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PERFORMANCE OF SOME LENTIL GENOTYPES IN THE NEW RECLAIMED LANDS AT ABU-SIMBEL

HAMDI, A., R. E. EL-LATHY, M. SHAABAN, ZAKIA M. EZZAT

Food Legume Res. Program. Field Crops Res. Institute, Agricultural Res. Center, Giza, Egypt.

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Abstract

This study aimed to evaluate 20 lentil genotypes for their performance and yield potential in the new reclaimed lands at Abu-Simbel and to estimate the genetic parameters, which help for further selection in this location. The genotypes were planted in November at three seasons (1999/2000, 2000/2001, 2001/2002). Significant differences occurred among seasons due to the wide variation in maximum and minimum air temperatures and relative humidity, which affected accumulation of plant dry matter and yield performance of genotypes. Three genotypes FLIP 95-68L, FLIP 86-7L and FLIP 89-71L out yielded the check cultivar Giza 9 by 32.3, 24.6 and 19%, respectively. In addition they had high harvest index values of 38.4, 31.3 and 29.8%, respectively. These genotypes also had higher seed yield/plant, number of pods and seeds/plant, and hence being promising and could be recommended for planting at Abu-Simbel after verification and large-scale on-farm trials. High estimates of phenotypic coefficient of variation, broad sense heritability together with genetic advance for seed yield/plant and harvest index, suggesting that pronounced progress should be expected from selection among genotypes for these characters at Abu-Simbel.

INTRODUCTION

Lentil (*Lens culinaris* Medikus) is a traditional crop in south Egypt, where 87% of its total acreage grown (Anonymous, 2002). Recently, large desert areas have been reclaimed in south region in Abu-Simbel, East Owinat, and Toshka, and it is aimed to plant these areas by field and horticultural crops. The crop rotation systems in such regions should include legume crops, because they can fix a considerable amount of nitrogen in the soil. In particular, lentil is one of the highest soil nitrogen-supplier food legume crops (Saxena, 1988). In addition lentil is a short duration legume crop and hence it requires lesser amounts of water during its life cycle. Therefore, growing lentil in such new land areas will save water, supply nitrogen to following crops, improve soil fertility and produce considerable straw yield to be used as a rich-protein feed.

Abu-Simbel is located 300km south Aswan City. It is a hot and dry region with sandy soil. High air temperature is a factor, with water stress and light intensity, lead to yield reduction in lentil due to flower drop and seed abortion (Summerfield, 1981). The number of pods set per inflorescence is reported to decrease with the increase in air temperature (Chandra and Asthana, 1988). In India, five out of 14 lentil genotypes screened for terminal heat tolerance were identified as heat-tolerant (Chandra and Asthana, 1993).

Effective selection depends on the existence of genetic variability. Several authors have emphasized the utility of estimates of variance components, as a basis for predicting the response of quantitative characters for selection in lentil (Hamdi, 1987; Ismail *et al.*, 1994). In addition knowledge of heritability of quantitative attributes has been useful as a tool for improving selection efficiency. Progress under selection in breeding programs depends on the magnitude of heritability for traits under selection. In lentil widely varying estimates of heritability, variability and genetic advance from selection for various lentil characters have been reported (Ismail *et al.*, 1994; Selim, 2000; Ibrahim, 2001; Hamdi *et al.*, 2002-a).

To grow lentil successfully in Abu-Simbel, as a hot region, evaluation of lentil genotypes should be made to identify the adapted genotypes to be grown in this region. Therefore this study aimed to evaluate various lentil genotypes for their performance and yield potential under heat stress conditions at Abu-Simbel and to estimate the genetic parameters, which help for further selection in this location.

MATERIALS AND METHODS

Twenty lentil genotypes varied in their origin and characteristics were grown at the Experimental Farm of Abu-Simbel Research Station, Aswan Governorate in the three-winter seasons 1999/2000, 2000/2001, and 2001/2002. Dates of planting were 19, 19, and 11 November in the three seasons, respectively. The results of the soil chemical analysis in the experimental site were: PH = 9.1, Organic matter = 0.1%, Calcium Carbonate (Ca Co_3) = 14%, total N = 18 ppm, total phosphorus = 5.3 ppm, and total potassium = 146 ppm. Fertilizer application was made according to soil analysis, where 15kg N and 25kg P_2O_5/feddan were applied to the soil before planting.

Seeds were inoculated with rhizobium culture (2 packets 200 g each/feddan). A randomized complete block design was used with 4 replicates. Each experimental plot consisted of 4 rows, 3 m long and 30 cm apart with plant density of 300 plants/m^2. Sprinkler irrigation system was used. Irrigation was applied daily, after planting till complete seedling emergence, then maintained every 20 days till the complete pod-filing stage. Three plant-samples (10 plants/each) were randomly taken from each experimental plot at vegetative, post-flowering and maturity growth stages to estimate fresh and dry weight/plant. Days to 50% flowering and days to 90% maturity were recorded. At harvesting, 10 individual plants were randomly chosen from the central area of each plot to estimate seed yield/plant, number of pods and seeds/plant, number of seeds/pod, plant height, and number of branches/plant. The remaining plants in each plot were hand-pulled, air dried, weighed, then threshed by hand. Seed yield/fed, biological yield/fed, straw yield/fed, harvest index (seed yield/biological yield) and 100-seed weight were estimated.

The meteorological data during the three growing seasons were obtained. Analysis of variance was made separately for each season then a combined analysis for the three seasons was calculated (Gomez and Gomez 1984). Estimates of phenotypic (P.C.V) and genotypic (G.C.V.) coefficient of variation were calculated by the formula suggested by Burton (1952). Heritability in broad sense was calculated according to Allard (1960). Expected genetic advance was estimated by the method suggested by Johnson *et al.* (1955).

RESULTS AND DISCUSSION

Weather conditions and seasonal effects:

The analysis of variance revealed that highly significant differences detected among seasons for all studied characters, indicating the importance of seasonal effects on the performance of lentil genotypes at Abu-Simbel. The maximum and minimum air temperatures varied widely between seasons (Figures 1 and 2). The first season (1999/2000) was the warmest in December, during vegetative growth stage, where the maximum temperature reached 33 °C, (Fig. 1), while it was the coldest almost all the season from January to end-March, during flowering and pod-filling stages (Fig. 2).

Both second and third seasons were near in temperature, except a warm weather occurred during vegetative growth stage in the second season (Fig. 1). Another important climatic factor affecting lentil yield potential is relative humidity (RH%) especially during pod development stage. The RH during pod formation and pod-filling stages were 39.7, 37.95 and 50.55% in the three seasons, respectively (Table, 1). Summerfield (1981) stated that relative humidity below 50% affected seed yield in lentil due to occurrence of empty pods and abortive seeds. Several researchers have reported seasonal effects on lentil characters (Hamdi, 1987; Selim, 2000).

Table 1. Average air relative humidity (%) during pod formation (15-28 Feb.) and Pod filling (1-31 March) stages in three seasons at Aswan.

Period	1999/2000	2000/2001	2001/2002	Average
February 15-28	43.4	38.9	43.1	41.8
March 1-31	36.0	37.0	58.0	43.7
Average	39.70	37.95	50.55	42.74

Mean number of days to flowering and maturity in the first season were 8 and 10 days shorter than the third season (Table, 2), because of a fast plant vegetative growth and early onset of flowering associated with hot winter in 1999/2000 season. The rapid growth also caused relatively short plants with few branches. Plant height averages in the three seasons were 33.3, 34.7, and 49.3 cm, respectively (Table 2). Similarly, branches/plant in the same seasons were 2.5, 2.7, and 3.7, respectively. High temperature and low RH in the first season also affected both seed yield/plant and seed yield/fed. The average seed yields/fed in the three seasons were 3.90, 4.07, and 5.23 ardab (one ardab = 160 kg), respectively (Table 2). It seems that seed yield ranked according to the ranks of temperature and RH. Seed yield in the third season was the highest, partially because of the long and cooler winter-season. The rise in air temperature beyond 17°C (average maximum and minimum values) is a limiting factor in achieving full yield potential (Chandra and Asthana, 1988). The average harvest index value in the first season was 23.2 % and 34% in the third season.

Fresh and dry weight of plants at various growth stages:

Average fresh and dry weight of lentil plants, plant height and number of branches/plant for all genotypes at vegetative, flowering and pod-filling stages in the three seasons are presented in Figures (3-5). The total plant fresh and dry weights (Fig. 3) reflect mainly changes in development of plant height and number of branches/plant at various growth stages. Plant height and number of branches/plant values were higher in the third season compared to the first and the second seasons (Figs. 4 and 5). Hence the total fresh and dry weight of lentil plants were higher in the third season. Accumulation of dry matter was much higher in pod-filling stage in the third season comparing with the other two seasons, reflecting the higher number of pods formed per plant in the third season. These results indicated that the environmental condition in the third season was more favorable to plant growth than in other seasons. The vegetative period of the third season was longer as indicated by days to flowering (Table 2).

Performance of genotypes:

The combined analysis of variance indicated highly significant differences among genotypes for all studied characters, except biological yield and straw yield/fed. Also the genotype x season interaction had a significant effect on all studied characters, except number of branches/plant, seed yield, biological yield and straw yield/fed and harvest index.

Large genotype x season interaction is common in varietal trials. As an example, Hamdi (1987) found the genotype x year component was more than three times as large as the genotype x location component in lentil, because year effect includes fluctuation in weather condition. Therefore it is important to test a set of genotypes in a series of seasons.

Phenological and morphological characters:

The average performance of days to flowering and maturity, plant height and number of branches/plant for all genotypes over seasons are given in Table (3). Narrow ranges between genotypes was obtained for both days to flowering and maturity, however it is clear that the genotype Sinai 1 was the earliest in flowering and maturity with over all means of 56 and 117.9 days, respectively. Earliness in flowering and maturity of Sinai 1 was previously reported (Hamdi *et al.*, 2002-b). Plant height ranged from 31.11 cm for ILL 7163 to 48.33 cm for FLIP 86-7L, and number of branches/plant ranged from 2.01 branches for FLIP 84-1L to 3.96 branches for Giza 9.

Seed yield/plant and yield component characters:

The genotypes FLIP 86-7L, FLIP 89-71L, FLIP 95-68L and FLIP 94-1L showed the highest average seed yield/plant of 1.01, 0.91, 0.85 and 0.84 g, respectively with insignificant differences between them (Table, 4). Yield increases of these genotypes over the check variety Giza 9 were 48.8, 34.2, 25.2 and 23.3%, respectively. High seed yield/plant of these genotypes was mainly due to their high number of pods and seeds/plant. Amongst, the genotypes FLIP 86-7L, FLIP 89-71L and FLIP 94-1L had also large seed size (100-seed weight above 3 g).

Seed, biological and straw yield/feddan and harvest index:

The genotypes FLIP 95-68L, FLIP 86-7L, FLIP 89-71L, FLIP 95-50L, Giza 51 and FLIP 94-1L gave the highest average seed yield that ranged from 5.75 to 4.84 kg/fed with insignificant differences between them (Table, 5). The first three genotypes showed the highest percentages of yield increase of 32.3, 24.6 and 19% over the yield of Giza 9, respectively and had high harvest index values of 38.4, 31.3 and 29.8%, respectively. These genotypes also had high seed yield/plant, number of pods and seeds/plant as mentioned before. Hence these genotypes are promising and could be recommended for planting at Abu-Simbel after verification and large-scale trials.

There are some genotypes showing superiority in some characters and should be exploited in breeding programs. For example, the early genotype Sinai 1 could be recommended for planting in case the earliness in flowering and maturity is more important than seed yield. On the other hand, hybridization between Sinai 1 and each of the high yielding genotypes FLIP 95-68L, FLIP 86-7L and FLIP 89-71L could be useful to produce early and high yielding populations and selection for earliness in flowering and maturity in these populations might be useful.

Genetic parameters of the studied characters:

Estimates of means, ranges, phenotypic coefficients of variation (PCV), genotypic coefficients of variation (GCV), broad sense heritability ($h^2_{b.s.}$) and genetic advance as percentage of the mean for studied characters are presented in Table (6). The highest magnitude of (PCV) was observed for number of seeds and pods /plant, seed yield/ plant and harvest index, indicating the possibility for effective selection for these traits. Days to flowering had a high heritability estimate (75.68 %). Seed yield/plant, seed yield/fed and harvest index showed moderate heritability estimates of 52.17, 52.24 and 55%, respectively. Ezzat and Ashmawy (1999) also reported high broad sense heritability for days to flowering in lentil. The expected genetic advance was relatively high for seed yield/plant (23.22%) and harvest index (22.99%).

Johnson *et al.* (1955) stated that heritability estimates together with genetic advance are more important than heritability alone to predict the effect of selecting the best individuals. Therefore, pronounced progress should be expected from selection between genotypes for seed yield/plant and harvest index. Moderate progress would be expected from selection for seed yield/fed and number of pods/plant.

Table 2. Average performance of the studied characters at Abu-Simbel in 1999/2000, 2000/2001, and 2001/2002 seasons.

Character	Season			LSD at 0.05
	1999/2000	2000/2001	2001/2002	
Days to 50% flowering	58.88	64.7	67.2	1.107
Days to 90% maturity	116.88	128.58	127.32	1.658
Plant height (cm)	33.25	34.73	49.28	3.330
No. of branches/plant	2.52	2.72	3.65	0.300
Seed yield/plant (g)	0.54	0.548	1.02	0.069
No. of pods/plant	12.75	13.28	30.15	2.235
No. of seeds/plant	16.12	15.47	42.21	3.820
No. of seeds/pod	1.27	1.18	1.38	0.061
100-seed weight (g)	2.93	3.03	2.83	0.156
Seed yield (ardab/fed)	3.9	4.07	5.23	0.379
Biological yield (t/fed)	3.54	4.31	3.41	0.314
Straw yield (t/fed)	2.91	3.66	2.58	0.306
Harvest index (%)	23.17	20.5	34.04	3.662

Table 3. Average days to 50% flowering and 90% maturity, plant height and number of branches at harvest for 20 lentil genotypes evaluated at Abu-Simbel in 2000/2001and 2001/2002 seasons.

Genotype	Days to 50% flowering*	Days to 90% maturity	Plant height (cm)	No. of branches/ plant
FLIP 84-112L	62.89^{ef}	122.7^{cdef}	34.67^{cdef}	2.01^{f}
FLIP 86-7L	65.11^{bcde}	119.6^{fg}	48.33^{a}	2.77^{cdef}
FLIP 88-34L	67.33^{ab}	126.9^{abc}	37.89^{bcde}	3.27^{abcd}
FLIP 88-37L	67.56^{ab}	125.7^{abcd}	34.11^{def}	3.00^{bcde}
FLIP 89-71L	63.78^{def}	121.3^{efg}	39.00^{bcde}	3.23^{abcde}
FLIP 94-1L	65.89^{abcd}	129.6^{a}	36.11^{cdef}	3.01^{bcde}
FLIP 95-50L	64.33^{cde}	124.6^{bcde}	42.44^{abcd}	2.97^{bcde}
FLIP 95-68L	66.44^{abcd}	124.1^{bcde}	38.78^{bcde}	2.47^{ef}
FLIP 96-48L	67.11^{abc}	127.3^{ab}	39.89^{abcd}	2.66^{def}
1LL 558x Precoz	62.89^{ef}	127.3^{ab}	42.89^{abc}	2.58^{def}
Fam.300x Precoz	64.33^{cde}	127.00^{ab}	39.00^{bcde}	2.91^{bcde}
X 95 S 115	62.33^{efg}	126.8^{abc}	38.89^{bcde}	3.61^{ab}
ILL 7163	68.56^{a}	125.7^{abcd}	31.11^{ef}	3.18^{bcde}
L138	61.33^{fgh}	125.4^{abcde}	38.11^{bcde}	2.50^{def}
JL1	61.22^{fgh}	124.6^{bcde}	28.67^{f}	3.13^{bcde}
Giza 4	61.00^{fgh}	121.6^{defg}	42.22^{abcd}	2.62^{def}
Giza 51	59.22^{h}	122.3^{def}	43.11^{abc}	3.48^{abc}
Giza 370	59.56^{gh}	119.7^{fg}	41.11^{abcd}	2.99^{bcde}
Sinai 1	56.00^{i}	117.9^{g}	40.67^{abcd}	2.97^{bcde}
Giza 9	65.00^{bcde}	125.3^{abcde}	44.78^{ab}	3.96^{a}
Over all mean	63.594	124.26	39.09	2.97

* Means followed by same letter (s) are not statistically different.

Table 4. Average seed yield/plant, number of pods/plant, number of seeds/plant, number of seeds/pod and 100-seed weight for 20 lentil genotypes evaluated at Abu-Simbel in 1999/2000, 2000/2001and 2001/2002 seasons.

Genotype	Seed yield/ plant (g)	No. of pods/plant	No. of seeds/plant	No. of Seeds/ Pod	100-seed weight (g)
FLIP 84-112L	0.513^{fg}	12.80^{hij}	15.23^{g}	1.17^{fghi}	2.76^{fgh}
FLIP 86-7L	1.010^{a}	25.48^{a}	34.06^{a}	1.30^{abcdef}	3.19^{abcde}
FLIP 88-34L	0.652^{def}	19.22^{bcdefg}	24.17^{bcdefg}	1.35^{abcde}	2.80^{efg}
FLIP 88-37L	0.633^{ef}	14.00^{ghij}	18.04^{efg}	1.31^{abcdef}	2.74^{fgh}
FLIP 89-71L	0.911^{ab}	25.01^{a}	32.78^{ab}	1.32^{abcdef}	3.09^{bcdef}
FLIP 94-1L	0.837^{abc}	24.31^{ab}	30.98^{abc}	1.42^{ab}	3.07^{cdef}
FLIP 95-50L	0.813^{bcd}	23.18^{abcd}	27.79^{abcde}	1.03^{i}	2.85^{defg}
FLIP 95-68L	0.850^{abc}	23.71^{abc}	28.56^{abcd}	1.26^{bcdefg}	2.82^{defg}
FLIP 96-48L	0.551^{fg}	12.19^{ij}	16.14^{fg}	1.24^{defgh}	3.37^{abc}
1LL 558x Precoz	0.770^{bcde}	15.03^{fghij}	31.91^{abc}	1.39^{abcd}	2.38^{hi}
Fam.300x Precoz	0.652^{def}	16.66^{efghi}	18.71^{defg}	1.27^{abcdef}	3.55^{a}
X 95 S 115	0.421^{g}	10.32^{j}	15.10^{g}	1.27^{abcdef}	3.48^{ab}
ILL 7163	0.767^{bcde}	17.92^{defghi}	26.22^{abcde}	1.42^{a}	2.88^{defg}
L138	0.658^{def}	18.72^{bcdefg}	20.91^{defg}	1.11^{ghi}	2.79^{efg}
JL1	0.674^{cdef}	16.18^{efghi}	20.29^{defg}	1.09^{hi}	2.52^{gh}
Giza 4	0.759^{bcde}	21.76^{abcde}	30.83^{abc}	1.41^{abc}	2.72^{fgh}
Giza 51	0.747^{bcde}	17.97^{cdefgh}	22.80^{cdefg}	1.23^{efgh}	3.22^{abcd}
Giza 370	0.734^{bcde}	17.82^{defghi}	24.47^{abcdefg}	1.34^{abcde}	3.32^{abc}
Sinai 1	0.418^{g}	19.82^{abcdef}	25.47^{abcdef}	1.32^{abcdef}	2.07^{i}
Giza 9	0.679^{cdef}	22.44^{abcd}	27.76^{abcde}	1.26^{cdefg}	2.97^{cdef}
Over all mean	0.778	21.717	28.839	1.38	3.03

* Means followed by same letter (s) are not statistically different.

Table 5. Average seed yield (ardab/fed), biological yield (t/fed), straw yield (t/fed) and harvest index for 20lentil genotypes evaluated at Abu-Simbel in 1999/ 2000, 2000/2001and 2001/2002 seasons.

Genotype	Seed yield (ardab/fed)	Biological yield (t/fed)	Straw (t/fed) yield	Harvest index (%)
FLIP 84-112L	3.508^{f}	3.907	3.345	17.17^{f}
FLIP 86-7L	5.414^{ab}	4.024	3.157	31.33^{abc}
FLIP 88-34L	4.565^{bcde}	3.264	2.533	32.69^{ab}
FLIP 88-37L	3.700^{ef}	3.464	2.876	24.28^{bcdef}
FLIP 89-71L	5.170^{abc}	3.985	3.157	29.78^{abcd}
FLIP 94-1L	4.837^{abcd}	3.687	2.912	27.89^{bcde}
FLIP 95-50L	4.982^{abc}	4.317	3.519	24.86^{bcdef}
FLIP 95-68L	5.745^{a}	3.707	2.788	38.35^{a}
FLIP 96-48L	3.728^{ef}	3.868	3.297	19.74^{ef}
1LL 558x Precoz	4.311^{cdeff}	3.858	3.167	25.78^{bcdef}
Fam.300x Precoz	4.409^{cdef}	3.298	2.592	28.85^{bcde}
X 95 S 115	3.670^{ef}	4.179	3.592	17.42^{f}
ILL 7163	4.254^{cdef}	3.640	2.959	23.71^{bcdef}
L138	3.909^{def}	3.917	3.291	20.64^{def}
JL1	4.002^{def}	3.515	2.875	24.27^{bcdef}
Giza 4	4.535^{bcde}	3.305	2.579	30.25^{abc}
Giza 51	4.845^{abcd}	3.827	3.051	26.22^{bcdef}
Giza 370	4.224^{cdef}	4.039	3.363	22.21^{cdef}
Sinai 1	3.887^{def}	3.803	3.181	24.20^{bcdef}
Giza 9	4.344^{cdef}	3.445	2.750	28.35^{bcde}
Over all mean	4.402	3.752	3.049	25.90

• No significant differences observed between genotypes for biological and straw yield/fed.

* Means followed by same letter (s) are not statistically different.

Table 6. Mean, range, phenotypic (PCV) and genotypic (GCV) coefficient of variations, heritability in broad sense ($h^2_{b.s.}$), and genetic advance as percentage of the mean (GA %) for studied characters of lentil genotypes evaluated at Abu-Simbel in 1999/2000, 2000/2001, and 2001/2002 seasons.

Character	Mean	Range	PCV %	GCV %	h2	GA %
Days to 50% flowering	63.6	56–68.6	5.08	4.44	75.68	7.93
Days to 90% maturity	124.3	117.9-129.6	2.48	1.02	17.04	0.87
Plant height (cm)	39.1	28.7-48.3	11.74	6.41	29.48	7.17
No. of branches/plant	2.97	2-4	14.85	9.69	42.62	13.04
Seed yield/plant (g)	0.70	0.42-1.01	21.6	15.61	52.17	23.22
No. of pods/plant	18.7	10.3-25.5	23.97	14.78	38.05	18.79
No. of seeds/plant	24.6	15.1-34.1	24.51	13.66	31.05	15.68
No. of seeds/pod	1.28	1.03-1.42	8.55	2.19	6.54	3.64
100-seed weight (g)	2.93	2.07-3.55	12.64	5.04	15.88	4.14
Seed yield (ardab/fed)	4.4	3.51-5.75	13.99	10.11	52.24	15.05
Biological yield (t/fed)	3.75	3.26-4.23	7.95	-4.84	0.0	6.07
Straw yield (t/fed)	3.05	2.53-3.59	10.16	-3.74	0.0	2.84
Harvest index (%)	25.9	17.17-38.35	20.29	58.64	55.0	22.99

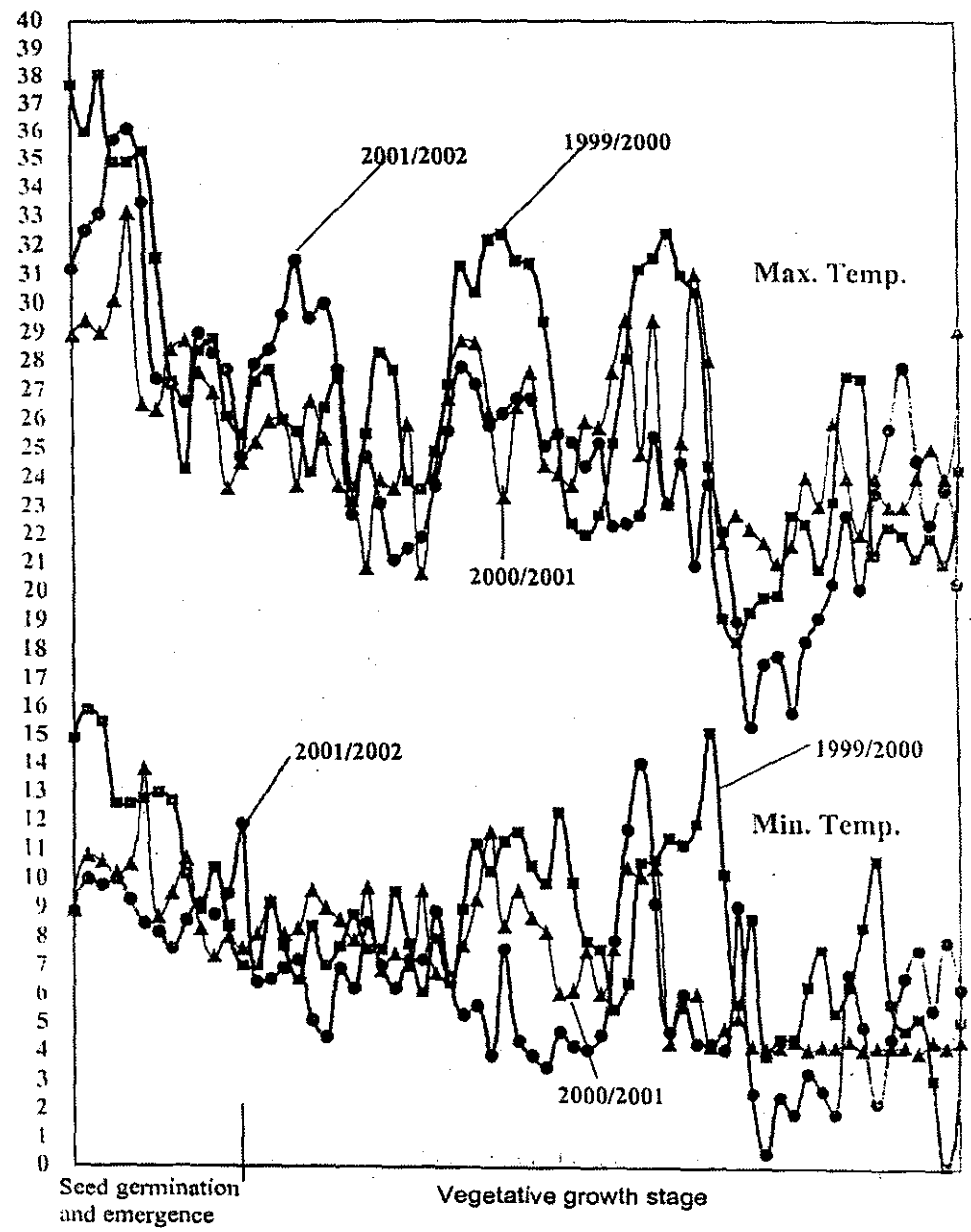

Fig. 1. Daily maximum and minimum air temperature (°C) from planting to the end of vegetative growth stage (19/11-22/1) in three seasons at Aswan.

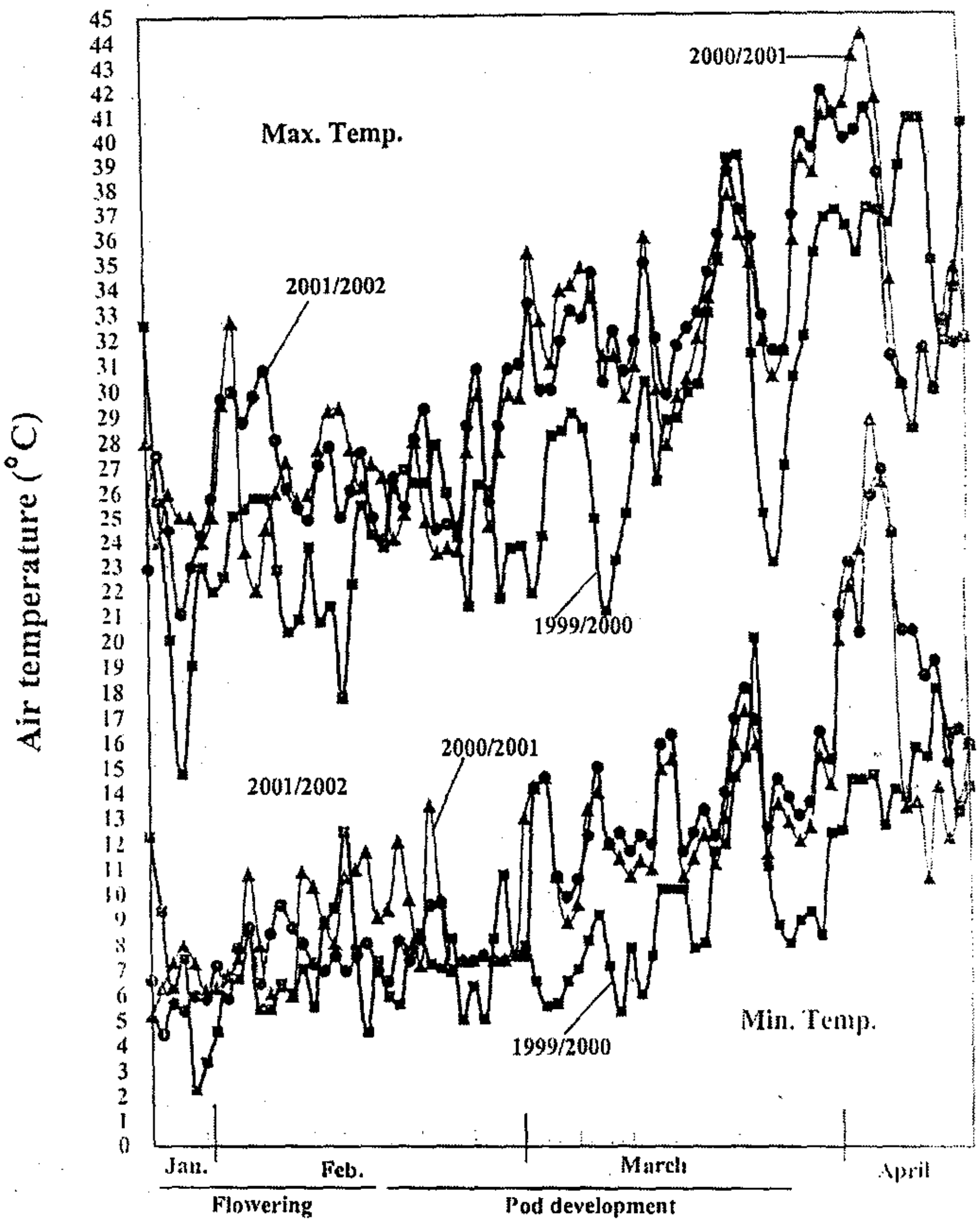

Fig. 2. Daily maximum and minimum air temperature (°C) from flowering (25/1-14/2) to pod formation and pod-filling stages (15/2-25/3) in three seasons at Aswan.

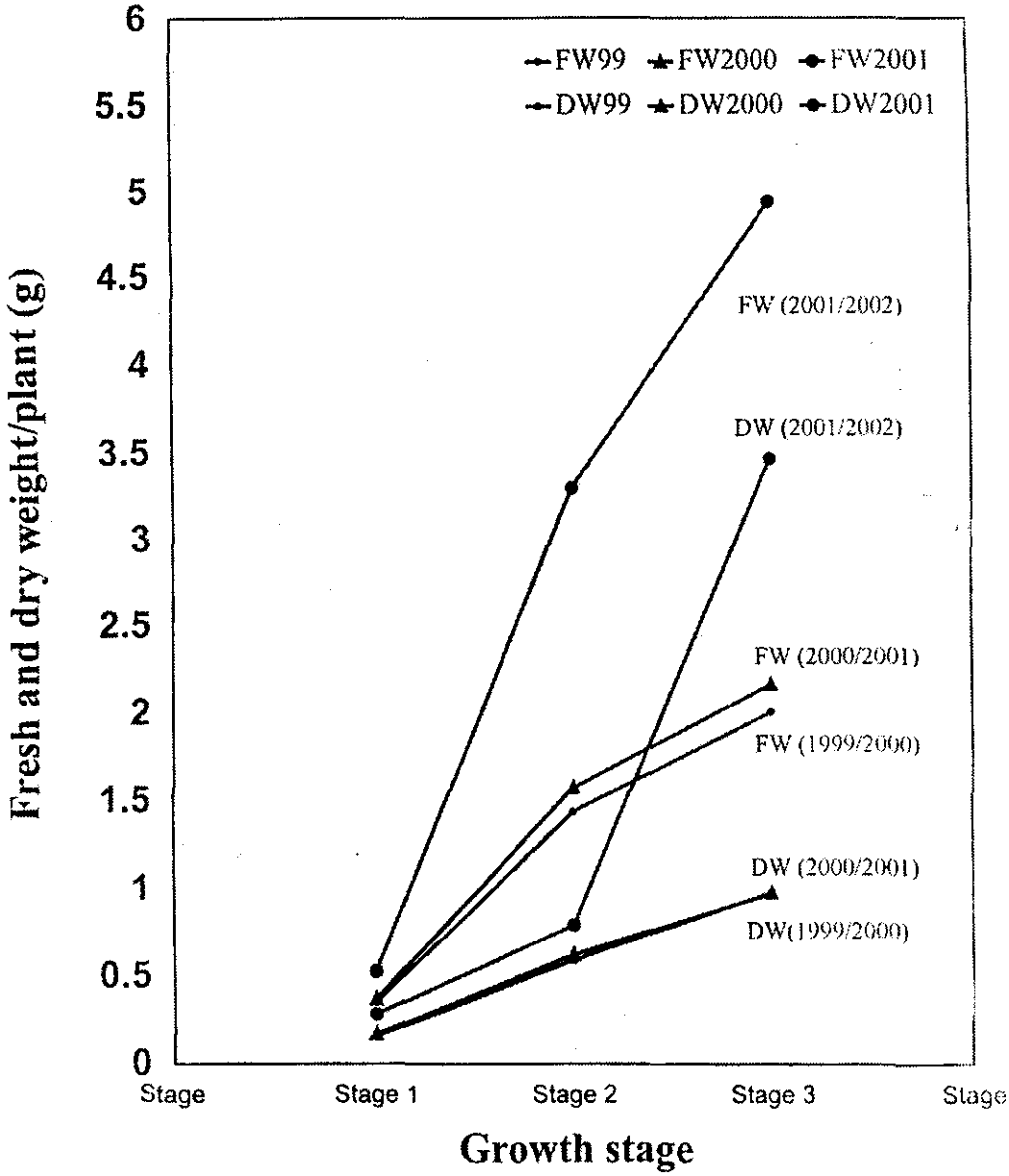

Fig. 3. Fresh (FW) and dry (DW) weight/plant (g) at vegetative (stage 1), flowering (stage 2), and pod-filling (stage 3) growth stages of all genotypes evaluated at Abu-Simbel in 1999/2000, 2000/2001 and 2001/2002 seasons.

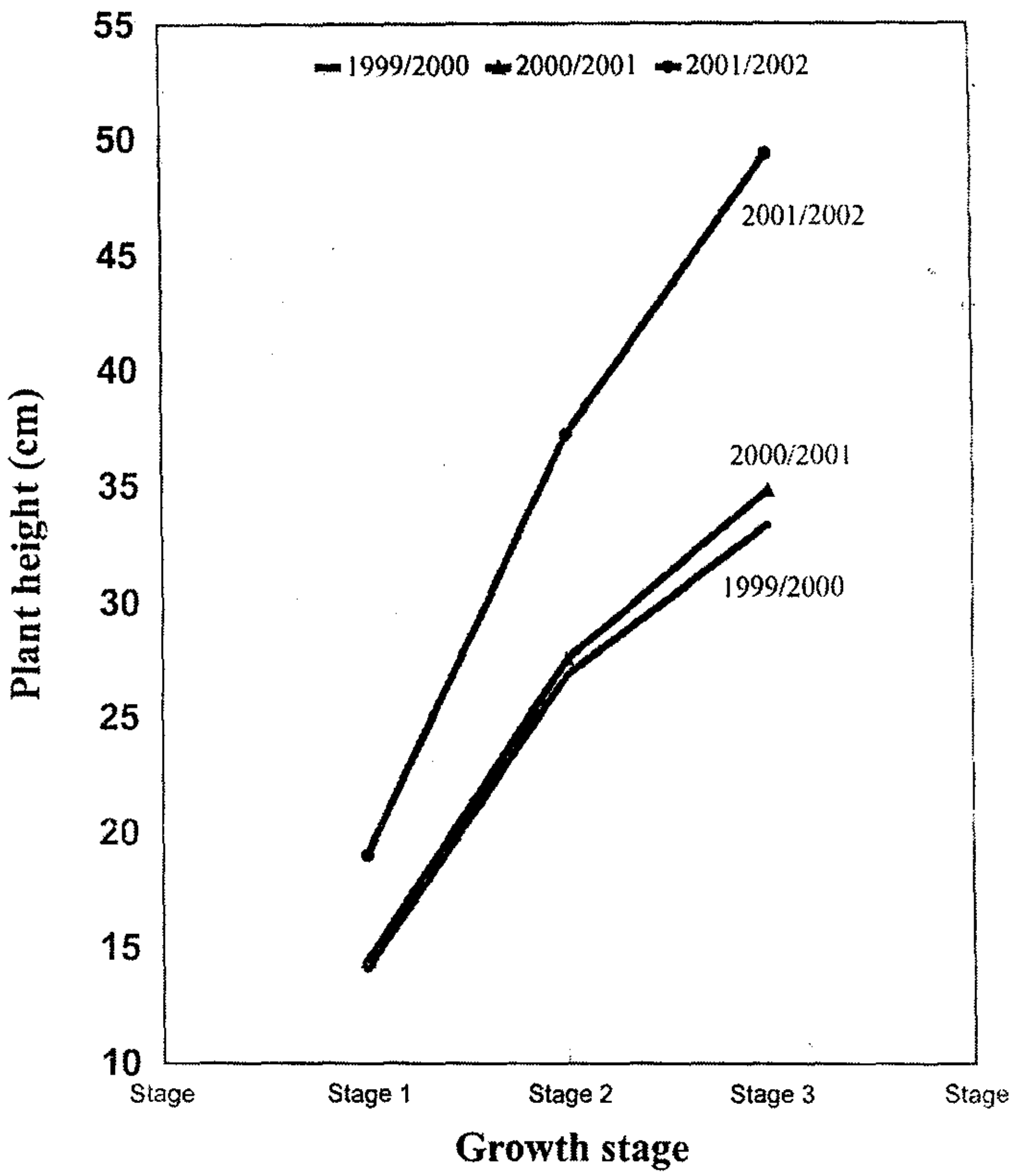

Fig. 4. Plant height (cm) at vegetative (stage 1), flowering (stage 2), and pod-filling (stage 3) growth stages of all genotypes evaluated at Abu-Simbel in 1999/ 2000, 2000/2001 and 2001/2002 seasons.

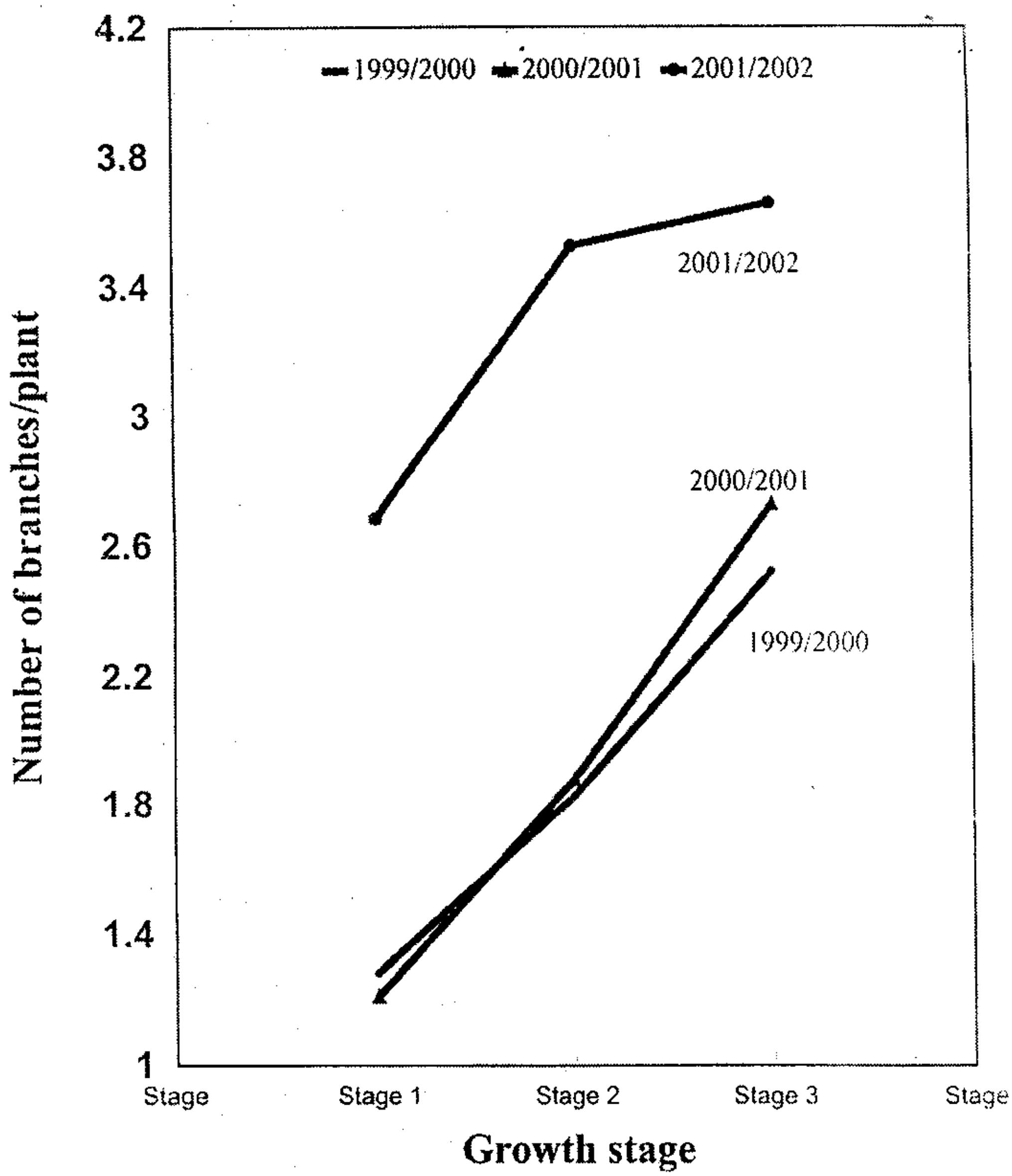

Fig. 5. Number of branches/plant at vegetative (stage 1), flowering (stage 2), and pod-filling (stage 3) growth stages of all genotypes evaluated at Abu-Simbel in 1999/2000, 2000/2001 and 2001/2002 seasons.

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أداء بعض التراكيب الوراثية للعدس في الأراضي المستصلحة حديثاً بأبي سمبل

أحمد حمدى إسماعيل حمدى، رأفت أحمد الليثى، محمد شعبان العيسوى، زكية محمد عزت

معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية – الجيزة.

تهدف هذه الدراسة إلى تقييم سلوك ٢٠ تركيب وراثي لمحصول العدس للوقوف على مدى أدائها وإنتاجيتها في الأراضي المستصلحة حديثاً بأبي سمبل، وتحديد المعايير الوراثية التي تساعد في انتخاب سلالات عالية المحصول تحت ظروف تلك المنطقة، وقد تم زراعة هذه التراكيب الوراثية خلال شهر نوفمبر في ثلاث مواسم متعاقبة هي ١٩٩٩/٢٠٠٠، ٢٠٠٠/٢٠٠١، ٢٠٠١/٢٠٠٢ .

ولقد أظهرت النتائج وجود اختلافات معنوية بين مواسم الزراعة وقد يعزى ذلك الى الاختلاف في درجات الحرارة العظمى والصغرى والرطوبة النسبية للهواء التي أثرت على مدى تراكم المادة الجافة للنبات وإنتاجية التراكيب المختبرة، وقد أنتجت التراكيب فليب ٩٥-٦٨ ل، فليب ٨٦-٧ ل، فليب ٨٩-٧١ ل أعلى محصول من البذور بنسب زيادة مقدارها ٣٢,٣، ٢٤,٦، ١٩ ٪ مقارنة بالصنف المحلي جيزه ٩، وقد حققت تلك التراكيب قيماً عالية لدليل الحصاد بلغت ٣٨,٤، ٣١,٣، ٢٩,٨ ٪ على التوالي، وقد تفوقت هذه التراكيب الوراثية أيضاً في صفات عدد القرون والبذور ووزن بذور النبات، وبناء على ذلك يمكن التوصية بزراعة هذه التراكيب الوراثية المبشرة في منطقة أبو سمبل بعد إجراء التجارب التأكيدية والتجارب الموسعة في حقول المزارعين.

أوضحت النتائج أيضاً أن كل من وزن بذور النبات ودليل الحصاد قد حققا أعلى التقديرات لمعامل التباين المظهري ونسبة التوريث والتقدم الوراثي المتوقع من الانتخاب، لذلك فإنه من المتوقع الحصول على تقدم ملحوظ إذا تم الانتخاب بين سلالات العدس المزروعة في أبو سمبل لهاتين الصفتين.