



Variability in grain amaranth (*Amaranthus hypochondriacus*)*

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Grain amaranth (*Amaranthus hypochondriacus* L.) is a unique, nutritionally rich non-cereal crop capable of combating malnutrition and has been identified as an alternative crop to traditional grain crops. Despite its nutritional importance (Bhuvanewari *et al.* 2001) and genetic diversity, no systematic work has so far been initiated to assess the performance and yield potential of the crop under

Kerala conditions. Hence, the present study was undertaken to evaluate the variability in the collected grain amaranth accessions and identification of superior genotypes for homestead and commercial cultivation.

The study was carried out in the Department of Olericulture, Kerala Agricultural University, Vellanikkara, during October 2005–February 2006 with 23 grain amaranth

Table 1 Means of different characters of grain amaranth accessions

Accession	Means of different characters					
	Plant height at flowering stage (cm)	Number of branches	Vegetable yield/plant (g)	Leaf stem ratio	Day to flower (days)	Grain yield/plant (g)
'GA 2'	56.50	5	108.00	1.90	40	51.00
'GA 4'	64.10	6	106.00	2.20	45	52.50
'GA 11'	62.00	5	101.3	2.50	40	52.50
'GA 13'	74.50	5	124.00	3.50	43	53.30
'GA 15'	72.00	13	110.00	3.26	50	92.00
'GA 20'	134.20	15	195.40	3.72	79	115.60
'GA 22'	53.20	5	107.00	3.40	32	49.90
'GA 23'	78.30	8	125.50	3.50	66	57.50
'GA 24'	95.56	15	192.00	2.87	78	112.00
'GA 25'	124.10	18	200.00	3.10	84	128.00
'GA 26'	124.90	14	190.00	2.95	76	98.20
'GA 27'	124.00	16	154.80	3.00	73	94.40
'GA 28'	90.24	15	150.00	2.36	72	92.00
'GA 29'	91.95	13	149.00	3.06	71	90.20
'GA 30'	90.10	12	140.00	1.38	71	90.30
'GA 31'	138.34	16	209.00	3.21	95	120.00
'GA 32'	86.00	14	139.00	3.20	70	90.00
'GA 33'	67.10	7	120.00	1.90	70	73.20
'GA 34'	78.00	14	109.55	2.70	64	77.00
'GA 35'	66.26	9	128.00	2.16	68	58.00
'GA 36'	60.00	7	116.00	2.38	68	50.20
'GA 37'	84.00	12	130.40	1.60	68	79.00
'GA 38'	71.25	10	110.50	2.10	72	71.60
(<i>P</i> =0.05)	6.94	4.88	13.13	0.57	10.57	7.49

*Short note

Based on the MSc thesis of the first author submitted to KAU during 2007

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accessions in randomized block design with two replications in a plot size of 2m² per genotype. The crop was raised as per the package of practices, recommendations of KAU (KAU 2007).

Table 2 Range, mean, genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability, genetic advance(GA) and genetic gain as percentage of mean in grain amaranth accessions for important characters

Character	Range	Mean \pm SEm	GCV	PCV	Heritability (%)	GA	GA% of mean
Plant height at flowering stage(cm)	53.2–138.34	95.2435 \pm 2.08	30.00	30.19	98.7	52.95	61.39
Number of branches	5–18	11.0652 \pm 1.46	36.24	40.81	78.8	7.33	66.24
Vegetable yield/plant (g)	101.3–209	155.8022 \pm 3.95	24.51	24.84	97.4	69.27	49.83
Leaf stem ratio	1.38–3.72	2.6933 \pm 0.17	23.53	25.22	87.0	1.22	45.29
Days to flower	32–95	63.5478 \pm 3.18	25.56	26.50	93.0	36.28	50.78
Grain yield/plant(g)	49.9–128	87.1417 \pm 2.25	49.40	49.83	98.3	49.59	100.91

All the 23 grain amaranth accessions exhibited significant differences for all the characters studied (Table 1) and the extent of variability with respect to yield and its component characters were measured and presented in Table 2.

Plant height at flowering was maximum in accession 'GA 31' (138.34 cm), followed by 'GA 20' (134.2 cm) and 'GA 26' (124.9 cm). 'GA 22' was dwarf with a plant height of 53.2 cm (Table 1). The mean value for this character as observed in Table 2 was 95.24 cm. PCV and GCV values were 30.19 and 30.00 respectively and genetic advance was 52.95. Heritability estimated for this character was the highest (98.7%) which reveals better chances of further improvement through selection.

Number of branches varied from 5 to as high as 18/plant. Maximum number of branches (18) was observed in 'GA 25' followed by 'GA 27' (16) and 'GA 31' (16) (Table 1) and minimum (5) in accessions 'GA 2', 'GA 11', 'GA 13' and 'GA 22'. The mean value recorded for this character was 11.06 (Table 2) with GCV and PCV values of 36.24 and 40.81, respectively. Values for heritability and genetic advance were 78.8% and 7.33, respectively. Variations in plant height and number of branches/plant was reported earlier by Sindhu (2002) in amaranth.

Vegetable yield obtained from a plant was maximum in 'GA 31' (209 g) and minimum in 'GA 11' (101.3 g). Values for PCV, GCV and genetic advance were 24.84, 24.51 and 69.27 respectively. Heritability estimated for this character was 97.4%. The existence of high variability for yield and yield attributes in amaranths was reported by many workers (Sukla and Singh 2000, Krishnakumary 2000).

Leaf stem ratio is an important character in amaranth indicating the palatability of the produce. In this study, maximum leaf stem ratio recorded was in 'GA 20' (3.72) and minimum in 'GA 30' (1.38) (Table 1). Number of days taken for 50% flowering ranged from 32 to 95 with a mean value of 63.54. Early flowering was noticed in accession 'GA 22' (32 days) and 'GA 31' was the late bolter which took 95 days for flowering. Heritability and genetic advance noticed for this character were 93% and 36.28, respectively (Table 2). Late flowering types were found to be high vegetable yielders since more number of harvests of greens were obtained.

The grain yield/plant ranged from 49.9 g in 'GA 22' to 128 g in 'GA 25'. Phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV) values were the highest in this character recording 49.40 and 49.83, respectively. Heritability were also high with an average value of 98.3% revealing better chance for further improvement in this trait. This increase in grain yield can be attributed to increase in plant height, number of branches, leaf width, leaf length and crop duration and similar observation was reported by Sudhir *et al.* (2003).

SUMMARY

An experiment was conducted to evaluate the variability and performance of 23 grain amaranth accessions in the plains of Kerala. Results of this study showed that 'GA 31' exhibited maximum plant height (138 cm) and vegetable yield/plant (209 g). Highest number of branches (18) and grain yield/plant (128 g) was observed in 'GA 25'. The study showed that phenotypic coefficient of variation was higher than genotypic coefficient of variation for most of the traits and it ranged from 12.64 to 49.83. High genotypic coefficient of variation with high heritability and genetic advance were recorded for grain yield and plant height at flowering suggesting good scope for selection.

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