 10, Gemmeiza 11, Sakha 94, Giza 168, Sids 13 and Shandawill 1 and five promising lines, i.e., L1, L2, L3, L4 and L5 obtained from wheat Research Department. Soil samples of the two locations were randomly taken from the experimental areas before sowing. Mechanical and chemical analyses of the experimental soils are presented in Table (1).

Sowing dates at Etay EL-Baroud were 25 and 21 November in the first and second seasons, respectively, and 18 and 23 November in the first and second seasons, respectively, at EL-Hammam. Seeding rates were 50 kg/ fad in the two locations and the plot size was 3.6 m2 (6 rows × 0.2 m length).

The biofertilizer used in these studies was Microbein as (*Psedomonnas* sp., *Azotobacter* sp., *Azopirillum* sp. and *B. megaterium*) at the rate of 500 gm/ fad. It is prepared by soil Microbiology Dept., Soil and Water Institute, Agricultural Research Center. Arabic gum was melted in warm water and was added to the biofertilizer. Wheat seeds were added to the mixture of biofertilizer and gum and carefully mixed then spread over plastic sheet far from the direct sun light for a short time before sowing. Four nitrogen treatments levels (75 kg N/ fad, 40 kg N + Microbein, 40 kgN/ fed and Microbein) were applied. Ammonium nitrate (33.5% N) was the source of inorganic nitrogen and was applied in two equal doses before the first and second irrigations.

Table 1

The previous mentioned treatments were arranged in split-plot design in three replications at both locations, the main plots were occupied with the four nitrogen treatments and the genotypes in the sub plots. The following measurements were recorded from each sub plot of the three replicates in the two locations: days to heading, days to physiological maturity, plant height (cm), number of spikes/ m^2, number of kernels/ spike, spike length (cm), 1000-kernel weight (g), grain yield (ton/ fed) and harvest index (%).

The experimental results were statistically analyzed according to Gomez and Gomez (1984). Treatments means were compared using L.S.D. test. Generally, experimental error for each trait in the two seasons were heterogenous, so the combined analysis over seasons did not carry out.

RESULTS AND DISCUSSION

Results presented in Table (2) showed that studied fertilization treatments had significant effects on earliness and agronomic chcracters. Also, there were significant differences between the studied wheat genotypes for the previous traits in the two locations and seasons.

With respect to fertilization treatments, inoculated wheat grains with Microbein produced the earliest heading (98.22 and 95.37 days) in the two seasons at Etay EL-Baroud and (86.91 and 86.80 days) at EL-Hamam and earliest physiological maturity (138.82 and 134.64 days) and (122.40 and 121.20 days) in the two successive season in the two locations, respectively.

On the contrary, nitrogen fertilizer application at 75 kg/ fed significantly increased the number of days to heading and physiological maturity in the two seasons at both locations. These results were in harmony with those obtained by Ashoush and Toaima (2004), Basha (2004), Singh *et al*. (2004) , Badr *et al.* (2009) and EL-Mezayen (2011).

With regard to wheat genotypes, Sids 12 cultivar was the earliest heading (96.83 and 91.0 days) in the first and second seasons, respectively, at Etay-EL-Baroud besides Sakha 94 (91.66 days) in the second season at the same location.

However, Gemmeiza 10, Shandaweel 1, Line 1 and Line 5 were the earliest heading (86.91, 86.25, 86.16 and 86.75 days), respectively, in the first season at EL-Hammam. Sids 12 and Shandaweel 1 cultivars, also were the earliest heading (84.83 and 85.16 days), respectively, in the second season at the same location. As for days to physiological maturity at Etay EL-Baroud, Misr 1, Sids 12, Sakha 94, Giza 168, Sids 13 cultivars, Line 1 and Line 5 were the earliest mature (143.75, 144.08, 143.58, 144.16, 144.0, 143.91 and 143.0 days), respectively, in the first season. However, Sids 12, Sakha 94 and Line 5 were the earliest mature (136.25, 135.50 and 136.16 days), respectively, in the second season at the same location (Table 2).

On the other hand, at EL-Hammam, Sids 12, Shandaweel 1 and Line 1 were the earliest mature (125.58, 124.75 and 125.33 days), respectively, in the first season, while, only Gemmeiza 10 cultivar was the earliest mature genotype (124.08 day) in the second season at the same location.

Results presented in Table (2) showed that the highest nitrogen application (75 kg/ fed.) produced the tallest plants (100.77 and 102.37 cm) in the first and second seasons, respectively, at Etay EL-Baroud and (90.99 and 90.38 cm) in the two successive seasons at EL-Hammam. Conversely, inoculation seeds with Microbein, only, gave the shortest plants (83.68, 88.87, 75.96 and 80.83 cm) in the preceding locations and seasons, respectively. That might be due to the lack of nitrogen as a result of sowing grains treated with biofertilizer only, and the role of nitrogen in plant growth (Moustafa *et al*., 1997). Similar results obtained by Abou El-Ela (2001), El- Habbasha *et al.* (2008), Pandey *et al.* (2008), Badr *et al.* (2009) and EL-Mezayen (2011).

Studied bread wheat genotypes, were significantly differed in their plant height in the two seasons at both locations (Table 2).

Table 2

At Etay EL-Baroud, both Misr 2 and Gemmeiza 11 cultivars gave the tallest plants (99.34 and 99.50 cm) in the first season and (101.82 and 101.66 cm) in the second season. However, Line 5 had the tallest plants (89.61 cm) at EL-Hammam in the first season and Line 5 and Misr 2 were the tallest (90.0 and 89.32 cm), respectively, in the second season at the same location.

With respect to spike length, the highest nitrogen level (75 kgN/ fed.), generally increased spike length in the two seasons at both locations, where spike length were (11.20 and 11.43 cm) in the first and second seasons, respectively, at Etay EL-Baroud and (9.72 and 9.64 cm) in the two successive seasons at EL-Hammam.

In the contrast, the shortest spikes (8.01 and 8.86 cm) in the two seasons at Etay EL-Baroud and (7.70 and 7.45 cm) at El-Hammam resulted from inoculation treatment. These results may be attributed to more absorption of inorganic nitrogen that led to improvement of plant growth, such as leaf area and leaf chlorophyll content which were reflected, in true, to increase nitrogenous compounds assimilation and growth substances, more cell division, development yield and yield attributes (Moustafa *et al*., 1997). Several investigators reported the positive effects of nitrogen fertilizer such as Bindia and Mankotia (2005), EL-Sayed and Hammad (2007), Grag *et al.* (2007), Hafez (2007), Seadh *et al*. (2009), Sharma and Verma (2010) and EL-Mezayen (2011).

Data in that table pointed out that Gemmeiza 11 cultivar had the tallest spikes (11.38 and 11.79 cm) in the two successive seasons at Etay EL-Baroud and (9.73 and 9.54 cm) at EL-Hammam. Conversely, Sids 13 cultivar produced the shortest spikes (8.88 and 9.15 cm) at Etay EL-Baroud and (8.36 and 8.02 cm) at EL-Hammam location.

Data in Table (3) indicated that grain yield and its components were significantly affected with fertilizer treatments and bred wheat genotypes in the two seasons at both locations.

With regard to grain yield, the highest nitrogen application level (75 kg/ fed) produced the highest grain yield (2.066 and 2.950 ton/ fed.) in the first and second seasons, respectively, at Etay EL-Baroud and (1.167 and 1.929 ton/ fed.) in the two successive seasons at EL-Hammam. However, grain yields resulted from application of 40 kgN/ fed only or combined with Microbein were statistically equaled with that resulted from 75 kgN/ fed application in the first season at Etay EL-Baroud.

On the contrary, inoculation wheat grains with Microbein, only produced the lowest grain yield (1.450 and 1.438 ton/ fed.) in the two successive seasons at Etay EL-Baroud and (0.643 and 1.017 ton/ fed) in the first and second seasons, respectively, at EL-Hammam. That might be due to the lack of nitrogen as a result of sowing grains treated with biofertilizer only, gave the lowest values of grain yield and its attributes. That may be explained by the slow and weak contribution of organic nitrogen, compared to inorganic nitrogen, on vegetative growth of wheat plants, especially in stages of rapid growth which demand high amounts of available nitrogen. That was reflected in lower dry matter synthesis and hence decreased yield and yield. These results are in good agreement with those emphasized by Omar *et al.* (1991) and Ali *et al.* (2003).

With regard to productivity of the studied wheat genotypes, data in Table (3) pointed out that Misr 1 and Gemmeiza 9 produced the highest grain yield (2.050 and 2.039 ton/ fed) in the first season, while Gemmeiza 9 and Giza 168 cultivars produced the highest grain yield (2.383 and 2.330 ton/ fed), respectively, in the second season at Etay EL-Baroud.

On the other hand, at EL-Hammam, Sids 13 produced the highest grain yield (1.060 ton/ fed) in the first season, while the same cultivar and Giza 168 produced the highest grain yield (1.641 and 1.701 ton/ fed.), respectively, in the second season.

With respect to number of spikes/ m^2, 75 kgN/ fed significantly surpassed the other fertilizer treatments (336.66 and 379.0) in the first and second seasons, respectively, at Etay EL-Baroud and (223.66 and 289.11) in the two successive seasons at EL-Hammam.

On the contrary, wheat grains treated with Microbein only produced the lowest spikes number/ m^2 (211.64 and 222.13) in the first and second seasons, at Etay EL-Baroud and (153.13 and 174.95) in the two successive seasons at EL-Hammam. Similar results were reported by EL-Kalla *et al.* (2002), Zewail (2007) and Askary *et al.* (2009).

As for genotypes effect, Line 2 produced the highest number of spikes/ m2 (324.08 and 338.83) in the two successive seasons at Etay EL-Baroud. However, in the first season at EL-Hammam, Gemmeiza 9, Sids 13, Giza 168 and Line 2 produced the highest number of spikes/ m^2 (209.25, 219.16, 214.66 and 214.0), respectively, while Giza 168 cultivar gave the highest spikes number/ m^2 (255.75) in the second season.

As for number of kernels/ spike, data in Table (3) showed that 75 kgN/ fed. application produced the highest number of kernels/ spike (66.96 and 68.67) in the two successive seasons at Etay EL-Baroud and (53.53 and 53.40) in the two seasons, respectively at EL-Hammam. However, the differences between 75 kgN/ fed and 40 kgN/ fed + Microbein did not reach the significance level in the two seasons at Etay EL-Baroud. On the other hand, Gemmeiza 9 gave the highest number of kernels/ spike (71.12) at Etay EL-Baroud in the first season, however Sakha 94 cultivar was significantly surpassed the other genotypes (70.08, 56.88 and 56.69) in the second season at Etay EL-Baroud and EL-Hammam in the two successive seasons, respectively.

The heaviest kernels resulted from nitrogen application of 75 kg/ fed. (47.44 and 51.69 g) in the first and second seasons at Etay EL-Baroud and (45.10 and 44.70 g) in the two successive seasons at EL-Hammam, beside that resulted from 40 kgN/ fed with and without biofertilizer inoculation (46.91 and 47.04 g), respectively, at Etay EL-Baroud in the first season. In the contrast, growing inoculated grains with Microbein only, resulted the lightest grains (41.23 and 40.48 g) in the first and second seasons, respectively, at Etay EL-Baroud and (37.12 and 38.63 g) in the two successive seasons at EL-Hammam (Table 3).

With respect to genotype effects, data presented in Table (3) showed that, at Etay EL-baroud, Misr 1, Giza 168 in the first and second seasons, respectively, and Gemmeiza 9 in both seasons produced the highest 1000-kernel weight (49.36, 52.65, 50.18 and 51.44 g). on the other hand, Sids 13 cultivar had the heaviest kernels (45.32 and 44.96 g) in the first and second seasons, respectively, at EL-Hammam.

As for harvest index, results in Table (3) pointed out that 75 kgN/ fed. application gave the highest harvest index values (31.76 and 33.27) in the first and second seasons, respectively, at Etay EL-Baroud and (29.78 and 33.92) in two successive seasons at EL-Hammam. On the converse, treated grains with Microbein, only produce the lowest harvest index (26.11 and 26.89) in the first and second seasons, respectively, at Etay EL-Baroud and (26.44 and 26.82) in the two successive seasons at EL-Hammam.

On the other hand, data in that table showed that Gemmeiza 9 and Giza 168 cultivars had the highest harvest indices (31.20 and 33.62) in the first and second seasons, respectively, at Etay EL-Baroud. However, at EL-Hammam, Sids 13 and Giza 168 cultivars in the first and second seasons, respectively, and Sakha 94 in the two seasons had the highest harvest index values (29.69, 32.08, 30.0 and 31.80).

Data in Tables (2 and 3) revealed that days to heading in the first season at Etay EL-Baroud and second season at EL-Hammam, plant height and harvest index in the two seasons at Etay EL-Baroud and EL-Hammam, respectively, and both grain yield and number of kernels/ spike at Etay EL-Baroud in the second season and EL-Hammam in the two seasons were significantly affected by interaction between fertilizer treatments and wheat genotypes.

Table 3

Table 3

With respect to days to heading in the first season at Etay EL-Baroud data in Table (4) showed that Misr 1 and Line 5 inoculated with Microbien, Sids 12 fertilized with 40 kgN/ fed or inoculated with Microbien only and Line 1 fertilized with 40 kgN/ fed or inoculated with Microbien or treated with both were the earliest heading, where their number of days to heading were (89.0, 94.98, 96.33, 93.66, 96.66, 95.33 and 94.33 days), respectively. However, results in that table at EL-Hammam in the second season, showed that Gemmeiza 10, Shandaweel 1 and Line 5 were the earliest heading under any of four fertilizer treatments. In that location, wheat grains inoculated with Microbien, generally, produced the earliest heading.

On the other hand, inoculated grains of Sakha 94 in the first season and Gemmeiza 10 in the second season at Etay EL-Baroud produced the shortest plants (66.16 and 76.44 cm), respectively. Conversely, Misr 2 and lines fertilized with 75 kgN/ fed in the first season and Misr 2 and Gemmeiza 9 fertilized with 75 kgN/ fed in the second season at the same location gave the tallest plants (96.05, 96.89, 113.94 and 110.33 cm), respectively (Table 4).

The highest nitrogen level (75 kg/ fed) produced the highest harvest index for Sakha 94 and Sids 13 in the two seasons, Misr 1, Gemmeiza 10 and Gemmeiza 11 in the second season, Gemmeiza 9, Giza 168 and Shandaweel 1 besides Sids 12 fertilized with 75 kgN/ fed or 40 kgN/ fed with Microbein in the first season at EL-Hammam (Table 4). That might be attributed to more absorption of inorganic nitrogen that led to improvement of plant growth, such as leaf area and leaf chlorophyll content which were reflected, in true, to increase nitrogenous compounds assimilation and growth substances development yield and its attributes (Moustafa *et al*., 1997).

As for grain yield, results in Table (5) pointed out that, sowing inoculated grains of studied wheat genotypes with Microbein only generally produced the lowest grain yield, however application of 75 kgN/ fed gave the highest grain yield. At Etay EL-Baroud in the second season, consequently, the highest grain yield recorded by Misr 2, Gemmeiza 9 and Shandaweel 1 cultivars, at EL-Hammam in the first season, Sids 12, Gemmeiza 9, Giza 168 and Line 1, Misr 1, Misr 2, Gemmeiza 9, Gemmeiza 10 and Sids 13 at EL-Hammam in the second season fertilized by 75 kgN/ fed. That may be explained by the slow and weak contribution of organic nitrogen, compared to inorganic nitrogen, on vegetative growth of wheat plants, especially in stages of rapid growth which demand high amounts of available nitrogen. That was reflected in lower dry matter synthesis and hence decreased yield and yield attributes. These results are in good agreement with those emphasized by Omar *et al.* (1991), Ali *et al.* (2003) and EL-Mezayen (2011).

With respect to number of kernels/ spike, data in Table (5) showed that interaction between fertilizer treatments and wheat genotypes had significant effect on that trait at Etay EL-Baroud in the second season and EL-Hammam in the two seasons. Both Sakha 94 and Giza 168 cultivars in the two seasons beside Sids 12 in the first season at EL-Hammam produced the highest number of kernels/ spike (66.50, 63.83, 63.27, 64.44 and 62.66), respectively, as a result of 75 kgN/ fed, application.

On the other hand, results of the second season at Etay EL-Baroud, Sakha 94 fertilized with 75 kgN/ fed., Sids 12 and Shandaweel 1 fertilized with 40 kgN/ fed and Microbein and Giza 168 under both treatments produced the highest number of kernels/ spike (86.46, 83.06, 82.46, 82.80 and 85.73), respectively.

In contrast, sowing grain wheat treated with biofertilizer only, gave the lowest number of kernels/ spike.

Table (4): Means of days to heading, plant height and harvest index as affected by fertilizer treatments × wheat genotypes interaction at Etay EL-Baroud and EL-Hammam in 2011/ 2012 and 2012/ 2013 seasons.

Fertilization / Genotypes	Days to heading							
	Etay EL-Baroud				EL-Hammam			
	2011/ 2012				2012/2013			
	75 kg	40kg+bio.	40 kg	Bio.	75 kg	40kg+bio.	40 kg	Bio.
Misr 1	102.00	101.66	97.33	89.0	92.33	88.66	91.66	88.99
Misr 2	105.00	103.33	99.66	100.66	89.66	89.00	90.00	88.33
Sids 12	99.33	98.00	96.33	93.66	92.00	85.00	90.33	84.00
Gemmeiza9	106.00	104.33	102.66	102.33	93.66	87.33	92.33	86.66
Gemmeiza10	107.00	108.33	105.33	102.33	86.66	86.66	88.00	86.33
Gemmeiza11	100.33	100.66	97.00	98.66	103.66	92.66	95.66	92.66
Sakha 94	99.33	98.00	98.66	97.00	102.33	93.33	88.33	92.33
Giza 168	100.66	99.66	99.33	99.33	93.33	89.66	92.00	86.33
Sids 13	102.66	104.00	99.66	101.33	91.66	89.66	88.66	85.33
Shandaweel 1	105.00	103.33	99.33	101.66	87.33	86.00	86.33	85.33
Line 1	98.66	96.66	95.33	94.33	88.66	87.00	85.66	83.33
Line 2	105.66	105.33	105.00	102.33	91.66	101.33	90.66	88.33
Line 3	101.00	98.66	97.66	98.00	89.00	95.33	90.66	86.00
Line 4	99.33	99.00	98.31	98.00	93.66	91.00	90.33	85.33
Line 5	97.00	96.33	97.33	94.98	87.00	88.00	87.66	84.33
L.S.D.0.05	3.23				4.38			
Fertilization / Genotypes	Plant height (cm)							
	Etay EL-Baroud							
	2011/ 2012				2012/ 2013			
	75 kg	40kg+bio.	40 kg	Bio.	75 kg	40kg+bio.	40 kg	Bio.
Misr 1	91.44	89.77	85.66	76.33	107.66	95.77	88.66	82.78
Misr 2	96.05	91.89	87.00	77.89	113.94	103.22	95.11	85.11
Sids 12	88.50	86.61	83.33	74.53	96.00	90.33	91.44	81.66
Gemmeiza9	94.29	94.55	87.22	73.89	110.33	102.72	92.66	83.88
Gemmeiza10	88.01	82.94	74.66	69.66	93.05	87.00	81.88	76.44
Gemmeiza11	91.01	90.44	87.66	81.33	105.33	104.00	99.89	88.77
Sakha 94	89.34	87.00	83.11	66.16	95.05	92.55	90.11	86.11
Giza 168	89.00	87.11	82.11	75.33	98.00	91.77	88.33	81.67
Sids 13	88.33	88.67	84.22	74.77	93.66	92.00	85.22	80.55
Shandaweel 1	88.33	86.33	77.55	71.86	98.66	98.55	91.89	85.22
Line 1	91.05	91.55	88.66	82.33	100.27	99.22	88.77	82.77
Line 2	91.66	91.55	86.89	82.22	101.66	100.55	89.55	86.55
Line 3	87.00	85.33	81.11	72.55	94.66	92.00	85.22	80.88
Line 4	94.00	93.33	88.33	77.66	101.00	101.66	91.00	87.89
Line 5	96.89	91.66	87.33	82.55	102.22	98.66	89.66	85.00
L.S.D.0.05	1.66				3.81			
Fertilization / Genotypes	Harvest Index (%)							
	EL-Hammam							
	2011/ 2012				2012/ 2013			
	75 kg	40kg+bio.	40 kg	Bio.	75 kg	40kg+bio.	40 kg	Bio.
Misr 1	30.80	29.12	31.55	26.56	34.79	30.73	30.39	27.63
Misr 2	29.65	30.81	28.07	25.64	33.12	29.79	29.25	24.93
Sids 12	31.75	31.62	26.72	23.81	32.78	32.05	28.92	25.11
Gemmeiza9	32.47	28.00	26.97	27.45	35.29	29.18	28.80	27.04
Gemmeiza10	30.53	30.75	29.86	27.24	35.88	31.33	31.81	27.21
Gemmeiza11	29.71	30.75	30.70	26.16	35.00	31.44	32.26	25.34
Sakha 94	33.68	27.81	30.74	27.78	35.82	32.37	31.28	27.75
Giza 168	33.21	30.33	28.10	26.48	34.0	33.51	31.02	29.80
Sids 13	31.92	29.72	30.19	26.92	34.81	33.48	31.97	29.85
Shandaweel 1	32.26	26.12	28.04	24.71	34.05	28.18	29.39	29.05
Line 1	26.17	28.64	30.73	24.80	31.29	29.76	31.14	28.16
Line 2	25.34	27.38	30.71	28.08	32.15	28.77	31.30	27.11
Line 3	26.07	31.35	30.99	25.90	33.50	30.76	31.14	24.70
Line 4	23.55	27.84	28.13	26.85	33.07	27.90	28.01	25.73
Line 5	29.62	25.50	27.17	28.28	33.32	27.07	28.49	25.96
L.S.D.0.05	2.12				1.71			

Table 5

REFERENCES

Abd Ghany, Bouthaina, F. (1994). Effect of biofertilization and chemical fertilizers on soil microbial properties and fodder production under calcareous soil conditions. Desert Inst. Bull., Egypt, 44 (2): 247- 262.

Abdel-Ati, A.A. and K.I. Zaki (2006). Productivity of some wheat cultivars in calcareous soils under organic farming and rainfed conditions with special references to plant disease. J. Agric. Sci., Mansoura Univ., 31(4): 1875- 1889.

Abedi, T., A. Alemzadeh and S.A. Kazemeini (2011). Wheat yield and grain protein, response to nitrogen amount and timing. Australin Journal of Crop Sci., 5(3): 330- 336.

Abou El-Ela, S.H. (2001). Response of some wheat varieties to mineral and biological nitrogenous fertilizer. Ph.D. Thesis, Fac. of Agric., Ain Shams Univ., Egypt.

Ali, O., O. Cagar and F. Sahin (2003). Yield response of wheat and barley to inoculation of plant growth promoting Rhizobacteria at various levels of nitrogen fertilization. J. Plant Nutr. Soil Sci., 166(2): 262- 266.

Ashoush, H.A. and S.E.A. Toaima (2004). Evaluation of four wheat lines under different N fertilizer levels and seeding rates. Egyptian J. of Agric. Res., 82(4): 1609- 1625.

Askary, M., A. Mostajeran, R. Amooaghaei and M. Mostajeran (2009). Influence of the co-inoculating *Azospirillium brasilense* and *Rhizobium meliloti* plus 2, 4-D on grain yield and N, P, K content of *Triticum aestivum* (cv. Baccros and Mahdavi). American-Eurasian J. of Agric. and Environmental Sci., 5(3): 296- 307.

Badr, E.A., O.M. Ibrahim and M.F. EL-Kramany (2009). Interaction effect of biological and organic fertilizers on yield and yield components of two wheat cultivars. Egyptian J. of Agron., 31(1): 17-27.

Basha, M.B.I. (2004). Agronomic Studies on wheat. M.Sc. Thesis, Fac. of Agric., Tanta Univ., Egypt.

Bindia, Kalia, B.D. and B.S. Mankotia (2005). Effects of integrated nutrient management on growth and productivity of wheat crop. Agric., Sci. Digest., Agric. Res. Communication Centre, Kanal, India. 25(4): 235- 239.

EL-Habbasha, S.F., M.M. Tawfik and M.M. Mohamed (2008). Response of two wheat varieties to partial replacement of recommended nitrogen fertilizer by bacterial inoculations. Egyptian J. of Agron., 30(2): 187- 200.

EL-Kalla, S.E., A.E. Sharief, A.A. Leilah, A.M. Abdalla and S.A.K. EL-Awami (2002). Utilization of some agriculture practices to improve some wheat cultivars productivity. 1. Yield and its components. J. Agric. Sci. Mansoura Univ., 27: 6583- 6697.

EL-Kased, F.A., R.N. Kamh and F. Abd EL-Ghany (1996). Wheat response to bio- and mineral nitrogen fertilized in newly reclaimed sandy soil. Desert Inst. Bull., Egypt, 49 (2): 373- 386.

EL-Mezayen, A.G.A. (2011). Agronomic studies on wheat crop. M.Sc. Thesis, Fac. of Agirc., Tanta Univ., Egypt.

EL-Sayed, Soad A. and S.M. Hammad (2007). Effect of nitrogen and potassium levels on organic and quality traits in three bread wheat cultivars. J. Agric. Sci., Mansoura Univ., 32 (7): 5139- 5153.

Gomez, K.A. and A.A. Gomez (1984). Statistical Procedures for Agricultural Research. (2^{nd} ed.). An International Rice Research Institute. J. Willey and Sons, New York, U.S.A. pp. 377-434.

Grag, B.K., H.A. Khan and Z.D. Kavia (2007). Interactive effects of Senna stems and nitrogen fertilization on net photosynthesis, Carbohydrates and nitrogen metabolism and yield of wheat. J. of Plant Biology. Society for Plant Physiology and Biochemistry, New Delhi, India, 34(1): 5-12.

Hafez, E.E.M.M. (2007). Effect of some agricultural practices on growth and productivity of wheat. M.Sc., Thesis, Fac. of Agric., Kafr EL-Sheikh Univ., Egypt.

Metin, T.A., G.B. Medime, C.C. Ramazan, O.F. Taskin and D. Sahin (2010). The effect of PGPR strain on wheat yield and quality parameters. Proceeding of World Congress of Soil Science, Soil Solutions for a Chaning World, 1-6 August, Brisbane, Australia, 140-143.

Moustafa, M.A., A. Helmy and M.A. Salem (1997). Effect of nitrogen fertilization on yield and yield components of wheat (*Triticum aestivum*) under new environments. J. Agric. Sci., Mansoura Univ., 22(1): 1-11.

Omar, M.N.A., M.H. Hegazy, R.A. Abd EL-Aziz, M.S.M. Abo-Soliman and M.M. Sobh (1991). Effect of inoculation with rhizobacteria on yield of wheat under graded levels of nitrogen fertilization, Ann. Agric. Sci., Ain Shams Univ., Cairo, 36(1): 99- 104.

Pandey, I.B., S. Paswan, N.K. Sinha and R.K. Pamdey (2008). Response of late sown wheat (*Triticum aestivum*) varieties to nitrogen levels. Indian J. of Agric. Sci., 78(6): 537- 539.

Seadh, S.E., M.L. EL-Abady, A.M. EL-Ghamry and S. Farouk (2009). Influence of micronutrients foliar application and nitrogen fertilization on wheat yield and quality of grain. J. of Biological Sci., 9(8): 851- 858.

Sharma, R.K. and R.P.S. Verma (2010). Effect of irrigation, nitrogen and varieties on the productivity and grain malting quality in barley. Cereal Research Commumications, 38(3): 419- 428.

Singh, R., R.K. Behl, K.P. Singh, P. Jain and Narula (2004). Performance and gene effects for wheat yield under inoculation of *Arbuscular mycorrhyza* fungi and *Azotobacter chroococcum*. Plant, Soil and Environment Institute of Agricultural and Food Information, Prague Czech Republic, 50 (9): 409- 415.

Zakir, A.M., M.T. Jan, M.Arif and A. Jan (2010). Wheat yielding components response to different levels of fertilizer-N application time and decapitation stress. Sarhad J. Agric. 26(4): 499- 506.

Zewail, R.M.Y. (2007). Improvement of wheat productivity by using some Biofertilizers and Antioxidants. M.Sc. Thesis, Fac. of Agric., Benha Univ., Egypt.

إستجابة بعض التراكيب الوراثية للقمح للتسميد النيتروجينى والحيوى فى منطقتين

سهير محمود حسن عبد الله[١] ، هناء محمد مهدى أبو زيد[٢]

[١] قسم بحوث القمح، معهد بحوث المحاصيل، مركز البحوث الزراعية، مصر.

[٢] قسم المحاصيل، كلية الزراعة، جامعة دمنهور، مصر.

الملخص العربى

أقيمت أربع تجارب حقلية فى كل من مزرعة إيتاى البارود بمحافظة البحيرة ومزرعة الحمام بمحافظة مطروح خلال الموسمين الزراعيين ٢٠١١/ ٢٠١٢، ٢٠١٢/ ٢٠١٣ لدراسة تأثير معاملات التسميد الآزوتى على بعض صفات النمو والمحصول ومكوناته لخمسة عشر تركيباً وراثياً من قمح الخبز. تناولت الدراسة ٤ معاملات تسميد أزوتى (٧٥ كجم نيتروجين/ فدان، ٤٠ كجم نيتروجين/ فدان + ميكروبين، ٤٠ كجم نيتروجين/ فدان، ميكروبين) ويمكن تلخيص أهم النتائج المتحصل عليها فى الآتى :

١-إضافة المعدل ٧٥ كجم نيتروجين/ فدان، أدى إلى زيادة معنوية فى كل الصفات المدروسة للخمسة عشر تركيباً وراثياً لقمح الخبز والمعاملة بالميكروبين فقط قللت قيم كل الصفات المدروسة فى كلا الموقعين فى الموسمين.

٢-أظهر الصنف سدس ١٢ تبكيراً فى الطرد والنضج فى موسمى الزراعة وفى كلتا المنطقتين- كما أظهر الصنف مصر ٢ أطول النباتات غالباً فى حين أعطى الصنف جميزة ١١ أطول السنابل فى كلتا المنطقتين. وأعطى كل من الصنفين مصر ١ وجيزة ١٦٨ أعلى محصولاً فى الموسم الأول والثانى على الترتيب بإيتاى البارود بينما أعطى الصنف جميزة ٩ أعلى محصولاً من الحبوب فى نفس المنطقة فى كلا الموسمين بينما أعطى الصنف سدس ١٣ أعلى محصولاً فى منطقة الحمام وذلك فى كلا موسمى الدراسة- من ناحية أخرى فقد أعطى الصنف سخا ٩٤ أكبر عدداً من الحبوب للسنبلة فى كلتا المنطقتين فى كلا الموسمين. والصنف سدس ١٣ فى الحمام وجميزة ٩ فى إيتاى البارود أثقل الحبوب وزناً فى الموسمين أما السلالة رقم ٢ فقد أعطت أعلى عدد من السنابل/ م^{٢} فى إيتاى البارود وكذلك الصنف جيزة ١٦٨ فى الحمام وذلك فى كلا الموسمين- من جهة أخرى أعطى كل من الصنفين جميزة ٩، جيزة ١٦٨ فى إيتاى البارود والصنف سخا ٩٤ فى الحمام أعلى قيم لمعامل الحصاد فى كلا موسمى الدراسة.

٣- أظهرت السلالة رقم ١ أقصى تبكيراً فى الطرد تحت أى من المعاملات السمادية عدا ٧٥ كجم ن/ ف كذلك الصنف سدس ١٢ المعامل بالميكروبين فقط أو بـ ٤٠ كجم ن/ فدان وذلك فى الموسم الأول فى إيتاى البارود- بينما أظهرت جميع التراكيب الوراثية المعاملة بالميكروبين فقط عدا الصنفين جميزة ١١، سخا ٩٤ أقصى تبكير فى الطرد، فى الموسم الثانى بمنطقة الحمام- من ناحية أخرى أعطى الصنف مصر ٢ والمسمد بـ ٧٥ كجم ن/ فدان، أطول النباتات فى كلا الموسمين بمنطقة إيتاى البارود- فى حين أعطى كل من الصنفين سخا ٩٤ وسدس ١٢ المسمدين بـ ٧٥ كجم ن/ فدان، أعلى قيم لمعامل الحصاد فى كلا الموسمين فى منطقة الحمام وبوجه عام أدت معاملة أى من التراكيب الوراثية بالميكروبين فقط إلى الحصول على أقل محصول للحبوب فى حين أعطى الصنف جميزة ٩ أعلى عدد من الحبوب/ سنبلة وذلك عند تسميدها بـ ٧٥ كجم ن/ فدان فى الموسم الثانى فى إيتاى البارود وكلا الموسمين بالحمام وكذلك الصنف مصر ٢ فى الموسم الثانى فى كل من المنطقتين. من ناحية أخرى فقد أعطى الصنف جيزة ١٦٨ أقصى عدد من الحبوب/ سنبلة فى الموسم الثانى فى إيتاى البارود وكلا الموسمين فى الحمام- بالإضافة إلى الصنف سخا ٩٤ فى كلا موسمى الزراعة بمنطقة الحمام وذلك تحت مستوى ٧٥ كجم ن/ فدان .

Table (1): Physical and chemical analysis of the experimental soils during growing seasons of the study 2011/ 2012 and 2012/ 2013.

Locations	Experimental year	Mechanical analysis			Soil texture	Soil pH	Organic matter %	Available macronutrients (ppm)			Total $CaCO_3$
		Sand %	Silt %	Clay %				N	P	K	
Etay EL-Baroud	2011/ 2012	11.87	34.40	54.73	Clay	8.1	1.77	52	32	238	1.36
	2012/ 2013	12.13	34.27	53.60		8.3	1.95	47	27	416	0.97
EL-Hammam	2011/ 2012	55.19	23.11	21.70	Sandy Loam	8.24	0.32	39.7	2.52	75.3	22.71
	2012/ 2013	55.94	21.93	22.13		8.40	0.27	37.3	2.71	77.2	23.11

Table (2): Means of earliness and agronomic characters as affected by fertilization treatments and bread wheat genotypes at Etay EL-Baroud and EL-Hammam in 2011/ 2012 and 2012/ 2013 seasons.

Factors	Days to heading				Days to maturity				Plant Height (cm)				Spike length (cm)			
	Etay EL-Baroud		El-Hammam		Etay EL-Baroud		El-Hammam		Etay EL-Baroud		El-Hammam		Etay EL-Baroud		El-Hammam	
	2011/ 2012	2012/ 2013	2011/ 2012	2012/ 2013	2011/ 2012	2012/ 2013	2011/ 2012	2012/ 2013	2011/ 2012	2012/ 2013	2011/ 2012	2012/ 2013	2011/ 2012	2012/ 2013	2011/ 2012	2012/ 2013
Fertilization																
75kgN/ fed	101.93a	100.00a	92.24a	91.24a	148.00b	141.24a	130.20a	132.53a	100.77a	102.37a	90.99a	90.38a	11.20a	11.43a	9.72a	9.64a
40 kgN/ fed + bio.	101.15a	99.17a	90.04b	88.93b	148.93a	141.80a	130.11a	130.15b	96.67b	99.18b	89.85b	88.44b	10.58b	10.97b	9.55a	9.43b
40 kgN/ fed	99.26ab	97.22b	89.88b	87.84bc	146.51c	140.53a	129.91a	129.71b	89.96c	91.99c	84.32c	84.84c	8.84c	9.96c	8.94b	8.72c
Biofertilizer	98.22b	95.37c	86.91c	86.80c	138.82d	134.64b	122.40b	121.20c	83.68d	88.87d	75.96d	80.83d	8.01d	8.86d	7.70c	7.45d
L.S.D.0.05	2.38	1.35	1.81	1.18	0.82	1.12	1.73	0.97	2.20	2.99	1.25	0.79	0.22	0.32	0.22	0.19
Genotypes																
Misr 1	97.50e	101.00cd	90.66bc	90.41bc	143.75d	138.75de	130.66ab	130.00bc	93.72de	100.45ab	85.80c	87.16c	10.09cd	10.27c	9.08c	8.76cd
Misr 2	102.15c	103.41b	89.25c	87.25d	147.91b	141.66c	129.75ab	127.75cd	99.34a	101.82a	88.20ab	89.32a	10.57b	10.80b	9.43b	9.15b
Sids 12	96.83f	91.00g	87.83c	84.83e	144.08d	136.25f	125.58c	126.08d	89.86f	93.15d	83.24d	84.58e	10.47bc	10.76b	9.23bc	9.00bc
Gemmeiza9	103.83b	104.75a	90.00c	90.00c	149.33a	146.66a	127.50bc	127.66cd	97.40b	100.44ab	87.49b	87.65c	10.27bc	10.54bc	9.05c	8.84c
Gemmeiza10	105.75a	101.91c	86.91d	87.41d	147.91b	143.25b	126.66bc	124.08e	84.59g	86.19f	78.82f	80.34g	9.44e	9.72d	8.65de	8.45de
Gemmeiza11	99.16d	93.33f	96.16a	96.08a	145.16cd	139.0de	131.16ab	133.33a	99.50a	101.66a	87.61b	88.21bc	11.38a	11.79a	9.73a	9.54a
Sakha 94	98.25d	91.66g	94.08ab	94.25a	143.58d	135.50f	132.16a	130.83b	90.95ef	92.47d	81.40e	85.50d	9.84d	10.50bc	9.25bc	8.93c
Giza 168	99.75d	93.91f	90.33bc	92.00b	144.16d	138.00e	127.83bc	131.33b	89.94f	93.22d	83.38c	84.77d	10.25c	10.48bc	9.11c	9.05bc
Sids 13	101.91c	99.16de	88.83cd	86.41de	144.00d	139.33de	128.66b	126.16d	87.86g	90.05e	84.00d	84.13e	8.88f	9.15e	8.36e	8.02f
Shandaweel 1	102.33b	99.80d	86.25d	85.16e	145.33cd	140.75c	124.75c	125.91d	93.58c	95.72c	81.02e	81.16g	9.73de	10.02cd	8.90cd	9.04bc
Line 1	96.25e	98.25e	86.16d	86.16de	143.91d	137.83e	125.33c	126.58d	92.76e	95.27c	88.48ab	89.00b	10.15cd	10.77b	9.15bc	9.19b
Line 2	104.50ab	103.33b	93.00b	86.58de	150.66a	143.41b	127.00bc	127.41cd	94.58de	97.69bc	88.08ab	88.38bc	9.20e	9.70d	8.65de	8.33e
Line 3	98.83de	94.25f	90.25bc	88.75cd	145.91c	137.08ef	128.33bc	130.33bc	88.19fg	89.55e	81.50e	82.58f	9.68de	10.19c	8.94cd	8.76c
Line 4	98.66de	100.75cd	90.08c	89.58c	144.75cd	139.66d	130.33ab	130.00bc	95.38d	97.83b	88.33ab	89.08b	9.40e	9.77d	8.52de	8.33e
Line 5	96.41e	93.33f	86.75d	85.66de	143.00d	136.16f	126.58bc	128.50c	93.88de	98.52b	89.61a	90.00a	9.66de	10.09cd	8.66d	8.58d
L.S.D.0.05	1.61	1.28	2.87	1.88	1.37	1.38	2.92	1.63	1.90	2.00	1.68	0.90	0.32	0.40	0.30	0.21
Fert.×Genot.	*	n.s	n.s	*	n.s	n.s	n.s	n.s	*	**	n.s	n.s	n.s	n.s	n.s	n.s

Means at the same column followed by same letter(s) are not significantly different at 0.05 probability level.
n.s. = not significant

Table (3): Means of grain yield and its components as affected by fertilization treatments and bread wheat genotypes at Etay EL-Baroud and EL-Hammam in 2011/ 2012 and 2012/ 2013 seasons.

Factors	Grain yield (ton/ fed)				No. of spikes/ m^2				No. of kernels/ spike			
	Etay EL-Baroud		El-Hammam		Etay EL-Baroud		El-Hammam		Etay EL-Baroud		El-Hammam	
	2011/ 2012	2012/ 2013	2011/2012	2012/2013	2011/2012	2012/2013	2011/2012	2012/2013	2011/2012	2012/2013	2011/2012	2012/2013
Fertilization												
75kgN/ fed	2.066a	2.950a	1.167a	1.929a	336.66a	379.00a	223.66a	289.11a	66.96a	68.67a	53.53a	53.40a
40 kgN/ fed + bio.	1.973a	2.258b	0.973b	1.607b	290.75b	317.66b	220.66a	235.11b	66.37a	71.23a	49.03b	49.39b
40 kgN/ fed	2.076a	1.640c	0.921c	1.359c	272.17b	246.42c	187.13b	201.42c	57.26b	60.64c	47.86b	48.56b
Biofertilizer	1.450b	1.438c	0.643d	1.017d	211.64c	222.13d	153.13c	174.95d	44.03c	47.46d	39.86c	38.63c
L.S.D.0.05	0.154	0.287	0.390	0.016	31.40	30.56	13.84	9.79	2.49	0.86	2.97	2.92
Genotypes												
Misr 1	2.050a	2.095bc	0.999ab	1.548bc	276.41bc	268.50c	202.91ab	222.13c	55.50cd	59.52d	44.09d	45.34d
Misr 2	1.995ab	1.965bc	1.007ab	1.480c	276.75bc	272.25c	188.75b	231.83bc	60.84bc	61.32cd	49.09d	48.02c
Sids 12	2.009ab	2.212ab	0.981ab	1.374d	296.66ab	280.83bc	191.66b	214.16c	67.04ab	69.58ab	52.64b	48.93bc
Gemmeiza9	2.039a	2.383a	0.966ab	1.538bc	257.41bc	283.25bc	209.25a	227.91bc	71.12a	63.38c	46.80c	49.07bc
Gemmeiza10	1.875ab	2.088bc	0.940b	1.600b	277.25bc	292.16bc	202.33ab	231.83bc	61.37bc	58.80d	48.22c	49.03bc
Gemmeiza11	1.923ab	1.950bc	0.900bc	1.565bc	243.83c	256.41c	190.0b	220.83c	55.54cd	63.73c	46.45cd	46.20cd
Sakha 94	1.850ab	2.004bc	0.836bc	1.368d	262.08bc	314.50ab	179.16b	221.66c	53.58cd	70.08a	56.88a	56.69a
Giza 168	1.979ab	2.330a	0.949ab	1.701a	303.08ab	304.50b	214.66a	255.75a	58.24c	66.79b	47.58c	49.05bc
Sids 13	1.833ab	2.135b	1.060a	1.641a	298.58ab	324.00ab	219.16a	243.33ab	63.50b	63.33c	51.84b	50.49b
Shandaweel 1	1.763b	2.312ab	0.710c	1.312d	283.75b	262.41c	177.50b	192.08d	59.29bc	67.97ab	50.80bc	50.13bc
Line 1	1.758b	1.906c	1.004ab	1.456cd	271.08bc	253.16c	182.08b	187.25d	55.58cd	57.05de	47.09c	45.52d
Line 2	1.988ab	2.109b	0.766c	1.420cd	324.08a	338.83a	214.00a	241.33ab	55.66cd	57.53d	43.92d	45.09d
Line 3	1.958ab	1.718c	0.965ab	1.400cd	278.08b	297.08bc	182.66b	237.58b	52.96d	59.46d	41.73d	44.30de
Line 4	1.747b	2.012b	1.009ab	1.447cd	259.08bc	315.83ab	206.16ab	223.66bc	52.49d	54.40e	41.69d	42.12e
Line 5	1.604b	1.852c	0.789c	1.320d	264.00bc	305.83b	185.66b	225.83bc	57.14cd	58.61d	43.68d	42.48e
L.S.D.0.05	0.240	0.194	0.116	0.099	33.53	30.56	19.78	15.00	4.69	2.94	2.65	2.16
Fert.×Genot.	n.s.	**	**	*	n.s	n.s	n.s.	n.s.	n.s.	*	**	**

Means at the same column followed by same letter(s) are not significantly different at 0.05 probability level.
n.s. = not significant

Table (3): Cont.

Factors	1000-kernel weight (g)				Harvest index (%)			
	Etay EL-Baroud		El-Hammam		Etay EL-Baroud		El-Hammam	
	2011/ 2012	2012/ 2013	2011/ 2012	2012/ 2013	2011/ 2012	2012/ 2013	2011/ 2012	2012/ 2013
Fertilization								
75kgN/ fed	47.44a	51.69a	45.10a	44.70a	31.76a	33.27a	29.78a	33.92a
40 kgN/ fed + bio.	46.91a	48.85b	42.69b	42.17b	30.60b	30.54b	29.05b	30.45b
40 kgN/ fed	47.04a	45.31c	42.01c	42.59b	30.11b	29.79b	29.24b	30.34c
Biofertilizer	41.23b	40.48d	37.12d	38.63c	26.11c	26.89c	26.44c	26.82d
L.S.D.0.05	0.72	0.90	0.56	0.66	0.97	1.24	0.55	0.19
Genotypes								
Misr 1	49.36a	48.04bc	39.53d	39.91e	30.34ab	28.47c	29.51ab	30.89bc
Misr 2	45.97bc	44.55d	41.55c	40.98d	29.69ab	29.10c	28.54bc	29.27d
Sids 12	46.02bc	48.05bc	37.86e	38.79f	30.00ab	32.98ab	28.47bc	29.71cd
Gemmeiza9	50.18a	51.44a	38.08e	41.45cd	31.20a	30.90bc	28.72b	30.08c
Gemmeiza10	43.34d	44.81cd	39.76d	41.43cd	30.95ab	29.07c	29.59ab	31.68ab
Gemmeiza11	44.83cd	47.27bc	44.90ab	42.62bc	28.64bc	29.47c	29.33ab	31.01b
Sakha 94	46.00bc	47.88bc	43.81b	42.78bc	30.91ab	29.86bc	30.00a	31.80a
Giza 168	44.74cd	52.65a	42.74bc	42.96bc	30.49ab	33.62a	29.53ab	32.08a
Sids 13	44.56cd	43.77d	45.32a	44.96a	30.61ab	31.37b	29.69a	31.77ab
Shandaweel 1	42.66d	45.49cd	38.22e	40.41de	29.88ab	32.68ab	27.78bc	30.16c
Line 1	44.18cd	46.37c	43.33b	42.69bc	29.80ab	29.73bc	27.58c	30.09c
Line 2	46.89b	40.32e	41.80c	42.05c	29.10b	27.97c	27.88b	29.83d
Line 3	43.55d	45.67cd	41.82c	42.05c	29.60b	29.15c	28.57bc	30.02cd
Line 4	45.36c	43.71d	44.99ab	43.99ab	27.38c	29.40c	26.59d	28.68d
Line 5	47.13b	48.71b	42.99bc	43.28b	26.10c	28.08c	27.64c	28.71d
L.S.D.0.05	1.45	1.76	1.21	1.04	1.57	1.69	0.95	0.77
Fert.×Genot.	n.s	n.s	n.s.	n.s.	n.s.	n.s.	*	*

Means at the same column followed by same letter(s) are not significantly different at 0.05 probability level.
n.s. = not significant

Table (5): Means of grain yield and number of kernels/ spike as affected by fertilizer treatments × wheat genotypes interaction at Etay EL-Baroud and EL-Hammam in 2011/ 2012 and 2012/ 2013 seasons.

Fertilization / Genotypes	Grain yield (ton/ fed)											
	Etay EL-Baroud				EL-Hammam							
	2012/ 2013				2011/ 2012				2012/ 2013			
	75 kg	40kg+ bio.	40 kg	Bio.	75 kg	40kg+ bio.	40 kg	Bio.	75 kg	40kg+ bio.	40 kg	Bio.
Misr 1	3.116	2.333	1.683	1.250	1.270	1.126	1.016	0.583	2.133	1.800	1.283	0.976
Misr 2	3.183	2.000	1.433	1.243	1.233	1.110	0.950	0.736	2.033	1.666	1.283	0.936
Sids 12	2.766	2.550	1.916	1.616	1.533	0.826	0.966	0.600	1.716	1.483	1.343	0.953
Gemmeiza9	3.533	2.783	1.766	1.450	1.516	.950	0.833	0.566	2.250	1.683	1.186	1.33
Gemmeiza10	2.950	2.183	1.566	1.653	1.166	0.816	1.076	0.700	2.050	1.800	1.466	1.083
Gemmeiza11	2.750	2.150	1.483	1.416	1.173	1.013	0.806	0.606	2.083	1.666	1.483	1.026
Sakha 94	2.633	1.966	1.800	1.616	1.050	0.616	0.940	0.740	1.833	1.366	1.260	1.013
Giza 168	3.160	2.583	2.050	1.573	1.363	1.100	0.800	0.533	1.853	1.883	1.683	1.286
Sids 13	3.160	2.233	1.600	1.591	1.256	1.133	1.086	0.766	2.066	1.950	1.466	1.083
Shandaweel 1	3.550	2.333	1.750	1.616	1.060	0.683	0.616	0.483	1.716	1.300	1.233	1.000
Line 1	2.766	2.100	1.483	1.275	1.416	0.926	0.950	0.723	1.733	1.583	1.483	1.025
Line 2	2.900	2.350	1.700	1.486	0.900	0.816	0.800	0.550	1.800	1.433	1.433	1.016
Line 3	2.833	1.950	1.766	1.225	0.843	1.266	1.016	0.633	1.883	1.550	1.333	0.833
Line 4	2.966	2.300	1.500	1.283	1.150	1.060	1.076	0.750	1.950	1.616	1.233	0.990
Line 5	2.666	2.066	1.400	1.276	0.966	0.660	0.890	0.676	1.733	1.313	1.216	1.000
L.S.D.0.05	0.386				0.253							
Fertilization / Genotypes	Number of Kernels/ spike											
	Etay EL-Baroud				EL-Hammam							
	2012/ 2013				2011/ 2012				2012/ 2013			
	75 kg	40kg+ bio.	40 kg	Bio.	75 kg	40kg+ bio.	40 kg	Bio.	75 kg	40kg+ bio.	40 kg	Bio.
Misr 1	68.60	66.73	55.66	47.09	47.48	48.00	42.50	38.38	57.37	45.66	43.83	34.50
Misr 2	69.33	66.26	61.06	48.62	55.03	47.17	52.00	42.00	55.03	46.72	49.27	41.05
Sids 12	69.73	83.06	68.93	56.60	62.66	53.50	50.67	43.75	52.66	46.16	52.78	44.11
Gemmeiza9	66.46	71.26	64.40	51.40	50.00	45.16	50.16	41.89	57.33	45.49	50.94	42.50
Gemmeiza10	67.40	64.00	58.00	45.80	54.66	58.83	42.67	36.72	55.57	58.44	45.89	36.22
Gemmeiza11	68.06	76.60	67.13	52.13	59.50	49.33	42.50	34.50	58.50	48.61	46.16	31.53
Sakha 94	86.46	77.40	80.33	54.15	66.50	60.00	57.83	43.19	63.27	57.66	58.83	47.00
Giza 168	82.80	85.73	54.20	44.42	63.83	44.00	45.33	37.16	64.44	44.55	47.77	39.44
Sids 13	69.86	65.93	66.60	50.95	58.50	55.17	50.16	43.53	58.62	54.72	48.83	40.16
Shandaweel 1	77.86	82.46	62.13	49.43	53.16	50.33	56.00	43.72	46.50	52.11	57.27	44.66
Line 1	56.00	67.80	60.93	43.50	47.50	45.50	53.33	42.05	42.16	46.50	51.22	42.22
Line 2	62.20	64.53	55.20	48.20	43.66	46.83	45.83	39.38	47.75	51.16	47.16	34.27
Line 3	69.80	62.93	58.13	46.86	45.17	42.83	43.50	35.44	46.05	49.83	45.50	35.83
Line 4	54.06	64.80	54.53	44.20	48.33	47.50	39.33	31.06	47.66	49.83	40.44	30.55
Line 5	67.53	68.00	55.80	43.13	47.00	41.41	46.17	40.17	48.50	43.41	42.50	35.50
L.S.D.0.05	5.90				5.88				4.81			