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Performance of *Amaranthus* (*Amaranthus spp.*) Genotypes for Growth, Herbage Yield and Seed Yield in Prayagraj Agro-climatic Conditions

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ABSTRACT

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A field experiment entitled “Performance of *Amaranthus* genotypes for growth, herbage yield and seed yield in Prayagraj Agro-Climatic condition” was carried out at research field, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, (Deemed-to-be University), Prayagraj, during the *Kharif* season of (2018-2019). Five plants were selected randomly from each plot and were tagged and maintained as observational plants for recording their growth and yield characters of *Amaranthus*. The Experiment was laid out in a Randomized Block Design with 15 treatments and 3 replications. Results revealed that the maximum Seed yield (kg/ha) was observed in T₁₀:Farmer variety (Tirupati) (17.58 kg/ha) influenced most of the characteristics significantly and recorded the highest values of plant height (35.10cm), number of leaves per plant (50.90), Number of branches per plant (4.40), leaf length (11.47 cm), Days to clipping (51.67), Days to first flowering (91.87), Days to first seed maturity (102.83), Spike length (13.23 cm²), Herbage yield per plant (77.89 g), Herbage yield per plot (2.94 kg), Herbage yield per ha (17.58 t/ha) and Seedyield per plant(6.07 g), per plot (42.47 g), per hectare (232.55kg/ha).

Introduction

Amaranthus (*Amaranthus spp.*), 2n=34 belongs to family Amaranthaceae. Amaranthus is from Greek meaning “not to wither” and refers to the persistent flower spike. It is high in Vitamin C, Calcium, Iron and other minerals. The nutritive value for 100 g of amaranthus has Moisture 91.6 g, Protein 2.46g, Minerals 0.6 g, Fibre 9.6 g, Carbohydrates 4.02 g, Energy 23 K Cal, Calcium 510 mg, Phosphorous 50 mg, Iron

2.32g, Thiamine 0.027mg, Riboflavin 0.158mg, Niacin 0.658 mg, Vitamin C 43.3 mg. India is the world’s second largest producer of vegetables next to China. According to estimation, India produces 87.50 million tonnes of vegetables from an area of 5.80 million hectares. *Amaranthus* belong to the family Amaranthaceae and genus *Amaranthus*. The family Amaranthaceae comprises 65 genera and 850 species. The genus *Amaranthus* includes 56 species. The important species of leafy amaranthus are: A.

tricolor, *A. dubius*, *A. lividus*, *A. blitum*, *A. tritris*, *A. spinosus*, *A. viridis* and *A. gracizans*. The most common and popular grain Amaranthus species are *A. hypochondriacus*, *A. cruentus* and *A. caudatus*.

One of the reasons there has been recent interest in amaranth is because of its useful nutritional qualities. The grain has 12 to 17% protein, and is high in lysine, an essential amino acid in which cereal crops are low. Amaranth grown at Arlington, WI in 1978 had protein levels of 16.6 to 17.5%. The grain is high in fiber and low in saturated fats, factors which contribute to its use by the health food market. Recent studies have linked amaranth to reduction in cholesterol in laboratory animals.

Thus, India shares about 12% of world's output of vegetables (Thamburaj and Singh, 2001). In India, it is cultivated in an area of 2500 hectares with an annual production of 50,000 tonnes.

The organics are the indigenous source of nutrients which can help in increasing production and productivity along with improvement in soil physical conditions. Use of such organic materials, which are being wasted in large amounts without proper use can help in reducing cost of cultivation, increasing productivity and improving soil as well as human and livestock health. Various organic manures so far recognized in this group are green manures, rural/urban compost, farm yard manure, vermicompost, liquid organic manure etc.

Materials and Methods

The present experiment "Performance of Amaranthus genotypes for Growth, Herbage yield and seed yield in prayagraj agro-climatic conditions" was done in Horticulture research field, Department of Horticulture,

Naini Agricultural Institute, SHUATS, Prayagraj region was conducted during the year 2018-2019. The varieties used for the experiment are farmer varieties which were collected from local areas of Telungana and Andhra Pradesh. The observations were recorded on five randomly selected plants per replication was conducted in Randomized block design (RBD) with 15 treatments and 3 replications.

The data collected on different parameters during the course of investigation were subjected to statistical analysis as per method of analysis of variance (Panse and Sukhatme 1957). The significance and non – significance of the treatment effect was judged with the help of 'F' variance ratio test. Calculated 'F' value was compared with the table value of 'F' at 5 % level of significance. If calculated value exceeds the table value, the effect was considered to be significant. The significant differences between the means were tested critical differences at 5% level of significance.

Results and Discussion

The detail pertaining to the research finding were presented and summarized below in this chapter.

The maximum plant height (35.10cm) was observed in the treatment T₁₀: Farmer variety (Tirupathi) and the minimum plant height (18.13cm) was observed in Treatment T₁: (Rangareddy). The maximum number of leaves (50.90) was observed in the treatment T₁₀: Farmer variety (tirupathi) and the minimum number of leaves (20.42) was observed in Treatment T₁: (Rangareddy). The highest number of branches was found in treatment T₁₀(9.30) at 45DAS and the lowest number of branches was found in treatment T₉: (5.87) Farmer variety (Eluru) (Table 1).

Table.1

Treatments	Treatment combination	Plant height (cm)	Number of leaves	Number of branches	Plant spread(cm^2)	Leaf size (cm)	Days to clipping	Days to flowering	Days to seed maturity	Spike length (cm)	Herbage yield (kg/plot)	Herbage yield (t/ha)	Seed yield (g/plot)	Seed yield (kg/ha)
T ₁	Farmer variety (Rangareddy)	18.13	26.47	2.33	12.93	7.83	57.67	80.73	91.80	7.93	1.44	9.63	15.63	103.69
T ₂	Farmer variety (Warangal)	21.37	31.50	2.70	15.77	7.33	55.00	83.80	96.73	9.00	1.70	13.57	16.57	109.43
T ₃	Farmer variety (Garla)	25.33	44.50	3.13	13.80	7.80	54.33	79.00	95.30	10.17	2.43	14.59	28.23	97.24
T ₄	Farmer variety (Kesamuobram)	18.83	29.30	2.53	15.57	9.23	53.33	79.13	92.07	8.37	1.59	13.63	18.43	100.41
T ₅	Farmer variety (Nekonda)	25.83	35.20	3.17	15.37	8.27	55.33	84.30	99.87	11.10	1.95	12.48	32.20	112.65
T ₆	AMVAR1 (Check)	23.97	33.27	2.73	14.97	7.10	55.67	81.67	92.70	9.67	1.81	15.29	22.17	168.42
T ₇	Farmer variety (Bhimavaram)	27.20	44.47	3.30	19.57	7.87	51.67	77.50	95.00	11.47	2.46	14.62	32.90	128.58
T ₈	Farmer variety (Kumaradevam)	28.57	46.80	3.67	17.27	8.57	53.00	87.03	101.47	12.37	2.70	8.53	35.70	136.68
T ₉	Farmer variety (Eluru)	20.77	41.93	2.37	16.20	7.30	51.33	76.00	90.67	8.57	2.21	16.56	17.73	176.84
T ₁₀	Farmer variety (Tirupati)	35.10	50.90	4.40	25.33	11.47	51.67	75.40	88.47	13.23	2.94	17.58	42.47	232.55
T ₁₁	Farmer variety (Guntur)	26.50	43.20	2.87	20.43	9.17	51.33	82.20	95.67	11.87	2.31	14.21	34.77	120.48
T ₁₂	Farmer variety (Rajahmundry)	25.03	39.10	2.57	15.47	7.30	52.00	76.83	93.20	10.53	2.07	9.42	28.70	95.57
T ₁₃	Farmer variety (Kurnool)	31.50	49.60	4.13	16.33	6.27	51.00	89.07	101.80	12.77	2.91	10.79	30.47	104.83
T ₁₄	Farmer variety (Nellore)	12.93	23.77	2.07	10.90	7.00	55.67	91.87	102.83	7.37	1.43	8.43	13.53	89.01
T ₁₅	Farmer variety (Visakapatanam)	25.20	40.53	2.70	16.73	7.63	54.33	84.30	93.90	9.43	2.27	10.39	22.40	110.46
F-Test		S	S	S	S	S	S	S	S	S	S	S	S	S
S.Ed. (+)		1.252	1.423	0.354	0.922	1.269	1.379	1.654	1.878	0.240	0.100	0.309	5.99	0.703
C. D. at 0.5		0.611	0.695	0.173	0.450	0.620	0.673	0.808	0.917	0.117	0.049	0.151	2.928	0.343

The highest leaf length was found in treatment T₁₀: Farmer variety (Tirupathi) (11.47cm) and the lowest leaf length was found in treatment T₁₃: (7.00cm) Farmer variety (Nellore). The minimum days to clippings is about (39.33 1st clipping) was found in treatment T₁₀:Farmer variety (Tirupathi) and maximum in T₁: (Rangareddy) (46.67days) and minimum days to 2nd clipping was found in treatment T₁₁: (51.33days) and highest in T₁ (Rangareddy) (57.67days). Minimum days to first flowering was about (75.40days) was found in Treatment T₁₀ (Tirupathi) and maximum was recorded about (91.87days) in Treatment T₁₄ (Nellore). The highest spike length was found in treatment T₁₀:Farmer variety (Tirupathi) (13.23cm) and the lowest spike length was found in treatment T₁₄: (7.37cm) Nellore variety.

Highest herbage yield per plant (77.89g), per plot (2.94 kg) per hectare(17.58t/ha) was recorded in treatment T₁₀:Farmer variety (Tirupathi) and the and lowest herbage yield per plant(58.56g),per plot(1.43kg), per hectare(8.43t/ha) was obtained in treatment T₁₄:(Nellore variety). Highest seed yield per plant (8.37g), per plot (42.47g), per hectare (232.55kg/ha) was recorded in treatment T₁₀:Farmer variety (Tirupathi) and lowest seed yield per plant (1.93g), per plot(13.53g), per hectare(89.01kg/ha) obtained in treatment T₁₄: Farmer variety (Nellore).

On the basis of present investigation it is concluded that the treatment T₁₀:Farmer Variety (Tirupathi) was found to be the best variety in respect of plant growth and yield parameters and showed maximum gross return(204175 Rs/ha), net return(132358 Rs/ha) and benefit: cost ratio i.e., (1:2.84). These findings are based on one season trail, therefore, further evaluation trails are needed to substantiate the findings.

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