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DIVERGENCE IN WHEAT UNDER BARANI CONDITION

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ABSTRACT

Genetic divergence employing Mahalanobis'D^2 statistic was worked out in 22 diverse genotypes of wheat based on nine economic traits under barani (non-irrigated) condition. All the genotypes were grouped into seven clusters. Maximum genetic distance was found between clusters IV ad VII followed by that between clusters III and VII and clusters IV and VI, suggesting the presence of wide diversity among these groups. The highly contributing characters were 1000-grain weight, days to maturity and grain yield. Considering higher cluster mean values and genetic distances, the crosses of the genotypes of cluster III and IV with the genotypes of cluster VII and of cluster IV with cluster VI were likely to produce high heterotic desired new recombinants.

KEY WORDS: *Genetic divergence, D^2 statistic.*

The present investigation was addressed to study the nature and degree of genetic divergence in a set of 22 wheat genotypes under barani (non-irrigated) condition which would help the plant breeder in choosing the right types of parents for purposeful hybridization or heterosis breeding programmes.

MATERIALS AND METHODS

Twenty two genotypes of wheat (**Triticum aestivum** L. em. Thell) were evaluated during rabi season at Regional Research Sub-station (OUAT), Motto, Balasore in a randomised complete block design with three replications. Each entry was represented by three row-lots of 3 m length with 23 cm row to row spacing. Data were recorded on five plants (chosen at random) in each plot for none economic traits and means of the 15 plants over three replications were subjected to analysis of variance and then multivariate analysis of D^2 statistic as suggested by Mahalanobis (1936). On the basis of magnitude of D^2 values, the genotypes were grouped into a number of clusters following Tocher's (Rao, 1952). The relative contribution of different characters towards genetic divergence was also worked out.

RESULTS AND DISCUSSION

Analysis of variance (Table 1) revealed highly significant differences among the genotypes for all the characters studied except effective spikes per hill and indicated the existence of wide genetic diversity. The highest variability was observed for effective spikes per hill (28 per cent) and the least variability for days to maturity (1 per cent). The test of significance based on Wilk's criterion also showed highly significant

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Table 2. Cluster composition in wheat

Cluster No	No.of genotypes	Genotypes in cluster
I	9	OW 52-1
II	4	OW 13-1 OW 52-2 OW 53-1 HI 1172
III	3	OW 52-3 OW 58-2 HI 1136
IV	2	HI 1085 Sagarika
V	2	OW 53-2 CAPN 1992
VI	1	HI 1170
VII	1	Sonalika

difference among the populations for the pooled effects of all the characters. Hence, further analysis to estimate D^2 values was done and on the basis of relative magnitude of D^2 values, all the 22 genotypes were grouped into seven clusters (Table 2). Maximum intercluster genetic distance was observed between genotypes of clusters IV and VII followed by that between clusters III and VII and clusters IV and VI (Table 3), suggesting the presence of wide diversity among these groups. The intracluster distance was maximum for cluster IV, indicated the diversity between the genotypes (HI 1085 and Sagarika) within the cluster. Appreciable genetic diversity in wheat was reported earlier by Srivastava et al. (1987).

The analysis for estimating the contribution of various characters towards the expression of genetic divergence showed that 1000-grain weight (21.1 per cent), days to maturity (15.8 per cent) and grain yield (15.5 per cent) contributed maximum to divergence (Table 3). However, the mean values of these three characters vary widely in different clusters and the importance of cluster III for test weight, cluster IV for days to maturity and cluster VI for grain yield became obvious. In a hybridization, programme, the highly divergent groups would be expected to manifest high heterosis and wide variability in genetic architecture (Jatasra et al., 1983). The present study, thus indicated that the crosses of the genotypes of clusters III and IV with the genotype of cluster VII and of cluster IV with cluster VI were likely to produce high heterotic hybrids for a successful varietal improvement programme to meet the needs of the farmers under barani cultivation.

Table 3. Intra- and intercluster D^2 values in wheat

Cluster	I	II	III	IV	V	VI	VII
I	22.8	42.6	52.4	58.4	35.9	51.3	63.7
II		22.5	73.6	82.4	63.5	106.9	52.6
III			23.4	76.7	79.4	99.9	126.2
IV				36.1	91.5	125.3	143.7
V					31.8	49.9	86.5
VI							82.5
VII							

Table 1. ANOVA and coefficients of variability in wheat

Source	d.f.	Days to 50% flowering	Days to maturity	Plant height	Spike length	Effective spikes/hill	Spikelets/ spike	Grains/ spike	1000-grain weight	Grain yield
Replications	2	41.6	12.6	22.3	0.2	2.3	0.5	13.2	2.5	0.7
Genotypes	21	53.5**	9.5**	144.6**	3.1**	1.7	6.3**	138.2**	183.1**	6.8**
CV%		4.9	1.1	11.1	8.1	28.1	6.2	13.5	12.0	17.4

** Significant at 1% level.

Table 4. Cluster means and relative contribution to D^2 values of different characters in wheat

Character	Clusters							Contribution to D^2(%)
	I	II	III	IV	V	VI	VII	
Days to 50% flowering	52	54	51	45	56	56	60	9.9
Days to maturity	77	76	76	73	79	78	78	15.8
Plant height (cm)	60.1	62.4	57.3	52.7	63.0	74.5	49.5	7.2
Spike length (cm)	8.0	9.6	8.5	9.1	8.8	7.6	9.3	7.8
Effective spikes/hill	3.7	3.1	3.2	4.4	3.7	3.9	3.0	2.6
Spikelets/spike	14.6	15.8	14.4	16.3	17.2	13.3	12.0	10.6
Grains/spike	28.7	26.3	25.0	40.6	35.9	26.4	19.1	9.7
1000-grain weight (g)	28.0	28.0	43.2	25.3	28.5	19.5	20.1	21.1
Grain yield (g/ha)	4.5	2.5	5.8	4.2	6.2	6.9	3.0	15.5

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INTEGRATED NUTRIENT MANAGEMENT IN GARDENLAND CROPPING SYSTEM

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ABSTRACT

An experiment on the integrated nutrient management in gardenland cropping system was conducted at the Tamil Nadu Agricultural University, Coimbatore. The study revealed that cropping systems viz., Ragi (cotton + greengram)- (sorghum + cowpea)(C_4)and Ragi-cowpea-maize (fodder) - (wheat + coriander) (C_3) recorded the highest dry matter production of 23393 and 18871 and 6927 and 40267 kg/ha. Highest economic returns were obtained in the C_4 cropping system which gave RS. 20710 and Rs. 21212 per hectare in the two years. Nutrient uptake pattern was found to follow the same trend as that of the dry matter production. Based on the post-harvest soil analysis, it was observed that the soil fertility status was not altered due to various cropping systems, if the crops included in the cropping systems were supplied with 100% recommended N,P and K to all the crops based on the soil test values.

KEY WORDS : Cropping system, Integrated Nutrient management, Cropping system.

To find out the suitable cropping system and also fertilizer requirement for the cropping system as a whole, the

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