Agriways 5 (2) : 113-117 (July - December, 2017)

ISSN: 2321-8614 (Print)
ISSN: 2454-2318 (Online)

STUDY OF GENETIC COMPONENTS FOR YIELD AND QUALITY TRAILS IN BREAD WHEAT (*Triticum aestivum* L.)

Archana Srivastava and S. K. Singh[1]

Dept. of botany, D.G.College Kanpur (U.P.)

[1]Dept. of Genetics & Plant Breeding, CCR (P.G.) College, Muzaffarnagar (U.P.)

E-mail : archanasrivastavadg@gmail.com

ABSTRACT

Ten bread wheat parental lines and their forty five hybrids were used for studying the character association among grain yield and its related characters. The results showed that the number of grain per spike, grain weight per spike, number of productive tillers per plant and harvest index were significantly and positively associated with grains yield per plant in both parental, and F1 generation.

Keywords : **Genetic components, bread wheat, *Triticum aestivum***

Grains yield in wheat, as in any other crop plant is a complex multicomponent character. Fonseca and Patterson (1963) emphasized the significance of component approach in formulating a successful breeding programme. The present study examnines the nature of association of association of yield with other characters by utilizing parental and their all possible F1 hybrid lines.

MATERIALS AND METHODS

Forty five hybrids were obtained by crossing ten genotypes/cultivars namely HD 2285, K 8305, UP 2121, K8565, K 8030, HUW 234, PB W 226, K 8103, HUW 300 and HP 1633 in a 10 X 10 diallel mating system excluding reciprocals. The experiment 10 parents and their 45 F1s was grown in Randomized Complete Block Design with three replication at research farm of C.S.A. University of Agriculture and Technology, Kanpur and D.G. College Kanpur as well. The experiment was conducted in two row plots. The lengths of each row 1.5 m with inter and intra row distance of 25 and 15 cm, respectively. Recommended dose of fertilizers with fine irrigation was applied to raise a good crop. Ten plants for observation were randomly taken from each parent and F1 generation Data were recorded on 13 characters namely days to reproductive phase, flag leaf area, spike area plant height, number of productive Tillers per plant, grain weight per spike, number of grains per spike, harvest index 1000-grain weight, grain yield per plants, seed hardness, protein content and tryptophan content. Simple correlation were worked out between grain yield and other characters for each parents and hybrids as per method suggested by Al jibouri *et al* (1958). The significance of phenotypic coefficient was tested against 'r' values from 'r' table of fisher and Yates (1938) for n-2 degree of freedom where n is a number of treatment.

RESULTS AND DISCUSSION

Estimate of phenotypic and genotypic association between all possible 78 pairs involving all the 13 characters separately for parental and first filial generation were computed. The results are presented in Table 1 and 2 for these generations respectively.

In parents, the correlation coefficient were positive and significant for 15 combinations out of 78 Days to reproductive phase was positively and significantly associated with flag area, 1000-grain weight and grain yield per plant. Flag leaf area was correlated positive and highly significant with grain yield per plant. Spike area was associated positive direction with grain yield per plant and protein content. Similar was the situation between numbers

of productive tillers per plant with harvest index. Grain yield was highly significant and positively associated with grain yield per spike, number of grains per spike, harvest index and 1000-grain weight. Grain weight per spike was positively and significantly associated with 1000-grain weight.

Tryptophan content was also correlated positively and significantly with seed hardness.

In F1 generation, the significant associations were recorded in 12 cases out of 78. Among these the significant and positive values were found in 10 combinations which were days to reproductive phase with flag leaf area and 1000-grain weight per spike with protein content, number of reproductive tillers per plant with harvest index and grain yield per plant, grain weight per spike with 1000-grain weight and grain yield per plant, number of grain per spike with grain yield per plant, 1000-grain weight with grain yield per plant, seed hardness with tryptophan content. Negative and Significant association were recorded for grain weight per spike with number of grains per spike; number of grains per spike with 1000-grain weight. Rest of the combinations exhibited weak association.

The extent of genotypic interrelationship were higher than phenotypic association in both the parental and F1 generations under study involving 78 characters combinations in each case. Ahmad *et al.* (1978) reported similar finding in bread wheat. Hence the significant phenotypic association between characters were primarily due to genetic causes, which might be due to pleotropic effect rather than linkage between genetic affecting direct characters. The self-pollination mechanism is a prelude the fixation of blocks of genes as Well as due to limited chance of breaking linkage compared with random mating system prevailing in cross pollinated crops. Such reports have been made by Weber and Moorthy (1952) and Johson *et al.* (1995).

Grain yield per plant possessed positive and significant association with grain weight per spike, number of productive tillers per plant, number of grains per spike and 1000-grain weight in F1 generation and similar was the situation in parental generation. Hence, the selection for these component traits; could lead to higher productivity. Positive correlation was repoted by Donald and Hamblin (1976), Ali *et al.* (1978) Mc Vetty and Evans (1980) for grain yield with same component traits, Paroda and Joshi (1974), Virk and Anand (1970), Vrik and Singh (1972) and Ahmad *et al.* (1978) reported for grain yied with 1000 grain weight and Pandey *et al.* (1983), Sharma *et al.* (1987) and Ahmad *et al.* (1990) for grain yield with harvest index.

Positive and significant correlation between tryptophan content and seed hardness was observed and protein content was found positively associated with tryptophan content. The similar finding was reported by Gill and Brar (1973), Pandey (1980) and Kerkhi (1983).

A positive association between protein content and seed hardness provided a check as the seed hardness could be taken as indicator of protein level in grain. Therefore, a large number of germplasm could be screened for protein the help of seed hardness which is quickly *measurable* in the Labortory and field conditions.

The positive and signifivant association between protein content and tryptophan content in both the parental and F1 generations was accordance with Srivastava *et al.* (1971) who reported the increase of concentration with the increase in protein content in percent which might be fertilizers to experimental crops.

On generalization of the result, it may be concluded that maximum emphasis during selection should be given for grain weight per spike, number of grain per spike, number of prodctive tillers per plant and harvest index for the improvement of grain yield in bread wheat.

Table1: Phenotypic (upper diagonal) and genotypic(lower diagonal) among 13 attributes in parental generation of a 10-parent-diallel cross in bread wheat

Character	Days to Reproduc e tive phase	flag laef area	spike area	Plant height	No of productive tillers/plant	Grain weight per spike	No of grains per spike	Harvest index	1000grain weight	Grain yieldper plant	Seed hardness	Protein content	Trytophan content
Days to reproductive phase	-	0.74**	0.42	0.12	0.23	0.12	-0.01	-0.04	0.68*	0.84**	-0.10	0.23	0.24
Flag leaf area	0.78	gp'	0.38	0.21	0.18	-0.08	0.17	0.24	0.01	0.82**	0.31	0.21	0.21
spike area	0.52	0.42	Gp'	0.15	0.32	0.21	0.12	-0.02	-0.01	0.84**	-0.17	0.65*	0.20
Plant height	0.21	0.27	0.18	gp'	0.31	0.17	0.31	0.21	-0.16	-0.08	-0.31	-0.27	0.17
No of productive tillers/plant	0.27	0.23	0.38	0.34	gp'	0.37	-0.16	0.72**	0.21	0.69*	0.17	0.31	0.21
Grain weight per spike	0.15	-0.74	0.25	0.20	0.39	gp'	0.72**	0.31	0.87**	0.74**	0.32	0.12	0.18
No of grains per spike	0.01	0.22	0.14	0.33	-0.14	0.74	gp'	0.12	0.21	0.82**	0.07	0,02	0.05
Harvest index	-0.02	0.32	-0.07	0.24	0.82	0.35	0.14	gp'	-0.62	0.72**	0.35	0.27	0.38
1000grain weight	0.72	0.12	-0.07	-0.13	0.26	0.91	0.24	0.17	gp'	0.71**	0.08	0.32	-0.21
Grain yieldper plant	0.12	0.08	0.89	-0.06	0.78	0.78	0.85	0.80	0.75	gp'	0.17	0.21	0.15
Seed hardness	0.87	0.89	-0.14	-0.21	0.21	0.34	0.15	0.40	0.20	0.20	gp'	0.06	0.68*
Protein content	0.40	0.24	0.69	-0.23	0.34	0.14	0.04	0.32	-0.21	0.27	0.10	gp'	0.39
Trytophan content	0.32	0.25	0.24	0.24	0.24	0.20	0.09	0.43	-0.12	0.18	0.74	0.28	gp'

*Significant at 5% level;**Significant at 1% level

Table2: Phenotypic (upper diagonal) and genotypic(lower diagonal) among 13 attributes in parental generation of a 10-parent-diallel cross in bread wheat

Character	Days to Reproduce tive phase	flag laef area	spike area	Plant height	No of productive tillers/plant	Grain weight per spike	No of grains per spike	Harvest index	1000grain weight	Grain yieldper plant	Seed hardness	Protein content	Trytophan content
Days to reproductive phase	gp'	0.27*	0.12	-0.14	0.06	-0.13	-0.02	0.07	0.28*	-0.09	0.13	0.09	0.07
Flag leaf area	0.25	gp'	0.12	0.06	0.06	-0.11	0.06	0.14	-0.17	-0.04	0.05	0.14	-0.11
spike area	0.14	0.16	gp'	-0.05	0.10	0.10	-0.08	-0.08	-0.05	0.15	0.19	0.25	0.02
Plant height	-0.14	0.07	-0.06	gp'	0.05	-0.01	0.10	0.08	-0.15	-0.09	0.01	-0.21	0.06
No of productive tillers/plant	0.09	0.07	0.17	0.06	gp'	0.13	-0.06	0.34**	0.09	0.39**	-0.11	0.05	0.07
Grain weight per spike	-0.15	-0.12	0.12	0.01	0.15	gp'	-0.59	0.17	0.45**	0.62**	0.10	0.02	0.13
No of grains per spike	-0.04	0.08	-0.10	0.12	-0.04	-0.68	gp'	-0.04	-0.42**	0.26**	-0.29	-0.04	-0.01
Harvest index	-0.08	0.15	-0.09	0.08	0.00	0.17	-0.04	gp'	-0.11	0.16	0.22	0.15	0.20
1000grain weight	0.33	-0.18	-0.06	-0.15	0.12	0.52	-0.46	-0.10	gp'	0.29**	-0.06	-0.04	-0.09
Grain yieldper plant	-0.11	-0.66	0.17	-0.10	0.40	0.67	0.28	0.14	0.34	gp'	0.06	0.14	0.05
Seed hardness	0.10	0.08	-0.21	0.01	-0.18	0.13	-0.13	0.29	-0.07	0.08	gp'	-0.01	0.26*
Protein content	0.23	0.25	0.35	-0.28	0.02	0.04	-0.03	0.18	-0.02	0.29	-0.08	gp'	0.21
Trytophan content	0.08	-0.14	0.02	0.07	0.06	0.16	-0.01	0.23	-0.11	0.06	0.31	0.25	gp'

*Significant at 5% level;**Significant at 1% level

REFERENCES:

Ahamd Z, Sharma JC, Katiyar RP and Bhatia RS (1978). Path analysis for productivity in wheat *Indian. J. Genet. 38 : 299-303.*

Ahamd Z, Singh KN and Srivastava VK (1990). Gene action and selection parameters for yield and quality components in spring wheat. *Indian J. Genet.*

Al-Jibouri HA, Miler PA and Robinson HF (1958). Genotypic environment variances in an upland cotton cross of inter specific origin *Agrow. J.* 50 : 633-637.

Ali NI and EI-Haddeg MM (1978). Generical analysis of diallel crosses in spring wheat. Egyptian J. Genet Cytol. 7 : 227-250.

Donald CM and Hamblin J (1976). The biological yield and harvest index of cereals as agronomics and plant breeding criteria. Adv. Agron. 20 : 361-405.

Fisher RA and Yates . (1938). Statistical tables for biological agricultural and medical research. Oliver and Boyd Ltd., Edinburgh.

Fonseca S and Patterson FL (1963). Yield component heritability and Interrelationship in winter wheat. *(T. aestivum). Crops Sc. 8 : 614-617.*

Gill KS and Brar GS (1973). Genetic analysis of grain protein and its relationship with some economic traits in wheat. *Indian J. Agric. 43:173-176.*

GM Bhatt (1973). Significance of path coefficient analysis determining the nature of character association. *Euphytica 22:338-343*

Johson HW, Robinson HF and Comstock RE (1955). Genotypic and phenotypic correlation in soyabean and thrie implication in selection. *Agron. J. 47:477-478*

Kerkhi SA (1983). Studies on genetic parameters in relation to quality attributes in spring wheat *(T. aestivum L.)* Unpl. Ph.D. Thesis C.S.A.U. Kanpur.

Mc Vetty PBF and Evans LF (1980). Breeding methodology in wheat II. Productivity, harvest index and hightmeasured in F2 spaced plants for yield selection in spring wheat. *Crop Sc. 20:587-589*

Pandey A, Chauhan YS Ahmad Z (1983). Genetic analysis of yield and its components in wheat. Proc. XV Inter. Cong. Genet. Abstr. New Dehli II:p.583

Pandey SP (1980). Biometricalstudies of yield its components and some quality traits wheat *T. aestivum* L. cm Thell.) Unpl. M.Sc. Ag. Thesis, C.S.AU., Kanpur.

Paroda RS, Joshi AB, and Solanki KR (1974). Path coefficient analysis for each character in wheat. *Cereal Res. Commun. 2:77-85.*

Sharma SK, Singh VP and Singh RLK (1987). Harvest index as a criterion for selection in wheat. Indian J. Genet. 47:119-123.

Srivastava KN, Prakash V, Dejjajat and Naik MS (1971). Improvement of quality of protein of S. 227 wheat by fertilization under rainfed condition Indian J. Agri. Sci. 203-205.

Vrik DS and Anand SC (1970). Studies on Correlation and their implications in selection in wheat. (*T. asetivum* L.) *Madras agri. J.* 57:713-717.

Vrik DS and Singh SB (1972). Path coefficient analysis grain yield in wheat (*T.aestvium* L.). *wheat InI. Serv.* 35:6-8.

Waber CR and Moorthy BR (1952). Heritability of oil content and agronomic characters in the F2 generation of soyabean rosses. Agron J. 44:202-209.