

Divergence analysis of exotic strains in barley (*Hordeum vulgare* L.)

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In order to access the genetic diversity, twenty five diverse strains of barley were subjected to D² statistics for nine quantitative traits viz. days to flowering, plant height, number of productive tillers per plant, ear length, number of grains per ear, grain weight per ear, 1000 grain weight, seed hardness and grain yield per plant. Genotypes were grouped into five clusters. Cluster I and II were most divergent. The genotypes of these three clusters may be used for hybridization programme. 1000 grain weight and plant height contributed more towards total divergence.

Key words : Barley, D² analysis, Genetic Divergence.

INTRODUCTION

Barley is one of the ancient cereal crop in human civilization and is being consumed as food and feed throughout the world. Introduction of exotic strains is an important aspect of plant breeding in the present scenario. Intensive efforts should be done to access the genetic divergence of these exotic lines so that they can be exploited for the development of high yielding varieties. The estimate of genetic divergence provides insight for the possible improvement of the characters under study. Divergence analysis is performed to identify the diverse genotypes to be used as parents in the hybridization programme.

MATERIALS AND METHODS

Twenty five diverse strains of barley were evaluated in Randomized Complete Block design with three replications in *Rabi* season of 2002-03 at Nawabganj Research farm of C.S.A. University of Agriculture and Technology, Kanpur. Each genotype was sown in 5 mts long rows with the spacing of 25cm x 5 cm. Data were

recorded from ten randomly selected plants for days to flowering, plant height (cm), number of productive tillers per plant, ear length (cm), number of grains per ear, grains weight per ear (g), 1000 grain weight (g), seed hardness (kg/grain) and grain yield per plant (g). D² analysis was carried as suggested by Mahalanobis (1928) and the genotypes were grouped in various clusters using Tocher's method as given by Rao (1952).

RESULTS AND DISCUSSION

Twenty five strains of barley were grouped into five clusters (Table 1). Cluster I and IV had 6 genotypes each followed by cluster III (5 genotypes) and cluster II and V (4 genotypes each). The maximum inter cluster distance was recorded between cluster I and II (105.64) closely followed by cluster II and III (104.60) (Table 2). The genotypes present in these clusters should be used in breeding programme to develop superior genotypes. The minimum distance between cluster IV and V indicated that strains present in these cluster are closely related. Selection of parents from those clusters should be avoided

Table 1 : Grouping of twenty five strains of barley in five clusters.

Cluster	Strains	Number of strains
I	IBYT-5, IBYT-16, IBYT-17, IBYT-18 IBYT-19, IBYT-23	6
II	Jagrati, IBYT-13, IBYT-14 and IBYT-15	4
III	IBYT-2, IBYT-3, IBYT-4, IBYT-21 and IBYT-22	5
IV	IBYT-6, IBYT-7, IBYT-11, IBYT-12, IBYT-24 and IBYT-25	6
V	IBYT-8, IBYT-9, IBYT-10 and IBYT-20	4

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Table 2 : Inter and Intra cluster distance (D value) involving 25 genotypes of barley.

Cluster	I	II	III	IV	V
I	71.87	105.64	77.85	80.39	82.50
II		92.69	104.60	78.93	86.62
III			79.35	73.18	82.39
IV				35.47	65.86
V					41.83

Table 3 : Cluster mean of different clusters for nine quantitative traits in barley.

S.No.	Character	Cluster				
		I	II	III	IV	V
1.	Days to flowering	78.67*	85.75**	83.67	82.50	80.08
2.	Plant height (cm)	54.14*	76.98**	60.57	67.77	67.82
3.	Number of productive tillers per plant	8.94*	10.33	11.33	9.56	11.58**
4.	Ear length (cm)	6.62*	7.21	7.50	8.62	10.32**
5.	Number of grains per ear	33.83	31.50	34.60	39.22**	27.75*
6.	Grain weight per ear (g)	1.20*	1.55	1.29	1.87**	1.23
7.	1000 grain weight	34.74	38.72**	33.33*	36.84	36.73
8.	Seed hardness (kg/grain)	17.84	20.51**	14.82*	17.95	18.41
9.	Grain yield per plant (g)	10.80*	17.81**	15.57	17.75	14.23

* Minimum value, ** Maximum value

Table 4 : Contribution of characters towards total divergence.

S.No.	Characters	No. of times ranked	Contribution towards total divergence
1	Days to flowering	00	0.00
2	Plant height	86	28.66
3	Number of productive per plant	00	0.00
4.	Ear length (cm)	11	3.67
5.	Number of grains per ear	2	0.66
6.	Grain weight per ear (g)	25	8.33
7.	1000 grain weight (g)	138	46.00
8.	Seed hardness (kg/grain)	11	3.67
9.	Grain yield per plant (g)	27	9.00

due to narrow genetic base. D^2 statistics was applied earlier by Horley *et al.* (1993) and Ortiz *et al.* (2001) to study the diversity in barley.

The cluster mean for nine characters under study showed considerable genetic difference among the clusters regarding one or more characters. Cluster II had

highest value for days to flowering, plant height, 1000 grain weight, seed hardness and grain yield per plant (Table 3). Genotypes having maximum tillers and long ears were present in cluster V. Cluster IV had maximum value for number of grains per ear and grain weight per ear. Contribution of nine characters towards total divergence

shown by Table 4 revealed that 1000 grain weight (46.1 %) contributed maximum towards total divergence followed by plant height (28.66%). However, days to flowering and number of productive tillers per plant had no contribution towards total divergence.

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