

YIELD PERFORMANCE AND STABILITY OF NEW BREAD WHEAT LINE

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Abstract

A new bread wheat (*Triticum aestivum* L) promising line was obtained from the national wheat research program at Sakha Agric. Res. Stn. and tested in yield trails for two successive seasons. In 2003/2004, nine preliminary yield trials experiments were conducted at nine different locations representing the whole country. Moreover, 28 advanced yield trails were carried out to compare the new line with the local commercial cultivars in 2004/2005. Also, stability parameters of grain yield were calculated for the new promising line and the local commercial cultivars. The results showed that the new promising line has high yielding ability and good yield stability especially in North and Middle Delta as well as in Middle Egypt. Therefore, it's highly recommended for these regions. On the other side, growing this new line in Upper Egypt or out valley is not recommended.

INTRODUCTION

One of the important strategy of wheat program, is breeding new high yielding wheat cultivars which characterized by yield stability and resistance to wheat diseases especially rusts. So, using micro and macro environments are essential to test new wheat promising lines (Comstock and Moll, 1963). In addition, Joppa *et al.* (1971) reported that stability analysis could materially asses the plant breeder in making decision regarding cultivar release. They also added that a cultivar which has a regression coefficient more than one may yield relatively more than others in proper environment. Moreover, El-Nagar (1997) showed that most wheat cultivars having high grain yield were unstable. However, Peterson (1997) cleared the importance of regional trials to test wheat cultivars. Thus, stability of wheat cultivars has been studied by many investigators (Hayam, s. Mahgoub,1996, Ageez *et al.* 1999, El-Sayed and Hefnawy 2001, Moshref 2001, El Shami *et al.* 2005 and Shehab EL-Din *et al.* 2005).

This study was conduct to identify the yielding ability and stability of a new bread wheat promising line developed by the National wheat breeding program.

MATERIALS AND METHODS

The new promising bread wheat line, has been selected from the exotic materials tested at Sakha Agric. Res. Stn., Egypt. The cross name and pedigree of this line is: OPATA / RAYON//KAUZ.

CMBW90Y3180-0T0PM-3Y-010M-010M-010Y-6M-0S.

Two levels of yield trials were used in this study:-

- 1- Preliminary Yield Trials:-** The new promising line was tested for grain yield ability comparing to those of the commercial cultivars, Sakha 61, Sakha 69, Sids 1 and GIZA 168 at nine Res. Stn., representing different geographical zones i.e., Sakha (North Delta), Gemmiza and Itay El-Barood (Middle Delta), Sids and Mallawy (Middle Egypt), Shandaweel and El-Mattana (Upper Egypt) as well as the New Valley and El - Nubaria (new land out Valley) in 2003/2004 growing season. The statistical design used was RCBD with four replicates according to Steel and Torrie (1980). The plot area was 4.8m², 6 rows, 4m long and 20 cm apart.
- 2- Advanced Yield Trials:-** the new promising line was tested for grain yield ability versus the same commercial cultivars in 28 locations in 2004/2005 growing season. The plot area was 3.0 x 3.5 = 10.5 m². At harvest, the two external rows were eliminated from each plot at preliminary and advanced yield trial experiments to avoid the boarder effect. So, four and 13 rows, respectively, were harvested, threshed and their grain yields were weighed and adjusted to ardab/fad.
- 3-** Stability parameters for grain yield were calculated according to Eberhart and Russell (1966).

RESULTS AND DISCUSSION

1- Preliminary Yield Trials,

Table (1) shows grain yields (ardab/fad.) of the new promising line and four commercial wheat cultivars (checks) in the preliminary yield trials conducted at nine research stations in 2003/2004 growing season. These research stations represent the old and new lands of Egypt. The results indicate that the new promising line significantly overcame all checks in grain yield at Sakha (North Delta) and Itay El-Barood (Middle Delta) in the old land and at the New Valley and El-Nubaria (new land). Moreover, the new promising line significantly surpassed all checks in the overall mean. Meanwhile, grain yield of the new promising line was superior at Sids and Mallawy (Middle Egypt) and at Shandaweel (Upper Egypt), although this increase could not reach the significance.

2- Advanced Yield Trials :

Table (2) shows the grain yields of the new promising line and the four commercial wheat cultivars (checks) in the advanced yield trials conducted at 28 locations in 2004/2005 growing season. In North Delta, grain yield of the new promising line was significantly superior to the mean of checks at Sakha and El-Dakahlia. Whereas, at Kafr El-Shekh and El-Serow, grain yield of the promising line was superior to the mean of checks but the difference was insignificant. Moreover, in Middle and South Delta, the new promising line significantly overcame the mean of checks at 3 locations namely, El- Gemmiza, El- Behira and Itay El-Barood, while at the other locations there were insignificant differences (Table 2).

In Middle Egypt region, the mean grain yield of check cultivars surpassed that of the new line, however, the differences were insignificant. On the other hand, the grain yields of the new line surpassed those of the check mean in three locations El- Nubaria, El- Ismailia and New Valley and vice versa in North Saini. On the other side, at Assuit and El- Oynat, grain yield of the new line was superior to the mean of checks with insignificant differences. From the obtained results it seems that the new promising line was sensitive to heat stress. So, it is not recommended for that region. These results are in harmony with those of Tammam *et. al.* 2000 and Tammam *et. al.* 2005.

3- Stability Parameters for Grain Yield :

Stability parameters for grain yield of the new promising line and the checks were presented in Table (3). The new promising line had better stability parameters for grain yield in the old land at North Delta, Middle and South Delta, Middle Egypt and Upper Egypt. These findings are supported by those of Joppa *et al.* (1971), Ageez *et al.*(1999), EL-Sayed and Hefnawy (2001), Moshref (2001), EL-Shami *et al.*(2005) and shehab El-Din *et al.* (2005).

In out valley, although the new promising line had high grain yield and significantly overcame the check means in three out of the six tested locations and had a regression coefficient of 1.08, the new line was unstable because it had a significant deviation from regression. These results agreed with those obtained by EL-Nagar (1997) and Peterson (1997).

In conclusion, these results indicate that the maximum grain yield potentiality is expected to be obtained from growing the new promising line in the old land at North Delta, South and Middle Delta, Middle Egypt. On the other hand growing this line in Upper Egypt or in the new land is not recommended.

Table 1. Grain yield (Ard./Fad.) of the preliminary yield trials for the new promising line and four bread wheat cultivars (checks) in 2003/2004 growing season.

Loc. Genotype	Sakha	EL-Gemmiza	Itai El- Barood	Sids	Mallawy	Shandweel	EL-Mattana	New valley	EL-Nubaria	Mean
Sakha 61	23.40	18.80	12.00	26.90	15.20	22.10	18.60	11.00	11.60	17.70
Sakha 69	24.90	24.00	14.20	24.30	17.10	19.90	17.80	12.30	13.40	18.70
Sids 1	23.10	16.90	14.10	26.40	18.10	21.70	16.00	14.30	7.80	17.60
Giza168	27.40	24.90	17.00	23.40	16.60	19.30	15.60	14.20	16.30	19.40
New Line	31.20	21.70	20.70	28.40	19.10	23.30	17.40	12.20	21.50	21.70
Mean	25.30	15.10	15.10	25.90	15.20	21.30	15.60	12.80	13.50	17.80
L.S.D 5%	2.00	1.70	1.70	5.30	2.80	4.40	2.00	2.70	4.70	1.20

Table 2. Grain yield (ard./fad.) of the advanced yield trials for the new promising line and four bread wheat cultivars (Checks) in 2004/2005. growing season.

Genotype	Sakha 61	Sakha 69	Sids 1	Giza 168	Check Mean	New Line	L.S.D 5%
<u>North Delta</u>							
Sakha	19.06	21.15	20.43	24.32	21.24	23.83	2.16*
Kfr.-Shekh	19.98	24.60	19.50	22.42	21.63	22.92	3.85
Dakahlia	18.80	22.00	18.67	22.00	20.37	21.80	1.38*
El-Serw	14.75	17.47	16.92	19.58	17.18	19.20	2.13
<u>Middle & South Delta</u>							
EL - Gemmiza	19.90	23.67	22.31	24.02	22.48	25.55	2.80*
EL - Gharbia	21.09	24.22	20.66	27.34	23.33	26.26	3.09
EL - Sharkia	15.49	16.49	17.30	18.95	17.06	15.04	2.03
Sers Elliaan	17.14	21.87	19.80	21.48	20.07	22.34	2.41
Behira	19.07	18.97	21.17	20.50	19.93	21.74	1.70*
Itay EL-Barood	16.99	18.16	19.67	20.86	18.92	22.30	1.60*
EL - Monofia	17.94	20.87	18.80	19.67	19.32	19.27	3.07
EL - Qalubia	19.07	22.80	18.94	23.80	21.15	21.80	5.77
<u>Middle Egypt</u>							
EL - Giza	28.27	33.34	33.34	30.00	31.24	30.67	2.36
EL - Fayoum	19.87	21.20	21.80	20.40	20.82	20.00	3.69
Sids	22.80	21.20	24.27	20.80	22.27	22.40	2.56
Beni Sweef	22.52	23.99	25.00	23.32	23.71	23.24	1.34
Mallawy	19.40	20.34	21.90	21.24	20.72	20.32	0.72
<u>Upper Egypt</u>							
Shandaweel	12.86	16.54	14.95	14.17	14.63	16.52	2.17
Mattana	13.54	18.87	17.40	19.00	17.20	19.27	2.35
Sohag	17.00	21.67	20.67	17.67	19.25	18.34	1.67
Kom Ombo	14.46	17.18	20.95	17.11	17.43	18.48	2.70
Aswan	11.89	12.49	13.16	11.08	12.16	12.71	2.55
<u>Out Valley</u>							
EL - Nubaria	13.54	15.76	13.44	18.27	15.25	20.02	2.81*
EL - Ismailia	4.81	3.42	4.27	5.41	4.48	6.80	0.25*
N.Sainai	7.10	11.61	11.17	12.43	10.58	9.24	1.25
New Valley	9.68	11.93	11.97	12.64	11.56	13.40	1.80*
Asuit	11.89	12.49	13.16	13.08	12.66	12.71	2.00
EL - Oynat	12.54	13.42	9.77	12.69	12.11	11.81	2.75

Table 3. Stability parameters for grain yield (ard./fad.) of the new promising line and the checks in 2004/2005 growing season.

Region	Entry	Mean	B	S ² _d
North Delta	Sakha 61	18.15	1.04	-0.48
	Sakha 69	21.31 a	1.24	1.23
	Sids 1	18.88	0.63	-0.27
	Giza 168	22.08 a	0.76	0.74
	Checks Mean	20.11		
	N.P.Line	21.94	0.87	-0.18
L.S.D 5%		1.23		
Middle and South Delta	Sakha 61	18.34	0.69*	-0.64
	Sakha 69	20.89 a	0.91	2.12*
	Sids 1	19.83	0.49*	-0.01
	Giza 168	22.08 a	1.06	0.16
	Checks Mean	20.29		
	N.P.Line	21.79 a	1.33	0.94
L.S.D 5%		1.05		
Middle Egypt	Sakha 61	22.57	1.01	-0.18
	Sakha 69	24.01a	1.49	3.39*
	Sids 1	25.26	1.36	-0.07
	Giza 168	23.15a	1.10	1.47
	Checks Mean	23.75a		
	N.P.Line	23.33a	1.25	-0.19
L.S.D 5%		1.20		
Upper Egypt	Sakha 61	13.95	0.58	0.74
	Sakha 69	17.35 a	1.13	0.43
	Sids 1	17.43 a	1.03	3.41*
	Giza 168	15.81	1.06	0.52
	Checks Mean	16.14 a		
	N.P.Line	17.06	0.85	0.64
L.S.D 5%		1.00		
Out Valley	Sakha 61	9.93	0.85	1.68*
	Sakha 69	11.44	1.12	-0.03
	Sids 1	10.63	0.83	2.11
	Giza 168	12.42 a	1.08	0.39
	Checks Mean	11.11		
	N.P.Line	12.36	1.08	5.33*
L.S.D 5%		0.80		

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القدرة المحصولية والثبات لسلاله جديدة من قمح الخبز

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تم استنباط سلالة جديدة من قمح الخبز بواسطة البرنامج القومى لبحوث القمح فى محطة البحوث الزراعية بسخا وتم تقييمها فى تسع من تجارب المحصول المصغرة و ٢٨ تجربة من تجارب المحصول المكبرة مثلت جميع مناطق زراعة القمح بالجمهورية خلال الموسمين الزراعيين ٢٠٠٣ | ٢٠٠٤ و ٢٠٠٤ | ٢٠٠٥ لمقارنة محصولها بالأصناف المحلية التجارية عالية الإنتاجية وكذلك تم تقدير الثبات لمحصول الحبوب للسلالة الجديدة وللأصناف المحلية . وقد أظهرت النتائج أن السلالة الجديدة المبشرة تتمتع بقدرة محصولية عالية وتتميز بالثبات فى محصول الحبوب وخصوصاً فى مناطق شمال وجنوب الدلتا ومصر الوسطى فى الأراضى القديمة . كما تبين من النتائج حساسية هذه السلالة لدرجات الحرارة العالية مما أدى إلى تفوق محصول أصناف المقارنة عليها فى مناطق مصر العليا وخارج الوادى لهذا لا يوصى بزراعتها فى مصر العليا وخارج الوادى ويوصى بزراعة هذه السلالة فى الدلتا ومصر الوسطى فى الأراضى القديمة.