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Effect of Plant Density on Phenological and Yield contributing characters of Shamli variety of Brinjal (Solanum melongena L.)

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ABSTRACT

A study was conducted to evaluate the effect of plant density on phenological and yield contributing characters of Brinjal (Solanum melongena L.*) to determine the optimum planting density. A field experiment on Brinjal cv. Shamli comprising of four spacings (30, 45, 60, 75cm) was conducted at D.A.V College, Abohar during 2017. Days to flower initiation, days to first fruit setting, Plant height and fruit diameter were recorded. Results indicated that 30 cm plant density gave minimum days to flower initiation and days to first fruit setting, maximum plant height and fruit diameter than the other spacing. It was concluded that 30 cm plant density significantly improve the fruit growth of Brinjal under field conditions.*

Keywords : *Brinjal, Planting density, flower initiation, Plant height, Fruit diameter*

I. INTRODUCTION

It belongs to the genus *Solanum*, family Solanaceae and order Solanales. The flower is star shaped, white to purple with yellow stamen and five lobbed corolla. It belongs to nightshade family of vegetables, which also includes tomato, sweet peppers, tobacco plant and potatoes. Brinjal is usually self pollinated but the extent of cross pollination has been reported as high as 48% and hence is classified as cross pollinated crop. The cone like formation of anthers favors self pollination, but since the stigma ultimately projects beyond the anthers, there is an ample opportunity for cross pollination. Fruit set in insect pollinated plants is much higher than that of self pollinated ones (Pal and Osvald, [1]). The fruit are dark purple in colour and shinny. Plants are sometimes spiny and older one become woody (Siemonsma and Kasem, [2]). Eggplant is grown all over the world as edible vegetable crop, it is nutritious crop as it contains 92.70 gm moisture, 1.4 gm protein, 0.30 gm fat, 0.30gm minerals, 0.30 gm fiber, 4.0 gm carbohydrate, 18 mg calcium, 47 mg phosphorus, 2 mg potassium, 0.11mg riboflavin and 12.0 mg vitamin c per 100 gm of edible portion (Degri et al, [3]). In India, Orissa, West Bengal and Bihar rank first, second and third respectively in eggplant production.The other important eggplant growing states in India are Karnataka, Maharashtra, Gujarat, Madhaya Pradesh and Andhra Pradesh (Dhaliwal, [4]). It contains nicotine but in tiny amount 0.01%. Delphinidin is a substance isolated from eggplant that exhibit anticancer properties. The raw fruit is somewhat bitter in taste because of presence of nicotine alkaloid present in it and even shows an astringent quality due to anthocyanine. Eggplant is good source of anti-oxidants.

Eggplant has a unique range of health benefits including an ability to help build strong bones and prevent osteoporosis, reduce symptoms of anemia, increase cognitive function, include cardiovascular health, protective and digestive system, help lose weight, manage diabetes, reduce stress, protect infants from birth defects.Fruit color of Shamli variety of brinjal is purple. Shape of fruit is long. Average weight of fruit is 90-95 gm. There are no spines on the leaf and fruits of this variety. Picking is done after 45-50 days after transplanting. Yield contributing characters of eggplant is affected by different plant densities.

II. MATERIALS AND METHODS

This research was done to find the effect of plant density on phenological and yield contributing characters of Brinjal (*Solanum melongena* L.). The experiments on Brinjal cv. Shamli consisted of different spacings (30cm, 45cm, 60cm, 75cm). The seedlings were transplanted in the field on 6 Feb 2017 and experiment was carried out till August, 2017. The experiment was conducted in four plots each of area 8.61 m^2.

The experiment was performed to find the effect of plant density on days to flower initiation, days to first fruit setting, plant height, fruit diameter. Days to flower initiation was taken as the date when the flower bud was just visible to naked eye. The date when the fruit bud was just appeared to the naked eyes, was taken as date of fruit setting. Plant height was measured at 15, 30, 45, 60 days after transplanting. Height of each plant was measured in cm by using measuring tape from ground surface to top most leaf of the plant from five randomly selected plants and their mean was calculated. Fruit diameter was measured using vernier calliper in centimetre. Fruits were taken from five randomly selected plants and their diameter was taken with vernier calliper and their average was calculated.

III. RESULTS AND DISCUSSIONS

3.1 Days to flower initiation

It was observed that the treatment T_1 (30 cm spacing) has shown early flowering initiation (March 3). The flowering initiation date in T_4 (75 cm spacing) was very late (March 10) as mentioned in Table 4.1. It was concluded that days to first flowering increased from closely spaced plants to widely spaced plants respectively. The findings of this research are similar with that of Gabisa *et al* [5] who observed that closely spaced plants (250,000 Plants ha^{-1}) had taken minimum days to flowering (44.00 days), whereas widely spaced plants (190476 Plants ha^{-1}) had taken maximum days to flowering (44.11 days).

3.2 Days to fruit setting

The first onset of fruit in T_1 was earlier (55 days after transplanting) and the delayed onset of fruit was observed in T_4 (66 days after transplanting) as shown in Table 4.2. It was found that that days to first fruit setting increased from closely spaced plants to widely spaced plants respectively. Similar results were observed by Hamid *et al* [6] while studying the effect of plant densities on Tomato in which closely spaced plants (71428 plant ha^{-1}) had taken minimum days to fruit set and widely spaced plants (35,714 plants ha^{-1}) had taken maximum days to first fruit set.

3.3 Plant height

The data in Table 4.3 reveales that the tallest plant (30.6 cm) was obtained in T_1 treatment (spacing-30cm) followed by T_2 treatment (30.4 cm) and 28.6 cm of T_3 treatment followed by T_4 treatment (27.1cm). It was found that plant height increased from widely spaced plants to closely spaced plants respectively. Similarly, Mirzaei *et al* [7] observed the effect of plant density (30, 40, 50 and 60 plants/m^2) on marigold. The results indicated that the highest plant height (51.01cm) was obtained under treatment of high density plants and lowest plant height (40 cm) was observed under treatment of low density plants. Also, Zibelo et *al* [8] observed that closely spaced plants had maximum plant height than widely spaced plants.

3.4 Fruit diameter

The data from the Table 4.4 revealed that fruit diameter was highest (4.25 cm) in 30 cm spaced plants followed by 45 cm spaced plants (3.55 cm) and of 60 cm spaced plants (3.39 cm) followed by 75 cm spaced plants (3.35 cm). It was observed that fruit diameter decreased from closely spaced plant to widely spaced plants respectively. Similarly, Ara *et al* [9] studied the effect of spacing on growth and yield of Tomato. They found that fruit diameter of closely spaced plants (40 cm) was maximum (6 cm), whereas widely spaced plants (50 cm) had minimum fruit diameter (5.96).

IV. OBSERVATIONS AND TABLES

Table 4.1: Impact of Plant density on days to flower initiation (days after transplanting)

Treatment	Days to flower initiation
T_1	25 days after transplanting
T_2	27 days after transplanting
T_3	30 days after transplanting
T_4	32 days after transplanting

Table 4.2: Impact of Plant density on days to fruit setting (days after transplanting)

Treatments	Days to fruit setting
T_1	55 days after transplanting
T_2	59 days after transplanting
T_3	64 days after transplanting
T_4	66 days after transplanting

Table 4.3: Impact of Plant density on plant height (cm)

TREATMENT	Days after transplanting			
	15 DAT	30 DAT	45 DAT	60 DAT
T_1	20.16	20.8	26.3	30.6
T_2	20.15	20.4	24.3	30.4
T_3	18.16	20.3	22.3	28.6
T_4	14.5	20.2	22.1	27.1

Table 4.4: Impact of Plant density on fruit diameter (cm)

Treatment	Avg. fruit breadth per plant (cm)
T1	4.25
T2	3.35
T3	3.39
T4	3.35

V. CONCLUSION

It was evident from the result that maximum growth parameter were obtained with 30 cm spaced plants. The minimum days to flower initiation (25 DAT) and days to first fruit setting (55 DAT) had taken by closely spaced plants as compared to widely spaced plants. The maximum plant height (30.6 cm) and maximum fruit diameter (4.25 cm) were observed in closely spaced plants (30 cm). It is concluded that the better growth can be obtained from closely spaced plants of Brinjal.

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