

Effect of plant density on growth, flowering and yield of Statice (*Limonium sinuatum*)

G.M. Deshpande, P.C. Sonawane and Manjul Dutt

College of Agriculture, Pune, India. Email: m_dutt@usa.net

Abstract

Investigation conducted on the effect of three plant-to-plant spacing of S_0 (15 cm), S_1 (30 cm) and S_2 (45 cm) with three row to row spacing of R_0 (30 cm), R_1 (45 cm) and R_2 (60 cm) on growth, flowering and yield of statice revealed that widest spacing of R_2S_2 effectively improved plant growth and flower quality but had shorter stalk length and lower yield as compared to closest plant density R_0S_0 which had significantly higher yield but unsatisfactory quality. The medium plant density R_1S_1 achieved moderately good yield with desirable quality of flowers.

Key words: Statice, *Limonium sinuatum*, growth, flowering, yield, stalk length, flower quality

Introduction

Statice belonging to family Plumbaginaceae is gaining importance as a cut flower as well as dried flower crop in Maharashtra due to relative ease of cultivation and short growing period. The quality cut flower fetches a premium in the market because of attractive appearance and good vase life. For proper growth and development, plant density plays an important role in case of physiological functioning of the plant. The planting distance affects the availability of nutrients, water and light to plant. This influences the photosynthetic activities affecting yield. In literature, till date, no standardized spacing is mentioned for optimum cut flower production in Statice.

Materials and methods

The present investigation was undertaken in a Factorial Randomized Block Design (F.R.B.D.) with three replications in Modibaug garden of the College of Agriculture, Pune.

Treatments consisted of three plant-to-plant spacing of S_0 (15 cm), S_1 (30 cm) and S_2 (45 cm) with three row to row spacing of R_0 (30 cm), R_1 (45 cm) and R_2 (60 cm). Seeds of local variety were obtained from Alandi region of Pune. Thirty days old uniform seedlings were transplanted in flat beds.

Results and discussion

Effect on growth: As clear from the Table 1 that at 30 days of growth, plant height under different spacings was non-significant. At 60 and 90 days interval the closest spacing R_0S_0 had maximum plant height. This went on decreasing as spacing increased and the widest spacing R_2S_2 recorded the lowest plant height. This may be due to availability of less space for spread of plant and hence all food material is utilized in erect growth. Gowda and Jayanti (1986) also observed similar results in chrysanthemum.

Plant spread also followed similar trends with 30 day stage having no significant influence. But at 60 days and 90 days variable spacing had significant influence with widest spacing R_2S_2 recording more spread as compared to closer spacing R_0S_0 . The competition for nutrients and light between plants may have resulted in less spread as observed by Patil (1973) in Marigold.

Effect on flowering: In Table 2, it is seen that widest spacing R_2S_2 recorded significantly earlier flowering than closer spacings, which resulted in days required for harvesting to be least in widest spacing R_2S_2 and having significant increase with progressive closer spacing. This could be due to competition among plants. Bunt (1978) observed similar results in carnation. Mean flower stalk length was more in closer spacing R_0S_0 and progressively decreased with increase in spacing. But higher plant spacing R_2S_2 produced more number of flower stalk per plant. This went on decreasing with decrease in plant spacing and increase in plant density.

Table 1. Effect of plant density on growth of Statice (*Limonium sinuatum*)

Treatment	Plant Height (cm)			Plant spread (cm)					
	30d	60d	90d	East – West			North- South		
				30d	60d	90d	30d	60d	90d
R_0S_0	15.30	57.26	84.55	40.73	44.53	50.13	41.00	43.90	51.68
R_0S_1	14.95	56.56	81.33	41.40	45.20	52.94	41.06	44.20	54.42
R_0S_2	13.26	52.80	79.50	42.80	52.66	57.22	43.33	50.70	56.66
R_1S_0	14.53	53.79	82.41	43.40	54.40	54.73	42.73	55.33	53.68
R_1S_1	13.64	50.83	76.82	44.10	60.00	59.44	44.10	60.50	58.82
R_1S_2	14.90	47.00	72.17	45.06	61.46	62.60	46.26	62.80	64.45
R_2S_0	13.60	45.06	69.74	42.73	62.83	60.41	42.86	61.90	60.53
R_2S_1	12.40	42.53	65.21	45.53	64.46	64.82	43.80	63.63	63.11
R_2S_2	10.86	40.06	62.23	47.90	64.93	67.19	47.30	61.23	66.00
C.D. ($p \leq 0.05$) Row to Row									
	N.S.	5.26	3.01	N.S.	5.47	5.61	N.S.	4.75	4.51
C.D. ($p \leq 0.05$) Plant to plant									
	N.S.	5.26	3.01	N.S.	5.47	5.61	N.S.	4.75	4.51
C.D. ($p \leq 0.05$) Row x Plant spacing									
	N.S.	9.08	5.26	N.S.	9.47	9.77	N.S.	8.28	7.83

$R_0 = 30\text{cm}$, $R_1 = 45\text{ cm}$, $R_2 = 60\text{ cm}$, $S_0 = 30\text{ cm}$, $S_1 = 30\text{cm}$, $S_2 = 45\text{ cm}$

Table 2. Effect of plant density on flowering and yield of *Statice* (*Limonium sinuatum*)

Treatment	Days to flower stalk initiation	Days required for harvesting from initiation	Mean length of flower stalk	Number of flower stalks plant ¹	Weight of flower stalks per plant (g)	Weight of flower stalks(ton/ha)
R ₀ S ₀	57.54	49.40	82.55	11.20	212.80	47.27
R ₀ S ₁	56.06	48.80	79.33	16.50	338.74	37.62
R ₀ S ₂	52.08	46.52	77.50	20.30	471.36	34.90
R ₁ S ₀	55.66	47.14	80.41	15.06	316.84	46.93
R ₁ S ₁	53.00	45.70	74.82	24.46	626.41	46.39
R ₁ S ₂	48.80	42.37	70.17	26.00	696.54	34.38
R ₂ S ₀	50.00	43.71	67.74	18.70	411.40	45.70
R ₂ S ₁	49.22	41.50	63.21	27.20	770.30	42.78
R ₂ S ₂	47.43	39.32	60.23	28.93	871.36	32.26
Row to Row						
C.D.(p=0.05)	3.94	3.64	3.01	5.11	73.63	N.S.
Plant to plant						
C.D.(p=0.05)	3.94	3.64	3.01	5.11	73.63	6.33
R X P						
C.D.(p=0.05)	7.59	6.33	5.26	8.84	127.66	10.97

R₀ = 30cm, R₁ = 45 cm, R₂ = 60 cm, S₀ = 30 cm, S₁ = 30cm, S₂ = 45 cm

Effect on yield: Yield of *Statice* in terms of weight of flower stalks per plant was more in wide spaced treatments and decreased in less spacing. Spacing, R₂S₂ was significantly superior over other spacings. Ability of producing more dry matter due to better photosynthetic activity could have resulted this difference. Conversely, weight of flower stalk per hectare was totally different from the above results. Wider spacing, S₂ in various combinations recorded less weight per hectare than S₀ or S₁. Highest weight of flowers per hectare was recorded in R₀S₀. Increase in number of plants per unit area in S₀ yielded more flower stalks than wider spacing having lower number of plants per unit area. Powell and Bunt (1983) working on chrysanthemum reported that high plant density reduced number of flowers but increased production per unit area by 6 times.

It can be concluded, that widest spacing of R₂S₂ effectively improved plant growth and flower quality but had shorter stalk length and lower yield as compared to closest plant density R₀S₀,

which had significantly higher yield but unsatisfactory quality. The medium plant density R₁S₁ achieved moderately good yield with desirable quality of flowers.

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