Asian Journal of Plant Sciences

ISSN 1682-3974

science alert

ANSInet
an open access publisher
http://ansinet.com

Asian Journal of Plant Sciences 2 (5): 431-433, 2003
ISSN 1682-3974

Growth and Harvestable Maturity of Red Amaranth at Different Sowing Dates

S.R. Saha, M. Nazim Uddin, M.A. Rahman, S.M. Sharifuzzaman and A.K.M. Anwar Habib
Horticulture Research Centre (HRC), Bangladesh Agriculture Research Institute (BARI),
Gazipur-1701, Bangladesh

Abstract: A study was conducted to optimize the time of sowing and stage of harvest of red amaranth during winter season to obtain higher yield without loss of palatability. It was observed that in November sowing, highest palatability (1.59) was achieved when harvested at 15 DAS. Harvesting at 20 days after sowing (DAS) was found to be suitable for November sowing considering economic yield as well as palatability. In December sowing had moderate palatability with leaf-stem ration 1.38. On the other hand, in January sowing when harvested at 30 DAS expressed acceptable leaf-stem ration (1.71). Therefore, considering yield and optimum palatability, harvesting of the crop should be done at 25 DAS in December sowing and 30 DAS in January sowing.

Key words: Red amaranth, growth, harvestable maturity, palatability

Introduction

Amaranthus (*Amaranthus tricolor*) plays an important role in nutrition among the leafy vegetables grown in Bangladesh. The leafy amaranthus is said to be the native of India (Shanmugavelu, 1989 and Nath, 1976). Among the leafy types, *Amaranthus tricolor* L. is the most commonly cultivated species in Bangladesh. However, during winter, its growth and development is slow than summer and rainy season (Bose *et al*., 1993). Normally plants are harvested at 20 to 30 days after sowing to consume as tender greens. Yawalkar (1985) reported that good green tender leaves without spines, stem green, medium thick and tender, petioles green, inflorescence terminal and medium sized , ready for first cutting after 30 days of sowing. Consumption of plants within 15 to 20 days as well as at the mature stages of 35 to 40 days after sowing is also not uncommon. Kader (1978) reported that the optimum stage of harvest in amarnathus could be fixed at the 25th days after sowing, as this stage the performance of the types was found to be superior with increase in leaf weight, stem weight, leaf length, leaf breadth, stem diameter and plant height. According to Vijayakumar (1980), the optimum stage of harvest in most of the types of amaranthus could be fixed between 25-30 days after sowing to get the highest yield as well as nutritious and palatable greens. The optimum harvestable maturity stage of red amaranth when grown during winter season of Bangladesh is not available. Therefore, the present experiment was undertaken to find out the optimum harvestable stage to get maximum yield without being sacrificing the palatability.

Materials and Methods

An experiment was conducted at the Central Research Station of HRC, BARI, Joydebpur from November 1995 to February 1996. The experiment was laid out in a RCB (Factorial) design with three replications. The red amaranth variety BARI Lal sak-1 was included in this study. Unit plot size was 3.25 x 2.00 m^2. Seeds were sown on the every month starting from November 1995 to January 1996. The different sowing dates were considered as three levels of one factor and five different stages of harvest at each sowing were considered as five levels of the other factor. Seeds were sown in plots maintaining 20 x 5 cm^2 spacing. Initially, continuous broadcasting of seeds was done in lines. Subsequently plants were thinned maintaining 5 cm plant to plant spacing. The crop was fertilized cowdung, TSP, Urea and MP were applied as basal doses during final land preparation. Irrigation and other cultural operations were done as and when needed. Twenty plants were selected from each plot for recording data omitting border effects and following the destructive sampling rule of physiological study. The different parameters were plant height, total plant weight, length and breadth of the largest leaf and partitioning of the plant into its components like leaf, stem and root. Leaf-stem ratio was also calculated to get optimum palatability stage. Incidentally November sowing had only four harvests up to flower initiation. Therefore, considering four stages of harvest in November sowing as four treatments, the analysis was accomplished in a RCB design. While the other two sowings viz. December and January with five harvests level each were analyzed

statistically in a factorial RCB design. While the other two sowing viz. December and January with five harvest levels were analyzed statistically in a factorial RCB design. Mean separation was done following Duncan's multiple range test (DMRT).

Result and Discussion

The yield and yield contributing characters revealed that there had a significant difference among different parameters due to different harvesting dates in November, December and also January sowings. Plant height ranged from 6.95 to 39.13 cm in November sowing when harvested at 15 and 30 days respectively. Similar increasing trend of plant height was observed in December and January sowings and it varied from 5.33 cm (15 DAS) to 29.02 cm (35 DAS). Stem length after 15 days, of sowing was found 3.76 cm while it was 28.02 cm at 30 DAS in November sowing but the stem length differed from 2.23 cm to 19.60 cm in December and January sowings at 15 DAS and 35 DAS, respectively. It had been observed an increasing trend of each of the parameters as the harvesting was delayed. This was found to be equally effective when total weight of twenty plants were considered. It varied from 6.37 g to 123.40 g being the highest at 30 DAS and the lowest at 15 DAS in November sowing whereas, during December and January sowings, it ranged from 2.37 g (15 DAS) to 287.60 g (35 DAS). The length and breadth of the widest leaf was observed to increase when harvesting was delayed in all the sowings (Table 1). Percent dry matter of stem ranged from as low as 5.33 at 25 DAS to as high as 11.51 at 30 DAS. However, it was statistically similar among the percent dry matter of 15, 20 and 25 DAS in November sowing. Mean while, dry matter percent of stem was observed to vary from 4.92 at 35 DAS to 11.30 at 15 DAS in December and January sowings. Regarding dry matter percent of leaf, it was found to differ from 10.89 (25 DAS) to 13.96 (15 DAS) in November sowing. Statistically significant variation was also observed in percent dry matter of leaf in December and January sowings also. It

Table 1: Yield and yield contributing characters of red amaranth as influenced by four stages of harvest in November sowing and five harvesting stages of December and January

Treatments (DAS)	Plant height (cm)	Stem length (cm)	Total wt. of 20 plants (g)	Length of widest leaves (cm)	Breath of widest leaves	Percent day matter			Leaf stem ratio
						Stem	Leaf	Root	
15DAS	6.95 d	3.76c	6.370c	2.04c	1.79g	6.91b	13.96a	9.17	1.59a
20 DAS	19.33c	7.45c	41.37c	4.32b	3.56c	6.47b	11.98b	10.90	1.21b
25 DAS	31.25b	19.69b	80.90b	8.16a	5.82b	5.33b	10.89b	10.26	0.78c
30 DAS	39.13a	28.02a	123.40a	9.21a	7.16a	11.51a	12.13b	10.74	0.59d
CV%	12.64	15.84	11.72	13.35	10.20	11.13	5.67	13.07	7.00
15 DAS	5.33e	2.23e	2.37d	1.14e	0.84e	11.30a	11.60b	9.69b	2.17a
20 DAS	9.38d	4.14d	9.53d	2.15d	1.49d	9.05b	14.86a	12.40a	2.04ab
25 DAS	15.12c	6.74c	45.66c	3.97c	2.90c	7.31c	12.40b	9.64b	1.82b
30 DAS	19.02b	12.82b	173.6b	5.61b	4.25b	6.59c	12.47b	8.48b	1.25c
35 DAS	29.02a	19.60a	287.6a	6.82a	5.06a	4.92d	12.64b	8.73b	0.76d

Means followed by common letters differ significantly at P> 0.01
DAS -Days after sowing.

Table 2: Main effect of date of sowing on the yield and yield attributes of red amaranth

Treatments (DAS)	Plant height (cm)	Stem length (cm)	Total wt. of 20 plants (g)	Length of widest leaves (cm)	Breath of widest leaves	Percent day matter			Leaf stem ratio
						Stem	Leaf	Root	
December	21.66	12.60	152.53	5.16	3.77	7.12	11.85	8.82	1.35
January	9.80	6.15	54.96	2.86	2.05	8.55	13.75	10.76	1.87

Table 3: Interaction effect of date of sowing and harvesting stages

Treatments (DAS)	Plant height (cm)	Stem length (cm)	Total wt. of 20 plants (g)	Length of widest leaves (cm)	Breath of widest leaves	Percent day matter			Leaf stem ratio
						Stem	Leaf	Root	
15 Dec.	8.18c	2.97fg	4.13e	1.61de	1.37de	11.2a	9.40c	7.75fg	2.14ab
20 Dec.	13.68d	5.40f	15.23e	2.61cd	1.88d	8.12bc	14.59a	12.34ab	1.85bc
25Dec.	22.0c	9.14d	78.52d	5.34b	3.93b	6.66cd	11.31de	8.69ab	1.38d
30Dec.	30.32b	19.46b	292.6b	7.12a	5.98a	4.49d	11.12de	6.87g	0.79ef
3 5Dec.	34.11a	23.34a	372.2a	8.19a	5.66a	5.13d	12.82 bcd	8.43efg	0.57f
15 Jan	2.48f	1.48g	0.60e	10.08a	0.32f	11.40a	13.84abc	11.64abc	2.20a
20 Jan	5.07f	2.88fg	3.81e	1.58ed	1.10e	9.98ab	15.13a	12.46a	2.25a
25Jan	8.23c	4.34ef	12.80e	2.59cd	1.87d	7.95bc	13.48abc	10.59bcd	2.25a
30Jan	9.27c	6.14e	54.57d	3.50c	2.52c	8.69bc	13.83abc	10.10cde	1.71cd
35Jan	23.93c	15.87c	203.0c	5.44b	4.45b	4.71d	12.46cd	8.03def	0.95e
CV%	9.90	15.61	17.51	14.41	12.24	15.78	8.32	10.09	11.96

Means followed by different letters differ significantly at P < 0.01 by DMR test DAS = Days after sowing.

ranged from 11.60 (15 DAS) to 14.86 (20 DAS). But the other harvesting stages were found in significant pertaining to dry matter percent of leaf in December and January sowings. There had not have any statistical variation regarding dry matter percent of leaf in November sowing du to different harvesting dates (Table 1). But much variation was observed in December and January sowings. It varied from 8.48% in 30 DAS to 12.40% in 20 DAS. Leaf-stem ratio ranged from 0.59 (30 DAS) to 1.59 (15 DAS). Considering the palatability stage through leaf-stem ratio, harvesting at 15 DAS in November sowing should be considered best but it was not economical in terms of yield. Thus, harvesting at 20 DAS was considered to be suitable for November sowing considering yield as well as palatability. Further, during December and January sowings harvesting could be done up to 30 DAS having good palatability (Table 1).

Main effect of dates of sowing (Table 2) indicated that December sowing superseded the January sowing in most of the parameters except dry matter percent and leaf-stem ratio. Plants of December sowing attained the maximum height (21.66 cm) compared to January sowing (9.80 cm). This trend was also maintained in case of the length and breadth of the widest leaf. But it was noted that the percent dry matter of leaf, stem and root as well as leaf-stem ratio was superior in January.

Delayed harvesting of red amaranth exhibited superior performance in plant height, stem length, total weight of twenty plants and size of the biggest leaf. But this trend was not noticed in case of percent dry matter of stem, leaf and root. On the contrary, the reverse trend was observed as to the parameter leaf-stem ratio. Considering palatability, yield of greens and dry matter content of stem and leaf; harvesting of the crop at 30 DAS is found to be superior over the other stages of harvest. Yawalkar (1985) reported that good green tender leaves without spines, thick and soft stem with fibreless petioles of red amaranth becomes ready for first cutting after 30 days of sowing. The interaction effect of two dates of sowing and five stages of harvest exhibited significant variation in all the parameters studied (Table 3). It is noted that in both December and January sowings plant height, stem length, total weight of twenty plants and size of the widest leaf increased as the harvesting dates were delayed. But the parameter, per cent dry matter of stem and leaf decreased gradually as the harvesting dates were delayed in December and January sowing except the harvesting at 30 DAS in later sowing. Pertaining to leaf-stem ratio, gradual declination was observed in both the sowings as the harvesting were delayed. It was also noted that plants sown in December and harvested at 25 DAS showed moderate palatability with leaf-stem ratio 1.33. Enyi (1965) suggested transplanting of plants within 27 days of sowing to ensure good yield. Besides, when plants were raised in January and harvested at 30 DAS showed acceptable leaf-stem ratio (1.71) among the other dates of harvest. Therefore, it could be concluded that red amaranth should be harvested 25 and 30 DAS in December and January sowing respectively.

References

Bose, T.K., M.G. Som and T. Kabir, 1993. Vegetables Crops in India, Naya Prokash. Calcutta.

Enyi, B.A.C., 1965. Effect of time of sowing at different stages of amaranth. Niger Agric. J., 2: 35.

Kader Mohideen, M., 1978. M.Sc. Thesis, Tamil Nadu Agric. Univ. Department of Horticulture. Coimbatore. India.

Nath, P., 1976. Vegetables for the tropical Region.Indian Council for Agricultural Research (ICAR), New Delhi.

Shanmugavelu, K.G., 1989. Production Technology of Vegetable Crops. Oxford and IBH publishing Co. (pvt), Ltd., pp: 682.

Vijaya, Kumar. M., 1980. M.Sc.(Ag) Thesis, Tamil Nadu Agric. Univ. Department of Horticulture. Coimbatore. India.

Yawalkar, K.S., 1985. Vegetable Crops in India. Naya Prokash. 3rd ed., pp: 70.