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Genetic-Morphological Analysis in Little Millet (*Panicum sumatrance* Roth. Ex Roemer and Schultes) under Different Sown Conditions

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A B S T R A C T

Genetic and morphological variability parameters were studied for grain yield and its attributes with a set of 30 genotypes of little millet (*Panicum sumatrances*) at Junagadh, Gujarat during *Kharif* 2017 in randomized block design with three replications under timely (E_1), late (E_2) and vey late sown (E_3) conditions. The characters studied were days to 50 % flowering, days to maturity, number of productive tillers per plant, plant height, panicle length, grain weight per main panicle, grain yield per plant, biological yield per plant, harvest index, 1000 seed weight, chlorophyll content and specific leaf weight along with seven non metric characters *viz.*, Plant growth habit, inflorescence shape, panicle compactness, grain color, lodging, grain shape and plant pigmentation were studied. Analysis of variance for each sowing date revealed highly significant differences among the genotypes for all the characters. The presence of highly significant differences established the existence of large variability among genotypes included in the experimental material. High GCV and PCV were observed for number of productive tillers per plant, biological yield per plant, harvest index and grain yield per plant for E_1 and E_2 environments, specific leaf weight for E_2 and E_3 environmental condition indicating broad genetic variability for these characters. Moderate estimates of PCV and GCV were observed for plant height in all environments. High heritability along with high genetic advance as per cent of mean observed for harvest index in all sowing conditions. Whereas, moderate heritability accompanies with moderate GAM was observed in plant height in all sowing conditions.

Introduction

Little millet (*Panicum sumatrense* Roth. ex. Roem. and Schultz.) is one of the important small grain crops that come up well in dry lands, which are characterized by high temperature, low fertile soil and poor management by resource poor farmers. It is considered to be indigenous to Indian subcontinent due to the luxuriant presence of its wild ancestor *Panicum psilopodium* throughout India. It is a self pollinated and allotetraploid crop with chromosome number of 2n = 4x = 36 belonging to the family *Poaceae* and sub family *Panicoideae*. Besides India, it is widely cultivated as, minor cereal across Nepal, Sri Lanka and western Burma. It is the first food of the year among the tribal farmers and is the staple food for millions in many parts of the world. Little millet is presently grown throughout India in about one million hectares. In India, little millet cultivated in an area of 291 thousand hectares with annual production of 102 thousand tones and productivity of 349 kg per hectare which is very less as compared to other cereal crops. Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Odisha, Tamil Nadu, Karnataka, Jharkhand and Gujarat are major little millet growing states in the country (Ashwini *et al.*, 2017). In Gujarat, little millet is cultivated in an area of 10,634 hectares with 9,526 tonnes of production having the productivity of 896 kg/ha in 2011 (Anon., 2014). In Gujarat, it is mainly cultivated as rainfed crop in *Kharif* in the less fertile hilly soil. There is number of land races of little millet are grown widely in Dangs, Tapi, Dahod, Panchmahal, Mahisagar, Navsari and Valsad district of Gujarat. It is valued for its drought tolerance, stress tolerance and nutritional value. The great merit of little millet is that it can be stored for a period of up to ten years or more without deterioration.

Consequently, it has traditionally played an important role as reserve food crop. Moreover, it is considered to be free of the major pest and diseases. In spite of these advantages, the national average grain yield of little millet is low, although it has a potential to yield up to 3 t/ha. Its low productivity has been due to lack of improved varieties, frequent drought in rainfed condition and unimproved traditional cultivation practices. Currently most of the farmers are cultivating local varieties (landraces). Replacement of land races by modern cultivars generally increases the productivity of the crop and income of the farmers. Besides, little millet is being pushed to more marginal areas; so it is believed that, this would aggravate the danger of loss of genetic variation. Therefore investigating and identifying plants for the genetic variation available in the breeding materials is the first step of plant breeding and so vital for successful crop improvement program in future. Hence, this study was undertaken to assess the genetic variability, heritability, genetic advance and inter relationship of different yield and yield contributing traits and to determine the genetic potential of these materials for future use in the breeding programme.

Materials and Methods

The present investigation was carried out in little millet (*Panicum sumatrance*)”at Instructional Farm, Junagadh Agricultural University, Junagadh, Gujarat during *kharif* 2017. The experimental material consisting of 30 genotypes presented in Table 1. In this experiment, genotypes were evaluated in randomized block design with three replications during *rabi* 2016-17 under timely (E_1) late (E_2) and very late sown (E_3) conditions. Observations for all Twelve character *viz*., days to 50 % flowering, days to maturity, plant height, main panicle length, grain weight per main panicle, grain yield per plant, biological yield per plant, harvest index, thousand seed weight, specific leaf weight and chlorophyll content; along with seven morphological character *viz.,* Plant growth habit, inflorescence shape, panicle compactness, grain color, lodging, grain shape and plant pigmentation were studied.

Statistical analysis

Statistical analysis was done on the mean values of five randomly selected plants or plot basis. The statistical software (INDOSTAT) was used to work out ANOVA, genetic parameters and the statistical methods adopted were as follows.

Genotypic coefficient of variance (GCV)

The magnitude of genetic variance existing in a character was estimated as per the formula suggested by Burton (1952).

$$\text{GCV (\%)} = \frac{\sqrt{\text{Vg}}}{\bar{\text{X}}} \text{ X } 100$$

Phenotypic coefficient of variance (PCV)

The magnitude of phenotypic variance existing in a character was estimated as per the formula given by Burton (1952).

$$\text{PCV (\%)} = \frac{\sqrt{\text{Vp}}}{\bar{\text{X}}} \text{ X } 100$$

Heritability broad sense (H)

It is the proportion of genotypic variance to the phenotypic variance. It was estimated by the formula as suggested by Burton and Devane (1953) and Jonson *et al.*, (1955).

$$\text{H (\%)} = \frac{\text{Vg } (\sigma^2 \text{g})}{\text{Vp } (\sigma^2 \text{p})} \text{ X } 100$$

Expected genetic advance (G.A.)

The expected genetic advance at 5% selection intensity was calculated by the formula given by Lush (1945) and Johnson *et al.*, (1955).

$$\text{GA} = \frac{Vg}{Vp} \text{ x } \sqrt{Vp} \text{ x K}$$

Where, GA = Genetic advance, K = selection differential (constant) 2.06 at 5% selection intensity (Allard, 1960), Vg = Genotypic variance and Vp = Phenotypic variance.

Results and Discussion

The information on genetic variability for different yield and yield contributing characters of economic importance is a pre requisite for a breeder to work with crop improvement. Analysis of variance for each sowing date (E_1, E_2 and E_3) revealed highly significant differences among the genotypes for all the characters. The presence of highly significant differences established the existence of large variability among genotypes included in the experimental material, indicating the presence of sufficient amount of genetic variability among the genotypes for grain yield per plant and other yield contributing traits (Table 2). These findings are in accordance with the most of the characters were also reported by Priyadharshini *et al.*, (2011), Ulaganathan and Nirmalakumari (2011), Haradari *et al.*, (2012), Reddy *et al.*, (2013). Who also observed significant variability in little millet germplasm. In general, the study revealed sufficient variability for all the yield and yield contributing traits and quality traits and thus helped in selection of specific genotype for different characters.

Genotypic and phenotypic coefficient of variation

Analysis of variance for each sowing date revealed highly significant differences among the genotypes for all the characters. The presence of highly significant differences established the existence of large variability among genotypes included in the experimental material. High GCV and PCV were observed for number of productive tillers per plant, biological yield per plant, harvest index and grain yield per plant for E_1 and E_2 environments, specific leaf weight for E_2 and E_3 environmental condition indicating broad genetic variability for these characters. Moderate estimates of PCV and GCV were observed for plant height in all environments (Fig. 1). High to moderate variability of these characters indicates more variability present in base population. This implied that the environmental role was for the expression of such characters. However GCV value also depends upon group of genotype used in study.

The estimates of genotypic and phenotypic coefficient of variability indicated that the values of phenotypic coefficient of variation were slightly higher than that of genotypic coefficient of variation for all the traits studied, indicating less effect of environment on the expression of characters studied. For these characters indicate that, the traits are more influenced by genetic factors with minimum influence of environment and also suggest that, the selection based on these characters would facilitate successful isolation of desirable genotypes, higher PCV estimates would mean the trait is more influenced by the environment. High magnitude of genotypic coefficient of variation indicated the presence of wide variation for the character under study. Similar findings were also reported by Abrahum *et al.,* (1989), Chunilal *et al.,* (1996), John (2007), nirmalakumari *et al.,* (2010), Ulanganathan and nirmalakumari (2011), Ganapathy *et al.,* (2011), Priyadharshini *et al.,* (2011), Chaudhari (2013), Selvi *et al.,* (2014), Suryanarayan *et al.,* (2014), Ulaganathan and Nirmalakumari (2014) and Saundaryakumari and Singh (2015) for number of productive tillers per plant. Chunilal *et al.,* (1996) for Biological yield per plant. Saundaryakumari and Singh (2015) for harvest index. Abraham *et al.,* (1989), Chunilal *et al.,* (1996), Chaudhari (2013) and Suryanarayana *et al.,* (2014) for grain yield per plant (Table 3).

Heritability in Broad Sense (%) and Genetic Advance as per cent over Mean

The GCV alone is not sufficient for the determination of amount of heritable variation. Burton (1952) suggested that, GCV together with the heritability estimates would give the best picture of the extent of advance to be expected by selection. The heritability estimates ranged from 92.74 % (for no. of productive tillers per plant) to 25.35 % (for specific leaf area); 81.77 (for thousand seed weight) to 20.85 (for grain yield per plant) and 85.66 % (for days to 50 % flowering) to 24.10 (for main panicle length) under timely, late and very late sown conditions, respectively. Overall High heritability along with high genetic advance as per cent of mean was observed for harvest index, which indicates these characters are largely governed by genes and selection for improvement of such characters could be rewarding. Whereas, moderate heritability accompanies with moderate GAM was observed in plant height, which indicated that these characters are less influenced by environment. While low heritability along with low GAM was found for grain weight per main panicle in all the environmental conditions, it indicates that the character is highly influenced by environmental effects and selection would be ineffective (Table 5). Similar results were also obtained in timely sowing condition by John (2006), Nirmalakumari *et al.,* (2010), Priyadharshini *et al.,* (2011), Dhanalakshami *et al.,* (2013) for number of productive tillers per plant, Shet *et al.,* (2010), Priyadharshini *et al.,* (2011), Dhanalakshami *et al.,* (2013), Saundaryakumari and Singh (2015) for grain yield per plant, Ganapathy *et al.,* (2011), Ulaganathan and Nirmalakumari (2011), Priyadharshini *et al.,* (2011), Haradari *et al.,* (2012), Suryanarayana *et al.,* (2014), Ulaganathan and Nirmalakumari (2014) for grain yield per plant and number of productive tillers per plant. Yogeesh *et al.,* (2015), Jyothsna *et al.,* (2016) for days to 50 % flowering and days to maturity. Priyadharshini *et al.,* (2011) for harvest index. This indicates the scope of selection in the population, since there is a wide range of variation. Under late sowing condition similar conclusion reported by Ulaganathan and Nirmalakumari (2011), Dhanalakshami *et al.*, (2013), Ulaganathan and Nirmalakumari (2014) for thousand seed weight; Priyadharshini *et al.*,(2011)for harvest index. Under very late sowing condition days to 50 % flowering, days to maturity and chlorophyll content reported high heritability along with high genetic advance as per of mean. Similar type of result casted by Yogeesh *et al.*, (2015), Jyothsna *et al.*, (2016) for days to 50 % flowering and days to maturity.

Morphological characterization

Morphological descriptors provide unique identification of cultivated crop varieties. The relationships of grain yields per plant with qualitative traits were investigated (Table 4). Inflorescence morphology was associated with grain yield and is used by the farmers to distinguish complexes of cultivars (De Wet, *et al.*, 1985). The accessions with green plants, decumbent growth, diffused panicles and ovate grains had significantly higher grain yield than those with purple plant and erect growth habit having compact types of panicles. An open and diffused type of panicle was mainly characterized by good panicle exertion and high single plant grain yield. In present investigation maximum intermediate (43.33 %) types of panicles was found followed by compact and then open. Erect type (56.66 %) of growth habits was found predominantly followed by prostrate and then decumbent. 80 % of total genotypes are non-lodging. In character plant pigmentation 76.66 % plants found non-pigmented and 23.34 % found with purple pigmentation. 60 % genotypes having globe inflorescence shape followed by arched and then diffused. Maximum variations were found in case of grain color. Light gray colour was pre dominant in material under study. Oval type grain shape was found in all the genotypes. Apart from that, erect type growth habit, green plants, open and diffused types of panicles, grey color grains and oval grain shape were predominant in genotypes under present study. These results are in harmony with Selvi *et al.*, in little millet and Lule *et al.*, 2012 in finger millet.

Table.1 Details of genotypes used in experiment

Sr. No.	Genotype	Source	Sr. No.	Genotype	Source
1.	WV-114	Waghai	16.	WV-135	Waghai
2.	WV-116	Waghai	17.	WV-140	Waghai
3.	WV-117	Waghai	18.	WV-141	Waghai
4.	WV-118	Waghai	19.	WV-142	Waghai
5.	WV-119	Waghai	20.	WV-143	Waghai
6.	WV-120	Waghai	21.	WV-144	Waghai
7.	WV-121	Waghai	22.	WV-145	Waghai
8.	WV-122	Waghai	23.	WV-146	Waghai
9.	WV-123	Waghai	24.	WV-147	Waghai
10.	WV-124	Waghai	25.	WV-148	Waghai
11.	WV-125	Waghai	26.	WV-149	Waghai
12.	WV-126	Waghai	27.	WV-150	Waghai
13.	WV-127	Waghai	28.	WV-151	Waghai
14.	WV-130	Waghai	29.	WV-152	Waghai
15.	WV-133	Waghai	30.	WV-153	Waghai

Table.2 Analysis of variance for twelve characters studied under three different environments in little millet

Sources of variation	D.F.	Days to 50 % flowering	Days to maturity	Plant height (cm)	No. of productive tillers per plant	Main panicle Length (cm)	Yield per panicle	Grain yield per plant (g)	Biological yield per plant	Harvest index (%)	1000 seed weight	Specific leaf weight (cm^2/g)	Chlorophyll content
Mean sum of square for first environment (E_1)													
Replication	2	102.81	41.03	685.12	0.072	21.40	0.06	0.214	0.008	10.722	0.050	0.064	1.688
Genotypes	29	1095.02**	814.31**	736.42**	6.732**	67.46**	0.65**	2.484**	58.093**	127.33**	0.123**	0.098**	11.27**
Error	58	38.22	49.64	257.25	0.171	13.13	0.083	0.273	6.678	9.529	0.030	0.046	1.961
Mean sum of square for second environment (E_2)													
Replication	2	138.41*	37.20	268.24	0.030	18.43	0.004	0.048	0.061	2.27	0.28**	0.06	6.71
Genotypes	29	199.83**	376.54**	436.65**	0.695**	90.00**	0.173**	0.454*	23.41**	75.02**	0.65**	0.53**	13.00**
Error	58	27.92	35.45	111.97	0.102	28.08	0.072	0.256	2.89	7.91	0.04	0.06	2.15
Mean sum of square for third environment (E_3)													
Replication	2	5.73	45.81	72.75	0.016	1.70	0.59	0.72	0.62	26.30	0.192**	0.176*	10.45**
Genotypes	29	346.72**	380.39**	308.04**	0.166**	17.59*	0.43**	0.65**	2.92**	65.11**	0.256**	0.196**	24.29**
Error	58	18.31	21.38	83.30	0.048	9.02	0.14	0.21	1.05	15.56	0.044	0.042	1.94

*, ** Significant at 5 % and 1 % levels, respectively

Table.3 Variability parameters for days to 50 % flowering, Days to maturity, Plant height, No. of productive tillers per plant, Main panicle length and Yield per main panicle, grain yield per plant, biological yield per plant, harvest index, thousand seed weight, specific leaf weight and chlorophyll content in little millet for different environmental conditions

S.V	Days to 50 % flowering			Days to maturity			Plant height (cm)		
	E_1	E_2	E_3	E_1	E_2	E_3	E_1	E_2	E_3
σ^2_g	352.27	57.30	109.47	254.89	113.70	119.67	159.71	108.28	74.85
σ^2_p	390.49	85.23	127.79	304.53	149.15	141.05	417.08	220.10	158.26
σ^2_e	38.22	27.93	18.32	49.64	35.45	21.39	257.38	111.82	83.41
GCV%	16.39	7.07	12.81	11.70	8.68	11.01	10.17	10.62	13.23
PCV%	17.25	8.63	13.84	12.79	9.94	11.95	16.43	15.13	19.24
H^2 (%)	90.21	67.23	85.66	83.70	76.23	84.84	38.29	49.20	47.30
GA	36.72	12.79	19.95	30.09	19.18	20.76	16.11	15.04	12.26
GAM (%)	32.06	11.95	24.42	22.05	15.61	20.88	12.96	15.34	18.75

S.V	No. of productive tillers/plant			Main panicle length (cm)			Grain weight per main panicle (g)		
	E_1	E_2	E_3	E_1	E_2	E_3	E_1	E_2	E_3
σ^2_g	2.19	0.20	0.04	18.07	20.63	2.86	0.19	0.04	0.10
σ^2_p	2.36	0.30	0.09	31.20	48.67	11.88	0.28	0.11	0.24
σ^2_e	0.17	0.10	0.05	13.13	28.04	9.01	0.08	0.07	0.14
GCV%	49.26	21.26	14.27	12.73	14.39	6.67	19.93	10.09	18.51
PCV%	51.15	26.22	21.33	16.72	22.10	13.60	23.90	17.41	29.32
H^2 (%)	92.74	65.78	44.77	57.92	42.39	24.10	69.54	33.60	39.86
GA	2.93	0.74	0.27	6.66	6.09	1.71	0.75	0.23	0.40
GAM (%)	97.72	35.52	19.67	19.95	19.30	6.75	34.23	12.05	24.07

S.V	Grain yield per plant (g)			Biological yield per plant (g)			Harvest index (%)		
	E1	E2	E3	E1	E2	E3	E1	E2	E3
σ^2_g	0.74	0.07	0.14	17.16	6.85	0.63	39.24	22.36	16.51
σ^2_p	1.01	0.32	0.36	23.83	9.74	1.68	48.77	30.32	32.10
σ^2_e	0.27	0.25	0.22	6.67	2.90	1.05	9.53	7.96	15.59
GCV%	23.83	7.69	14.07	28.49	22.81	10.68	30.26	20.13	15.10
PCV%	27.88	16.83	22.25	33.58	27.22	17.51	33.74	23.44	21.05
H^2 (%)	73.06	20.85	40.00	72.01	70.27	37.23	80.45	73.75	51.44
GA	1.51	0.24	0.50	7.24	4.52	0.99	11.57	8.37	6.00
GAM (%)	41.96	7.23	18.33	49.81	39.40	13.43	55.92	35.61	22.31

S.V	Thousand seed weight (g)			Specific leaf weight (g/cm^2)			Chlorophyll content		
	E1	E2	E3	E1	E2	E3	E1	E2	E3
σ^2_g	0.03	0.21	0.07	0.02	0.16	0.05	3.11	3.61	7.46
σ^2_p	0.06	0.25	0.12	0.07	0.21	0.09	5.09	5.78	9.40
σ^2_e	0.03	0.05	0.04	0.05	0.06	0.04	1.98	2.17	1.94
GCV%	6.22	21.90	11.95	9.05	28.49	18.87	17.95	20.30	23.13
PCV%	8.74	24.22	15.01	17.97	33.45	25.85	22.98	25.70	25.97
H^2 (%)	50.70	81.77	63.40	25.35	72.53	53.28	61.05	62.44	79.38
GA	0.26	0.84	0.44	0.14	0.69	0.33	2.84	3.09	5.01
GAM (%)	9.13	40.79	19.61	9.39	49.98	28.38	28.90	33.05	42.46

Table.4 Qualitative characteristics of little millet genotypes based on visual observation

Sr. no.	Genotypes	Panicle compactness	growth habit	Lodging	Pigmentation	Inflorescence shape	Grain color	Grain shape
1.	WV-114	Intermediate	Prostate	Non- lodging	Non-pigmented	Arched	Dark gray	Oval
2.	WV-116	Intermediate	Prostate	Non- lodging	Non-pigmented	Arched	Straw white cream	Oval
3.	WV-117	Intermediate	Erect	Non- lodging	Non-pigmented	Globe	Light gray	Oval
4.	WV-118	Open	Erect	Non- lodging	Pigmented	Globe	Light gray	Oval
5.	WV-119	Compact	Decumbent	Non- lodging	Non-pigmented	Arched	Light brown	Oval
6.	WV-120	Compact	Decumbent	Non- lodging	Non-pigmented	Globe	Light gray	Oval
7.	WV-121	Intermediate	Erect	Non- lodging	Non-pigmented	Diffused	Light gray	Oval
8.	WV-122	Intermediate	Erect	Lodging	Non-pigmented	Globe	Light gray	Oval
9.	WV-123	Compact	Prostrate	Non- lodging	Non-pigmented	Arched	Golden yellow	Oval
10.	WV-124	Intermediate	Erect	Non- lodging	Pigmented	Diffused	Golden yellow	Oval
11.	WV-125	Open	Erect	Non- lodging	Non-pigmented	Arched	Light gray	Oval
12.	WV-126	Open	Prostate	Non- lodging	Pigmented	Arched	Golden yellow	Oval
13.	WV-127	Intermediate	Decumbent	Non- lodging	Pigmented	Globe	Light gray	Oval
14.	WV-130	Intermediate	Decumbent	Non- lodging	Non-pigmented	Globe	Light gray	Oval
15.	WV-133	Open	Erect	Lodging	Non-pigmented	Globe	Light gray	Oval
16.	WV-135	Compact	Decumbent	Lodging	Non-pigmented	Globe	Light gray	Oval
17.	WV-140	Intermediate	Erect	Non- lodging	Non-pigmented	Globe	Light gray	Oval
18.	WV-141	Open	Erect	Non- lodging	Pigmented	Arched	Light brown	Oval
19.	WV-142	Open	Erect	Non- lodging	Pigmented	Globe	Straw white cream	Oval
20.	WV-143	Compact	Erect	Lodging	Non-pigmented	Globe	Light gray	Oval
21.	WV-144	Intermediate	Erect	Lodging	Non-pigmented	Globe	Light gray	Oval
22.	WV-145	Open	Erect	Lodging	Non-pigmented	Globe	Light gray	Oval
23.	WV-146	Intermediate	Decumbent	Non- lodging	Non-pigmented	Globe	Light gray	Oval
24.	WV-147	Open	Erect	Non- lodging	Non-pigmented	Arched	Dark brown	Oval
25.	WV-148	Compact	Erect	Non- lodging	Non-pigmented	Globe	Light gray	Oval
26.	WV-149	Intermediate	Erect	Non- lodging	Non-pigmented	Globe	Straw white cream	Oval
27.	WV-150	Compact	Erect	Non- lodging	Non-pigmented	Arched	Light brown	Oval
28.	WV-151	Compact	Prostrate	Non- lodging	Non-pigmented	Arched	Straw white cream	Oval
29.	WV-152	Intermediate	Prostate	Non- lodging	Non-pigmented	Arched	Straw white cream	Oval
30.	WV-153	Compact	Prostate	Non- lodging	Pigmented	Arched	Straw white cream	Oval

Table.5 Summary of Heritability, Genetic advance and Genetic advance as percent of mean for twelve characters of little millet sown in three different dates

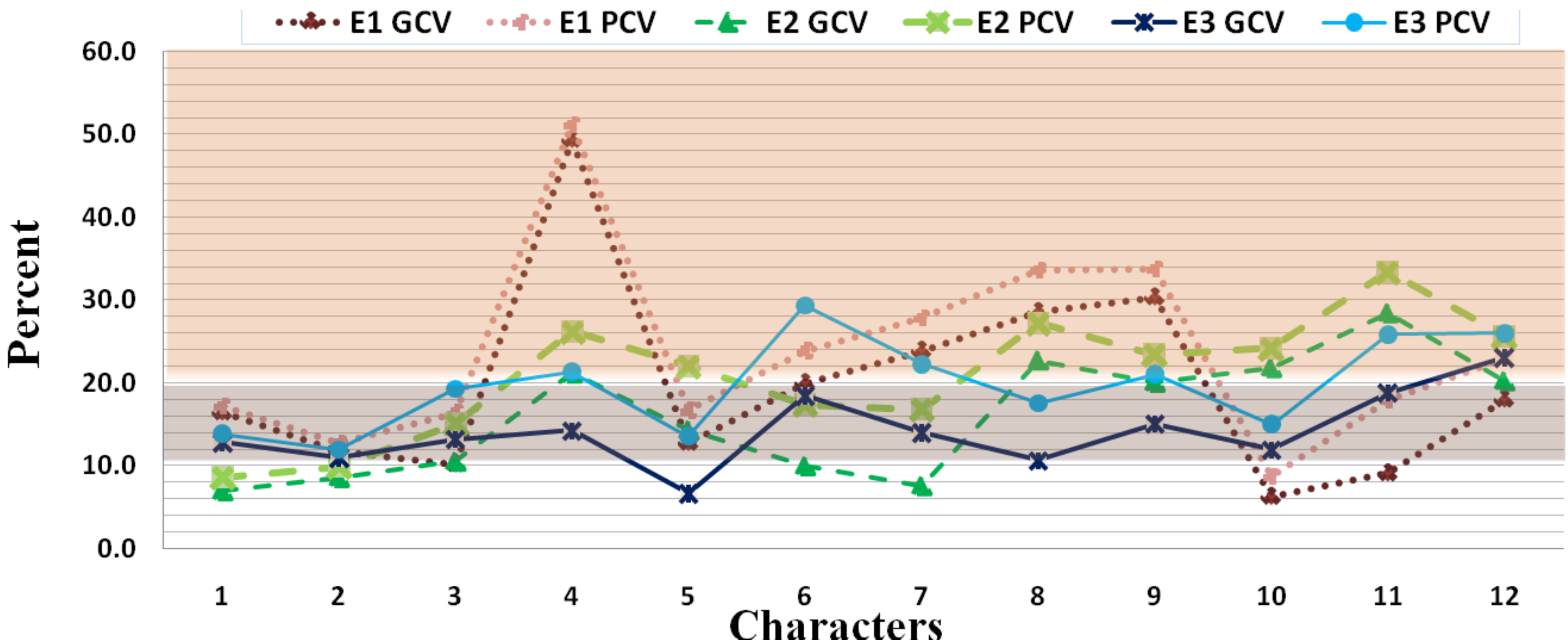
		Heritability (Broad sense H^2)								
Genetic Advance as Percent of		**Timely Sowing (E1)**			**Late Sowing (E2)**			**Very Late sowing (E3)**		
		High	**Medium**	**Low**	**High**	**Medium**	**Low**	**High**	**Medium**	**Low**
	High	1, 2, 9, 4, 7, 8	6, 12	-	8, 9, 10, 11	12, 4	-	2, 1, 9, 12	9, 6	-
	Medium	-	3, 5	-	2	1, 3, 5	6	11	3, 4 , 7, 8, 10	-
	Low	-		10, 11	-	7	-	-	-	5

Category for Genetic advance and Genetic advance as % of mean: Low: 0 to 10, Moderate: 10 to 20, High: 20 or above

Category for Heritability Broad sense: Low: 0 to 35, Moderate: 35 to 70: High: 70 or above

1. Days to 50 % flowering
2. Days to maturity
3. Plant height
4. No. of productive tillers per plant
5. Main panicle length
6. Grain yield per main panicle
7. Grain yield per plant
8. Biological yield per plant
9. Harvest index
10. Thousand seed weight
11. Specific leaf weight
12. Chlorophyll content

Fig.1 Graphical comparison of genotypic coefficient of variance (GCV) and phenotypic coefficient of variance (PCV) for twelve characters of little millet sown in three different dates



1. Days to 50 %flowering
2. Days to maturity
3. Plant height
4. Number of productive tillers per plant
5. Main panicle length
6. Grain weight per main panicle
7. Grain yield per plant
8. Biological yield per plant
9. Harvest index
10. Thousand seed weight
11. Specific leaf weight
12. Chlorophyll content

E1 - GCV: GCV for Timely sowing
E1 - PCV: PCV for Timely sowing
E2- GCV: GCV for Late sowing
E2 - PCV: PCV for Late sowing
E3- GCV: GCV for Very late sowing
E3- PCV: PCV for Very late sowing

In conclusion, here in this experiment three different environments are made available by three different date of sowing to check the performance and the effect of environment on the genotypes. All the accessions studied showed wide range of variation for all the characters including grain yield per plant and this genetic variability can be effectively utilized for crop improvement made it clear that genetic diversity in little millet landraces was substantial. Number of productive tillers was the highly variable and heritable character and it showed highest genetic advance also. This character may be successfully used as selection criteria in improving grain yield. Among 30 genotypes two genotypes namely WV -135 and WV – 148 are average stable and suitable for all the three dates of sowing in Junagadh condition.

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