

Study of Variability and Comparative Performance of Triticale with Wheat*

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A wide range of variability was observed for many characters in the 14 Triticale types studied for various statistical parameters. The genotypic coefficient of variability ranged from 4.36 for days to flower to 17.56 for yield per plant. A high genotypic coefficient of variability and heritability combined with a greater genetic advance as percentage of mean for 1000 grain weight, number of grains per main ear, number of ears per plant and yield per plant, indicates that selection for these characters would be effective in the improvement of yield of Triticales. From the comparative study of Triticale with wheat, the superiority of Triticale over wheat with respect to most of the yield contributing character has been established.

The man-made cereal, Triticale is an artificial genus synthesised from crosses involving wheat and rye. At present only relatively less information available on the range of phenotypic variation present in respect of quantitative characters of Triticale. Many characters of economic importance are highly influenced by environmental conditions. Breeding progress of a population mainly depends upon the amount and magnitude of genetic variability present in the population. The present investigations were undertaken on a collection of Triticales to explore the genetic variability by determining the magnitude of heritability of different characters and also to compare the Triticales with wheat for different characters of economic importance.

MATERIAL AND METHODS

Fourteen Triticale types obtained from Mexico through Rockefeller foundation were utilized for the study. The material was raised in a randomised block design with four replications at I.A.R.I., New Delhi, during the rabi season of 1967-68. Two wheat varieties Sonora 64 and S 227 were used as checks. In each replication, each variety was grown in three rows of 10 feet length, adopting 12" x 4" spacings. Five plants were randomly selected for each variety in every replication and detailed observations were recorded on eight characters, Days to flower, Days to maturity, Plant height, No. of ear per plant, No. of spikelets per main ear, No. of grains per main ear, 1000 grain weight and yield per plant.

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The genotypic coefficient of variation was estimated according to Burton and Devane (1963) and Heritability by the formula suggested by Hanson *et al.* (1956). The expected genetic advance was estimated by the formula suggested by Robinson *et al.* (1949).

RESULTS AND DISCUSSION

All the statistical parameters namely range, mean, variance (phenotypic and genotypic) genotypic coefficient of variability, heritability, genetic advance and genetic advance as percentage of mean for different characters of Triticales and means of wheat are presented in Table I. It suggests that considerable range of variability was present

with respect to the characters viz; number of grains per main ear, plant height, days to maturity end days to flower. Lesser variability was observed in case of number of ears per plant, number of spikelets per main ear and grain yield per plant. The character 1000 grain weight has moderate variability.

In all the cases the variance due to phenotype is more than the variance due to genotype. The values of genotypic variance are high for number of grains per main ear (79.17) followed by plant height (66.57). The genotypic coefficient of variability ranged from 4.36 for days to flower to 17.56 for yield plant. Number of ears plants, number of

TABLE I. Various statistical parameters of different characters in Triticale and Wheat

Character	Range	Mean Triticale	Wheat	Variance Phenotypic	Genotypic	Error	GCV	Heritability	Genetic advance	Genetic advance as % of mean
Days to flower	92.00-112.00	101.87	100.50	35.15	19.84	15.31	4.36	56.44	6.93	6.80
Days to maturity	108.00-130.00	122.08	123.62	46.61	30.04	16.57	4.49	64.44	9.07	7.38
Plant height (cm)	125.15-151.25	139.04	96.65	87.61	66.57	21.24	5.86	75.81	14.65	10.53
Number of ears per plant	5.00- 9.15	7.15	11.45	2.27	1.17	1.10	15.10	51.54	1.60	22.37
Number of spikelets/main ear	23.70- 30.47	27.32	20.41	5.92	2.07	3.85	5.23	34.96	1.75	6.40
Number of grains/main ear	49.75- 82.70	64.23	62.62	128.34	79.17	49.17	13.84	61.68	14.39	22.40
1000-grain weight (gm)	32.60- 50.57	42.10	28.66	43.07	32.91	10.16	13.61	76.41	10.33	24.53
Yield/plant (gm)	9.95- 19.65	13.38	17.07	10.39	5.54	4.85	17.56	53.32	3.54	26.45
Protein content %		18.95	14.78							

grains per main ear and 1000 grain weight have shown comparatively higher values than the other characters.

The higher estimates of heritability in broad sense for the characters 1000 grain weight, plant height, days to maturity and number of grains per main ear would suggest that the genetic factors are important in the expression of these characters and the variation is due to the additive gene effects. A high genotypic coefficient of variability and heritability combined with a greater genetic advance as percentage of mean for 1000 grain weight, number of grains per main ear, number of ears per plant and yield per plant, indicates that selection for these characters would be effective in the improvement of yield of Triticales. Sharma *et al.* (1966) and Sethi *et al.* (1972) working in barley (*Hordeum vulgare*, L.) Gandhi *et al.* (1964) in wheat, Sethi and Singh (1972) in Triticale have reported similar conclusions.

From the comparative study of Triticale with wheat, it is evident that for most of the yield contributing characters, namely, number of spikelets per main ear, number of grains per main ear and 1000 grain weight, the mean values of Triticale are higher than that of wheat. The values regarding days to flower and days to maturity are almost same in both the crops. The higher values of 1000 grain weight in Triticale are attributable to their bolder seeds. The protein percentage is considerably higher in Triticale than wheat, the values being 18.95 per cent in Triticale and 14.78 per cent in wheat.

In spite of all the above favourable factors, the Triticale gave some what lower yields than wheat. Probably this might be due to the fact that effective tillers per plant are less in Triticales. Two major abnormalities namely, partial sterility and endosperm shrivelling have to be overcome if Triticale has to be grown as a commercial crop or atleast to act as a substitute for wheat crop in the marginal areas.

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