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EVALUATION OF SOME BARLEY GENOTYPES FOR GRAIN QUALITY AND CROP PRODUCTIVITY

BY

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ABSTRACT

Thirty genotypes of barley *(Hordeum vulgare* L*)* were evaluated for use in the breeding programs. All genotypes were tested in the lab before planting for standard germination and conductivity characters, seedling growth and chemical characters then planted in the field at the Experimental Farm at Giza, Agricultural Research Centre in a randomized complete blocks design with three replications during 2004 / 2005 and 2005 / 2006 seasons . Plant height, No.of spikes/ m long, spike length, No. of kernels / spike, 100 – kernel weight and plant grain yield were estimated. Results showed that barley genotypes differed significantly in with respect to the studied attribute. Genotype No.18 recorded the highest values for original germination percentage, plumule length, radical length, seedling fresh weight, seedling dry weight, electrical conductivity and plant height in both seasons. Genotype No.21 gave the highest values for five characters, namely No. of spikes/m long, spike length, No. of kernels/spike, 100-kernel weight and plant grain yield in both seasons. Genotype No.23 showed the highest values for protein and carbohydrate percentages in both seasons. However, the study revealed that certain distinguished genotypes such as No.5, No.6, No.18, No.21 and No.23 expressed the highest performance. Thus, they may be useful for plant breeder. For the studied character, for use in the barley improvement program for studied characters.

INTRODUCTION

Barley (*Hordeum vulgare* L.) is the world's fourth most important crop in terms of cultivated area and it is considered as one of the most suitable crops, which can be grown over a wide range of environmental conditions. In Egypt, barley cultivated area is mostly under rainfed conditions and newly reclaimed lands.

Seed quality components essentially fall into three categories; namely hygiene, viability and potential performance. The third category refers to the capacity of the seed lot to produce normal seedlings having uniformity, potential field emergence and potential storability. Germination test is successful in two respects being repeatable and provide information about the potential of a seed lot

to germinate under optimum conditions (Matthew, 1981). When maximum viability is reached, a seed lot should theoretically have a germination of nearly 100%. Loss of viability is can be attributed to the deterioration processes due to seed ageing and both pre- and post- harvest (Powell, 1988). Therefore, the germination test aimed at determining the maximum germination potential of a seed lot, which in turn can then be used to compare the quality of different lots and estimate the field planting value (ISTA, 1993).

Seedling measurements included seedling growth test as determined by measuring the linear growth and seedling dry weight, which has been used successfully on barley and wheat (Perry, 1977). Also obtain the seedling dry weight, which as closely related to seed vigor (Edje and Burris, 1970). The electrical conductivity test as measured from the electrolyte leakage of the seeds (Hibbard and Miller, 1928) or from a single seed (Hepburn *et al.*, 1984). A direct correlation has been reported between the quantity of carbohydrates exuded from seeds and seedling performance (Keeling, 1974). The chemical composition of barley grains i.e., protein and total carbohydrates is known to differ with varieties and particle size of ground barley (Rieckhoff *et al.*, 1999).

The present study was carried out to evaluate barley seed quality by using viability, biochemical and chemical tests. In addition some yield components were determined in order to assist the breeder as to the value of the studied material in the breeding program.

MATERIALS AND METHODS

The genotypes used in this study (Table 1), comprises thirty genotypes from barley research section, twenty-two from ICARDA and eight for local varieties. Seeds were adjusted for moisture content by incubation at 20°C and 100% relative humidity, then seed lots were stored in plastic bags at 5°C without any fungicides until uses in the laboratory for viability, biochemical and chemical tests and in the field for meaning yield components.

Studied traits:

A.In the laboratory:

Standard germination test:

Four- hundred seeds in replicates of 100 seeds (divided into two sub replications of 50 seeds) were taken at random from each seed lot of barley genotypes and planted on moist filter paper there spaced uniformly inside covered Petri dishes and incubated at 20°C for seven days. At the end of the prescribed germination period, the normal seedlings were recorded in each replication of each seed lot as germination percentage according to Association of Official Seed Analysis (AOSA, 1991).

Seedling growth test:

Seedling growth test is determined through the differences in normal seedling development by measuring seedling growth and dry weight of seedling after a specified time period during the subsequent rate of growth. Seeds were

incubated for seven days using four replications of 100 seeds each (divided into two sub replications of 50 seeds) for each seed lot of barley genotypes at 20°C. Then abnormal seedlings as well as decayed seeds were discarded and the linear measurement of plumule and radical per cm, as well as seedling fresh and dry weight to the nearest mg were determined from normal seedlings.

Table (1): Name or Pedigree of the thirty barley genotypes used in this study.

No.	Name and Pedigree	Source
1	Giza .123	Egypt
2	26216/6/CI01021/4/CM67/U.Sask1800//Pr o/CM67/3/DL70 /5/Nach a 2	ICARDA
3	QB813. 2	ICARDA
4	Aths / Rihane -01 // Aths / Lignee 686	ICARDA
5	Aths / Lignee 686//Orge 905/Cr. 289-53-2	ICARDA
6	Giza .117/3/Barberosse/ Rhodrs " S"/ /Gloria "S"/Come "S"	ICARDA
7	Giza .119 / Cr . 366 - 13 - 2	ICARDA
8	Giza .117 / 3 / WI 2197 / C I 13450 // Arar	ICARDA
9	Giza .126	Egypt
10	Alanda – 01/ Harmra	ICARDA
11	Lignee 527 // Chn - 01//Allanda	ICARDA
12	Giza .125//Aths/Lignee 686	ICARDA
13	Arar/Lignee 527/3/As 46/Aths * 2//Aths/Lignee 686	ICARDA
14	Donarias / Gloria - Bar//Ciao/3/Grando	ICARDA
15	Arrivat/3/Arizona 5908/Aths//Lignee 640	ICARDA
16	Giza .2000	Egypt
17	Thm. Unk.	ICARDA
18	PETUNIA	ICARDA
19	Ssn/Bra//Arar/3/Saida	ICARDA
20	Baca "S"/3/AC253//CI0887/CI05761/4/JLB70-01	ICARDA
21	Aths/Rihane01//Sawsan/Lignee 640	ICARDA
22	Rihane-05//As46/Aths*2Aths/Lignee 686	ICARDA
23	Giza .125	Egypt
24	Aths/Rihane01//Sawsan/Lignee 640	ICARDA
25	Algerian selection plot 809//Gloria "S"/Copal "S"	ICARDA
26	CLN-B/805138//Gloria/Copal/3/SEN/4/.....	ICARDA
27	Giza .124	Egypt
28	Giza .130	Egypt
29	Giza .129	Egypt
30	Giza .131	Egypt

Conductivity test:

The conductivity test provides a measurement of electrolyte leakage from plant tissue. Seed lots have high electrolyte leakage are Classified as low vigour, while those having low electrolyte leakage are considered having high

vigour. Four replications of 50 seeds chosen at random from each seed lot were weighted to two decimal places (0.01g) prior to placement into the 500 ml flasks containing 250 ml of deionized water.

All flasks containing water and seeds were covered with aluminium foil or cling film prior to placing at 20°C (± 1°C) for 24 hours. At the end of the soaking period, the conductivity of the solution was measured immediately with ORION model 115conductivity meter.

The conductivity per gram of seed weight for each replication was calculated according to (AOSA, 1983) as following:

$$\frac{\text{Conductivity for each flask (µs)}}{\text{Weight of seed sample (g)}} = \mu s.cm^{-1} g^{-1}$$

Chemical tests:

Protein percentage was determined by the micro Kjeldahl method described by (AOAC, 1980). Total carbohydrates were determined using the method described by Montgomry (1961).

B. Field data:

Seeds of barley genotypes were sown at the Experimental Farm at Giza, Agricultural Research Center, during the two successive seasons of 2004/2005 and 2005/2006 on the 20th of November. The experimental design was a randomized complete blocks with three replications. Plot size was 4.2 m^2 (1.2x3.5 m) i.e. each plot included three rows planted 30 cm apart and 3.5 m long using recommended practices. Measurement were recorded on plant height, number of spikes per meter long, spike length, number of kernels per spike, 100-kernel weight and plant grain yield using 10 randomly taken plants from the middle row of each plot.

Data were statistically analyzed according to Steel *et al.* (1977). The original data of germination percentage were transformed to angles (Arcsine) before statistical analysis according to Gomez and Gomez (1984) and (Snedecor and Cochran, 1980)

RESULTS AND DISCUSSION

A. Laboratory characters:

Standard germination and conductivity characters:

Data reported in Table (2) indicate that standard germination percentage and electrical conductivity were significantly influenced by barley genotypes.

The transformed values after standard germination test ranged from (77.8 to 90%) which equals to (94 to 100%) in standard germination data and from (75.8 to 87.98%) which equals to (94 to 99.5%) in standard germination data with an average of (84.o and 82.2%) being equals to (97.9 and 97.3%) in

standard germination data in both seasons, respectively. The highest value of standard germination percentage was obtained from genotype No.18 in both seasons while genotype No.26 recorded the lowest value of standard germination percentage in both seasons. In general the germination test values were not less than 90%, indicating that the quality of seed lots were not subjected, to deterioration and the performance were not impaired (Hampton and Coolbeer, 1990).

Data indicated that electrical conductivity values ranged from 27.3 to 63.7 μs cm $^{-1}g^{-1}$ and from 27.3 to 65.4 μs cm $^{-1}g^{-1}$ with a mean of 44.5 and 45.6 μs cm $^{-1}g^{-1}$ in both seasons, respectively. Genotype No.18 gave the highest vigor grain while the lowest vigor grain was obtained from genotype No. 26 in both seasons. It is clear that electrolyte leakage measured from high vigor grain was less than that measured from low vigor grain because the higher vigor grain was able to reorganize their membranes more rapidly and repair any damage to a greater extent than low vigor grain.

Seedling growth and chemical characters:

Results in Table (3) showed that plumule length, radical length and seedling fresh weight were significantly influenced by barley genotypes in both seasons. Plumule length varied from (9.1 to 12.3cm) and from (8.5 to 11.7 cm) with average of (10.7 cm and 10.1 cm) in both seasons, respectively. Genotype No.18 gave the highest value of plumule length followed by No.6, No.14, No.5 and No.20 in the first season and genotypes No.6, No.20, No.5, in both seasons while genotype No.26 gave the lowest one of plumule length in both seasons.

Radical length ranged from (6.4 to 9.2cm) and from (5.9to 9.1 cm) with median of (7.7 cm and 7.3 cm) in both seasons, respectively. The highest value of radical length was obtained from genotype No.18, while genotype No.26 gave the value of radical length in both seasons.

Regarding seedling fresh weight, it ranged from (155.8to 249 mg) and from (149.5 to 237.8mg) with an average of (199.8mg and 188 mg) in both seasons, respectively. Genotype No.18 gave the highest value of seedling fresh weight but insignificantly by genotype No.5 in both seasons, but genotype No.26 gave the lowest value for seedling fresh weight in both seasons.

Seedling in Table (4) dry weight, protein and carbohydrate percentages were influenced by barley genotypes in both seasons ranged from (16.3to 29.5 mg) and from (15.3 to 27.5 mg) with an average (22.0 mg and 20.3mg) in both seasons, respectively. Genotype No.18 gave the highest seedling dry weight. The lowest value for seedling dry weight was obtained by genotype No.26 in both seasons. Therefore, seed lots with high germination and high mean seedling dry weight are considered to have greater vigor than with high germination and low mean seedling dry weight.

Table (2): Germination percentage and its transformed values and electrical conductivity of 30 barley genotypes.

No.	Germination percentage		Electrical conductivity	
	2004/2005	2005/2006	2004/2005	2005/2006
1	95.5 (78.1)	95.0 (77.2)	60.8	62.4
2	98.0 (83.1)	97.0 (81.6)	44.7	48.3
3	97.5 (82.2)	96.5 (80.7)	53.3	49.4
4	96.5 (79.5)	96.0 (78.7)	47.3	58.1
5	99.5 (88.0)	99.5 (88.0)	33.5	33.9
6	99.5 (88.0)	99.0 (86.0)	33.5	36.2
7	98.0 (83.1)	97.0 (80.2)	45.4	47.7
8	99.5 (88.0)	98.5 (85.1)	31.8	38.7
9	99.5 (88.0)	98.5 (85.1)	36.0	35.7
10	98.0 (84.3)	97.5 (82.2)	43.8	45.5
11	96.0 (78.7)	95.5 (78.0)	54.7	62.4
12	98.5 (86.5)	97.5 (82.4)	41.7	43.5
13	99.0 (87.1)	98.5 (85.1)	37.7	38.2
14	99.5 (88.0)	99.0 (86.0)	33.8	35.9
15	98.5 (85.1)	97.5 (83.6)	41.2	43.9
16	99.0 (86.0)	98.0 (83.1)	38.8	40.9
17	99.0 (86.0)	98.0 (84.3)	38.6	40.1
18	100.0 (90.0)	99.5 (88.0)	27.3	27.3
19	96.0 (80.2)	95.5 (78.0)	44.4	45.4
20	98.5 (85.1)	98.0 (84.3)	42.1	42.1
21	98.0 (84.4)	97.5 (82.2)	43.8	43.8
22	99.0 (86.0)	98.0 (84.4)	38.1	38.1
23	97.5 (83.6)	97.0 (81.6)	46.9	45.9
24	96.5 (80.7)	96.0 (78.7)	52.5	54.8
25	96.5 (80.9)	95.5 (78.0)	60.6	47.3
26	94.0 (77.8)	94.0 (75.8)	63.7	65.4
27	97.5 (82.4)	97.5 (82.2)	45.9	46.9
28	97.5 (83.6)	97.0 (81.6)	47.9	46.8
29	97.5 (82.2)	97.5 (82.2)	46.8	47.9
30	98.0 (83.1)	98.0 (83.1)	57.7	54.7
Mean	97.9 (84.0)	97.3 (82.2)	44.5	45.6
L.S.D.at 0.05	3.0 (7.7)	2.8 (7.1)	1.4	1.1
C.V	2.05	2.75	1.65	1.81

Protein percentage varied from (9.3to 11.3%) and from (9.3 to 11.30 %) with median of (10% and 10%) in both seasons, respectively. The highest protein percentage was obtained from genotype No.23. While genotype No.26 gave the lowest protein percentage in both seasons.

Carbohydrate percentage, ranged from (38.3 to 42.4 %) and from (37.8 to 42.8%) with an average of (40.2 and 40.1%)in both seasons, respectively. Genotype No.23 gave the highest value of carbohydrate percentage. While the lowest carbohydrate percentage was obtained from genotype No. 7 in both seasons.

Table (3): Plumule length, radical length and seedling fresh weight of 30 barly genotypes for seasons (2004/2005- 2005/2006).

No.	Plumule length (cm)		Radical length (cm)		seedling fresh weight (mg)	
	2004/2005	2005/2006	2004/2005	2005/2006	2004/2005	2005/2006
1	10.2	10.2	7.6	7.1	207.5	198.0
2	10.1	9.3	6.6	6.6	201.5	185.3
3	10.7	9.5	8.3	7.3	210.8	197.0
4	11.3	10.7	6.7	6.2	204.3	194.5
5	11.6	11.0	8.7	8.9	232.8	222.5
6	11.8	11.3	8.6	8.5	219.0	201.3
7	10.3	10.0	7.7	7.3	205.8	191.3
8	12.1	10.8	8.5	8.1	188.5	177.8
9	10.9	10.7	8.3	7.1	191.5	187.8
10	10.4	10.2	7.3	6.9	200.8	191.3
11	10.5	10.3	6.7	5.9	199.5	186.5
12	10.6	10.3	7.5	7.7	167.3	152.5
13	10.3	10.0	7.3	6.6	197.0	187.0
14	11.7	10.8	8.6	8.1	181.8	168.5
15	11.2	9.9	7.3	6.5	182.3	170.0
16	11.3	9.6	7.7	7.0	184.0	171.0
17	11.1	10.6	7.0	6.1	207.8	190.8
18	12.3	11.7	9.2	9.1	249.0	237.8
19	11.1	10.7	7.7	6.9	209.8	196.3
20	11.4	11.2	9.1	8.0	177.8	166.0
21	9.9	9.8	7.8	6.6	188.0	183.8
22	10.1	9.8	8.3	8.1	187.5	180.8
23	10.7	9.2	7.5	7.7	196.8	180.5
24	10.2	8.9	7.1	6.4	192.3	184.0
25	9.5	9.9	7.5	7.2	209.5	193.3
26	9.1	8.5	6.4	5.9	155.8	149.5
27	10.8	10.6	8.0	7.7	210.5	200.5
28	10.8	9.4	8.1	7.7	211.3	196.3
29	9.5	9.2	8.0	7.8	212.0	203.3
30	10.5	9.6	7.7	7.6	211.0	195.0
Mean	10.7	10.1	7.7	7.3	199.8	188.0
L.S.D at 0.05	0.9	1.1	1.2	1.2	23.0	24.7
C.V	1.12	1.25	0.85	0.95	2.75	2.90

B. Field characters:

Plant height, number of spikes per meter long and spike length are given in Table (5) were significantly influenced by plant genotypes in both seasons. Plant height ranged from (68.7 to 83.7cm) and from (71 to 86cm) with mean of (76.3 cm and 78.8cm) in both seasons, respectively.

The highest value of plant height was obtained from genotypes No.18 No.5, No.8, No.6, No.9, No.14, No.11, No.27, No.23, No.22, No.7 While genotype No.26 gave the lowest one value for plant height in both seasons.

The number of spikes per meter long, ranged from (85.3 to 115 cm) and from (94.7 to 128.7) spikes /m long with means of (100.3) spikes/m long and (111) spikes/m long for both seasons, respectively. Genotype No. 21 gave the highest number for spikes per meter long While genotype No.26 obtained the lowest one value in the highest and spike length respectively in both seasons.

Table (4): Seedling dry weight, protein percentage and carbohydrate percentage of 30 barley genotypes.

No.	Seedling dry weight(mg)		Protein percentage		Carbohydrate percentage	
	2004/2005	2005/2006	2004/2005	2005/2006	2004/2005	2005/2006
1	24.3	22.5	10.7	10.5	39.9	39.5
2	22.5	20.0	9.5	9.5	39.4	38.9
3	25.5	22.8	9.8	9.9	39.7	39.5
4	24.0	22.5	9.4	9.5	40.2	39.9
5	28.0	25.0	9.6	9.8	40.4	40.1
6	25.8	24.3	9.9	9.4	39.9	39.3
7	23.0	21.0	10.0	10.1	38.9	37.8
8	19.5	18.5	9.9	9.5	38.3	37.9
9	18.8	17.8	10.0	10.0	39.0	39.6
10	21.8	19.5	10.2	10.4	39.8	40.4
11	21.0	19.5	10.4	104	40.8	40.7
12	17.3	15.8	9.7	10.0	39.5	40.2
13	20.3	19.5	10.0	9.6	40.5	39.8
14	19.0	18.0	9.9	10.0	40.6	41.1
15	19.0	17.3	9.4	9.5	40.2	39.8
16	19.3	18.3	11.0	11.3	41.8	41.4
17	25.3	22.3	10.6	10.6	40.7	40.2
18	29.5	27.5	9.4	9.5	39.4	39.7
19	23.5	21.5	9.6	9.7	39.8	40.2
20	17.8	16.8	10.5	10.4	41.0	40.3
21	19.8	19.0	11.0	11.1	42.1	42.4
22	18.8	17.5	11.2	11.2	41.9	41.0
23	20.3	18.3	11.3	11.3	42.4	42.8
24	17.5	16.5	9.7	9.5	39.9	39.2
25	24.3	21.8	9.5	9.4	39.1	38.8
26	16.3	15.3	9.3	9.3	38.7	38.5
27	24.5	22.8	9.8	9.8	41.8	41.3
28	25.0	21.3	9.5	9.4	40.7	41.1
29	24.0	23.0	9.8	10.0	41.3	41.6
30	25.5	22.5	9.6	9.6	40.6	40.8
Mean	22.02	20.3	10.0	10.0	40.3	40.1
L.S.D at 0.05	2.46	2.30	0.34	0.34	0.60	0.60
C.V	1.65	1.90	2.15	1.90	2.70	235

Table (5): Plant height, No. of spikes/m long and spike length 0f 30 barley genotypes during /06 seasons.

No.	Plant height (cm)		No. of spikes/m long		Spike length (cm)	
	2004/2005	2005/2006	2004/2005	2005/2006	2004/2005	2005/2006
1	72.7	75.3	88.3	101.3	6.8	7.0
2	75.7	79.7	99.3	108.0	6.1	6.5
3	74.7	76.7	86.7	100.7	5.9	6.1
4	74.3	76.3	100.0	109.7	6.7	7.1
5	82.3	85.3	112.3	124.0	7.0	7.4
6	81.0	85.0	112.7	124.3	7.0	7.2
7	77.7	80.0	106.7	113.7	6.9	7.2
8	82.0	85.3	113.3	125.7	7.0	7.2
9	82.7	84.7	113.7	120.3	7.0	7.2
10	76.7	78.7	100.7	110.3	6.6	7.0
11	77.3	81.7	98.3	117.3	6.3	7.1
12	75.3	78.3	99.0	109.3	6.4	6.8
13	80.7	85.0	109.3	119.7	6.9	7.2
14	79.7	82.7	111.7	123.7	6.8	7.2
15	72.0	75.0	99.3	110.7	6.3	6.8
16	74.7	76.7	88.3	101.7	6.0	6.6
17	75.7	77.3	98.7	107.7	6.5	6.9
18	83.7	86.0	113.7	121.3	7.0	7.2
19	76.7	77.0	101.7	106.3	6.8	7.2
20	71.7	74.7	86.3	100.3	5.8	6.2
21	71.0	74.0	115.0	128.7	7.2	7.4
22	79.0	80.3	87.3	97.0	5.8	6.5
23	79.7	81.0	99.7	108.3	6.5	6.7
24	73.0	75.3	99.7	109.7	6.7	6.3
25	76.0	78.0	86.3	100.7	6.2	6.7
26	68.7	71.0	85.3	94.7	5.7	6.1
27	76.0	81.3	101.0	110.3	6.8	7.1
28	70.3	71.3	98.7	108.3	6.5	6.9
29	75.7	78.7	98.3	108.7	6.1	6.5
30	72.7	76.3	99.0	107.0	6.4	6.9
Mean	76.3	79.0	100.3	111.0	6.5	6.9
L.S.Dat 0.05	7.0	6.9	13.2	17.8	0.4	0.5
C.V	14.04	16.69	21.71	20.14	18.71	14.05

Table (6): No. of kernels/spike, 100-kernel weight and plant grain yield of 30 barley genotypes during 2004/05season/06.

No.	No. of kernels/spike		100-Kernel weight (g)		Plant grain yield (g)	
	2004/2005	2005/2006	2004/2005	2005/2006	2004/2005	2005/2006
1	39.7	41.3	3.2	3.5	33.1	41.5
2	37.3	39.3	3.0	3.7	23.5	31.2
3	35.7	38.7	3.2	3.4	21.0	28.0
4	39.0	40.0	3.3	3.6	24.9	31.6
5	41.7	45.3	4.1	4.7	37.7	50.6
6	41.0	45.0	4.1	4.2	22.2	26.8
7	40.7	43.3	3.9	4.6	21.8	25.1
8	40.3	44.0	4.3	4.4	23.9	29.2
9	41.0	43.0	4.3	4.1	27.1	36.3
10	38.0	39.3	3.1	3.4	28.9	34.9
11	37.7	39.7	3.2	3.9	30.8	38.9
12	37.3	39.0	3.4	3.5	25.4	33.6
13	40.3	42.7	3.5	3.7	27.6	41.1
14	38.7	39.0	3.5	3.7	26.9	32.8
15	36.7	38.0	3.0	3.5	24.3	29.8
16	38.3	39.0	3.6	3.8	28.4	33.7
17	37.7	41.7	3.6	4.1	31.8	39.1
18	41.3	44.7	4.2	4.8	22.1	27.8
19	39.0	37.7	3.5	3.8	25.5	37.6
20	35.0	37.0	3.8	4.4	32.9	43.1
21	42.7	46.7	4.4	4.9	39.8	52.1
22	35.3	38.3	3.5	4.0	34.9	43.3
23	36.3	40.0	3.8	3.8	37.4	48.9
24	37.0	41.7	2.8	3.3	24.6	32.8
25	37.0	39.7	3.9	4.0	20.0	28.2
26	34.3	36.7	2.7	3.1	18.2	21.9
27	39.3	41.7	3.2	3.6	28.4	32.0
28	38.3	40.3	2.7	3.3	24.4	30.8
29	36.4	40.3	3.6	3.5	32.4	41.5
30	37.7	40.0	3.1	3.4	25.3	30.9
Mean	38.4	40.8	3.5	3.9	27.5	35.2
L.S.D at 0.05	4.2	3.7	0.5	0.5	1.9	2.0
C.V	19.80	17.87	20.20	21.13	19.65	20.27

Spike length ranged from (5.7 to 7.2cm) and from (6.1 to 7.4cm) with a mean of (6.5cm and 6.9cm) for both seasons, respectively. The highest spike length was obtained from genotype No.21 while the lowest spike length was derived from genotype No.26 in both seasons, respectively.

Results in Table (6) indicated that number of kernels per spike, 100-kernel weight and plant grain yield were significantly influenced by barley

genotypes in both seasons. The number of kernels per spike varied from (34.3 to 42.7) and from 36.7 to 46.7 with an average of (38.4) and 40.8 kernels/spike in both seasons, respectively. Genotype No.21 gave the highest value while genotype No.26 gave the lowest one in both seasons.

Also 100-kernel weight varied from 2.7 to 4.4g and from 3.1 to 4.9 g with an average of 3.5 g and 3.9g in both seasons, respectively. The heaviest 100-kernel weight was obtained from genotype No.21. While the lowest 100-kernel weight was obtained from genotype No.26 in both seasons.

Plant grain yield, showed that plant grain yield ranged from 18.2 to 39.8 g and from 21.9 to 52.1g with an average of 27.5g and 35.2g in both seasons, respectively. Genotype No.21 gave the highest value of plant grain yield. Genotype of No.26 gave the lowest value of plant grain yield in both seasons.

CONCLUSION

This study showed that barley genotypes differed significantly with respect to the studied attribute. Genotype No.18 recorded the highest values for original germination percentage, plumule length, radical length, seedling fresh weight, seedling dry weight, electrical conductivity and plant height in both seasons. Genotype No.21 gave the highest values for five characters, namely No. of spikes/m long, spike length, No. of kernels/spike, 100-kernel weight and plant grain yield in both seasons. Genotype No.23 showed the highest values for protein and carbohydrate percentages in both seasons. However, the study revealed that certain genotypes such as No.5, No.6, No.18, No.21 and No.23 expressed the highest yield performance. Thus, they may be useful for plant breeder for the studied character, for use in the barley improvement program.

REFERENCES

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

A.O.S.A. (1983): Association of Official Seed Vigour Testing Handbook, Contribution No .32 to the Handbook on Seed Testing, Association of Official Seed Analysts, Lincoln. NE, U.S.A., 88 pp.

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

Edje, O.T. and Burris, J.S. (1970): Seedling Vigour in Soybeans Proceedings of the Association of Official Seed Analysts, 60: 149 – 157.

Gomez, K. A. and Gomez, A. A. (1984): Statistical Producer for Agricultural Research. 2nd. John Wiley & Sons, New York, U.S.A.

Hampton, J.C. and Coolbear, P. (1990): Potential versus actual seed Performance - can vigour testing provide an answer?Seed Sci. and Technol.,18:215 – 228.

Hepburn, H.A.; Powell, A.A and Matthews, S. (1984): Problems associated with the routine application of electrical conductivity measurements of individual seeds in the germination testing of pea and soybean . Seed Sci .and Technol. .12:403-413.

Hibbard, R.P. and Miller, E.V (1928): Biochemical studies on seed Viability. I. Measurement of conductance and reduction. Plant physiology, 3:335-352.

I.S.T.A. (1993): International Rules for Seed Testing. Seed Sci. and Technol., 21 : 25 - 46 .

Keeling, B . L. (1974): Soybean seed rot and the relation of seed exudate to host susceptibility. Phytopathology, 64: 1445 – 1447 .

Matthews, s. (1981): Evaluation of techniques for germination and vigor studies. Seed Sci. and Technol., 9: 543 - 551. .

Montgomery, R. (1961): Further studies of the phenol sulphuric acid reagent for total carbohydrates.Biochem . Biophys. Acta, 84 : 591 – 593.

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

Powell, A.A. (1988): Seed vigour and field establishment. Advances in Research and Technology of Seeds,11 : 29 – 80 .

Rieckhoff, D.; Trautwein, E.A .; Malkki, Y. and Erbersdobler, H.F. (1999): Effect of different cereal cholesterol and bile acid metabolism in the syrian golden hamster. Cereal Chem., 76, (5) : 788 .

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

Steel,R. G.D.; Torrie, P.G.H. and Dickey, D.A. (1977): Principals and Precedures of Statistics. Mc – Graw – Hill. Book Company Inc ., New York, 280.

تقييم بعض التراكيب الوراثية للشعير لجـــودة الحبـــوب وإنتاجيـــة المحصـــول

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استخدمت حبوب ثلاثين تركيبا وراثيا من الشعير في تجارب معمليه وحقليـــة لتقييم خصائصها في برامج التربية. ولتحقيق هذا الغرض اختبرت التراكيب الوراثيـــة قبل الزراعـــة فى المعمـــل لتقدير النسبة المئوية للانبات القياسى ودرجـــة التوصـــيل الكهربائى، صفات نموالبادرة والمكونات الكيميائية ثم زرعت فـــي الحقـــل بالمزرعـــة التجريبية بالجيزة – مركز البحوث الزراعية فى تصـــميم قطـــاعات كاملة العشـــوائية فى ثـــلاث مكـــررات خـــلال موســـمى ٢٠٠٤ / ٢٠٠٥ ، ٢٠٠٥ / ٢٠٠٦ وبعـــد

الحصـــــاد تم تقدير طـــول النبات (سم)، طـــول الســـنبلة (سم)،عـــدد الحبوب فـــى السنبلة ، وزن ١٠٠ حبـــة(جم) ومحصول حبـــوب النبات (جم) للجرام.

وقد أوضحت الدراسة أن هناك تبـــــاين واضح بـــين التراكيـــب الوراثيـــة للشعير في الصفات المعملية والحقلية وســـجل التركيب الوراثى رقـــم١٨أعلى القيم في سبع صفات هى :النسبة المئويـــة للانبات الطبيعي% ، طول الريشة سم ، طول الجذير سم، الوزن الطـــازج للبـــادرة جم، الوزن الجاف للبادرة جم، درجة التوصيل الكهربي وطول النبات في كلا الموسمين . وأعطـــى التركيب الوراثى رقم ٢١ أعلى القيم فـــي خمس صـــفات حقلية هي : عدد السنابل في المتر الطـــــولي، طول الســـنبلة ، عـــدد الحبوب في السنبلة ، وزن١٠٠ حبة و محصول الحبوب في النبات في كلا الموسمين. وأعطى التركيب الوراثي رقم ٢٣ أعلى القيم في النسبة المئويـــة للبـــروتين والنســـبة المئوية للكربوهيدرات في كلا الموسمين .

وقد تبين من الدراسة أن هناك بعض التراكيب الوراثية مثـــل أرقـــام ٥، ٦، ١٨، ٢١ ، ٢٣ أظهرت نتائج ايجابية نسبيا تحت ظروف الاختبارات المدروســـة ممـــا يمكن معه الاستفـــــــادة منها في برامج التربية .