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Performance of different amaranth (*Amaranthus spp.*) genotypes for seed production under agro-climatic conditions of Konkan region

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Abstract

The field experiment entitled “Performance of different amaranth (*Amaranthus spp.*) genotypes for seed production 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 fourteen treatments as genotypes along with one check (Konkan Durangi) replicated thrice. During investigation, the analysis of variance revealed that all the characters for seed purpose viz. growth parameters, flowering behaviour and seed yield varied significantly. While studying for seed production purpose, the highest plant height (103.58 cm) and inflorescence length (40.14 cm) were recorded in the genotype T₁₃, the longest terminal inflorescence stalk length was noticed in genotype T₄ (32.21 cm), The earliest days (32.13 days) for flower initiation, highest seed yield per plot and per hectare were observed in the genotype T₈ (279.87 g) and (932.90 Kg). On the basis of mean performance of the genotypes, genotypes T₁₃ (DPL-AS-13), T₈ (DPL-AS-8), T₆ (DPL-AS-6), and T₇ (DPL-AS-7), have been identified as promising genotypes with respect to growth, flowering and seed yield under Konkan agro-climatic conditions. The present study reveals that the genotypes identified should be considered as the promising genotypes and can be used as parental source in breeding programmes for multi-trait improvement.

Keywords: Amaranth, genotypes, performance, growth, flowering behaviour, and seed yield

Introduction

Amaranth (*Amaranthus spp.*) is an important leafy vegetable and grain crop belong to the family Amaranthaceae with chromosome number 2n=24. The family comprises 65 genera and 850 species widely distributed throughout world in tropical, sub-tropical and temperate regions as grain crops, pot herbs, ornamentals and dye plant of which 50-60 species are edible and it is cultivated for leafy as well as grain purpose and few of them are wild species. The most common grain *Amaranthus* species are *A. hypochondriacus*, *A. cruentus* and *A. caudatus*. 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]. It is also known as Chaulai and Math.

Amaranth is a rich source of nutrients; it serves as an alternative source of nutrition for people in developing countries. (Prakash and Pal, 1991 and Shukla et al. 2003) [12]. Tender stems and leaves contain moisture (85.70%), protein (4.0 g), fat (0.50 g), carbohydrates (6.30 g), calcium (397.0 mg), iron (25.5 mg), phosphorus (83.0 mg), vitamin A (9200 IU), and vitamin C (99 mg) (Rai and Yadav, 2005) [13].

Besides its use as a leafy vegetable, grain amaranth seeds are highly nutritious and rich in protein, vitamins and minerals. The tiny seeds of grain amaranth are popped or parched and milled for flour or gruel. The seeds are also most valuable part for industry from which flour could be used as a bread making, biscuits, pasta, almond paste, etc. (Muthukrishnan and Irulappan, 1986; Shanmugavelu, 1989) [7]. The dry seeds of amaranth are used for preparation of snack and food and also used to prepare beverages, including alcohol. It is also used to make ‘ogi’ (fermented product).

Amaranth is a warm season crop. It is adapted to the 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)^[5]. In Maharashtra, amaranth is predominantly cultivated in the Konkan region, especially in Ratnagiri, Sindhudurg and Raigad districts, where it is grown mainly during *rabi*-summer seasons after the harvest of kharif rice. In the Konkan region, considerable genetic and morphological variability exists among local amaranth genotypes with respect to plant height, leaf shape, leaf colour, inflorescence behaviour, flowering habit, maturity period, harvesting methods and yield attributes. Such variability significantly influences consumer preference and cultivation practices across different localities. Thus, existing biodiversity provides great scope for selection and improvement of promising amaranth genotypes, particularly for specific purpose such as seed production. Hence, there is a need to assess the comparative performance of local genotypes to identify high-yielding, stable and well-adapted types suitable for seed production. Selection of such superior genotypes will contribute to enhanced seed availability, productivity, and sustainability of amaranth cultivation in the region. In view of the above, the present investigation entitled "Performance of amaranth (*Amaranthus spp.*) genotypes for seed production under agro-climatic conditions of Konkan region" has been undertaken to evaluate local genotypes for growth, flowering, yield and seed production attributes, and to identify promising high-yielding genotypes for recommendation to farmers and vegetable growers of the Konkan region.

Material methods

The present experiment "Performance of different amaranth (*Amaranthus spp.*) genotypes for seed production under agro-climatic conditions of Konkan region" 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. Fourteen genotypes were selected and collected from Ratnagiri, Sindhudurg and Thane district of Konkan region for investigation from farmer's field based on their variation in growth and yield characters in relation to plant height, leaf colour, leaf shape, type of inflorescence and method of harvesting. These types were evaluated along with the variety Konkan Durangi released by Dr. B. S. K. K. V, Dapoli as Local Check under field conditions. 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	Konkan Durangi (Check)
T ₈	DPL-AS-8		

The data on growth, flowering and yield characters for seed 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 60 days after sowing (DAS). The mean values of five plants used for recording observations were computed for each of the fourteen characters on seed yield for each of the genotype in each replication and were subjected to statistical analysis (Panse and Sukhatme, 1995)^[10].

Result and discussion

The comparative performance of different amaranth genotypes grown under Konkan condition is presented in Table 1 the results revealed that differences due to various genotypes of amaranth under study varied significantly for all the characters.

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	63.22	50.33	11.53	11.19	6.05	9.02
T ₂	68.65	43.47	8.53	10.21	5.60	9.48
T ₃	57.57	22.33	0.00	12.27	5.95	11.82
T ₄	61.33	28.67	9.27	12.10	7.45	9.90
T ₅	80.47	52.93	10.93	10.22	5.90	7.65
T ₆	82.71	33.73	10.67	10.50	5.37	9.36
T ₇	82.07	20.93	0.00	12.62	7.00	8.79
T ₈	97.13	22.53	0.00	12.02	6.91	8.09
T ₉	78.52	41.94	9.20	11.67	6.93	9.27
T ₁₀	63.05	17.60	0.00	14.80	7.68	9.49
T ₁₁	56.19	28.67	11.27	8.25	6.05	10.37
T ₁₂	58.65	41.97	11.53	11.65	7.92	10.75
T ₁₃	103.58	17.20	0.00	16.33	8.33	9.83
T ₁₄	56.97	35.37	9.47	10.40	4.56	8.63
T ₁₅	98.04	35.47	9.60	10.95	6.41	8.77
Range	56.19-103.58	17.60-52.93	0.00-11.53	8.25-16.33	4.56-8.33	7.65-11.82
Mean	73.87	36.47	6.80	11.67	6.54	9.41
Result	SIG	SIG	SIG	SIG	SIG	SIG
S.Em ±	0.93	0.71	0.12	0.30	0.25	0.22
CD@5%	2.78	2.07	0.36	0.86	0.73	0.63

The highest plant height was recorded in the genotype T₁₃ (103.58 cm). The lowest plant height was noticed in the genotype T₁₁ (56.19 cm). Similar results in relation plant height were also reported by Pharle *et al.* (2019)^[11], Shrivasthav *et al.* (2020) and Pagidipally *et al.* (2021)^[9]. Significantly the highest number of leaves was noticed in the genotype T₁₃ (71.20), whereas genotype T₁₀ recorded the lowest number of leaves (17.60). The variation in number of leaves in amaranth was also noticed by Nachare (2019)^[8] and Shrivasthav *et al.* (2020). The highest number of branches per plant was reported in T₁ and T₁₂ (11.53) which was at par with T₁₁ (11.27). Genotype T₃, T₇, T₈, T₁₀ and T₁₃ noticed the lowest number of branches (0.00). The similar findings regarding the number of branches per plant was in conformity with Pharle *et al.* (2019)^[11], Shrivasthav *et al.* (2020) and Pagidipally *et al.* (2021)^[9] in amaranth.

Data regarding to leaf characters are presented at Table 1 and illustrated in Fig.1. The genotype T₁₃ reported significantly the highest leaf length of (16.33 cm). Same genotype *i.e.*, T₁₁ was exhibited to have significantly the lowest leaf length (8.25 cm). Variation in leaf length of various amaranth genotype was also noticed by Tejaswini *et al.* (2017)^[19], Jandge *et al.* (2018), Warekar (2018)^[20], and Pagidipally *et al.* (2021)^[9]. Highest leaf breadth was recorded in T₁₃ (8.33 cm) which was at par with genotype T₁₂ (7.92 cm) and T₁₀ (7.68 cm). Same genotype *i.e.* T₁₄ was recorded significantly the lowest leaf breadth (4.56 cm). The similar findings regarding the leaf breadth variation per plant was in conformity with Kujur (2015)^[6] and Tejaswini *et al.* (2017)^[19].

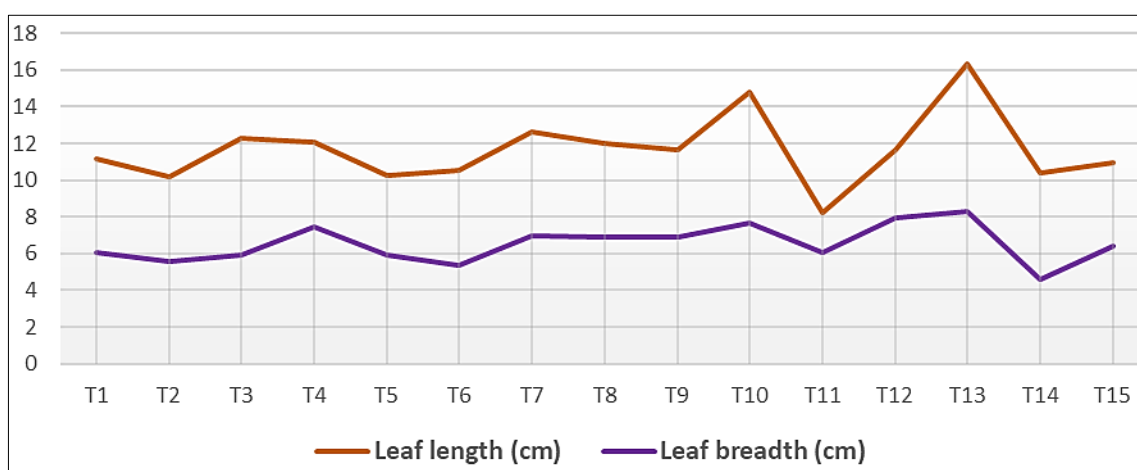


Fig 1: Variation in leaf length and leaf breadth (cm) among local amaranth genotypes

Significantly, the highest stem diameter was reported in the genotype T₃ (11.82 mm). The genotype T₅ showed the lowest stem diameter (7.65 mm). The similar stem diameter variation was also recorded in amaranth genotypes by Warekar (2018)^[20], Pharle *et al.* (2019)^[11] and Shahiba *et al.*, (2020)^[14].

Data regarding to flowering behaviour are presented at Table 2 and illustrated in Fig.2. The data revealed that all the genotypes of amaranth genotype significantly varied in terms of various flowering observation under study.

Table 2: Study on flowering behaviour of amaranth (*Amaranthus spp.*) genotypes under Konkan agro-climatic conditions

Genotypes	Flowering behaviour				
	Days to flower initiation	Length of inflorescence (cm)	Terminal inflorescence stalk length (cm)	Number of lateral inflorescence	Days to seed maturity
T ₁	35.73	27.73	12.26	3.67	33.20
T ₂	38.47	26.93	20.82	3.13	34.74
T ₃	41.73	36.10	5.66	26.60	38.69
T ₄	39.93	25.72	32.21	7.37	36.08
T ₅	37.60	24.60	17.73	2.81	35.58
T ₆	32.40	32.61	12.25	22.60	30.23
T ₇	33.20	33.47	15.15	20.67	31.67
T ₈	32.13	36.18	16.15	24.67	30.20
T ₉	38.40	26.75	18.11	1.93	35.13
T ₁₀	41.57	20.31	4.48	29.88	39.19
T ₁₁	39.67	16.19	6.26	6.97	38.10
T ₁₂	42.27	16.05	11.19	1.53	41.48
T ₁₃	33.00	40.14	14.18	35.20	29.57
T ₁₄	35.20	23.30	14.89	2.13	31.09
T ₁₅	35.07	26.35	15.11	6.67	32.18
Range	32.13-42.27	16.05-40.14	4.48-32.21	1.53-35.20	29.57-41.48
Mean	37.09	27.49	14.43	13.05	34.47
Result	SIG	SIG	SIG	SIG	SIG
S.Em±	0.24	0.45	0.27	0.65	0.22
CD@5%	0.71	1.31	0.78	1.90	0.64

The earliest days (32.13 days) for flower initiation were reported in genotype T₈ and which was significantly superior over all the genotypes under study. The genotype T₁₂ recorded maximum number of days (42.27 days) for flower initiation. Similar results in relation to significant variation in days to initiation of flowering were also reported by Nachare (2019) [8], Pharle *et al.* (2019) [11] and Pagidipally *et al.* (2021) [9].

The genotype T₁₃ recorded significantly the highest value of inflorescence length (40.14 cm). Whereas, genotype T₁₂ recorded significantly the lowest mean value inflorescence length (16.05 cm). The Similar results in relation length of inflorescence were also reported by Nachare (2019) [8], Pharle *et al.* (2019) [11], Shrivasthav *et al.* (2020), Pagidipally *et al.* (2021) [9] in amaranth.

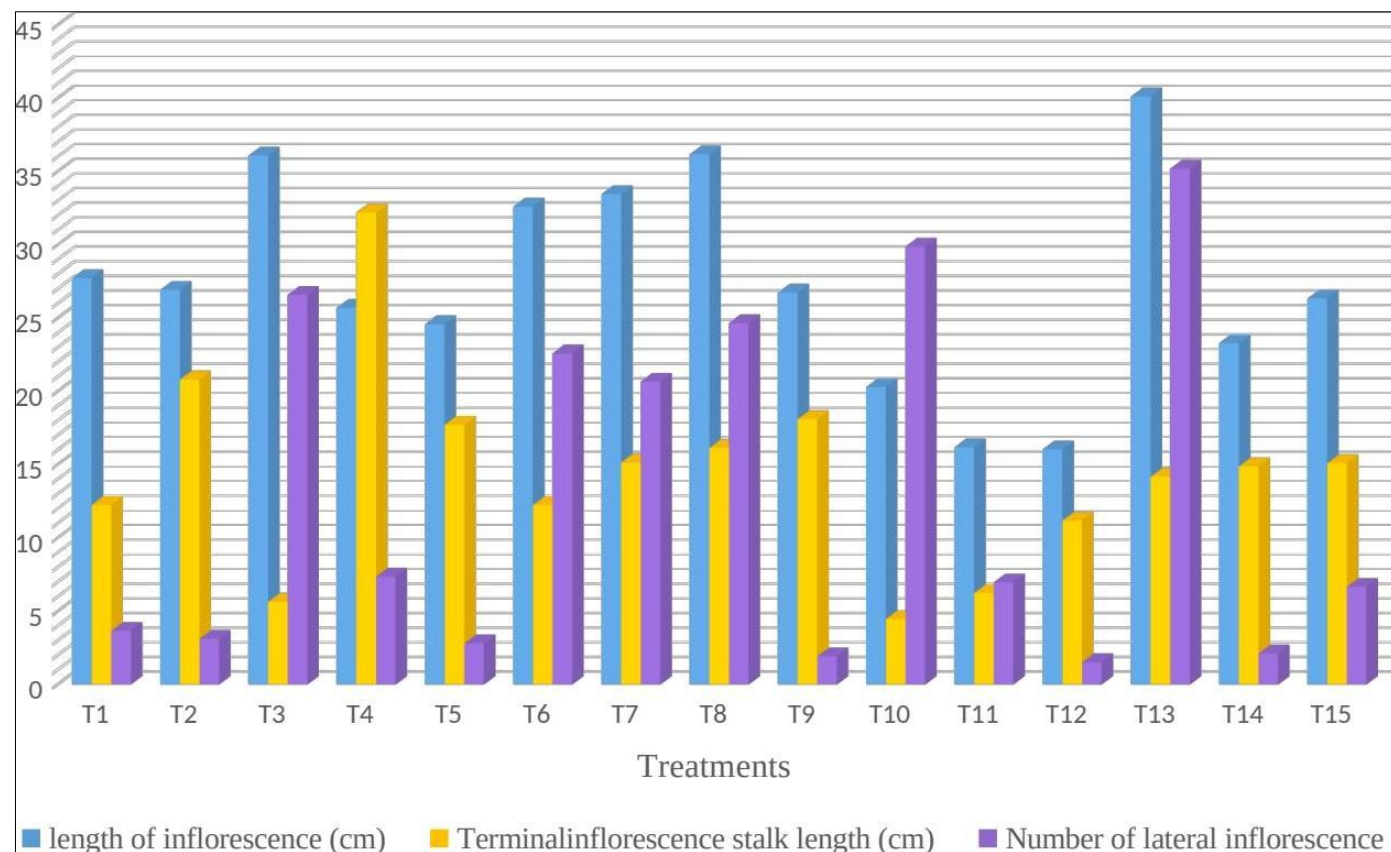


Fig 2: Variation in Length of inflorescence (cm), Terminal inflorescence stalk length (cm) and Number of lateral inflorescence among local amaranth genotypes

Significantly the longest terminal inflorescence stalk length was noticed in genotype T₄ (32.21 cm) and shortest was recorded in T₁₀ (4.48 cm). Similar results in relation to significant variation in terminal inflorescence stalk length were also reported by Pharle *et al.* (2019) [11]. The genotype T₁₀ recorded that the maximum number of lateral inflorescences *i.e.* 35.20, while genotype T₁₂ recorded that the minimum *i.e.*, 1.53. Above findings regarding to variation in number of lateral inflorescences in different amaranth are in conformity with Sheela *et al.* (2018) [16] and Nachare (2019) [8].

The earliest days (29.57 days) for days to seed maturity were noticed in genotype T₁₃ and which was significantly superior over all the genotypes. The genotype T₁₂ recorded highest number of days (41.48 days) for days to seed maturity. Similar results in relation to significant variation in days to seed maturity were also reported by Pagidipally *et al.* (2021) [9]. The variation in flowering behaviour might be due to difference in genetic makeup, growth rate, soil and climatic conditions as well as its interaction with environmental factors.

The yield per unit area is significantly influenced by the yield per plant. It is the important character in breeder's perspective when applying selection criteria in crop improvement. Yield is a very complex character, and a variety of other characters contribute to its expression.

Table 3: Study on seed yield of amaranth (*Amaranthus spp.*) genotypes under Konkan agroclimatic conditions

Genotypes	Seed yield plant-1(g)	Seed yield plot-1(g)	Seed yield ha-1(Kg)
T ₁	4.54	35.07	116.89
T ₂	3.31	48.59	161.96
T ₃	6.81	33.50	111.67
T ₄	4.67	51.53	171.78
T ₅	5.11	67.39	224.65
T ₆	17.85	245.17	817.22
T ₇	7.77	244.29	814.29
T ₈	8.95	279.87	932.90
T ₉	4.71	79.61	265.39
T ₁₀	1.77	19.77	65.90
T ₁₁	2.28	65.03	216.78
T ₁₂	2.05	30.00	99.99
T ₁₃	19.90	227.54	758.46
T ₁₄	4.22	23.27	77.57
T ₁₅	7.43	112.23	374.09
Range	1.77-19.90	19.77-279.87	65.90-932.90
Mean	6.75	104.19	347.30
Result	SIG	SIG	SIG
S.Em±	0.18	0.63	2.12
CD@5%	0.54	1.84	6.18

Data in relation to the yield observation namely seed yield per plant, seed yield per plot (g) and seed yield per hectare (Kg) are presented in Table 3 and illustrated in Fig 3 the result revealed that all the yield observations varied significantly among all the 15 genotypes of amaranth under study.

Significantly, the highest seed yield per plant was recorded in the genotype T₁₃ (19.90 g) which was significantly over other genotypes whereas, the lowest yield per plant was observed in genotype T₁₀ (1.77 : g). The similar variation pattern in amaranth genotype for seed yield per plant was also noticed by Jashwitha *et al.* (2021) [4], Pagidipally *et al.* (2021) [9] and Desai *et al.* (2022) [2].

Significantly, the highest seed yield per plot and per hectare was observed in the genotype T₈ (279.87 g) and (932.90 Kg) which were significantly superior over the rest of genotypes. Whereas, lowest yield per plot and per hectare was observed in genotype T₁₀ (19.77 g) and (65.90 Kg). This variation might be a result of the genotypes varying genetic make-up and their capacity to adapt to environments outside of their immediate environment. The similar variation pattern in amaranth genotype for seed yield per plant was also reported by Shrivasthav *et al.* (2020), Pagidipally *et al.* (2021) [9] and Desai *et al.* (2022) [2].

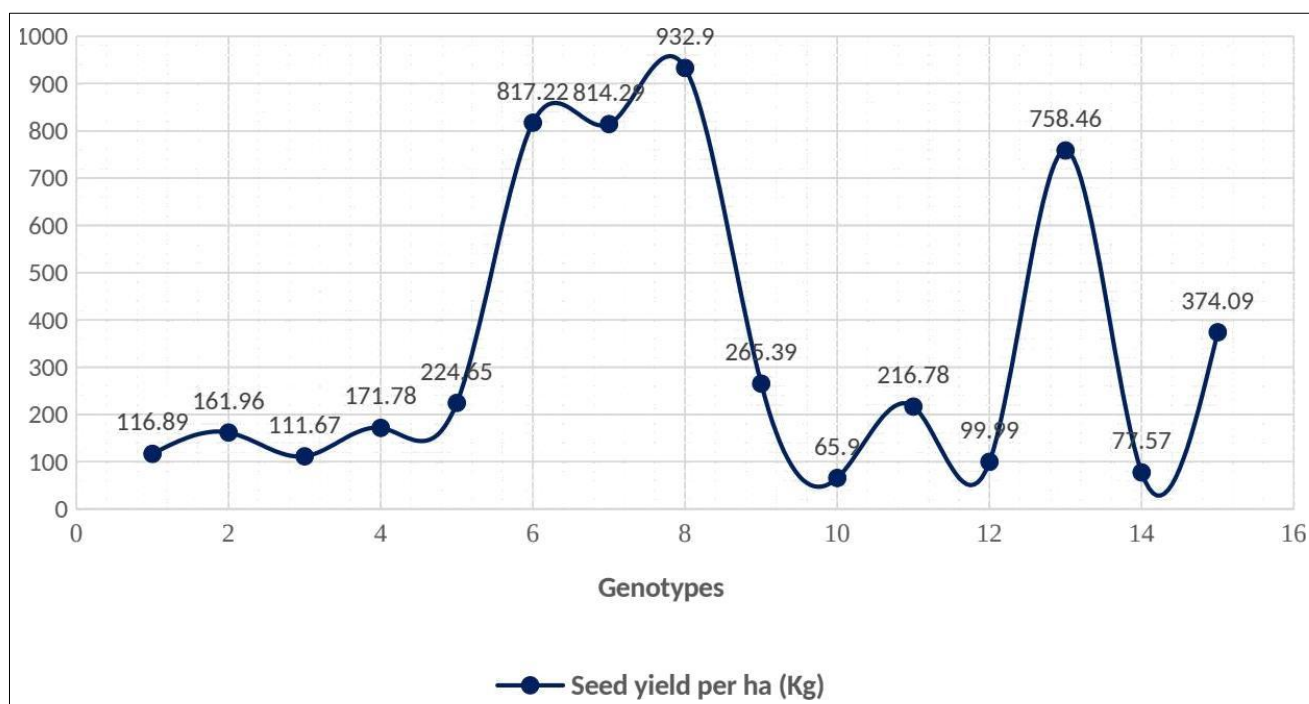


Fig 3: Variation in seed yield per hectare (Kg) among local amaranth genotypes

Conclusion

The present investigation on fifteen local amaranth genotypes could be concluded on the basis of growth parameter, flowering behaviour and seed yield characters. While studying for the seed production purpose, all the characters were varied significantly and it was found that, genotypes T₁₃ (DPL-AS-13), T₈ (DPL-AS-8), T₆ (DPL-AS-6), and T₇ (DPL-AS-7) recorded better performance with respect to growth, flowering behaviour, seed yield under Konkani agro-climatic conditions.

References

1. Cole JN. *Amaranthus* from the past to the future. The Vegetable Book. Rodale Press Emmaus Pennsy Wania, U.S.A; 1989:25-38.
2. Desai S, Gangadharappa PM, Hiremath JS, Nishani S, Pushpa TN, Rathod V. Performance of potential fenugreek genotypes for seed yield and its attributing traits in Northern dry zone of Karnataka. The Pharma Innovation Journal. 2022;11(6):259-263.
3. Jangde B, Asati BS, Tripathy B, Bairwa PL. Evaluation of Quantitative and Qualitative Characters in *Amaranthus* (*Amaranthus tricolor* L.) Genotypes under Chhattisgarh Plains. Int J Curr Microbiol App Sci. 2018;7:708-715.
4. Jashwitha BP, Hadimani HP, Vijayamahantesh, Mulla SA. Performance of various methi (*Trigonella foenum graecum* L.) genotypes for yield and yield attributing parameters. The Pharma Innovation Journal. 2021;10(9):90-93.
5. Khale N. Studies on spacing cum clipping on herbage and seed production of amaranth (*Amaranthus tricolor* L.) Cv. Konkani Durangi. Thesis submitted to Dr B S K K V, Dapoli; 2018.
6. Kujur A. Collection, evaluation and identification of suitable genotypes of kheda (*Amaranthus dubius* Mart.) under Chhattisgarh plain condition. Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh) (Unpublished); 2015.
7. Muthukrishnan CR, Irulappan I. *Amaranthus*. In: Bose TK, Som MG, editors. Vegetable crops in India. Calcutta: Naya Prokash; 1986. p. 670-679.
8. Nachare C. Evaluation of various amaranth (*Amaranthus tricolor* L.) genotypes under agroclimatic conditions of Konkani region during rabi season. Thesis submitted to Dr B S K K V, Dapoli; 2019.
9. Pagidipally B, Topno SE. Performance of *Amaranthus* (*Amaranthus spp.*) Genotypes for Growth, Herbage Yield and Seed Yield in Prayagraj Agro-climatic Conditions. Int J Curr Microbiol App Sci. 2021;10(2):1311-1315.
10. Panse VG, Sukhatme PV. Statistical methods for Agricultural Workers. New Delhi: ICAR Publication; 1995.
11. Pharle NR, Naik HP, Mane SB, Kapse VD, Vaidya KP, Dhopavkar RV, *et al.* Studies on Growth Performance of

- Amaranth (*Amaranthus spp.*) genotypes under Konkan agro-climatic conditions. The Pharma Innovation Journal. 2019;8(12):427-428.
12. Prakash D, Pal M. Nutritional and anti-nutritional composition of vegetable and grain amaranth leaves. J Sci Food Agric. 1991;57:573-583.
 13. Rai N, Yadav RK. Advances in Vegetable Production (New Delhi). New Delhi: Research Book Center; 2005:5-6.
 14. Shahiba AM, Beena T, Arun C. Evaluation of Thirty *Amaranthus* Genotypes (*Amaranthus tricolor* L.) for Different Biometric Characters. Int J Curr Microbiol App Sci. 2020;9(8):1621-1631.
 15. Shamugavelu KG. Production Technology of Vegetable Crops. Oxford London: Oxford and IBH Publishing Co. Pvt. Ltd.; 1989:682.
 16. Sheela NM, Revanappa S, Ajjapalavar PS, Nagaraja MS, Raghuvendra S. Genetic variability, heritability and genetic advance in grain amaranth (*Amaranthus spp.*). Intl J of Curr Microbiol App Sci. 2018;7(7):1485-1494.
 17. Shrivastav SP, Yadav CB, Singh V, Maurya V. Evaluation and Identification of most Promising Genotypes for Varietal Development in *Amaranthus* (*Amaranthus paniculatus* L.). Intl J of Curr Microbiol App Sci. 2020;9(1):345-360.
 18. Shukla S, Singh SP. A study on genetic variability and selection parameters of amaranth. Farm science journal. 2003;12(2):164-166.
 19. Tejaswini N, Saidaih P, Redddy R, Ranmesh T. Evaluation of vegetable amaranth (*Amaranthus tricolor* L.) genotypes for yield and yield attributing characters. J of pharmacognosy and Phytochemistry. 2017;6(6):2572-2578.
 20. Warekar AA. Growth and yield performance of Amaranth (*Amaranthus spp.*) genotypes under Konkan region of Maharashtra. Dapoli: Dr BalasahebSawant Konkan Krishi Vidyapeeth; 2018.