Madras Agric. J., 97 (1-3): 29-30, March 2010
https://doi.org/10.29321/MAJ.10.100334

Short Note

Genetic variability, Heritability and Genetic Advance in Bread Wheat (*Triticum aestivum* L.em. Thell.) under Salinity Stress Conditions

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Twelve wheat genotypes were studied under salinity conditions. Grain yield per plot and harvest index recorded the highest phenotypic and genotypic variations. Also high heritability was recorded by grown yield per plot thus suggesting direct selection for yield would be effective under saline conditions. Maximum genetic advance as per cent of mean was also recorded by grain yield and harvest index.

Keywords: Bread wheat, genetic variability, Saline tolerance

Wheat is an important cereal crop of India. However wheat is constrained by salinity stress in many regions. Hence developing high yielding varieties having salinity/ alkalinity tolerance is of great importance. Selection of desirable genotypes must be performed with reliable estimates. The genetic parameters like coefficient of variation, heritability and genetic advance provide a clear insight into the extent of variability and a relative measure of the efficiency of selection of genotype based on phenotype, in a highly variable population. Hence the present study was carried out to find the genetic parameters for yield and its certain important traits in wheat.

Materials and Methods

Twelve salinity tolerant strains of wheat were grown at SKN College of Agriculture, Jobner in randomized block design with four replications under salinity stress conditions. Each strain was represented by a 2 h 4.5 m2 plot having eight rows of each strain. Recommended package of practices were followed. Data on six traits *viz*. plant height (cm), days to 75 percent flowering, days to 75 percent maturity, biological yield per plot, harvest index and grain yield per plot were recorded. Estimates of phenotypic, genotypic and environmental coefficients of variation, heritability and genetic advance were computed according to Burton (1952), Burton and Devane (1953) and Johnson *et al*. (1955) respectively.

Results and Discussion

The statistical analysis showed highly significant differences among strains for all the characters. The mean, range, variance, coefficient of variability, heritability and genetic advance are presented in Table 1.

The highest value of PCV and GCV were observed for grain yield / plot (84.36 and 71.00% respectively) followed by biological yield / plot (64.31 and 37.24%). High phenotypic and genotypic coefficients of variations were also observed for harvest index (61.92 and 45.17% respectively). However PCV and GCV were low for days to 75 percent flowering, days to 75 percent maturity and plant height. The high values of PCV with corresponding high values of GCV in these traits in dicate the presence of great extent of genetic variability in these characters suggesting better scope for improvement through phenotypic selection. Environmental coefficient of variation(ECV) was found to be minimum for days to 75 percent flowering (1.68%) followed by days to 75 percent maturity (6.47%) suggesting that the environment is playing insignificant role in the expression of these characters and so selection for the improvement of these characters would be effective. The phenotypic and genotypic coefficients of variability{PCV and GCV} were reported to be almost equal in magnitude for plant height, days to 75 percent flowering and per plant grain yield and certain other characters in the studies of Maloo (1984) and Pawar *et al*. (2002) in wheat indicating that variability existed mainly due to genetic factors.

Effectiveness of selection depends not only on the nature of gene combination of individual genes; but also influenced strongly by the degree to which phenotype can be modified by the environment. This is the basic of the principal of heritability as explained by Lerner and Dempster (1948). Therefore, selection acts on genetic differences and the benefit from selection for a particular trait depends largely on its heritability (Allard, 1960). So it is evident that GCV alone is not sufficient for successful selection. In

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Table 1. Mean, range, phenotypic (Phe.), Genotypic(Geno.) and environmental (Env.) variances (Var.),coefficient of variability, heritability and genetic adavance in wheat

Character	Mean ± SEm	Range	Variance			PCV	GCV	ECV	Heritability	Genetic Advance	Genetic Advance as % of men
			Phe.	Geno.	Env.						
Days to 75% Flowering	98.34 -+0.83	96.50 100.75	3.91	1.17	2.74	2.01	1.09	1.68	29.87	1.21	1.23
Days to 75% Maturity	121.27 -+3.93	116.00 -125.50	46.12	1.16	44.96	5.59	0.89	5.51	2.52	0.37	0.30
Plant height (cm.)	56.84 -+3.77	52.85 67.25	47.90	14.90	33.00	12.17	6.79	10.10	31.10	4.42	7.77
Biological yield/plot (kg)	1.27 -0.33	0.41- 2.16	1.30	0.89	0.44	64.31	37.24	52.23	33.53	0.56	44.42
Harvest Index	16.00 -3.39	6.67% -30.09%	1.33	0.89	46.07	61.97	45.12	42.42	53.14	10.82	67.66
Grain yield/plot (kg)	0.24 +0.06	0.04- 0.60	0.05	0.03	0.01	84.36	71.00	38.46	70.83	0.32	123.09

view of Burton (1952) GCV along with heritability would provide a precise idea to the amount of genetic gain to be expected from selection.

Low to high estimates of heritability (broad sense) were observed by all the characters (Table 1). Interestingly, present investigation revealed high value of heritability for grain yield/plot (70.83%) indicating the preponderance of genetic component and low environmental influence on this character. High estimates of heritability as observed for grain yield is a highly desirable phenomenon. More or less equal influence of genetic and environmental factors in the case of harvest index (53.14%) was evident. High heritability in plant height, yield/plant and days to 50 percent flowering has also been reported by Das Gupta and Das (1984) and Maloo (1984).

High heritability (broad sense) does not always indicate better response to selection since it is inclusive of non-additive genetic variance also. Hence, for predicting the real resultant effect of selection, high heritability coupled with high genetic advance would be a more reliable criteria than simple heritability alone (Johnson *et al.,* 1955).

In the current study, maximum genetic advance (% of mean) was observed for grain yield/plot(123.09%) followed by harvest index (67.66%) and biological yield/plot (44.42%). The other characters observed low genetic advance, which indicates that predominantly the additive gene action involved in the expression of these traits which makes the direct selection highly effective. High values of genetic advance for plant height (40.06%) and grain yield / plant (32.91%) has been reported by Pawar *et al.* (2002).

Since genetic coefficient of variability, phenotypic coefficient of variability and heritability estimates determine the component of heritable variation and genetic advance measures the extent of its suitability under selection, all these parameters should be considered simultaneously so as to bring effective improvement in yield and other characters.

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Received: October 5, 2009; Accepted: January 15, 2010