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Inheritance of Plant Height, Grain Yield and its Components in Three Barley Crosses

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ABSTRACT

Field experiments were carried out during the three successive growing seasons of 2015/2016, 2016/2017 and 2017/2018 in the Agricultural Research station at South Valley Research Station in Toshka Region. Inheritance of plant height, grain yield and its components was studied in three barley crosses, i.e., (I) Giza 126 x C.C.89, (II) Line1 x Giza 124 and Giza 124 x Giza 126. The six populations, i.e.; P_1, P_2, F_1, F_2, BC_1 and BC_2 for each of the three crosses were evaluated. The additive and dominance genetic estimates, as the type of gene effect, were significant for most studied traits in the three crosses. Also, significant estimates for one or more epistatic gene interactions were displayed for all studied traits in the three crosses except, 1000-kernel weight in the second cross, no. of spikes and grain yield per plant in the third cross. Highly significant positive heterosis over the mid-parent values were obtained for plant height and no. of kernels per spike in the three crosses, no. of spikes per plant; spike length and grain yield per plant in the first and second crosses. Highly significant positive heterosis over the better parent was obtained for plant height in the second and third crosses, grain yield per plant in the first cross and spike length in the second cross. Highly significant positive values for inbreeding depression were detected for plant height and spike length in the three crosses, no. of spikes per plant and grain yield in the first and second crosses and for no. of kernels per spike in the first and third crosses. High heritability values, in broad sense were obtained for plant height and 1000 -kernel weight. Moderate values were obtained for no. of spikes per plant, spike length and grain yield/plant. On the other hand, low to moderate heritability values in narrow sense were detected for all traits studied. Low to moderate values were obtained from the predicated genetic gain for all the studied traits in the three crosses. It could be concluded that, the best crosses showing advanced values of the mid-parent heterosis and predicted genetic advance from selection for grain yield and some of its components in this study were crosses 1and 2 .so, it can be used these crosses in breeding program to improve the barley crop.

Keywords: Six populations, Heterosis, Inbreeding depression, Heritability, Crosses.

INTRODUCTION

Barley is one of the main grain crops, ranking fourth in world. after maize, wheat and rice. Barley can be grown with less rainfall than any other cereal and makes possible human settlements at the barren limits of agriculture. The goal of most plant breeding programs is to increase crop productivity. Genetic improvement of crops can be considered as directed evaluation acting on the existing genetic variability in the germplasm. Improvement of grain yield can be done by direct selection on single plant basis in early generation or field plot basis in late generations. So the breeders need information about nature of gene action, heritability, inbreeding depression, heterosis and predicted genetic gain from selection (Δg) for yield and yield components.

The aim of the present work is to estimate the six genetic parameters; heterosis, inbreeding depression, heritability in broad and narrow sense, expected gain from selection and percentage of gain and five types of gene action according to Gamble's procedure (1962) for plant height, yield and its components in the three barley crosses, i.e. Giza 126 x C.C.89, Line 1 x Giza 124 and Giza 124 x Giza 126. The parents are derived from different regions and\ moreover the exotic group contains substantially high grain yield. Therefore, this study aimed also to determine the genetic advantages and discuss the breeding value of crosses between local and exotic barley varieties.

MATERIALS AND METHODS

This investigation was carried out during the three growing seasons of 2015/2016, 2016/2017 and 2017/2018, at the Agricultural Research Station of the South Valley Research Station at Toshka district, Aswan, Egypt.

The genetic materials used in this study embodied four genetically diverse varieties and promising line of six rowed barley *(Hordeum vulgare* L.*)* (Table a).

Table a. Name, pedigree and origin of the four barley genotypes.

No.	Name.	Pedig ree.	Origin.
1	Giza 124	Local varity	Egypt
2	Giza 126	Local varity	Egypt
3	C.C.89	Panniy/Salmas/5/Baca"s/"3/AC253/ /C108887/C10 5761/4/JLB70-01	ICARDA
4	Line 1	Alanda /Lignee 527/Arar	ICARDA

Viz: Giza 124, Giza 126 from Egypt, C.C.89 and Line 1 from ICARDA.

The experimental populations used in this study were derived from three crosses among the parental materials. The original crosses namely (I) Giza 126 x C.C.89, (II) Line 1 x Giza 124 and Giza 124 x Giza 126, were developed in the growing season 2015/2016. In 2016/2017, F1 plants were selfed and backcrossed to each parent and reaped as single plants. In 2017/2018, three experiments of a randomized complete block design .with three replications were conducted. Each experiment included the plants of; parents, F_1, F_2, BC_1 and BC_2 for each cross. Each replication consisted of 41 rows, 3.75 meter long with 30 cm between rows. In each row 25 kernels were sown by hand to ensure accuracy in spacing of 15 cm. The number of rows and plants used for each population as follows:

Population	Number of rows	Number of plants
P_1	4	60
P_2	4	60
F_1	4	60
F_2 (F_1 selfed)	17	350
B_1 (Backcross of F_1 to P_1)	6	100
B_2 (Backcross of F_1 To P_2)	6	100

Data were collected as follows.

1) Plant height at maturity: Length in centimeters from the soil surface to the tip of the spike on the tallest culm (excluding owns).
2) Number of spikes per plant: determined by counting the fertile spikes per plant.
3) Spike length (cm)
4) Number of kernels per spike was determined as an average number of kernels from 10 main spikes.

5) 1000-kernel weight in grams.
6) Grain yield per plant in grams.

The genetically parameters were: heterosis over the mid- and the better parents and inbreeding depression (I.D.%) according to Mather(1949). Types of gene effects compatible with Gamble (1962), heritability in broad and narrow senses according to Mather, (1949) and predicted genetic gain from selection (Δg) calculated according to Johanson *el al.* (1955).

RESULTS AND DISCUSSION

The results obtained for analysis of the three crosses are shown in Tables 1and 2.

Table 1. Means(x`) and variances (s^2) of six populations for plant height (cm), number of spikes/plant and spike length (cm) in the three crosses of barley.

Characters	Crosses		Populations					
			P_1	P_2	F_1	F_2	BC_1	BC_2
Plant height (cm)	I. Giza 126 x C.C.89	x`	83.83	82.30	84.37	83.03	83.63	82.87
		s^2	6.57	8.79	6.05	21.46	15.77	16.96
	II. Line 1 x Giza 124	x`	76.20	82.60	86.97	80.13	78.43	78.97
		s^2	5.20	3.75	4.82	20.97	16.87	15.59
	III.Giza124xGiza 126	x`	67.20	83.83	86.03	79.62	78.20	79.65
		s^2	5.20	6.57	6.62	15.40	14.80	13.87
No of spikes/ plant (spike)	I. Giza 126x C.C.89	x`	11.9	15.25	16.76	13.64	13.72	14.25
		s^2	24.61	22.73	20.56	47.81	35.92	39.64
	II. Line 1x Giza 124	x`	10.66	15.53	15.62	13.33	11.84	14.16
		s^2	17.52	18.91	17.03	40.33	35.22	35.71
	III.Giza124xGiza 126	x`	10.66	11.90	11.57	11.65	11.06	11.21
		s^2	17.52	24.61	20.43	39.32	35.42	38.67
Spike length (cm)	I. Giza 126 x C.C.89	x`	5.64	7.43	7.20	6.68	6.38	6.76
		s^2	1.75	1.86	1.92	4.64	3.72	3.39
	II. Line 1 x Giza 124	x`	5.14	7.74	8.61	6.83	6.76	7.0
		s^2	0.92	0.87	0.79	1.86	1.55	1.43
	III.Giza124xGiza 126	x`	5.14	5.64	5.69	5.21	5.29	5.47
		s^2	0.92	1.75	0.86	1.95	1.80	1.74
no. of kernels spike (kernel)	I. Giza 126 x C.C.89	x`	50.40	64.80	67.40	56.70	59.00	60.50
		s^2	3.76	4.57	5.26	15.73	12.42	13.36
	II. Line 1 x Giza 124	x`	51.60	67.50	68.80	60.50	59.00	61.70
		s^2	2.67	4.38	5.37	17.04	12.87	15.68
	III. Giza124 x Giza 126	x`	51.60	50.40	52.36	50.37	51.30	50.79
		s^2	2.67	3.76	4.75	8.57	7.52	7.43
1000- kernel weight (g)	I. Giza 126 x C.C.89	x`	40.28	43.25	42.31	42.88	44.35	42.88
		s^2	17.63	16.42	18.37	45.44	38.26	36.94
	II. Line 1 x Giza 124	x`	46.91	47.0	46.89	46.89	46.95	47.27
		s^2	4.89	5.72	5.13	16.54	12.11	11.98
	III. Giza 124 xGiza 126	x`	46.91	40.28	40.17	40.05	44.39	42.58
		s^2	4.89	17.63	11.86	28.65	26.46	24.73
Grain yield / plant (g)	I. Giza 126 x C.C.89	x`	23.8	43.89	46.61	32.00	31.81	37.97
		s^2	918.73	10.96	17.59	30.79	28.72	26.54
	II. Line 1 x Giza 124	x`	25.78	47.23	44.48	36.56	32.47	40.62
		s^2	26.13	22.78	27.23	44.86	38.71	36.95
	III.Giza124 xGiza126	x`	25.78	23.89	24.31	24.98	25.0	24.79
		s^2	26.13	18.73	20.65	38.42	35.06	33.79

Table 2. Estimates of gene effects, heterosis (H%) inbreeding depression (I.D.%), hertability in broad and narrow senses and genetic advance ("g) for plant height, no. of spikes per plant and spike length in the three barley crosses

Character	Cross No.	Gene effect						Heterosis %		ID %	Hertiability %		Genetic advance	
		m	A	D	aa	ad	dd	M.P	B. P		B.S	N.S	"g	"g%
Plant height	I	83.03**	0.76	2.19	10.88**	-0.01	0.99	15.7**	0.64	1.5**	66.74	47.48	4.53	5.46
	II	80.13**	-0.54	1.85	-5.72**	2.66*	23.66**	9.5**	5.3**	7.86**	78.11	45.21	4.26	5.32
	III	79.62**	-1.45**	3.24*	-2.78*	2.37**	19.17**	7.5**	2.6**	7.45**	60.0	13.80	1.12	1.40
No. of spikes per plant	I	13.64**	-0.53	4.57	1.38	1.15	3.35	23.46**	9.9	18.6**	52.7	42.0	5.98	43.8
	II	13.33**	-2.32**	1.21	-1.32	0.12	6.75	19.28**	0.06	14.7**	55.8	24.1	3.15	23.6
	III	11.65**	-0.15	-1.77	-2.06	0.47	-3.22	2.6	-2.77	-0.7	46.97	11.57	1.49	12.8
Spike length	I	6.68**	-0.38	0.23	-0.44	0.52	1.63	10.2**	-3.1	7.2*	58.7	41.3	1.8	26.9
	II	6.83**	-0.24	2.37**	0.2	1.06**	2.38**	33.7**	11.2**	20.7**	53.8	39.8	1.12	16.4
	III	5.21**	-0.18	0.98	0.68	0.07	-0.04	5.57	0.89	8.44**	40.57	21.21	0.61	11.7
Number of kernels per spike	I	56.7**	-1.5**	22.0**	12.2**	5.7**	-1.2	17.0**	4.0**	15.9**	71.2	36.1	2.95	5.2
	II	60.5**	-2.7**	0.65	-0.6	5.25**	-0.1	2.1**	-9.9**	0.49	45.8	32.45	2.76	4.65
	III	50.37**	0.51+	4.06**	2.7**	-0.09	-0.16	2.67**	1.47*	3.8**	56.5	25.55	1.54	3.06
1000 -kernel weight	I	42.88**	1.47+	3.94+	2.94+	2.96**	-9.25*	1.3	-2.2	1.3	61.5	34.5	4.79	11.17
	II	46.89**	-0.32	0.77	0.88	-0.28	-1.73	5.02	-0.34	5.02	68.3	54.4	4.56	9.72
	III	40.05**	1.81*	10.32**	13.74**	-1.51+	-20.15**	0.30	-14.37**	0.30	60.0	21.33	2.35	5.87
Grain yield per plant	I	32.0**	-6.16**	24.28**	11.56**	3.84**	9.88**	31.3**	6.5**	31.3**	48.8	20.5	2.34	7.3
	II	36.56**	-8.15**	7.89**	-0.06	2.58**	15.79**	17.8**	-5.9**	17.8**	43.4	31.3	4.32	11.81
	III	24.98**	0.21	-0.87	-0.34	-0.74	0.95	-2.8	-5.7	-2.8	43.2	20.8	2.66	10.63

I, cross between Giza 126 x C.C.89 II, cress between Line 1 x Giza 124 III, cross between Giza 124 xGiza 126 *and significant at 0.05 and 0.01 levels of probability, respectively**

Mean and variances of the six traits in the three crosses for the six populations are presented in Table 1.

The results in Table 1, showed that, all F_1 hybrids except either its respective smaller or better parent for all traits in the first and second crosses exceed 1000- kernel weight. Also, F1 plants were more than the F2, plants, pointing that inbreeding depression has been occurred. The variance of the F2 populations was higher than those parents, F1 and back crosses.

Gene effects, heterosis, inbreeding depression, predicted genetic advance and heritability in the three crosses for plant height, no. of spikes/plant and spike length are given in Table 2 and for no. of kernels per spike. 1000-kernel weight and grain yield/plant are given in Table *2*.

The estimates of additive gene effect (a) and dominance gene effect (d) are small for parameter (m) in the three crosses. However, the mean effects (m) for all traits studied in the three crosses reported highly significant which select the contribution due to the overall mean plus the locus effects and interactions of the fixed loci (Table 2). Similar results were obtained by Bnejdi and Gazzah (2010).

Estimates of parameter (d),effect of dominance gene are quite more in magnitude as compared with parameter (a), additive gene effects in most cases. The six parameters estimated that the effects of dominance gene were significant for most traits in the three crosses indicating the importance of dominance gene effects in inheritance of these traits. However, the relative magnitude of these effects to the mean effects suggests that they are of minor importance in the explanation of yield variation.

Significant estimates of the effects of the epistatic gene effects for one or more of the three types of epistasis were detected in the three crosses in most traits. The magnitude of the epistatic parameters relative to the mean effects is small. Generally, the magnitude of the total epistatic effects is larger than the magnitude of the additive effects. The magnitude and significance of the estimates of (aa), (ad) and (dd) explained that the epistatic gene effects are present and important in the basic genetic mechanism of yield inheritance in the barley populations studied in the first and the second crosses. These results also suggest that genetic models assuming negligible epistasis may be biased to a greater or lesser extent.

The dominance effect and dominance x dominance epistatic effect played major roles in the inheritance of plant height and grain yield per plant for the first and the second crosses and spike length for the second cross (Table 2). Both of these effects are expected to increase the value of the F1 (Hayman, 1958). Since both are positive, heterosis can be explained by both (d) and (dd), but their relative importance cannot be clearly defined by Chapman and McNeal, (1971).

Heterosis over the mid-parents value in our investigation was presented in the three crosses for all traits except 1000 – kernel weight.

Highly significant positive heterosis values were obtained for plant height, and no. of kernels per spike in all the three crosses. While, no. of spikes per plant , spike length and grain yield per plant showed highly significant positive heterotic effect in the first and the second crosses.

These results could be an indication that a high yield is expected in F_1 hybrids than the mid-parents for grain yield and no. of spikes/plant in the first and the second crosses. The third cross was not promising for grain yield per plant and most of its component studied. On the other hand, the hybridization between varieties and or lines which have different genetic background, i.e. crosses no I and II (local x introduction) showed higher heterotic values when compared with cross no III (local x local). These results obtained were identical with those reported by EL-Shawy (2008),Khattab *et al.* (2010) and EL-Akhdar (2011) for no. of spikes/plant, spike length and grain yield per plant Khaled (2013) and Mohamed, (2014) for no. of kernels per spike, EL-Shawy (2008), EL-Seidy ,*et al* (2011) and EL- Refaey. *et al.* (2015a), for plant height and EL- Bawab (2003) and EL-Seidy.*et al.* (2011) and EL-Akhdar, (2011).for 1000-kemel weight.

Significant or highly significant positive heterotic effect was obtained for better parent of the plant height in the second and the third crosses, spike length in the second cross, no .of kernels per spike in the first and the third crosses and grain yield per plant in the first cross only.

Also, the obtained negative values of heterosis pointing that F1 seeds were lower than their parents. Negative values of heterosis were obtained in the second crosses for no- of kernels per spike and grain yield per plant and the third cross for 1000- kernel weight.

Regarding inbreeding depression highly significant positive values for both heterosis and inbreeding depression were associated with plant height, no of spikes per plant and grain yield per plant in the first and the second crosses, spike length in the second cross and no. of kernels per spike in the first and the third crosses. This is logical since because expression of heterosis in F1 will be followed by considerable reduction in the F_2 performance. On the other hand, negative values were detected for no. of spikes per plant and grain yield per plant in the third cross. Positive and significant values were obtained for plant height, spike length in the three crosses. While, positive and significant values were obtained for no. of kernels per spike and 1000- kernel weight in the two crosses. The high level of heterosis and inbreeding depression present in this study were an evidence of the relative importance of dominant gene effects in this material. These results are in agreement with those reported by EL-Sayed (2007), Mohamed (2014) and Mansour *et al.* (2015).

Heritability is very important in any breeding program. It should be recognized as a first step before starting hence genetic advance through selection depends on the magnitude of heritability values of the trait under study.

The value of heritability in dictates whether progress in selection of plant personality is relatively easy or difficult in the breeding program.

Heritability in broad sense includes all types of genetic variances. It was estimated for the studied traits and the obtained values are presented in Table 2.

In the present investigation, the estimates of heritability in broad sense were high for plant height and 1000- kernel weight in all crosses and no. of kernels per spike in one cross. Math result was obtained by EL-Sayed (2007), EI-Shawy (2008) and Khaled (2013)

For number of spikes per plant, spike length and grain yield per plant. Heritability values were moderate. This result agreed with Rutger *et.al.*(1966), Rasmusson and Glass (1967), EL-Sayed, (2007) , EL-Seidy (2007) , EL-Shawy (2008), and EL-Seidy *et.al.*(2011). This trait is strongly influenced by the environment, which cause reduction in the values of heritability of such quantitative trait.

Heritability in narrow sense for the studied traits was estimated, which the portion of genetic variance due to additive gene action, and the obtained results are presented in Table (2).

The hybridization between (local x introduction) showed higher heritability values in broad and narrow sense, i.e. crosses I and 11 as compared with cross III (local x local) for all the studied traits.

Heritability estimates in narrow sense ranged from (11.57 to 54.4) low to moderate for all the studied traits. Comparatively low heritability values (20.5 to 31.3) were obtained for grain yield per plant for the three crosses Low to moderate values were estimated for the other traits. These results are matched with Amin (2013), Mansour *et al.*(2015) and Kandil *et al.*(2016).

High estimates of broad sense were accompanied by low values of the narrow sense heritability.

The genetic advance under selection according to Johanson *et al.,* (1955) for the characters studied is presented in Table 2.

The expected genetic advance for characters in this study was derived by using heritability in narrow sense, therefore, high genetic advance was found to associate with moderate heritability in narrow sense for plant height, no. of spikes per plant and 1000-kernel weight in the first and the second crosses math results were obtained by Khattab *et al.(*2010*),*EL- Seidy *et al.*(2011) and Mansour *et al.(2015)*.

Low genetic advance was found in the third cross III (local x local) associate with low heritability in narrow sense, also for spike length and no of kernels per spike The minimum increase in grain yield reached 2.34 and 2.66(g) per plant if the top of 5% of the F_1 plants were selected for the first and the third crosses, respectively. The maximum increase was 4.32 (g) per plant in the second cross According to the genetic advance under selection, the lowest grain yield per plant would reach 34.34 and 27.64 (g)per plant for the first and the third crosses, respectively. The second cross for grain yield per plant(g) in F_3 populations will increase from 24.98(g) in the F_2 to 29.30 (g) in F_3 populations The above results means that promising grain yield increase can be achieved in F_3. Therefore, the selection for these traits could be effective for successful breeding purpose. Math results were obtained by EL- Refaey *et al*., (2015 a).

The genetic advance as a percent of the F_2 mean (Δg %) for the all studied traits are presented in Table 2.

It was high for no. of spikes per plant and spike length. Relatively, low genetic advance (Δg %) was obtained for plant height; no of kernels per spike, 1000-kernel weight and grain yield per plant. math results were obtained by EL-Refaey *et al.* (2015 b). In conclusion; the results of crossing barley genotypes from diverse genetic pools give the advantage of improvement of local cultivars.

REFERENCES

Amin,I.A. (2013). Genetic behavior of some agronomic traits in two durum crosses under heat stress . Alex. J.Agric Res., 58(1):53-66

Chapman, S.R. and F.H. McNeal (1971): Gene action for yield components and plant height in spring wheat cross. Crop Sci., 11: 384-386.

Bnejdi,F. and M.EL Gazzah (2010). Epistasis and genotype -by- environment interaction of grain protein content in durum wheat. Genetic and Molecular Biology 33 (1):125-130.

EL-Akhdar, A.A.A.(2011).Genetic studies on yield and its components in some barley crosses .M.Sc.Thesis Fac., Agric., Kafrelsheikh , Univ. Egypt.

EL- Bawab, A.M.O. (2003).Genetic studies on some characters in barley. Egypt. J. Agric., 81(2):235-255.

EL-Refaey, R.A. ; M.A.EL-Moselhy; A.A. EL- Gammaal and A.A. EL-Naggar (2015 a).Generation mean analysis for yield and its components in five crosses of barley (*Hordeum Vulgare L)* under water stress conditions. J.Agric. Res. Kafr EL- Sheikh Univ.,41(2): 670-683.

EL-Refaey,R.A.;A.A.EL-Gammaal;M.A.EL-Moselhy, and A.A.EL-Naggar (2015 b). Quantitative inheritance of some barley agronomic traits under water stress conditions .J. Agric .Res. Kafr EL-Sheikh Univ., 41(3):885-901.

EL-Sayed, M.M.A. (2007). Estimation of quantitative genetic statistics in diallel crosses of barley .M.Sc.Thesis Fac., Agric., Kafrelsheikh, Univ., Egypt.

EL-Seidy, E.H.;M.A. EL-Moselhy; A.A. EL- Gammaal and A.A. EL-Naggar (2011). Genetic behavior and heritability estimates for some growth, physiological, earliness traits and grain yield in barley breeding. Egypt. J.Plant Breed., 15 (2):51-64.

EL- Shawy, E.E.A. (2008). Genetic analysis of some important traits of six-row barley in normal and saline affected fields .M.Sc Thesis Fac., Agric.,Kafrelsheikh,Univ., Egypt.

Gamble, E.E. (1962): Gene effects in corn *('lea mays* L.) I- Separation and relative importance of gene effects for yield .Can. J of plant Sci.,42: 339.

Hayman, B.I. (1958): The separation of epistatic from additive and dominance variation in generation means. Heredity, 12: 371-390.

Johanson, H.W.;H.F.Robinson and R.E.Comstock (1955): Estimation of genetic and environmental variability in soybean. Agron. J , 47: 314.

Kandil,A.A.;A.E.Sharief and Hasnaa S.M.(2016). Estimates of gene action for yield and its components in bread Wheat (*Triticum aestivum L)* .Int.J. of Agron. and Agri. Res., 8(1) : 34-40

Khaled, M.A.I. (2013) .Genetic system controlling the yield and its components in three bread wheat (*Triticum aestivum L)* crosses . Egypt. J. Agric .Res., 91(2):641-653.

Khattab,S.A.M.;R.M. Esmali and A.M.F. AL-Ansary (2010) . Genetically analysis of some quantitative traits in bread wheat(*Triticum aestivum* L.*)* .New York Science .,3(11):152-157.
Matter, K (1949): Biometerical Genetics. Dover puble. Inc.London 162 pp.
Mansor, M.;A.G. Abdel-Hafez; Kh. A. Amer and E.E. EL-Shawy (2015).
Genetic studies on barley productivity in relation to leaf rust infection. Egypt.J.Agric. Res., 93(2A) . 171-185.
Mohamed, N.E.M.(2014). Genetic control for some traits using generation mean analysis in bread wheat (*Triticum aestivum* L.*)* . International of Plant and soil Sci., 3(9): 1055-1068.
Rasmusson, D.C. and R.L.Glass (1967): Estimates of genetic and environmental variability in barely. Crop Sci., 7: 185-189.
Rutger, J.N.; C.W.Schaller.; A.D.Dickson and J.C.Williams (1966): *[/* Variation and covariation in agronomic and malting quality characters in barley. I. Heritability estimates. Crop Sci., (6): 231-234.

وراثة ارتفاع النبات والمحصول ومكوناته فى ثلاثة هجن من الشعير

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تم تنفيذ هذه التجربة بمحطة البحوث الزراعية بجنوب الوادى فى منطقة توشكا بجنوب مصر التابعة لمركز البحوث الزراعية خلال ثلاثة مواسم زراعية ٢٠١٦/٢٠١٥ـ ٢٠١٦ ٢٠١٧/ و ٢٠١٧ /٢٠١٨وذلك لدراسة وراثة الصفات الإقتصادية فى الشعير وهى أرتفاع النبات وطول السنبلة ومحصول الحبوب للنبات و بعض مكونات المحصول مثل عدد السنابل على النبات ، عدد الحبوب فى السنبلة ووزن الألف حبة. واستخدم فى هذه الدراسة صنفين محليين وصنف و سلالة مستوردين وتم عمل ثلاثة هجن جيزة ١٢٦x جيزة ١٢٤، وجيزة١٢٤ x سلالة ١ وهجين مركب٨٩ سلاله x جيزة١٢٦، فى تجربة فى تصميم قطاعات كاملة العشوائية تحتوى على ٣ مكرارت وكانت كل مكررة تشمل الأبوين والجيل الأول والجيل الثانى والجيل الرجعى الأول والثانى لكل هجين ويمكن تلخيص أهم النتائج المتحصل عليها فيما يلى : ١ـ كان الفعل الجينى المضيف وغير المضيف معنويا فى كل الصفات لهجين او أكثر وكان هناك دورا لفعل الجين المتفوق بأنواعة الثلاثة فى وراثة معظم الصفات المدروسة فى الهجن الثلاثة وكان التأثير السيادى للجين أكبر من التاثير المضيف ٢ـ أوضحت النتائج أن قوة الهجين المحسوبة على أساس متوسط الأباء كانت موجبة وعالية المعنوية فى كل من صفتى ارتفاع النبات وعدد الحبوب فى السنبلة للهجن الثلاثة اما فى صفات عدد السنابل على النبات وطول السنبلة ومحصول الحبوب للنبات فقد ظهرت قوة الهجين فى كلا من الهجينين الأول والثانى ولم تظهر المعنوية فى الهجين الثالث حيث ان أباء الهجينين الأول والثانى ذات اصول متباعدة ٣ـ كانت قوة الهجين المحسوبة على أساس الأب الأفضل موجبة وعالية المعنوية فى بعض الصفات لبعض الهجن وكانت سالبة وعالية المعنوية او غائبة فى صفات اخرى فى بعض الهجن ٤ـ كان هناك تأثير للتربية الداخلية معنويا وموجبا لجميع الصفات المدروسة فى الهجن الثلاثة عدا عدد السنابل على النبات ومحصول الحبوب للنبات فقد كانت سالبة وغير معنوية فى الهجين الثالث ٥ـ كانت درجة التوريث بمعناها الواسع قد تراوحت من قيم مرتفعة الى متوسطة فى جميع الصفات أما درجة التوريث بمعناها المحدود فقد تراوحت من قيم منخفضة الى متوسطة لجميع الصفات المدروسة. ٦ـ كانت قيمة التحسين المتوقع نتيجة الانتخاب ٥% من افضل نباتات الجيل الثانى أكبر فى الهجين الأول والثانى عنة فى الثالث مما يزيد من فرصة اجراء الانتخاب بطريقة النسب عند تحسين صفة المحصول ومكوناته.التوصية : كانت أفضل الهجن بالنسبة لصفة محصول الحبوب هما الهجينين الأول والثانى حيث أعطيا أعلى القيم بالنسبة لكلا من قوة الهجين بناء على متوسط الأبوين وكذلك التقدم الوراثى المتوقع والمتنبأ به نتيجة الانتخاب لذلك يمكن التوصية بإدخال تلك الهجن فى برامج تحسين الشعير.