ISSN 1110-0419

Annals Of Agric. Sc., Moshtohor,
Vol. 42 (3): 989-1000, (2004).

SEED CHARACTERISTICS AS INDICATORS OF PEANUT SEED QUALITY.

BY

Abd-Alla, M.M.S.* and Sorour, W.A.I.**

* Seed Technology Research Section.

** Oil Crops Research Section.

Field Crops Research Institute, Agricultural Research Centre, Giza, Egypt

ABSTRACT.

Seed of twenty genotypes from erect and semi - spreading types of peanut (*Arachis hypogaea L.*) were used in order to evaluate their characteristics for using in the breeding programs from the seed technology point by certain characters of seeds. Seed traits who divided to shape, size and weight of seed, in addition to, seed tests who divided to seed germination test, normal seedlings classification test, seedling measurements, accelerated ageing test and chemical analysis were the measurements of evaluation in the present investigation . It was found that peanut genotypes varied significantly concerning of seed traits and tests.

M.32 recorded the highest values for six characters, namely seed germination percentage, normal strong seedlings, seedling growth rate, seedling vigour index, accelerated aging and seed oil percentage . M.15, M.17 and M.25 gave the highest values for length and thickness of seed, size and weight of seed, also M.30 gave the highest values for seed width, epicotyl length and seedling length. However, the study revealed that certain supperiour genotypes such as M.32 and M.15 gave relatively positive results for most investigated tests . Thus, they may be useful for plant breeder.

INTRODUCTON

Peanut (*Arachis hypogaea L.*) is an important crop internationally for both direct human consumption and as an one of the main world sources of edible oil . In Egypt, it is grown for local direct consumption and about 35% of the local national production is for export.

Seeds must be viable and possess physiological traits allow rapid germination and establishment seedlings. High quality seeds are an essential factor to ensure improved field emergence who often leads to increased yield (Johnson and Mulvaney, 1980). High quality seed characteristics divide to seed traits and seed tests.

Seed traits are include the variability in seed shape, who could provide seed with useful trait for identifying and classifying peanut germplasm. The only published scheme for rating peanut seed shape is based on the ratio of two measurements, width and length of seed but assumes that the variability in the third dimension, seed thickness, is not independent (Nelson and Wang, 1989). The direct influence of seed size on seedling emergence and plant growth has been well documented (Main and Nafziger, 1992). A significant correlation was shown between seedling vigour of genotypes and seed weight, so heavy seeds producing lines have been selected in some breeding programs (Townsed, 1974). Seed tests are include seed germination and vigour tests who are the main physiological quality attributes. Seed germination test is universally accepted as an index of quality for marketing seeds and as indicator of field germination for producers (Barla-Szabo and Dolinka, 1988). Several laboratory tests were proposed for use in the vigour assessment have been derived from seed germination test and include seedling vigour classification test (Prijic *et al.*, 1990), seedling length (Perry, 1977), length of root, hypocotyl and epicotyl (AOSA, 1978), seedling growth rate (AOSA, 1983), seedling vigour index (ISTA, 1985) and the accelerated ageing test as one of the most frequently used vigour test methods to estimate the longevity of seed in commercial storage (Ferguson, 1990). For all that, the present study was carried out to measurement the differences in shape and characteristics of seed as indicators of peanut seed quality.

MATERIALS AND METHODS

Seeds of twenty genotypes from erect and semi-spreading types of peanut were produced in 1998 under the same conditions of Oil Crops Research Section, Field Crops Research Institute, Agricultural Research Centre (ARC), Giza. Genotypes that are used in this study were development in previous studies by Sorour (1989), whereas he treated two commercial cultivars of Giza 4 (a semi-spreading cultivar) and Giza 5 (an erect growth habit) with three different potent mutagens; gamma rays, ethylmethane sulphonate (EMS) and sodium azide (Na N3) who prepared in three concentrations.

From these previous studies which continuous eight years for stabilization of characters in mutants seed. Sixteen mutants chosen for higher yielding. These mutants were M 9,M 15,M 17, M 18,M 22, M 23, M 25, M 26, M 29, M 30, M. 32, M.34, M.79, M.235,M.382 and M.383,in addition to, two commercial cultivars (Giza 4 and Giza 5) and two strains, the first was red seeds and the second was white seeds. Each genotype is presented as one seed lot and stored under controlled conditions . Thereafter, introduced to Seed Technology Research Section, Field Crops Research Institute, ARC, Giza, to measurement the differences in some characteristics of seed as indicators of peanut seed quality. All seed lots were adjusted to 11-12 % moisture content by incubation at 25 °C and 100 % relative humidity, then seed lots stored in plastic bags at 5 °C without any fungicides until use. The information in (Table 1) show a diversity of genetic backgrounds and countries of the origin for other genotypes.

Table (1) : Genetic backgrounds and countries of origin for other genotypes.

Genotypes	Pedigree	Country
Giza 4	Selected line from S- 274	Egypt
Giza 5	Early bunch	U.S.A.
Red strain	Introduction 293 (A)- Comet	U.S.A.
White strain .	Introduction 293 (B)- Comet	U.S.A.

A. Seed traits :

Seed shape :

Although most commercial cultivars from crops have limited diversity in seed shape, peanut genotypes reveals a large range in seed shape but it not fully described.

Four replications of 50 seeds were randomly chosen from each seed lot to determine the diverse seed shape by using a caliper accurate to 0.01mm. Width, length and thickness of seed were recorded for each seed. A description of seed shape could be established by using two ratio; width to length (WLR) and width to thickness (WTR). Two categories of WLR and WTR were established to create a binary as visual classification scheme. Width to length ratio was represented by numerals of one or two and width to thickness ratio was represented by letters of N or F to denote normal or flat seeds.

Seed size :

From above seed distances data, i.e. width, length and thickness of seed for each seed lot could be calculated seed size of lot to 0.01 cm^3 according to (ISTA, 1985) by the formula given below :

Seed size = Seed width x Seed length x Seed thickness

Seed weight :

Four replications of 50 seeds were randomly taken from each seed lot to determine the diverse of seed weight to 0.01 gram.

B. Seed tests :

Seed germination test :

Germination test results establish the maximum plant producing potential of seed lots and correlate quite well emergence under favorable field conditions. Four replications of 50 seeds were randomly chosen from each seed lot and planted between moist paper germination towels in a straight line with the embryos downward inside plastic bags and incubated at 25 °C for ten days. At the end of the prescribed germination period, the normal germination seedlings were recorded in each replication of lot as germination percentage according to Association of Official Seed Analysts (AOSA, 1991).

Normal seedlings classification test :

It is a seedling evaluation test for determine seed vigour through normal seedlings who divide to normal strong seedlings which are symptomatic of high vigour or increased quality and normal weak seedlings which are symptomatic of low vigour or reduced quality. After ten days from incubated four replications of

50 seeds from each seed lot at 25 °C, seedlings were classified into normal strong seedlings which had complete morphological parts without breaks or lesions and normal weak seedlings which had some deficiencies in root, hypocotyl, cotyledon and epicotyl according to (AOSA, 1991).

Seedling measurements :

Seedling measurements is necessary for determine seed vigour too, and include four linear growth sites i.e, length of root, hypocotyl and epicotyl as a seedling length, seedling growth rate and seedling vigour index. After ten days from incubated four replications of 50 seeds from each seed lot at 25 °C, abnormal seedlings and decayed seeds were discarded from seed sowed, then length of root, hypocotyl, epicotyl and seedling per cm were determined from normal seedling. The total dry weight of normal seedlings to the nearest mg was divided by the number of seedlings for a seedling growth rate (AOSA, 1983), but seedling vigour index (SVI) was calculated with the help of data recorded on germination percentage and seedling length according to (ISTA, 1985)by formula given below :

SVI = Seedling length (cm) x Germination percentage

Accelerated ageing test :

The basis of accelerated ageing test is that higher vigour seeds tolerate the high temperature, high humidity treatment and thus retain their capability to produce normal seedlings in the germination test . It is using for predicting the relative storability of seeds. Two hundred seeds from each seed lot were exposed to 41°C and 100 % relative humidity for 72 hours, thereafter they sowed and evaluated as an in the seed germination test (AOSA, 1991).

Chemical analysis :

Percentage of oil and protein were estimated in the seeds of genotypes according to (AOAC, 1980).

Data of each laboratory test were statistically analyzed as complete randomized design in factorial arrangement according to Steel *et al.*(1997). The original data of germination percentage were transformed by using acrsine. Treatment means of laboratory tests were compared using Least Significant Differences (L.S.D.) as mentioned by (Snedecor and Cochran, 1980).

RESULTS AND DISCUSSION

A. Seed traits :

Seed shape:

Data recorded in (Table 2) indicated clearly that seed shape was significantly influenced by width to length ratio (WLR) and width to thickness ratio (WTR) who dependent on the width, length and thickness of seed.

The present results indicated that the dimensions of seed varied from 7.73 to 8.88 mm with an average of 8.32 mm for seed width, from 11.45 to 20.33 mm with an average of 17.87 mm for seed length and from 8.20 to 10.30 mm with an average of 9.58 mm for seed thickness, but WLR ranged from 0.41 to 0.69 with an average of 0.47 and WTR ranged from 0.82 to 0.97 with an average of 0.87.

It could be observed that, M.15 had the highest values for width, length and thickness of seed, without significant differences between this mutant and Giza 4, M.18, M.25 and M.235 for the three studied traits. On the other side, white strain had significantly lowest values for the three traits. White strain gave the highest value of WLR and it was differed significantly with all other genotypes, but the lowest value was obtained from M.9 . Whereas red strain gave the highest value of WTR followed by M.30 without significant differences, but the lowest value was obtained from M.9 and M.29.

Table (2): Seed traits for twenty peanut genotypes .

Genotype	Seed trait						
	Width (mm)	Length (mm)	Thickness (mm)	WLR	WTR	Size (cm^3)	Weight (g)
Giza 4	8.80	19.53	9.90	0.45	0.89	1.70	0.89
Giza 5	7.93	18.90	9.43	0.42	0.84	1.41	0.77
M.9	7.73	18.90	9.45	0.41	0.82	1.38	0.74
M.15	8.85	20.33	10.30	0.44	0.86	1.85	0.96
M.17	8.55	20.05	10.20	0.43	0.84	1.75	0.93
M.18	8.65	19.40	9.90	0.45	0.87	1.66	0.94
M.22	8.00	18.15	9.68	0.44	0.83	1.41	0.88
M.23	8.75	19.55	9.78	0.45	0.89	1.67	0.89
M.25	8.68	19.85	10.10	0.44	0.86	1.74	0.94
M.26	7.98	16.63	8.88	0.48	0.90	1.18	0.64
M.29	8.05	18.43	9.83	0.44	0.82	1.46	0.90
M.30	8.88	18.00	9.55	0.49	0.93	1.53	0.80
M.32	8.50	15.15	9.40	0.56	0.90	1.21	0.67
M.34	8.08	15.73	9.08	0.51	0.89	1.15	0.67
M.79	8.33	19.65	9.68	0.42	0.86	1.58	0.88
M.235	8.58	19.50	10.10	0.44	0.85	1.69	0.88
M.382	8.28	19.38	9.93	0.43	0.83	1.59	0.92
M.383	7.98	15.58	9.15	0.51	0.87	1.14	0.61
Red strain	7.98	13.28	8.20	0.60	0.97	0.87	4.52
White strain	7.90	11.45	9.00	0.69	0.88	0.81	00.4
Mean	8.32	17.87	9.58	0.47	0.87	1.44	0.79
L.S.D. at 5%	0.50	0.96	0.54	0.04	0.06	0.17	0.04

M: Mutant

Data indicate also that width to length ratio (WLR) and width to thickness ratio (WTR) are relatively stable traits and the stability of seed shape in peanut suggests that it could be useful as another descriptor, particularly in germplasm collections. Actual seed measurement is a time-consuming process, so this propose a visual seed shape classification scheme based on the data collected in the same table, i.e. width, length and thickness of seed. Two classes were established for both WLR and WTR in (Table 3) and the range for WTR is nearly 50% larger than for the WLR.

The longitudinal section of genotypes less than 0.49 was biggish than genotypes higher than 0.50, while the cross section of genotypes higher than 0.90 who call flat seeds was biggish than genotypes less than 0.89 who call normal seeds.

Results in (Table 4) indicated that the means of twenty genotypes tested ranged from 0.41 to 0.69 for WLR and from 0.82 to 0.97 for WTR and the smallest WTR was 0.82 for twenty genotypes evaluated . It could be concluded that the results presented here indicate that seed shape is a valid descriptor and that additional classes could be justified . These results are in harmony with the results obtained by Nelson and Wang (1989).

Table (3): Definition and designations of peanut seed shape classification based on width -length ratio(WLR) and width-thickness ratio (WTR).

	Longitudinal section	
WLR	≥ 0.50	≤ 0.49
Class	1	2
	Cross section	
WTR	≥ 0.90	≤ 0.89
Class	F (flat)	N (normal)

Table (4): Distribution of twenty selected peanut genotypes according to seed shape classification, range of width -thickness ratio (WTR) within each width length ratio (WLR) class and range of WLR within WTR class.

WLR Class	1	2
No. of genotypes	5	15
Range of WTR	0.87-0.97	0.82-0.91
WLR Class	F	n
No. of genotypes	5	15
Range of WTR	0.45-0.60	0.41-0.69

Size and weight of seed :

Seed size and seed weight are shown above in (Table 2) were significantly influenced by peanut genotypes. Seed size differed from 0.81 to 1.85 cm^3 with an average of 1.44 cm^3 and the highest value was obtained from M.15 followed by M.17, M.25 and Giza 4 without significant differences but the lowest value was obtained by white strain. In this behalf, Gan *et al.* (1992) found that a direct influence of seed on seedling emergence and plant growth has been well documented.

Seed weight varied from 0.44 to 0.96g with an average of 0.79g and M.15 gave the highest value of seed weight followed without significant differences by M.18, M.25 and M.17, but the lowest value was obtained from red strain . In this behalf, Townsend (1979) concluded that the high seed weight classes gave the greatest average seedling emergence, hypocotyl length, radical length, total length and dry weight than for low seed weight classes.

B. Seed tests :

Seed germination test :

Seedlings vigour classification who divide to normal seedlings, abnormal seedlings and decayed seeds are shown in (Table 5). It is clear from the present results that germination percentage of normal seedlings and their transformed values were significantly influenced by genotypes.

Table (5): Original classification of seed germination and normal seedlings as percentage and the transformed values for twenty peanut genotypes.

Genotype	Classification of seed germination %			Normal seedlings classification %	
	Normal seedlings	Abnormal seedlings	Decayed seeds	Normal strong seedlings	Normal weak seedlings
Giza 4	76.5 (61.1)	4.5 (12.2)	19.0 (25.8)	49.0 (44.4)	27.5 (31.6)
Giza 5	80.5 (64.0)	4.0 (11.3)	15.5 (23.0)	48.0 (43.9)	31.0 (33.7)
M.9	69.5 (56.5)	4.5 (12.2)	26.0 (30.6)	46.0 (42.6)	23.5 (27.5)
M.15	70.0 (56.8)	5.5 (13.5)	24.5 (29.6)	47.5 (43.6)	22.5 (28.1)
M.17	69.5 (56.5)	3.0 (9.8)	27.5 (31.6)	40.0 (39.2)	29.5 (32.9)
M.18	78.5 (62.4)	5.0 (12.9)	16.5 (23.9)	62.5 (52.3)	16.0 (23.0)
M.22	76.5 (61.0)	5.0 (12.9)	18.5 (25.5)	52.5 (46.5)	24.0 (29.2)
M.23	78.5 (62.4)	4.5 (12.0)	17.0 (24.4)	52.0 (46.1)	26.5 (30.7)
M.25	83.5 (66.1)	5.0 (12.9)	11.5 (19.8)	56.5 (48.8)	27.0 (31.2)
M.26	87.0 (68.9)	4.0 (11.3)	9.0 (17.4)	60.0 (50.8)	27.0 (31.2)
M.29	73.5 (59.1)	5.5 (13.5)	21.0 (27.3)	48.5 (44.2)	24.5 (29.6)
M.30	83.0 (65.7)	3.5 (10.7)	13.5 (21.5)	46.5 (42.9)	36.5 (37.0)
M.32	93.0 (74.9)	1.5 (6.1)	4.5 (10.5)	68.0 (55.6)	24.0 (29.3)
M.34	88.5 (70.3)	2.5 (9.0)	9.0 (17.3)	56.5 (48.8)	32.0 (34.3)
M.79	71.5 (57.8)	5.5 (13.5)	23.0 (28.7)	42.5 (40.6)	29.0 (31.8)
M.235	73.0 (58.7)	4.5 (12.0)	22.5 (28.3)	47.5 (43.6)	25.5 (30.2)
M.382	87.0 (68.9)	5.0 (12.9)	8.0 (16.4)	60.5 (51.2)	26.5 (30.8)
M.383	79.0 (62.8)	3.0 (9.8)	18.0 (25.1)	51.5 (45.9)	27.5 (31.5)
Red strain	92.0 (73.9)	2.5 (9.0)	6.5 (14.5)	52.0 (46.2)	41.0 (39.8)
White strain	91.0 (72.7)	2.5 (9.0)	6.5 (14.6)	67.0 (55.0)	24.0 (29.2)
Mean	80.1 (64.0)	4.1 (11.3)	15.9 (22.8)	52.7 (46.6)	27.3 (31.1)
L.S.D. at 5%	4.43 (3.43)	1.74(2.87)	3.91 (3.81)	11.99(7.00)	11.57(7.95)

Transformed values in brackets

The transformed values of normal seedlings as germination percentage ranged from 56.5 to 74.9 (it equals to 69.5 to 93.0 % in original data) with an average of 64.0 (it equals to 80.1 % in original data). M.32 gave the highest value of germination percentage and the lowest value of abnormal seedlings and decayed seeds, it was followed by red strain and white strain without significant differences, while M.9 and M.17 gave the lowest value of germination percentage. In this behalf, when seed lot and environmental conditions are benign, seed germination result will often correlate well with field emergence (Ladonne, 1989).

Normal seedlings classification test :

Results in (Table 5) indicate also that normal seedlings classification who divide to normal strong seedlings and normal weak seedlings was significantly influenced by genotypes.

The transformed values of normal strong seedlings varied from 39.2 to 55.6 (it equals to 40.0 to 68.0 % in original data) with an average of 46.6 (it equals to 52.7 % in original data), but normal weak seedlings varied from 23.0 to 39.8 (it equals to 16.0 to 41.0 % in original data) with an average of 31.1 (it equals to 27.3 % in original data).

M.32 gave the highest value of normal strong seedlings followed by white strain, M.18 and M.382 without significant differences, while M.17 gave the lowest value of normal strong seedlings. The highest value of normal weak seedlings was obtained from red strain followed by M.30, M.34 and Giza 5 without significant differences, while the lowest value was obtained from M.1. Prijic *et al.* (1990) in soybean, found that normal strong seedlings gave plants have numerous pods and seeds, but normal weak seedlings did not gave plants affect significantly, nevertheless plants have a few number of pods.

Seedling measurements :

Data in (Table 6) indicated that seedling measurements included the length of root, hypocotyl, epicotyl and seedling, in addition to, seedling growth rate (SGR) and seedling vigour index (SVI) were significantly influenced by genotypes.

These results revealed that seedling measurements ranged from 3.20 to 7.38 cm with an average of 5.64 cm for root length, 2.43 to3.88 cm with an average of 3.23 cm for hypocotyl length,1.90 to 3.52 cm with an average of 2.59 cm for epicotyl length, 8.21 to 13.18 cm with an average of 11.46 cm for seedling length,168.0 to 251.8 mg with an average of 216.9 mg for seedling growth rate and from 5.69 to 11.84 with an average of 9.22 for seedling vigour index.

The highest value of root length was obtained from Giza 5 followed by red strain, Giza 4 and M.32 without significant differences, while the lowest value of root length was obtained from M.9. The highest hypocotyl length value was obtained from M.383 and significantly differed with those M.18, M.34, Giza 5 and M.30. Whereas red strain gave the lowest hypocotyl length value. M.30 gave the highest epicotyl length value followed by white strain and M.25 without significant differences, while the lowest epicotyl length value was obtained from red strain. The highest value of seedling length was obtained from M.30 followed by Giza 5, white strain and M.32 without significant differences, while the lowest value of seedling length was obtained from M.9. The highest seedling growth rate value (SGR) was obtained from M.32 followed by M.23, M.15 and M.25 without significant differences, while the lowest value was obtained from Giza 5. M.32 gave the highest value of seedling vigour index (SVI) followed by white strain and M.30 without significant differences, while M.9 gave the lowest value of seedling vigour index . The available results were in harmony with Woodstock (1969) who revealed that seedling growth consider as a measure of seed vigour .

Table (6) : Seedling measurements for twenty peanut genotypes.

Genotype	Root Length (cm)	Hypocotyl length (cm)	Epicotyl length (cm)	Seedling length (cm)	SGR (mg)	SVI
Giza 4	6.95	3.08	2.18	12.21	239.3	9.32
Giza 5	7.38	3.43	2.15	12.96	168.0	10.42
M.9	3.20	2.88	2.13	8.21	215.3	5.69
M.15	5.25	3.35	2.15	10.75	242.3	7.54
M.17	5.68	3.25	2.18	11.11	220.3	7.72
M.18	5.88	3.45	2.50	11.83	223.0	9.27
M.22	4.25	3.33	3.00	10.58	196.5	8.09
M.23	6.18	3.10	2.78	12.06	250.3	9.46
M.25	5.25	3.38	3.23	11.86	241.0	9.89
M.26	4.93	3.30	2.65	10.88	183.5	9.45
M.29	5.10	3.20	2.33	10.63	217.0	7.81
M.30	6.23	3.43	3.52	13.18	215.8	10.93
M.32	6.13	3.20	3.40	12.73	251.8	11.84
M.34	5.03	3.45	2.58	11.06	20.70	9.78
M.79	5.33	3.10	2.10	10.53	230.8	7.53
M.235	4.80	3.18	2.23	10.21	176.5	7.45
M.382	6.18	3.33	2.68	12.19	193.0	10.60
M.383	5.20	3.88	3.10	12.18	228.0	9.62
Red strain	7.20	2.43	1.90	11.53	214.5	10.71
White strain	6.60	2.93	2.98	12.51	223.8	11.38
Mean	5.64	3.23	2.59	11.46	216.9	9.23
L.S.D. 5%	0.601	0.405	0.381	0.763	38.77	0.718

SGR: Seedling growth rate. SVI: Seedling vigour index.

Accelerated ageing test and chemical analysis :

Results in (Table 7) indicated that germination percentage after accelerated ageing and their transformed values, protein and oil percentage of seed were significantly influenced by genotypes.

The transformed values of germination percentage after accelerated ageing ranged from 34.7 to 59.4 (it equals to 32.5 to 74.0 % in original data)with an average of 46.8 (it equals to53.1 % in original data), while protein and oil percentage of seed ranged from 17.98 to 29.18 % and from 51,38 to 59.18 % with an average of 23.67 and 54.62, respectively.

M.32 gave the highest value of germination percentage after accelerated ageing followed by white strain without significant differences, while the lowest value was obtained from M.9. The decline in germination percentage after accelerated ageing was related to initial degree of deterioration of seed lots, viz, high vigour lots remains high germination percentage, while low vigour lots show a marked decline in germination percentage.These results agrees with those reported by Baskin (1977) who found that a correlation between accelerated ageing test and seed vigour in peanut.

Table (7): Accelerated ageing test and chemical analysis for twenty peanut genotypes.

Genotype	G.P. after accelerated ageing	Seed protein percentage	Seed oil percentage
Giza 4	41.5 (40.1)	23.85	54.35
Giza 5	59.0 (50.2)	24.13	52.70
M.9	32.5 (34.7)	24.30	54.18
M.15	34.5 (36.0)	21.50	52.90
M.17	35.0 (36.3)	27.10	52.48
M.18	46.0 (42.7)	29.18	51.38
M.22	50.0 (45.0)	23.18	52.08
M.23	48.0 (43.9)	22.05	54.33
M.25	65.5 (54.1)	23.35	57.30
M.26	69.0 (56.2)	21.88	55.75
M.29	38.5 (38.4)	21.80	56.45
M.30	62.5 (52.2)	27.98	57.25
M.32	74.0 (59.4)	27.65	59.18
M.34	69.5 (56.5)	17.98	55.75
M.79	35.5 (36.6)	25.00	55,05
M.235	37.5 (37.8)	20.23	53.48
M.282	67.0 (55.0)	22.05	53.10
M.383	54.5 (47.6)	20.45	53.00
Red strain	69.5 (56.5)	27.25	58.15
White strain	71.5 (57.8)	22.45	53.50
Mean	53.1 (46.8)	23.67	54.62
L.S.D. 5%	4.57 (2.74)	1.018	0.738

Transformed values in brackets. G.P.: Germination percentage.

Results indicate also that the highest value of seed protein percentage was obtained from M.18 which significantly differed than M.30, M.32 and red strain, while the lowest one was M.34. The highest value of seed oil percentage was obtained from M.32 which significantly differed than red strain,M.25 and M.30, while the lowest one was M.18. In this concern, Bulisiani and Warner (1980) found that seedlings grown from seeds containing higher amounts of protein accumulate more dry matter than seedlings grown from seeds containing lower amounts of protein.

REFERENCES

A.O.A.C. (1980): Official Methods of Analysis of Association of Official Analytical Chemists 12 th ed., Washington D.C.,USA.

A.O.S.A. (1978): Association of Official Seed Analysts " Rules for Testing Seeds ". J. of Seed Technol., 3, (3): 1 – 126 .

A.O.S.A. (1983): Seed Vigour Testing Handbook : Contribution No.32 to The Hand-book On Seed Testing, Association 0f Official Seed Analysis, N.E, USA.

A.O.S.A. (1991): Association of Official Seed Analysis " Rules for Testing Seeds ". J. of Seed Technol., 12, (3) : 1 – 125.

Barla- Szabo, G. and Dolinka, B. (1988): Complex stressing vigour test : A new method for wheat and maize seeds. Seed Sci. and Technol., 36 : 63 – 73.

Baskin, C.C. (1977): Vigour test methods –accelerated ageing. Assoc.Off. Seed Anal. Newsleter, 51, (5) : 42 – 52.

Bulisiani, E.A. and Warner, R.L. (1980): Seed protein and nitrogen effects upon seed- ling vigour in wheat. Agron.J., 72 : 657 – 662.

Ferguson, J. (1990): Report of seed vigour subcommittee. J. of seed Technol., 14: 182 – 184.

Gan, Y.; Stobbe, E. H. and Moes, Y.(1992): Relative data of wheat seedling emmer- gence and its impact on grain yield. Crop Sci., 32 : 1275 – 1281.

I.S.T.A. (1985): International Seed Testing Association, International Rules for Seed Testing. Proc. Int. Seed Test. Assoc., 31: 1 – 52.

Johnson, R. R. and Mulvaney, D.L. (1980): Development of a model for use in maize replant decision. Agron. J., 72 : 459 – 464.

Ladonne, F. (1989): Relationship between standard germination test, conductivity test and field emergence of pea seeds. Acta Horticulturae, 153 – 162.

Mian, A.R. and Nafziger, E. D. (1992): Seed size effects on emergence head number and grain yield of winter wheat. J. Prod. Agric., 5 : 265 – 268.

Nelson, L.R. and Wang, P. (1989): Variation and evaluation of seed shape in soybean. Crop Sci., 29 : 147 – 150.

Perry, D.A. (1977): A vigour test for seeds of barley (*Hordeum vulgare)* based on measurement of plumule growth. Seed Sci.and Technol., 5:709-719.

Prijic, L.J.; Jovanovic Mirjana and Propovic Padmila (1990): Effect of seedling category on main characters of soybean. Semenarstvo, 7, (1): 3 – 10.

Snedecor, G.W. and Cochran, W.G. (1980): Statistical Methods. 7 th ed. Iowa State Univ. Press, Ames. Iowa, USA, 325 –330.

Sorour, W.A.I. (1989): Genetic studies in peanuts *(Arachis hypogaea L.)* developing genetically improved mutants through mutation induction. Ph. D.Thesis, Faculty of Agric. Cairo Univ., Egypt.

Steel, R.G.D.; Torrie, P.G. H. and Dickey, D. A. (1997): Principals and Procedures of statistics. Mc- Graw- Hill. Book Company Inc., New York, 280.

Townsend, C.E. (1979): Association among seed weight, seedling emergence and planting depth in cicer milkvetch. Agron. J., 71: 410 – 414.

Townsend, E.G. (1974): Selection for seedling vigor *(Astragalus cicer L.)*. Agron. J., 66 : 241 – 245.
Woodstock, L.W. (1969): Seedling growth as a measure of seed vigour. Proc. Int. Seed Test. Ass., 34 : 273 – 280.

معالم البذرة كمؤشرات لجودة بذور الفول السوداني

محمد محمود سـليمان عبد الله *، وسيم على إبراهيم سـرور**
* قسم بحوث تكنولوجيا البذور
** قسم بحوث المحاصيل الزيتية
معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية – جيزة – مصر

استخدمت بذور عشرون تركيبا وراثيا من الطرز القائمة والنصف المنبسطة من الفول السوداني من أجل تقييم معالمها للاستعمال في برامج التربية من الوجهة التكنولوجية من خلال معالم محددة للبذور. وتعتبر سمات البذرة من شكل وحجم ووزن البذرة بالإضافة إلي اختبارات البذرة كاختبار الانبات، اختبار تصنيف البادرات الطبيعية، مقاييس البادرة، اختبار الشيخوخة والتحليل الكيميائي وحدات قياس للتقييم في الدراسة الحالية.

أوضحت الدراسة أن التراكيب الوراثيـة للفول السوداني اختلفت معنويا في سمات واختبارات البذرة فقد سجلت الطفرة ٣٢ أعلى قيمة في ستة صفات هي النسبة المئوية لانبات البادرة، البادرات القوية الطبيعية، معدل نمو البادرات، دليل قوة إنبات البادرة، الشيخوخة والنسبة المئوية لزيت البذرة، وقد أعطت الطفرات ١٥، ١٧، ٢٥ اعلى القيم في طـول وسـمك البذرة، حجم ووزن البذرة، وأعطت الطفرة ٣٠ أعلى قيمة في عرض البـذرة، طول السويقة الجنينية العليا وطول البادرة.

وقد توصلت الدراسة إلي وجود تراكيب وراثيـة تنفرد بمعالم محددة مثل الطـفرة ٣٢، الطـفرة ١٥ حيث أعطت نتائج ايجابية نسبيا تحت ظروف معظم الاختبارات المدروسة مما يمكن معه لمربى النباتات الاستفادة منها.