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Short Communication

Inheritance of yield and quality components in durum wheat (*Triticum durum* desf.)

O. P. Dhillon[1], Mohd. Yunus and R. S. Waldia

Department of Plant Breeding, CCS Haryana Agricultural University, Hisar 125 004

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Grain yield is a complex character resulting from the interaction of a number of component characters and the utilization value of durum wheat depends upon the nature of milling and food value. All these quality traits have inter relationship with yield and its components. Generation means analysis is a simple and useful technique for characterising gene effects [1]. The knowledge on the nature of gene effects operative in the inheritance of yield, yield components and quality components would be useful for the development of better cultivars.

The present investigations were carried out with six generations *viz.*, P_1, P_2, F_1, F_2, BC_1 and BC_2 generated from each of the four crosses. WH896 × MACS2846 (C-I), WH896 × PDW233 (C-II), WH912 × HI6896 (C-III) and WH912 × MACS2846 (C-IV). Six generations of each cross were sown in a compact family block design. Weighted analysis of Cavalli [2] were performed in all the four crosses for the quantitative and qualitative traits to know the adequacy of three parameter (non-epistatic model). The estimate of gene effects i.e. six parameter model were obtained using the generation mean analysis model of Jinks and Jones [1].

The results (Table 1) showed that dominance gene effects followed by dominance × dominance interactions were important for the inheritance of most of the characters [3 and 4] in all the four crosses except a few. Additive gene effects and additive × additive interaction effects represent the fixable genetic variance, which were observed for yield, yield components and quality components [5 and 6] which can be used in evolving homozygous cultivars by following hybridization and selection method like pedigree method of selection. On the other hand - dominance gene effects and dominance × dominance interactions effects are non fixable components of genetic variance. In spite of high magnitude of dominance gene effects and dominance × dominance interactions, it is difficult to exploit them due to presence of duplicate epistasis which is evident from the opposite signs of 'h' and 'l' in most of the traits. In such a situation some form of intermating or biparental mating between selected plants from early segregating generations could help in developing durum wheat populations which upon selection will result into high yielding and good quality cultivars.

References

1. **Jinks J. L. and Jones R. M.** 1958. Estimation of the components of heterosis. Genetics, **43**: 223-234.
2. **Cavalli L. L.** 1952. An analysis of linkage in quantitative inheritance (ed. E.C.R. Rieve and Waddinton, C.G.), pp 135-144. H.M.S.O. London.
3. **Bhatiya V. J., Jadon B. S. and Pittia M. S.**. 1987. Gene effects for grain yield and its components in durum wheat. Madras agric. J. **74**: 258-260.
4. **Matuz J and Beke B.** (1996). Inheritance of quality traits in two durum wheat (*Triticum durum* Desf) crosses. Cereal Res. Comm. **24** : 203-210.
5. **Bebyakin V. M. and Martynov S. P.** 1983. Genetic analysis of grain quality characters *in Triticum durum* Genetika **19**: 1686-1692.
6. **Mann M. S., Sharma S. N. and Bhatnagar A. K.** 1995. Combining ability and nature of gene effects for grain yield and harvest index in macaroni wheat. Crop Improv. **22**: 65-68.

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[1]Present address: Directorate of Wheat Research P.B. 158, Karnal, 132 001

Table 1.- Estimates of gene effects obtained from six parameter model of Jinks and Jones (1958) of yield, its components and quality traits in four durum wheat crosses

Character	Cross[1]	m	(d)	(h)	(i)	(j)	(l)
Grain yield/plant	I	78.48 ± 2.11	0.02 ± 0.67	−74.19** ± 3.10	−30.20** ± 2.10	6.00** ± 1.33	44.74** ± 2.31
	II	73.93 ± 1.96	−0.66 ± 0.80	−76.36** ± 2.94	−24.62** ± 1.95	4.82** ± 1.42	54.64** ± 2.28
	III	63.54 ± 2.06	2.91** ± 0.76	−32.91** ± 3.06	−5.62** ± 2.05	−0.40 ± 1.43	20.18** ± 2.34
	IV	50.88 ± 2.16	3.82** ± 0.71	5.02* ± 2.16	4.46** ± 2.16	−9.17** ± 1.54	−2.05 ± 2.50
No. of grains/spike	I	74.72 ± 2.21	10.87** ± 0.80	−123.30** ± 3.29	−54.92** ± 2.20	3.87* ± 1.54	62.65** ± 2.49
	II	69.61 ± 2.40	0.34 ± 0.95	−12.81 ± 3.61	−2.94 ± 2.38	18.79** ± 1.77	16.27** ± 2.79
	III	44.85 ± 2.18	−3.50** ± 0.83	62.33** ± 3.26	21.98** ± 2.16	−1.94 ± 1.56	−34.98** ± 2.52
	IV	Additive-dominance model is adequate					
No. of effective tillers/plant	I	17.37 ± 1.13	0.30 ± 0.47	−11.71** ± 3.29	−3.94** ± 1.12	0.74 ± 0.94	7.74** ± 1.40
	II	14.24 ± 1.05	0.50 ± 0.47	−0.59 ± 1.64	1.46 ± 1.04	3.26** ± 0.88	1.20 ± 1.29
	III	14.55 ± 1.09	0.60 ± 0.49	3.56* ± 1.68	−1.28 ± 1.07	−.00** ± 0.87	−5.24** ± 1.34
	IV	Additive-dominance model is adequate					
1000-grain weight (g)	I	52.37 ± 1.37	−1.52** ± 0.48	−7.73** ± 2.09	−7.28** ± 1.37	4.43** ± 1.03	0.39 ± 1.62
	II	58.46 ± 1.19	−3.85** ± 0.45	−7.97** ± 1.83	−11.08** ± 1.18	5.02** ± 0.93	1.62 ± 1.43
	III	42.74 ± 1.10	−10.55** ± 0.49	62.15** ± 1.79	19.94** ± 1.09	11.96** ± 1.00	−35.66** ± 1.44
	IV	44.86 ± 1.15	1.47** ± 0.49	13.49** ± 1.82	0.38 ± 1.14	5.19** ± 0.99	9.31** ± 1.45
Protein content (%)	I	12.49 ± 0.51	−0.54* ± 0.22	21.65** ± 0.78	8.82** ± 0.51	1.33** ± 0.40	−14.43** ± 0.62
	II	11.14 ± 0.49	−0.44* ± 0.19	9.64** ± 0.77	5.40** ± 0.48	−3.73** ± 0.41	−3.93**
	III	13.27 ± 0.51	−0.04 ± 0.21	−2.22** ± 0.79	−2.46** ± 0.50	−2.79** ± 0.41	0.85 ± 0.63
	IV	14.74 ± 0.53	−0.04 ± 0.19	−1.58 ± 0.80	−2.80** ± 0.52	2.33** ± 0.42	−2.07** ± 0.65
β-carotene (ppm)	I	7.47 ± 0.48	0.69** ± 0.21	−5.59** ± 0.77	−1.86* ± 0.48	1.24** ± 0.42	3.62** ± 0.61
	II	7.71 ± 0.50	0.46* ± 0.20	−3.72** ± 0.78	−0.92 ± 0.49	1.71** ± 0.41	2.73** ± 0.62
	III	8.16 ± 0.52	1.20** ± 0.18	−4.00** ± 0.80	−2.42** ± 0.52	−0.05 ± 0.40	2.13** ± 0.63
	IV	7.54 ± 0.49	0.83** ± 0.18	−2.88** ± 0.77	−1.40** ± 0.49	−1.33** ± 0.41	2.17** ± 0.62
Yellow berry (%)	I	18.31 ± 1.24	14.64** ± 0.57	−18.39** ± 1.94	1.46 ± 1.23	−35.53** ± 1.04	18.75** ± 1.57
	II	19.05 ± 1.58	0.04 ± 0.58	23.45** ± 2.40	25.98** ± 1.57	−28.87** ± 1.19	−6.83** ± 1.89
	III	23.75 ± 1.41	6.34** ± 0.65	19.08** ± 2.21	14.32** ± 1.39	−7.15** ± 1.20	−31.25** ± 1.78
	IV	20.13 ± 1.46	9.77** ± 0.64	−21.92** ± 2.24	−10.94** ± 1.44	9.93** ± 1.17	24.61** ± 1.80

*, **Significant at 5% and 1% level, respectively.

Cross-I: WH986 × MACS 2846; **Cross-II**: WH896 × PDW233; **Cross-III**: WH912 × HI6896 and **Cross-IV** : WH912 × MACS2846