



Evaluation of Promising Lines of Vegetable Amaranth (*Amaranthus viridis* L.) Suitable for Cultivation in North Eastern India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Sixteen accessions of vegetable amaranth (*Amaranthus viridis* L.) were collected from different locations of the state of Assam and North East. The accessions were tested for leaf and plant yield and component characters under different breeding trials. They were evaluated consecutively for

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three years in the Deptt. of Horticulture, AAU, Jorhat in station trials. The accessions viz., Am-1, Am-2, Am-3, Am-4, Am-5, Am-6, Am-7, Am-8, Am-9, Am-10, Am-11, Am-12, Am-13 (Boga Morisa), Am-14 (Ranga Morisa), Am-15 and Am-16 were tested in zonal trials covering UBVZ (Upper Brahmaputra valley zone), NBPZ (North Bank Plains zone) and LBVZ (Lower Brahmaputra valley zone) also. In these trials, among all genotypes JorAm-1 (Shyamali) and JorAm-2 (Rodali) were found to be the best for leaf and plant yield and other component characters. The AICRP (VC) trials conducted throughout the country exhibited average plant yield of 137 q/ha in JorAm-1 and 133.18 q/ha in JorAm-2 with 25 – 30% yield increase over the best check variety. Shyamali was a green leaf variety whereas Rodali was a purplish variety. The edible leaves were getting ready for plucking at 30 – 35 days after sowing. Both of them were found to be tolerant with 5% infection to leaf spot and aphids. They have been recommended in the Zonal Research Committee Meeting (ZREAC) and Annual Technical Committee Meeting (ATCM) held at Assam Agricultural University (AAU), Jorhat for release in the state of Assam. In view of the consumer preference and taste, the varieties are spreading very fast and getting popularity throughout entire NE states. Considering yield performance and other desirable characteristics, extensive cultivation of these varieties may be done in better performing states also.

Keywords: *Amaranth; Shyamali; Rodali; NE States.*

1. INTRODUCTION

Amaranth (*Amaranthus viridis* L.) is an important leafy vegetable crop of Assam and North East India. Both leaves and whole plants are used for consumption purpose. Grain amaranthus is also grown in many countries including India [1]. Botanically it belongs to the family Amaranthaceae. It is rich in protein content (upto 38%) by dry weight. The leaves and seeds contain lysine an essential amino acid [2]. Although, amaranthus is having lot of variability in North Eastern region but most of them are poor yielder. In order to increase income from amaranthus cultivation higher yield is an important criterion. Further, systematic research work conducted in this crop for its improvement is very limited in the country as a whole. Therefore, present investigation was undertaken at Assam Agricultural University, Jorhat which has resulted in two promising varieties of amaranthus the performance and characteristics of which are presented in this paper.

2. MATERIALS AND METHODS

All total sixteen (16) germplasm of amaranthus Am-1, Am-2, Am-3, Am-4, Am-5, Am-6, Am-7, Am-8, Am-9, Am-10, Am-11, Am-12, Am-13 (Boga Morisa), Am-14 (Ranga Morisa), Am-15 and Am-16 were collected from different locations of Assam and North Eastern region. With these materials including one locally grown cultivar as check variety, (Am-13 or Boga Morisa) the field experiment was conducted at the Horticultural farm of the Assam Agricultural University, Jorhat during kharif seasons of 2016-

17 to 2018-19. The seeds were sown in the month of March every year. The experiment was laid out in a randomized block design with 3 replications. The size of the plot was 3.0 m x 3.0 m with a spacing of 30 cm between rows and 10 cm between plants. The FYM and NPK were applied as per package of practices recommended for spinach beet grown in Assam. The observations were recorded on different quantitative and qualitative characteristics as per descriptor of the NBPGR. Standard statistical analysis for yield and component characters was done following Panse and Sukhatme [3]. The promising varieties were tested in zonal and AICRP (VC) trials also.

3. RESULTS AND DISCUSSION

Out of the 16 germplasms, two germplasms Am-1 and Am-2 showed better yield performances than the local check Am-13 or Boga Morisa. Therefore, the trialwise and varietywise mean performance with respect to leaf and plant yield of JorAm-1 and JorAm-2 in comparison to local check variety are presented in Table 1. For both the characters, they showed significantly better performance than the check variety. JorAm-1 and JorAm-2 exhibited leaf yield of 59.0 q/ha and 67.2 q/ha respectively in the station trials. The increase in leaf yield was 33.4% in JorAm-1 and 52.0% in JorAm-2. The percentage increase in leaf yield over the local check varieties in different zones of Assam was 35% in JorAm-1 and 22% in JorAm-2. The plant yield of JorAm-1 and JorAm-2 was 104.0 q/ha and 120.5 q/ha respectively. The increase in plant yield was 31.6% in JorAm-1 and 52.5% in JorAm-2 over

the check variety. Bora et al. [4] recorded similar results in their earlier studies also. The results of the AICRP(VC) trials exhibited an average plant yield of 137 q/ha in JorAm -1 and 133.2 q/ha in JorAm-2. The percentage increase in plant yield ranged from 25.42 – 29.03% over the best check variety in better performing centres.

Table 2 shows the morphological characteristics of the two varieties in comparison to the local cultivar used as check in the study. JorAm-1 was

having green leaf pigmentation whereas JorAm-2 having purple pigmentation. However, petiole is purple in both the varieties. Leaf veins are prominent in JorAm-1 whereas it was smooth in JorAm-2. JorAm-2 took more days (64 days) for flowering than JorAm-1 (58 days). Although field study of diseases and insect pests has indicated the occurrence of leaf spot and aphids on the crop but there was no reduction in yield in these varieties grading them as tolerant one.

Table 1. Pooled data of yield performances of Amaranthus germplasms from different trials conducted during the year 2016-17 and 2018-19

Entries/Trials	JorAm-1	JorAm-2	LC/BC ¹
Performance in Station trials:			
	Leaf yield (q/ha)		
Preliminary yield trial	61.6	62.7	42.0
Advanced yield trial-I	58.8	66.1	43.7
Advanced yield trial-II	56.6	73.9	47.0
Mean	59.0	67.2	44.2
CD (5%)	19.0	15.0	9.5
Percentage increase over check	33.4	52.0	-
Percentage increase over check in Zonal Trials ²	35.0	22.0	-
Performance in Station trials:			
	Plant yield (q/ha)		
Preliminary yield trial	108	112	75
Advanced yield trial-I	105	118	78
Advanced yield trial-II	101	132	84
Mean	104.0	120.5	79.0
CD (5%)	21	26	16
PC increase over check	31.6	52.5	-
Performance in AICRP Trials			
	(Plant yield in q/ha):		
Advanced yield trial-I	140.10	134.83	108.78
Advanced yield trial-II	133.90	131.52	103.58
Mean	137.00	133.18	106.18
Percentage increase over the best check (BC)	29.03	25.42	

¹Local Check/ Best Check, ²Zonal trials conducted at KVKs of Sonitpur, Kamrup and Kokrajhar and farmers' fields at Titabor representing zones viz., NBPZ, LBVZ and UBVZ

Table 2. Morphological and other characteristics of the amaranthus varieties

Characters	Varieties		
	JorAm-1	JorAm-2	LC
Branching index	Branches all over	Branches all over	Branches all over
Stem pubescence	None	None	None
Stem pigmentation	Purple	Purple	Purple
Leaf pubescence	Nil	Nil	Nil
Leaf pigmentation	Green	Purple	Pinkish green
Leaf shape	Lanceolate	Cuneate	Lanceolate
Prominence of leaf veins	Rugose	Smooth	Rugose
Petiole pigmentation	Purple	Purple	Purple
Terminal inflorescence shape	Panicle with short branches	Panicle with short branches	Panicle with short branches
Presence of axillary	Present	Present	Present

Characters	Varieties		
	JorAm-1	JorAm-2	LC
inflorescence			
Inflorescence density	Intermediate	Intermediate	Low
Inflorescence colour	Pinkish green	Pinkish green	Pinkish green
Plant height >60 cm	74 cm	79 cm	55 cm
Leaf number > 40	106	95	48
Leaf length >15 cm	18.9 cm	18.0	10.2 cm
Leaf breadth (cm)	11.5cm	11.2cm	7.6 cm
Internode length	6.8 cm	9.5 cm	3.7 cm
Days to 50% flowering >50 days	58 days	64 days	45 days



Fig. 1. Two promising varieties of vegetable *Amaranth* (Shyamali, the green leaf variety and Rodali, the purplish variety)

4. CONCLUSION

Based on the results mentioned above, the varieties JorAm-1 and JorAm-2 have been recommended in the ZREAC and ATCM meeting held at AAU in the year 2019 and 2020 respectively for release in the state of Assam [5]. Accordingly, proposals in the name of Shyamali (JorAm-1) and Rodali (JorAm-2) have already

been submitted for their release. In the national level, the varieties have been conserved at NBPGR, New Delhi (Accession Nos. IC 586670 and IC 586671). Preliminary reports have been published in different literatures at different times about these varieties [6,7,4]. In view of the consumer preference and taste, the varieties are spreading very fast and getting popularity throughout entire NE states. The extensive

cultivation of these varieties may be done in other states also wherefrom better performance has been reported.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Raiger HL, Jajoria NK. Grain Amaranth: Naturally gluten free superfood grain. *Indian Farming*. 2023;73(03):24–27.
2. Grubb A, Raser RA. *The Weed Foragers Handbook*;2012.
3. Panse VG, Sukhatme PV. *Statistical methods for Agricultural workers*, ICAR,New Delhi;1978.
4. Bora GC, Kalita UC, Gogoi S, Das RT, Baruah M, Rajkhowa D, Kharghoria PP. Glimpses of Vegetable. *Improvement Research in Assam Agricultural University, India. Int. Journal of Agricultural Sciences*. 2023;15(9):12619-12622.
5. Anonymous. AAU News letter;2021.
6. Bora GC, Saikia L, Bhattacharyya A, Rahman S, Hazarika GN. ‘Shyamali’ and ‘Rodali’ – two promising varieties of Vegetable Amaranth (*Amaranthus* spp.) suitable for cultivation in NE India. In *Book of Abstracts of the National Seminar on “Climatic Change and Climate Resilient Agriculture” held at BNCA, AAU, Biswanath Chariali, Assam wef.2013; 3(20):117.*
7. Bora GC. “Amaranthus” – A book chapter in *Forage Crops of the World 2 volume set, volume ii, minor forage crops;2019.* Edited by Md Hydeyatullah and Parveen Zaman- A Taylor and Francis publication, CRC Press. 2019;225-37.

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