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A NEW EARLY MATURING LENTIL CULTIVAR: SINA 1

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ABSTRACT

The new early lentil (*Lens culinaris* Medikus) cultivar Sinai 1, which is a selection from the Argentinean variety Precoz, has developed by lentil breeding program, Food Legume Research Program, ARC, Egypt. Its yield performance and stability was evaluated in 155 various types of yield trials in Egypt during the period from 1995/96 to 2000/2001 seasons in old and new reclaimed lands, and from 1991/92 to 1997/98 seasons in rainfed areas. The seed yield of Sinai 1 exceeded the yield of the wide spread local cultivar Giza 9 by 12.3%, 10.6%, and 70.5% in old lands at North Egypt (Delta region), in new reclaimed lands and in rainfed areas, respectively, while it gave lower seed yield than Giza 9 in old lands at South Egypt. Sinai 1 matured earlier than Giza 9 by 21 days in north, 7 days in south, and 28 days in rainfed areas. Moreover, it showed considerable yield stability and resistance to root-rot and wilt diseases. We recommend to grow Sinai 1 in rainfed and new reclaimed areas and in old lands in North Egypt specially before cotton in cotton rotation farming systems, which may help to expand the cultivated area of lentil in Egypt.

INTRODUCTION

Lentil (*Lens culinaris* Medikus) is an important dietary item in Egypt and in many other Mediterranean countries (Abou-Shakra and Tannos, 1981). Lentil seeds are rich in protein (25%) content (Hamdi and Elemery, 1996), it provides nutritionally rich residues for animal feed (Nordblom and Halimeh, 1982), and play a key role in maintaining productivity of the soil particularly through biological N fixation (Saxena, 1988).

In Egypt lentil grows mainly in old lands of the Nile valley. The cultivated area was remained stable until 1975-76 (about 70,000 feddan). However, from 1977, the area has decreased annually, and reached about 5000 feddan only in 2000-2001. The average seed yield has increased from 3.9 ardab/feddan (624 kg/fed) in 1950s to 4.4 ardab/feddan (704 kg/fed) in 2000-2001 (Anonymous, 2001).

The main reason behind decline lentil area in old lands are the competition of other winter crops as wheat, berseem (clover) and vegetables that are more profitable to the farmers, and which now occupy much of the area previously used for lentil. Insert lentil planting before cotton in cotton rotation is an important way to increase lentil area in the Nile valley (Hamdi, 1998). Lentil has recently spread to outreach of the Nile valley, as in the new reclaimed desert areas and in North Coast of the country under rainfed conditions, but lentil area in these regions still low and reached about 705 feddan in the new reclaimed lands and 902 feddan in rainfed areas (Average of 1993-99).

To grow lentil successfully in new reclaimed lands, rainfed areas and before cotton in cotton rotation in old lands, early maturing lentil varieties (short duration) must be available, because early maturing varieties can be harvested early and allow farmers to plant cotton in proper time. Lentil requires low water, so it is suitable for planting in new reclaimed lands.

Because lentil has recently grown under rainfed conditions in North Coast of Egypt, producing drought tolerant cultivars become important objective in lentil breeding program (Hamdi, 1998). Early maturing lentil varieties are mostly adapted to dry environments due to their drought escaping (Hamdi *et al.* 1992, Silim *et al.* 1993). Fischer and Maurer (1978) noted that quantification of drought tolerance should be based on seed yield under dry conditions even in the absence of an understanding of specific mechanisms of tolerance. A few accessions of cultivated lentil have been identified as being adapted to drought (Hamdi *et al.* 1992) due to their early in maturity. Another source of drought tolerance was also identified in wild lentil (Hamdi and Erskine, 1996).

Therefore, releasing early maturing lentil varieties is an important aim in lentil breeding program at ARC in Egypt. The present study aimed to evaluate the yield potential and stability of the new early maturing cultivar Sinai 1 under various agro-ecological regions in Egypt.

MATERIALS AND METHODS

The cultivar 'Sinai 1' was developed by pure line selection from the Argentinean variety 'Precoz' which introduced from the International Center of Agricultural Research in the Dry Areas (ICARDA), Aleppo, Syria. Selections within Precoz were made for uniformity of seed size and shape and color of both testa and cotyledons. Further selections among progeny rows were made for uniformity to days to flowering, growth habit, and days to maturity. Sinai 1 is characterized by an erect growth habit, medium plant height, with leaves that have large sized leaflets, purple stem color, flowers are mostly white. Pods contain single large seed (100 seeds = 4.5 g), which have yellow testa and cotyledons.

The selected line was evaluated, comparing with the local cultivar Giza 9, for yield potential and stability and earliness in maturity over wide range of locations in primarily and advanced yield trials and on-farm trials at farmer's fields. The trials were conducted in old lands at North, Middle and South Egypt, at new reclaimed lands outreach the Nile Valley and under rainfed conditions in North Coast of the country. The total number of trials was 155, as 26 primarily yield trials (14 trials in North and 12 in Middle and South Egypt), 48 advanced yield trials (21 and 27 trials in North and South Egypt, respectively), 23 on-farm trials (12 and 11 trials in North and South Egypt, respectively), 20 and 38 trials at new reclaimed lands and in rainfed areas, respectively. Both primarily and advanced yield trials were carried out at Agricultural Research Stations of ARC at Nubaria (Alexandria), Itay El-Barood (Beheira), Sakha (Kafr El-Sheikh), Gemmiza (Gharbeia), Giza, Sids (Beni-Suif), Mallawy (El-Minia), Shandaweel (Sohag), and Mataana (Quena). On-farm trials were conducted in farmer's fields in old lands at Beheira, Kafr E l-Sheikh, Dakahlia, and Assuit governorates, and

in new reclaimed lands at Nubaria, Alexandria (El-Hamam), Beheira, East Ismailia, West Beni-Suif, and Al-Wadi El-Gadeed. In rainfed areas the trials were carried out at North Sinai and Matrouh, where the rainfalls were 221, 205, 99.4, 211, and 408 mm in winter seasons in 1991/92, 1994/95, 1995/96, 1996/97, and 1997/98, respectively. The rainfalls in 1992/93 and 1993/94 seasons were less than 80 mm and hence the trials were cancelled due to poor germination.

In all trials a randomized complete block design with 4 replicated was used, but with different plot size. In primarily yield trials 4 rows, 3m long and 0.3m width giving 4.8m^2 -plot size was used. In advanced and on-farm trials a plot size of 14.4 m^2 (12 rows, 4m long and 0.3m width) was applied. In rainfed areas, a strip plot design with 40 m^2/plot was used. Seedling rate was 60 kg/fed, but in rainfed areas 25kg/fed was used. Number of days from sowing to when 90% of the plants/plot were completely matured was recorded. At harvesting, plants/plot were harvested by hand, threshed, and seeds weighed. Statistical analysis of variance was made for each trial separately and F test was used to compare between means (Gomez and Gomez, 1984). Stability analysis was calculated according to the method described by Eberhart and Russell (1966).

The new cultivar Sinai 1 and the check cultivar Giza 9 were tested against the causal organisms of root-rot (*Rhizoctonia solani*) and wilt (*Fusarium oxysporum*) separately in pots trials at Giza in two seasons in 2000/2001 and 2001/2002 and against the complex diseases (root-rot and wilt) in sick-plot at Giza in 1999/2000 and in pots trial in 2001/2002 at Giza according to the method described by Hamdi *et al.* (1991). Percentage of infected plants (disease incidence) was recorded two months after planting. Number of healthy and survival plants was counted and percentage of survival plants was calculated and used as disease index as follows: (1) 80-100% survival plants = highly resistant (HR); (2) 70-79% = resistant (R); 60-69% moderately susceptible (MS); 50-59% susceptible (S), and less than 50% is highly susceptible (HS).

RESULTS AND DISCUSSION

The average seed yield of Sinai 1 and Giza 9 in 14 primarily yield trials conducted in North Egypt are given in Table (1 a). The data show that Sinai 1 gave an average seed yield of 494 kg/fed comparing with 399 kg/fed for Giza 9. The percentage yield increase of Sinai 1 over Giza 9 was recorded 23.8%. Regarding the stability parameters (Table 1 b), both cultivars showed regression coefficients did not differ significantly from unity (b = 1) and deviation from regression did not differ significantly from zero (S^2_d = 0). Coefficient of determination (R^2) of Sinai 1 and Giza 9 were high and recorded 0.953 and 0.949, respectively, indicating a better fit of the linear model with usual regression analysis applied (Hamdi *et al.*, 1995). The results indicate that both cultivars are stable. However, Sinai 1 gave an average seed yield above overall mean, while the average seed yield of Giza 9 was below overall mean, indicating that Sinai 1 is better than Giza 9. In this regard, Eberhart and Russell (1966) noted that the stable entry should has regression coefficient = 1,

deviation from regression = 0 and seed yield above average mean. Sinai 1 matured at 121.8 days after sowing, while Giza 9 matured at 143 days. Sinai 1 was also found to be the earliest in maturity when compared with 24 lentil genotypes in several locations in Egypt (Ibrahim, 2001).

Table 1 (a): Average seed yield (kg/fed) for Sinai 1 comparing with the check cultivar Giza 9 evaluated in primarily yield trials at various agricultural research stations in North Egypt in six seasons (1995/96-2000/2001).

Location	Season	Seed yield (kg/fed)		
		Giza 9	Sinai 1	Significance
Nubaria	1995/96	270	528	*
Gemmiza	1995/96	670	700	NS
Gemmiza	1995/96	650	635	NS
Nubaria	1996/97	780	806	NS
Sakha	1996/97	156	323	**
Gemmiza	1996/97	260	410	*
I. El-Barood	1997/98	201	175	NS
Gemmiza	1997/98	535	555	NS
Gemmiza	1997/98	553	832	*
Gemmiza	1998/99	225	321	NS
Gemmiza	1998/99	100	265	*
Gemmiza	1999/2000	620	650	NS
Gemmiza	1999/2000	395	540	*
Gemmiza	2000/2001	171	176	NS
Overall mean		399	494	**
CD		228.46	219.58	
SE		61.06	58.69	

Average days to maturity of Sinai 1= 121.8 and Giza 9 = 143.
Seed yield approximated to the nearest kg.
*, ** Significant at 0.05 and 0.01 levels of probability.
NS: Not significant.

Table 1 (b): Stability parameters of Giza 9 and Sinai 1 in primarily yield trials at North Egypt.

Cultivar	No. of trials	Mean yield Kg/fed	Regression Coefficient (b)	Deviation from regression	R^2
Giza 9	14	399	1.021	0.237	0.953
Sinai 1	14	494	0.979	0.222	0.949

The results of advanced yield trials which carried out in North Egypt (Table 2 a) show also the superiority of Sinai 1. Its seed yield was exceeded the yield of Giza 9 by 8.1% and also matured earlier by 22.9 days. Similar trend of stability was observed, where both cultivars were stable, but Sinai 1 had higher seed yield than Giza 9 and hence considers better than Giza 9 (Table 2 b).

The results of 12 on-farm trials conducted in farmer's fields in North Egypt during 1995/96 to 2000/2001 (Table 3 a) show that seed yield of Sinai 1 was

significantly higher than the yield of Giza 9 in 11 trials. Despite the overall seed yield of Sinai 1 exceeded the yield of Giza 9 by 4.9%, the differences between them was not significant. Again both cultivars were stable in these locations as shown in Table (3 b). Sinai 1 was matured at 126.9 days, while Giza 9 matured at 150.8 days.

Table 2 (a): Average seed yield (kg/fed) for Sinai 1 comparing with the check cultivar Giza 9 evaluated in advanced yield trials at various agricultural research stations in North Egypt in five seasons (1995/96-1999/2000).

Location	Season	Seed yield (kg/fed)		
		Giza 9	Sinai 1	Significance
Nubria	1995/96	92	398	**
Sakha	1995/96	179	114	NS
I.El-Barood	1995/96	301	578	**
Gemmiza	1995/96	654	608	NS
Nubaria	1996/97	482	621	**
Sakha	1996/97	862	856	NS
I.El-Barood	1996/97	826	690	*
I.El-Barood	1996/97	971	923	NS
Gemmiza	1996/97	552	461	NS
Gemmiza	1996/97	542	788	*
I.El-Barood	1997/98	336	327	NS
I.El-Barood	1997/98	376	302	NS
I.El-Barood	1997/98	385	317	NS
Gemmiza	1997/98	697	1109	**
Gemmiza	1997/98	961	967	NS
Gemmiza	1997/98	869	707	NS
Gemmiza	1998/99	236	172	NS
Gemmiza	1998/99	74	265	**
Gemmiza	1999/2000	457	574	*
Gemmiza	1999/2000	390	431	*
Gemmiza	1999/2000	516	417	NS
Overall mean		512.30	553.57	
CD		274.04	271.31	NS
SE		59.80	59.20	

Average days to maturity of Sinai 1= 127.7 and Giza 9 = 150.6.
Seed yield approximated to the nearest kg.
*, ** Significant at 0.05 and 0.01 levels of probability.
NS: Not significant.

Table 2 (b): Stability parameters of Giza 9 and Sinai 1 in advanced yield trials at North Egypt.

Cultivar	No. of trials	Mean yield Kg/fed	Regression Coefficient (b)	Deviation from regression	R^2
Giza 9	21	512.30	1.006	0.387	0.913
Sinai 1	21	553.57	0.995	0.361	0.911

Table 3 (a): Average seed yield (kg/fed) for Sinai 1 comparing with the check cultivar Giza 9 evaluated in on-farm trials in North Egypt in six seasons (1995/96-2000/2001).

Location	Season	Seed yield (kg/fed)		
		Giza 9	Sinai 1	Significance
Kafr El-Sheikh	1995/96	381	467	*
Kafr El-Sheikh	1996/97	520	558	**
Kafr El-Sheikh	1996/97	475	500	*
Kafr El-Sheikh	1997/98	958	893	NS
Kafr El-Sheikh	1997/98	696	775	*
Kafr El-Sheikh	1998/99	640	558	**
Kafr El-Sheikh	1999/2000	600	750	*
Kafr El-Sheikh	1999/2000	806	845	*
Beheira	1999/2000	582	675	**
Dakahlia	1999/2000	816	1125	*
Dakahlia	2000/2001	731	766	*
Kafr El-Sheikh	2000/2001	1104	802	*
Dakhlia				
Overall mean		692.42	726.17	NS
SD		206.06	188.01	
SE		59.48	54.27	

Average days to maturity of Sinai 1= 126.9 and Giza 9 = 150.8.
Seed yield approximated to the nearest kg.
*, ** Significant at 0.05 and 0.01 levels of probability.
NS: Not significant.

Table 3 (b): Stability parameters of Giza 9 and Sinai 1 in on-farm trials at North Egypt.

Cultivar	No. of trials	Mean yield Kg/fed	Regression Coefficient (b)	Deviation from regression	R^2
Giza 9	12	692.42	1.053	0.521	0.877
Sinai 1	12	726.17	0.947	0.909	0.852

Seed yield performance and stability analysis of Sinai 1 and Giza 9 evaluated in Middle and South Egypt in primarily, advanced, and on-farm trials during 1995/96 to 2000/2001 are presented in Tables (4 a, b - 6 a, b). The data show that the yield of Sinai 1 did not differ significantly from the yield of Giza 9 in primarily and advanced yield trials, while it gave significantly lower yield than Giza 9 in on-farm trials. However, Sinai 1 was also early in maturity as it matured at 129, 137.9 and 128.5 days in primarily, advanced and on-farm trials, respectively. The corresponding days to maturity of Giza 9 in these trials were 135.2, 144.9 and 138 days, respectively. Again both cultivars were stable as indicated by their stability parameters given in Tables (4-6 b). The results refer that Sinai 1 performed lower or equal seed yield than Giza 9 in this region. It seems that Sinai 1 is not adapted to the growth conditions in Middle and South Egypt.

Table 4 (a): Average seed yield (kg/fed) for Sinai 1 comparing with the check cultivar Giza 9 evaluated in primarily yield trials at various agricultural research stations in Middle and Upper Egypt in six seasons (1995/96-2000/2001).

Location	Season	Seed yield (kg/fed)		
		Giza 9	Sinai 1	Significance
Giza	1995/96	271	174	NS
Mallawy	1995/96	711	708	NS
Mallawy	1995/96	899	711	NS
Giza	1996/97	233	385	*
Giza	1996/97	428	720	*
Mallawy	1997/98	610	686	NS
Sids	1997/98	125	182	*
Mallawy	1998/99	600	550	NS
Sids	1998/99	220	200	NS
Sids	1999/2000	400	320	NS
Sids	1999/2000	292	261	NS
Sids	2000/2001	156	147	NS
Overall mean		412.08	420.33	NS
CD		243.57	237.77	
SE		70.31	68.64	

Average days to maturity of Sinai 1= 129 and Giza 9 = 135.2.
Seed yield approximated to the nearest kg.
*, ** Significant at 0.05 and 0.01 levels of probability. NS: Not significant.

Table 4 (b): Stability parameters of Giza 9 and Sinai 1 in primarily yield trials at Middle and South Egypt.

Cultivar	No. of trials	Mean yield Kg/fed	Regression Coefficient (b)	Deviation from regression	R^2
Giza 9	12	412.08	1.013	0.472	0.934
Sinai 1	12	420.33	0.987	0.428	0.931

Sinai 1 was also evaluated in 20 sites in new reclaimed desert areas outside the Nile Valley. The average seed yield of Sinai 1 was 756.85 kg/fed, while Giza 9 gave an average seed yield of 684.25 kg/fed. The average seed yield increase of Sinai 1 over Giza 9 in this region was reached 10.6%. Sinai 1 matured at 128.3 days comparing with 143.8 days for Giza 9, indicating also its earliness in maturity in this region as in other regions. Both cultivars were also stable as indicated by their means of seed yield, regression coefficient (b), and deviation from regression (S^2_d), and coefficient of determination (R^2) (Table, 7 b). Again Sinai 1 had higher average seed yield and hence it considers better than Giza 9.

Table 5 (a): Average seed yield (kg/fed) for Sinai 1 comparing with the check cultivar Giza 9 evaluated in advanced yield trials at various agricultural research stations in Middle and Upper Egypt in six seasons (1995/96-2000/2001).

Location	Season	Seed yield (kg/fed)		
		Giza 9	Sinai 1	Significance
Sids	1995/96	733	634	NS
Mallawy	1995/96	619	571	NS
Sids	1996/97	253	253	NS
Mallawy	1996/97	433	379	NS
Sids	1996/97	269	216	NS
Shandaweel	1996/97	879	759	NS
Sids	1997/98	48	215	*
Sids	1997/98	106	136	NS
Sids	1997/98	54	247	*
Mallawy	1997/98	287	305	NS
Mallawy	1997/98	472	371	*
Shandaweel	1997/98	125	75	NS
Shandaweel	1997/98	196	208	NS
Mataana	1997/98	173	150	NS
Mataana	1997/98	221	179	NS
Malawy	1998/99	800	1004	**
Sids	1998/99	368	247	*
Sids	1998/99	241	116	NS
Mallawy	1998/99	711	419	**
Mallawy	1998/99	435	374	NS
Shandaweel	1998/99	69	127	**
Shandaweel	1998/99	300	193	*
Sids	1999/2000	503	482	NS
Mallawy	1999/2000	799	753	NS
Mallawy	1999/2000	863	816	NS
Sids	2000/2001	92	78	NS
Sids	2000/2001	53	163	NS
Overall mean		374.15	350.74	NS
CD		274.72	251.60	
SE		52.87	48.42	

Average days to maturity of Sinai 1= 137.9 and Giza 9 = 144.9.
Seed yield approximated to the nearest kg.
*, ** Significant at 0.05 and 0.01 levels of probability.
NS: Not significant.

Table 5 (b): Stability parameters of Giza 9 and Sinai 1 in advanced yield trials at Middle and South Egypt.

Cultivar	No. of trials	Mean yield Kg/fed	Regression Coefficient (b)	Deviation from regression	R^2
Giza 9	27	374.15	1.046	0.665	0.965
Sinai 1	27	350.74	0.954	0.513	0.958

Table 6 (a): Average seed yield (kg/fed) for Sinai 1 comparing with the check cultivar Giza 9 evaluated in on-farm trials at Assuit in South Egypt in six seasons (1995/96-2000/2001).

Location	Season	Seed yield (kg/fed)		
		Giza 9	Sinai 1	Significance
Assuit	1995/96	607	642	*
Assuit	1995/96	630	607	*
Assuit	1996/97	620	485	*
Assuit	1996/97	435	385	NS
Assuit	1997/98	1630	1441	NS
Assuit	1997/98	840	716	NS
Assuit	1998/99	508	560	*
Assuit	1998/99	325	335	*
Assuit	1999/2000	599	426	**
Assuit	2000/2001	882	595	**
Assuit	2001/2002	802	610	**
Overall mean		716.18	618.36	**
CD		346.85	296.74	
SE		104.58	89.47	

Average days to maturity of Sinai 1= 128.5 and Giza 9 = 138.0.
Seed yield approximated to the nearest kg.
*, ** Significant at 0.05 and 0.01 levels of probability.
NS: Not significant.

Table 6 (b): Stability parameters of Giza 9 and Sinai 1 in on-farm trials at Assuit in South Egypt.

Cultivar	No. of trials	Mean yield Kg/fed	Regression Coefficient (b)	Deviation from regression	R^2
Giza 9	11	716.18	1.080	0.237	0.980
Sinai 1	11	618.36	0.920	0.463	0.973

The advantage of Sinai 1 in new reclaimed areas, as an early cultivar, would be explained since that in these areas irrespective channel irrigation system is using, there is allows shortage in available water especially at the end tail of channels. For this reason and also to save water early maturing cultivars prefer by farmers and hence early lentil cultivars are prevented due to their less water requirements.

The new cultivar Sinai 1 was also evaluated under rainfed conditions in North Coast of the country (N. Sinai and Matrouh) in five seasons (1991/92-1997/98). The tested locations included four sites at Matrouh and 34 sites at North Sinai. The data in Table (8a) indicate the superiority of yield performance of Sinai 1. The overall means yield of Sinai 1 was 573.42 kg/fed comparing with 335.70 kg/fed for Giza 9, giving a yield increase of 70.8%. Sinai 1 was clearly early in maturity with average days to maturity of 116.3 days comparing with 134.2 days for Giza 9. Again both cultivars were stable, but Sinai 1 is considering better than Giza 9 due to its higher seed yield (Table 8b).

The results indicate that Sinai 1 had higher seed yield than Giza 9 in North Egypt, the new reclaimed lands and at rainfed areas in North Sinai, but it had lower yield than Giza 9 Middle and south Egypt. The yield superiority of Sinai 1 over Giza 9 under rainfed conditions was also reported by Hamdi *et al.* (1998), who found that seed yield increase of in Sinai 1 over Giza 9 was ranged from 50% to 243%. Sinai 1 also showed higher harvest index than Giza 9 under rainfed conditions in N. Sinai with averages of 0.51 and 0.43 in two seasons comparing with 0.37 and 0.37 for Giza 9 in the same seasons. The adaptability of Sinai 1 to low- rainfed conditions in North coast of Egypt was also found by Hamdi (1994).

Another advantage of Sinai 1 under dry conditions is its fast root growth, which caused fast vegetative growth rate and hence early maturing (Hamdi and El-Set, 1999). They found also that the relative yield index of Sinai 1 (ratio of yield at 25% soil water holding capacity to the yield at 80% soil water holding capacity) was high and recorded 0.8 comparing with 0.66 for Giza 9, which indicate the adaptability of Sinai 1 to dry conditions. In addition, Sinai 1 found to be produced large number of root branches (laterals) and it is consider a good combiner for desirable root system characters and it could be used as a parent in crosses aimed to improve root system in lentil (Hamdi, 1992).

Reaction of Sinai 1 and Giza 9 to root-rot and wilt diseases:

Data in Table (9) show the reaction of Sinai 1comparing with Giza 9 to root-rot and wilt diseases in the three seasons. The data indicate that the percentages of survival plants of Sinai 1 under root-rot infection were 74 and 76.3% in 2000/2001and 2001/2002 seasons, respectively, while the corresponding values of Giza 9 in the same seasons were 44 and 53.8%, respectively. For wilt disease, the survival percentages of Sinai 1 was 76 and 82.5%, while Giza 9 had 39 and 65% in both seasons, respectively. The reactions of Sinai 1 and Giza 9 to the complex diseases (root-rot and wilt) were 67.1, 75% in 1999/2000 and 75, 58.8% in 2001/2002 seasons, respectively.

The results proved that Sinai 1 is resistant to root-rot and wilt diseases. Since both diseases are the most important soil-borne diseases infected lentil in Egypt (Abdel-Kader, 1977), planting Sinai 1 will provide high level of resistance and hence increase the yield.

As indicated above the percentages seed yield increase of Sinai 1 over Giza 9 in N. Egypt, new reclaimed lands and rainfed areas were 7.8%, 10.6%, and 12.3%, respectively, in addition to its earliness in maturity by at least three weeks earlier than Giza 9.

In conclusion, the new cultivar Sinai 1 could be grown successfully in rainfed areas, at the new reclaimed lands and in old lands in North Egypt. In old lands in North Egypt, Sinai 1 could be grown before cotton where it can be harvested early and allow farmers to plant cotton in proper time.

Table 7 (a): Average seed yield (kg/fed) for Sinai 1 comparing with the check cultivar Giza 9 evaluated in on-farm trials in new reclaimed lands in six seasons (1995/96-2000/2001).

Location/ Site (S)	Season	Seed yield (kg/fed)		
		Giza 9	Sinai 1	Significance
Nubaria	1995/96	519	552	*
Nubaria (S1)	1996/97	895	977	NS
Nubaria (S2)	1996/97	316	378	*
Ismailia	1996/97	480	540	NS
Nubaria	1997/98	1241	1282	*
Ismailia (S1)	1997/98	790	911	**
Ismailia (S2)	1997/98	811	861	*
Beni Suif (S1)	1997/98	315	466	NS
Beni Suif (S2)	1997/98	580	880	**
Nubaria	1998/99	506	644	**
E.W.Gadeed	1998/99	708	925	*
Ismailia (S1)	1998/99	633	618	NS
Ismailia (S2)	1998/99	605	645	NS
Beheira	1998/99	900	940	NS
Alexandria (S1)	1999/2000	811	845	NS
Alexandria (S2)	1999/2000	1040	1008	*
E.W Gadeed (S1)	1999/2000	661	674	*
E.WGadeed (S2)	1999/2000	289	334	*
Alexandria (S1)	2000/2001	919	952	*
Alexandria (S2)	2000/2001	666	705	*
Overall mean		684.25	756.85	**
CD		248.80	240.04	
SE		55.63	53.67	

Average days to maturity of Sinai 1= 128.3 and Giza 9 = 143.8.
Seed yield approximated to the nearest kg.
*, ** Significant at 0.05 and 0.01 levels of probability. NS: Not significant, S= site.

Table 7 (b): Stability parameters of Giza 9 and Sinai 1 in on-farm trials at new reclaimed lands.

Cultivar	No. of trials	Mean yield Kg/fed	Regression Coefficient (b)	Deviation from regression	R^2
Giza 9	20	684.25	1.018	0.153	0.975
Sinai 1	20	756.85	0.982	0.291	0.974

Table 8 (a): Average seed yield (kg/fed) for Sinai 1 comparing with the check cultivar Giza 9 evaluated in rainfed area in five seasons (1991/92-1997/98).

Location	Season	Seed yield (kg/fed)		
		Giza 9	Sinai 1	Significance
Matroh S1	1991/92	664	955	*
Matroh S2	1991/92	687	806	*
N. Sinai S1	1994/95	165	298	NS
N. Sinai S2	1994/95	231	920	*
N. Sinai S3	1994/95	151	277	NS
N..Sinai S4	1994/95	113	130	NS
N.Sinai S5	1994/95	172	261	*
N. Sinai S6	1994/95	252	382	*
N. Sinai S7	1994/95	202	290	NS
N. Sinai S8	1994/95	462	458	NS
N. Sinai S9	1994/95	714	1055	*
N. Sinai S10	1994/95	174	185	NS
N. Sinai S11	1994/95	317	563	*
N. Sinai S1	1995/96	34	353	*
N. Sinai S2	1995/96	151	588	*
N. Sinai S3	1995/96	34	84	NS
N. Sinai S4	1995/96	252	504	*
MatrouhS1	1995/96	101	202	*
MatrouhS2	1995/96	67	151	*
N. Sinai S1	1996/97	609	861	*
N. Sinai S2	1996/97	555	945	*
N. Sinai S3	1996/97	462	714	*
N. Sinai S4	1996/97	840	1555	*
N. Sinai S5	1996/97	903	1261	*
N. Sinai S6	1996/97	714	798	NS
N. Sinai S7	1996/97	315	357	NS
N. Sinai S8	1996/97	420	1071	*
N. Sinai S1	1997/98	134	376	*
N. Sinai S2	1997/98	93	124	*
N. Sinai S3	1997/98	231	538	*
N. Sinai S4	1997/98	101	542	*
N. Sinai S5	1997/98	97	244	*
N. Sinai S6	1997/98	135	269	NS
N. Sinai S7	1997/98	664	740	*
N. Sinai S8	1997/98	143	836	*
N. Sinai S9	1997/98	681	849	*
N. Sinai S10	1997/98	382	828	*
N. Sinai S11	1997/98	345	420	NS
Overall mean		335.70	573.42	**
SD		353.65	251.35	
SE		57.37	40.77	

Average days to maturity of Sinai 1= 116.3 and Giza 9 = 134.2.
Seed yield approximated to the nearest kg.
*, ** Significant at 0.05 and 0.01 levels of probability
NS: Not significant, S= Site.

Table 8 (b): Stability parameters of Giza 9 and Sinai 1 in rainfed areas at North Sinai and Matrouh.

Cultivar	No. of trials	Mean yield Kg/fed	Regression Coefficient (b)	Deviation from regression	R^2
Giza 9	38	335.70	0.816	0.734	0.884
Sinai 1	38	573.42	1.184	0.335	0.941

Table 9: Percentage of survival plants and level of resistance of Sinai 1 and Giza 9 to root-rot (*R. solani*) and wilt (*F. oxysporum*) and diseases complex (root-rot and wilt) in three seasons

Season	Root-rot		Wilt		Complex		Type of trial
	Sinai 1	Giza 9	Sinai 1	Giza 9	Sinai 1	Giza 9	
1999/2000	-	-	-	-	67.1 R	52.0 S	Sick-plot
2000/2001	74.0 R	44.HS	76.0 R	39.0 HS	-	-	Pots trial
2001/2002	76.3 R	53.8 S	82.5 HR	65.0MS	75.0 R	58.8 S	Pots trial

HR: highly resistant, R: resistant, MS: moderately susceptible, HS: highly susceptible.

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صنف العدس الجديد المبكر فى النضج: سيناء ١

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الصنف الجديد سيناء ١ هو صنف منتخب من صنف العدس الأرجنتينى "بريكوز" وقد تم تحسين هذا الصنف عن طريق الإنتخاب الفردى من خلال برنامج تربية العدس بمركز البحوث الزراعية بمصر، وقد تم تقييم إنتاجيته وإجراء تحليل الثبات الوراثى له مقارنة مع الصنف المحلى واسع الإنتشار جيزة ٩ فى ١٥٥ تجربة حقلية فى الأراضى القديمة فى شمال وجنوب مصر وفى الأراضى المستصلحة حديثاً خارج وادى النيل فى الفترة من ١٩٩٥/٩٦ إلى ٢٠٠٠/٢٠٠١ وكذلك فى الأراضى المطرية فى شمال سيناء ومطروح خلال الفترة من ١٩٩١/٩٢ إلى ١٩٩٧/٩٨، كما تم تقييمه للمقاومة لمرضى عفن الجذور والذبول.

وقد أظهرت النتائج تفوق محصول البذور للصنف الجديد سيناء ١ على الصنف جيزة ٩ بمقدار ١٢,٣%، ١٠,٦%، ٧٠,٥% فى الأراضى القديمة بشمال الجمهورية وفى الأراضى المستصلحة الجديدة وفى الأراضى المطرية على الترتيب، ولكنه لم يظهر تفوقاً فى المحصول على جيزة ٩ فى الأراضى القديمة فى مصر الوسطى وجنوب الجمهورية، وقد تميز الصنف سيناء ١ كذلك بالتبكير فى النضج بحوالى ٢١ يوماً فى شمال الجمهورية و سبعة أيام بالجنوب و ٢٨ يوماً بالأراضى المطرية، بالإضافة الى ذلك فقد تميز الصنف الجديد بالثبات الوراثى فى كل مناطق الإختبار، كما تميز أيضاً بمقاومته العالية لمرضى عفن الجذور والذبول، وبناء على ذلك فنوصى بزراعة الصنف الجديد سيناء ١ فى المناطق المطرية فى شمال سيناء ومطروح وفى الأراضى المستصلحة الجديدة وفى الأراض القديمة بشمال الجمهورية خاصة قبل زراعة القطن حيث يمكن حصاده مبكراً وزراعة القطن فى الموعد المناسب دون تأخير مما يساهم فى زيادة مساحة العدس المنزرعة فى مصر.