RELATIONSHIP OF VIABILITY PARAMETERS AND QUALITY OF SOYBEAN UNDER DIFFERENT STORAGE CONDITION

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ABSTRACT

This study was conducted at the seed technology Research during 2002 to 2005 years to investigate the effect of some storage conditions, i.e. storage times (6,18 and 30 months) and Two storage places (closed storage room and incubated at 10 °C) on some seed quality parameters. Seven soybean genotypes i.e. (Crawford, H.L.18, Giza 35, Clark, H.L 43 Giza 82 and Giza 21). Germination percentage, moisture content, oil percentage, acidity percentage, protein percentage and parameters of oil quality (free fatty acid percentage and acid value) were determined after harvest (zero time), then 6, 18 and 30 months storage periods.

The obtained results recorded highly significant differences among the tested cultivars for all studied characters. This mainly due to differences in the genetic constitution of these cultivars. Moreover, increasing storage period after harvest until 30 months affected significantly all characters such as germination percentage, oil percentage and crude protein percentage which were decreased significantly.; Increasing storage period increased significantly free fatty acid percentage, acid value and acidity percentage. Moreover, highly significantly differences were observed among seed quality characters due to different storage places. The storage place incubated at 10 ^{0}C gave the highest values for germination percentage, protein percentage, oil percentage, the best oil characters (by decline each of free fatty acid, acid value and acidity percentage). Whereas seeds stored at closed storage room gave bad oil characters (by increasing free fatty acid percentage, acid value and acidity percentage) and decline in each of germination percentage, crude protein percentage and oil percentage. However, H.L. 43 ranked first and was superior to other cultivars in germination percentage, while both Giza 35 and Clark gave the lowest values for germination percentage. On the other hand,

Crawford cultivar gave the highest value for oil content and crude protein, Giza 35 cultivar gave the lowest value for oil content. The results also revealed that the interaction between storage period and storage place, between storage period and genotypes, between storage place and genotypes were significant for all studied characters.

Accordingly, it could be recommended that soybean seeds of any studied cultivars could be well stored till 30 months with little decline in viability under stored at 10^0C. H.L. 43 followed by Crawford were the best cultivars for storability, while Giza 35 and Clark were the lowest cultivars for storability.

INTRODUCTION

Suitable storage must maintain seed quality and quantities. Soybean seed goes under a series of chemical and viability changes during storage particularly in the first few months of storage after harvesting. Careful storage may help alleviate problems of seed availability and large seed crops may be safely stored for several years by careful control of temperature and relative humidity. In some parts of the world especially in the tropics, conditioned storage is necessary in order to maintain high viability of some seeds from harvest to planting (Harrington 1973). Proper storage minimizes the rate of deterioration and prolongs the first phase, in which causes a little loss of viability. Seed deterioration was increased and life span was decreased as storage temperature and moisture content increased (Anonymous 1991). Several factors such as temperature, moisture, variety and nutrient status influence seed maturity, or maximum dry weight of the seed (Copeland and Mc Donald 1995). Germination declined 207 % per degree (C^o) storage temperature rise. Low temperature was the most effective means of preserving seed germination. Most observations indicated that starchy seeds above 12 % and oily seeds above 9 % deteriorate faster in sealed storage than in nonsealed storage (Harrington 1973). The hydrolysis of phospholipids leads to the released of glycerol and fatty acids, and this reaction accelerates with increasing seed moisture content (Harrington 1973). El-Sayed et al (2004) indicated that, flax seed of any the studied cultivar could be

well stored for long time with little decline in viability and chemical composition under storage incubated at 20^0C.

MATERIALS AND METHODS

The present investigation was carried out in the laboratory of seed technology at Sakha Agricultural Research Station during 2002-2005 years to investigate the effect of some storage conditions on viability (germination) and some seed quality and oil quality characters of soybean seed. These characters were germination percentage, moisture percentage, oil percentage, crude protein percentage, acidity percentage, free fatty acid percentage and acid value. Seven soybean Genotypes namely Crawford, H.L 18, Giza 35, clark, H.L. 43, Giza 82 and Giza 21 from fresh harvest crop. Two samples of seven soybean seeds of cultivars were stored in jute sacks to study the effect of three storage periods) 6, 18 and 30 months). These cultivars were stored in two different storage places. These places were closed storage room and incubated at 10^0C.

Standard germination :- Test was carried out under optimum conditions according to international rules testing (ISTA, 1999).

Chemical composition characters:- Seed samples were taken at random from each plot and grounded to fine powder to pass through 2 mm mesh for chemical analysis; i.e., moisture content, oil percentage, crude protein percentage. In addition oil quality [free fatty acid percentage (FFA) and acid value (A.V)] and acidity percentage were determined according to procedures outlined in AOAC (1990).

At the beginning of storage germination, moisture content, seed oil characters and some chemical compositions of seed were measured on an original weight basis as follows:

Table (1) Mean of germination, some chemical characters, oil quality (F. F. A and A.V) and acidity of seven soybean genotypes from combined analysis over storage periods

Genotype	Germination %	Moisture %	Oil %	Crude protein %	F.F.A %	A.V	Acidity %
Crawford	99	9.50	24.44	38.95	0.0098	0.0204	7.90
H. L. 18	93	10.20	23.85	38.20	0.0098	0.0200	8.20
Giza 35	92	9.90	24.00	38.70	0.0110	0.0242	10.00
Clark	95	10.80	23.80	39.35	0.0119	0.0240	10.10
H. L. 43	100	9.00	23.80	38.28	0.0110	0.0220	9.70
Giza82	98.6	10.00	23.95	39.47	0.0104	0.0208	10.55
Giza 21	92	9.50	24.20	38.62	0.0090	0.0185	7.60

Collected data were analyzed according to the factorial completely randomized design with three replicates. Analysis of variance computed according to Snedecor and Cochran (1982) and treatment means was compared by Duncan's multiple range test, (Duncan 1955). Correlations performed according to Singh and Chaudhary (1977).

RESULTS AND DESCUSSION

The effect of storage periods on the studied viability parameters of soybean seed lots are given in Table (2). Increasing storage period from 6 to 18 and 30 months significantly decreased the mean germination percentage from 86 %, 64.4 % and 39.8 %, respectively. These findings are in agreement with those obtained by El-Aidy (1988), El-Borai et al (1993), Soad (1997), El-Aidy et al (2001) and El- Sayed et al (2004).

The decline in germination percentage with storage time was associated with a decrease in oil and crude protein percentage of seeds. However, the different oil quality indices were significantly affected. Increasing storage period from 6 up to 30 months highly significantly affected acidity percentage, F.F.A percentage and A.V. Similar results were reported by El- Aidy (1988), El- Borai et

Table (2) Germination percentage, oil character, oil and protein content of soybean seed as influenced by storage period, storage place and soybean genotypes

Item	Germination %	Moisture %	Oil %	F F A %	A.V	Acidity %	Crude protein %
storage period							
6 months	86.1 a	9.86 a	23.41 a	0.0117 c	0.0238 c	10.36 c	38.05 a
18 month	64.4 b	9.41 c	22.81 b	0.0777 b	0.1562 b	12.24 b	37.08 b
30 month	39.8 c	9.68 b	22.02 c	0.2047 a	0.4098 a	13.71 a	35.05 c
storage place							
10°C	86.3 a	10.05 a	23.36 a	0.0653 b	0.1311 b	11.23 b	37.48 a
closed storage room	40.6 b	9.25 b	22.13 b	0.1308 a	0.2621 a	12.98 a	35.98 b
genotypes							
Crawford	71.2 b	9.59 bc	23.28 a	0.0980 b	0.1973 c	11.59 d	37.39 a
H.L. 18	63.7 c	9.60 bc	22.92 b	0.1084 a	0.2171 b	11.91 c	36.29 e
G 35	55.7 e	9.66 b	22.42 d	0.1085 a	0.2176 b	12.36 b	36.44 de
Clark	57.3 e	9.78 a	22.71 c	0.1105 a	0.2215 a	12.20 b	36.86 bc
H.L.43	75 a	9.49 c	22.69 c	0.0934 c	0.1872 d	11.780 c	36.63 cd
G 82	61.8 cd	9.77 a	22.62 c	0.0801 e	0.1605 f	12.66 a	37.08 b
G 21	59.3 de	9.65 b	22.57 cd	0.0874 d	0.1751 e	12.23 b	36.39 de

Means designated by different letters in the same column are significantly different at 5 % according to Duncan's multiple range test.

al (1993), El-Sayed (1997), El- Aidy et al (2001) and El-Sayed (2004). Also Wilson and Mc Donald (1986) who proposed that, during storage seed lipids are subjected to continuous slow oxidation resulting in the formation of hydroperoxides and oxygenated fatty acid. This is debated to weather. The increase in free fatty acid is due to production of lipases by microflora or by the seed itself (Hummel et al 1954).

Increasing storage from 6 up to 30 months significantly increased the mean acidity, F.F.A and A.V., while decreased oil and crude protein percentage.

Mean germination percentage of soybean seeds as affected by different storage places. (incubated at 10^0C and closed storage room) are given in Table (2). Data indicated that the highest germination percentage was obtained from soybean seeds incubated at 10^0C compared with storage in closed storage room.

The results obtained were similar at those reported by other investigators such Delouch and Baskin 1973; Harrington 1973; Bass and Stanwood 1977; Ellis and Roberts 1980; Robert 1981; Pomeranz 1992; Chhetri et al 1993; Copeland and Mc Donald 1995; Chimtembo 1996; Soad 1997 and El-Sayed et al (2004) who reported that the germination declined more rapidly at higher temperature and slowly at lower temperature. Meantime, storage at closed storage room recorded the lowest value of crude protein and oil percentage (35.98 and 22.13, respectively) and showed high values for F.F.A. percentage, A.V. and acidity percentage (0.1308 %, 0.2621 and 12.98 %), respectively.

Table (2) indicates that the germination percentage of soybean seeds was significantly affected by genotypes. H.L.43 was significantly the highest in germination percentage followed by Crawford (75 and 71.2 %), respectively). Also Crawford was significantly the highest in oil percentage and crude protein percentage. On the other hand, Giza 35 and Clark were significantly lower in germination percentage and higher in F.F.A,, In addition Crawford was significantly higher in protein percentage, while Giza 82 was significantly higher in acidity percentage. Moisture content of soybean seed was significantly affected by genotypes.

The interaction between storage place and storage period Fig (1) and Table (3), indicates that germination decline from 94.6, 84.5 to 79.7 % after (6, 18 and 30 months, respectively at incubated 10^0C. Meanwhile, germination percentage decline from 77.6, 44.2 to 0.00 percentage after (6, 18 and 30 months, respectively).It is also observed that decline in oil percentage and crude protein up to 30 months. The lowest oil percentage 22.90 and 21.13 percentage were recorded at 10^0C temperature and closed storage room, respectively. Low temperature (10^0C) showed little remarkable changes in crude protein percentage up to 30 months compared with closed storage room (35.76 % and 34.35 %), respectively. F.F.A., A.V. and acidity of soybean seeds affected by interaction between storage place and storage period showed in Table (3). Results show rapid increase in these characters when stored at closed storage room after 30 months storage ((0.2884 %, 0.5771

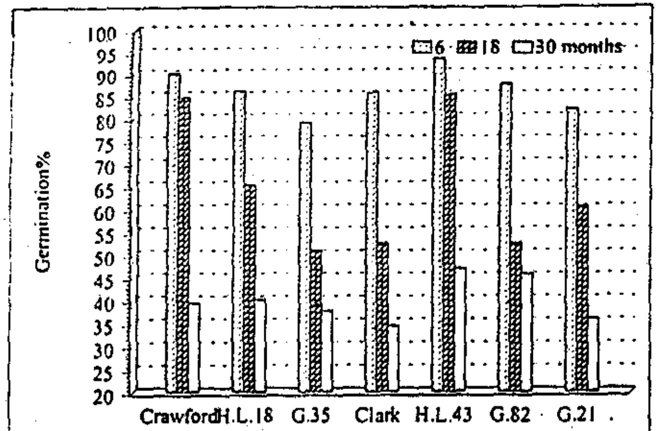

Fig (2):Effect of interaction between storage period and genotype on germination %

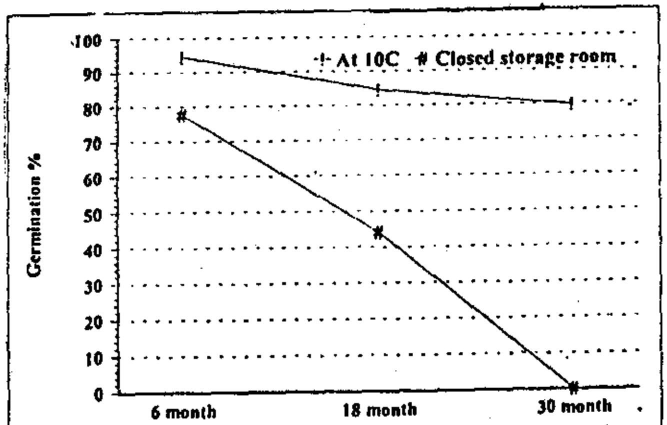

Fig (1): Effect of interaction between storage period and storage place on germination %

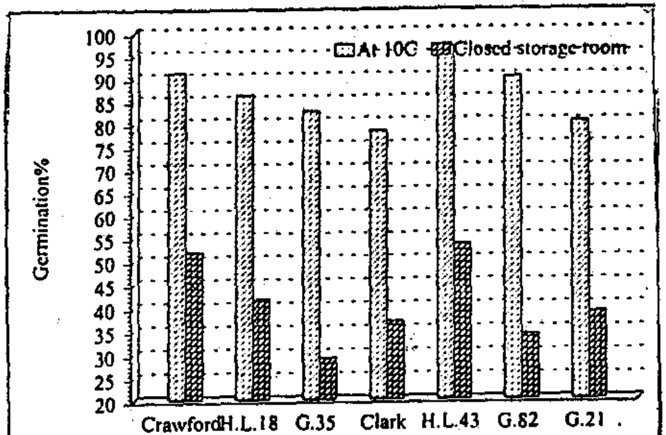

Fig (3):Effect of interaction between storage place and genotype on germination %

and 14.57 %, respectively), meanwhile it was slowly increased at 10 ^{0}C (0.1210 %, 0.2425 and 12.85 %, respectively. Similar results were reported by El- Aidy (1988); Soad (1997) and El-Sayed et al (2004).

Table (3) Germination percentage, oil character, oil and protein content of soybean seed as influenced by interaction between storage period and storage place, storage period and genotype.

Item	Germination %	Moisture %	Oil %	F F A %	A.V	Acidity %	Crude protein %
Interaction between storage period × storage place							
6 months × 10°C	94.60	9.99	23.83	0.0107	0.0220	9.31	38.74
6 months × Closed storage room	77.60	9.72	22.98	0.0126	0.0255	11.40	37.36
18 month × 10°C	84.50	10.14	23.35	0.0642	0.1287	11.53	37.93
18 month × Closed storage room	44.20	8.67	22.27	0.0913	0.1837	12.95	36.22
30 month × 10°C	79.70	10.01	22.90	0.1210	0.2425	12.85	35.76
30 month × Closed storage room	0.00	9.36	21.13	0.2884	0.5771	14.57	34.35
F test	**	**	**	**	**	**	**
LSD at 5%	3.33	0.097	0.1396	0.001941	0.001941	0.1399	0.2654
Interaction between storage period × genotype							
6 months × Craford	90.00	9.71	24.28	0.0111	0.0227	9.45	38.79
6 months × H.L. 18	86.00	10.01	23.60	0.0106	0.0214	9.44	37.77
6 months × G 35	78.70	9.82	23.11	0.0125	0.0261	11.01	38.13
6 months × Clark	85.50	10.42	23.13	0.0124	0.0250	10.81	38.31
6 months × H.L. 43	93.30	9.43	23.23	0.0122	0.0249	10.62	37.75
6 months × G 82	87.50	9.96	23.28	0.01212	0.0244	11.26	38.03
6 months × G 21	81.70	9.65	23.21	0.0109	0.0219	9.90	37.58
18 month × Crawford	84.50	9.55	23.18	0.0682	0.1395	12.03	37.36
18 month × H.L. 18	65.20	8.95	23.24	0.0837	0.1677	12.38	36.72
18 month × G 35	50.80	9.35	22.44	0.0766	0.1536	12.11	36.30
18 month × Clark	52.30	9.14	22.82	0.0903	0.1809	12.20	37.39
18 month × H.L. 43	85.00	9.41	22.53	0.0698	0.1398	11.59	36.92
18 month × G 82	52.30	9.75	22.80	0.0698	0.1399	12.90	37.82
18 month × G 21	60.30	9.69	22.66	0.0858	0.1719	12.47	37.03
30 month × Crawford	39.20	9.51	22.39	0.2146	0.4296	13.29	36.02
30 month × H.L.18	40.00	9.82	21.91	0.2310	0.4624	13.90	34.37
30 month × G 35	37.50	9.81	21.71	0.2363	0.4730	13.95	34.90
30 month × Clark	34.20	9.79	22.19	0.2288	0.4586	13.59	34.90
30 month × H.L. 43	46.70	9.63	22.31	0.1984	0.3968	13.13	35.22
30 month × G 82	45.50	9.60	21.76	0.1584	0.3171	13.81	35.39
30 month × G 21	35.80	9.61	21.85	0.1655	0.3314	14.33	34.57
F test	**	**	**	**	**	**	**
LSD at 5%	6.22	0.1815	0.2593	0.003631	0.003631	0.2618	0.4965

The interaction effect between genotypes and storage periods according to data collected in Fig (2) and Table (3). Show significant decrease in germination percentage, oil and crude protein percentage up to 30 months storage. In addition F.F.A. %, A.V. and acidity percentage increased with increased storage period up to 30 months. In general H.L.43 gave the highest germination percentage with all storage period.

The interaction effects between genotypes and storage place according to data collected in Fig (3) and Table (4) show significant increases in germination Percentage, oil percentage and crude protein percentage with seeds

Table (4) Germination percentage, oil character, oil and protein content of soybean seed as influenced by interaction between storage place and genotype soybean

Item	Germination %	Moisture %	Oil %	F.F.A. %	A.V	Acidity %	Crude protein %
Effect of interaction between storage place × genotype							
10°C × Crawford	90.90	9.95	23.69	0.0627	0.1259	10.57	38.09
10°C × H.L. 18	86.00	10.03	23.26	0.0676	0.1355	10.92	36.81
10°C × G 35	82.40	10.07	23.17	0.0735	0.1481	11.42	37.22
10°C × Clark	78.00	10.26	23.09	0.0829	0.1665	11.55	37.76
10°C × H.L. 43	96.70	9.79	23.28	0.0550	0.1104	11.03	37.32
10°C × G 82	89.80	10.12	23.45	0.0562	0.1125	11.85	37.93
10°C × G 21	80.00	10.10	23.59	0.0592	0.1187	11.26	37.21
Closed storage room × Crawford	51.60	9.23	22.87	0.13320	0.2687	12.61	36.69
Closed storage room × H.L. 18	41.40	9.16	22.57	0.1493	0.2988	12.90	35.76
Closed storage room × G 35	28.90	9.24	21.67	0.1434	0.2871	13.29	35.67
Closed storage room × Clark	36.70	9.30	22.33	0.1381	0.2764	12.84	35.97
Closed storage room × H.L. 43	53.30	9.19	22.10	0.1318	0.2640	12.53	35.93
Closed storage room × G 82	33.80	9.41	21.78	0.1040	0.2084	13.46	36.23
Closed storage room × G 21	38.60	9.20	21.55	0.1155	0.2314	13.20	35.58
F test	**	**	**	**	**	**	**
LSD at 5%	5.08	0.1482	0.2117	0.002964	0.002964	0.2138	0.4054

stored at 10^0C for seven genotypes compared with closed storage room. On the other hand, the lowest values of F.F.A. % A.V. and acidity were recorded with seeds stored at 10^0C for all genotypes compared with closed storage room. Meantime, H.L. 43 gave the highest germination percentage with all storage place i.e. closed storage room and incubated at 10^0C it gave 96.7 and 53.3 percentage, respectively.

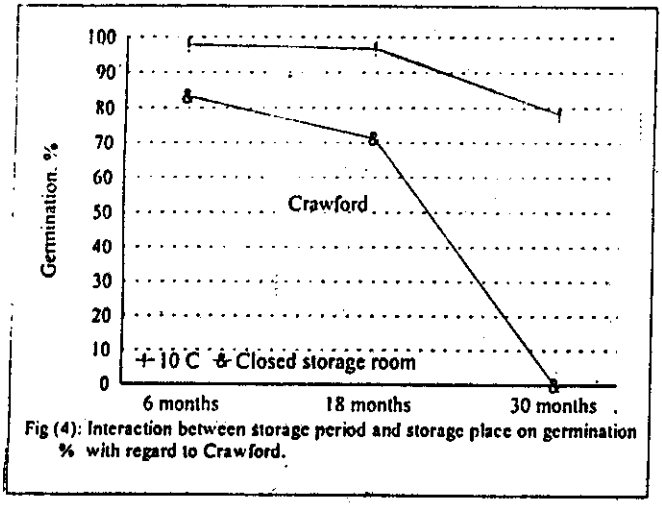

Fig (4): Interaction between storage period and storage place on germination % with regard to Crawford.

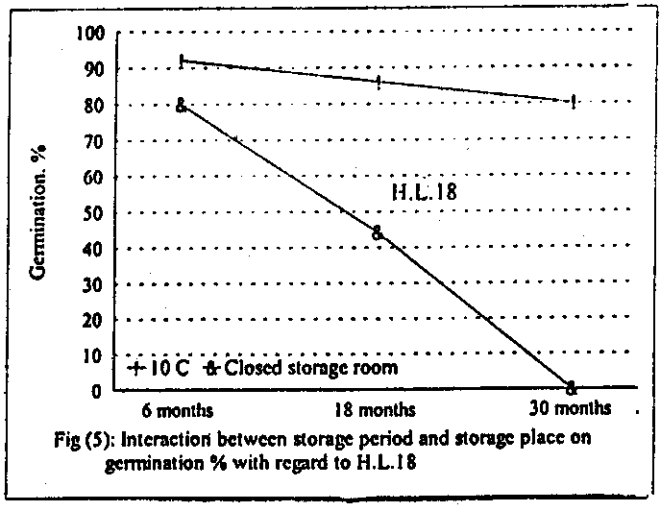

Fig (5): Interaction between storage period and storage place on germination % with regard to H.L.18

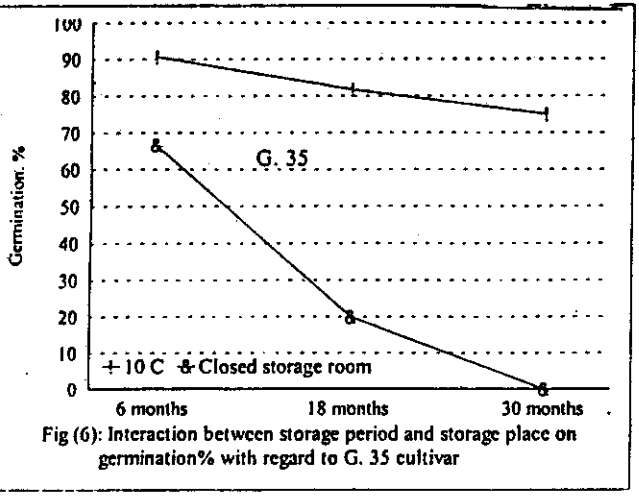

Fig (6): Interaction between storage period and storage place on germination% with regard to G. 35 cultivar

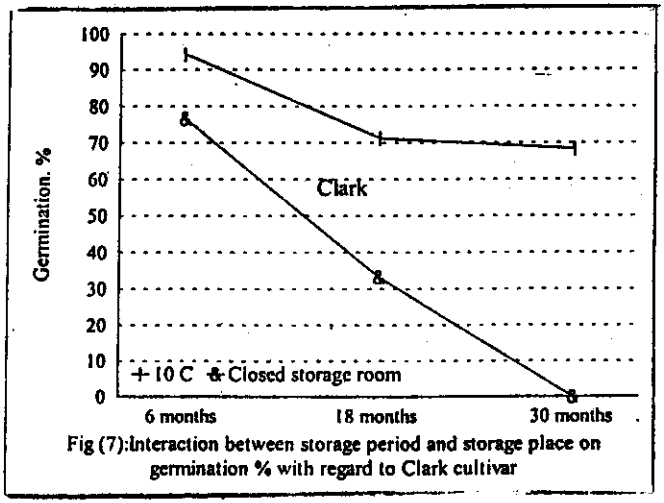

Fig (7):Interaction between storage period and storage place on germination % with regard to Clark cultivar

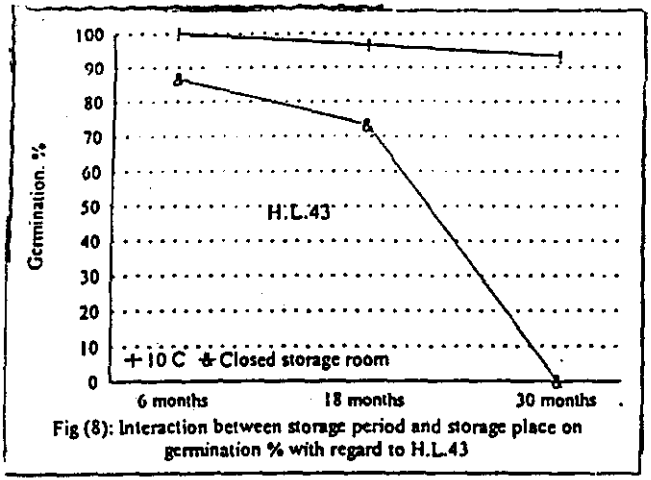

Fig (8): Interaction between storage period and storage place on germination % with regard to H.L.43

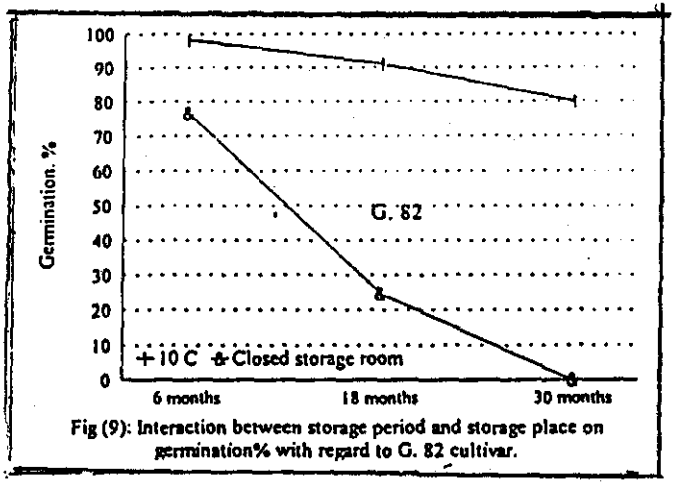

Fig (9): Interaction between storage period and storage place on germination% with regard to G. 82 cultivar.

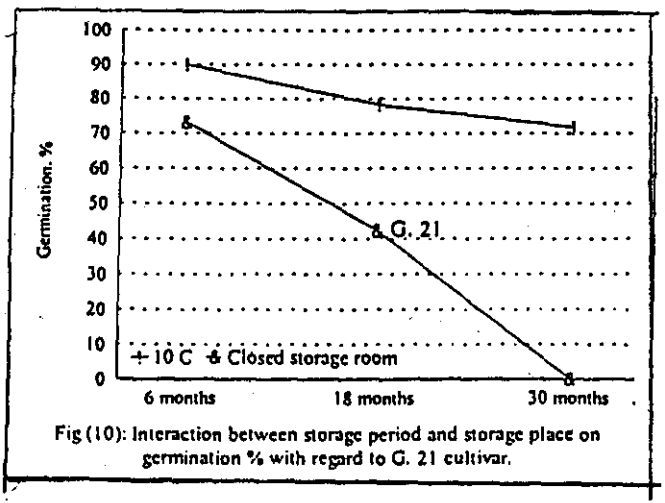

Fig (10): Interaction between storage period and storage place on germination % with regard to G. 21 cultivar.

Effects of second order interaction among storage period, genotypes and storage place according to data collected in Fig (4-10) and Table (5) show significance in all tests. However, there was a clear trend that H.L. 43 gave the highest values of germination percentage were recorded with two storage places and all storage periods.

Table (5) Germination percentage, oil character, oil and protein content of soybean seed as influenced by interaction between storage period, storage condition and genotype soybean

Item	Germination %	Moisture %	Oil %	F F A %	A.V	Acidity %	Crude protein %
Effect of interaction between storage period × storage place × genotype							
6 months ×10C × Crawford	96.70	9.65	24.43	0.0098	0.0204	7.93	38.95
6 months × 10C × H.L. 18	92.00	10.48	23.83	0.0098	0.0200	8.28	38.15
6 months ×10C × G 35	90.70	9.93	23.78	0.0113	0.0247	10.25	38.56
6 months × 10C × Clark	94.30	10.95	23.31	0.0121	0.0243	10.50	39.22
6 months × 10C × H.L. 43	100.00	9.16	23.73	0.0114	0.0236	9.80	38.26
6 months × 10C × G 82	98.30	10.11	23.78	0.0108	0.0218	10.68	39.45
6 months × 10C × G 21	90.00	9.62	23.96	0.0096	0.0195	7.70	38.58
6 months×Closed storage room×Crawford	83.30	9.76	24.13	0.0124	0.0251	10.96	38.62
6 months × Closed storage room× H.L 18	80.00	9.55	23.37	0.0113	0.0227	10.60	37.40
6 months × Closed storage room × G 35	66.70	9.7	22.45	0.0136	0.0274	11.78	37.70
6 months × Closed storage room × Clark	76.70	9.88	22.95	0.0127	0.0257	11.12	37.40
6 months × Closed storage room× H. L.43	86.70	9.70	22.72	0.0129	0.0262	11.43	37.23
6 months × Closed storage room × G 82	76.70	9.8	22.78	0.0134	0.0271	11.83	36.60
6 months × Closed storage room × G 21	73.30	9.67	22.45	0.0121	0.0243	12.10	36.57
18 month × 10C × Crawford	97.70	10.40	23.53	0.0554	0.1113	11.23	38.51
18 month × 10C × H.L. 18	86.00	9.58	23.46	0.0833	0.1669	11.69	37.27
18 month × 10C × G 35	81.70	10.13	23.18	0.0694	0.1392	11.17	37.60
18 month × 10C × Clark	71.30	9.79	23.06	0.0697	0.1395	11.62	38.68
18 month × 10C × H.L. 43	96.70	10.14	23.2	0.0558	0.1117	10.96	37.56
18 month × 10C × G 82	80.00	10.45	23.49	0.0558	0.1118	11.917	38.22
18 month × 10C × G 21	78.30	10.52	23.55	0.0602	0.1205	12.11	37.68
18 month×Closed storage room×Crawford	71.30	8.69	22.82	0.0809	0.1677	12.83	36.21
18 month × Closed storage room× H.L.18	44.30	8.33	23.02	0.0841	0.1685	13.08	36.16
18 month × Closed storage room × G 35	20.00	8.57	21.7	0.0838	0.1680	13.05	35.00
18 month × Closed storage room Clark	33.30	8.48	22.58	0.1110	0.2222	12.78	36.10

Table (5) cont.

18 month × Closed storage room H.L. 43	73.30	8.67	21.86	0.0838	0.1680	12.22	36.27
18 month × Closed storage room G 82	24.70	9.06	22.12	0.0837	0.1680	13.88	37.42
18 month × Closed storage room G 21	42.30	8.87	21.76	0.1114	0.2232	12.82	36.383
30 month × 10C Crawford	78.30	9.79	23.10	0.1230	0.2460	12.55	36.81
30 month × 10C H.L. 18	80.00	10.04	22.49	0.1097	0.2195	12.78	35.02
30 month × 10C × G 35	75.00	10.16	22.56	0.1398	0.2803	12.85	35.49
30 month × 10C × Clark	68.30	10.03	22.91	0.1670	0.3358	12.54	35.39
30 month × 10C × H. L. 43	93.30	10.06	22.9	0.0979	0.1959	12.32	36.15
30 month × 10C × G 82	91.00	9.81	23.09	0.1019	0.2040	12.95	36.12
30 month × 10C × G 21	71.70	10.15	23.27	0.1079	0.2161	13.98	35.35
30 month×Closed storage room×Crawford	0.00	9.24	21.67	0.3063	0.6132	14.03	35.24
30 month×Closed storage room × H.L. 18	0.00	9.61	21.32	0.3524	0.7052	15.02	33.73
30 month × Closed storage room × G 35	0.00	9.45	20.86	0.3328	0.6657	15.04	34.30
30 month × Closed storage room × Clark	0.00	9.55	21.47	0.2905	0.5813	14.64	34.40
30 month × Closed storage room×H.L.43	0.00	9.21	21.73	0.2988	0.5978	13.94	34.29
30 month × Closed storage room × G 82	0.00	9.38	20.43	0.2148	0.4301	14.67	34.67
30 month × Closed storage room × G 21	0.00	9.06	20.43	0.2231	0.4467	14.67	33.79
F test	**	**	**	**	**	**	**
LSD at 5%	8.80	0.2567	0.3667	0.005135	0.005135	0.3703	0.7021

The simple correlation coefficient (r) values presented in Table (6) indicate highly significant and positive correlation between germination percentage and each of oil percentage (r=0.8509); crude protein percentage (r=0.7558). In addition, negative correlation between germination percentage and each of F.F.A. percentage (r=-0.831); A.V(r= -0.8317) and acidity percentage (r= -0.7752). Table (6) revealed that oil percentage was highly significantly and positively associated with crude protein percentage (r= - 0.7960), while it showed significant and negative association with F.F.A. percentage (r=-0.7491); A.V.(r=-0.7489) and acidity percentage (r=-0.8043). However, F.F.A. percentage showed highly significant and strong positive correlation with acidity percentage (r= 0.7870) and A.V. (= 1.00), while it was highly

Table (6) correlation between means of studied characters for soybean genotypes under storage period, and storage place

Item	Moisture %	Oil %	F.F.A %	A.V	Acidity %	Crude protein %
Germination %	0.5207**	0.8509**	- 0.8318**	- 0.8317**	- 0.7752**	0.7558**
Moisture %	1.00	0.4487**	- 0.2603**	- 0.2615**	- 0.3491**	0.3960**
Oil %		1.00	- 0.7491**	- 0.7489**	- 0.8043**	0.7960**
F.F.A %			1.00	1.00 **	0.7870**	- 0.8063**
A.V				1.00	0.7871**	- 0.8065
Acidity %					1.00	- 0.8172
Crude protein %						1.00

* = significant ** = highly significant. r at 5 % = 0.174 r at 1 % = 0.228

significant and negative correlated with crude protein percentage (r = -0.8063). In addition, positive correlation between A.V. and acidity percentage (r = 0.7871), while it was highly significant and negatively correlated with crude protein percentage (r= -0.8065). Morever, Table (6) revealed that acidity percentage was highly significantly and negatively correlated with crude protein percentage (r= -0.8172).

The results generally, indicated that high viability and high-quality were observed for seeds stored under cool and dry conditions than seeds stored in closed room.

REFERANCE

A..OA.C. (1990). Official Methods of Analysis of the Association of Official Analytical Chemists 15 th (edition, published by Association of Official Analytical Chemists Arlington, Virginia USA.)

Anonymous (1991), Safe seed storage, reported by a working group of the NARP central administration for seed. Seed Technology Component pag. 1-6

Bass L. N. and P. C.Stanwood (1977). Long- term preservation of sorghum seed as affected by seed moisture, temperature, and atmospheric environment Crop Science, 18:575-577

Chhetri, D. R., A. S. Rai and A. Bhattacharjee (1993) Chemical manipulation of seed longevity of 4 crop Species in an

unfavourable storage environment Seed Science and Technology 21: (1)31-44

Chimtembo, A. S. (1996). Longivity of maize, sunflower, cowpea seeds under traditional storage conditions in the Rural Areas of Traditional ICARDA. Oraganisation and Management of National Seed Programmes proceedings of a follow- up seminar/ workshop January 1996 pag 163-166

Copeland, L.O and Mc Donald M. B. (1995). Seed longevity and deterioration . PP. 181-220 in: Seed Sci. Technol. Chapman and Hill.

Delouch, J.C. and C.C. Baskin, (1973). Accelerated ageing technique for predicting the relative storability of seed lots. Seed Science and Technology, 1, 427-452.

Duncan, D.B. (1955). Multiple range and multiple F. test Biometrics, II: 1-42.

El-Aidy, A.Nadia; Soad, A.El-Sayed and Samia, A. Salama (2001): Effect of package kind on cotton seed quality and viability during storage. J. Agric.Res. Tanta Univ., 27 (4)

El-Aidy, N. A. (1988). Optimizing storage condition of rice grains. Candidate in Agricultural Sciences. Odecca Technology institute of Food Technology Odecca, USSR.

El-Borai, M.A.; Nadia. A.El-Aidy and M. El-Emery (1993). Effect of different storage periods on seed quality of three soybean cultivars. J.Agric. Sci. Mansoura, 18: 8, 2206-2211.

Ellis, R. H. and E. H. Roberts, (1980). The influence of temperature and moisture on seed viability period in barley (Hordeum distichum L.). Annals of Botany 45: 31-37.

El-Sayed , Soad, A.; M,E.A. Kineber and Eman.A.El-Kady (2004): Effect of package kind on cotton seed quality and viability during storage. J. Agric.Res. Tanta Univ., 27 (4)

Harrington J.F. (1973). Packaging seeds for storage and shipment. Seed Science and Technology, 1.701-709

Hummel, B.C.W.; L. S. Cuendet, C. M. Christensen, and W. F. Geddes, (1954). Grain storage studies XIII: Comparative changes in respiration, viability and chemical composition of mold-free and mold-contaminated wheat upon storage. Cereal Chem. 31: 143-150.

I.S.T.A. (1999). International rules for Seed Testing Association . Seed Sci. &Technol, 27, 155-165

Pomeranz, Y. (1992). Biochemical, functional, and nutritive changes during storage. PP. 55-118 in: Storage of cereal grains and their products, 4th Edition D. B. Sauer (ed.). Am. Assoc. Cereal Chem., St. Paul, MN.

Roberts EH 1981, Physiology of ageing and its application to drying and storage, in Seed Science and Technology, 9. pp. 359-372.

Senedcor., G.W. and W.G. Cochran. (1982): Statistical methods applied to experiments in agriculture and biology. 7 th ed. Seventh reprinting . The Iowa State Univ. Press. Ames. IOWA, U.S.A.

Singh, R.K. and B.D. Chaudhary (1977). Biometrical Methods in Quantitative Genetic Analysis, pp. 54-68.

Soad, A. El-Sayed (1997). Effect of storage conditions on seed quality of wheat and faba bean. Ph.D. Thesis., field crops. Ph. D. Thesis, Faculty of Agric. Kafr El-Sheikh, Tanta Univ., Egypt.

Wilson, D.O., Jr and Mc Donald, Jr. (1986). The lipid peroxidation indol of seed aging, seed Sci. Technol. 14: 269-300

الملخص العربي

العلاقه بين الحيويه وصفات الجودة لفول الصويا تحت ظروف تخزين مختلفه

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أقيمت هذه الدراسه في مركز البحوث الزراعيه بسخا – كفر الشيخ خلال الفترة ٢٠٠٢-٢٠٠٥الدراسة بعض الظروف التخزينيه على تقاوي فول الصويا على فترات تخزين (٦، ١٨ و٣٠ شهرا)، تحت ظرفين من ظروف التخزين هما ا- تحت درجه حراره (١٠م) ب- تحت درجة حرارة غير متحكم فيها (مخازن مغلقه)] ودرست التغيرات في الحيوية

وصفات الزيت والتركيب الكيماوي لبذور سبعه تراكيب وراثيه لفول الصويا (كرافورد، هجين ١٨، جيزه ٣٥، كلارك، هجين ٤٣، جيزه ٨٢ ، جيزه٢١) وقد أوضحت الدراسة ما يلي:

١- أدت زيادة فترة التخزين إلى نقص في كل من حيوية البذور ونسبة البروتين والزيت وتدهور في صفات الزيت (بارتفاع الأحماض الدهنية الحرة ورقم الحموضة) بينما أدت زيادة فترة التخزين إلى ارتفاع الحموضة الكلية للبذور

٢- أدى التخزين تحت ظروف الحرارة المنخفضة (١٠م) لمدة ٣٠ شهر إلى الحفاظ على حيوية البذور ، أيضا نسبة البروتين والزيت و صفات الزيت الجيدة، مقارنة بالتخزين في المخازن المغلقة الذي أدى إلى التدهور السريع في الحيوية وانخفاض نسبة البروتين والزيت بالبذور بالإضافة إلى الحصول على صفات زيت رديئة

٤- سجل هجين ٤٣ أعلى نسبة إنبات يليه الصنف كراوفورد بينما سجلت الاصناف جيزه ٣٥ وكلارك أقل نسبة إنبات ، أيضا سجل الصنف جيزه ٣٥ أقل نسبة زيت في حين سجل الصنف كراوفورد أعلى نسبة زيت وأيضا أعلى نسبة بروتين

وبالنسبة لصفات الزيت الجيده (بانخفاض الأحماض الدهنية الحرة و رقم الحموضة) فقد سجلت الأصناف جيزه ٨٢ ، جيزه٢١ يليه هجين ٤٣ أعلى صفات زيت جيده وعلى العكس فقد سجلت الاصناف جيزه ٣٥ ، كلارك أيضا الهجين ١٨ صفات رديئة بالنسبة للزيت (بارتفاع الأحماض الدهنية الحرة ورقم الحموضة) على النحو الآخر سجل الصنف جبزه ٨٢ يليه جيزه ٣٥، جيزه ٢١ و كلارك ارتفاع الحموضة الكلية

ومن النتائج المتحصل عليها يمكن استنتاج أن الظروف المثلى لتخزين تقاوي فول الصويا لفترة تصل إلى ٣٠ شهر هي تخزينها تحت درجات حرارة منخفضة نسبيا تصل إلى ١٠ م. وتجدر الإشارة إلى تخزين التقاوي لفترات طويلة نسبيا يستلزم التحكم في درجة حرارة المخزن للمحافظة عليها أو الإبطاء من معدل تدهور التقاوي لأقل حد ممكن.