EVALUATION OF YIELD AND SEED QUALITY CHARACTERS FOR SOME LENTIL GENOTYPES IN EGYPT

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Abstract

The study aimed to find out a high yielding genotypes adapted to local environments and to study the genetic variability and relationships among yield, yield components and seed quality characters of 20 lentil genotypes. Growing season significantly affected all characters except seed yield/fed. Seed yield averaged 494.31 kg/fed (3.09 ardab/fed). The genotype FLIP 95-67L had the maximum seed yield of 678.99 kg/fed (4.24 ardab/fed) and exceeded the yield of Giza 9 by about 29%. The genotypes FLIP 96-98L and XG 98/2/3 had the highest content of seed protein being 23.8% followed by Giza 9, Sinai 1 and FLIP 89-34L, with insignificant differences among them. Seed yield/fed was correlated positively and significantly with plant height, seed yield/plant, and number of pods and seeds/plant and hydration coefficient after cooking. Seed protein content was positively and significantly correlated with each of total soluble solids (r = 0.339), hydration coefficients before cooking (r = 0.301) and after cooking (r = 0.357). Despite no significant relationship occurred between seed protein content and seed yield, selection for high seed yield will indirectly increase seed protein yield. The highest magnitude of phenotypic coefficient of variation was observed for number of seeds/plant (30.23), seed yield /plant (26.69), seed yield/fed (24.04) and number of pods /plant (24.00) and 100-seed weight (20.18) indicating the possibility for effective selection for these traits.

INTRODUCTION

Lentil (*Lens culinaris* Medikus) is an important food legume in Egypt. Since the crop is traditional dietary item throughout the country, protein content and cooking quality are the most important quality characters. Lentil seeds are rich in protein with an average of 25% and (66%) carbohydrates (Hamdi and El-Emery, 1996). Hence yield and quality evaluation are considered important objectives in lentil breeding program.

Several researchers have conducted testing variety experiments to evaluate yield and seed quality characters and they found wide variability for yield, yield components and seed quality characters among lentil genotypes. For example, a range of seed protein of 22.1 to 26.9% was found by Hamdi *et al.*(1991). Seed cookability varied among lentil genotypes and ranged from 53.3% to 71.7% (Hamdi *et al.*, 2002-a). Hamdi (1987) reported highly significant differences among genotypes for seed protein content (22.1-26.9%), and cooking time (25.2–48.6 min). He also found significant differences between genotypes and environment effects on seed protein quality using SDS-acrylamide gel electrophoresis. Erskine *et al.* (1985) found differences between locations in cooking time, but the range in cooking time was greater between genotypes than locations. Hamdi (1987) reported significant effects of seasons, environments, irrigation and locations on cooking time of lentil seeds.

Evaluation of lentil germplasm is an important part in lentil improvement program at ARC, since the local landraces have a narrow genetic base (Hamdi and Rabeia, 1990), introducing exotic genotypes has been a matter of great importance to increase the genetic variability of lentil germplasm in Egypt. Therefore, the present study aimed, through testing a large number of exotic genotypes under Egyptian conditions, to find out high yielding genotypes adapted to local environments, and to study the genetic variability of lentil genotypes with respect to the important characteristics.

MATERIALS AND METHODS

A total of 18 lentil accessions randomly chosen from the germplasm collection of Agricultural Research Center (ARC) in Egypt were grown at Gemmiza Research Station. The local cultivar Giza 9 and the early maturing variety Sinai 1 were also grown for comparison (Table 1). Two field experiments were carried out during the two winter seasons of 2001/2002 and 2002/2003. Sowing was done on 20 November in both seasons. The genotypes were grown in randomized complete block design with four replications. Plots were 3.5 x 1.8m and consisted of 6 rows spaced 30 cm apart. Fertilizer was applied at the rate of 30kg P_2O_5 and 15kg N/fed prior to planting. The following plant characters were measured: (1) Number of days from sowing to 50% flowering, (2) days from sowing to 90% maturity, (3) plant height (cm), (4) Number of branches per plant, (5) seed weight /plant, (6) Number of pods /plant, and (7) Number of seeds/plant. The characters from 3 to 7 were recorded on random sample of 20 guarded plants from each plot, while 100- seed weight was averaged over four 100 -seed count samples from each plot. Seed yield/ plot was determined from the middle four rows of the plot then seed yield/feddan was calculated.

The following seed quality characters were evaluated (1) percentage of seed protein content (calculated by multiplying the total nitrogen by 6.25 according to the method of A.O.A.C, 1990), (2) Hydration coefficient of seeds before cooking (H.C.B): 10 g of dry seeds from each experimental plot were soaked in tap water for 8h, then was calculated as [(weight of soaked seeds-weight of dry seeds)/weight of dry seeds] x 100, (3) Hydration coefficient of seeds after cooking (H.C.A) was estimated by placing 10 g of dry seeds from each experimental plot in glass tubes (100 cm^3) containing enough water. The tubes were put in oven for 2 h at 100°C. The hydration coefficient after cooking (H.C.A) was determined in cooked seeds according to the method of Fahmy *et al.* (1996) as follows: H.C.A % = [(weight of cooked seeds - weight of dry seeds)/weight of dry seeds] x 100, (4) seed cookabillty (Coc %): the cookabillty of lentil seeds was measured by using the normal press of fingers to test the seed consistency. When 5 seeds were soft, more seeds were tested for softness until it had been verified that 80% of seeds were cooked, (5) The total soluble solids (T.S.S %) was determined by putting the cooking water left after cooking the seeds in an empty pot then dried on 60°C over night. T.S.S was calculated as follows: T.S.S% = [(weight of pot after drying-weight of empty pot)/ Initial weight] x 100 (Fahmy *et al.*, 1996).

The statistical analysis of variance was made in every year as a randomized complete block design, then the combined analysis of variance for the two seasons was performed according to Gomez and Gomez (1984). Simple correlation coefficient among all studied characters was calculated. Phenotypic and genotypic coefficient of variation, heritability in broad sense and expected genetic advance were calculated as suggested by Allard (1960).

RESULTS AND DISCUSSION

Data of morphological, phenological, yield and related characters and seed quality traits as affected by seasons and lentil genotypes are presented in Tables (2-5).

Seasonal effects:

The effect of seasons on phenological, morphological, yield and its component characters is shown in Table (2). Growing season significantly affected all characters except seed yield/fed. Most characters gave higher values in the second season. For example, plant height was 29.4 cm in the first season, while it increased to 34.5 cm in the second season. Seed yield/plant also increased from 0.7g in first season to 1.5g in second season. It seems that the growth conditions in the second season were more favorable than in the first season. The minimum and maximum average air temperature in January (beginning of flowering period) in the first season was 9.3 and 18.4 °C, while the corresponding degrees in the second season were 12.0 and 22.3 °C. In addition, some cold days were encountered in January and February in the first season, where the minimum temperature reached 4.5 to 6°C. Variation in air temperature between seasons in Egypt and their effects on lentil growth was previously reported by Hamdi *et al.* (2003).

Genotype effects:

Days to flowering and maturity:

Mean days to 50% flowering of all genotypes was 81.95 with a range of 72.1–86.8 days (Table 2). Sinai 1 was the earliest followed by genotypes: FLIP 89-51L, ILL 7163 and FLIP 96-98L comparing with the control variety Giza 9. Sinai 1 flowered 9 days earlier than Giza 9. Days to maturity ranged from 131.4 days for Sinai 1 to 144.5 days for Family 29 with a mean of 140.1 days. Most tested genotypes matured earlier than Giza 9, which is desirable since earliness is a major objective in variety screening program in lentil (Hamdi, 1998). The earliness of Sinai 1 in both flowering and maturity was also reported by Hamdi *et al.* (2002-b).

Plant height and number of branches/plant:

Results in Table (3) indicate that the genotypes significantly varied in plant height and number of branches/plant. The range of plant height was 27.0 to 37.7 with a mean of 31.95 cm. Number of branches/plant ranged from 3.0 branches for XG 9/3/3 to 5.3 branches for XG 88-17 (Table 3). Plant height and number of branches/plant are important characters since they reflect plant vigor, which leads to high yield (Erskine and Goodrich, 1988) and their variability would be helpful for selecting parents to be used in crossing programs. The data showed that the genotype XG 88-17 combined high plant height and the highest number of branches/plant. Therefore this genotype could be used as a source of these characters in crossing program. Wide variability in plant height and number of branches/plant among lentil genotypes were reported by Ezzat and Ashmawy (1999), Ibrahim (2001) and Hamdi *et al.* (2003).

Seed yield and yield component characters:

The data of seed yield/plant, numbers of pods and seeds/plant and 100-seed weight as yield component characters and seed yield/feddan are presented in Table (4). There was a wide range of seed yield/plant. FLIP 95-67 L gave the maximum seed yield/plant (1.68g) and outyielded the check cultivar Giza 9 by 44.83%. Number of pods/plant also varied widely among the tested genotypes. It ranged from 49.18 pods for FLIP 95-67L to 17.45 pods for XG 98/2/2. Similar wide variability was also occurred in number of seeds/plant as shown in Table (4). The genotype FLIP 95-67L had 71.10 seeds/plant and exceeded Giza 9 by 39.99%. These genotypes combined the highest number of pods and seeds/plant and hence the highest seed yield/plant as indicated in table (4). Weight of 100 seeds showed a range of 3.59-1.66 g with overall average of 2.18g indicating that most of the tested genotypes are small seeded. In comparison, the average 100-seed weight of international lentil germplasm at ICARDA is 3.4 g (Hamdi *et al.*, 1991). The results in Table (4) indicated that only one genotype (Sinai 1) had 100-seed weight above 3.4 g.

Importing large seeded lentil has become common in the Egyptian market, Therefore, large seeded lentil genotypes should be introduced to our germplasm and more attention should be given to selection of large seeded types. Seed yield averaged 494.31 kg/fed (3.09 ardab/fed) and ranged from 273.07 kg/fed (1.71 ardab/fed) for XG 98/2/2 to 678.99 kg/fed (4.24 ardab/fed) for FLIP 95-67L. This genotype had the maximum yield and yield component characters as indicated above. Its seed yield/fed exceeded the yield of Giza 9 by about 29%. The superiority of this genotype in seed yield could be attributed to the high numbers of pods and seeds/plant. This promising genotype will be re-tested in advanced yield trials of the lentil program.

Seed quality characters:

The means of seed protein content, total soluble solids (T.S.S), hydration coefficient before cooking (H.C.B) and after cooking (H.C.A) and cookability for all studied genotypes are given in Table (5). The data showed that T.S.S, H.C.B and H.C.A characters had the widest ranges of 1.16 to 2.06, 111.0 to 124.0 and 109.0 to 122.8, respectively, followed by seed cookability character with a range of 77.8 to 97.8 and seed protein content with a range of 17.0 to 23.8. The genotypes FLIP 96-98L and XG 98/2/3 had the highest content of seed protein being 23.8% followed by Giza 9, Sinai 1 and FLIP 89-34L but with insignificant differences among them. The range of seed protein content found in the present study was close to that previously reported. For example, Hamdi and El-Emery (1996) reported a range of 22-28% and Hamdi *et al.* (1991) found a range of 24-26%. The data of T.S.S showed narrow variation among the tested genotype. FLIP 99-23L gave the highest T.S.S. value being 2.06 while Giza 9 gave a value of 1.73 %.

The means of H.C.B for all genotypes ranged from 111% for ILL 7163 to 124% for ILL 7723. Giza 9 gave value of 123%. The variation in H.C.B indicated that the tested genotypes differed in imbibing water potential. A high capacity to absorb water indicated good seed quality. Several factors have been identified to influence seed hydration. These include the age and composition of dry seeds, storage conditions, moisture contents and production factors. The values of H.C.B obtained in this study were similar to those reported by Hamdi *et al.* (2002-a). The overall means of H.C.A. for all genotypes showed significant differences among genotypes. The range of this character was from 109.0% for FLIP 95-67L to 122.8% for x G 98/2/3 (Table 5). Giza 9 had value of 114.0%. Although the range of the H.C.A values was narrow, the differences between genotypes may allow selection among them. In fact the soaking process, in which seed imbibes water, is greatly dependent on the inherent physical-chemical composition of the seed. The results of seed cookability presented in Table (5) showed significant differences among lentil genotypes. The local check variety Giza 9 had 96.8% cookability value. The values of this character for all genotypes ranged from 77.8% for FLIP 89-34L to 97.8 for FLIP94-1L, XG 98/1/1and XG 98/2/3.

Correlation analysis:

The simple correlation coefficients among all tested characters were calculated and presented in Table (6). The results showed that seed yield/fed was correlated positively and significantly with each of plant height, seed yield/plant, number of pods and seeds/plant and H.C.A. Positive correlation between seed yield and yield component suggesting that high seed yield could be improved by selection for number of pods/ plant.

Seed protein content was positively and significantly correlated with each of T.S.S. ($r = 0.339$), H.C.A ($r = 0.357$) and H.C.B. ($r = 0.301$). These relationships indicate that high seed protein content is also an indication of good seed quality and selection for one quality character is sufficient to maintain high level of other quality characters. No significant relationships occurred among seed protein content in one side and yield and its component on the other side. These relations suggest that selection for high seed yield will indirectly increase seed protein yield. Similar relations among seed protein content and yield and yield component characters were reported in lentil (Hamdi, 1987).

Genetic parameters of the studied characters:

The estimates of phenotypic coefficients of variation (P.C.V), genotypic coefficients of variation (G.C.V), broad sense heritablity ($h^2_{b.s}$), genetic advance (GA) and genetic advance as percentage of the mean (GA%) for studied characters are presented in Table (7).

The highest magnitude of (P.C.V) was observed for number of seeds/plant (30.23), seed yield /plant (26.69), seed yield/fed (24.04) and number of pods /plant (24.00) and 100-seed weight (20.18) indicating the possibility for effective selection for these traits. However, number of seeds/plant and seed yield /plant combined the highest estimates of both P.C.V and G.C.V. High heritability estimates were obtained for seed yield/fed (84.59%) seed yield /plant (73.62), number of pods /plant (73.04) and number of seeds/plant (58.73%). All seed quality characters gave high heritability estimates, which ranged from 89.43 for cookability to 99.324 for T.S.S.

Ezzat and Ashmawy (1999) also reported high broad sense heritability for T.S.S in seed lentil. The highest values of expected genetic advance were found for seed yield/fed. (41.9%), number of seeds /plant (36.6%), number of pods /plant (35.6%), seed yield/ plant (34.7%) 100-seed weight (34.1%) and T.S.S (32.1%). However, Johanson *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 genotypes. Therefore, pronounced progress should be expected from selection between genotypes for T.S.S and seed yield /fed.

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Table 1. Name and source of lentil germplasm evaluated in Egypt in 2001/2000 and 2002/20003 seasons.

Genotype	Source
FLIP 88-34L	Selection from hybrid introduced from ICARDA
FLIP 88-37L	Selection from hybrid introduced from ICARDA
FLIP 89-34L	Selection from hybrid introduced from ICARDA
FLIP 89-51L	Selection from hybrid introduced from ICARDA
FLIP 94-1 L	Selection from hybrid introduced from ICARDA
FLIP 95-67L	Selection from hybrid introduced from ICARDA
FLIP 96-98 L	Selection from hybrid introduced from ICARDA
FLIP 99-23 L	Selection from hybrid introduced from ICARDA
ILL 7163	Selection from hybrid introduced from ICARDA
ILL 7715	Selection from hybrid introduced from ICARDA
ILL 7723	Selection from hybrid introduced from ICARDA
X G 88-17	Selection from hybrid from Egypt
X G 98/1/1	Selection from hybrid from Egypt
XG 98/2/2	Selection from hybrid from Egypt
XG 98/2/3	Selection from hybrid from Egypt
XG 98/3/3	Selection from hybrid from Egypt
XG 98/9/1	Selection from hybrid from Egypt
Family 29	Land race from Egypt
Sinai 1	An Egyptian variety from Argentinean precoz, early maturing
Giza 9	An Egyptian cultivar

Table 2. Overall means of all studied characters in 2001/2002 and 2002/2003 seasons.

Character	Season		L.S.D 5%
	2001/2002	2002/2003	
Days to 50% flowering	79.4	84.5	1.1
Days to 90% Maturity	141.5	138.7	1.0
Plant height (cm)	29.4	34.5	4.6
No. of Branches/ plant	3.3	4.9	1.0
Seed yield /plan (g)	0.7	1.5	0.3
No.of pods/ plant	28.0	46.7	5.6
No.fo seeds / plant	30.1	64.7	4.0
100- seed weight (g)	2.0	2.3	0.1
Seed yield (kg/fed.)	420.4	568.2	NS

Table 3. The Overall means of days to 50% flowering, for 90% maturity,plant height and number of branches /plant of tested lentil genotypes (combined data of 2001/2002 and 2002/2003 seasons).

Genotypes	Days to 50% flowering	Days to 90% maturity	Plant height (cm)	No. of branches /plant
FLIP 98-34L	84.5	140.9	30.0	4.0
FLIP 88-37L	82.4	139.6	27.0	3.6
FLIP 89-34L	84.1	140.1	28.1	4.5
FLIP 89-51L	77.0	138.4	28.3	4.8
FLIP 94-1 L	80.6	138.1	30.8	4.0
FLIP 95-67L	85.5	140.5	31.5	5.1
FLIP 96-98 L	79.6	139.3	35.4	4.7
FLIP 99-23L	83.8	140.5	27.9	3.8
ILL 7163	79.1	137.9	36.6	4.0
ILL 7715	82.5	141.5	31.1	5.0
ILL 7723	80.6	140.5	33.9	4.7
X G 88-17	81.3	141.5	36.7	5.3
X G 98/1/1	82.9	141.4	32.3	3.9
XG 98/2/2	86.8	138.8	29.7	3.4
XG 98/2/3	82.8	140.0	31.4	3.6
XG 9/3/3	84.1	142.6	31.4	3.0
XG 98/9/1	86.8	143.0	33.4	3.2
Family 29	81.6	144.5	37.7	4.6
Sinai 1	72.1	131.4	28.5	3.4
Giza 9	81.0	142.0	37.5	3.6
Range	72.1-86.8	131.4-144.5	27.0-37.7	3.0-5.3
Mean	81.95	140.12	31.95	4.10
L.S.D. 5 %	1.394	1.147	3.781	1.037

Table 4. The Overall means of seed yield and yield component characters for tested lentil genotypes (combined data of 2001/2002 and 2002/2003 seasons).

Genotypes	Seed yield /plant (g)	No. of pods /plant	No. of seeds /plant	100-seed weight (g)	Seed yield (kg/fed)
FLIP 98-34L	1.11	38.04	47.50	2.28	476.95
FLIP 88-37L	1.16	39.88	51.65	2.18	503.59
FLIP 89-34L	1.11	38.83	49.73	2.03	500.14
FLIP 89-51L	0.76	30.79	33.60	2.83	361.18
FLIP 94-1 L	1.16	40.70	51.75	1.80	503.58
FLIP 95-67L	1.68	49.18	71.10	2.16	678.99
FLIP 96-98 L	1.09	38.30	49.30	2.15	482.76
FLIP 99-23L	0.72	22.83	25.45	2.38	335.00
ILL 7163	0.86	33.35	38.15	2.20	408.94
ILL 7715	1.33	46.89	60.75	2.14	648.15
ILL 7723	1.47	47.29	62.60	2.08	657.29
X G 88-17	1.32	46.50	61.00	1.98	645.25
X G 98/1/1	1.32	42.90	56.55	2.23	614.89
XG 98/2/2	0.63	17.45	21.05	1.94	273.07
XG 98/2/3	0.94	33.81	40.40	1.95	447.24
XG 9/3/3	1.23	41.40	52.60	2.08	551.28
XG 98/9/1	1.00	34.86	45.20	1.81	432.35
Family 29	1.10	36.83	46.21	1.66	467.05
Sinai 1	0.80	25.69	32.25	3.59	371.38
Giza 9	1.16	40.66	50.79	2.14	527.25
Range	0.36-1.68	17.45-49.18	21.05-71.10	1.66-3.59	273.07-678.99
Mean	1.10	37.31	47.38	2.18	494.31
L.S.D. 5 %	0.421	13.018	14.261	0.118	130.627

Table 5. Overall means of seed protein content, total of soluble solids (T.S.S), hydration coefficient before (H.C.B) and after (H.C.A) cooking and cookability characters of tested al lentil genotypes (combined data of 2001/2002 and 2002/2003 seasons).

Genotypes	Seed protein content (%)	T.S.S	H.C.B	H.C.A	Cookability %
FLIP 98-34L	20.8	1.88	116.0	114.0	90.0
FLIP 88-37L	22.0	1.67	115.8	111.8	87.8
FLIP 89-34L	23.0	1.86	119.0	112.8	77.8
FLIP 89-51L	18.8	1.84	116.0	113.0	82.8
FLIP 94-1 L	20.8	1.87	112.0	114.0	97.8
FLIP 95-67L	20.8	1.96	119.0	109.0	92.8
FLIP 96-98 L	23.8	2.05	120.8	110.8	95.0
FLIP 99-23L	19.8	2.06	113.8	110.8	95.0
ILL 7163	19.8	1.89	111.0	116.0	87.8
ILL 7715	21.8	1.92	122.0	113.8	82.8
ILL 7723	19.0	1.95	124.0	114.0	92.8
X G 88-17	20.8	1.80	120.8	112.0	92.8
X G 98/1/1	21.0	1.27	121.0	120.0	97.8
XG 98/2/2	22.0	1.36	122.0	122.0	95.0
XG 98/2/3	23.8	1.21	122.8	122.8	97.8
XG 9/3/3	17.0	1.81	120.8	112.0	91.8
XG 98/9/1	18.8	1.69	119.0	112.0	92.8
Family 29	22.0	1.74	122.0	114.0	93.0
Sinai 1	23.0	1.16	119.8	118.0	92.8
Giza 9	23.0	1.73	123.0	114.0	96.8
Range	17.0-23.8	1.16-2.06	111.0-124.0	109.0-122.8	77.8-97.8
Mean	21.063	1.735	119.013	114.325	91.613
L.S.D. 5 %	0.828	0.059	0.727	0.955	5.016

Table 6. Phenotypic correlation coefficient between all tested characters for lentil genotypes evaluated at Gemmiza in 2001/2002 – 2002/2003 seasons.

No.	Characters	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Plant height.	-0.202	0.014	0.305**	0.382**	0.335**	0.330**	-0.212	0.388**	-0.050	-0.156	0.234*	-0.034	0.140
2	Days to 50% flowering		0.831**	-0.320**	0.137	0.091	0.074	-0.400**	0.112	-0.091	0.241*	-0.129	0.045	-0.100
3	Days to 90% maturity			-0.092	0.189	0.191	0.190	-0.455**	0.237*	-0.092	0.081	0.117	0.116	0.016
4	No. of branches				0.158	0.195	0.154	0.062	0.178	-0.027	-0.057	0.171	0.077	0.050
5	Seed yield/plan					0.500**	0.457**	-0.150	0.565**	-0.203	-0.151	0.171	0.109	0.090
6	No. of pods/plant						0.924**	-0.225*	0.448**	-0.129	-0.136	0.224*	0.092	-0.031
7	No. of seeds/plant							-0.189	0.430**	-0.118	-0.147	0.231*	0.117	-0.027
8	100-seed weight								-0.146	0.193	-0.374*	0.203	0.138	0.085
9	Seed yield kg/fed.									-0.191	-0.155	0.251*	0.124	-0.067
10	Seed protein content										0.339**	0.357**	0.301**	0.058
11	T.S.S											-0.806**	0.334**	-0.297**
12	H.C.A												0.277*	0.211
13	H.C.B													0.151
14	Cookability													-

Table 7. Estimates of phenotypic (P.C.V) and genotypic (G.C.V) coefficients of variation, broad sense heritability (h^2) genetic advance (GA) and genetic advance as percentage of mean (GA %) of studied characters.

Character	PCV%	GCV%	h^2%	GA*	GA%
Plant height	13.393	8.563	40.872	3.603	11.277
50% flowering	6.065	3.207	27.959	2.863	3.493
90% maturity	3.181	1.170	13.543	1.243	0.887
No. branches	19.086	13.113	47.208	0.760	18.56
Seed yield/plant	26.694	22.903	73.62	0.381	34.73
No. pods/plant	24.002	20.513	73.042	13.289	35.620
No. seeds/plant	30.23	23.167	58.733	17.329	36.575
100-seed weight	20.177	18.272	82.006	0.742	34.086
Seed yield/fed	24.038	22.108	84.587	207.049	41.886
Seed protein %	8.721	8.610	97.466	3.688	17.510
T.S.S	15.679	15.626	99.324	0.557	32.080
H.C.A	3.237	3.224	99.170	7.561	6.614
H.C.B	3.138	3.130	99.528	7.656	6.433
Cookability %	5.947	5.624	89.428	10.036	10.955

* Expected genetic advance from selecting the to 5% of tested genotypes.

تقييم المحصول وصفات الجودة لبعض التراكيب الوراثية لمحصول العدس فى مصر

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تهدف هذه الدراسة الى انتخاب تراكيب وراثية عالية الانتاجية والمتأقلمة للبيئة المصرية ودراسة المعايير الوراثية والارتباط بين صفات المحصول ومكوناته مع صفات جودة البذور لعشرين تركيب وراثى لمحصول العدس.

أظهرت النتائج وجود تأثيرا معنوي لموسم الزراعة على جميع الصفات ماعدا محصول البذور للفدان وقد بلغ متوسط محصول البذور للفدان ٤٩٤,٣١كجم (٣,٠٩ اردب/فدان) وحققت السلالة FLIP 95-67 L اعلى محصولاً للبذور بلغ ٦٧٨,٩٩كجم للفدان (٤,٤٤ اردب/فدان) بزيادة قدرها ٢٩% أعلى من انتاجية الصنف المحلى جيزة ٩ وقد حققت السلالات FLIP 96-98L, XG.98/2/3 أعلى نسبة بروتين فى البذور حيث بلغت ٢٣,٨% تلاها جيزة ٩ وسيناء ١و FLIP 89-34 L دون وجود فروق معنوية بينهم.

وقد اظهرت النتائج ايضاً وجود علاقة ارتباط موجب بين محصول البذور ومعامل تشرب البذور للماء قبل الطهي، كما تحقق ارتباطاً موجباً ومعنوياً بين نسبة البروتين بالبذور وكل من مجموع المواد الصلبة الذائبة بالبذور (٠,٣٣٩) ومعامل تشرب البذور للماء قبل الطهى (٠,٣٠١) وبعد الطهى (٠,٣٥٧)، وعلى الرغم من عدم وجود علاقة معنوية بين نسبة البروتين بالبذور ومحصول البذور، إلا أن الانتخاب للمحصول العالي سوف يزيد بطريقة غير مباشرة كمية البروتين بالبذور. وقد تحققت أعلى قيم لمعامل التباين الكلى لكل من عدد البذور للنبات (٣٠,٢٣) ومحصول البذور للنبات (٢٦,٦٩) ومحصول البذور للفدان (٢٤,٠٤) وعدد القرون فى النبات(٢٤,٠) ووزن ١٠٠ بذرة (٢٠,١٨) مما يدل على كفاءة الانتخاب لتحسين هذه الصفات بين السلالات المختبرة.