

GRAIN YIELD AND STABILITY OF THE NEW EGYPTIAN BREAD WHEAT CULTIVAR SIDS 12

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ABSTRACT

The new promising bread wheat cultivar Sids 12 was newly released from the Egyptian Wheat research department, Field crops research institute, ARC, Egypt. Sids 12 had been selected from a local cross made at Sids Agriculture research Station. Yield evaluation was performed through 61 experiments conducted at different levels of preliminary and advanced yield trials during the three successive growing seasons from 2002/2003 to 2004/2005 2005. Results proved superiority of the new bread wheat cultivar Sids 12 compared with the commercial checks cultivars of Sakha 61, Sakha 69, Sakha 93 and Giza 168 at North, South and Middle Delta regions. Sids 12 cultivar out yielded Gemmiza 9 at Middle and Upper Egypt. Stability parameters for grain yield revealed that Sids 12 cultivar had better stability parameters in Middle and Upper Egypt, therefore, it could be recommended for planting in these regions.

INTRODUCTION

Wheat is the leading human food crop in Egypt. The total National consumption from wheat ranges from 13 million tons whereas, the national wheat production was fluctuating about eight million tons during the last five years. Therefore, the import wheat about six million tons. Reducing the gap between national wheat production and consumption is a national goal. For doing so, breeding for new high yielding cultivars is an ongoing process for the National Wheat Research Program, Field Crops Research Institute (FCRI), Agricultural Research Center (ARC), to increase wheat production vertically. Moreover, increasing wheat production horizontally also, requires,

high yielding wheat cultivars for the newly reclaimed areas east and west of Nile Delta and around the Nile Valley at Upper Egypt.

In mid 1990's, Sids 1, the commercial bread wheat cultivar was released for cultivation in Middle and Upper Egypt as well as in saline soils (Ghanem *et al.*, 1996). Two high yielding bread wheat cultivars, Sakha 93 and Giza 168 were released by Shehab El-Din *et al.*, in 1999 year, when they proved their superiority and wide adaptability to all Egyptian districts. Sakha 93 cultivar showed good tolerance to unfavorable environmental conditions, e.g. salinity and drought. In different successive series, further bread wheat cultivars, i.e. Gemmeiza 7 (Shehab El-Din *et al.*, 2000), Gemmeiza 9 (Mosaad *et al.*, 2000), Sakha 94 (Shehab El-Din *et al.*, 2005) and Gemmeiza 10 (El-Shami *et al.*, 2005) were released during the last eight years, for the same goal.

The present investigation is actually an evaluation for yielding ability and stability of the new developed bread wheat cultivar, Sids 12, comparing to the superior Egyptian commercial cultivars.

MATERIALS AND METHODS

Following the principles of pedigree method, the new promising cultivar Sids 12, has been selected from a local cross made at Sids Agricultural Research Station. The pedigree and history of this cross is :
BUC//7C/ALD/5/MAYA74/ON//1160.147/3/BB/GLL/4/CHAT"S"/6/MAYAVUL//
CMH74A.630/4*SX. ,SD7096-4SD-1SD-1SD-0SD.

The new promising cultivar Sids 12 was tested in eight, preliminary yield trials in 2002/2003 season at different stations representing the whole country, Shaka (North Delta), El-Gemmeiza and Itay El-Barod (Middle Delta), El-Nobaria (West Delta), Sids and Mallowy (Middle Egypt), Shandaweel and The New Valley (Upper Egypt). The plot area was 6 rows, 3.5 m long and 20 cm. apart. Moreover, Sids 12 was tested for grain yielding ability versus the commercial cultivars (checks) Sakha 69, Giza 168, Sakha 93 and Gemmeiza 9 in the advanced yield trials during the two seasons 2003/2004 and 2004/2005. In these advanced yield trials, all promising lines as well as checks were tested in large plot area (3x 3.5 m = 10.5m²) experiments. However, to represent all regions, 53 trials were carried out all over the country during 2003/2004 and 2004/2005 seasons. The statistical design used in these experiments was the Randomized Complete Block Design (RCBD) with four replicates according to Steel and Torrie (1980). All recommended cultural practices for each region were applied on all experiments. In additions stability parameters for grain yield of the advanced yield trials were calculated according to Eberhart and Russell (1966).

RESULTS AND DISCUSSION

1- Preliminary Yield Trials:

The results in Table 1 show the grain yield expressed as Ardab/Faddan (ard/fad) of the preliminary yield trials for the new bread wheat cultivar Sids 12 and three bread wheat commercial cultivars, of Sakha 61,

Sakha 69 and Giza 168 in 2002/2003 season. It is obvious from this table that Sids 12 had significantly surpassed Sakha 61 at six out of the eight tested locations and in the over all mean. Moreover, Sids 12 was not significantly different from the other two checks. On the other hand, Giza 168 had significantly overcome Sids 12 at Sakha location. The results indicated that sids 12 cultivar surpassed sakha 61 cultivar in the preliminary trials by 23.91% over eight locations. The results show that the sids 12 cultivar exceeded sakha 61 at sids location by 28.82% and by 38.65% at El-Nobaria location. In addition, Sids 12 cultivar produced highest yield at both sids and El-Gemmeiza locations compared with other locations.

Table 1: Grain yield(ard/fad) of the preliminary yield trials for Sids 12 and three bread wheat cultivars in 2002/2003 Season.

Location Cultivar	Sakha	El-Gemmeiza	Itai El-Barood	Sids	Mallawy	Shandaweel	New-Valley	El-Nobaria	Mean
Sakha 69	23.89	27.49	21.78	32.36	19.66	21.69	13.57	24.27	23.09
Giza 168	26.37	31.09	20.80	27.71	21.87	20.65	15.01	26.89	23.80
Sakha 61	20.81	25.10	17.89	22.17	17.31	18.35	13.53	19.04	19.28
Sids 12	24.44	29.81	22.94	28.56	21.74	21.90	15.34	26.40	23.89
Mean,	23.23	27.93	21.00	27.64	20.46	20.95	14.55	23.25	22.38
LSD 5%	1.93	2.81	2.35	4.09	3.99	3.91	2.72	5.02	1.10
CV%	5.89	7.12	7.94	10.49	13.83	13.23	13.23	15.30	11.36

2- Advanced Yield Trials :

The results of the advanced yield trials in North Delta in 2003/2004 season denonstrated in Table 2-a revealed that Sids 12 significantly overcome the three commercial cultivars at one location only (El-Dakhlia-1) and had significantly exceeded Sakha 93 at El-Serw and Giza 168 at El-Dakhlia 2 locations. Meanwhile, the over all mean of North Delta, proved that, Sids 12 mean was significantly higher than those of two checks, Sakha 69 and Sakha 93 and insignificantly affected with Giza 168 cultivar. It could be stated that sids 12 cultivar significantly surpassed sakha 93 cultivar by 9.67% over the four locations and by 51.05% at Dakhlia location. The results indicated that highest grain yield at advanced yield trials was produced four Sakha and Dakhlia locations compared with other locations. In addition, the results of the advanced yield trials in Middle and South Delta in 2003/2004 season shown in (Table 2-b) the results clearly indicate that there was insignificant difference between Sids 12 and each of the other three checks at all tested locations. Sakha 69 cultivar exceeded all studied cultivars at all locations except Sers El-lian which sids 12 cultivar significantly surpassed all studied cultivars, the results indicated that sids 12 cultivars exceeded Giza 168 by 22.96% at this location. Meanwhile, in the over all mean of Middle and South Delta, Sids 12 cultivar significantly surpassed the bread wheat commercial cultivar Sakha 93, 3.59%. Similarly, the advanced yield trials in Middle and Upper Egypt in 2003/2004 season presented in Tables 2 c and d showed that Sids 12 cultivar insignificantly differd in grain yield compared with those of to the three checks either at the tested locations or in the over all mean of Middle or Upper Egypt. The results indicated that sids 12 cultivar significant out yielded only at sids and Mallawy locations all studied cultivars

Sids 12 cultivar exceeded Sakha 93 cultivar by 12.2 % at Sids location and by 9.67% at Mallawy location at Middle Egypt .In addition at the four locations ,the results show both El-Fayoum and Sids locations exceeded both El-Giza and Mallawy location over studied cultivars in advanced trials . Regarding advanced trials at Upper Egypt locations ,The results indicated that Sids 12 cultivar surpassed both Giza 168 and Sakha 93 cultivars overall locations and all locations except El-Mattana location. Overall studied cultivars highest grain yield was recorded from El-Mattana location compared with other locations at Upper Egypt .

Table 2a : Grain yield (ard / fad) of the advanced yield trials for Sids 12 and three bread wheat cultivars at North delta in 2003/2004 season.

Location Cultivar	Sakha	El-Serw	El-Dakhliya-1	El-Dakhliya-2	Mean
Sakha 69	24.92	18.89	14.67	27.00	21.37
Giza 168	25.38	20.09	22.00	21.34	22.20
Sakha 93	25.76	14.40	15.67	26.00	20.46
Sids 12	26.10	17.34	23.67	22.67	22.44
Mean	25.78	18.53	19.73	24.47	22.13
LSD 5%	1.66	1.98	0.75	1.14	0.71
CV %	4.52	7.50	2.65	3.27	4.63

Table 2-b : Grain Yield (ard / fad) of the Advanced Yield Trials for Sids 12 and Three Bread Wheat Cultivars at Middle & South Delta in 2003/2004 Season.

Location Cultivar	El-Gem-meiza	Sers-Ellian	Itay El - Barood	El-Behira	Kafr El-Hamam	El-Shrkia	ElQalu-obia	Mean
Sakha 69	27.52	22.86	20.34	20.14	21.54	18.00	26.74	22.45
Giza 168	26.58	20.42	19.62	19.67	19.44	17.91	24.34	21.14
Sakha 93	28.52	21.64	18.68	19.00	21.47	16.35	20.60	20.89
Sids 12	25.08	25.11	19.07	19.60	21.00	18.73	22.87	21.64
Mean	28.10	22.96	20.27	19.88	20.38	17.96	23.07	21.80
LSD 5%	2.36	0.88	2.58	2.01	2.03	1.78	3.37	0.74
CV %	5.88	2.68	5.46	5.99	6.98	6.95	10.25	6.46

Table 2-c : Grain yield (ard / fad) of the advanced yield trials for Sids 12 and three bread wheat cultivars at middle Egypt in 2003/2004 season.

Location Cultivar	El-Giza	El-Fayoum	Sids	Mallawy	Mean
Sakha 69	24.17	26.00	24.67	19.88	23.68
Giza 168	25.74	25.60	24.94	19.68	23.99
Sakha 93	24.44	26.34	22.54	18.60	22.98
Sids 12	22.94	24.40	25.29	20.40	23.26
Mean	24.19	25.87	24.69	19.67	23.61
LSD 5%	2.85	5.11	2.19	1.65	1.68
CV %	8.25	13.85	6.22	5.86	10.21

Table 2-d : Grainy (ard / fad) of the advanced yield trials for Sids 12 and three bread wheat cultivars at upper Egypt in 2003/2004 Season.

Cultivar	Location	Shand-aweel	El-Mattana	Kom-Ombo	Mean
Sakha 69		19.97	22.40	16.88	19.75
Giza 168		16.64	21.00	15.71	17.78
Sakha 93		16.84	23.94	16.03	18.94
Sids 12		18.54	21.60	17.74	19.29
Mean		19.49	22.09	17.46	19.68
LSD 5%		2.90	3.19	3.12	1.74
CV %		10.40	10.10	12.53	11.69

Table 2-e: Grain yield (ard / fad) of the advanced yield trials for sids 12 and three bread wheat cultivars at out valley in 2003/2004 season.

Location Cultivar	Nobaria	S.Tah--reer	El-Shar-kia	El-Aree-sh	Assuit	Abo-Sembel	New-Valley	Mean
Sakha 69	19.84	18.20	20.30	11.60	9.37	5.91	9.88	13.63
Giza 168	16.10	18.20	20.94	11.97	10.40	6.77	11.03	13.63
Sakha 93	17.11	17.60	17.67	10.97	9.34	5.19	10.62	12.78
Sids 12	14.36	17.47	19.37	11.47	9.20	5.33	10.71	12.56
Mean	16.50	17.17	18.64	12.25	10.13	5.39	10.95	13.01
LSD 5%	1.67	--	--	1.28	1.17	0.85	--	0.62
CV %	7.11	9.90	4.34	7.33	8.07	10.97	15.51	9.02

Furthermore, results of the advanced yield trials of Out Valley locations in 2003/2004 season .The results in table 2-e indicated that the new bread wheat cultivar, Sids 12 had insignificant difference in grain yield compared with the three checks at the all tested locations. Over all mean Sids 12 cultivar showed the lowest grain yield comparing to those of the three checks.

Regarding the advanced yield trials conducted at North Delta in 2004/2005 season .The results listed in Table 3-a. Clearly showed that Sids 12 cultivar significantly exceeded the three checks at one location at (El-Dakhliia -1). It also, significantly surpassed two of the three checks at El-Dakhliia 2 location and in the over all mean of North Delta. Sids 12 cultivar significantly exceeded Sakha 93 cultivar at Sakha location, while Sakha 93 had significantly overcome it at El-Serw location . The results clearly showed that sids 12 cultivar exceeded Sakha 93 by 11.41 % and Giza 168 by 6.87% over all locations of north Delta .Over all studied cultivars ,Sakha location out yielded other locations .

The results of advanced yield trials at Middle and South Delta in 2004/2005 season are presented in Table 3-b. These results proved that Sids 12 had significantly surpassed two checks (Giza 168 and Gemmeiza 9) at El-Gemmeiza location and it had significantly overcome Sakha 93 at El-Behira location, while it had no significant differences with to the three checks

at four locations, namely Itay El-Barod, Kafr El-Hamam, El-Qalubia and Bahteem.

Table 3-c showed the results of the advanced yield trials conducted at Middle Egypt in 2004/2005 season. It is evident from these results that the new bread wheat cultivar Sids 12 had significantly overcome Gemmeiza 9 at Mallawy location and in the over all mean. On the other hand, Sids 12 had no significant difference with the other checks at the other four locations and with the over all mean of Middle Egypt.

Table 3-a: Grain yield (ard / fad) of the advanced yield trials for sids 12 and three breed wheat cultivars at north delta in 2004/2005 season.

Location Cultivar	El-Serw	El- Dakhlia-1	El- Dakhlia-2	Sakha	Mean
Giza 168	15.56	22.00	21.80	29.08	22.11
Sakha 93	17.55	19.74	21.64	25.86	21.20
Gemmeiza 9	16.03	25.34	23.50	28.22	23.27
Sids 12	14.83	26.87	23.94	28.82	23.62
Mean	14.50	25.06	22.42	28.53	22.63
LSD 5%	2.09	1.13	0.65	2.12	0.79
CV %	10.13	3.18	2.04	5.23	5.05

Table 3-b: Grain yield (ard / fad) of the advanced yield trials for sids 12 and three breed wheat cultivars at middle & south delta in 2004/2005 season.

Location Cultivar	Itay El- Barod	El- Behira	ElGemm- eiza	Sers- Elilian	Tag Elezz	K. El- Hamam	ElShar- kia	El- Mono- fia	El- Qalubia	Bah- teem	Mean
Giza 168	21.34	25.67	24.38	22.58	21.47	22.54	17.55	27.87	21.54	20.27	22.52
Sakha 93	23.27	20.54	25.02	21.22	22.87	22.82	17.49	26.34	24.87	19.07	22.35
Gemmeiza 9	22.27	25.20	20.75	20.44	23.87	19.25	19.78	23.00	24.67	20.74	22.00
Sids 12	21.60	24.20	27.05	20.90	20.80	21.10	14.46	23.67	24.34	19.40	21.75
Mean	23.45	24.27	24.36	20.97	21.43	21.64	18.79	24.98	23.26	20.12	22.33
LSD %	2.01	0.76	2.63	0.69	0.61	2.58	1.89	1.84	--	--	0.72
CV %	6.03	2.20	7.59	2.30	1.98	8.38	7.05	5.16	9.53	14.90	7.32

Table 3-c: Grain yield (ard / fad) of the advanced yield trials for sids 12 and three breed wheat cultivars at middle Egypt in 2004/2005 season.

Location Cultivar	Sids	El- Fayoum	El- Giza	Mallawy	El-Minia	Mean
Giza 168	24.87	30.22	24.47	23.75	24.60	25.58
Sakha 93	24.70	29.78	23.40	23.74	23.34	24.99
Gemmeiza 9	23.84	29.00	21.60	20.09*	23.40	23.59
Sids 12	26.67	29.87	25.20	24.26	22.80	25.76
Mean	25.06	30.51	23.05	22.31	23.14	24.81
LSD 5%	--	2.71	--	2.64	3.41	1.31
CV%	9.11	6.23	9.01	8.29	10.35	8.51

The advanced yield trials carried out at Upper Egypt in 2004/2005 season (Table 3-d) revealed that Sids 12 had significantly outyielded the local checks Giza 168 and Gemmeiza 9 at Assuit location, whereas it significantly surpassed Gemmeiza 9 only at El-Mattana location and in the over all mean of Upper Egypt. For The Out Valley, results of the advanced yield trials in 2004/2005 season illustrated Table 3-e. revealed that Sids 12 had significantly overcome Giza 168 and Sakha 93 at El-Ismallia and it had significantly exceeded Gemmeiza 9 only at El-Ewoinaat location. Meanwhile, Sids 12 was not significantly different from to the three checks at El-Nubaria, El-Sharkia are at The New Valley locations.

Table 3-d: Grain yield (ard / fad) of the advanced yield trials for sids 12 and three breed wheat cultivars at Upper Egypt in 2004/2005 Season.

Location Cultivar	Assuit	Shandaweel	El-Mattana	Kom Ombo	Mean
Giza 168	11.64*	21.40	21.00	18.37	18.10
Sakha 93	13.27	24.64	19.94	15.29	18.28
Gemmeiza 9	11.47*	20.10	17.07*	17.93	16.64*
Sids 12	13.77	21.17	20.34	17.96	18.31
Mean	12.40	22.08	20.20	18.54	18.31
LSD 5%	1.52	--	3.26	--	1.31
CV %	8.60	9.27	11.32	10.21	10.27

Table 3-e: Grain yield (ard / fad) of the advanced yield trials for sids 12 and three breed wheat cultivars at Out valley in 2004/2005 season.

Location Cultivar	El-Nobaria	El-Ismallia	El-Sharkia	New Vally	El-Ewoinaat	Mean
Giza 168	17.27	6.20	16.60	14.17	8.20	12.49
Sakha 93	18.83	5.53	17.12	12.47	8.27	12.44
Gemmeiza 9	18.97	6.84	18.58	13.27	5.47	12.63
Sids 12	15.50	6.82	15.41	14.10	9.60	12.29
Mean	18.92	6.40	17.41	13.91	8.87	13.10
LSD 5%	--	0.18	--	2.27	2.05	1.15
CV %	12.76	1.99	10.31	11.44	16.23	12.62

3- Stability Parameters for Grain Yield:

Stability parameters for grain yield of the advanced yield trials in 2003/2004 and 2004/2005 seasons were calculated according to Eberhart and Russell (1966). The stable cultivar according to this method was defined as one which had a high average performance over a wide range of environments, a regression coefficient of 1.0 and no deviation from regression mean square. The results in Tables 4 and 5 revealed that Sids 12 had better stability parameters in Middle Egypt and Upper Egypt in 2003/2004 and 2004/2005 seasons. Therefore it could be recommended for planting in those environments , only.

Table: (4): Grain yield stability parameters for sids 12 as compared with local checks in advanced yield trials in 2003/2004 season.

Region	Cultivar	Stability Parameters		
		Grain Yield (ard/fad)	b	S ² _d
North Delta:				
	Sakha 69	21.37*	1.36	12.55**
	Giza 168	22.20	0.47	3.25**
	Sakha 93	20.46*	1.75	1.58**
	Sids 12	22.44	0.78	8.78**
	LSD 5%	0.72		
Middle & South Delta:				
	Sakha 69	22.45*	0.98	1.96**
	Giza 168	21.14	0.88	1.04*
	Sakha 93	20.89*	1.10	1.23*
	Sids 12	21.64	0.72	1.70**
	LSD 5%	0.74		
Middle Egypt:				
	Sakha 69	23.68	0.97	-1.44
	Giza 168	23.99	1.02	-0.49
	Sakha 93	22.98	1.14	0.58
	Sids 12	23.26	0.72	-0.28
	LSD 5%	1.68		
Upper Egypt :				
	Sakha 69	19.75	1.18	-0.86
	Giza 168	17.78	1.17	0.13
	Sakha 93	18.94	1.76	3.53*
	Sids 12	19.29	0.85	-0.63
	LSD 5%	1.74		
Out Valley:				
	Sakha 69	13.63*	1.19	1.73**
	Giza 168	13.63*	1.03	0.98**
	Sakha 93	12.78	0.97	0.66**
	Sids 12	12.56	1.02	0.91**
	LSD 5%	0.41		

Table: (5): Grain yield stability parameters for sids 12 as compared with local checks in advanced yield trials in 2004/2005 season.

Region	Cultivar	Stability Parameters		
		Grain Yield (ard/fad)	b	S ² _d
North Delta:				
	Giza 168	22.11*	0.88	3.97**
	Sakha 93	21.20*	0.50	4.95**
	Gemmeiza 9	23.27	0.87	-0.21
	Sids 12	23.62	1.03	0.57
	LSD 5%	0.80		
Middle & South Delta:				
	Giza 168	22.52*	1.20	1.93**
	Sakha 93	22.35	1.09	2.43**
	Gemmeiza 9	22.00	0.59	2.71**
	Sids 12	21.75	1.50	1.94**
	LSD 5%	0.72		
Middle Egypt:				
	Giza 168	22.58	0.77	-0.77
	Sakha 93	24.99	0.80	-0.79
	Gemmeiza 9	23.59*	0.97	-0.02
	Sids 12	25.75	0.75	0.28
	LSD 5%	1.32		
Upper Egypt :				
	Giza 168	18.10	1.06	-0.22
	Sakha 93	18.28	1.06	7.98**
	Gemmeiza 9	16.64*	0.85	0.45
	Sids 12	18.31	0.78	-0.59
	LSD 5%	1.31		
Out Valley:				
	Giza 168	12.49	0.92	-0.22
	Sakha 93	12.44	1.05	-0.39
	Gemmeiza 9	12.63	1.14	2.69**
	Sids 12	12.29	0.70*	0.31
	LSD 5%	1.03		

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محصول الحبوب والنبات لصنف قمح الخبز الجديد سدس ١٢

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تم استنباط صنف جديد من قمح الخبز هو سدس ١٢ من قسم بحوث القمح بالانتخاب من الهجين المحلى بمحطة البحوث الزراعية بسدس.

ولقد تم إجراء ٦١ تجربة حقلية لمقارنة المحصول سواء المصغره منها أو المكبره تتضمن الصنف الجديد سدس ١٢ بالإضافة لأصناف قمح الخبز التجارية المنزرعة فى ثلاثة مواسم ابتداء من ٢٠٠٢/٢٠٠٣ حتى ٢٠٠٤/٢٠٠٥. ولقد أظهرت النتائج تفوق الصنف الجديد سدس ١٢ على الأصناف للتجارية سخا ٦١، سخا ٦٩، سخا ٩٣ وجيزة ١٦٨ فى مناطق شمال ووسط وجنوب الدلتا. وكذلك فقد تفوق الصنف الجديد سدس ١٢ على الصنف جميزة ٩ فى منطقتى مصر الوسطى والعليا. وأظهر تحليل الثبات لمحصول الحبوب للصنف الجديد سدس ١٢ أنه يتميز بالثبات فى منطقتى مصر الوسطى والعليا ولذلك ينصح بزراعته فى هاتين المنطقتين فقط.