GENETIC STUDIES ON SOME CHARACTERS IN BARLEY

EL-BAWAB, A. M. O.

Barley Res. Dept., Field Corps Res. Inst., ARC, Giza.

(Manuscript received in June 2002)

Abstract

Six genotypes of 6-rowes barley (*Hordeum Vulgare L.*) were crossed in all possible combinations excluding reciprocals in 1999/2000 at Giza Research Station. The F1 parents were grown in 2000/2001 at Giza Res. St. using randomized complete blok design, Heading date (HD), Maturity date (MD), plant height (PLHT), spike length (SL), number of spikes / pant (NS/P), number of grains/spike (NG/S), spike grain weight (SKW), biological yield/plant (BY/P), grain yield/plant (GY/P), and 1000 kernel weight (1000kwt), were studies. The data of the F1 barley crosses and their parents were statistically analyzed for potence ratio, heterosis, combining abilities and inheritance of studied traits. Results showed, that most of the evaluated crosses had positive overdominance for all studied traits except for HD and MD. The highest cross in potence ratio was 1x5 which showed negative overdominance for HD, complete dominance for MD and positive overdominance for the other traits. Morever, 3 crosses in SL, 5 in PLHT, 8 in NS/P, 7 in SKW, 8 in NG.S, 5 in BY, 9 in GY, and 4 in 1000kwt were considered good crosses in this respect. For heterosis, the cross 1x5 was the best cross as it expressed significant negative heterotic effect in HD and showed useful heterosis in yield and yield components. Also, useful heterosis was obtained from 6 hybrids in PLHT, 15 in SL, 13 in NS/p, 14 in NG/S, 12 in SKW, 10 in BY/P, 12 in GY/P and 6 in 1000kwt. Hence these crosses can be used in breeding for earliness and the other studied characters. Additive gene action was predominant which confermid the results of GCA and GCA/SCA ratios (exceeded the unity). The parents P1, P2 and P5 were the best general combiners for GY/P, BY/P was (1x5) followed by (1x2). However, the best crosses for PLHT, SL, NS/P, 1000kwt, and (HD and MD) were 1x6, 1x3, 2x5, 1x4 and 2x3, respectively. These crosses are valuable to build up a population with high genetic yield potential. Heritability values in broad sense were high for all the studies traits while the narrow sense heritability values were high for 1000kwt, (70%), GY/P (67.16%), SL, (66.67%), and SKW, (63.73%) and was moderate for the other studies traits. This study showed, the parental values were good predictability of the performance of hybrids.

INTRODUCTION

The success in any breeding programe depends mainly on the selection of parents which, when crossed, will result in higher proportion of transgressive segregates. This neccessistes the investigation of potance ratio, heterosis and combining ability before

breeding plan for further genetic upgrading of the existing material (Bhatnagar and Sharma, 1995). There is a paucity of information on the combining ability and inheitance of quantitatively inherited characters in barly. Diallel analysis and genetics in barly have been reported by Abo-El Enien and Morssi 1977, Ahmed, 1990, 1998, Ahmed et al 1998, Bilgan 1996, Madic 1996 and Marcil and Sarrafi 1996.

This study was carried out to determine the magnitute of heterosis and various genetic components for the studied traits of barley. The study aimed also to investigate the relative importance of potence ratio, general and specific abilities and broad and narrow sense heritabilities of these traits in a diallel mating system method.

MATERIAL AND METHODS

Six genotypes were chosen from the barley programe on the basis of predicated response to irrigation and rainfall, but care was taken to ensure awide genetic base (Table 1). Crosses were made between the six genotypes in 1999/2000, the six parents and their 15 F1 were grown in a randomized complete block design with six replications during 2000/2001 growing season at the experimental farm of Agricultural Research Center at Giza. Ten plants from each entry were selected to record observations on heading date (HD), maturity date (MD), plant height (PLHT), spike length (SL), number of spikes/plant (NS/P), number of grains/Spike (NG/S), spike grain weight (1000kwt). Potence ratio (P) calculated according to Smith 1952. Heterosis was calculated as the difference of the F1 mean from the mid -parent (MP), and better (BP) respectively and expressed in perecentage (Fanseaca and Patterson, 1968 and Bhatt 1971). Analysis of variance for combining ability was made according to Griffing 1956, method 2 model 1. The variance components as broad sense heritabilities calculated according to Griffings diallel analysis method 1956, in the F1 generation. As describted by Kempthorne and Curnaw 1961.

Table (1): Pedigree of the six parents used in study.

Geno. No.	Pedigree	Source
1	Giza 117/Fao 86 (Registered as Giza 123)	Egypt
2	Gloria-Bar/3/Api/CM67-B//MZO/4/C114033	ICARDA
3	GAPA-BAR/3/Api/CM67-B//MZQ/4/C114032	ICARDA
4	Cr 366-13-1/Giza 121 (Registered as Giza 2000)	Egypt
5	Deir alla 106/Strain 205/3/Rihan 03	ICARDA
6	Arizona 5908 /Aths//Lignee 640/4/WI 2691//L2966-64	USA

RESULTS AND DISCUSSION

The mean performance of the six parents and their 15 F1 crosses are given in Table 2. Analysis of variance were performed on the six parents and their 15 F1 crosses. Analysis of variance were also undertaken for the F1 crosses in each case. Differences among crosses were highly significant, indicating, that genetic variation exists and that a genetic analysis could be appropriately undertaken for the ten characters. Our findings are in line with reported by Ahmed et al 1998, Bilgen 1996 and Abo El-Enine and Morssi 1977 which they found a paucity of information on the combining ability and inheitance of quantitatively inherited characters in barly.

1. Potence ratio

Potence ratio values of the characters of the F1 hybrids are presented in Table 3. It should be pointed out here that potence ratio (p) indicates the average dominance of the whole gens set of one parent or the other, but can not indicate the actual dominance of individual genes. The values of the potence ratio ranged from -5 to 4.05 and from -3 to 4 in HD and MD respectively. These results indicated that there were negative and positive partial, complete and overdomenance in these traits. On the other site for the other traits potency values ranged from 0.67 to 6.4 in PLHT, 1.0 to 11.0 in SL, 0.7 in NG/s, 0.04 to 8.4 in SKW, 0.13 to 0.27 to 28.64 in GY and from 0.41 to 1.82 in 1000kw., these data revealed that there were positive partial, complete and overdominance in these characters. However, the best cross was 1x5 for all studied, which had negative over dominance in HD, complete dominance in MD and overdominance in the other traits. Therefore we found 3 crosses in SL, 5 in PLHT, 8 in NS/P, 7 in SKW, 8 in NG/S, 5 in BY/P, 9 in GY/P, and 4 in 1000kwt that were considered good crosses because they showed the highest values of potence ratio, positive overdominance. These crosses could be useful for identifying high yielding potential genotypes. Our findings are in good agreement with those reported by Mosherf 1996, who found overdominance for plant height, yield and yield components.

2. Heterosis

Heterosis relative to both mid and better parent for the studied traits values are presented in Table 4. Most of the 15 F1 hybrids significantly exceeded both mid and better-parents for all studied traits except for HD and MD. Five crosses (1x2, 1x5, 1x6, 4x5, and 5x6) and three crosses (1x5, 1x6, and 5x6) had negative significant heterotic effective relative to mid and better -parents for HD, respectively. Heterosis in the above mentioned crosses was in the desired direction (earliness). Further more, two

crosses (1x3, 1x6) showed useful heterosis for MD which gave negative values. Regarding, the other studies attributes, heterosis values over mid and better parents are shown in Table 4. Generally the useful heterosis was obtained from 3 hybrids for HD, 2 for MD, 6 for PLHT, 15 for SL, 13 for NS/P, 14 for NG/S, 12 for SKW, 10 for BY/P, 12 for GY/P and 6 for 1000kwt. Hence these crosses are valuable in breeding for earliness and high yielding potential. Similar results were recorded by Chun and Lee. 1986, Bhatt 1971, Ahmed et al 1998 and Madic 1996.

3. Combining ability

Analysis of variance for combining ability (Table 4), revealed that the mean squares due to general (gca) and specific (sca) combining abilities were highly significant for all the studied traits in F1 generation indicating the importance of both additive and none additive gene action controlling the inheritce of yield and its component characters. Data presented in Table 5, showed that the first parent (P1) had the best gca for GY/P, BY/P, PLHT and good to moderate in NS/P, NG/S and MD followed by P2, although it was the best combiner in HD, MD, NS/P, and good in 1000kwt. Moreover P4 was the best combiner for SKW and 1000kwt, P6 was the best combiner in NG/S and S1 while P2 and P33 were the best and good general combiner for earliness, respectively. P5 was high combiner for GY/P, BY/P, NS/P and 1000kwt. Generally these parents offer the best possibilities for the development of improved lines of barley through hybridization programe.

The sca estimates for the F1 of the 13 crosses are presented in Table 6. The data indicated that the hybrid 1x5 was the best in sca for GY/P, BY/P, 1000kwt and good to medium for NG/S, NS/P, PLHT, SKW and HD followed by the hybrid 1x2 except for NG/S, SKW and 1000kwt, although. It was the best one in NG/S and SKW. Moreover, the hybrids 1x6, 1x3, 2x5, 1x4, and 2x3 showed the best sca for PLHT, SL, NS/P, 1000kwt and (HD and MD), respectively. It is evident that crosses which exhibited consistently significant positive sca in F1 also exhibited significant positive heterosis over better -parent. These results are in good agreement with those reported by Abo-El Enien and Morrsi 1977, Bhatmagar and Sharma 1995 and Ahmed et al 1998.

4. Heritability

Data presented in Table 7, showed that the highest values for broad (hb) and narrow sense (hn) heritabilities were obtained from 1000kwt (91.19 and 70%) followed by GY/P (90.86 and 67.16%), SKW (87.25 and 63,73%) and SL (86.05 and 66.67%), respectively. The highest values of hn indicate that the additive variance con-

stitutes the greatest portion of the total genetic variance. High hb to medium hn were found in BY/P (90.85 and 57.81%) and HD (88.21 and 57.35%), respectively. These results indicated that the dominance effects of genes controlling these traits. Morever high value of hb with low value of hn were showed in MD (91.26 and 43.26%)and PLHT (85.22 and 49.65%), respectively. These results indicated the dominance effects of gene controlling these traits. Similar results were mentioned by Bilgn 1996, Ahmed 1998, and Ahmed et al 1998. Because the genetic system controlling these characters mainly additive with minor, but significant dominance affects one would expect that the good arrays will maintain their supremacy in later generations. It should be emphasized that, above the conclusion must be confirmed to the six parential lines and the crosses used in the present investigation. Despite of limitation, the results obtained on this study are consisted with those of other studies of similar scope.

CONCLUSION

It could be concluded that the best cross in potence ratio and heterosis was 1x5 for HD and other traits. The parents P1, P2 and P5 were the best general combiners for GY/P, BY/P and moderate to high combiners for other traits. P4 was the best combiner in 1000kwt and SKW, P6 was the best combiner in NG/S and SL, while P2 and P3 were the best combiner for earliness. The best specific cross for GY/P and BY/P was (1x5) followed by (1x2). However, the best crosses for PLHT, SL, NS/P, 1000kwt, and (HD and MD) were 1x6, 1x3, 2x5, 1x4, and 2x3, respectively, these crosses are valuable to build up a population with high genetic yield potential. Heritability values in broad sense were high for all the studied traits while the narrow sense heritability values were high for 1000kwt, (70%), GY/P (67.16%), SL, (66.67%), and SKW, (63.73%) and was moderate for the other studied traits. This study showed, the parental values were good predictability of the performance of hybrids.

REFERENCES

1. Abo-El-Enien, R. A. and L. R. Morssi, 1977, Heterosis and combining ability in barley by diallel analysis, Egypt J. Genet. Cytol., 6-84-97.

2. Ahmed, I. A. 1990, Combining ability analysis over environments in diallel crosses of barley (*Hordeum Vulgare* L.). Zagazig J. Agric. Res., 17 (3): 1109-1114.

3. Ahmed, I. A. 1998. Studies on diallel analysis of some quantitative traits in barley (*Hordeum Vulgare* L.). Egyot J. Appl. Sci., 13 (6): 65-71.

4. Ahmed, I.A., A. M. O. El-Bawab, A.M. El-Sherbini and M.A., El-Moselhy, 1998. Diallel

analysis for yield and yield components in barley. J. Agric. Sci. Mansoura Univ. 23 (7): 2971-2979.

5. Bhatt, G. M., 1971. Heterosis performance and combining ability in a diallel cross among spring wheat (*T. aestivum L.*) Aust. J. Agric Res., 22: 359-369.

6. Bhatnagar, V. K. and S. N. Sharma, 1995. Diallel analysis for combining ability for grain yield and its components in barley. Indian J. Genet. And Plant Breed., 55 (3): 228-232.

7. Bilgen, G., 1996. Genetic analysis of some agronomical characters in seven barley crosses. Yedi arpa melezinde bazi agrononlic ozeliklerin genetik analizleri. Anadolu, 6 (2): 69-83.

8. Chun, J. U. and E. S. Lee, 1986. Heterosis and combining ability for agronomic traits in barley hybrids with special reference to two and six rowed barley crosses. Korean J. of Bre. (Korea R.) 18 (4): 40-45.

9. Fonseca, S. and F. L. Patterson, 1968. Hybrid vigor in a seven parent diallel cross in common winter wheat (*Triticum aestivum L.)* crop Sci. 8: 85-88.

10. Griffing, B. 1956. Concept of general and specific combining ability in relation to diallel crossings systems. Aust J. Bilo. Sci., 9: 463-493.

11. Kempthorne, O. and R. N. Curnaw, 1961. The partial diallel crosses. Biometrics 17: 229-250.

12. Madic, M. 1996. Inheritance of spike traits and grain yield in barley (*Hordeum Vulgare* L.). Hybrids, Rev. of Res. Work at the Fac. Of Agric. Belgrade, 41: 1,53-54.

13. Marcial, L. and Sarrafi, 1996. Genetic analysis of some chlorophyll fluorescene and productivity in barley (*Hordeum Vulgare* L.) Plant Breed., 115(5): 339-342.

14. Singh, S.J. and B. D. Singh, 1990. Genetics of earliness in barley Crop-Improv., 17 (2): 174-178.

15. Smith, H. H., 1952. Fixing transgressive vigour in Nicotiana rustica in heterosis.Iowa State Coll Press Ames Iowa, USA.

Table (2): Mean performance of six barley genotypes and their hybrids used in this study.

Parents	HD	MD	PLHT(cm)	SL(cm)	NS/P	NG/S	BY/P(g)	SKW(g)	GY/P(g)	1000kwt(g)
1	88	118	96.3	7.5	11.7	50	80.00	2.73	30.83	50.69
2	78	110	85.3	6.3	11.3	53	54.87	3.07	24.57	55.62
3	74	106	87.3	7.3	9.0	52	47.03	2.80	20.63	64.04
4	83	114	89.3	9.1	9.0	58	68.60	3.23	20.97	62.65
5	90	123	80.7	8.2	10.0	54	67.93	2.97	27.10	59.24
6	89	125	88.3	9.0	6.0	60	58.13	3.33	21.30	54.44
x	84	116	87.9	7.9	9.2	54	62.76	3.02	24.23	57.78
Crosses										
1x2	82	111	99.7	8.0	12.7	62	82.13	3.53	36.90	55.27
1x3	84	115	96.7	8.7	13.0	58	71.07	2.93	29.93	59.95
1x4	88	124	98.7	9.2	11.0	56	57.63	2.97	29.77	62.12
1x5	85	119	96.7	8.3	14.0	60	89.33	3.20	38.66	63.71
1x6	86	112	100.3	9.8	11.3	64	70.50	3.30	27.37	55.57
2x3	79	109	92.7	7.9	11.7	55	67.87	3.00	28.67	61.73
2x4	82	115	93.0	9.3	12.0	60	74.03	3.67	30.17	63.79
2x5	86	120	86.0	8.5	12.7	56	76.23	3.10	30.17	60.63
2x6	85	118	91.0	9.1	11.0	61	70.60	3.43	28.83	56.38
3x4	81	116	89.7	9.2	11.0	60	66.07	3.67	25.67	64.07
3x5	86	117	87.5	8.5	12.5	55	73.53	3.00	30.23	64.69
3x6	86	118	89.3	9.3	10.6	62	60.70	3.47	26.00	62.12
4x5	84	125	90.3	9.2	11.0	60	75.00	3.60	28.23	62.94
4x6	84	120	89.7	9.5	8.3	63	68.50	3.70	26.70	61.68
5x6	88	127	88.8	10.0	10.3	61	65.63	3.43	28.93	59.32
x	84	118	92.7	8.9	11.5	59	72.46	3.33	29.75	60.91
LSD at 5%...	5	9	10.5	1.2	2.4	4	8.23	0.45	5.45	4.65

Table (3): Potence ratio (P), Percentage of heterosis over mid parents (MP) and better parents (BP) for the 15 F1 generations for the studied characters in six –rowed barley

Croses	HD			MD			SL (cm)			PLHT (cm)			NS/P		
No.	P	MP	BP	P	MP	BP	P	MP	BP	P	MP	BP	P	MP	BP
1x2	-0.20	-1.21	5.13	-0.75	-2.63	0.91	1.83	15.94	7.14	1.62	9.80	3.53	6.00	10.43	8.54
1x3	0.43	3.70	13.51	0.50	6.68	-8.49	11.00	14.85	13.33	0.84	5.34	0.42	2.44	32.04	11.11
1x4	0.80	2.33	6.02	4.00	13.79	8.77	1.27	11.52	2.28	1.02	6.36	2.08	0.70	17.65	5.98
1x5	-4.00	-4.49	-5.41	-1.00	2.08	0.84	1.42	6.41	1.22	1.08	9.49	0.62	3.76	29.63	19.66
1x6	-5.00	-2.82	-11.67	-3.00	-8.57	-5.54	1.67	15.15	5.55	2.00	8.67	4.15	0.86	27.65	-3.42
2x3	1.50	3.95	6.76	0.50	0.93	2.83	2.20	16.18	8.22	6.40	7.41	6.19	1.42	16.67	5.31
2x4	1.00	2.48	5.13	1.50	2.68	4.55	1.19	20.78	3.33	2.85	6.53	4.14	1.30	30.43	6.20
2x5	0.33	2.38	10.25	0.54	3.00	9.09	1.32	17.24	3.66	1.30	3.61	1.18	3.08	18.69	12.39
2x6	0.27	1.80	8.87	0.07	0.40	7.27	1.04	18.18	1.11	2.80	4.84	3.06	0.89	17.19	-2.65
3x4	0.55	3.19	9.46	1.00	3.64	9.43	1.24	12.88	2.22	1.40	1.59	0.45	3.00	37.50	22.22
3x5	4.05	4.88	16.21	0.29	2.18	10.38	1.67	9.68	3.66	1.60	4.17	0.23	5.60	29.47	23.00
3x6	0.60	5.52	16.21	0.26	2.17	11.38	1.35	14.11	3.33	3.00	1.71	1.13	2.00	40.00	16.67
4x5	-0.71	-2.89	1.21	0.23	5.48	7.89	1.50	6.98	2.22	1.33	6.23	1.12	1.67	29.41	10.00
4x6	-0.83	2.89	1.21	0.09	0.41	5.26	1.00	5.56	4.40	1.80	1.01	0.44	3.60	27.69	18.57
5x6	1.00	-1.68	-1.12	3.00	2.48	3.25	3.50	16.27	11.11	1.13	5.09	0.57	1.40	37.33	3.00
LSD at 5%		0.47	3.92		0.72	1.17		0.18	0.30		0.98	1.60		0.73	1.17
LSD at 1%		0.49	4.85		0.95	1.56		0.23	0.40		1.30	2.11		0.95	1.56

Table 3 Content.

Croses	NG/S			SKW (g)			BY/P (g)			GY/P (g)			1000kwt (g)		
No.	P	MP	BP	P	MP	BP	P	MP	BP	P	MP	BP	P	MP	BP
1x2	7.0	20.38	16.98	3.71	21.72	14.98	1.17	21.78	2.66	2.94	33.21	19.69	0.79	3.03	-0.63
1x3	7.0	13.72	11.53	4.00	5.78	6.64	0.46	11.89	-11.16	0.83	13.46	-2.09	0.41	4.50	-6.39
1x4	1.0	3.70	-3.44	0.04	0.33	-8.75	0.20	1.79	-5.46	0.79	14.94	-3.43	-0.91	9.62	-0.85
1x5	4.0	15.38	11.11	2.92	12.28	7.74	2.54	20.76	11.66	5.14	33.24	25.20	1.82	15.89	7.55
1x6	1.4	12.73	3.33	0.90	8.91	0.90	0.13	2.07	-11.88	0.27	4.99	-11.22	1.56	11.35	2.04
2x3	5.0	4.76	3.77	0.43	2.04	-2.28	4.32	33.20	23.69	3.08	26.86	16.69	0.45	3.18	-3.61
2x4	1.8	8.11	3.45	6.50	16.51	13.62	1.78	19.90	7.92	4.11	32.50	22.79	1.32	7.86	1.82
2x5	5.0	4.67	3.70	1.60	2.64	-0.90	2.27	24.14	12.82	3.45	16.75	11.32	1.77	5.57	2.35
2x6	1.3	7.97	1.67	1.72	7.19	3.28	8.65	24095	21.45	3.59	25.67	17.33	2.29	2.45	1.37
3x4	1.7	9.10	3.45	2.95	21.82	13.62	0.76	14.27	3.69	28.64	23.41	22.41	1.03	1.14	0.05
3x5	2.0	3.77	1.85	1.22	3.81	1.00	1.54	27.92	8.24	1.96	26.64	11.54	0.56	5.39	1.02
3x6	1.5	10.71	3.33	1.48	13.03	4.20	1.46	15.14	4.42	14.79	23.99	22.07	0.61	4.93	-2.94
4x5	2.0	7.14	3.45	3.85	16.12	11.46	19.79	9.86	9.33	1.36	27.23	4.17	1.16	3.27	0.46
4x6	4.0	6.78	5.00	8.40	12.81	11.11	0.98	8.09	-0.15	32.70	26.30	25.35	0.52	3.58	-1.55
5x6	1.3	7.02	1.67	1.56	8.89	4.20	0.53	4.13	-0.39	1.63	19.55	6.75	1.03	4.36	0.14
LSD at 5%		0.85	1.40		0.10	0.18		1.60	2.60		0.94	1.54		0.59	0.95
LSD at 1%		1.13	1.85		0.13	1.24		2.18	3.44		1.24	2.04		0.77	1.27

Table (4): Analysis of variance (mean square) for combining ability for the studied characters in the F1 six rowed barley.

Source	df	MD	HD	PLHT(cm)	SL(cm)	NS/P	NG/S	SKW (g)	BY/P (g)	GY/P (g)	1000kwt(g)
Gca	5	25.90**	101.5**	110.6**	3.84**	82.71**	100.95**	1.68**	414.5**	192.67**	81.31**
Sca	15	7.02**	40.2**	37.21**	0.98**	22.04**	26.99**	0.37**	152.03**	37.86**	15.99**
Error	70	1.96	6.19	11.66	0.41	6.19	8.73	0.13	30.5	10.53	4.11
Gca/Sca		3.69	2.52	2.97	3.92	3.75	3.74	4.5	2.72	5.09	5.04

P = 0.05, **P = 0.01

Table (5): Estimates of general combining ability effects for the parent for earliness, plant height, spike length, yield and its components characters in six –rowed barley.

Parents	HD	MD	PLHT(cm)	SL(cm)	NS/P	NG/S	SKW (g)	BY/P (g)	GY/P (g)	1000kwt(g)
P1	0.60	-1.80	4.70	-0.17	1.1	0.20	-0.14	5.27	2.77	-1.59
P2	-1.60	-3.10	1.10	-0.41	1.2	-0.60	0.02	1.71	1.20	-1.35
P3	-1.21	-2.70	-1.50	-0.30	0.2	-1.40	-0.12	-4.61	-1.65	1.61
P4	-0.60	2.30	-0.40	0.31	-1.5	1.41	0.19	-0.59	-1.64	2.01
P5	1.40	-3.90	-2.80	0.03	0.9	-1.0	-0.06	3.48	1.48	1.35
P6	1.40	1.30	-0.90	0.57	-1.8	1.5	0.14	-5.27	-2.18	-1.89
SE (g)	0.26	0.46	0.40	0.12	0.46	0.55	0.07	1.03	0.61	0.38
LSD 0.05	0.52	0.92	0.80	0.24	0.9	1.10	0.14	2.06	1.20	0.76
LSD 0.01	0.69	1.22	1.06	0.32	1.2	1.46	0.19	2.73	1.62	1.01

Table (6): Estimates of specific combining ability effects for the studied crosses in F1 generation for the studied characters in six -rowed barley.

Crosses.no.	HD	MD	PLHT(cm)	SL(cm)	NS/P	NG/S	SKW (g)	BY/P (g)	GY/P (g)	1000kwt(g)
1x2	-1.4	-2.1	1.2	-0.32	-1.10	3.00	0.32	2.69	3.18	-2.70
1x3	0.2	1.5	0.8	2.70	0.20	-0.20	-0.14	-2.05	-0.94	-0.98
1x4	3.6	10.5	0.9	-0.16	-0.1	-5.00	-0.41	-1.51	-1.11	4.81
1x5	-1.4	0.5	2.1	-0.46	0.50	1.40	0.07	8.12	4.60	3.04
1x6	-0.4	-8.1	3.6	0.50	-0.50	2.90	-0.03	-1.96	-2.97	-1.86
2x3	-2.6	-8.5	0.3	-0.29	-1.20	-2.40	-0.23	-1.69	-0.63	0.56
2x4	-0.2	2.8	0.4	0.50	0.80	0.20	0.13	0.45	0.86	2.22
2x5	1.8	2.8	-0.5	-0.02	1.50	-1.80	-0.19	-1.42	-2.26	-0.28
2x6	0.8	1.8	-1.9	-0.40	0.10	0.70	-0.06	1.70	0.06	-1.29
3x4	-1.6	-1.6	-1.1	0.29	0.90	0.60	0.27	-1.19	-0.79	-0.46
3x5	1.4	-2.2	-0.9	-0.13	-0.10	-2.00	-0.15	2.20	0.65	0.82
3x6	1.4	1.4	-1.0	0.13	0.60	2.50	0.12	-1.88	0.08	1.53
4x5	-1.2	0.8	0.8	-0 04	0.10	0.20	0.24	0.35	-1.36	-1.33
4x6	-1.2	-1.6	-1.7	-0.28	0.10	0.70	0.04	1.90	0.77	0.65
5x6	0.8	3.8	-0.2	0.50	0.30	1.10	0.02	-5.04	-0.12	-1.05
SE	0.44	0.79	1.08	0.20	0.78	0.93	0.11	1.75	1.03	0.64
LSD 0.05	0.8	1.6	2.1	0.39	1.50	1.70	0.21	3.49	2.05	1.27
LSD 0.01	1.2	2.1	2.9	0.53	2.00	2.40	0.28	4.63	2.73	1.69

Table (7): Estimates of the variance components and broad sense and narrow sense and narrow sense heretabilities calculates using Griffing's method in the F1 generation.

Characters	6^2 A	6^2 NA	6^2 G	6^2 E	6^2 Ph	h^2 b.s%	h^2 ns%
Heading date	9.44	5.08	14.52	1.94	16.46	88.21	**57.35**
Maturity date	30.65	34.01	64.66	6.19	70.85	91.26	**43.26**
Plant height (cm)	36.69	25.55	62.24	11.66	73.90	84.22	**49.65**
Spike length (cm)	1.96	0.57	2.53	0.41	2.94	86.05	**66.67**
Number of spike /plant	30.34	15.85	46.19	6.19	52.38	88.18	**57.92**
Number of grains /plant	36.98	18.26	55.24	8.73	63.97	86.35	**57.81**
Spike grain weight (g)	0.65	0.24	0.89	0.13	1.02	87.25	**63.73**
Biological yield /P (g)	181.20	121.53	302.73	30.50	333.23	90.85	**54.36**
Grain yield /P (g)	77.40	27.33	104.74	10.53	115.27	90.86	**67.16**
1000kwt (g)	32.66	9.88	42.54	4.11	46.65	91.19	**70.00**

6^2 A = Additive variance
6^2 NA = None additive variance
6^2 G = Genetic variance
6^2 E = Environmental variance
6^2 Ph = Phenotypic variance
h^2 b s = Broad sense hertability
h^2 ns = Narrow sense hertability

دراسات وراثية على بعض الصفات فى الشعير

أحمد محمد عرابى البواب

مركز البحوث الزراعية – معهد بحوث المحاصيل الحقلية – قسم بحوث الشعير

أجرى التهجين الدائرى فى إتجاه واحد بين ٦ من أصناف الشعير ذو الستة صفوف فى الموسم الزراعى ١٩٩٩ / ٢٠٠٠، زرعت الأباء الستة والخمسة عشر هجين (الجيل الأول) المتحصل عليه من التهجين الدائرى فى تجربة حقلية بالمزرعة التجريبية لمركز البحوث الزراعية بالجيزة . فى قطاعات كاملة العشوائية فى الموسم الزراعى ٢٠٠٠ / ٢٠٠١ . تم تسجيل قراءات النمو على الصفات التالية تاريخ التزهير ، تاريخ النضج ، طول النبات ، طول السنبلة، عدد الحبوب / السنبلة ، عدد السنابل / النبات ، وزن حبوب السنبلة ، المحصول الكلى / النبات، محصول الحبوب / النبات، ووزن الألف حبه . أجرى التحليل الإحصائى على القراءات المسجلة على الأباء ونباتات الجيل الأول لدراسة وراثة بعض الصفات فى الشعير من خلال دراسة القدرة العامة والخاصة على الإئتلاف وقوة الهجين ودرجة السيادة ودرجة التوريث. وفيما يلى ملخص لأهم النتائج :

– اظهرت النتائج من تحليل التباين للصفات تحت الدراسة وجود إختلافات معنوية بين الخمسة عشر هجيناً لكل الصفات .

– اظهرت النتائج ان بعض الهجن التى يمكن الإستفادة منها فى برنامج التربية للمحصول العالى والتبكير مثل الهجين ١ × ٥، حيث سجل درجة سيادة فائقة سالبة لتاريخ التزهير ودرجة سيادة كاملة لتاريخ النضج الفسيولوجى ودرجة سيادة فائقة موجبة بالنسبة لباقى الصفات المدروسة، فى حين أنه سجلت درجة سيادة فائقة موجبة فى ثلاثة هجن لطول السنبلة وخمسة لطول النبات وثمانية لعدد السنابل /النبات وسبعة لوزن حبوب السنبلة وثمانية لعدد حبوب السنبلة وخمسة للمحصول الكلى / للنبات وتسعة لمحصول الحبوب / للنبات وأربعة لوزن الألف حبه ، مما جعلت هذه الهجن لها فائدة كبيرة فى برنامج التربية .

– أظهرت الدراسة أنه هناك قوة للهجين فى كل الهجن تحت الدراسة (١٥) وذلك لجميع الصفات التى تم دراستها وقد سجل الهجين (١ × ٥) قوة هجين بالنسبة للأب الأحسن المبكر فى صفه طرد السنابل والأب الأعلى فى محصول الحبوب وباقى الصفات المدروسة ويعتبر من الهجن المبشرة وكذلك سجلت قوة الهجين قياسا على الأب الأعلى فى ستة هجن لصفه طول النبات وكل الهجن لطول السنبله و ١٣ لعدد السنابل / النبات و ١٤ لعدد الحبوب / السنبلة و١٢ لوزن حبوب السنبلة و ١٠ للمحصول الكلى / النبات و ١٢ لمحصول الحبوب / النبات و ٦ لصفه وزن الألف حبه .

– تميزت جميع الصفات المدروسة بمعنوية التباين نتيجة للقدرة العامة والخاصة على الإئتلاف وأظهرت الدراسة أن التأثير المضيف للجينات له دور فعال فى توريث الصفات تحت الدراسة وتأكد ذلك من دراسة النسبة بين القدرة العامة والخاصة على الأئتلاف وأن المكون الوراثى المضيف له التأثير الأكبر فى وراثه هذه الصفات . أظهرت الأصناف ٥ ، ٢ ، ١ قدرة عالية على