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Study on variation and selection parameters in ragi genotypes (*Eleusine coracana* Gaertin.)

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ABSTRACT

A study was undertaken to estimate the genetic variability and selection parameters heritability and genetic advance for yield and yield contributing characters in finger millet. The study based on 65 genotypes received from ICRISAT Hyderabad including 5 checks revealed that highly significant genotypic and phenotypic variability exist in the crop with respect to characters days to 50% flowering, plant height, basal number of tillers, flag leaf length, flag leaf sheath length, peduncle length, exertion length, inflorescence length, longest finger length, peduncle branch number, 1000 grain weight and yield. The highest heritability and genetic advance observed in case of yield and plant height indicated that the character might be under control of additive genes. The higher heritability was also observed in respect of number of basal tillers, plant height and flag leaf sheath length, and longest finger. Therefore, weight age should be given on these traits selection programme of genotypes for substantial yield improvement of finger millet.

Key words : *Eleusine coracana* Gaertin, Selection parameter, Variability, Correlation coefficient, Path analysis

INTRODUCTION

Wide range of variability was present in finger millet genotypes (*Eleusine coracana* Gaertin) under study and PCV and GCV were high for yield. The genetic information in any crop improvement depends upon the extend of genetic variability present. Generally economic characters are greatly influenced by environment and become very much difficult to assess the magnitude of genetic/ heritable variability in these characters from phenotypic observations alone. Methods have been developed to partition total phenotypic variability into genetic and environmental components of variance. The present study was undertaken to estimate the genetic variability for yield and economic characters in ragi because meager genetic improvement has been done so far.

MATERIALS AND METHODS

Sixty five genotypes received from ICRISAT, Hyderabad with five checks were grown in Randomized Block Design with three replications at All India co-ordinated Small Millets Improvement Project, Zonal Agril. Research Station Shenda Park, Kolhapur. Each entry was grown in one-meter row with spacing of 30 cm between the rows and 10 cm within the plants. All the recommended package of practices was followed. Five randomly selected plants from each genotypes in each replication were used to record observations on days to 50 per cent flowering [FLG], plant height [PLHT] (cm), basal number of tiller [BT], flag leaf blade length (cm) [FLBL], flag leaf blade width (cm) [FLBW], flag leaf sheath length (cm) [FLSL], peduncle length (cm) [PEDELEN], exertion (cm) [EXER], inflorescence length (cm) [INFLL], Inflorescence width (cm) [INFLW], length of longest Finger (cm) [LLF], width of longest finger (cm) [WFL], panicle branch number [PBN], 1000 grain weight (gram) and grain yield'[1]plot [YIELD]. The mean of five plants was subjected to statistical analysis; data were statistically analyzed to estimate phenotypic and genotypic co-efficient of variation as suggested by Burton (1952). Phenotypic and genotypic co-relation by Panse and Sukhatme,(1961). Heritability by Allard (1960) along with path co-efficient as suggested by Dewey and Lu(1959).

RESULTS AND DISCUSSION

Variation among genotypes with respect to all most all the traits length of main panicle was highly significant. This is also evident from the high range shown by genotypes with respect to various characters (Table 1). Analysis of variance showed that the genotypes differed significantly among themselves for all traits studied indicating presence of wide range of variability in the genotypes. Days to 50 per cent flowering ranged from 70 days to 96, days plant height ranged from 61 to 106 cm, basal tiller number ranged from 2-6. There was also wide range in yield and yield contributing characters. The range between 1000 grain weight and yield'[1] plot was 1.21-2.81 and 26-542g per plot, respectively.

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Table 1 : Range, mean, F value critical difference and coefficient of variation for various characters in finger millet (*Eleusine coracana* Caertin)

Character	Range	Mean	F Value	C.D. (P=0.05)	C.V
FLG	70-96	80.16	11.395**	5.943	4.480
PLHT	61-106	80.91	30.892**	6.027	4.614
BT	2-6	4.57	14.622**	1.256	17.268
FLBL	15.41	33.15	10.894**	5.168	9.657
FLBW	0.53-1.26	0.84	5.238**	0.173	12.712
FLSL	7.0-25.33	10.95	20.538**	1.761	9.968
PEDELEN	6.0-28.60	21.47	9.073**	4.338	12.515
EXER	5.0-14.66	10.98	1.87	2.418	13.629
INFLL	4.53-5.33	6.50	7.771**	1.521	14.370
INFLW	2.36-7.00	4.43	3.417**	1.259	17.618
LLF	3.66-16.33	5.89	14.321**	1.362	14.361
WLF	0.57-1.03	0.77	3.356**	0.244	19.624
PBN	1.00-3.00	1.22	2.922**	0.615	31.251
1000 grain weight	1.21-2.81	2.20	11.697**	0.298	7.875
Yield	26.0-542.7	190.48	147.786**	25.759	8.376

**Significance

High heritability was associated with high genetic gain in characters like plant height, length longest finger, flag leaf sheath length, and yield indicating that additive effects are of importance in determining these characters Phenotypic selection might, therefore, be helpful improving the yield. These results are in agreement for different attributes (Kempana and Thirumalehar, 1968). Genetic advance are high in case of longest finger, days to 50% flowering, exertion, inflorescence width length of longest finger width of longest finger panicle number, and 1000 grain weight, was quite less though, high amount of heritability was present which attributed to lesser amount of variation also reflected by PCV and GCV for these characters. Characters having high GCV also had high genetic advance. Genetic advance was highest in case of yield, plant height, flag leaf blade length, flag leaf sheath length and days to, 50% flowering. Thus, selection for such characters will be useful for varietals improvement in finger millet. These results were in conformity with Goud and Laxmi (1977). A wide range of variability for all the characters associated with yield and high heritability which is predominantly due to additive genes reported in the studies made so far suggests greater scope for developing varieties superior to presently studied genotypes through hybridization followed by selection. Selection for 1000 grain weight will be more efficient if it is based on one or more highly heritable characters correlated with each other, which can be studied with the help of genotypic and phenotypic correlations. The genotypic correlation was lower than phenotypic ones, which indicated that environment played role in making the inherent relationship between these characters (Johnson *et al.,* 1955). 1000-grain weight and total yield was highly correlated at 1% level of significance with all the characters under study in positive direction except for the exertion (Table 2). These results are in agreement with Chaudhari and Acharya (1969) who reported the yield was highly positively and significantly associated with 1000 grain yield. The major variables of yield seem to be number of productive tiller and 1000 grain weight with inflorescence length.

In general, phenotypic variance for all the characters was higher than the genotypic (Table 2), Genotypic and phenotypic variances for days to 50%, Flag leaf blade length, Flag leaf width, Basal number of tiller and Plant height were much higher indicating the presence of wide variability in the genotypes for these characters. Dhagat *et al.* (1978) also reported high genotypic and phenotypic variability for plant height and days to maturity in barnyard Millet. The higher range values for these characters confirm this observation. The characters main peduncle length and 1000 seed weight showed comparatively lower variability while the difference between the genotypes with lowest value and the highest value was more than double for the important economic characters like basal tiller number / plant length at flag leaf length of inflorescence length, longest finger length and yield. Genotypic co-efficient of variation is expressed as percentage over mean for various characters ranged between 13.63 for exertion length to 83.40 for days to 50 per cent flowering likewise, basal tiller, plant height, inflorescence length and width in length of flag leaf and

Table 2 : Genotypic variance, genotypic co-efficient of variation, phenotypic coefficient of variation, heritability genetic advance and genetic advance as % of mean for various characters in finger millet

Character	Mean	Range	Genotypic variance	GCV	Phenotypic variance	PCV	Heritability	Genetic advance 5%	Genetic Advance as percentage of mean % mean
FLG	80.16	70-96	46.95	83.40	60.49	94.67	77.60	12.44	15.13
PLHT	80.91	61-106	138.83	45.64	152.77	52.76	90.88	23.14	28.59
BT FLBL	4.57	2-6	2.75	72.68	3.353	40.65	81.95	3.09	18.61
	33.15	15.41	33.91	75.36	44.038	20.02	76.73	10.44	31.65
FLBW	0.84	0.53-1.26	0.002	51.02	0.028	19.75	58.55	0.20	23.81
FLSL	10.95	7.0-25.33	7.75	25.44	8.35	27.32	86.69	5.34	48.79
PEDELEN	21.47	6.0-28.60	19.43	20.52	26.05	24.43	72.91	7.75	36.11
EXER	10.98	5.0-14.66	9.62	13.63	11.86	31.35	8.10	5.75	52.36
INFLL	6.50	4.53-5.33	3.038	21.59	2.89	25.93	69.30	2.43	14.37
1NFLW	4.43	2.36-7.00	0.47	15.81	1.098	23.67	44.62	0.96	21.76
LLF	5.89	3.66-16.33	3.67	32.52	3.39	75.54	83.76	3.61	61.52
WLF	0.77	0.57-1.03	0.018	17.39	0.41	26.22	43.99	0.18	23.76
PBN	1.22	1.00-3.00	0.093	25.01	0.24	40.03	39.04	0.39	32.19
1000 GR.WT.	2.20	1.21-2.81	0.11	14.87	0.14	83.16	78.10	0.60	27.07
Yield	190.48	26.0-542.7	124.45	58.60	12.70	89.19	98.00	97.59	119.48

width suggest that substantial amount of genetic variability exist in the genotypes for these characters.

Heritability was highest for yield and so was the genetic advance suggesting that these characters might be largely govern by the additive gene action and improvement with respect to these characters could be brought about by phenotypic selection. *Johnson et al.* (1955) have suggested that heritability estimates along with genetic advance shall be more helpful in predicting gain under phenotypic selection than heritability estimate alone. Higher heritability were also obtained for days to 50% flowering, basal tiller, flag leaf blade length, length of longest finger, flag leaf sheath length, inflorescence length, peduncle length and 1000 grain weight but genetic advance with respect to these characters was not proportionately higher than non additive genes. The lowest heritability noticed in case of length of peduncle suggests that the character is very much under the environmental influence.

The study reveals that genotypes exhibit fair amount at genetic variability for the characters under study.

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