The Pharma Innovation Journal 2022; 11(12): 4891-4894

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(12): 4891-4894

www.thepharmajournal.com
Received: 27-09-2022
Accepted: 29-10-2022

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Comparative performance of amaranth (*Amaranthus* spp.) genotypes grown under agro-climatic conditions of Konkan region

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Abstract
The present investigation entitled "Comparative performance of amaranth (*Amaranthus* spp.) genotypes grown under agro-climatic conditions of Konkan region" was carried out at College of Horticulture, Dapoli (MS), Dr. Balasaheb Sawant Konkon Krishi Vidyapeeth Dapoli, Dist. Ratnagiri during *rabi-summer* season in year 2021-2022. The experiment was laid out in Randomized Block Design with fifteen treatments as genotypes replicated thrice. During investigation, the analysis of variance revealed that all the characters for leafy purpose viz. growth parameters and yield and yield attributing characters varied significantly. While studying for the leafy purpose, genotypes T_3 (DPL-AS-3), T_5 (DPL-AS-5), T_6 (DPL-AS-6), T_8 (DPL-AS-8) and T_{11} (DPL-AS-11) were recorded better performance with respect to growth, yield and yield attributing characters under Konkan agro-climatic conditions.

Keywords: Amaranth genotypes, growth parameters and yield

Introduction
Amaranth (*Amaranthus* spp.) is one of the most popular and common leafy vegetables belong to the family Amaranthaceae (Chr. No. =34). It is native to the India or Southern China region. It is grown for vegetable throughout the world due to its suitability to wide range of soil and climate and they bear names in various countries as 'African Spinach', 'Tampala', in China and 'Pig weed' in India. (Cole, 1989) [1]. Tender stems and leaves contains moisture (85.70 %), protein (4.0 g), fat (0.50 g), carbohydrates (6.30 g), calcium (397.0 mg), iron (25.5mg), phosphorus (83.0 mg), vitamin A (9200IU), and vitamin C (99 mg) (Rai and Yadav, 2005) [7].
Amaranth is a warm season vegetable crop. It is adapted to the conditions of hot, humid tropics, but also suitable for temperate climate during summer. Amaranth species that grow under varying climate conditions differ in their day length requirements and respond differently to change in photo and thermoperiodism (Khale *et al*., 2018) [3]. In Maharashtra, it is mostly grown in West coast region especially Ratnagiri, Sindhudurg and Raigad districts of Konkan. In Konkan region, amaranth is grown during rabi and summer seasons after harvesting of kharif rice. However, it shows variation in growth and yield characters, i.e. plant height, leaf shape and leaf colour, behaviour of inflorescence development and method of harvesting either as a single cut or multicut. Therefore, there is ample scope to evaluate suitable cultivars for different purpose under Konkan conditions. Due to its wide variability in morphological characters as well as flowering and fruiting habit; the consumer preference also varies with the locality. Thus, existing biodiversity provides great scope for selection of promising amaranth genotypes for vegetable growers. Hence, there is a need to undertake efforts to accelerate the research activities to evaluate comparative performance of local genotypes to select promising high yielding genotypes from local genotypes to recommend the vegetable growers to enhance the production and productivity. Considering above strength of amaranth in Konkan region, it is proposed to conduct experiment entitled "Comparative performance of amaranth (*Amaranthus* spp.) genotypes under agro-climatic conditions of Konkan region"

Material and Methods
The field experiment was conducted at the Department of Vegetable Science, College of Horticulture, Dapoli. Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli (Maharashtra) during the rabi-summer season, 2021-22. The basic material for the study involved fifteen

genotypes of Amaranth were grown in RBD plot design with Three replications during winter season 2021- 22. The spacing adopted was 30 cm between lines to line. After field preparation, the seeds were sown on the raised beds at 30 cm spacing between two lines. Seeds were sown in lines at 1cm depth on beds.

Treatments Details

Treatments	Genotypes	Treatments	Genotypes
T_1	DPL-AS-1	T_9	DPL-AS-9
T_2	DPL-AS-2	T_{10}	DPL-AS-10
T_3	DPL-AS-3	T_{11}	DPL-AS-11
T_4	DPL-AS-4	T_{12}	DPL-AS-12
T_5	DPL-AS-5	T_{13}	DPL-AS-13
T_6	DPL-AS-6	T_{14}	DPL-AS-14
T_7	DPL-AS-7	T_{15}	DPL-AS-15 (Konkan Durangi)
T_8	DPL-AS-8		

The data on growth and yield attributing characters for herbage yield were recorded on five randomly selected equally competitive plants in each genotype and in each replication for majority of the traits. These five plants were randomly selected by avoiding the border plants and were labelled for recording the observations at 30 days after sowing (DAS). The mean values of five plants used for recording observations were computed for each of the ten characters on herbage yield for each of the genotype in each replication and were subjected to statistical analysis (Panse and Sukhatme, 1985) [5].

Result and Discussion

The comparative performance of various amaranth genotypes grown under Konkan agro-climatic condition is presented in Table 1 the results revealed that differences due to various genotypes were highly significant for all the characters under study.

Among the different genotypes studied, the highest plant height was observed in the genotype T_{10} (24.93 cm) and genotype T_{14} recorded the lowest plant height (15.79 cm). Similar type of variations related to plant height was also reported in amaranth by Warekar (2018) [11], Nachare (2019) [4] and Pharle *et al.* (2019) [6]. The highest number of leaves was recorded in the treatment T_1 (14.93) which was at par with genotype T_{14} (14.67) only and lowest number of leaves were recorded in the genotype T_{13} (8.20). The variation in number of leaves in amaranth was also noticed by Nachare (2019) [4]. The maximum number of branches were recorded in the genotype T_{14} (6.27) which was significantly superior over other genotypes and the lowest number of leaves was recorded in the genotypes T_3, T_7, T_8, T_{10} and T_{13} (0.00). The variation in number of branches in amaranth was also noticed by Pharle *et al.* (2019) [6].

Table 1: Study on growth parameters of amaranth (*Amaranthus* spp.) genotypes under Konkan agro-climatic conditions.

Genotypes	Plant height (cm)	No. of leaves per plant	No. of branches per plant	Leaf length (cm)	Leaf breadth (cm)	Stem diameter (mm)
T_1	21.79	14.93	3.17	7.82	3.99	4.91
T_2	20.56	8.27	3.79	4.86	3.01	3.55
T_3	20.93	9.80	0.00	6.92	4.40	3.33
T_4	18.80	8.40	2.63	6.35	3.25	3.38
T_5	21.73	10.40	4.83	6.35	3.95	4.12
T_6	22.07	8.73	4.13	5.97	3.09	3.14
T_7	17.65	9.67	0.00	6.60	3.94	3.93
T_8	22.42	10.13	0.00	5.29	3.07	3.70
T_9	18.68	10.13	5.08	6.15	3.76	4.37
T_{10}	24.93	8.67	0.00	6.16	2.94	3.74
T_{11}	18.54	8.80	5.16	4.24	3.17	3.82
T_{12}	16.48	8.53	4.37	5.80	3.93	4.15
T_{13}	18.54	8.20	0.00	7.27	3.93	4.86
T_{14}	15.79	14.67	6.27	6.07	2.45	4.30
T_{15}	20.41	10.53	5.30	7.21	4.73	5.20
Range	15.79-24.93	8.20-14.93	0.00-6.27	4.24-7.82	2.45-4.73	3.14-5.20
Mean	19.95	9.99	2.98	6.20	3.57	4.03
Result	SIG	SIG	SIG	SIG	SIG	SIG
S.Em ±	0.49	0.27	0.15	0.26	0.10	0.15
CD@5%	1.43	0.80	0.43	0.75	0.30	0.45

The highest leaf length was exhibited in genotype of T_1 (7.82 cm) which was at par with genotypes of T_{13} (7.27 cm) and T_{15} (7.21 cm). Genotype T_{11} (4.24 cm) had showed the lowest leaf length. These results are in conformity with results of Warekar (2018) [11], Nachare (2019) [4] and Pharle *et al.* (2019) [6]. Highest leaf breadth was recorded in T_{15} (4.73 cm) which was at par with genotype T_3 (4.40) and genotype T_{14} recorded the lowest leaf breadth (2.45 cm). These results are in conformity with results of Warekar (2018) [11], Nachare (2019) [4] and Pharle *et al.* (2019) [6]. Maximum stem diameter was recorded in the genotype T_{15} (5.20 mm) and which was at par with T_1 (4.91 mm) and T_{13} (4.86 mm) and genotype T_6 recorded the minimum stem diameter (3.14 mm). A similar results obtained by Pharle *et al.* (2019) [6] and Shahiba *et al.*, (2020) [8].

The data regarding yield and yield attributing characters of different amaranth genotypes are summarized in Table 2

Table 2: Study on yield and yield attributing characters of amaranth (*Amaranthus* spp.) genotypes under Konkan agro-climatic conditions.

Genotypes	Yield and yield attributing characters			
	Days to first harvest	Number of harvestings	Herbage yield (Kg/plot)	Herbage yield (t/ha)
T_1	28	2.67	2.11	7.02
T_2	25	3.00	2.37	7.89
T_3	24	3.00	5.13	17.09
T_4	27	2.33	2.54	8.48
T_5	24	3.00	2.87	9.56
T_6	25	3.00	5.00	16.68
T_7	24	3.00	5.03	16.77
T_8	23	3.00	4.63	15.44
T_9	24	3.00	2.02	6.73
T_{10}	25	3.00	2.81	9.37
T_{11}	27	3.00	3.62	12.05
T_{12}	28	3.00	2.51	8.37
T_{13}	26	3.00	2.24	7.47
T_{14}	27	2.67	2.00	6.65
T_{15}	27	2.00	2.49	8.29
Range	23-28	2.00-3.00	2.00-5.13	6.65-17.09
Mean	25.6	2.84	3.15	10.52
Result	SIG	SIG	SIG	SIG
S.Em ±	0.14	0.14	0.22	0.76
CD@5%	0.43	0.40	0.65	2.21

Genotype T_8 took minimum days to first harvest (23 days), while T_1 and T_{12} took the maximum days to first harvest (28 days). The variation in days to first harvest in amaranth was also noticed by Nachare (2019) [4]. The highest number of harvestings recorded in genotypes T_2 (3), T_3 (3), T_5 (3), T_6 (3), T_7 (3), T_8 (3), T_9 (3), T_{10} (3), T_{11} (3), T_{12} (3) and T_{13} (3) which was at par with T_1 (2.67) and T_{14} (2.67) genotypes. While, the lowest number of pickings (2.00) was recorded in the genotype T_{15}. The variation in number of harvesting in amaranth was also reported by Nachare (2019) [4].

The genotype T_3 recorded the highest herbage yield i.e. 5.13 kg and which was at par with T_7 (5.03 kg), T_6 (5.00 kg), T_8 (4.63 kg) genotypes and T_{14} recorded that the lowest herbage yield i.e. 2.00 kg. A similar results obtained by Warekar (2018) [11] and Nachare (2019) [4]. The highest yield per hectare was observed in the genotype T_3 (17.09 tonnes) and which was at par with T_7 (16.77 tonnes), T_6 (16.68 tonnes), T_8 (15.44 tonnes) and the lowest herbage yield was observed in genotype T_{14} (6.65 tonnes). Similar type of variations related to herbage yield per hectare was also reported in amaranth by Warekar (2018) [11] and Nachare (2019) [4].

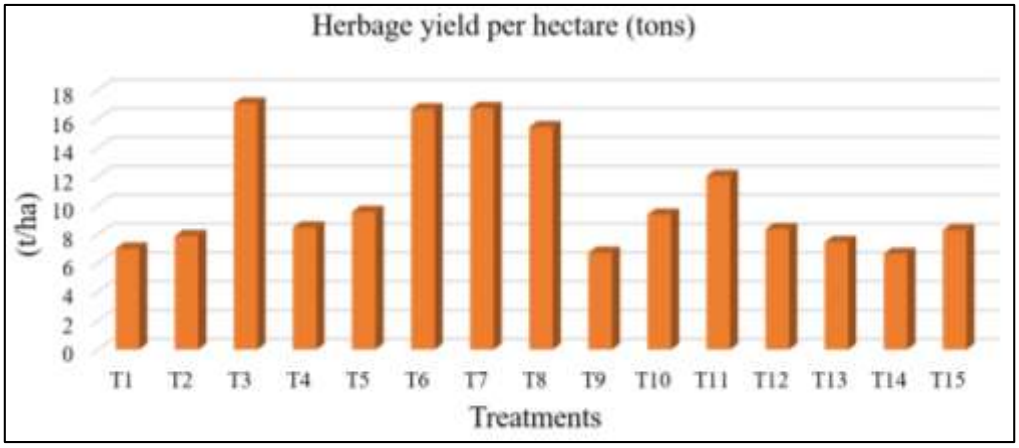

Fig 1: Herbage yield per hectare (tons)

Conclusion

The present investigation on fifteen local amaranth genotypes could be concluded on the basis of growth parameter and yield and yield attributing characters. While studying for the leafy purpose, all the characters were varied significantly and it was found that, genotypes T_3 (DPL-AS-3), T_5 (DPL-AS-5), T_6 (DPL-AS-6), T_8 (DPL-AS-8) and T_{11} (DPL-AS-11) recorded better performance with respect to growth, yield and yield attributing characters under Konkan agro-climatic conditions.

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