Performance and Genetic Parameters for Some Wheat Genotypes under Different Nitrogen Fertilizer Levels in New Reclaimed Land

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ABSTRACT

Wheat growing has been extended to newly reclaimed lands. This investigation was carried out at the Experimental Farm at El-Bustan area, ARC (sandy soil and sprinkler irrigation) during the two winter seasons, 2006/2007 and 2007/2008. Three experiments were conducted side by side, included three different nitrogen levels (N1=120, N2=180 and N3=240 Kg / ha), one level for each experiment. Fourteen bread wheat genotypes were evaluated and used to estimate coefficient of variability, heritability and expected genetic advance for grain yield, its components and some agronomic characters. The results indicated highly significant differences between the two seasons for number of kernels per spike, 1000-kernel weight and plant height under low nitrogen fertilizer level (N1). On the other hand, seasons mean squares were highly significant for grain yield t/ha, number of kernels per spike, 1000-kernel weight, harvest index and plant height in N2 and N3, respectively. However, all wheat genotypes, at the highest amount of nitrogen level (N3), produced higher grain yield, number of spikes/m^2 , number of kernels / spike and 1000-kernel weight, compared with N1 or N2. Genotype No. 7 gave the highest value of grain yield (3.96 t/ha) under low nitrogen level (N1), while, genotype No. 14 had the highest mean value of number of spikes/m^2 and 1000-kernel weight under high nitrogen level (N3). In general, all garin yield components decreased with decreasing nitrogen fertilizer levels. The genotypic coefficients of variability (GCV) values for all studied characters were lower than those of phenotypic coefficient of variability (PCV) under all nitrogen levels. PCV values were quite higher for biological yield (30.49), harvest index (29.96), grain yield (23.14) and number of spikes /m^2 (21.43) in N1. The same results were recorded in N2, except for number of spikes /m^2 · Whereas, in N3, the high value of PCV was for grain yield (19.75), follwed by biological yield (16.84). On contrast, the number of days to maturity showed considerable low variability, under all nitrogen levels, which indicated little opportunity for improvement through selection. GCV values for biological yield, grain yield, harvest index and number of spikes /m^2 also, were high under all nitrogen levels, except for number of spikes /m^2 in N2. Heritability, in broad sense, ranged from 51 %, for number of spikes /m^2, to 98 % for the number of days to maturity and plant height. In general, high estimates of heritability were found for all traits under this study, except for number of kernels/spikes in N3. The highest, heritability was recorded for plant height, the number of days to maturity and biological yield under all nitrogen levels. The lowest value of heritability was recorded for number of kernels/spikes in all nitrogen levels. Genetic advance showed a wide range of variation across the different nitrogen levels, where it varied from 10.4, for number of days to maturity, to 59.8 for number of biological yield in N1, from 5.32 for number of days to maturity to 55.1 for biological yield, in N2, and from 5.9 for number of days to maturity to 36.4 for grain yield in N3.

Key words: Wheat (Triticum aestivum L.), GCV, PCV, Genetic advance, Heritability.

INTRODUCTION

Wheat is the most important food crop in Egypt and ranks first among all cereals for human food. Wheat growing has been extended to the newly reclaimed land, but, wheat production in the newly reclaimed land is much lower, as compared to many other regions due to abiotic stresses, such as drought, salinity and low fertility. Nitrogen had the largest effect on development, crop growth and achievement of grain yield potential, especially under limited fertilizer conditions (low input system). Wheat genotypes show that a large variation exists for nitrogen utilization and for their tolerance to nitrogen deficiency. Heritability estimates and genetic advance help the prediction of the response to selection (Larik *et al.*,1989). For these reasons, adaptation of wheat genotypes to medium or low soil nutrient content, especially

nitrogen, is the main target for recent national policy in wheat production. The main objectives of this study were to: 1- Screen some bread wheat genotypes for high yielding ability under normal and low nitrogen fertilizer levels, 2- Estimate the coefficient of variability, heritability and genetic advance in some elite lines of wheat for grain yield and some other important traits, as selection criteria, for improving grain yield under different nitrogen fertilizer levels.

MATERIALS AND METHODS

Three field experiments were performed, side by side, in the same field at the Experimental Farm of Abd El-Moneim Riyad Research Station, at El-Bustan area, for the two successive winter seasons, 2006/2007 and 2007/2008, under sprinkler irrigation, where the farm soil was almost sandy. Fourteen bread wheat genotypes, including eleven diverse new advanced elite genotypes, in addition to three commercial cultivars as checks. These promising lines were selected from local yield trails. The pedigree of these genotypes is presented in Table (1).

The wheat genetic materials were subjected to three nitrogen levels, where one level was applied in each experiment as follows: Experiment (1) was grown under low nitrogen level (N1=120 Kg ha^{-1}), Experiment (2) was grown under moderate nitrogen level (N2=180 Kg ha^{-1}) and Experiment (3) was grown under recommended nitrogen level (N3=240 Kg ha^{-1}).

Each experiment was arranged in a randomized complete block desgin (RCBD), with three replications, in both seasons. Each plot consisted of eight rows, 4 meters long and 20 cm apart (plot size=4.8 m^2). Nitrogen fertilizer treatments were applied at eight equal doses for each experiment. during seed bed preparation, phosphorus and potassium fertilizers were applied at the rates of 71 kg ha^{-1} P_2O_5 and 114 Kg ha^{-1} K_2O.

Table 1: Pedigree of fourteen wheat genotypes used in the study

Entry No.	Pedigree
1	MILAN/ MUNIA CMSS92M01740S-015M-0Y-0Y-050M-5Y-3M-0Y-1PZ-0Y-3PZ-0GM
2	CRDN/PASTOR CMSS96M02446S-050M-040Y-050M-020Y-36M-0Y-1M-0Y-0GM
3	OPATA M85/ GEM#9 CG8193-2GM-3GM-0GM
4	SAKHA 93//GIZA 164 /SAKHA 61 CGZ(21)- 2GM-1GM-0G
5	CROC-1/AE.SQUARROSA(205)//KAUZ/3/PASTOR CMSS96M01558S-050M-040Y-0100M-020Y-52M-0Y-0GM
6	OTUS/TOBA97 CHMW98Y00641S84DH-0Y-0GM
7	GALVEZ/WEAVER/3/VORONA/CNO79//KUZ. CMSS93B00271S-23Y-010M-010Y-010M-5Y-0M-0S.
8	BUC//7C/ALD/5/MAYA74/ON//1160.147/3BB/GLL/4/CHAT"S"/6/MAYA/ VUL//CMH74A.630/4*SX. SD7096-4SD-1SD-1SD-0SD.
9	MAYON"S"//CROW"S"/VEE"S" ICW90-0382-5AP-0TS-0BR-2AP-0L-0AP-0SD.
10	MAYA"S"/MON"S"/4/CMH72428/MRC//JUP/3/582/5/A2.SAKHA8/6/ SAKHA69. SD10157-1SD-1SD-2SD-0SD-0SD.
11	HTCML(324)/L.15261L.124 GZ99.SSD89-0GZ-0GZ-6GZ-1GZ-0GZ.
12	SAKHA 93
13	GIZA 168
14	GEMMIZA 9

During the two growing seasons, the following data were recoded:

1-Number of days to maturity (DM).

2- Plant height in cm (PH).

At harvest time, the central four rows of each plot, with three meters long, were harvested by hand and mechanically threshed and the data were recorded for grain yield and its components, as follows:

3- Grain yield /plot (GY): Was estimated as the weight of clean grains of each plot, which was converted to tons ha^{-1}.

4- Biological yield /plot (BY): Was estimated as the total above ground dry mater of each plot and converted to tons ha^{-1}.

5- Number of spikes $/m^2$ (SPN): Was estimated twice by counting the spikes of a random one meter long for guarded rows.

6- Number of kernels / spikes (KN): Was recorded as the average number of kernels per ten spikes taken at random from each plot.

7-1000-kernel weight (KW): Was recorded as the average of two random samples with 1000 kernels of clean grains from each plot.

8- Harvest index (HI): Was estimated according to the formula, GY/BY X100 (HI).

Statistical analysis:

All data of RCBD were analyzed, using SAS package software for each season, then, combined analysis for the two seasons was performed for each experiment (Gomez and Gomez, 1984). The expected mean squares were calculated according, to Snedecor and Cochran (1982).The estimates of variance components were obtained, as suggested by Toker (1998) from the combined analysis.

The phenotypic variance (δ^2p) was estimated as follows:

$\delta^2 p = \delta^2 g + (\delta^2 gy /y) + (\delta^2 e/ry)$

Where, y, r and g are numbers of years , replicates and genotypes, respectively.

$\delta^2 gy$ is the variance components of genotypes x years.

$\delta^2 e$ and $\delta^2 g$ are the variance components for error and genotypes, respectively.

Heritability in broad sense (h^2) was determined as: $\delta^2 g / \delta^2 p$.

The phenotypic and genotypic coefficients of variation were estimated as follows:Phenotypic coefficient of variation (PCV) = (δ p / x) X 100 .

Genotypic coefficient of variation (GCV) = (δ g / x) X 100 .

Where, x = grand mean of all entries.

The genetic advance under selection (GA) was calculated, according to Allard (1960), as follws:

EGA = k x (δ p) x h^2 b.s .

Selection intensity and differential were 5% and 2.06, respectively. The expected genetic advance (EGA) as percentage of the grand mean (EGA %), was calculated as follows: EGA %= (GA / x) X 100

RESULTS AND DISCUSSION

Effect of seasons:

The results of the combined analysis of variance (not presented) revealed highly significant differences between the two seasons for the number of kernels per spike, 1000-kernel weight and plant height under low nitrogen fertilizer level (N1). On the other hand, seasons mean squares were highly significant for grain yield, number of kernels per spike, 1000-kernel weight, harvest index and plant height in both N2 and N3. Significant differences of the effect of seasons were might be due to the large differences in the environmental conditions dominating the experimental site in the two growing seasons. In general, the first season (2006/2007) had the largest values for all studied characters under all nitrogen fertilizer levels, compared with the second season (2007/2008). This finding explained the different genotypic ranking from season to season in all studied traits under different nitrogen fertilizer levels. Ardell *et al.* (2004) found variable response of wheat biological yield and grain yield and its components under different nitrogen fertilizer levels with varied years.

Performance of wheat genotypes:

Mean squares, associated with wheat genotype differences (not tabulated) were found, herein, to reach the level of significance in all studied traits in the combined analysis (Table 2). This finding revealed that the presence of genetic variability among the tested wheat genotypes, which differently ranked from season to season in all studied traits under different nitrogen fertilizer levels. The grain yield over all genotypes increased with increasing nitrogen levels. It ranged from 3.43 t ha^{-1} , in N1 (120 Kg N ha^{-1}). to 4.91 t/ ha^{-1}in N3 (240 Kg N ha^{-1}).

With regard to grain yield (Table 3), it was found to be appreciably influenced by wheat genotypes and different nitrogen fertilizer levels. In general, productivity of all genotypes was significantly affected by nitrogen fertilizer levels All genotypes, at the highest amount of nitrogen (N3), produced higher grain yield, compared with N1 or N2. It was observed.

Table 2 : Average of the studied characters for fourteen wheat genotypes in 2006/2007 and 2007/2008 seasons under different nitrogen levels

Characters	Nitrogen level	2006/2007	2007/2008	Combined	Significance from combined ANOVA
Grain yield (t/ha)	N1	3.48	3.39	3.43	**
	N2	4.73	4.44	4.59	**
	N3	5.21	4.61	4.91	**
Biological yield (t/ha)	N1	13.67	13.51	13.59	**
	N2	14.58	14.52	14.55	**
	N3	15.58	15.39	15.48	**
Number of spikes/m^2	N1	343.30	341.10	342.30	**
	N2	377.40	378.30	377.90	**
	N3	395.20	391.20	393.20	**
Number of kernels /spike	N1	39.70	37.10	38.40	**
	N2	43.40	41.80	42.60	**
	N3	44.60	43.50	44.00	**
1000-kernel weight (g)	N1	40.10	38.00	39.10	**
	N2	42.00	41.50	41.80	**
	N3	43.80	43.20	43.50	**
Harvest index	N1	0.26	0.25	0.25	**
	N2	0.33	0.31	0.32	**
	N3	0.34	0.30	0.32	*
Plant height (cm)	N1	90.60	86.80	88.70	**
	N2	97.50	99.40	98.50	**
	N3	99.50	101.50	100.50	**
Number of days to maturity	N1	140.50	141.00	140.80	**
	N2	140.50	140.60	140.50	**
	N3	142.60	142.30	142.50	**

N1=120 Kg N/ha. N2=180 Kg N/ha. N3=240 Kg N/ha.
* and ** : Significant at 0.05 and 0.01 probability levels, respectively.

that genotype No.13 gave the highest values of grain yield under the high nitrogen level N3 (5.56t/ha) with no significant difference, compared with genotypes No.14, 11 and 12, while, genotype No. 6 gave the lowest value (4.05 t/ha). On the other hand, genotype No. 7 gave the highest value of grain yield (3.96 t/ha) under the low nitrogen level (N1) with no significant difference, compared with genotypes No.12 and 13. The reduction in grain yield for genotype No. 7 was 19% when nitrogen fertilizer decreased from N3 to N1, at the same time, this reduction was 24 and 32% for genotypes No.12 and No.13, respectively. The results indicated that genotype No.7 was more stable when nitrogen fertilizer was a limiting factor in the present area. These results are in harmony with those reported by Ghazal *et al* (1998), Abd El-Ghani and Awad (1999), Patil *et al* (2000) and Allam (2003).

Concerning the number of spikes/m^2, the results indicated that genotype No. 14 had the highest mean value under all nitrogen fertilizer levels, (385, 393.3, and 440 for N1,N2 and N3, respectively). Under N1, genotype No.14 was not significant as compared with genotypes No.1,9,10,11,12 and 13. While, under N2, it was only, significant compared with genotypes No.1and No.4 and significant with all genotypes under high nitrogen level (N3). These results indicated that genotype No.14 was more stable for this trait. Generally, under this study, increasing nitrogen level increased the total number of spikes per unit area. These results agreed with those obtained by El-Badry (1989) and Moustafa *et al* (1997).

The differences among wheat genotypes, under different nitrogen fertilizer levels, concerning the number of kernels / spike, reached the significance level in the combined analysis. The results showed that genotype No.12 produced the highest number of kernels /spike over all other genotypes under N1 and N2 (42.0 and 45.8, respectively). Also, it was not significant with genotype No.14, which produced the highest number of kernels /spike under high nitrogen level (N3). On contrast, the genotypes No. 3,1 and 5 recorded the lowest values under N1, N2 and N3 (35.6, 37.8 and 41.0, respectively). Ghazal *et al* (1998) and Abd El-Ghani and Awad (1999) reported that all grain yield components decreased with decreasing nitrogen fertilizer levels.

One –thousand weights is an important grain yield component in the present area. Genotype No.14 gave the highest mean value (44.3 and 45.7g) under N2 and N3, respectively, but was not significant with genotype No.4, which gave the highest value (41.3g) under low nitrogen level N1. These results indicated that an increase in the nitrogen level resulted in an increase in the grain weight. These results agreed with the findings of Chaudhary and Mehmood (1998), Abad almed *et al* (2000) and Erkossa *et al* (2000) who concluded that grain yield and its components were significantly affected by wheat genotypes and nitrogen fertilizer levels. On contrast, Saleh *et al* (1985) reported that 1000-kernel weight decreased with increasing nitrogen rates.

Table 3: Means of grain yield (t/ha),number of spikes / m^2, number of kernels /spike and 1000- kernel weight as affected by wheat genotypes under different nitrogen levels (combined data).

Genotype	Grain yield (t/ha)			Number of spikes / m^2			Number of kernels /spike			1000-kernel weight (g)		
	N1	N2	N3	N1	N2	N3	N1	N2	N3	N1	N2	N3
1	3.06	4.11	4.58	373.3	356.7	373.3	35.7	37.8	43.8	36.8	40.6	41.8
2	3.05	4.76	5.00	340.0	383.3	386.7	38.7	42.2	43.8	38.6	41.5	43.3
3	3.26	4.54	4.77	343.3	373.3	375	35.6	39.5	42.5	38.1	39.0	42.6
4	3.02	3.99	4.67	301.7	340.0	373.3	37.7	41.8	44.0	41.3	42.5	42.7
5	3.19	4.38	5.01	338.3	378.3	376.7	37.0	41.8	41.0	38.4	42.6	43.4
6	3.37	4.10	4.05	321.7	376.6	366.7	37.6	42.3	45.5	36.2	40.1	42.1
7	3.96	4.93	4.88	303.3	390.0	378.3	36.3	40.3	44.5	39.8	41.6	44.5
8	3.33	4.62	4.93	290.0	386.7	398.3	37.8	43.8	43.3	40.4	41.0	44.0
9	3.58	4.48	4.62	355.0	386.0	393.3	38.3	44.2	43.3	39.0	40.5	41.2
10	3.54	4.69	4.90	361.7	375.0	396.7	38.2	42.5	43.5	38.9	42.4	43.7
11	3.40	4.55	5.22	355.0	388.3	410.0	40.7	44.0	44.3	38.6	42.2	44.1
12	3.89	4.73	5.14	361.7	385.0	420.0	42.0	45.8	45.3	40.8	44.2	45.3
13	3.78	5.02	5.56	361.7	376.7	416.6	40.8	45.2	45.3	40.8	42.5	44.9
14	3.61	5.32	5.42	385.0	393.3	440.0	41.2	45.0	46.3	39.7	44.3	45.7
LSD 0.05	0.32	0.39	0.53	34.3	23.16	15.58	2.04	1.71	1.84	1.60	1.62	1.30

N1=120 Kg N/ha. N2=180 Kg N/ha. N3=240 Kg N/ha.

Table 4: Means of biological yield (t/ha), harvest index, plant height (cm) and number of days to maturity as affected by wheat genotypes under different nitrogen levels (combined data)

Genotype	Biological yield (t/ha)			Harvest index			Plant height (cm)			Number of days to maturity		
	N1	N2	N3	N1	N2	N3	N1	N2	N3	N1	N2	N3
1	12.36	12.92	14.57	0.249	0.321	0.314	88.3	92.5	98.3	138.5	139.8	142.0
2	12.08	12.71	15.12	0.255	0.376	0.330	88.3	93.33	97.5	138.0	139.0	141.3
3	11.46	12.50	14.79	0.286	0.363	0.323	91.7	101.7	150	139.0	139.2	141.5
4	11.04	12.15	13.89	0.278	0.328	0.337	89.1	94.17	96.7	137.5	139.2	140.0
5	12.36	13.19	14.72	0.259	0.336	0.341	93.3	101.6	103.3	137.7	139.2	141.0
6	12.78	13.47	13.9	0.265	0.304	0.288	90.8	103.3	101.7	139.0	140.0	141.8
7	13.96	14.79	15.63	0.286	0.334	0.312	82.5	99.17	101.	140.0	140.5	141.5
8	13.82	15.07	15.97	0.242	0.307	0.308	90.8	96.67	95.8	139.8	139.7	142.5
9	15.90	15.83	16.04	0.226	0.283	0.289	85.8	95.0	96.7	143.2	141.2	141.8
10	16.18	16.32	15.76	0.220	0.286	0.312	90.8	97.5	96.7	143.1	142.2	144.3
11	15.55	15.97	17.15	0.220	0.286	0.305	89.2	101.7	104.2	145.2	141.2	143.7
12	15.13	15.76	16.74	0.258	0.306	0.308	84.2	103.3	105	141.7	140.2	142.3
13	13.54	16.74	16.53	0.281	0.300	0.334	89.2	105.8	105	140.8	141.7	143.7
14	14.10	16.32	15.83	0.256	0.326	0.346	87.5	92.5	100.0	147.2	144.5	147.0
LSD 0.05	1.20	1.26	1.30	0.028	0.035	0.034	4.21	3.02	3.54	1.68	1.44	1.38

N1=120 Kg N/ha. N2=180 Kg N/ha. N3=240 Kg N/ha.

The differences among wheat genotypes, under different nitrogen levels, in biological yield, harvest index, plant height and number of days to maturity were found to be significant in the combined analysis (Table 4). In general, the highest values of these traits were obtained from plants received the fertilizer level N3, while, the lowest values were obtained by the plants received the fertilizer levels N2 and N1, respectively. Similar results were reported by Frederick and Camberato (1995), Moustafa *et al* (1997), Ryan *et al* (1997) and Allam (2002). It could be concluded that these variations in the results were quite expected since the tested wheat genotypes had some differences in their genetic structure and their responses to environmental conditions.

Genetic parameters:

Table (5) shows the estimates of phenotypic coefficient of variability (PCV), genotypic coefficient of variability (GCV), broad-sense heritability (h^2), expected genetic advance (EGA) and expected genetic advance as a percentage of mean. The phenotypic coefficient of variability (PCV) was higher than genotypic coefficient of variability (GCV) for all studied characters under all nitrogen fertilizer levels.At low nitrogen level (N1), a perusal coefficient of variability indicated that PCV was quite higher for biological yield (30.49), harvest index (29.96), grain yield (23.14) and number of spikes /m^2 (21.43). Similar results were recorded in N2, except for number of spikes /m^2 , whereas, in N3, the high value of PCV was that of grain yield (19.75), follwed by biological yield (16.84). On contrast, number of days to maturity showed considerable low variability, under all nitrogen levels (5.20, 2.64 and 3.08, respectively), which indicated little opportunity for improvement through selection. This observation was in agreement with the results of Sundeep *et al.* (2002). Moreover, genotypic coefficient of variability (GCV) for biological yield, grain yield, harvest index and number of spikes /m^2 also, were high under all nitrogen levels, except for number of spikes /m^2 in N2.

With respect to heritability in broad sense, it ranged from 51.3 to 97.9%. In general, high estimates of heritability were found for all traits under this study, except for number of kernels/spikes in N3. The highest heritability was recorded for plant height,

Table 5: Genetic parameters for grain yield, biological yield, spike number per m^2, kernel number per spike, 1000-kernel weight, harvest index, plant height and number of days to maturity under different nitrogen levels.

Character	Nitrogen level	Range	Grand mean	P.C.V.	G.C.V.	h^2 (%) (b.s)	EGA	EGA (%) of mean
Grain yield (t/ha)	N1	3.02-3.96	3.43	23.14	21.82	88.9	1.45	42.3
	N2	3.99-5.32	4.59	20.66	19.49	89.0	1.55	33.8
	N3	4.04-5.56	4.91	19.75	18.67	89.4	1.79	36.36
Biological yield (t/ha)	N1	11.04 -16.18	13.59	30.49	29.77	95.3	8.13	59.8
	N2	12.15- 16.74	14.55	28.60	27.66	93.5	8.02	55.1
	N3	13.89- 17.15	15.48	16.84	15.72	87.1	4.67	30.20
Number of spikes/m^2	N1	290.0-385.0	342.3	21.43	20.21	89.0	134.4	39.3
	N2	340.0- 393.3	377.9	9.87	9.12	85.3	65.60	17.4
	N3	366.7- 440.0	393.2	13.69	13.50	97.3	107.9	27.44
Number of kernels /spike	N1	35.7- 42.0	38.4	14.86	12.65	72.5	8.52	22.2
	N2	37.8- 45.8	42.6	14.66	12.78	76.0	9.76	22.9
	N3	41.0- 46.3	44.0	9.82	7.03	51.3	4.56	10.4
1000-kernel weight (g)	N1	36.2 - 41.3	39.1	10.65	8.91	70.0	6.00	15.3
	N2	39.0- 44.3	41.8	9.50	8.64	82.7	6.77	16.2
	N3	41.2 – 45.7	43.5	7.85	7.47	90.6	6.37	14.7
Harvest index	N1	0.220-0.286	0.254	29.96	21.20	85.3	0.10	40.3
	N2	0.283- 0.376	0.318	22.79	22.12	94.3	0.14	44.24
	N3	0.289- 0.346	0.318	15.31	13.78	81.0	0.08	25.47
Plant height (cm)	N1	82.5-93.3	88.7	8.46	8.10	91.8	14.18	15.9
	N2	92.5- 105.8	98.4	11.34	11.22	97.9	22.47	22.8
	N3	95.8-105.0	100.5	8.87	8.63	94.7	17.39	17.3
Number of days to maturity	N1	137.5-147.2	140.8	5.20	5.13	97.3	14.67	10.4
	N2	139.0- 144.5	140.5	2.64	2.61	97.9	7.48	5.32
	N3	140.0- 147.0	142.5	3.08	2.97	93.1	8.41	5.90

number of days to maturity and biological yield under all nitrogen levels. The lowest value of heritability was recorded for number of kernels/spikes in all nitrogen levels.

The expected genetic advance, expressed as a percentage of mean (genetic gain), showed a wide range of variations across the different nitrogen levels and varied from 10.4 to 59.8, in N1, from 5.32 to 55.1, in N2, and from 5.9 to 36.4 in N3 . High genetic advance was associated with high heritability estimates for biological yield and harvest index, in N1 and N2, and for grain yield in N1. These estimates reflected the possibility of effective selection for this trait. The results were in agreement with those reported by Masood and Chaudhry (1987).

Moderate to high values of heritability and genetic advance reflected the involvement of additive gene action for the inheritance of these traits. However, the high estimates of heritability with low genetic advance were detected for number of days to maturity, 1000-kernel weight and plant height, except in N2 for plant height. These results indicated that selection for these traits, in early segregation generation, might not be effective due to the presence of non-additive gene action and high genotype-environment interaction. Besides, low heritability estimates (51.3) with low genetic advance (10.4) were observed for number of kernels / spike in N3. Many researchers reported the presence of high heritability and genetic advance in different grain yield related attributes in wheat(Ashraf *et al.* (2002), Kamal *et al.* (2003), Khalil and Afridi (2004), Ansari *et al.* (2005), Inamullah *et al.* (2006), Shabana *et al.* (2007) and Waqar *et al.* (2008).

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الملخص العربى

أداء بعض التراكيب الوراثية للقمح وتقدير ثوابتها الوراثية تحت مستويات مختلفة من التسميد النيتروجينى فى الأراضى الجديدة المستصلحة

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أجرى البحث بالمزرعة البحثية لوحدة البحث والتطوير بمنطقة البستان تحت ظروف الأراضى الرملية والرى بالرش الثابت خلال الموسمين الشتويين ٢٠٠٦ /٢٠٠٧ و ٢٠٠٧ / ٢٠٠٨ لتقييم اربعة عشر تركيبا وراثيا للقمح تحت ثلاثة مستويات من التسميد النيتروجينى ، وشملت الدراسة ثلاث تجارب حقلية جنبا إلى جنب فى نفس الحقل، كل تجربة حقلية تحت مستوى واحد من التسميد النيتروجينى كما يلى:

١- ١٢٠ كيلو جرام نيتروجين بالهكتار و ٢- ١٨٠ كيلو جرام بالهكتار و ٣- ٢٤٠ كيلو جرام بالهكتارمع تقدير المعايير الوراثية تحت المستويات المختلفة للنيتروجين والتى تساعد فى عملية الأنتخاب. ويمكن تلخيص أهم النتائج فى النقاط التالية :

١- وجدت أختلافات عالية المعنوية بين موسمى الزراعة لصفات عدد حبوب السنبلة ووزن الألف حبة و أرتفاع النبات تحت كل مستويات النيتروجين، بالأضافة إلى صفة محصول الحبوب ودليل الحصاد فى كل من المستوى الثانى والثالث.

٢- سجلت كل التراكيب الوراثية أعلى القيم لمحصول الحبوب تحت المستوى الثالث من التسميد النيتروجينى ، بالمقارنة مع المستويين الأول والثانى .

٣- أعطى التركيب الوراثى رقم ٧ أعلى محصول حبوب(٣,٩٦ طن /هكتار) تحت مستوى النيتروجين المنخفض ، وكان أقل التراكيب فى النقص لمحصول الحبوب بنقص التسميد النيتروجينى .

٤- كانت قيم معامل الأختلاف المظهرى أعلى من قيم معامل الأختلاف الوراثى لكل الصفات المدروسة تحت كل مستويات النيتروجين.

٥- سجلت قيم معامل الأختلاف المظهرى قيما عالية لصفة المحصول البيولوجى ودليل الحصاد و محصول الحبوب وعدد السنابل بالمتر المربع وذلك تحت مستوى التسميد النيتروجينى الأول والثانى ، ماعدا صفة عدد السنابل بالمتر المربع تحت المستوى الثانى، بينما كانت أعلى القيم لصفة محصول الحبوب تحت المستوى الثالث من التسميد النيتروجينى.

٦- سجلت صفة عدد الأيام للنضج أقل القيم لمعامل الأختلاف المظهرى و معامل الأختلاف الوراثى تحت المستويات الثلاث من التسميد النيتروجينى.

٧- سجلت قيم درجة التوريث (فى المدى الواسع) لمختلف الصفات تحت الدراسة حيث تراوحت ما بين ٥١,٣ و ٩٧,٩ % .وكانت أعلى القيم لصفات ارتفاع النبات وعدد الأيام للنضج والمحصول البيولوجى، وكانت أقل القيم لصفة عدد السنابل بالمتر المربع.

٨- سجلت صفات المحصول البيولوجى ودليل الحصاد قيما عالية لكل من درجة التوريث والتقدم الوراثى تحت كل من مستوى النيتروجين الأول والثانى ، بينما سجلت صفة عدد السنابل بالمتر المربع أقل القيم لدرجة التوريث والتقدم الوراثى تحت المستوى الثالث من التسميد النيتروجينى.