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## EFFECT OF CORM SIZE AND SPACING ON GROWTH AND FLOWERING OF GLADIOLUS SP CV. WHITE FRIENDSHIP

Sudhakar, M And Ramesh Kumar, S

Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar (Tamilnadu), India

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### ABSTRACT

An experiment to study the effect of corm size and spacing on growth and flowering of gladiolus sp cv. white friendship under Tamilnadu condition was carried out in the Floriculture unit, Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar, during 2010-2011 with objectives of studying individual and interaction effects of different corm size viz., 3.5– 4.5 cm, 4.6-5.5 cm and above 5.5 cm and spacing viz., 30x20 cm, 30x25 cm and 30x30 cm on growth and flowering parameters. All nine possible combinations of the corm size and spacing were laid in combination as treatment in factorial randomized block design (FRBD) with three replications. The growth and yield parameters of gladiolus were significantly influenced by corm size and spacing adopted. Corm size of above 5.5 cm and spacing of 30x30cm were found excellent when compared to others. The interaction between corm size and spacing exhibited significant enhancement in growth and yield parameters. Combination of C<sub>3</sub> x S<sub>3</sub> with corm size of above 5.5 cm and spacing of 30x30cm has exhibited the highest values in growth parameters viz., plant height (77.44 cm), number of leaves per plant (6.50), leaf length (45.47 cm), leaf width (4.84 cm), and the yield parameters viz., days to spike emergence 74.66 (days), number of floret per spike (10.52), length of spike (65.59cm), florets diameters (8.64cm), florets length (6.58cm), diameter of corm (5.06 cm) and number of cormels (19.12) when compared with other treatment combinations.

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### INTRODUCTION

The globally growing floriculture industry has achieved significance during the past few decades. At present, cut flower production focus has moved from traditional growers, such as the Netherlands, Germany and France, to countries like African countries and some of the Asian countries where the climates are better and production costs are low (Zhao *et al.*, 2008). In India, there has been a dynamic shift from sustenance production to commercial production of commercial flowers with 160.7 thousand ha area under floriculture during 2010-11. Productions of flowers are estimated to be 870.4 Mt of loose flowers and 43417.5 million (numbers) of cut flowers during 2010-11. The gladiolus, popularly called “queen of bulbous” a member of the family irridaceae and sub family Ixoideae has its elegant flower spikes which have rich variation of colors and long vase life is commercially grown for its fascinating flowers which are used as the most preferred

line flowers in floral arrangements worldwide. The major producing countries are the United States (Florida and California) Holland, Australia, Japan, Italy, France, Poland, Iran, India, Brazil, China, Malaysia and Singapore. In India Gladiolus has attained considerable importance as cut flower in the states like U.P, Himachal Pradesh, Maharashtra, Karnataka etc.

Production of quality gladiolus spikes is still a problem in many countries as the commercial cultivation aimed at export standard spikes are governed by the quality of propagation materials *ie.* Corms and cormels (Singh and Doahre, 1994; Hartman *et al.*, 1990; Ziv and Lilien-Kipnis, 1990). One mother corm generally produces a spike with one daughter corm of standard size and few cormels. However, the cormels require two to three seasons to produce standard flower spike and daughter corm. These cormels are auxiliary buds on the corm which is a compressed thickened stem and as the resting

\*Corresponding author: +91

Email: [ayanshola2005@yahoo.com](mailto:ayanshola2005@yahoo.com), [fowoltfaith@hotmail.com](mailto:fowoltfaith@hotmail.com)

perpuating organ (Ahmad *et al.*, 2000; Nagaraju *et al.*, 2002; Sinha and Roy, 2002). To achieve production of quality spikes improved crop management techniques need to be standardized for every new location where the crop is grown. Besides the climatic condition, the plant spacing plays important role in growth, yield and quality of flowers and corms (Yadav and Tyagi, 2007). The basic crop management practices like plant spacing and corm size are not yet standardized for cultivating this crop in a commercial scale at Tamilnadu condition. Hence, the present investigation was undertaken to study the effect of corm size and spacing on growth, flowering, and yield of gladiolus *sp* cv. white friendship.

## MATERIALS AND METHODS

The experiment was conducted during 2010-2011 in Floriculture unit, Department Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar. There were totally nine treatments replicated three times in a factorial randomized block design (FRBD). Three different corm sizes *viz.*, C<sub>1</sub>-3.5– 4.5 cm, C<sub>2</sub>-4.6-5.5 cm and C<sub>3</sub>-above 5.5 cm and three different spacings *viz.*, S<sub>1</sub>-30x20 cm, S<sub>2</sub>-30x25 cm and S<sub>3</sub>-30x30 cm in nine possible combinations *viz.*, C<sub>1</sub> x S<sub>1</sub>, C<sub>1</sub> x S<sub>2</sub>, C<sub>1</sub> x S<sub>3</sub>, C<sub>2</sub> x S<sub>1</sub>, C<sub>2</sub> x S<sub>2</sub>, C<sub>2</sub> x S<sub>3</sub>, C<sub>3</sub> x S<sub>1</sub>, C<sub>3</sub> x S<sub>2</sub> and C<sub>3</sub> x S<sub>3</sub>, were adopted as treatments. According to treatment schedule, gladiolus cv 'white friendship' corms of different size were planted during first week of december. Where in the spacing was adopted as per treatment schedule. Uniform cultural practices of irrigation, weeding and manuring were followed for all the treatments. The growth and yield parameters *viz.*, plant height, number of leaves per plant, leaf length, leaf width, days to spike emergence, spike length, number of floret per spike, flower diameter, flower length, diameter of corm and number of cormels were recorded and the data were analysed using the analysis of variance to draw the standard error and the critical difference was worked out at 0.5% probability as suggested by Panse and Sukhatme (1978).

## RESULT AND DISCUSSION

### Growth Parameters

The growth parameters of gladiolus cv. white friendship were significantly influenced by both the corm size and spacing individually and interaction. From the present investigation it is evident that the growth, flowering and yield of gladiolus were influenced significantly by corm size and spacing conditions. The maximum plant height was obtained in C<sub>3</sub>xS<sub>3</sub> at all stages of the crop 67.44 cm at 60 DAP and 77.44cm at 90 DAP. In all stages of the crop which was on par with C<sub>3</sub>xS<sub>2</sub> 64.81 cm at 60 DAP and 75.39cm at 90 DAP. The least plant height was recorded in C<sub>1</sub> x S<sub>1</sub> at all stage of the crop 43.57cm at 60 DAP and 54.61cm at 90 DAP respectively. Singh (2000) also observed greater plant height from corm size >5.10 to <6.00 cm as compared to those from the largest size grade (>6.0 to <6.50 cm dia.). The maximum number of leaves was obtained in C<sub>3</sub>xS<sub>3</sub> at all stages of the crop 4.54 at 60 DAP and 6.50 at 90 DAP. In all stages of the crop which was on par with C<sub>3</sub>xS<sub>2</sub> 4.45 at 60 DAP and 5.77 at 90 DAP. The least number of leaves was recorded in C<sub>1</sub> x S<sub>1</sub> at all stage of the crop 3.18 at 60 DAP and 3.84 at 90 DAP respectively. These findings are contrary to the results of Mohanty *et al.* (1994) who reported taller plants from large sized corms (dia. 2.45–2.55 cm) with more number of leaves and longer leaf blade as compared to medium (dia. 1.25-1.30 cm) and small (dia. 0.50-0.53 cm) Similar results were also observed by Farid Uddin *et al.* (2002). In wider spacing plant height was more this may due to less competition for nutrient this might be due to the fact that the plant population per unit area optimum and all the plants received the proper amount of sun light, aeration and nutrition for maximum production of spikes. In other treatment the area and resources available could not be used effectively by the plants. Number of corms produced per plant was the highest at the widest spacing (30x30) but it was on pair with all other spacing treatments (table 1).

**Table 1 Effect of corm size and spacing on growth of Gladiolus *sp* cv.White friendship**

Treatments	Plant height (cm)	Number of leaves per plant	leaf length(cm)	leaf width(cm)
C <sub>2</sub>	62.69	4.77	34.13	3.47
C <sub>3</sub>	73.73	5.86	42.19	4.53
SED	0.39	0.88	0.32	0.10
CD(p=0.05)	0.84	0.17	0.69	0.22
S <sub>1</sub>	61.54	4.50	33.60	3.60
S <sub>2</sub>	64.52	4.84	36.49	3.73
S <sub>3</sub>	66.50	5.34	37.34	3.94
SED	0.39	0.88	0.32	0.10
CD(p=0.05)	0.84	0.17	0.69	0.22
T <sub>1</sub> – C <sub>1</sub> x S <sub>1</sub>	54.61	3.84	30.21	3.17
T <sub>2</sub> – C <sub>1</sub> x S <sub>2</sub>	55.50	3.96	30.42	3.24
T <sub>3</sub> – C <sub>1</sub> x S <sub>3</sub>	58.32	4.35	31.16	3.40
T <sub>4</sub> – C <sub>2</sub> x S <sub>1</sub>	61.65	4.34	32.56	3.40
T <sub>5</sub> – C <sub>2</sub> x S <sub>2</sub>	62.69	4.80	34.46	3.45
T <sub>6</sub> – C <sub>2</sub> x S <sub>3</sub>	63.74	5.17	35.39	3.57
T <sub>7</sub> – C <sub>3</sub> x S <sub>1</sub>	68.36	5.31	36.50	4.23
T <sub>8</sub> – C <sub>3</sub> x S <sub>2</sub>	75.39	5.77	44.61	4.51
T <sub>9</sub> – C <sub>3</sub> x S <sub>3</sub>	77.44	6.50	45.47	4.84
SED	0.69	0.14	0.56	0.18
CD (P=0.05)	1.46	0.30	1.20	0.38
Corm size:	C <sub>1</sub> - 3.5 – 4.5 cm	C <sub>2</sub> - 4.6 – 5.5 cm	C <sub>3</sub> - > 5.5 cm	
Spacing:	S <sub>1</sub> (25x20 cm)	S <sub>2</sub> (25x25 cm)	S <sub>3</sub> (30x30 cm)	

**Table 2** Effect of corm size and spacing on flowering and corm growth of *Gladiolus sp* cv. White friendship

Treatments	Days to spike emergence	Spike length (cm)	Number of floret per spike	Flower diameter (cm)	Flower length (cm)	Diameter of corm (cm)	Number of cormels
C <sub>1</sub>	84.33	51.32	7.48	5.44	4.78	2.35	6.74
C <sub>2</sub>	81.33	58.09	8.57	6.89	5.42	3.40	10.65
C <sub>3</sub>	79.12	64.36	9.87	7.90	6.33	4.47	17.05
SED	0.42	0.42	0.17	0.18	0.12	0.06	0.06
CD(p=0.05)	0.90	0.90	0.36	0.38	0.26	0.12	0.14
S <sub>1</sub>	82.00	56.50	8.36	6.39	5.27	3.08	9.98
S <sub>2</sub>	80.66	58.14	8.63	6.61	5.59	3.34	11.24
S <sub>3</sub>	79.22	59.13	8.94	7.23	5.67	3.80	13.22
SED	0.42	0.42	0.17	0.18	0.12	0.06	0.06
CD(p=0.05)	0.90	0.90	0.36	0.38	0.26	0.12	0.14
T <sub>1</sub> - C <sub>1</sub> x S <sub>1</sub>	86.22	50.30	7.21	5.20	4.50	2.13	6.23
T <sub>2</sub> - C <sub>1</sub> x S <sub>2</sub>	84.14	51.19	7.55	5.58	4.89	2.30	6.64
T <sub>3</sub> - C <sub>1</sub> x S <sub>3</sub>	82.62	52.48	7.48	5.55	4.95	2.63	7.36
T <sub>4</sub> - C <sub>2</sub> x S <sub>1</sub>	82.10	56.52	8.29	6.48	5.32	3.10	8.40
T <sub>5</sub> - C <sub>2</sub> x S <sub>2</sub>	82.02	58.41	8.61	6.68	5.47	3.40	10.37
T <sub>6</sub> - C <sub>2</sub> x S <sub>3</sub>	80.10	59.33	8.81	7.50	5.47	3.70	13.19
T <sub>7</sub> - C <sub>3</sub> x S <sub>1</sub>	78.10	62.69	9.53	7.50	5.99	4.03	15.31
T <sub>8</sub> - C <sub>3</sub> x S <sub>2</sub>	76.02	64.81	9.57	7.57	6.42	4.33	16.71
T <sub>9</sub> - C <sub>3</sub> x S <sub>3</sub>	74.66	65.59	10.52	8.64	6.58	5.06	19.12
SED	0.73	0.73	0.30	0.31	0.21	0.10	0.11
CD (P=0.05)	1.56	1.56	0.63	0.66	0.46	0.22	0.24

Corm size: C<sub>1</sub> - 3.5 - 4.5 cm    C<sub>2</sub> - 4.6 - 5.5 cm    C<sub>3</sub> - > 5.5 cm  
Spacing: S<sub>1</sub> (25×20 cm)    S<sub>2</sub> (25×25 cm)    S<sub>3</sub> (30×30 cm)

Increase in corm production when wider spacing was provided might be due to the availability of more nutrients and light, which ultimately increased the rate of photosynthesis and translocation of assimilates to the storage organs as is also reported by Mukhopadhyay and yadav (1984) and Bijimol and Singh (2001). Nair and singh (2004). Shiraz and Maurya (2005).

#### Flowering Parameters

From the present investigation it is evident that the growth, flowering and yield of *gladiolus* cv. white friendship were influenced significantly by corm size and spacing combination. The early flowering was obtained in C<sub>3</sub> x S<sub>3</sub> with 74.66 days. The maximum of 86.22 days absent in C<sub>1</sub>xS<sub>1</sub> for flower emergence. The reproductive parameters like number of floret per spikes were higher in the treatments C<sub>3</sub>xS<sub>3</sub> with 10.52 followed by treatment C<sub>3</sub>xS<sub>2</sub> with 9.57 and the least number of florets per spike were observed in treatment C<sub>1</sub> x S<sub>1</sub> with 7.21. The florets length (cm) were higher the treatment C<sub>3</sub> x S<sub>3</sub> with 65.59cm followed by C<sub>3</sub>xS<sub>2</sub> with 64.81cm. the least spike length were obtained in treatment C<sub>1</sub> x S<sub>1</sub> with 50.30 cm and florets diameters (cm), florets length (cm), were higher the large corm size 5.5 cm above combination of 30x30 cm (table-2). The large corms produced flowered earlier plants were flower spikes, had more florets per spike and produced more cormels per plant, compared with medium or small corms with the similar findings were reported by Sing and Singh (2004). There was direct relationship between corm size and the floral parameters. Thus the number of florets and length of flowering spike were greatly to large sized corms. These results are in accordance with those obtained by Farid Uddin *et al.* (2002).The wider spacing produced flower earlier plants were taller with larger leaves and flower spikes, had more florets per spike and produced more cormels per plant, compared with medium or small corms with the similar findings were reported by Sing and Singh (2004), Shiraz

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