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Studies on Growth and Yield Performance of Grain Amaranthus (*Amaranthus* spp.) Genotypes

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Abstract: Field experiment was conducted during *Kharif* 1988, at Dharwad to know the performance of grain amaranth genotypes. Among the genotypes IC 35463 recorded higher plant height, more number of leaves total drymatter production and highest grain yield (8.25 q/ha). It was on par with IC 420005 and IC 21930.

Introduction

Amaranth (*Amaranthus* spp. L.) is a quick growing pseudo cereal crop and is commonly known as rajagirah. Amaranth originated in Central America is widely grown in many tropical and sub tropical countries. This is an important crop and is widely spread in India. The crop is highly resistant to drought and diseases and best suited to extreme stress condition and in crop rotation. This crop is commonly grown in Northern and Southern hilly regions of India, (Joshi *et al.*, 1983) for both greens grains. Considering its high drought resistance nature, fast growing habit due to its potentiality there is a need to study the performance of this crop in Karnataka. Hardly few attempts have been made to ascertain its yield potential in India in general and Karnataka in particular.

Material and Methods

Field experiment was conducted at Agricultural College Farm, Dharwad to assess the performance of grain amaranthus genotypes on black clay loam soil during *Kharif* 1988. Seven genotypes were laidout in factorial RBD with four replications. The soil was analysed before sowing for physical and chemical charactersitics. The soil pH was 7.5 with moderate total nitrogen (0.053%) and available potassium (212 kg/ha) but low in available phosphorus (13.3 kg/ha). the crop received 100:50:50 kg N:P:K/ha in 45 cm X 10 cm spacing. Intercultivation followed by two hand weedings were made at 15 and 25 days after sowing in all the treatments.

The crop received an annual rainfall of 731 mm. Observations were recorded on growth and yiled parameters at 60, 75 days after sowing and at harvest. The grain yield and 1000-grain weight were also recorded at harvest. The crop was harvested at complete maturity stage from the net plot of 2.7 X 3.0 m size (125 days after sowing) and yield per plot was converted to hectare basis.

Results and Discussion

The performance of genotypes with respect to grain yield/ha and 1000-grain weight presented in table 2. The genotype IC 35463 produced highest grain yield (8.25 q/ha), which was on with IC 42006 (8.08 q/ha), IC 35711 produced lowest grain yield (4.19 q/ha), which was on par with Aedulils (5.78 q/ha).

The differences in grain yield of genotypes may be attributed to the differences in their yield components. Higher yields in IC 35463 may be attributed to higher number of spikelets (58.6/ear) and higher grain weight per ear (37.65 g) (Table 2). Mohideen and Rajgopal (1975) found that increased yiled of amaranth genotypes was due to the increased number of spikelets and individual plant yield (grain weight/ear). The higher grain yield of IC-35463 (8.25 q/ha) and IC-42006 (8.08 q/ha) was due to their higher grain weight per ear (37.65 g and 36.63 g respectively), mainly as a consequence of higher number of spikelets per ear and also higher 1000-grain weight.

The data on plant height and number of leaves are presented in table 1. The genotypes differed significantly with respect to height of plant at 60, 75 DAS and at harvest. At 60 DAS significantly higher plant height was noticed in Akola local, IC 5564, IC 35463 and IC 21980 compared to other two genotypes. Akola local recorded highest plant height (114.30 cm) and lowest with IC 35711 (79.40 cm).

At 75 DAS, IC 35463 registered highest plant height (146.5 cm) followed by Akola local (136.6 cm). In turn these three genotypes were found on par. Aedulis recorded significantly lower plant height (99.3 cm) which was on par with that of IC 35711 (102.7 cm).

At harvest also, there was significant difference in plant height among the genotypes. IC-35463 was the tallest (151.40 cm) followed by IC-42006 and lowest recorded with IC-35711 (113.13 cm), which was on par with Aedulis. These results are in conformity with the findings of Mohideen *et al.* (1983).

The data on number of green leaves per plant (Table 1) differed significantly in genotypes at 60 and 75 DAS. At 60 DAS, IC 21930 recorded significantly higher number of green leaves and on par with IC 35463. At 75 DAS, IC 35463 recorded more number of leaves (69.90)m which was on par with Akola local, IC 21930 and IC 42006 lowest number of leaves were registered with IC 35711 (47.60). Joshi (1981), was also observed watch differences in number of leaves in various genotypes.

The data on number of greeen leaves per plant (Table 1) differed significantly in genotypes at 60 and 75 DAS. At 60 DAS, IC-21930 recorded significantly higher number of green leaves and on par with IC-35463. At 75 DAS, IC-35463 recorded more number of leaves (69.90), which was on par with Akola local, IC-21930, and IC-42006 lowest number of leaves were registered with IC-35711 (47.60). Joshi (1981), also observed such differences in number of leaves in various genotypes.

The grain yield of a genotype mainly depends on the total drymatter production and its accumulation in ear after flowering, as the major portion of the dry matter produced during the post flowering period is translocated to the ear. In the present experiment it was observed that (Table 1), IC-35463 produced maximum dry matter per plant (125.75 g) at harvest, followed by IC-42006 (112.48 g). Aedulis registered the lowest total dry matter per plant (77.79 g). However, interaction were found to be significant. Naidu *et al.* (1982) observed wide variation in the drymatter accumulation among four species of grain amaranth.

The differences in grain yield of genotypes may also be related to the drymatter acucmulation in the ear at harvest. The darymatter accumulation in ear at harvest was highest in IC-35463 (70.25 g) followed IC-42006 (67.98 g) and the lowest in IC-35711 (46.9 g).

Table 1. Plant height (cm) and number of leaves per plant of grain amaranth genotypes at various stages

Genotypes	Plant height (m)			No. of leaves		Drymatter distribution (g/plant)		
	60 DAS	75 DAS	125 DAS	60 DAS	75 DAS	Stem	Ear	Total
Akola local	111.40	136.60	144.33	34.00	62.00	36.06	60.99	97.05
Aedulis	88.93	99.30	119.13	33.60	52.70	37.37	50.42	87.79
IC 42006	105.80	128.30	144.53	32.80	49.60	44.50	67.98	112.48
IC 35711	79.40	102.70	113.13	26.90	47.60	47.31	46.90	94.21
IC 21930	105.33	133.30	142.20	37.60	60.30	50.50	61.15	111.65
IC 35463	109.40	146.50	151.40	37.20	69.90	45.50	70.25	125.75
IC 5564	111.00	129.00	136.00	28.60	56.40	40.34	58.41	98.75
S.Em±	5.37	6.57	9.65	2.50	4.56	2.78	2.68	4.61
C.D. at 5%	16.55	13.72	29.73	7.90	14.05	8.55	8.28	14.23

Table 2. Dry matter distribution on various parts of plant of harvest (g)

Genotypes	Inflorescence Length (cm)		No. of spikelets per inflore-scence	Mean length of spikelet (at harvest)	Grain weight per ear (g)	1000-grain weight (g)	Grain yield (q/ha)	Straw yield (q/ha)	Harvest index
	75 DAS	At harvest							
Akola local	39.90	59.46	44.60	29.80	28.97	0.575	6.85	50.61	0.120
Aedulis	35.73	55.33	44.00	30.30	26.86	0.532	5.78	50.65	0.105
IC 42006	38.33	67.26	52.60	30.80	36.64	0.585	8.08	45.79	0.137
IC 35711	19.33	53.40	38.30	30.60	20.64	0.490	4.19	49.70	0.007
IC 21930	37.53	59.16	52.40	32.30	34.78	0.621	7.46	40.86	0.171
IC 35463	41.30	68.06	58.60	30.10	37.65	0.620	8.25	44.07	0.157
IC 5564	42.06	63.83	46.30	31.80	30.63	01.549	6.23	47.17	0.133
S.Em±	2.38	2.72	3.00	1.68	1.9714	0.060	0.52	0.78	0.020
C.D. at 5%	7.34	8.40	9.24	NS	5.265	NS	1.63	2.41	NS

NS = Non-significant.

The grain yield also followed the similar trend. More of the total drymatter proudced by IC-35711 went into vegetative part (50.2 per cent of total) rather than to reproductive part and hence resulted in lower grain yield.

The genotypes differed markedly with respect to straw yield (Table 2). Aedulis recorded the highest straw yield (50.65 q/ha) which was on par with Akola local (50.61 q/ha) and IC-35711 (49.70 q/ha). The lowest straw yield was produced by IC-21930 (40.86 q/ha). Genotypes did not differ significantly with respect to harvest index.

The results indicated that IC-35463, IC-42006 and IC-21930 are good yielders of grain as well as fodder as compared to other genotypes.

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