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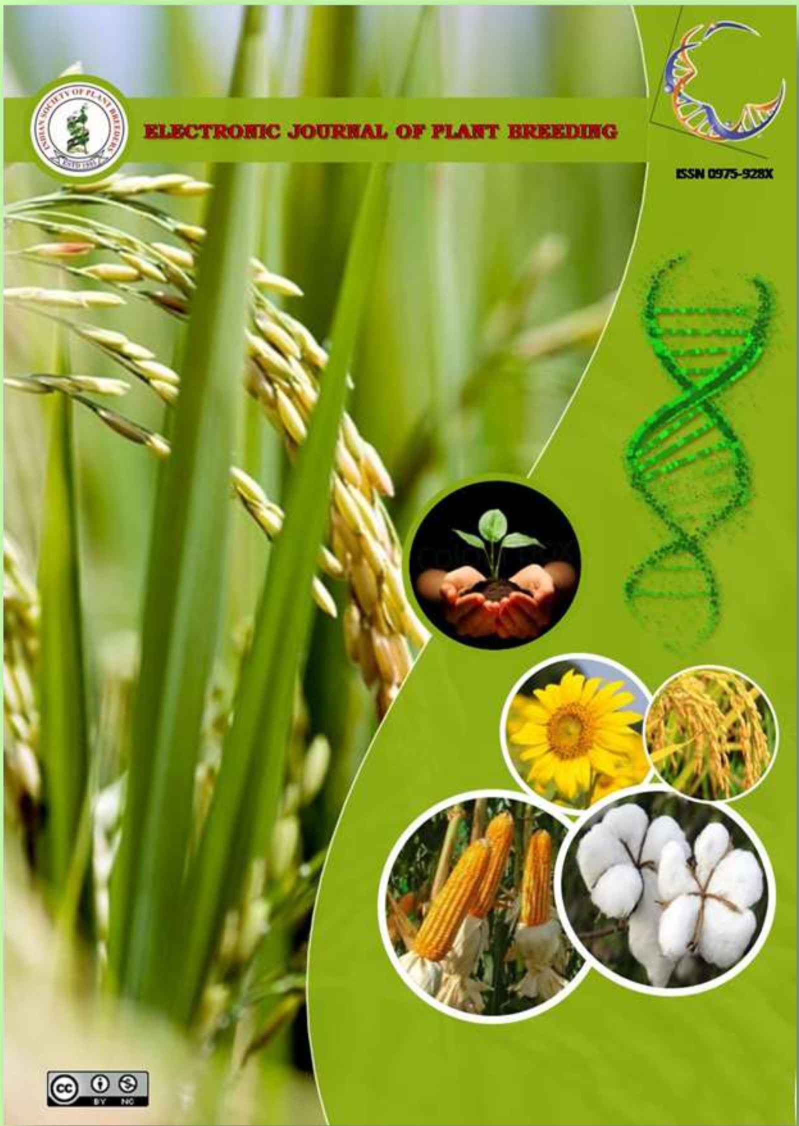

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Research Article

Studies on genetic variability in finger millet [*Eleusine coracana* (L.) Gaertn] genotypes under sodic conditions

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Abstract
The present study was carried out during *kharif* 2018 at Anbil Dharmalingam Agricultural College and Research Institute, Trichy under sodic field condition. The experimental material comprising of 120 finger millet genotypes along with two checks *viz*., TRY 1and Paiyur 2 was laid out in randomized complete block design. Observations were recorded for 13 quantitative characters and the data were analyzed for biometric characters *viz*., phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), heritability(h^2) and genetic advance as per cent of mean (GAM).High PCV and GCV were recorded for the characters Na^+/K^+ ratio, grain yield per plant, number of tillers per plant, number of productive tillers per plant and straw yield per plant indicating the presence of high variability among the finger millet genotypes. High heritability coupled with genetic advance as per cent of mean was observed for all the characters except days to maturity it may be due to additive effects and selection may be effective for those character with high heritability and genetic advance *viz*., days to 50% flowering, plant height, earhead length, finger length, number of fingers per earhead, number of tillers per plant, number of productive tillers per plant, 1000 grain weigh, Na^+/K^+ ratio, straw yield per plant and grain yield per plant.

Keywords
Finger millet, heritability, PCV, GCV, genetic advance.

Introduction

Finger millet, an allotetraploid cereal, is widely cultivated in the arid and semi-arid regions of the world. Being rich in protein and calcium, it serves as 'nutritious millet' for rural populations in developing countries. India is the major producer of finger millet in the world. This is cultivated mostly as a rainfed crop in India under diverse production environments. Considering increased demand for food purposes and decreasing area due to competing crops, there is immediate need for genetic enhancement of finger millet productivity. One of the major constraints limiting crop in many parts of the world is salinity where information on tolerance is meager. India is having rich source of germplasm which has been conserved. However, only a small fraction of genetic diversity is utilized in crop improvement program(Nethra *et al.*, 2014). Hence the present study was carried out to assess the variability present in the 120 finger millet genotypes under sodic condition.

Materials and Methods

The present investigation was conducted during *Kharif* 2018 at Anbil Dharmalingam Agricultural College and Research Institute, TNAU, Trichy with 120 finger millet genotypes along with two checks *viz*., TRY 1and Paiyur 2 under sodic soil. The accessions were obtained from Indian Institute of Millets Research, Hyderabad. The experiment was laid out in randomized complete block design with two replications.

Observations were recorded from five randomly selected plants in each accession for 13characters *viz*., days to 50% flowering, days to maturity, plant height (cm), flag leaf length (cm), earhead length (cm),finger length (cm), number of fingers per earhead, number of tillers per plant, number of productive tillers per plant, 1000 grain weight,Na^+/K^+ ratio, straw yield per plant(g) and grain yield per plant (g). The data were subjected to analysis of variance according to the method recommended by Panse and Sukhatme (1985). Phenotypic and genotypic coefficients of variation were computed according to the method suggested by Burton (1952). Heritability on broad sense was calculated as per formula given by Allard (1960). Genetic advance was expressed by using the formula suggested by Johnson *et al.* (1955).

Results and Discussion

Analysis of variance revealed that mean sum of squares due to genotypes were highly significant for all the characters under study (Table 1). It indicates that the germplasm accessions tested were highly variable. Variations in finger millet genotypes were also reported by Singamsetti *et al.* (2018), Mahanthesha *et al.* (2017), Kumari and Singh (2015) and Kumar *et al.* (2010). The estimates of mean, range, genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability in broad sense (h^2) and genetic advance as percent of mean (GAM) were presented in Table 2.

Highest PCV and GCV were observed for Na^+/K^+ ratio (48.58% and 47.92%) followed by grain yield per plant (43.06% and 42.29%), number of tillers per plant (31.92% and 30.19%), number of productive tillers per plant (31.34% and 27.89%) and straw yield per plant (30.55% and 30.14%). Hence, these characters are more suitable for direct selection. Similar findings were reported by Reddy *et al*. (2013), Kumari and Singh (2015), Mahanthesha *et al*. (2017) and Priyadharshini *et al*. (2011).

Moderate PCV and GCV were recorded for finger length (20.74% and 17.90%), number of fingers per earhead (18.96% and 18.71%), earhead length (18.70% and 18.62%) plant height (18.26% and 18.17%), 1000 grain weight (17.12% and 16.20%), flag leaf length (15.34% and 14.71%) and days to 50% flowering (11.62% and 11.50%). The results were in accordance with Singamsetti *et al.* (2018), Kumari and Singh (2015) and Reddy *et al.* (2013) while days to maturity (9.58% and 9.48%) showed the lowest GCV and PCV. Similar results were also reported by Singamsetti *et al.* (2018), Negi *et al.* (2017), Kumari and Singh (2015) and Shinde *et al.* (2014). Moderate to low values of PCV and GCV restrict the scope for selection of genotypes based on these characters.

The genotypes under study showed high heritability for all the characters. Highest heritability was recorded for earhead length (99.12%) followed by plant height (98.95%), days to maturity (98.14%), days to 50% flowering (97.98%), number of fingers per earhead(97.37%), Na^+/K^+ ratio (97.31%), straw yield per plant (97.29%), grain yield per plant (96.49%), flag leaf length (91.95%), 1000 grain weight (89.56%), number of tillers per plant (89.46%), number of productive tillers per plant (79.16%) and finger length (74.46%). Heritability estimates were more than 70% for all the characters studied which indicates that these characters were less influenced by environmental conditions and phenotypic selection would be effective for these characters.

It is a difference between the mean genotypic value of selected lines and mean genotypic value of the population before selection. Highest value of genetic advance was recorded for Na^+/K^+ ratio (97.36%) followed by grain yield per plant (85.59%), straw yield per plant (61.23%), number of tillers per plant (58.82%), number of productive tillers per plant (51.11%), earhead length (38.18%), number of fingers per earhead (38.03%), plant height (37.22%), 1000 grain weight (31.59%), finger length (32.82%), flag leaf length (29.05%) and days to 50% flowering (23.45%), except days to maturity (19.36%).

Heritability and genetic advance are important selection parameters. Heritability estimates along with genetic advance are normally more helpful in predicting the gain under selection (Johnson *et al*., 1955). High heritability and high genetic advance were recorded for all the characters except days to maturity. Direct selection for these characters would be effective as heritability and genetic advance are high due to additive gene interaction. Similar results of high heritability and high genetic advance were obtained by Singamsetti *et al*. (2018) for 50% flowering, plant height and earhead length, Reddy *et al*. (2013) for number of fingers per earhead and earhead length, Kumari and Singh (2015) for grain yield per plant, number of tillers per plant and 1000 grain weight, Mahanthesha *et al*. (2017) for number of productive tillers per plant and finger length and Devaliya *et al.* (2018) for straw yield per plant.

Higher values of PCV and GCV for the characters Na^+/K^+ ratio, grain yield per plant, number of tillers per plant, number of productive tillers per plant and straw yield per plant indicates higher variability among these characters. The estimates of high heritability coupled with high genetic advance were observed for all the characters taken except days to maturity. Direct selection for these characters would be effective which might be due to presence of additive gene control.

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Table 1. Analysis of variance of RBD for different traits

Character	Mean sum of squares		
	Treatment	Replication	Error
Degrees of freedom	**1**	**121**	**121**
Days to 50% flowering	238.7675**	10.4167	2.5091
Days to maturity	303.0109**	4.0042	2.7689
Plant height	593.2476**	18.6421	3.1321
Flag leaf length	45.5392**	1.4430	1.9770
Earhead length	6.5834**	0.1270	0.0302
Finger length	3.9333**	1.9729	0.5749
No. of fingers per earhead	4.1013**	0.2100	0.0531
No. of tillers per plant	7.8057**	0.2313	0.4376
No. of productive tillers per plant	0.3296**	0.5597	0.7542
1000 grain weight	0.3816**	0.0282	0.0211
Na^+/K^+ ratio	0.0253**	0.0001	0.0003
Straw yield per plant	1554.3375**	21.6000	22.8100
Grain yield per plant	260.9841**	28.4126	4.7041

**significance at 1% level

Table 2. Variability parameters for yield and other component traits in finger millet

S. No.	Characters	Mean	Range		PCV (%)	GCV (%)	h^2 (%)	GAM (%)
			Minimum	Maximum				
1	Days to 50% flowering	95.79	75.50	135.00	11.62	11.50	97.98	23.45
2	Days to maturity	129.31	100.00	168.00	9.58	9.48	98.14	19.36
3	Plant height	93.99	53.30	135.05	18.26	18.17	98.95	37.22
4	Flag leaf length	32.09	19.15	45.60	15.34	14.71	91.95	29.05
5	Earhead length	9.81	5.44	15.16	18.70	18.62	99.12	38.18
6	Finger length	7.18	4.05	12.75	20.74	17.90	74.46	31.82
7	No. of fingers per earhead	7.55	4.70	14.82	18.96	18.71	97.37	38.03
8	No. of tillers per plant	6.34	1.75	13.10	31.92	30.19	89.46	58.82
9	No. of productive tillers per plant	6.02	1.15	13.10	31.34	27.89	79.16	51.11
10	1000 grain weight	2.60	0.94	3.60	17.12	16.20	89.56	31.59
11	Na^+/K^+ ratio	0.23	0.01	0.77	48.58	47.92	97.31	97.36
12	Straw yield/plant	94.38	22.55	177.28	30.55	30.14	97.29	61.23
13	Grain yield/plant	26.73	10.64	70.69	43.06	42.29	96.49	85.59

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