

Effect of nitrogen and spacing on flower yield of spider lily (*Hymenocallis littoralis* L.)

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Research Article

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Effect of nitrogen and spacing on flower yield of spider lily (*Hymenocallis littoralis* L.)

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Abstract

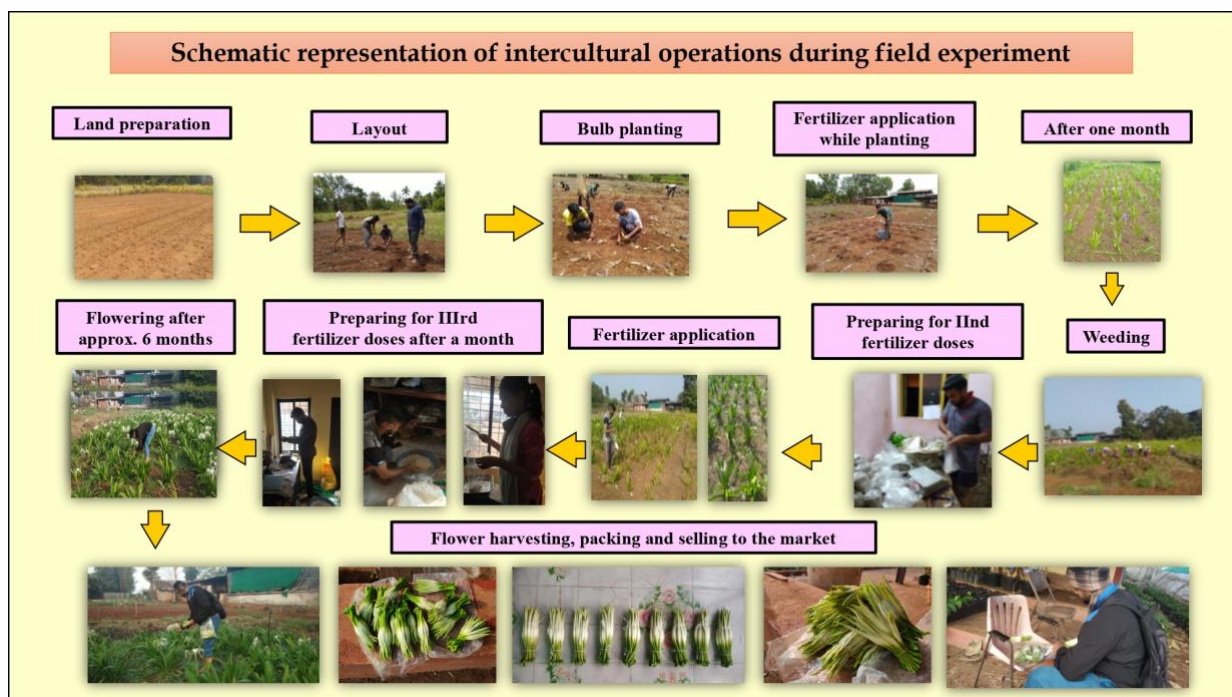
Aim: The present investigation entitled “Effect of nitrogen and spacing on flowering of spider lily (*Hymenocallis littoralis* L.)” was undertaken at College of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli by considering the commercial importance of spider lily under Konkan agro-climatic conditions.

Methodology: The experiment was laid out in a split plot design using four levels of nitrogen and three levels of spacing with three replications along with the common dosage of phosphorous (150 kg ha^{-1}) and potassium (100 kg ha^{-1}).

Results: Flower yield and yield attributing characters viz., the highest number of flower buds per plant (46.84), flower buds per ha (16.01 lakh), flower yield per plot (8.50 kg) and flower yield per ha (6.56 t ha^{-1}) were recorded with the treatment N_1 (300 kg ha^{-1}). With regards to spacing, the highest number of flower buds per plant (36.23), flower buds per ha (19.37 lakh), flower yield per plot (9.48 kg) and flower yield per ha (7.31 t ha^{-1}) was recorded in S_3 ($30 \times 60 \text{ cm}$). However, the interaction effect of treatment combination N_1S_3 (300 kg N ha^{-1} ; $30 \times 60 \text{ cm}$) recorded the highest number of flower buds per plant (58.52), flower buds per ha (29.49 lakh), flower yield per plot (16.06 kg) and flower yield per ha (12.39 t ha^{-1}).

Interpretation: The observations were recorded on various flowering parameters namely number of flower buds per plant, flower buds per ha (lakh ha^{-1}), flower yield per plot (kg plot^{-1}) and flower yield per ha (t ha^{-1}) and most of the parameters were differed significantly at highest levels of nitrogen and spacing.

Key words: Spider lily; nutrient management; spacing flower yield.



Introduction

Flowers invariably denote purity, strength and nobility and inspire the complete humankind to follow the trail of morality. Flowers also are connected with Gods and Goddesses in Indian culture, cherish Brahma, Vishnu, Shiva, Krishna, Lakshmi, Saraswati, etc whereas Lotus represents purity of the body, speech, and mind in Buddhist culture. In India, flowers are vital with reference to religion, attire, medicative use, antagonistic toxins depletion, primitive spirituality, and providing physiological and psychological relaxation effects on workplace workers. (Ikei *et al.*, 2014).

In India, the world underneath cultivation of flower crops got nearly tripled from 106 thousand ha throughout 2001-02 to 339 thousand ha during 2018-19 (ICAR-DFR Annual Report, 2019). In 2018, annual growth in area and production was 5.8% and 16.4%, respectively, compared to 2016-17 (NHB, 2018). In Maharashtra, the area under horticulture is 11.36 thousand ha with production of loose and cut flowers accounting 57.61 and 0.11 MT, respectively (Kumar *et al.*, 2021) whereas the Konkan region having quite 310 ha area under flower cultivation with a production of 376 MT (Patil *et al.*, 2010).

Floral bud of the spider lily is commercially important and frequently cultivated in West India, particularly in southern Gujarat, Maharashtra, and Karnataka. It also has a high quality in the Mumbai flower market, where it sells for Rs. 6–12 per kg. It is grown commercially in the Konkan districts of Thane, Dahanu, Vasai, and Ratnagiri, mostly for sale in nearby markets. It was also employed as a commercial and intercrop in orchards in the early years, and it now has around 2045 acres of area under flower crops, with Maharashtra having a 3.09 percent share in flower output (Patil *et al.*, 2010).

The normalization of agro-tech for high efficiency with good quality flowers is of paramount importance for the benefits of farmers involved in the culture of this culture. Spider Lily is a new potential impending crop of flowers, so far, very little or no research study is done in this crop. Recognizing the growing importance of this crop, it was therefore much more necessary to determine the optimum dose of fertilizer and spacing needed to obtain a yield. Spider Lily is a new revival of imminent potential flowers, so far, very little or no research study is performed in this culture.

Materials and Methods

The field investigation entitled “Effect of nitrogen and spacing on growth and flowering of spider lily (*Hymenocallis littoralis* L.)” was undertaken at College of Horticulture, Dapoli; Dist. Ratnagiri (MS) during the year 2019-2021.

The experiment details are as followed:

Nitrogen doses: 4 (Through: Urea) -

N₁:- 300 kg/ha

N₂:- 250 kg/ha

N₃:- 200 kg/ha

N₄:- 150 kg/ha

(Whereas, common doses of phosphorus and potash were 150 kg/ha and 100 kg/ha respectively.)

Spacing: 3 -

S₁:- 90 × 60 cm²

S₂:- 60 × 60 cm²

S₃:- 30 × 60 cm²

Total No. of treatments: 4×3=12

No. of replications: 3

Block size: 5.4 × 2.4 m. (12.96 sq. m.)

Design: Split plot design

Five plants were selected randomly from each plot in each treatment and tagged for the purpose of recording different visual observations. Number of flower buds picked per tagged plants from each net plot was recorded and average was worked out. The number of buds per spike was counted from each five tagged plants at 60 days of interval after first spike emergence and average was worked out. After that, the number of flower buds per net plot was recorded and it was converted on hectare basis to reflect yield per hectare.

The data obtained was analyzed statistically as per the method suggested by Panse and Sukhatme (1989). The standard error of mean (S.E) was worked out and the critical difference (C.D.) at 5 per cent was calculated whereas, the results were found significant. The important results have been supported through graphs and plates.

Results and discussion

Number of flower buds per plant:

During 2019-20 and 2020-21; the highest number of buds per plant was 26.76 and 66.91, respectively, observed in N_1 and significantly superior over all nitrogen levels. The lowest number of flower buds per plant was 12.02 and 40.71 was noticed in N_4 and N_3 . (Table 1). With regards to pooled data, the highest number of flower buds per plant (46.84) was found in N_1 which was significantly superior over rest of the nitrogen levels, while the lowest number of flower buds per plant (26.82) was observed in N_3 (Table 1). The results are strongly supported by Sonone (2019) who revealed that the application of highest dose of nitrogen i.e., 450 kg N per plant recorded highest number of flower buds per plant i.e., 54.27, 55.04 and 56.51 at 90, 180 and 270 days after treatment, whereas lowest number of flower buds per plant i.e., 17.40, 17.94 and 19.31 was obtained in the treatment receiving 0 kg N/ha. Kejekar (2012) registered the similar results. Results of the present findings also agreed with Patil and Reddy (2002), Belorkar *et al.*, (1992) and Prathiban and Khader (1991) in tuberose.

The spacing had a non-significant influence on number of flower buds per plant for the year 2020-21, whereas significant variation was observed in the year 2019-20 and in pooled data also (Table 1). During 2019-20; number of flower buds per plant differed significantly. The highest number of flower buds per plant (20.10) was observed in S_3 and it was significantly superior over all the spacing, whereas treatment S_2 exhibited the lowest number of flower buds per plant (14.59). During 2020-21; the number of flower buds per plant varied non-significantly. In pooled data, number of flower buds per plant varied significantly (Table 1). The highest number of flower buds per plant (36.23) was noted in S_3 and it was found significantly superior, whereas treatment S_2 exhibited the lowest number of flower buds per plant (30.88). The interaction effect of nitrogen and spacing ($N \times S$) on number of flower buds per plant for two successive years including pooled data exhibited similar trend and it differed significantly (Table 1). Patel *et al.*, (2002) observed similar trend that the highest number of flower buds per plant in spider lily was recorded with nitrogen dose of 250 kg/ha and spacing of 75×30 cm.

Flower harvesting and packaging for market sell



Table: 1. **Effect of nitrogen and spacing on number of flower buds per plant of spider lily**

	Number of flower buds per plant														
	NITROGEN														
SPACING	2019-20					2020-21					POOLED				
	N1	N2	N3	N4	MEAN	N1	N2	N3	N4	MEAN	N1	N2	N3	N4	MEAN
S1	21.75	14.08	12.60	11.76	15.05	64.47	46.80	39.47	37.63	47.09	43.11	30.44	26.03	24.69	31.07
S2	21.27	12.31	12.72	12.07	14.59	56.50	45.31	45.67	41.23	47.18	38.88	28.81	29.19	26.65	30.88
S3	37.27	17.40	13.48	12.24	20.10	79.77	43.45	36.99	49.24	52.36	58.52	30.43	25.23	30.74	36.23
MEAN	26.76	14.60	12.93	12.02		66.91	45.19	40.71	42.70		46.84	29.89	26.82	27.36	
	N		S		N×S	N		S	N×S		N		S	N×S	
F test	SIG		SIG		SIG	F test		SIG	NS	SIG	F test		SIG	SIG	SIG
S.Em.±	0.63		0.89		1.78	S.Em.±		1.01	1.60	3.21	S.Em.±		0.60	0.92	1.83
CD@5%	2.16		2.66		5.32	CD@5%		3.50	-	9.62	CD@5%		2.59	2.64	5.28
Treatment details:-			Nitrogen						Spacing						
			N1			300kg/ha			S1			90×60cm			
			N2			250kg/ha			S2			60×60cm			
			N3			200kg/ha			S3			30×60cm			
			N4			150kg/ha			*Number of plants as per spacing are24(90×60 cm), 36 (60×60 cm) and 72(30×60 cm) in 12.96 sq.m. area						

Flower yield per plot (kg plot⁻¹):

Flower yield per plot exhibited significant variation with respect to the various nitrogen levels during both the years of study *i.e.*, 2019-20 and 2020-21 as well as in pooled data (Table 3) which is graphically illustrated in Fig 2. During 2019-20; significantly the highest flower yield per plot (4.97 kg) was observed in N₁, while the lowest flower yield per plot (1.85 kg) was noticed in N₄ (Table 3). During 2020-21; the similar significant trend was noticed. The highest flower yield per plot (12.03 kg) was observed in N₁ which was significantly superior over rest of the nitrogen levels, whereas the lowest flower yield per plot (6.09 kg) was observed in N₃ (Table 3). Pooled data revealed that the highest flower yield per plot (8.50 kg) was found in N₁ which was significantly superior over rest of the nitrogen levels, while the lowest flower yield per plot (4.40 kg) was recorded in N₃ (Table 3). During the present investigation, it was observed that the role of nitrogen in flowering can be explained by the concept that a sufficient amount of stored carbohydrates is required to induce the plants to transition from the vegetative phase to the flowering phase. Nitrogen consumption may influence carbohydrate storage and cause competition for carbon skeletons between carbohydrate and amino acid metabolism. Ample nitrogen encourages amino acid synthesis, and a significant amount of photosynthetically generated triose-phosphate serves as amino acid skeletons. The majority of amino acids in growing tissues, such as young leaves and root tips, are required for protein synthesis, and if growth is not hampered by other reasons, no significant accumulation of carbohydrates occurs. (Mengel *et al.*, 2001). Kejekar (2012) observed significant effect of nitrogen on flower yield per plot. The application of nitrogen @ 400 kg N/ha (N₃) was recorded highest flower yield (605.4) per plot and it was followed by treatment receiving N₂ (300 kg N/ha) and N₁ (200 kg N/ha). Similar results were reported by Ghule *et al.*, (2003) and Patel *et al.*, (2002) in spider lily.

Flower yield per plot varied significantly at different levels of spacing during both the years of experimentation as well as in pooled data. During 2019-20; flower yield per plot differed significantly. The highest flower yield per plot (5.22 kg) was observed in S₃ and it was significantly superior over rest of the spacing, whereas treatment S₁ exhibited the lowest flower yield per plot (1.33 kg) (Table 3). During 2020-21; flower yield per plot varied significantly. The highest flower yield per plot (13.73 kg) was noticed in S₃ and it was significantly superior over rest of the treatments, while the lowest flower yield per plot (4.23 kg) was recorded in S₁ (Table 3). Pooled data also exhibited significant difference in flower yield per plot. The highest flower yield per plot (9.48 kg) was noted in S₃ and it was found significantly superior, whereas treatment S₁ recorded the lowest flower yield per plot (2.78 kg) (Table 3). The flower yield per plot was the highest in S₃ (closer) spacing might be due to the production of flowers per unit area was primarily a function of plant population where clearly found that higher number of plants per unit area produced higher number of flowers. Mishra *et al.*, (2002) revealed that the higher (18.26 t/ha) flower yield was obtained in closer spacing (15 × 15 cm) in tuberose. Similar trend was observed by George (1997) and Koladiya (1995) in spider lily.

The effect of interaction (N × S) on flower yield per plot for two years of experimentation including pooled data exhibited similar trend with significant variation. During 2019-20; flower yield per plot varied significantly. The highest flower yield per plot (10.07 kg) was observed in N₁S₃ and it was significantly superior, whereas lowest flower yield per plot (0.98 kg) was recorded in treatment combination N₄S₁ (Table 3). During 2020-21; the significant trend was observed. The treatment combination N₁S₃ recorded the highest flower yield per plot (22.05 kg), while the lowest flower yield per plot (3.10 kg) was noticed in N₄S₁ (Table 3). In pooled data, flower yield per plot differed significantly. The treatment combination N₁S₃ recorded the highest flower yield per plot (16.06 kg) which was found significantly superior, whereas the lowest flower yield per plot (2.04 kg) was observed in N₄S₁ (Table 3). The increase in the yield in terms of flower yield per plot might be due to the reason that nitrogen is known to play an important role in plant metabolism due to its constitutional role in various important protein molecules as well as it helped in better vegetative growth resulting in higher production of flowers and with reference to spacing, higher number of plants per plot of an area. These results are in close agreement with Koladiya (1995) who recorded the highest flower yield with closer spacing *i.e.* 60 × 20 cm and higher dose of nitrogen *i.e.* 40 g/m².

Number of flower buds per hectare (in lakh):

The data on effect of nitrogen levels, spacing and their interaction on number of flower buds per hectare was studied for two succeeding years. Data were pooled and presented in Table 2 with graphical illustration in Fig. 1. Number of flower buds per hectare differed significantly with respect to the various nitrogen levels during both the years of study *i.e.*, 2019-20 and 2020-21 as well as in pooled data. During 2019-20 and 2020-21; significantly the highest number of flower buds per hectare was 8.04 lakh and 23.98 lakh, respectively which was observed in N₁. The lowest number of flower buds per hectare (4.11 lakh) was noticed in N₄ during 2019-20 whereas the lowest number of flower buds per hectare (13.51 lakh) was observed in N₃ during 2020-21 (Table 2). Pooled data exhibited that the highest number of flower buds per hectare (16.01 lakh) was found in N₁ which was significantly superior over rest of the nitrogen levels, while the lowest number of flower buds per hectare (8.98 lakh) was observed in N₃ (Table 2). Thus, the nitrogen had significant effect on number of flower buds per hectare.

Table:2. Effect of nitrogen and spacing on flower yield per plot (kg plot⁻¹) of spider lily

	Flower yield per plot (kg plot ⁻¹)															
	NITROGEN															
SPACING	2019-20					2020-21					POOLED					
	N ₁	N ₂	N ₃	N ₄	MEAN	N ₁	N ₂	N ₃	N ₄	MEAN	N ₁	N ₂	N ₃	N ₄	MEAN	
S ₁	2.09	1.14	1.10	0.98	1.33	6.21	4.17	3.44	3.10	4.23	4.15	2.66	2.27	2.04	2.78	
S ₂	2.75	1.62	1.58	1.48	1.86	7.81	6.06	5.66	5.37	6.23	5.28	3.84	3.62	3.43	4.04	
S ₃	10.07	4.62	3.12	3.09	5.22	22.05	11.34	9.18	12.35	13.73	16.06	7.98	6.15	7.72	9.48	
MEAN	4.97	2.46	1.93	1.85		12.03	7.19	6.09	6.94		8.50	4.82	4.01	4.40		
	N		S		N×S		N		S		N		S		N×S	
Ftest	SIG		SIG		SIG		Ftest		SIG		Ftest		SIG		SIG	
S.Em.±	0.12		0.15		0.30		S.Em.±		0.20		S.Em.±		0.12		0.39	
CD@5%	0.42		0.44		0.89		CD@5%		0.69		CD@5%		0.51		1.13	
Treatment details:-			Nitrogen							Spacing						
			N ₁				300kg/ha				S ₁			90×60cm		
			N ₂				250kg/ha				S ₂			60×60cm		
			N ₃				200kg/ha				S ₃			30×60cm		
			N ₄				150kg/ha				*Number of plants as per spacing are 24(90×60cm), 36(60×60cm) and 72(30×60cm) in 12.96 sq.m. area					

Table: 3. Effect of nitrogen and spacing on number of flower buds per ha (in lakh) of spider lily

	Number of flower buds per ha (in lakh)														
	NITROGEN														
SPACING	2019-20					2020-21					POOLED				
	N1	N2	N3	N4	MEAN	N1	N2	N3	N4	MEAN	N1	N2	N3	N4	MEAN
S1	3.55	2.61	2.33	2.18	2.67	11.94	8.67	7.31	6.97	8.72	7.74	5.64	4.82	4.57	5.69
S2	5.91	3.42	3.53	3.35	4.05	15.69	12.59	12.69	11.45	13.10	10.80	8.00	8.11	7.40	8.58
S3	14.67	9.67	7.49	6.80	9.66	44.31	24.14	20.55	27.36	29.09	29.49	16.90	14.02	17.08	19.37
Mean	8.04	5.23	4.45	4.11		23.98	15.13	13.51	15.26		16.01	10.18	8.98	9.68	
	N		S		N×S		N	S	N×S			N	S	N×S	
F test	SIG		SIG		SIG	F test	SIG	SIG	SIG		F test	SIG	SIG	SIG	
S.Em.±	0.62		0.34		0.68	S.Em.±	0.40	0.71	1.42		S.Em.±	0.37	0.39	0.79	
CD@5%	2.15		1.02		2.03	CD @5%	1.37	2.14	4.27		CD @5%	1.61	1.14	2.27	
Treatment details:-			Nitrogen							Spacing					
			N1			300kg/ha				S1			90×60cm		
			N2			250kg/ha				S2			60×60cm		
			N3			200kg/ha				S3			30×60cm		
			N4			150kg/ha				*Number of plants as per spacing are 24(90×60 cm),36 (60×60cm) and 72(30×60cm) in 12.96 sq.m. area					

Maske *et al.*, (2015) reported that highest (4.33 lakh) flowers per ha with the application of highest level of nitrogen *i.e.*, 400 kg/ha. The similar reports were given by Paramagoudar (2015) in spider lily. In daylily, Pandey *et al.*, (1991) found the highest yield (75.79 million flowers/ha) with the application of highest dose of nitrogen *i.e.*, 370 kg/ha.

Number of flower buds per hectare varied significantly between different levels of spacing during both the years of experimentation as well as in pooled data (Table 2). During 2019-20 and 2020-21; the highest number of flower buds per hectare was 9.66 lakh and 29.09 lakh respectively which was observed in S_3 and it was significantly superior over all the spacing, whereas during 2019-20; treatment S_1 exhibited the lowest number of flower buds per hectare (2.67 lakh) and lowest number of flower buds per hectare (8.72 lakh) was recorded in S_1 during 2020-21 (Table 2). Pooled data also exhibited significant variation in the number of flower buds per hectare. The highest number of flower buds per hectare (19.37 lakh) was noted in S_3 and it was found significantly superior, whereas treatment S_1 recorded the lowest number of flower buds per hectare (5.69 lakh) (Table 2). In spider lily, highest (20.62) number of flower buds per ha in closer spacing (60×45 cm) which was significant result as per present study (Paramagoudar, 2015). Koladiya (1995) reported that significantly highest number of flowers per ha (599.33 thousands) was obtained under closer spacing (60×20 cm), while it was lowest (235.69 thousands) in spacing of 60×40 cm in spider lily. The effect of interaction ($N \times S$) on number of flower buds per hectare exhibited significant trend (Table 2) for two succeeding years of experimentation as well as in pooled data. Koladiya (1995) reported, the interaction effect between different spacing and nitrogen levels on number of flowers per hectare was found in spider lily to be significant in which the highest (760.94, 771.04, 777.78 and 787.88 thousand) flowers per hectare at first, second, third and fourth flowering, respectively was found under the S_1N_4 interaction (60×20 cm and 40 g N/m²). The lowest (200.67, 206.06, 204.71 and 202.02 thousand) flowers per hectare were found under the S_3N_1 interaction (60×40 cm and 0 g N/m²) at first, second, third and fourth flowering, respectively.

Flower yield per hectare (t ha⁻¹):

Flower yield per hectare exhibited significant variation with respect to the various nitrogen levels during both the years of study *i.e.*, 2019-20 and 2020-21 as well as in pooled data (Table 4). During 2019-20; significantly the highest flower yield per hectare (3.83 t) was observed in N_1 , while the lowest flower yield per hectare (1.43 t) was noticed in N_4 (Table 4). During 2020-21; the same significant trend was noticed. The highest flower yield per hectare (9.28 t) was observed in N_1 which was significantly superior over rest of the nitrogen levels, whereas the lowest flower yield per hectare (4.70 t) was observed in N_3 (Table 4). Pooled data revealed that the highest flower yield per hectare (6.56 t) was found in N_1 which was significantly superior over rest of the nitrogen levels, while the lowest flower yield per hectare (3.10 t) was recorded in N_3 (Table 4). Similar results were reported by Ghule (2003), Patel *et al.*, (2002) in spider lily and Pandey *et al.*, (2000) in gladiolus.

Flower yield per hectare varied significantly at different levels of spacing during both the years of experimentation as well as in pooled data. During 2019-20; flower yield per hectare differed significantly. The highest flower yield per hectare (4.03 t) was observed in S_3 and it was significantly superior over rest of the spacing, whereas treatment S_1 exhibited the lowest flower yield per hectare (1.02 t) (Table 4). During 2020-21; flower yield per hectare varied significantly. The highest flower yield per hectare (10.59 t) was noticed in S_3 and it was significantly superior over rest of the treatments, while the lowest flower yield per hectare (3.27 t) was recorded in S_1 (Table 4). Pooled data also exhibited significant difference in flower yield per hectare. The highest flower yield per hectare (7.31 t) was noted in S_3 and it was found significantly superior, whereas treatment S_1 recorded the lowest flower yield per hectare (2.14 t) (Table 4). Similar trend was observed by George (1997) and Koladiya (1995) in spider lily.

The effect of interaction ($N \times S$) on flower yield per hectare for two succeeding years of experimentation including pooled data exhibited similar trend with significant variation. During 2019-20; flower yield per hectare varied significantly. The highest flower yield per hectare (7.77 t) was observed in N_1S_3 and it was significantly superior, whereas lowest flower yield per hectare (0.76 t) was recorded in treatment combination N_4S_1 (Table 4). During 2020-21; the same significant trend was observed. The treatment combination N_1S_3 recorded the highest flower yield per hectare (17.01 t), while the lowest flower yield per hectare (2.40 t) was noticed in N_4S_1 (Table 4). In pooled data, flower yield per hectare differed significantly. The treatment combination N_1S_3 recorded the highest flower yield per hectare (12.39 t) which was found significantly superior, whereas the lowest flower yield per hectare (1.75 t) was observed in N_3S_1 (Table 4). This increase in flower yield per hectare might be due to the application of higher dose of nitrogen and closer spacing which supplied nutrient to plants for longer duration and a greater number of plants in a unit area of land. These results are in close agreement with Patel *et al.*, (2002) who recorded the highest flower yield with spacing of 75×30 cm and nitrogen level of 250 kg/ha (Table 4).

Table: 4. Effect of nitrogen and spacing on flower yield per ha (t ha⁻¹) of spider lily

	Flower yield per ha (t ha ⁻¹)															
	NITROGEN															
SPACING	2019-20					2020-21					POOLED					
	N ₁	N ₂	N ₃	N ₄	MEAN	N ₁	N ₂	N ₃	N ₄	MEAN	N ₁	N ₂	N ₃	N ₄	MEAN	
S ₁	1.61	0.88	0.85	0.76	1.02	4.79	3.22	2.65	2.40	3.27	3.20	2.05	1.75	1.58	2.14	
S ₂	2.12	1.25	1.22	1.14	1.43	6.03	4.68	4.36	4.14	4.80	4.08	2.96	2.79	2.64	3.12	
S ₃	7.77	3.56	2.41	2.38	4.03	17.01	8.75	7.08	9.53	10.59	12.39	6.16	4.75	5.96	7.31	
MEAN	3.83	1.90	1.49	1.43		9.28	5.55	4.70	5.36		6.56	3.72	3.10	3.39		
	N		S		N×S			N	S	N×S			N	S	N×S	
F test	SIG		SIG		SIG		F test	SIG	SIG	SIG		F test	SIG	SIG	SIG	
S.Em.±	0.09		0.11		0.23		S.Em.±	0.15	0.28	0.56		S.Em.±	0.09	0.15	0.30	
CD@5%	0.33		0.34		0.68		CD@5%	0.53	0.84	1.68		CD@5%	0.39	0.43	0.87	
Treatment details:-			Nitrogen							Spacing						
			N ₁				300kg/ha				S ₁			90×60cm		
			N ₂				250kg/ha				S ₂			60×60cm		
			N ₃				200kg/ha				S ₃			30×60cm		
			N ₄				150kg/ha				*Number of plants as per spacing are 24(90×60cm), 36(60×60cm) and 72(30×60cm)in 12.96 sq.m. area					

Fig.1: Effect of nitrogen, spacing and their interactions on number of flower buds per ha (in lakh) of spider lily

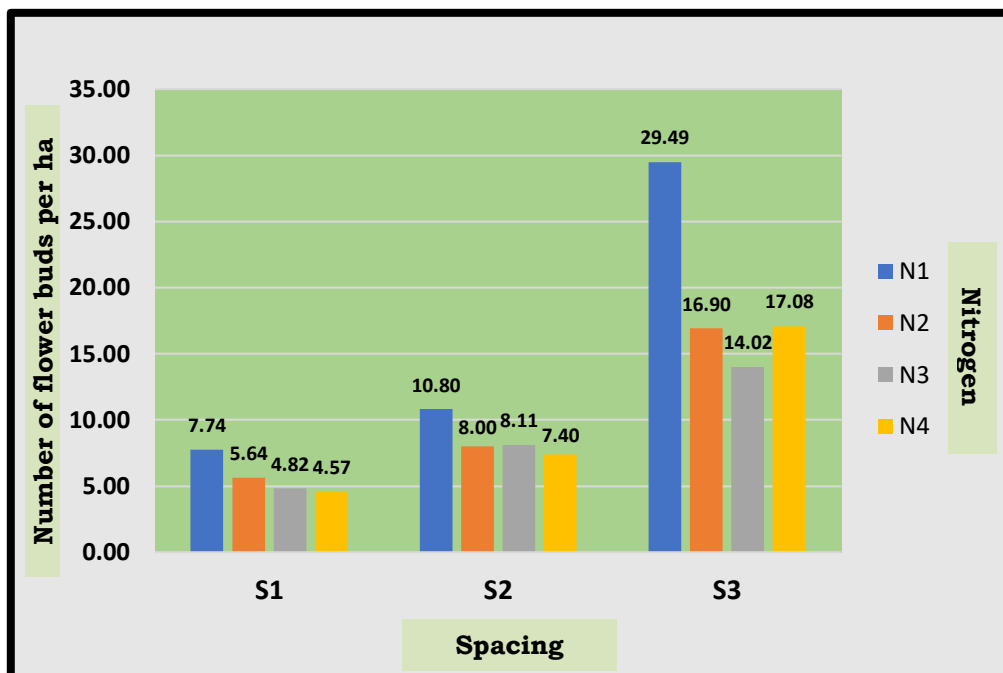
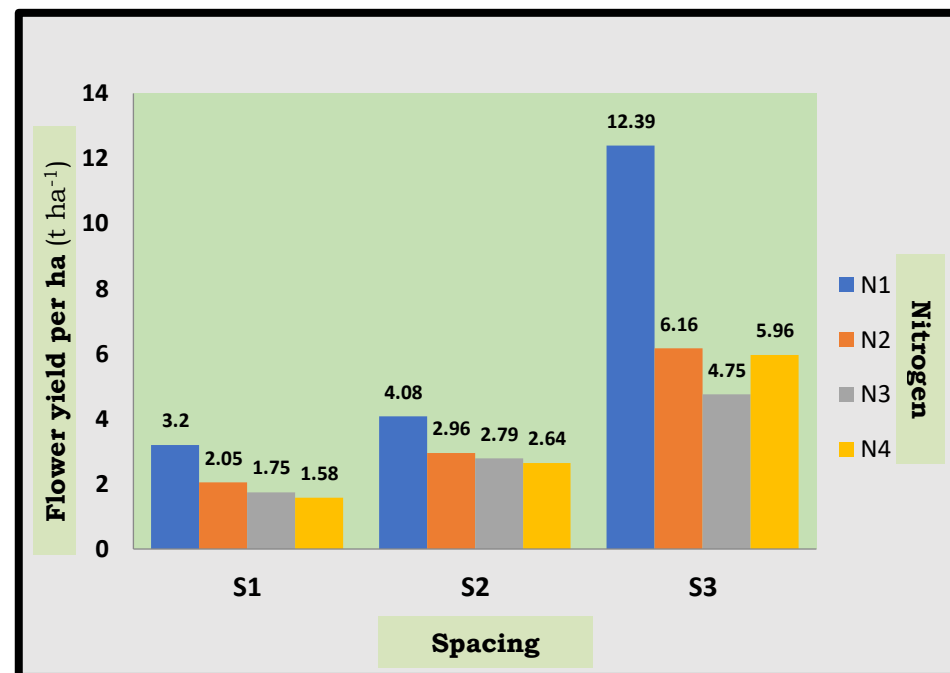


Fig.2: Effect of nitrogen, spacing and their interactions on flower yield per ha ($t\ ha^{-1}$) of spider lily



Treatment details:-	Nitrogen		Spacing	
	N ₁	300kg/ha	S ₁	90×60cm
	N ₂	250kg/ha	S ₂	60×60cm
	N ₃	200kg/ha	S ₃	30×60cm
	N ₄	150kg/ha	*Number of plants as per spacing are 24(90×60 cm),36 (60×60cm) and 72(30×60cm) in 12.96 sq.m. area	

Conclusion

From above findings, it could be concluded that the spider lily planted at the spacing of 30×60 cm with the application of 300 kg nitrogen per ha along with common dose of 150 kg phosphorus and 100 kg potassium per ha under Konkan agro-climatic conditions was found economical.

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