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COLLECTION AND EVALUATION OF CHENCH (*CORCHORUS ACUTANGULS* LAM.) AN UNEXPLOITED AND UNDER UTILIZED LEAFY VEGETABLE OF CHHATTISGARH

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ABSTRACT

The field experiment was conducted to study the performance of 25 diverse Chench (*Corchorus acutanguls* Lam.) genotypes collected from different parts of Chhattisgarh. Observations were recorded from five randomly selected plants of each genotype in each replication for twenty yield and its attributing characters viz., plant height, number of leaves per plant, petiole length, internodal length, number of branch per plant, stem girth, days to 50% flowering, fresh weight of plant, dry matter percentage of plant, harvest index, leaf stem ratio, test weight, leaf yield kg per plot, chlorophyll content, ascorbic acid content and fibre content. High significant difference due to genotypes was observed for all the traits studied indicating sufficient genetic variability among the genotypes. In the present study The genotype IGCB-23 recorded significantly highest leaf yield (3.19 kg/ha). However, the genotype IGCB-2 showed the maximum plant height (50.59 cm). Highest fresh weight of plant recorded in genotype IGCB-2 (12.44 gm) while, maximum no. of branches was noticed in genotype IGCB-1 (15.73). Maximum fibre content recorded in genotype IGCB-21 (15.12 %), maximum chlorophyll content noticed in IGCB-25 (44.07 SPAD) and maximum ascorbic acid content found in IGCB-5 (95.05 mg/100 g).

INTRODUCTION

Chench (*Corchorus acutangulus* Lam.) is one of the unexploited and underutilized leafy vegetable. In Chhattisgarh it is popularly known as Chench Bhaji and belongs to the family Tiliaceae consisting of 40 genus and 400 species (Heywood *et al.*, 2007). Chench is rich source of vitamins, minerals such as potassium and calcium. High content of beta-carotene, fibre, folic acid, potassium and high volume of water makes it a heart healthy green vegetables as it help in lowering blood cholesterol level, high blood pressure and other risk factors for heart diseases (Sharma, 2002). This leafy vegetable is very easily available in all part of Chhattisgarh People of the state are not fully aware of the health benifites provided by this leafy vegetable but consumed as leafy vegetable for its rich taste The success of any crop improvement programme depends upon the nature and magnitude of genetic variability existing in breeding material with which plant breeder is working, choice of parents for hybridization and selection procedure (Meena and Bahadur, 2013). Evaluation and documentation are important for exploitation of genetic variability for sustainable human benefits. According to Singh (2003), evaluation may consist of nothing more than description of the place of origin and a morphological and phenological description of the germplasm or it may consist of information on physiological, biochemical, genetical, plant pathological or other characteristics. Evaluation and characterization provide a rapid, reliable and efficient tool of information to augment the utilization of germplasm. For the development of suitable varieties of chench, it is essential to evaluate the characters of the available germplasm properly and conserve the collected materials for future use. Variability is a touch stone to the breeders to evolve high yielding and stable varieties through selection, either from the existing genotypes or from the segregates of a cross.

Chench bhaji is very well recognized at local level but unfortunately less or no systematic work yet to be initialized under Chhattisgarh region. Looking to the higher yield potential, higher nutritional content with local adaptability, the systematic work will be initialized to exploit immense potential of leafy vegetables. Similar studies have also been done by Raja *et al.* (2011) in drumstick ,Makanur *et al.* (2013) in cowpea and Tripathi *et al.* (2013) they concluded that characterization of germplasm based on quantitative descriptors is important for both plant breeders and germplasm curators to optimize the use of the variability available. Hence, the present study was undertaken to find out and establish suitable selection criteria for higher leaf yield through this study, Therefore the objective of collection and evaluation of Chench germplasms in order to provide efficient tool of information to augment the utilization of germplasm in further breeding programme.

MATERIALS AND METHODS

The experimental material for the study comprised of 25 genotypes are IGCB-1,

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IGCB- 2, IGCB-3, IGCB-4, IGCB-5, IGCB-6, IGCB-7, IGCB-8, IGCB-9, IGCB-10, IGCB-11, IGCB-12, IGCB-13, IGCB-14, IGCB-15, IGCB-16, IGCB- 17, IGCB-18, IGCB-19, IGCB-20, IGCB-21, IGCB-22, IGCB-23, IGCB-24 and IGCB-25, collected from three agro climatic zones of Chhattisgarh and laid in randomized complete block design (RCBD) with three replications at the Horticultural Instructional and Research Farm, Department of Horticulture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) lies between 21°16' N latitude and 81°36' E longitude with an altitude of 289.56 meters above the mean sea level. The experiment was conducted during Rabi season 2014-15. The soil properties like organic carbon (%) 0.60, Available N (kg ha⁻¹) 275.00, Available P (kg ha⁻¹) 16.75 and Available K (kg ha⁻¹) 303.00 Soil Reaction pH 7.09 and Electrical conductivity (n mh cm⁻¹) 0.19 was observed in the site of experiment. The seeds were sown in 20cm apart between rows and 15cm within the row. Standard agronomic practices and plant protection measures were taken as per schedule. Test weight was recorded before sowing of crop. Observations were recorded on five randomly selected plants per replication for plant height, number of leaves per plant, , petiole length, stem girth, number of branch per plant,, root length, fresh weight of plant, dry weight of plant, dry matter percentage of plant, leaf yield kg per plot, harvest index, leaf stem ratio, fibre content, chlorophyll content and Ascorbic acid content were recorded at 60 days after sowing while days to 50% flowering, duration of crop were recorded periodically. The labeled plants and mean values for each observation were used for statistical analysis.

RESULTS AND DISCUSSION

The analysis of variance for all the characters under study and mean performance of twenty quantitative and qualitative characters of Chench genotypes are presented in Table 1 and 2 respectively. This analysis of variance revealed that mean

sum of squares due to genotypes was highly significant for all the studied characters. This is an indication of existence of sufficient variability among the genotypes for leaf yield and its component traits. Significant mean sum of squares due to leaf yield and attributing characters revealed existence of considerable variability in material studied for improvement of various traits. These findings are in general agreement with the findings of Varalakshmi (2004), Shukla *et al.* (2005 a) and Joshi *et al.* (2011). This not only indicates the extent of variation between the growing conditions but also reflected the degree of genetic variability among the genotypes tested.

Plant height ranged from 27.10 cm (IGCB-5) to 50.59 cm (IGCB-2) with an overall mean of 36.20 cm. Maximum plant height was recorded in the genotype IGCB-2 (50.59 cm). However, genotype IGCB-5 (27.10 cm) was noted for minimum plant height. Number of leaves per plant ranged between 9.93 to 25.33 with an average mean of 14.32 cm. Maximum number of leaves per plant recorded in genotype IGCB-1 (25.33) followed by IGCB-25 (23.66), IGCB-19 (19.86) and IGCB-14 (19.40). While genotype IGCB-5 (9.93) was noted for minimum number of leaves per plant. Highest number of branches per plant recorded in genotypes IGCB-1 (15.73) followed by IGCB-2 (14.06) and IGCB-25 (14.00) whereas, minimum number of branch per plant recorded in IGCB-23 (3.40) with overall mean of 9.50. The range of petiole length lies between 1.59 to 2.55 with an overall mean of 2.06 cm. The highest petiole length 2.66 cm was recorded in genotype IGCB-14. Whereas, it was found statistically *at par* with genotypes IGCB-2 (2.66 cm) and IGCB-16 (2.53 cm). Genotype IGCB-7 (1.59 cm) were noted for minimum petiole length. The range of internodal length varied from 1.13 to 2.91 with overall mean of 1.49 cm. Maximum internodal length recorded in genotype IGCB-23 (2.91 cm) followed by IGCB-2 (2.36 cm) and IGCB-25 (2.29 cm). Whereas, lowest Internodal length 1.13 cm was recorded in genotype IGCB-16. Stem girth ranging from 3.26 to 4.86 with overall mean of 3.90 mm. The maximum stem girth 4.86

Table 1: Analysis of variance for 20 characters among 25 genotypes of Chench

Character(df)	Mean sums of square	Replication 2	Treatment 24	Error 48
01	Plant height (cm)	0.14201	135.018**	0.59594
02	Number of leaves per plant	93.4464	48.3619**	7.88751
03	Ascorbic acid (mg/100 gm)	0.40747	2.0717**	0.8969
04	Chlorophyll content (SPAD)	0.3692	0.5373**	0.0361
05	Petiole length cm	0.00979	0.33259**	0.04052
06	Stem girth (mm)	0.43573	0.56763**	0.26198
07	Number of branches per plant	0.19524	40.5324**	0.414
08	Root weight (g)	0.00507	0.03388**	0.00537
09	Seed yield (gm/plot)	0.0357	5.084**	0.1587
10	Fresh weight of plant (g)	0.14814	18.8249**	0.25079
11	Dry weight of plant (g)	0.00338	0.60642**	0.01302
12	Internodal length (cm)	0.065	0.632**	0.033
13	Dry matter %	39.4304	53.8417**	21.234
14	Days to 50 % flowering	13.72	114.83**	0.92833
15	Yield kg per plot	0.01305	0.80532**	0.02352
16	Harvest index (%)	0.00281	0.07631**	0.00326
17	Leaf stem ratio	0.01623	0.85593**	0.02605
18	Fibre content %	0.07007	14.2984**	0.02908
19	Test weight (g)	0.00174	0.72844**	0.00026
20	Duration of the crop	43.5733	82.7811**	0.47611

Table 2: Mean performance twenty five Chench genotypes for twenty qualitative and yield attributing traits

Characters	Plant height (cm)	No of leaves/plant	No of branches /plant	Petiole length (cm)	Internodal length (cm)	Stem girth (mm)	Root length (cm)	Fresh weight (gm)	Dry weight (gm)	Days to 50 % Flowering
IGCB-1	31.86	25.33	15.73	1.61	1.20	3.26	14.23	6.62	0.79	54.66
IGCB - 2	50.59	14.86	14.06	2.66	2.36	4.46	10.98	12.44	2.18	62.00
IGCB - 3	48.08	16.93	11.06	2.32	1.32	4.50	9.86	4.98	0.87	52.00
IGCB - 4	35.36	11.10	5.86	2.02	1.20	3.40	9.58	8.61	1.06	61.00
IGCB - 5	30.28	9.933	4.33	1.95	1.26	3.46	11.85	5.24	0.93	54.66
IGCB -6	44.92	11.86	9.06	2.13	1.20	3.26	9.153	3.81	0.85	63.00
IGCB -7	33.83	16.46	8.26	1.59	1.23	3.86	11.42	4.11	0.24	56.66
IGCB - 8	33.73	14.20	4.33	2.07	1.53	4.20	11.06	3.81	0.49	58.00
IGCB - 9	45.00	14.46	13.93	2.04	1.36	4.20	8.54	4.77	0.60	61.00
IGCB - 10	39.81	12.73	11.86	1.69	1.44	3.53	10.96	4.65	0.57	63.00
IGCB - 11	30.60	11.46	12.43	1.67	1.20	3.80	9.89	6.59	0.55	61.00
IGCB - 12	36.46	12.26	12.26	2.26	1.14	3.40	11.41	6.19	0.54	58.00
IGCB - 13	34.43	10.33	11.60	1.65	1.26	3.60	10.20	3.42	0.49	65.33
IGCB - 14	35.38	19.40	13.00	2.84	1.36	4.26	10.85	3.86	0.66	63.33
IGCB - 15	32.80	12.13	11.00	2.30	1.26	4.36	8.61	3.97	0.50	66.00
IGCB - 16	39.57	13.10	10.60	2.53	1.13	4.53	9.32	5.75	1.03	63.33
IGCB - 17	30.56	12.73	8.02	2.13	1.56	3.80	8.38	5.54	0.69	65.00
IGCB - 18	27.10	11.53	6.60	1.73	1.53	3.93	9.83	3.67	0.44	64.00
IGCB - 19	27.88	19.86	5.73	2.27	1.30	3.60	9.76	10.65	0.82	52.00
IGCB - 20	34.76	11.46	7.64	2.01	1.26	3.73	8.32	5.44	0.69	64.66
IGCB - 21	28.11	11.26	5.80	1.76	1.40	4.06	9.71	3.67	0.69	55.33
IGCB - 22	34.57	12.53	12.46	1.88	1.30	3.60	8.99	6.17	1.03	58.33
IGCB - 23	41.13	15.93	3.40	2.12	2.91	4.86	10.87	10.84	1.10	45.66
IGCB - 24	30.56	12.40	4.60	2.33	2.27	4.00	12.29	9.35	1.97	62.33
IGCB - 25	47.64	23.66	14.00	1.97	2.29	3.80	14.02	5.36	1.38	41.66
Mean (x)	36.20	14.32	9.50	2.06	1.49	3.90	10.40	5.98	0.84	58.88
SEm ±	0.44	1.62	0.37	0.11	0.10	0.29	0.25	0.28	0.06	0.55
CD (p=0.05)	1.26	4.60	1.05	0.33	0.29	0.83	0.73	0.82	0.18	1.57
CV (%)	2.13	19.61	6.76	9.75	12.10	13.11	4.28	8.36	13.42	1.63

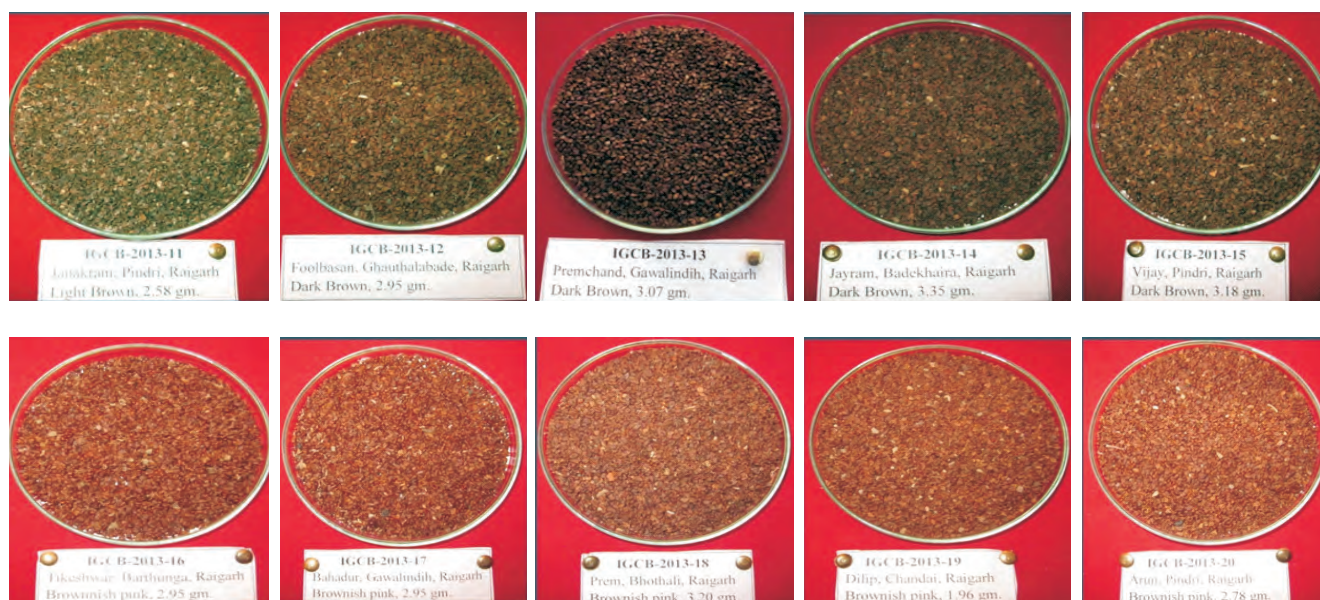
**Figure 1a: Collection of Chench genotypes (*Corchorus acutanguls* Lam.)**

mm was recorded in genotype IGCB-23 and it was found statistically *at par* with genotype IGCB- 16 (4.53 mm), IGCB-3 (4.50 mm), IGCB-2 (4.46 mm), IGCB-15 (4.36 mm) and IGCB-14 (4.26 mm), IGCB-9 (4.20 mm) and IGCB-8 (4.20 mm) and IGCB-21 (4.06 mm). The minimum stem girth recorded in IGCB-6

(3.26 mm). Root length is ranged from 8.38 to 14.23 with an overall mean of 10.40 cm. The maximum root length 14.23 cm was recorded in genotypes IGCB-1 followed by IGCB-25 (14.02 cm), IGCB-24 (12.29 cm) and IGCB-5 (11.85 cm) whereas, the minimum root length was recorded in genotype

Table 2: Cont.....

Characters	Fibre content %	Chlorophyll (lcontent (SPAD)	Ascorbic acid (mg/ 100 gm)	Harvest index	Leaf stem ratio	Dry matter %	Duration	Test weight (gm)	Seed yield (gm/plot)	Leaf Yield (Kg/ plot)
IGCB-1	08.93	32.66	84.66	0.316	1.51	11.21	36.00	2.67	7.41	1.91
IGCB - 2	09.47	33.08	82.86	0.376	1.54	18.85	31.00	2.90	4.41	2.21
IGCB - 3	11.59	30.63	86.97	0.490	1.05	18.39	36.00	2.92	6.36	2.31
IGCB - 4	10.51	30.35	83.87	0.680	1.27	18.23	26.00	2.63	6.67	2.17
IGCB - 5	10.67	32.75	95.05	0.513	1.21	18.13	31.33	2.59	3.72	2.07
IGCB -6	11.85	31.14	93.33	0.403	1.11	22.13	40.66	3.16	4.24	1.07
IGCB -7	11.64	39.07	54.52	0.570	0.94	13.83	36.66	2.66	5.11	1.76
IGCB - 8	10.73	33.26	75.08	0.490	1.10	13.82	36.33	3.16	8.17	1.41
IGCB - 9	10.69	31.08	69.09	0.456	1.49	14.27	45.66	2.73	5.08	1.16
IGCB - 10	10.80	33.90	75.00	0.736	1.83	30.03	41.33	3.26	9.93	1.28
IGCB - 11	06.33	31.21	88.00	0.326	0.88	15.64	36.00	2.59	4.09	1.26
IGCB - 12	10.68	37.07	85.73	0.530	1.87	12.92	46.00	2.95	6.44	1.27
IGCB - 13	12.25	33.15	87.66	0.383	1.12	17.15	36.00	3.07	8.45	1.46
IGCB - 14	10.59	32.63	65.56	0.500	0.85	19.26	30.66	3.35	3.89	1.66
IGCB - 15	14.24	31.34	92.10	0.490	0.89	11.75	41.66	3.18	4.79	1.21
IGCB - 16	10.69	29.06	82.60	0.823	1.46	17.82	35.66	2.95	6.38	1.71
IGCB - 17	10.77	30.93	84.00	0.490	1.03	21.06	31.00	2.95	4.71	1.48
IGCB - 18	11.77	30.82	82.68	0.576	1.04	12.28	36.00	3.23	4.11	2.51
IGCB - 19	09.84	30.12	82.02	0.776	2.18	14.99	36.33	1.96	6.86	1.60
IGCB - 20	10.76	32.28	80.83	0.743	2.59	12.71	36.66	2.78	4.40	1.35
IGCB - 21	15.12	32.08	83.56	0.363	1.22	19.59	36.33	3.32	3.37	1.64
IGCB - 22	11.72	31.24	79.00	0.820	2.59	19.69	31.66	2.42	5.96	1.30
IGCB - 23	03.93	36.92	79.83	0.613	0.81	19.35	46.00	1.97	8.24	3.19
IGCB - 24	11.84	39.11	83.55	0.413	0.74	20.67	41.66	1.66	6.28	1.10
IGCB - 25	08.92	44.07	90.60	0.293	0.64	21.93	29.66	1.63	7.67	2.13
Mean (x)	10.65	33.31	82.00	0.52	1.32	17.42	36.49	2.75	5.87	1.69
SEm ±	0.09	2.18	0.31	0.03	0.09	2.66	0.39	0.09	0.36	0.08
CD (p=0.05)	0.27	6.21	0.89	0.09	0.26	7.55	1.13	0.02	1.03	0.25
CV (%)	1.60	11.38	0.66	10.82	12.21	26.43	1.89	0.59	10.72	9.05

Figure 1b: Collection of Chench genotypes (*Corchorus acutangulus* Lam.)

IGCB-17 (8.38 cm). Maximum fresh weight recorded in genotypes IGCB-2 (12.44 g) followed by IGCB-23 (10.84 g) and IGCB-19 (10.65 g) whereas, the minimum fresh weight of plant recorded in IGCB-13 (3.42 g) with an overall mean of 5.98 g. Dry weight of plant ranged from 0.24 to 2.18. Maximum

dry weight of plant recorded in IGCB-2 (2.18 g) followed by 1.97 g (IGCB-24) and 1.10 (IGCB- 23) with an overall mean of 0.84 g. whereas, minimum dry weight of plant recorded in IGCB-7 (0.24 g). Mean days of 50% flowering ranged from 41.66 to 65.33 with a mean of 58.88 days. Earliest 50%



Figure 1c: Collection of Chench genotypes (*Corchorus acutangulus* Lam.)

flowering was recorded in the genotype IGCB-25 (41.66 days) which was followed by IGCB-23 (45.66 days), IGCB-3 (52.00 Days) and delayed flowering was recorded in IGCB-13 (65.33 days).

Maximum fibre content recorded in genotype IGCB-21 (15.12 %) followed by IGCB-15 (14.24 %) and IGCB-24 (11.84 %). While, minimum fibre content noticed in IGCB-23 (3.93 %) with an overall mean of 10.65 %. The dry matter percentage of plant ranged from 5.54 to 22.13 with an overall mean of 14.74 %. The maximum dry matter percentage found in IGCB-6 (22.13 %). however, it was found statistically *at par* with genotypes *viz.* IGCB-25 (21.93 %), IGCB-17 (21.06 %) and IGCB-24 (20.67 %) minimum dry matter percentage of plant found in IGCB-7 (5.54 %). Harvest index varied from 0.31 to 0.82 with an overall mean of 0.53 %. Maximum harvest index 0.82 % was recorded in genotype IGCB-16 and found statistically *at par* with genotypes IGCB-22 (0.82), IGCB-19 (0.77), IGCB-20 (0.74 %) and IGCB-10 (0.73 %). Minimum harvest index 0.31 % was recorded in genotype IGCB-1. Leaf stem ratio ranged from 0.64 to 2.59 with an overall mean of 1.32. Maximum Leaf stem ratio 2.59 was recorded in genotype IGCB-22. However, it was found statistically *at par* with genotypes IGCB-20 (2.59). Whereas, minimum Leaf stem ratio 0.64 was recorded in genotype IGCB-25. Duration of crop ranged from 26.00 to 46.00 with a mean of 36.49 days. Minimum crop duration was recorded in the genotype IGCB-4 (26.00 days) followed by IGCB- 25 (29.66 days), IGCB-14 (30.66 days) and IGCB-2 (31.00 days). Whereas, maximum crop duration was recorded in IGCB-23 (46.00 days). Leaf yield per plot ranged from 1.07 to 3.19 with an overall mean of 1.69 kg. The maximum chlorophyll content 44.07 SPAD noticed in IGCB-25 followed by IGCB-25(39.11 SPAD) and IGCB-7 (39.07), while minimum chlorophyll content recorded in the genotype IGCB-16 (29.06 SPAD). Highest ascorbic acid content 95.05 mg found in genotype IGCB-5 followed by IGCB-25 (90.60 mg) and IGCB-11 (88.00 mg), minimum chlorophyll content found in genotype IGCB-7 (54.52 mg).

Maximum leaf yield per plot 3.19 kg was recorded in genotype IGCB-23 followed by IGCB-18 (2.51 kg), IGCB-3 (2.31 kg) and IGCB-2 (2.21 kg). Whereas, minimum leaf yield per plot found in IGCB-6 (1.07 kg). Maximum test weight recorded in genotypes IGCB-14 (3.35 g) followed by IGCB-21 (3.32 g) and IGCB-10 (3.26 g). While, minimum test weight recorded in IGCB-25 (1.63 g) with an overall mean of 2.75 g. Seed yield ranged from 33.7 to 99.3 with an overall mean of 57.75 g/plot. Maximum seed yield recorded in genotype IGCB-10 (99.3

g/plot), IGCB-13 (84.5 g/plot) and IGCB-23 (82.4 g/plot). Whereas, minimum seed yield recorded in genotype IGCB-21 (33.7 g/plot).

Based on results it can be concluded that there are variation in Chench genotypes specially with respect to plant height, number of leaves, petiole length ,dry matter %, days to 50% flowering, harvest index, leaf stem ratio, Chlorophyll content, fiber content, ascorbic acid content and yield per plot which indicated that there is better scope for selection for the improvement of these characters. These findings are in close proximity with the results of Varalakshmi *et al.* (2004) who reported variability for, plant height, petiole length, days to 50% flowering and leaf yield in *Amaranthus*. Similar finding were also reported by Selvan *et al.* (2013), Pan *et al.* (2008), Das and Kumar (2012), and Ahammed *et al.* (2013).

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