

Gladiolus Plant Growth, Corm and Cormel Yield as Influenced by *Trichoderma* and Varieties

Anjana Sisodia, Akash Pal, Anil K. Singh,
A. K. Pal, Minakshi Padhi

Received 11 June 2018; Accepted 15 July 2018; Published on 6 August 2018

Abstract An experiment was carried out during 2017-2018. Experiment was laid out in randomized block design with three replications. The study reveals that plant treated with *Trichoderma* noticed earlier sprouting, but there is no any significant effect on days to 20, 30, and 40% sprouting. *Trichoderma* fail to exert any significant effect on number of sprouts per plant, whereas early sprouting was noticed with *Trichoderma* treated corms. Plants treated with *Trichoderma* also exhibited maximum weight of corms and cormels per plant. There was no any significant effect of *Trichoderma* on number of corms per hill, diameter of corm and weight

of cormels per hill. Among different cultivars days to 10, 20, 30, 40 and 50% sprouting was recorded earlier in cultivar Dhanvantri. The maximum number of sprouts per hill was noticed in cultivar Punjab Dawn. The maximum number of corms per hill recorded in cultivar Punjab Dawn, whereas the maximum number of cormels per hill was noticed in cultivar Shubhangini. The maximum size of corm was recorded in cultivar Punjab Dawn and maximum weight of corms per hill was recorded in cultivar Punjab dawn, whereas the maximum weight of cormels per hill recorded with cultivar Shubhangini.

Keywords Gladiolus, Cultivars, *Trichoderma*, Growth, Corms.

Introduction

Among different cut flowers, gladiolus is an important commercial flower crop both in domestic and international market. It is one of the important ornamental bulbous flower crop used as a cut flower, floral arrangements for interior decoration, very good for beds, herbaceous border and for making bouquets. In India gladiolus is commercially grown in West Bengal, Maharastra, Uttar Pradesh, Uttarakhand, Punjab, Haryana, Sikkim Jammu and

Anjana Sisodia*, Akash Pal, Anil K. Singh,
A. K. Pal, Minakshi Padhi
Department of Horticulture, Institute of Agricultural Sciences,
Banaras Hindu University, Varanasi, UP, India
e-mail: anjana.floriculture@gmail.com
*Corresponding author

Kashmir, Karnataka, Gujarat, Himachal Pradesh, Tamil Nadu, Madhya Pradesh, Delhi and Rajasthan (Singh and Sisodia 2017). To boost up the yield potential use of bio-agents like *Trichoderma* plays an important role in enhancing the plant growth and corm yield parameters in gladiolus. *Trichoderma* has its own importance on growth and other floral qualities of gladiolus because *Trichoderma* supply the nutrients and improve the soil physical health and also protect against plant diseases either by direct action against the pathogen. Sometimes varietal wealth for a particular region has paramount importance for commercial production of gladiolus. Therefore, an experiment was conducted to study the response of gladiolus plant growth and corm yield to *Trichoderma* and varieties.

Materials and Methods

Experiment was carried out at Horticulture Research Farm, Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, UP, during 2017-2018, which is situated at 25°02' North latitude, 83°03' East longitudes and at an elevation of 128.93 meters above sea level. Healthy and disease-free corms of 8 varieties (Yellow Jester, Tiger Flame, Punjab Morning, Punjab Dawn, Pusa Kiran, Shubhangini, IIHR, and Dhanvantri) were treated with *Trichoderma* and at

spacing of 30 cm between the rows and 20 cm between the plants during December 2017. The experiment was laid out in randomized block design with three replications. All cultural operations were uniformly done for all the varieties. Observations were recorded on various growth and corm parameters and data were analyzed statistically.

Results and Discussion

Growth parameters

Various growth parameters influenced significantly due to *Trichoderma* and gladiolus varieties (Table 1). However, application of *Trichoderma* fail to exert any conspicuous effect on days to 20, 30 and 40% sprouting. There was also no any significant difference on number of sprouts per plant. Although early sprouting of 10% corms was noted with treatment of *Trichoderma*. Similarly, *Trichoderma* resulted in early sprouting of 50% of corms. Beneficial effect of *Trichoderma* has also been advocated by earlier workers as Godse et al. (2006), Dongardive et al. (2007 and Singh et al. (2016).

All the growth character influenced significantly due to varieties of gladiolus. It is interested to note that early sprouting of 10, 20, 30,40 and 50% was noticed with cultivar Dhanvantri followed by Pusa

Table 1. Gladiolus plant growth influenced by *Trichoderma* and varieties.

Treatments	Days to 10% sprouting	Days to 20% sprouting	Days to 30% sprouting	Days to 40% sprouting	Days to 50% sprouting	No. of sprouts hill
Bio-agent						
Control	9.91	10.16	10.25	11.85	12.83	2.29
<i>Trichoderma</i>	8.83	9.54	9.83	10.41	10.83	2.32
CD at 5%	0.84	NS	NS	NS	1.26	NS
Gladiolus varieties						
Yellow Jester	10.83	11.33	11.83	12.83	13.33	1.56
Tiger Flame	12.00	12.50	12.66	13.83	14.16	2.28
Punjab Morning	10.16	11.00	11.00	12.00	12.66	2.53
Punjab Dawn	8.66	8.66	8.83	9.16	10.8	3.20
Pusa Kiran	7.50	7.50	8.16	8.16	9.83	2.51
Shubhangini	9.83	11.50	10.16	10.16	10.83	1.85
IIHR	9.16	9.16	10.16	10.16	11.33	2.32
Dhanvantri	6.83	7.16	7.50	7.50	7.83	2.20
CD at 5%	1.68	2.56	1.66	1.86	2.51	0.83

Kiran. However, there was no any significant difference between these two varieties. In general, late sprouting was noticed with cultivars Yellow Jester, Tiger Flame and Punjab Morning. Cultivar Punjab Dawn resulted in maximum number of sprouts per hill which was statistically at par with cvs. Punjab Morning and Pusa Kiran and significant to all other varieties. It was because of genetic constitution of each germplasm which performed differently to others. Singh et al. (2013 a) and Sisodia and Singh (2015 b) conducted trial and found significant variation in various growth characters in gladiolus varieties. Present results are also lent credence with the observation made by Pandey et al. (2012).

Corm and cormel parameters

Significant effect due to application of *Trichoderma* was exhibited on weight of corms per plant and number of cormels per plant. However, there was no any pronounced effect of *Trichoderma* on number of corms per plant, diameter of corm and weight of cormels per plant (Table 2). Several workers reported that there is no significant effect of application of *Trichoderma* as Gangadharan and Gopinath (2000) and Dongardive et al. (2009). Although beneficial effect of *Trichoderma* has been documented by Godse et

al. (2006) and Dubey and Singh (2007). Application of *Trichoderma* in combination with FYM and vermicompost found beneficial weight of corms in gladiolus (Sisodia and Singh 2015a).

Significant effect of gladiolus cultivars was recorded on the corm and cormel parameters. Cultivar Punjab Dawn resulted in maximum number of corms per hill which was statistically at par with Punjab Morning and significant to all other varieties. Similarly, cultivar Punjab Dawn resulted in maximum weight of corms per hill which was significant to all other varieties. Cultivar Dhanvantri produced bigger size of corm which was significantly higher than other varieties. Cultivar Shubhangini produced more number of cormels per plant and maximum weight of cormels per plant which was statistically higher than other varieties. The difference in various traits is mainly due to genetic constitution of the varieties. Variation in the mean performance of corm and cormel yield has also been reported by ranjan et al. (2010), Pandey et al. (2012), Singh et al. (2013 b) and Kadam et al. (2014).

Table 2. Gladiolus corm yield influenced by *Trichoderma* and varieties.

Treat-ments	Num-ber of corms/hill	Weight of corms/hill (g)	Dia-meter of corm (cm)	Num-ber of cormels/hill	Weight of cormels/hill (g)
Bio-agent					
Control	3.06	72.91	4.22	22.17	5.11
<i>Trichoderma</i>	3.17	80.95	4.42	28.61	5.71
CD at 5%	NS	6.52	NS	3.26	NS
Gladiolus varieties					
Yellow Jester	2.02	41.82	4.49	13.50	2.31
Tiger Flame	2.58	35.92	3.49	24.63	4.46
Punjab Morning	4.26	108.22	4.44	16.29	3.72
Punjab Dawn	4.47	152.87	4.67	21.11	5.66
Pusa Kiran	2.51	72.34	4.31	44.26	7.52
Shubhangini	2.86	62.34	4.11	55.65	12.03
IIHR	3.25	53.29	3.80	15.62	4.45
Dhanvantri	2.95	88.63	5.23	12.06	3.10
CD at 5%	1.09	13.05	0.46	6.48	4.48

References

- Dongardive SB, Gollivar VJ, Bhongle SA (2007) Effect of organic manure and biofertilizers on growth and flowering in gladiolus cv White prosperity. *Pl Arch* 7 (2) : 657—658.
- Dongardive SB, Gollivar VJ, Bhongle SA (2009) Effect of organic manure and biofertilizers on corms and cormels yield of gladiolus. *Ann Pl Physiol* 23 (1) : 114—116.
- Dubey RK, Singh RS (2007) Effect of *Trichoderma viride* and *Pseudomonas fluorescens* on corm and cormel production in gladiolus. *J Ornament Hort* 10 (3) : 184—186.
- Gangadharan GD, Gopinath G (2000) Effect of organic and inorganic fertilizers on yield of spikes, corms, cormels and returns of gladiolus cv White Prosperity. *Karnataka J Agric Sci* 13 (4) : 937—941.
- Godse SB, Gollivar VJ, Chopde N, Bramhankar KS, Kore MS (2006) Effect of organic manures and biofertilizers with reduced doses of inorganic fertilizers on growth, yield and quality of gladiolus. *J Soils and Crops* 16 (2) : 445—449.
- Kadam GB, Kumar G, Saha TN, Tiwari AK, Kumar R (2014) Varietal evaluation and genetic variability studies on gladiolus. *Ind J Hort* 71 (3) : 379—384.
- Pandey RK, Bhat DJI, Dogra S, Singh A, Laishram N, Jamwal S (2012) Evaluation of gladiolus cultivars under subtropical conditions of Jammu. *Int J Agric Sci* 8 (2) : 518—522.
- Ranjan JK, Attri BL, Das B, Hare K, Ahmed N (2010) Performance of gladiolus genotypes for cut flower and corm production under high altitude of Uttarakhand. *Ind J Hort* 67 : 386—390.
- Singh AK, Sisodia A (2017) Textbook of Floriculture and Land-

- scaping. New India Publishing Agency, New Delhi, pp 432.
- Singh AK, Kumar A, Ghimire NR (2013a) Performance of Indian and exotic varieties of gladiolus under eastern Uttar Pradesh conditions. *Asian J Hort* 8 (1) : 191—194.
- Singh AK, Kumar A, Sisodia A (2013 b) Growth, flowering and bulb yield in tuberose as influenced by cultivars. *Environ Ecol* 31 (4A) : 1823—1825.
- Singh AK, Maurya KC, Sisodia A, Barman K, Padhi M (2016) Effect of farmyard manure, vermicompost and *Trichoderma* on plant growth and postharvest life of gladiolus. *J Ornam Hort* 19 (3/4) : 75—79.
- Sisodia A, Singh AK, (2015a) Effects of farmyard manure, vermicompost and *Trichoderma* on flowering and corn attributes in gladiolus. *Bangladesh J Botany* 44 (2) : 309—314.
- Sisodia A, Singh AK, (2015b) Plant morphology, growth and corm parameters as influenced by gamma doses in gladiolus cultivars. *Environ Ecol* 33 (2A) : 888—892.