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## Standardization of optimum time planting on broccoli production

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**ABSTRACT :** The effect of sowing date on the growth and yield of broccoli was studied at Horticulture College and Research Institute, Anantharajupet, YSR Kadapa (Dist), Andhra Pradesh, India, during *Rabi* season of 2013. Four sowing dates were used in this study viz., 20<sup>th</sup> November-2013, 10<sup>th</sup> December-2013, 31<sup>st</sup> December-2013 and 20<sup>th</sup> January-2014 under open field conditions. Significant variations were observed in different growth, yield and quality parameters among the planting dates. The results indicated that significantly higher growth parameters viz., plant height, number of leaves per plant, stalk stem diameter, leaf length, width, petiole length and higher yield components like curd weight, curd length, curd width, yield per hectare, B:C ratio and higher curd quality components viz., ascorbic acid content and shelf-life at room temperature and at 4°C were recorded in December 10<sup>th</sup> planting (D<sub>2</sub>). Minimum days to curd initiation were observed in December 10<sup>th</sup> planting, whereas least number of days to harvest was observed in January 20<sup>th</sup> planting (D<sub>4</sub>).

**KEY WORDS :** Broccoli, Planting dates, Sulphoraphane, Curd weight, Curd yield, B: C ratio, Ascorbic acid, Shelf life

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**B**roccoli (*Brassica oleracea* var. *italica* L.) is an important fancy and highly nutritive exotic vegetable. It is cool season crop belongs to Cruciferae family. In India, its cultivation is negligible but now gaining popularity with Indian growers for the last couple of years due to its high nutritive value and increased tourist influx. Broccoli is a rich source of folic acid, vitamin-C, vitamin-A and a compound, sulphoraphane which is associated with reducing the risk of cancer (Guo *et al.*, 2001). Yield and yield attributing characters of broccoli were significantly influenced by the time of sowing (Hossain *et al.*, 2011). Proper planting time played an important role in achieving good yield for broccoli (Yoldas and Esiyok, 2004). Since this crop has been introduced recently in Andhra Pradesh, there is a

dire need to standardize the dates of transplanting to suit the local conditions. The planting dates have directly affecting yield and quality parameters in broccoli (Kunicki *et al.*, 1999). In spite of its greater importance in terms of bringing good returns to farmers; no systematic research work has been carried out in standardizing its agro-techniques in Andhra Pradesh. Hence, the present investigation was planned to standardize the time of planting in broccoli.

### RESEARCH METHODS

A field experiment was conducted at Horticulture College and Research Institute, Anantharajupet during the *Rabi* season of 2013 to 2014. The experiment was laid out in a Randomized Block Design with three

replications having twelve treatments. The treatments comprised of the combination four dates of planting (20<sup>th</sup> Nov., 10<sup>th</sup> Dec., 31<sup>st</sup> Dec., and 20<sup>th</sup> January designated as D<sub>1</sub>, D<sub>2</sub>, D<sub>3</sub> and D<sub>4</sub>). Well-rotten FYM @ 15-20 t ha<sup>-1</sup>, nitrogen @ 70 kg ha<sup>-1</sup>, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O both @ 100 kg ha<sup>-1</sup> were applied at the time of land preparation. Plots measuring 2.4 x 2.4 m were laid out. F<sub>1</sub> hybrid like Fantasy was used in this research. Healthy seedlings of 30 days old were transplanted at a spacing of 45x60 cm at evening hours as per the treatments and observations on plant height (cm), number of leaves per plant, stalk stem diameter (mm), leaf length (cm), width (cm), petiole length (cm), days to curd initiation, days to harvest, curd weight (g), curd length (cm), curd width (cm), yield/ha (t), B:C ratio, ascorbic acid content (mg/100g) and shelf life (days) were recorded.

## RESEARCH FINDINGS AND DISCUSSION

The findings of the present study as well as relevant discussion have been presented under following heads :

### Effect of planting dates on growth and flowering:

Significant difference was observed among the growth and flowering characters due to different planting dates in broccoli (Table 1). December 10<sup>th</sup> planting (D<sub>2</sub>) has recorded highest plant height (43.13 cm), number of

leaves per plant (27.50 cm), stalk stem diameter (48.10 mm), leaf length (33.84 cm), width (23.59 cm), petiole length (16.38 cm) and lowest values was recorded from January 20<sup>th</sup> planting (D<sub>4</sub>). This might be due to conducive climatic conditions prevailed during the crop period. The plant growth characters were significantly reduced from December 31<sup>st</sup> (D<sub>3</sub>) to January 20<sup>th</sup> (D<sub>4</sub>) transplanting, this might be due to lower average minimum temperature during late planting. Similar results were obtained by Saikia *et al.* (2010) and Sighal *et al.* (2009) in broccoli. December 10<sup>th</sup> (D<sub>2</sub>) and January 20<sup>th</sup> planting (D<sub>4</sub>) took less (34.22) and more number of days to flower bud initiation (39.50), respectively, whereas January 20<sup>th</sup> Planting (D<sub>4</sub>) has recorded least number of days to harvest (53.08) followed by December 31<sup>st</sup>(D<sub>3</sub>) planting (54.51).

### Effect of planting dates on yield and quality characters:

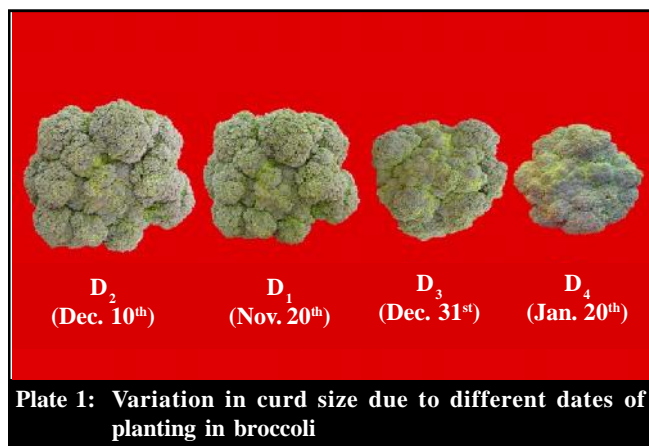
Planting dates showed significant effect on yield and quality parameters of broccoli curds (Table 2; Fig. 1 and Plate 1). December 10<sup>th</sup> planting recorded maximum values for curd weight (834.66g), curd length (21.12cm), curd width (24.87cm), yield per hectare (37.04t), B:C ratio (3.83) followed by November 20<sup>th</sup> (D<sub>1</sub>) planting. The lower yields were recorded in delayed planting on

**Table 1 : Effect of different dates of planting on growth and flower characters of broccoli**

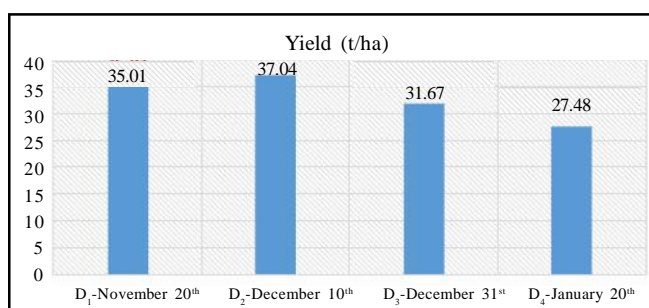
Treatments	Plant height (cm)	No. of leaves/plant	Stalk stem diameter (mm)	Leaf length (cm)	Leaf width (cm)	Leaf petiole length (cm)	Days to bud initiation	Days to harvest
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
D <sub>1</sub> -November 20 <sup>th</sup>	42.24	26.01	46.81	32.42	22.57	15.30	38.28	55.35
D <sub>2</sub> -December 10 <sup>th</sup>	43.13	27.50	48.10	33.84	23.59	16.38	34.22	57.15
D <sub>3</sub> -December 31 <sup>st</sup>	38.15	25.31	44.91	31.67	21.04	14.96	35.55	54.51
D <sub>4</sub> -January 20 <sup>th</sup>	36.64	24.06	44.45	30.51	20.53	13.40	39.50	53.08
S.E. ±	0.13	0.11	0.36	0.31	0.34	0.26	0.13	0.65
C.D. (P=0.05)	0.40	0.34	1.07	0.91	1.01	0.78	0.40	0.21

**Table 2 : Effect of different dates of planting on curd yield and quality characters of broccoli**

Treatments	Curd weight (g)	Curd length (cm)	Curd width (cm)	Yield per ha (tonnes)	B:C ratio	Vit-C content (mg/100g)	Shelf-life (Days)	
							At room temp.	At 4°C
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
D <sub>1</sub> -November 20 <sup>th</sup>	784.01	17.68	23.01	35.01	3.56	118.16	2.17	7.16
D <sub>2</sub> -December 10 <sup>th</sup>	834.66	21.12	24.87	37.04	3.83	125.50	3.33	8.10
D <sub>3</sub> -December 31 <sup>st</sup>	717.83	16.36	21.81	31.67	3.13	108.37	2.14	6.06
D <sub>4</sub> -January 20 <sup>th</sup>	626.22	15.58	19.55	27.48	2.58	97.22	2.08	5.11
S.E. ±	4.83	0.14	0.19	0.22	-	0.34	0.08	0.029
C.D. (P=0.05)	14.43	0.41	0.56	0.67	-	1.03	0.25	0.085



**Plate 1: Variation in curd size due to different dates of planting in broccoli**



**Fig. 1 : Yield/ha (tones) as influenced by different planting dates in broccoli**

20<sup>th</sup> January indicates that planting time assumes a major significance, as delayed transplanting adversely affects the yield by arresting the plant growth and production blinks due to insect-pest and disease attack in the prevailing high temperature (35-40<sup>o</sup> C) during curd development period. These results are in agreement with the findings (Ara *et al.*, 2009) in cauliflower and Nooprom *et al.* (2013) in broccoli. Regarding the quality characters, highest ascorbic acid content (125.50 mg 100 g<sup>-1</sup>) and shelf-life of curds at room (3.33 days) and at 4<sup>o</sup>C (8.10 days) both were recorded from December 10<sup>th</sup> planting (D<sub>2</sub>).

### Conclusion :

Transplanting of broccoli on December 10<sup>th</sup> (D<sub>2</sub>)

was found to be effective and maximum values for growth, yield and quality parameters with highest B: C ratio, followed by November 20<sup>th</sup> planting (D<sub>1</sub>). From the present investigation, it can be inferred that under Rayalaseema region of Andhra Pradesh, planting of broccoli from November 20<sup>th</sup> (D<sub>1</sub>) to December 10<sup>th</sup> (D<sub>2</sub>) was found to be ideal to get higher yields with good returns.

### REFERENCES

- Ara, N., Kaiser, M.O., Khalequzzaman, K.M., Kohinoor, H. and Ahamed, K.U. (2009). Effect of different dates of planting and lines on the growth, yield and yield contributing characteristics of cauliflower. *J. Soil Nature*, **3** (1): 16-19.
- Guo, J.H., Lee, S., Chiang, F. and Chang, C. (2001). Antioxidant properties of the extracts from different parts of broccoli in Taiwan. *J. Food & Drug. Analysis*, **9**: 96-101.
- Hossain, M.F., Ara, N., Uddin, M.R., Dey, S. and Islam, M.R. (2011). Effect of time of sowing and plant spacing on broccoli production. *Trop. Agric. Res. & Exten.*, **14** (4) : 90-92.
- Kunicki, E., Capecka, E., Siwek, P. and Kalisz, A. (1999). The effect of plant spacing on the yield and quality of three broccoli cultivars in autumn growing. *Folia Hort.*, **11** (2): 69-79.
- Nooprom, K., Santipracha, Q. and Sompong, T.C. (2013). Effect of planting date and variety on growth and yield of broccoli during the dry season in southern Thailand. *Internat. J. Plant, Animal & Environ. Sci.*, **3**(2) : 121- 124.
- Saikia, B.R., Phookan, D.B. and Sanchita, Brahma (2010). Effect of time of planting and planting densities on growth, yield and economic production of broccoli (*Brassica oleracea* var. *italica*) cv. PUSA BROCCOLI KTS-1. *J. Hill Agric.*, **1** (2): 135-139.
- Singhal, B.K., Preeti, Srivastava, B.K., Singh, M.P. and Singh, P.K. (2009). Effect of date of planting and spacing on the performance of broccoli. *Indian J. Hort.*, **66**(1) : 137-140.
- Yoldas, F. and Esiyok, D. (2004). Effects of plant spacing, sowing and planting date on yield and some quality parameters of broccoli. *Ege Univ. Ziraat Facultesi Dirges*, **41** (2): 37- 48.

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