Response of Wheat Cultivars to Mineral and Bio-fertilization of Nitrogen

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ABSTRACT: Two field experiments were carried out at Etay El- Baroud Agricultural Research Station, El- Behira Governorate, Egypt, during 2013/2014 and 2014/2015 seasons, to study the response of three wheat cultivars i.e. Misr 1, Sids12 and Sakha 93 to five mineral and bio nitrogen fertilization (zero kg N/fed, 25 kg N/ fed + cerealein, 50 kg/ fed + cerealein, 75 Kg N/fed + cerealein and 100 kg N/ fed). The results revealed that Sids 12 cultivar was earliest in heading date and longest spike in both season. Sids 12 was earliest in maturity in the second season and achieved the highest flag leaf area in the first season and longest spike in both seasons. While, Misr 1 gave the highest value of leaf area in the second season and the highest plant in the first season. All studied characters significantly increased by increasing N-fertilization (mineral with biofertilizer) in the first and second season. Sakha 93 gave the highest values of number of grains/spike in the first and second season and grain weight in the second season. On the other hand, Sids 12 was the highest in number of spikes/m^2 in the two studied seasons. Misr 1 achieved the heaviest 1000 – grain weight in the second season and it was achieved heaviest grain yield in 1st and 2nd seasons and equaled with Sids 12 in the second season and it achieved the highest values of biological yield in the first season and HI (%) % in both seasons. While, Sakha 93 achieved the highest values of straw yield and biological yield in the second season. All yield and yield components were significantly and gradually increased by N- fertilization up to 100 kg N/ fed in the first and second season. Misr 1 achieved the highest values at 100 kg N/fed in the first and second season and number of spikes/ m^2 at 100 kg N/fed in the first season and 75 kg N + cerealein in the second season. While, Sids 12 gave the longest spike at 100 kg in the two seasons. Sakha 93 achieved the highest values of number of grains/ spike during the two growing seasons, grain weight/spike and 1000- grain weight in the second season only at 100 kg N/fed application. Sids 12 gave the highest values of grain weight/spike and 1000- grain weight at 100 kg N/fed in the 1st season. Misr1 gave the highest grain yield in the first season and Sakha 93 in the second season at 100 kg N/fed. While, Sids 12 gave the highest values of straw and biological yield in the first season and Sakha 93 in the second season at 100 kg N/fed.

Keywords: wheat cultivars, yield, nitrogen, mineral, biofertilization

INTRODUCTION

Wheat (*Triticum aestivum* L.) is considered to be one of the most important cereal crops in the world as well as in Egypt. It ranks first among the main four crops namely rice, maize and barely. It occupies about 30% of the world cropping area (FAO, 2016). Wheat used as human food and animal feed. In Egypt, the cultivated area of wheat reached about 3.1 million feddan in 2015/2016 giving 8.2 million tons of grains with national average of about 18.1 ardab/fed. However, the local consumption surpassed 14–15 million tons every year Egypt import about 55 % of its wheat consumption to face the great need of high population increment and the shortage of production and the main target is to approximate between production and consumption.

Nitrogen is the most important factor to limit crop production and increase growth, biomass, yield and protein of crops. The efficiency of nitrogen fertilizer increased by using ammonium gas (El-Gizawy and Salem, 2010 and Zaki *et al*, 2016). Most of researches done to evaluating wheat cultivars to maximizing grain yield, El- Hag (2011), Omar *et al.* (2014) and Kandil *et al.* (2016) who revealed that wheat cultivars differed in days to heading, days to maturity, plant height, number of spikes/m^2, grain yield, straw yield, harvest index, number of grains/spike and 1000- grain weight under different levels of nitrogenous fertilization.

Bio-fertilizers are known as microbial inoculations and consists of artificially multiplied cultures of certain soils organisms that can improve soil fertility and crop productivity. Bio fertilizers add nutrients through the natural processes of nitrogen fixation. This use might also reduce the use of chemical fertilizers. excessive chemical fertilizers may result in low nitrogen use efficiency, potentially exerts more pressure on the environment. Biofertilizer produced significant increment in all yield and yield components characters under study (Zaki *et al*., 2012 and Zaki *et al*., 2016).

The main aim of this study was to evaluate the response of three wheat cultivars to mineral and bio fertilizers nitrogen.

MATERIALS AND METHODS

Two field experiments were conducted at Etay El- Baroud Agricultural Research Station, El- Beheira Governorate, Egypt during 2013/2014 and 2014/2015 seasons to study the response of three wheat cultivars to mineral and bio fertilizers nitrogen.

The preceding crop was maize in the two seasons. Soil samples of the experimental sites were taken at the depth of zero to 30 cm soil depth before the sowing. Some physical and chemical analyses were done according to the method described by Chapman and Pratt (1978). Detailed results of the soil characteristics are presented in Table (1).

The experimental design was split plot design in three replications. Three wheat cultivars i.e. Misr 1, Sids12 and Sakha 93 were allocated in main plots, while five mineral and bio- nitrogen fertilization (zero kg N/fed, 25 kg N/ fed + cerealein, 50 kgN/fed + cerealein, 75 Kg N/fed + cerealein and 100 kg N/ fed) were distributed of randomly in the subplots.

Each sub plot size was 10.50 m^2 (3 m in length and 3.5 m in width). The grains of the tested wheat cultivars were obtained from wheat Research Section of Agriculture Research Center, Ministry of Agriculture, Egypt. Sowing dates were 21th and 19th November 2013 and 2014 in both seasons, respectively, while seeding rate was 70 kg/fed.

Inoculation with cerealein at the rate of 200 g, a nitrogen fixing bacteria were performed by coating wheat grains with product individually using a sticking substance (Arabic gum) just before sowing. The biofertilizer was

produced by General Organization for Agriculture Equalization Ministry of Agriculture and Land – Reclamation, Egypt (Abou- El- Naga, 1993).

Mineral nitrogen fertilization in the form of ammonium nitrate (33.5 % N) was added at two equal doses, the first one added before 1st irrigation (21 days after sowing) and the second dose added before the 2nd irrigation. Phosphorus fertilizers was added at the rate of (31 kg P_2O_5/fed) during land preparation. Potassium fertilizer was applied before sowing (during seedbed preparation) at rate of 24 kg K_2O/fed. Other agricultural practices were done as recommended by the Ministry of Agriculture.

The most important studied characters were:

Plant height (cm), days to heading, maturity date, flag leaf area (FLA), number of spikes/m^2, spike length (cm), number of grains/spike, grain weight/spike, number of spikelets/spike, 1000- grain weight (g), grain yield (tons/fed), straw yield (tons/fed), biological yield(tons/fed) and harvest index (HI%). Whereas, Flag Leaf Area (FLA) = K (L*W) whereas; FLA: Leaf area (cm^2), K: Constant (0.75), L: Maximum leaf length (cm) and W= Maximum leaf width (cm) according to Radford (1967).

All data collected were subjected to analysis of variance according to Gomez and Gomez (1984).

Table (1). Some physical and chemical properties of the experimental soil in 2013/2014 and 2014/2015 seasons

Soil properties	seasons	
	2013/2014	2014/2015
A) Mechanical analysis:		
Sand (%)	20.3	20.0
Silt (%)	26.1	25.3
Clay (%)	53.6	53.7
Soil texture class	Clay	Clay
B) Chemical analysis		
E.C (1:1) (dS/m)	2.1	2.12
p^H	8.1	8.3
1) Soluble cations (mg/L)		
Ca^{++}	190.50	190.52
Mg^{++}	45.75	45.77
K^+	51.32	51.33
Na^+	201.11	201.22
2) Soluble anions (mg/L)		
Cl^-	250.60	250.65
HCO_3^-	262.03	262.03
$So_4^=$	500.51	500.55
O.M %	1.77	2.23
Available N (mg/kg)	35.5	54.7
Available P (mg/kg)	11.1	11.5
Available K (mg/kg)	221	225

RESULTS AND DISCUSSION

Results in Table (2) pointed out that growth characters (heading date, maturity date and flag leaf area) were significantly affected by the three different wheat cultivars in the first and second seasons, where Sakha 93 cultivar recorded highest values of heading date in the first season were recorded for Sakha 93, while these values were recorded with using Misr 1 in the second season. On the other side, Sids 12 and Sakha 93 gave the highest number in maturity date in the first and second season, respectively. However, Sids 12 and Misr 1 surpassed in flag leaf area in both seasons.

Results listed in Table (2) also showed that days to heading, days to maturity and flag leaf area were significantly increased by increasing nitrogen levels from zero up to 100 kg N/fed during the two investigated seasons. In general, the highest values were taken at 100 kg N / fed and the lowest at control treatment.

Table (2). Plant attributes of wheat cultivars as affected by mineral nitrogen fertilization with bio-fertilizer (cerealein) in 2013/2014 and 2014/2015 seasons

Treatments	Days to Heading		Days to Maturity		Flag leaf area (cm^2)	
	2013/2014	2014/2015	2013/2014	2014/2015	2013/2014	2014/2015
A) Wheat cultivars						
Misr 1	101.4	108.6	142.0	149.8	28.4	36.0
Sids 12	100.8	104.0	143.2	144.9	34.2	27.3
Sakha 93	102.0	105.1	143.0	151.7	30.6	26.6
LSD at 0.05	0.46	0.45	ns	2.34	2.4	0.66
B) Mineral and biofertilizer of nitrogen						
0 kg N/fed	99.7	104.6	139.0	146.0	22.5	20.3
25 kg N/fed+Bio	110.3	105.6	139.7	147.8	29.9	24.1
50 kg N/fed+Bio	102.0	109.0	143.0	148.7	33.5	27.7
75 kg N/fed+Bio	101.7	106.9	145.7	151.0	38.0	30.6
100 kg N/fed	102.3	106.8	146.3	150.6	31.5	38.0
LSD at 0.05	0.73	0.76	2.12	1.41	3.92	1.26
Interaction						
A x B	*	*	*	*	*	*

ns.: Not significant difference at 0.05 level of probability, *: Significant different at 0.05 level of probability.

Results listed in Table (3) indicated that Misr 1 cultivar significantly surpassed all other cultivars under study during the two investigated seasons in plant height and number of spikes/m^2 whereas Sakha 93 cultivar was the shortest and Sids 12 was the lowest in number of spikes/m^2 in the first and second season, respectively. On the other hand, sids12 gave the longest spike while, Sakha 93 has the shortest spike in the two studied season. Same results are in agreement with Abdel –Khalek *et al*. (2015). While, Abdel- Rrazek and El – Sheshtawy (2013) performed that Gemmeiza 9 was the highest. Results in Table (3) also cleared that plant height, number of spike/m^2 and spike length were significantly and gradually increased by increasing nitrogen levels from 0 to 100 kg N/ fed. The highest plants were (95.0 and 93.1 cm) and the maximum numbers of spikes/m^2 were (271.9 and 273.7) and the longest spike (10.1 and 10.5 cm) were detected at 100 kg N / fed in the first and second season, respectively.

Table (3). Plant height, number of spikes/m^2 and spike length of wheat cultivars as affected by mineral nitrogen fertilization with bio-fertilizer (cerealein) 2013/2014 and 2014/2015 seasons

Cultivar	Plant height (cm)		No of spikes/m^2		Spike length (cm)	
	2013/2014	2014/2015	2013/2014	2014/2015	2013/2014	2014/2015
A) Wheat cultivars						
Misr 1	89.3	88.5	263.0	260.9	9.5	9.5
Sids 12	87.1	85.4	226.3	232.3	9.9	9.8
Sakha 93	82.4	80.2	249.4	247.7	9.1	9.2
LSD at 0.05	1.12	0.31	8.65	4.21	0.17	029
B) Mineral and bio-fertilizer of nitrogen						
0 kg N/fed	76.0	76.1	211.1	205.6	8.7	8.7
25 kg N/fed + Bio	82.2	80.3	236.8	236.7	9.1	9.3
50 kg N/fed + Bio	86.9	85.6	245.8	251.9	9.9	9.4
75 kg N/fed + Bio	91.2	88.3	266.1	267.0	9.9	9.8
100 kg N/fed	95.0	93.1	271.9	273.7	10.1	10.5
LSD at 0.05	1.30	1.17	7.14	5.89	7.14	0.25
Interaction						
A x B	*	*	*	*	*	*

ns.: Not significant difference at 0.05 level of probability, *: Significant different at 0.05 level of probability.

Results cited in Table (4) showed that the three tested wheat cultivars significantly varied in their yield components i.e. number of grains/spike, number of spikletes/spike in both seasons, whereas grain weight/spike in the second season and 1000 – grain weight in the first season only. Sakha 93 surpassed the other varieties in its number of grains / spike in the two studied seasons and grain weight/spike in the second season. On the other side, Sids 12 surpassed in its number of spikletes/spike in both seasons and in its 1000 – grain weight in the first season only. while Misr 1 in the second season. These results may be due to genetic makeup and variation between wheat varieties and were in agreements with Omar *et al.* (2014) and Abdel– Khalek *et al.* (2015). However, Mansour *et al*. (2016) found that Misr 1 came in the first rank in yield components.

It is clear that yield components of wheat were significantly and gradually increased by increasing nitrogen fertilizers as mineral as well as bio fertilizers in the two investigated seasons. Results listed in Table (4) detected that the highest numbers were given at 100 kg N/fed and adding 75 kg N/fed + 200 g of cerealein came in the second rank. On the other hand, the lowest values were recorded under control treatment. These results are in harmony with those obtained by Zaki *et al*. (2012), and Abdel – Razek and El – Sheshtawy (2013).

Results listed in Table (5) pointed out that the three wheat cultivars were insignificantly differed in grain and straw yields while biological yield was significantly affected by wheat cultivars in both seasons and harvest index in the first season. Misr 1 cultivar surpassed in all other cultivars under this study biological yield in the first season and Sakha 93 in the second season. These results are in agreements with those obtained by El – Hag (2012).

Table (4). Yield components of wheat cultivars as affected by mineral nitrogen fertilization with bio-fertilizer (cerealein) in 2013/2014 and 2014/2015 seasons

cultivar	No of grains/ spike		Grain weight /spike (g)		No of spikelets/ spike		1000- grain weight(g)	
	2013/2014	2014/2015	2013/2014	2014/2015	2013/2014	2014/2015	2013/2014	2014/2015
A) Wheat cultivars								
Misr 1	43.8	40.3	1.91	1.70	20.6	20.7	48.3	41.3
Sids 12	41.6	38.0	1.89	1.47	21.8	21.9	52.1	38.1
Sakha 93	46.6	45.7	1.86	1.87	20.6	20.7	43.4	40.9
LSD at 0.05	1.6	5.25	ns	022	0.60	0.80	1.67	ns
B) Mineral and biofertilizer of nitrogen								
0 kg N/fed	38.0	33.9	1.39	1.21	19.0	19.2	39.8	34.2
25 kg N/fed+ Bio	41.0	38.0	1.72	1.54	19.7	19.9	43.8	37.1
50 kg N/fed + Bio	43.0	40.7	1.91	1.59	21.0	21.8	48.0	39.9
75 kg N/fed + Bio	48.0	45.3	2.14	1.91	21.7	21.9	52.8	42.9
100 kg N/fed	50.3	48.7	2.27	2.15	23.7	23.4	55.3	46.3
LSD at 0.05	1.3	1.6	0.10	0.18	0.62	0.47	1.21	2.50
Interaction								
A x B	*	*	*	*	*	*	*	*

ns.: Not significant difference at 0.05 level of probability, *: Significant different at 0.05 level of probability.

Grain, straw and biological yields as well as HI (%) were significantly and gradually increased by increasing mineral nitrogen supported with biofertilizer in the two investigated seasons. The highest values were taken at 100 kg N/fed and the lowest at control treatment. These results are in agreement with those recorded by Zaki *et al*. (2012) and Abdel – Razek and El – Sheshtawy (2013).

Table (5). Grain, straw and biological yields as well as harvest index of wheat as affected by mineral N fertilization with bio-fertilizer (cerealein) in both seasons

Cultivars	Grain yield (tons / fed)		Straw yield (tons/ fed)		Biological yield (tons/ fed)		HI (%)	
	2013/2014	2014/2015	2013/2014	2014/2015	2013/2014	2014/2015	2013/2014	2014/2015
A) Wheat cultivars								
Misr 1	2.03	1.47	3.85	3.11	5.88	4.58	33.7	32.4
Sids 12	1.82	1.47	4.00	3.13	5.82	4.60	30.8	32.1
Sakha 93	1.83	1.46	3.77	3.26	5.60	4.72	31.4	30.9
LSD at 0.05	n.s	n.s	n.s	n.s	0.01	0.54	2.23	ns
B) Mineral and biofertilizer of nitrogen								
0 kg N/fed	1.51	1.26	2.76	2.80	4.27	3.95	31.1	31.2
25 kg N/fed+Bio	1.67	1.37	3.47	2.97	5.14	4.34	33.8	31.7
50 kg N/fed+Bio	1.83	1.47	3.55	3.11	5.38	4.58	33.2	32.3
75 kg N/fed+Bio	2.14	1.56	4.59	3.36	6.73	4.91	30.3	31.8
100 kg N/fed	2.31	1.68	5.00	3.60	8.11	5.29	31.5	32.0
LSD at 0.05	0.20	0.60	0.33	0.22	0.01	0.22	2.87	1.83
Interaction								
A x B	*	*	*	*	*	*	*	*

ns.: Not significant difference at 0.05 level of probability, *: Significant different at 0.05 level of probability.

Results listed in Table (6) detected that plant height, number of spikes/ m^2 and spike length were significantly affected by the interaction between wheat cultivars and nitrogen fertilizer supported biofertilizer in the first and second season. It's important to clear that, Misr 1 cultivar was the highest when added 100 kg N/fed in the 1^{st} and 2^{nd} seasons and also gave the highest number of spikes/m^2 in the 1st season at 100 kg N / fed and 75 kg N + 200 g cerealein in

the second season. It is important to clear that, Sids 12 cultivar surpassed of the two other varieties in spike length character under the application of 100 kg N/ fed during the two studied season. these results were in agreement with those obtained by Abdel – Razek and El – Sheshtawy (2013).

Results presented in Tables (2 to 5) showed that growth, yield and its components were significantly varied by the interaction between wheat cultivars and mineral N + bio fertilizer nitrogen. These results indicated that wheat cultivars and mineral N and bio fertilizer nitrogen act dependently on the preview mentioned characters.

Table (6). The interaction effect between wheat cultivars and mineral nitrogen fertilization + cerealein inoculation of plant attributes in 2013/2014 and 2014/2015 seasons

Wheat Cultivars	Mineral and biofertilizer of nitrogen	Plant height (cm)		No of spikes / m2		Spike length (cm)	
		2013/2014	2014/2015	2013/2014	2014/2015	2013/2014	2014/2015
Misr 1	0 kg N/fed	80.0	80.0	216.7	213.3	8.8	8.8
	25 kg N/fed+ Bio	86.0	84.7	252.3	248.3	9.3	9.4
	50 kg N/fed+ Bio	89.0	87.7	261.3	268.3	9.5	9.5
	75 kg N/fed+ Bio	93.3	91.7	278.3	274.3	9.8	9.7
	100 kg N/fed	97.7	97.3	283.0	238.7	10.0	10.2
Sids 12	0 kg N/fed	76.3	77.3	176.7	180.0	9.1	9.1
	25 kg N/fed+ Bio	83.7	81.7	215.7	219.7	9.3	9.4
	50 kg N/fed+ Bio	88.0	86.3	224.7	238.7	9.7	9.7
	75 kg N/fed+ Bio	91.3	88.7	255.0	260.0	10.5	10.2
	100 kg N/fed	96.3	93.0	259.7	263.0	10.6	10.7
Sakha 93	0 kg N/fed	71.3	70.0	216.7	206.7	8.2	8.5
	25 kg N/fed+ Bio	77.0	74.7	242.3	242.0	8.8	9.0
	50 kg N/fed+ Bio	83.7	82.7	251.3	248.7	9.2	9.1
	75 kg N/fed+ Bio	89.0	84.7	265.0	266.7	9.4	9.3
	100 kg N/fed	91.0	89.0	273.0	274.3	9.7	9.9
LSD at 0.05		2.26	2.03	12.36	10.2	0.26	0.44

Results presented in Table (7 and 8) pointed out that the number of grains/spike, grain weight/spike and 1000 – grain weight, grain, straw and biological yields were significantly affected by the interaction between the three wheat cultivars and nitrogen treatments supported with bio fertilizers during the two investigated seasons. It is important to say that Sakha 93 gave the highest values of number of grains/spike, grain weight / spike and 1000- grain weight in the first and second seasons under the application of 100 kg N/ fed. While, Misr 1 gave highest value of grain yield (2.53 tons/fed) and Sakha 93 equaled with Sids 12 in the second season (1.69 tons/fed) with 100 kg N /fed application. In addition, Sids 12 cultivar gave the highest value of straw yield (5.19 ton /fed) in the 1st season and Sakha 93 (3.68 tons/ fed) at the rate of 100 kg N / fed in the second season. It is important to clear that Sids 12 was the heaviest in biological yield character in the first season.

Table (7). Interaction effect between wheat cultivars and mineral nitrogen fertilization + cerealein inoculation of yield and its components in 2013/2014 and 2014/2015 seasons

Treatments		No of grains/spike		Grain weight /spike (g)		1000- grain weight (g)	
Cultivars	fertilizers	2013/2014	2014/2015	2013/2014	2014/2015	2013/2014	2014/2015
Misr 1	0 kg N/fed	37.7	31.7	1.21	1.15	40.9	35.9
	25 kg N/fed +Bio	42.0	39.3	1.67	1.69	43.5	38.7
	50 kg N/fed +Bio	43.0	41.7	1.90	1.71	47.5	40.1
	75 kg N/fed +Bio	47.0	43.3	2.24	1.81	54.3	43.4
	100 kg N/fed	49.0	45.7	2.32	2.10	55.6	48.4
Sids 12	0 kg N/fed	35.0	29.3	1.32	0.98	41.6	32.6
	25 kg N/fed +Bio	39.0	33.3	1.71	1.31	46.3	34.6
	50 kg N/fed +Bio	42.0	38.3	1.92	1.41	52.7	38.6
	75 kg N/fed +Bio	45.0	43.3	2.16	1.75	58.1	40.3
	100 kg N/fed	47.0	45.7	2.35	1.91	61.9	44.1
Sakha 93	0 kg N/fed	40.0	40.7	1.44	1.45	37.2	34.1
	25 kg N/fed +Bio	42.0	41.3	1.77	1.63	41.6	38.1
	50 kg N/fed +Bio	44.0	42.3	1.91	1.64	43.8	40.9
	75 kg N/fed +Bio	52.0	49.3	2.03	2.19	45.9	45.1
	100 kg N/fed	55.0	54.7	2.13	2.43	48.4	46.3
LSD at 0.05		2.25	2.79	0.18	0.32	2.10	4.34

Table (8). Interaction effect between wheat cultivars and mineral nitrogen fertilization+cerealein inoculation of yield in 2013/2014 and 2014/2015 seasons

Cultivars	fertilizers	Grain yield (tons/fed)		Straw yield (tons/fed)		Biological yield (tons/ fed)	
		2013/2014	2014/2015	2013/2014	2014/2015	2013/2014	2014/2015
Misr 1	0 kg N/fed	1.61	1.30	2.84	2.74	4.45	3.71
	25 kg N/fed +Bio	1.52	1.40	3.58	2.80	5.1	4.20
	50 kg N/fed +Bio	2.16	1.48	3.73	3.07	5.89	4.55
	75 kg N/fed +Bio	2.41	1.54	4.28	3.37	6.69	4.90
	100 kg N/fed	2.53	1.65	4.84	3.58	7.37	5.25
Sids 12	0 kg N/fed	1.48	1.26	2.53	2.74	4.01	4.01
	25 kg N/fed +Bio	1.77	1.34	3.52	3.01	5.29	4.36
	50 kg N/fed +Bio	1.59	1.46	3.77	3.05	5.36	4.51
	75 kg N/fed +Bio	2.02	1.61	4.98	3.29	7.00	4.90
	100 kg N/fed	2.22	1.69	5.19	3.56	7.41	5.25
Sakha 93	0 kg N/fed	1.52	1.21	2.92	2.92	4.44	4.12
	25 kg N/fed +Bio	1.71	1.38	3.30	3.11	5.01	4.47
	50 kg N/fed +Bio	1.75	1.48	3.15	3.19	4.9	4.67
	75 kg N/fed +Bio	1.99	1.52	4.51	3.42	6.5	4.94
	100 kg N/fed	2.20	1.69	4.98	3.68	7.18	5.37
LSD at 0.05		0.34	0.11	0.57	0.38		0.38

CONCLUSION

As a result of this two seasons field study, it was concluded that yield and its components of wheat crop increased with sowing wheat cultivar “Misr 1” under 100 kg N/fed or 75 kg N/fed + bio- fertilizer (cerealein) which recorded the highest grain yield under study conditions at El-Behira Governorate, Egypt.

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الملخص العربي

استجابة بعض أصناف القمح للتسميد المعدني والحيوي للنتروجين

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اجريت تجربتين حقليتين بمحطة البحوث الزراعية بإيتاي البارود خلال الموسمين ٢٠١٣ / ٢٠١٤ و ٢٠١٤/ ٢٠١٥ لدراسة أستجابة ثلاثة اصناف من القمح (مصر ١ , سدس ١٢ , سخا ٩٣) لخمسة مستويات من التسميد الازوتي مع اضافة ٢٠٠ جرام سيريالين بمعا ملتها للتقاوي عند الزراعة (صفر , ٢٥ كجم ن + سيريالين / فدان, ٥٠ كجم ن + سيريالين / فدان , ٧٥ كجم ن + سيريالين / فدان , ١٠٠ كجم ن/ فدان).

وتتلخص أهم النتائج فيما يلي : –

- تفوق الصنف مصر ١ على الصنف سدس ١٢ وصنف سخا٩٣ فى ارتفاع النبات وعدد السنابل /م٢ ووزن ال١٠٠٠ حبه ومحصول الحبوب ودليل الحصاد بينما تفوق سدس١٢ فى طول السنبله ، وتفوق الصنف سخا٩٣ فى عدد الحبوب بالسنبله كما اوضحت النتائج ان صنف سدس١٢ كان مبكرا فى طرد السنابل والنضج بينما تأخر صنف سخا٩٣ فى الطرد والنضج.
- ادت زيادة التسميد النتروجينى الى ١٠٠كجم للفدان الى زيادة معنوية فى ارتفاع النبات ومحصول الحبوب والقش والبيولوجى ودليل الحصاد ومكونات المحصول.
- ادى التفاعل بين الاصناف والتسميد النتروجينى الى ظهور اختلافات معنوية حيث تفوق الصنف مصر١ باضافة ١٠٠كجم لنيتروجين للفدان على باقى الاصناف فى صفات ارتفاع النبات وعدد السنابل/م٢ ومحصول الحبوب بينما تفوق الصنف سدس١٢ مع اضافة ١٠٠ وحدة ازوت فى محصول القش والمحصول البيولوجى ووزن١٠٠٠ حبة ووزن حبوب السنبلة.
- أدى تلقيح حبوب القمح بالسماد الحيوي (السيريالين) + ٧٥ كجم ن/فدان لزيادة في محصول الحبوب ومكوناته ، حيث لا توجد فروق معنوية بين هذه المعاملة والتسميد ١٠٠ كجم ن/فدان تحت ظروف منطقة الدراسة.
- ويوصي البحث بزراعة صنف القمح (مصر ١) تحت معدل التسميد ١٠٠ كجم/فدان أو ٧٥ كجم/فدان + السيريالين مما كان له تأثير على زيادة المحصول ومكوناته ويفضل التسميد الحيوي مع المعدني تحت ظروف منطقة ايتاي البارود – البحيرة.