

***Amaranthus* spp. genotype suitable for Chhattisgarh plains**

Ishwar Singh Diwan, Neeraj Shukla and Nisha Chandel

Department of Horticulture, Indira Gandhi Krishi Vishwavidyalaya, Krishak Nagar, Raipur (C.G.), India

Received October 29, 2018 and Accepted January 11, 2019

ABSTRACT : In the present investigation, ten genotypes of vegetable amaranthus were evaluated for their suitable leaf yield in Chhattisgarh plains. The analysis of variance indicated that the mean sum of square due to genotypes were highly significant for all the 16 characters. 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. The highest leaf yield kg per plot was recorded in genotype 2012/AMVAR-4 followed by 2012/AMVAR-7 (17.41 kg/plot), CG Amaranthus-1 (17.36 kg/plot). Thus mean performance of 2012/AMVAR-4 genotype on the character of leaf yield kg/plot is superior among all the genotypes and this performance show the suitability in Chhattisgarh plains and important role play in further improvement programme of vegetable amaranthus.

Key Words : Amaranthus or Chaulai (*Amaranthus* spp.) genotypes, screening, leaf yield,

Amaranthus or Chaulai (*Amaranthus* spp.) is a very popular leafy vegetable in India as well tropical and sub-tropical areas of globe and it can be grown throughout the year. Amaranthus preferred for both urban and rural population and it's also considered to be the cheapest and easiest source of nutrients, vitamins and protein leafy vegetable and it could be rightly described as a "poor man's vegetable" (Varalakshmi, 2004). The amaranth can grow under varied soil and agro climatic conditions (Katiyar *et al.*, 2000) are resistant from heat, drought and major disease problems. As India is the center of origin of *Amaranthus* spp., the Chhattisgarh state has wide genetic variability of amaranths in the local land races provides ample opportunity to develop or identify high yielding varieties with variable traits. Therefore present investigation under taken to find out the suitable amaranthus genotype for Chhattisgarh plains with various characters.

Materials and Methods

The experimental material consisted of 10 genotypes of amaranthus selected from a germplasm collection maintained under AICRP on vegetable crops at the Department of Horticulture, IGKV, Raipur (C.G.). The material was grown in a randomized block design with four replications in winter (October, 2014). The genotypes were raised in flat beds of size 3 × 2 m² and evaluated under irrigated condition. Observations were recorded on 10 plants in each replication for the 16 characters *viz.*, plant height, plant weight, number of leaves, leaf length, leaf width, leaf weight, stem weight, stem girth, internodal length, petiole length, panicle length, number of cutting, 1000 seed weight, seed yield, crop duration and leaf yield. The analysis of variance and mean performance was carried out for each character separately as per method of Panse and Sukhatme (1967).

Results and Discussion

The analysis of variance for all the characters under study is presented in Table-1. These analyses of variance revealed that mean sum of squares due to genotypes were highly significant for all characters. This is an indication of existence of sufficient variability among all the genotypes for leaf yield and its components traits. The observation on ten plants from each genotype of all four replications for leaf yield and its components characters were used for calculating the mean performance. The observations were first averaged for ten plant taken randomly for each genotype in each replication and were later averaged over all the four replications. The mean performances of different genotype are presented character wise in Table-2. The plant height ranged from 8.39 cm (2012/AMVAR-2) to 12.15 cm (CG Amaranthus-1) with an overall mean of 10.10 cm. Higher plant height was recorded in the genotype CG Amaranthus-1 (12.15 cm) followed by 2012/AMVAR-7 (11.97 cm), 2012/AMVAR-6 (10.39 cm) while lowest plant height was found in 2012/AMVAR-2 (8.39 cm) followed by 2012/AMVAR-5 (9.09 cm), Arka Sguna (9.17 cm).

The Plant weight ranged from 52.50 g (2012/AMVAR-1) to 70.50 g (2012/AMVAR-7) with an overall mean of 62.20 g. Higher plant weight was recorded in 2012/AMVAR-7 (70.50 g) followed by 2012/AMVAR-5 (70.00 g), 2012/AMVAR-3 (65.25 g) and lowest Plant weight was found in 2012/AMVAR-1 (52.50g) followed by 2012/AMVAR-6 (56.75 g), CG Amaranthus-1 (60.25 g).

The number of leaves ranged from 18.36 (2012/AMVAR-6) to 26.36 (CG Amaranthus-1) with an overall mean of 20.88. Higher number of leaves was recorded in CG Amaranthus-1 (26.36) followed by 2012/AMVAR-5 (23.79), 2012/AMVAR-1 (20.52) and Lowest number of

Table-1 : Analysis of variance for leaf yield and its component characters in Amaranthus.

S.No.	Character (df)	Mean sums of square		
		Replication	Treatment	Error
		3	9	27
1	Plant height (cm)	5.674	5.862*	2.381
2	Plant weight (gm)	46.667	133.489*	53.148
3	Number of leafs/plant	0.899	24.774**	1.795
4	Leaf length (cm)	0.454	6.588**	0.802
5	Leaf width (cm)	0.753	1.172*	0.514
6	Leaf weight (gm)	0.008	1.756**	0.015
7	Stem weight (gm)	0.137	5.808**	0.223
8	Stem girth (cm)	0.036	0.320**	0.025
9	Internodal length (cm)	0.018	0.492**	0.060
10	Petiole length (cm)	0.061	0.874**	0.107
11	Panicle length (cm)	0.975	8.920**	2.578
12	Number of cutting	0.467	1.789**	0.522
13	1000 seed weight (gm)	0.005	0.006**	0.002
14	Seed yield (gm/ plant)	3.811	4.776**	1.428
15	Crop duration	6.958	170.081*	70.236
16	Leaf yield (kg/plot)	92.737	22.131**	6.468

*: Significant at 5%, **: Significant at 1%

leaves was found in 2012/AMVAR-6 (18.36) followed by 2012/AMVAR-2 (18.61), 2012/AMVAR-3 (18.87).

The leaf length ranged from 4.83 cm (2012/AMVAR-1) to 8.98 cm (Arun) with an overall mean of 6.14 cm. Higher leaf length was recorded in Arun (8.98 cm) followed by Arka Saguna (7.78 cm), CG Amaranthus-1 (6.30 cm) and lowest leaf length was found in 2012/AMVAR-1 (4.83 cm) followed by 2012/AMVAR-3 (5.33 cm), 2012/AMVAR-6 (5.37 cm).

The leaf width ranged from 3.45 cm (2012/AMVAR-1) to 5.06 cm (CG Amaranthus-1) with an overall mean of 4.35 cm. Higher leaf width was recorded in CG Amaranthus-1 (5.06 cm) followed by Arka Saguna (5.00 cm), Arun (4.98 cm) and Lowest leaf width was found in 2012/AMVAR-1 (3.45 cm) followed by 2012/AMVAR-5 (3.82 cm), 2012/AMVAR-7 (4.04 cm).

The leaf weight ranged from 1.27 g (2012/AMVAR-2) to 2.84 g (Arun) with an overall mean of 1.88 g. Higher leaf weight was recorded in Arun (2.84 g) followed by Arka Saguna (2.82 g), CG Amaranthus-1 (2.82 g) and lowest leaf weight was found in 2012/AMVAR-2 (1.27 g) followed by 2012/AMVAR-2 (1.39

g), 2012/AMVAR-1 (1.66 g).

The stem weight ranged from 7.38g (2012/AMVAR-1) to 11.49g (CG Amaranthus-1) with an overall mean of 8.79g. Higher stem weight was recorded in CG Amaranthus-1 (11.49g) followed by 2012/AMVAR-7 (10.13 g), Arka Saguna (9.34 g) and lowest stem weight was found in 2012/AMVAR-1 (7.38 g) followed by 2012/AMVAR-6 (8.13g), 2012/AMVAR-4 (8.14g).

The stem girth ranged from 1.47 cm (2012/AMVAR-2) to 2.39 cm (CG Amaranthus-1) with an overall mean of 1.66 cm. Higher stem girth was recorded in CG Amaranthus-1 (2.39 cm) followed by Arun (1.86 cm), 2012/AMVAR-4 (1.69 cm) and lowest stem girth was found in 2012/AMVAR-2 (1.47 cm) followed by 2012/AMVAR-3 (1.54 cm), 2012/AMVAR-5 (1.49 cm).

The internodal length ranged from 1.36 cm (2012/AMVAR-1) to 2.51 cm (Arka Saguna) with an overall mean of 1.78 cm. Higher intermodal length was recorded in Arka Saguna (2.51 cm) followed by 2012/AMVAR-4 (2.21 cm), 2012/AMVAR-6 (1.84 cm) and lowest intermodal length was found in 2012/AMVAR-1

Table-2 : Mean Performance for leaf yield and its components in Amaranthus

Genotypes	Characters														
	Plant height (cm)	Plant weight (gm)	No. of leaves /plant	Leaf length (cm)	Leaf width (cm)	Leaf weight (gm)	Stem weight (gm)	Stem girth (cm)	Internod- Petiole al length (cm)	Panicle length (cm)	No. of cutting	1000 seed wt. (gm)	Seed yield (g/plant)	Crop duration (Days)	Leaf yield (kg/plot)
2012/AMVAR-1	10.49	52.50	20.52	4.83	3.45	1.66	7.38	1.54	1.36	2.50	4.25	0.77	11.54	120.50	14.67
2012/AMVAR-2	8.39	62.50	18.87	5.75	4.38	1.27	8.50	1.47	1.39	3.39	4.25	0.80	8.52	118.50	13.61
2012/AMVAR-3	9.61	65.25	18.61	5.33	4.05	1.39	8.27	1.54	1.58	2.68	4.25	0.82	10.83	121.50	14.69
2012/AMVAR-4	9.77	62.50	19.98	6.15	4.50	1.48	8.14	1.69	2.21	3.70	4.00	0.74	11.02	122.50	17.83
2012/AMVAR-5	9.06	70.00	23.79	5.57	3.82	1.67	8.33	1.49	1.72	3.43	4.00	0.73	9.44	100.25	15.84
2012/AMVAR-6	10.39	56.75	18.56	5.37	4.24	1.42	8.13	1.49	1.84	3.47	4.00	0.85	10.98	119.25	13.56
2012/AMVAR-7	11.97	70.50	20.67	5.35	4.04	1.48	10.13	1.57	1.67	2.71	3.75	0.83	9.91	120.50	17.41
Arka saguna	9.17	64.75	19.83	7.78	5.00	2.82	9.34	1.55	2.51	3.38	5.50	0.78	9.35	121.00	13.62
Arrun	9.99	57.00	21.63	8.98	4.98	2.84	8.23	1.86	1.84	3.59	4.25	0.77	8.89	116.00	10.13
CG Amaranthus-1	12.15	60.25	26.36	6.30	5.06	2.82	11.49	2.39	1.72	2.57	5.75	0.81	11.37	114.75	17.36
Mean (x)	10.10	62.20	20.88	6.14	4.35	1.88	8.79	1.66	1.78	3.14	4.40	0.79	10.18	117.48	14.87
SEm±	0.771	3.645	0.670	0.448	0.359	0.062	0.236	0.079	0.122	0.164	0.361	0.021	0.597	4.190	9.927
CD (p=0.05)	2.2386	10.5772	1.9440	1.2994	1.0406	0.1797	0.6856	0.228	0.3542	0.4747	1.0485	0.0599	1.7337	12.1592	3.69
CV (%)	15.28	11.721	6.417	14.589	16.485	6.576	5.373	9.476	13.702	10.421	16.424	5.235	11.735	7.134	17.104

(1.36 cm) followed by 2012/AMVAR-3 (1.58 cm), 2012/AMVAR-2 (1.39 cm).

The petiole length ranged from 2.50 cm (2012/AMVAR-1) to 3.70 cm (2012/AMVAR-4) with an overall mean of 3.14 cm. Higher petiole length was recorded in 2012/AMVAR-4 (3.70 cm) followed by Arun (3.59 cm), 2012/AMVAR-7 (3.47 cm) and lowest petiole length was found in 2012/AMVAR-1 (2.50 cm) followed by 2012/AMVAR-3 (2.68 cm), CG Amaranthus-1 (2.57 cm).

The panicle length ranged from 9.75 cm (CG Amaranthus-1) to 14.17 cm (2012/AMVAR-1) with an overall mean of 12.99 cm. Higher panicle length was recorded in 2012/AMVAR-1 (14.17 cm) followed by Arun (14.70 cm), 2012/AMVAR-4 (14.08 cm) and lowest panicle length was found in CG Amaranthus-1 (9.75 cm) followed by 2012/AMVAR-6 (11.36 cm), Arka Saguna (12.39 cm).

The number of cutting ranged from 3.75 (2012/AMVAR-7) to 5.75 (CG Amaranthus-1) with an overall mean of 4.40. Higher number of cutting was recorded in CG Amaranthus-1 (5.75) followed by Arka Saguna (5.50), 2012/AMVAR-1 (4.25) and lowest number of cutting was found in 2012/AMVAR-7 (3.75) followed by 2012/AMVAR-1 (4.25), 2012/AMVAR-4 (4.00).

The 1000 seed weight ranged from 0.73g (2012/AMVAR-5) to 0.85g (2012/AMVAR-6) with an overall mean of 0.79 g. Higher 1000 seed weight was recorded in 2012/AMVAR-6 (0.85 g) followed by 2012/AMVAR-7 (0.83 g), 2012/AMVAR-3 (0.82 g) and lowest 1000 seed weight was found in 2012/AMVAR-5 (0.73 g) followed by 2012/AMVAR-1 (0.77 g), 2012/AMVAR-4 (0.74).

The seed yield per plant ranged from 8.52 g (2012/AMVAR-2) to 11.54g (2012/AMVAR-1) with an overall mean of 10.18 g. Higher seed yield per plant was recorded in 2012/AMVAR-2 (11.54 g) followed by CG

Amaranthus-1 (11.37 g), 2012/AMVAR-3 (0.82 g) and lowest seed yield per plant was found in 2012/AMVAR-2 (8.52 g) followed by 2012/AMVAR-5 (9.44 g), Arun (8.89 g).

The crop duration ranged from 100.25 days (2012/AMVAR-5) to 122.50 days (2012/AMVAR-4) with an overall mean of 117.48. Higher crop duration was recorded in 2012/AMVAR-4 (122.50 days) followed by 2012/AMVAR-3 (121.50 days), 2012/AMVAR-1 (120.50 days) and lowest crop duration was found in 2012/AMVAR-5 (100.25 days) followed by Arun (166.00 days), CG Amaranthus-1 (114.75).

The leaf yield ranged from 10.13 kg/plot (Arun) to 17.83 kg/plot (2012/AMVAR-4) with an overall mean of 14.87 kg/plot. Higher leaf yield was recorded in 2012/AMVAR-4 (17.83 kg) followed by 2012/AMVAR-7 (17.41 kg), CG Amaranthus-1 (17.36 kg) and lowest leaf yield was found in Arun (10.13 kg) followed by Arka Saguna (13.61 kg), 2012/AMVAR-2 (13.61 kg).

The mean performance for leaf yield kg per plot of 2012/AMVAR-4 was superior among all the genotype and the analysis of variance showed that considerable variability existed among the genotypes for most of the traits showing possibilities of further genetic improvement in amaranthus.

References

- Panase, V.G. and Sukhatme, P.V., 1967. Statistical methods for agricultural workers. ICAR, New Delhi : 97-151.
- Katiyar, R.S.; Shukla, S. and Rai, S., 2000. Varietal performance of grain amaranth (*A. hypochondriacus*) on sodic soil. Proceedings of the National Academy of Sciences, **70**(2) : 185–187.
- Varalakshmi, B., 2004. Characterization and Preliminary Evaluation of Vegetable Amaranth (*Amaranthus* spp.) Germplasm. *Plant Genetic Resources Newsletter*, **137** : 55-57.