

Original Research Article

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Effect of Substitution of Nutritional Source through Organics and Bio Inputs on Corm and Cormel Production in Gladiolus (*Gladiolus grandiflorus* L.) cv. American Beauty

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The present work entitled as Effect of substitution of nutritional source through organics and bio-inputs on corm and cormel production in gladiolus (*Gladiolus grandiflorus* L.) cv. American Beauty was carried out at the college farm, Horticultural College and Research Institute, Venkataramannagudem. The corm and cormel characters were significantly influenced by different nutritional sources. Application of 75% RDF + 25% RDN through vermicompost + Azotobacter +PSB + KMB exhibited significant superiority in respect of corm characters such as number of corms per mother corm, corm diameter, corm weight, number of cormels produced per mother corm, cormel weight per plant and corm number per hectare.

Introduction

Gladiolus, a native of South Africa is one of the most popular ornamental bulbous plant grown commercially for its fascinating flowers in many parts of the world and is popularly called as “Queen of bulbous” flowers. The term gladiolus was coined by Pliny the Elder (A.D-23-79) deriving from the Latin word “Gladius”, because of its sword-like leaves. It is popularly known as sword lily. The modern hybrids are botanically

known as *Gladiolus grandiflorus* belonging to family Iridaceae bearing chromosome number 60. In Europe it is also known as ‘corn flag’ because *Gladiolus illyricus* is found wild as weed in the corn fields. In the international cut-flower trade gladiolus occupies fourth place (Bhattacharjee and De, 2010). It is mainly cultivated for cut-flowers because of its elegant appearance and prolonged vase life. Gladiolus spikes are most popular in flower arrangements and for preparing attractive bouquets (Mishra *et al.*, 2006). The

magnificent inflorescence with various colour have made it attractive for use in herbaceous borders, beddings, rockeries, pots and for cut-flowers.

The flowers open from bottom to upwards. The flowers may be frilly, ruffled or plain, solid coloured or multi-coloured and they come in every shade and colour combination imaginable. The upright growth habit of gladiolus lends itself to any manner of floral arrangements, from minimalist Japanese 'Ikebana' and 'Boroque' bouquets.

The crop benefiting microbial inoculants generally called as "biofertilizers" help in augmenting the crop productivity through effective mobilization of nutrients to the crop. These beneficial microorganisms are also known to secrete plant growth promoting substances like Indole Acetic Acid, Gibberellic Acid, Cytokinins, vitamins which are known to influence on the crop growth. Consequently, the role of bio-inoculants has been identified in improving the qualitative and quantitative characters of various crops. To ensure maximization of productivity in any crop, optimum nutrient supply is one of the important factors.

Different agro-techniques play an important role in growth and development of gladiolus crop, among them nutrition is one of the most important aspects which directly influences the spike yield and quality. Gladiolus being highly responsive crop to nutrition, it requires larger doses of macro nutrients viz., nitrogen, phosphorus and potassium (Dubey and Mishra, 2005). Crop yields in general are boosted by the application of chemical fertilizers since they play a significant role in supplying essential nutrient elements for intensive crop production which heralded green revolution in the country. Increased and indiscriminate use of chemical fertilizers in an unbalanced manner has created the problem of

multiple nutrient deficiencies, diminishing soil fertility, deteriorating its structure and health making the yields unsustainable.

Materials and Methods

The investigation was carried out at the College Farm, Horticultural College and Research Institute, Venkataramannagudem, West Godavari district during *Rabi* 2016-2017 with an objective of finding out the effect of organic nutritional sources with reduced inorganic fertilizer dose on corm and cormel characters. The experiment was laid out in Randomised Block Design with nine treatments and replicated thrice. There were nine treatments consisting of T₁: 75% RDF + 25% RDN through vermicompost (VC), T₂: 75% RDF + 25% RDN through VC + *Azotobacter*, T₃: 75% RDF + 25% RDN through VC + PSB, T₄: 75% RDF + 25% RDN through VC + KMB, T₅: 75% RDF + 25% RDN through VC + *Azotobacter* + PSB, T₆: 75% RDF + 25% RDN through VC + *Azotobacter* + KMB, T₇: 75% RDF + 25% RDN through VC + PSB + KMB, T₈: 75% RDF + 25% RDN through VC + *Azotobacter* + PSB + KMB, T₉: 100% RDF (30N: 20P: 9K g m⁻²). These corms were planted at 20 cm apart within a row spaced at 30 cm distance from the adjacent row at a depth of 5-6 cm in month of October. The recommended dosage of N, P, and K 300:200:90 kg/ha (Rajesh, L., 2016) was applied through Urea, Single Super Phosphate and Murate of Potash respectively. Calculated amount of vermicompost (325 g) was applied as per treatment to the plots one week before planting. Half the dose of nitrogen and complete dose of phosphorus and potash were supplied at the time of planting whereas the remaining half of nitrogen was applied 45 days after planting. The bio fertilizers viz., *Azotobacter*, PSB and KMB were added each at the rate 4 kg ha⁻¹ to the respective treatment plots (Pansuriya and Chauhan, 2015).

Results and Discussion

Number of corms produced per mother corm

Significant differences were observed among the different nutritional treatments in the present study. The maximum number of corms produced per mother corm (3.88) by the application of 75% RDF + 25% RDN through vermicompost + *Azotobacter* + PSB + KMB (T₈) and minimum number of corms produced per mother corm (1.80) was recorded by application of 100% RDF (30N: 20P: 9K g m⁻²) (T₉). The increase in number of corms per mother corm might be due to the better soil environment with the application of organics such as vermicompost, biofertilizers. This application of organics might have resulted in higher uptake of the nutrients into the plants. This higher uptake of nutrients resulted in good vegetative growth and further laid a path for the efficient transfer of more food substances into the corms at the end of the crop growth period. The results obtained by earlier workers Gangadharan and Gopinath, (2000) are found to be in conformity with those obtained in the present investigation (Table 1).

Corm diameter (cm)

There were significant differences with respect to corm diameter among the various treatment combinations. The maximum corm diameter (5.65 cm) was found by the application of T₈: 75% RDF + 25% RDN through vermicompost + *Azotobacter* + PSB + KMB and minimum corm diameter (3.70 cm) was recorded by application of T₉: 100% RDF (30N: 20P: 9K g m⁻²). The increase in the diameter of the corm could be due to the better soil environment with the application of organics such as vermicompost, biofertilizers. This application of organics might have resulted in higher uptake of the nutrients into the plants. This higher uptake of nutrients

resulted in good vegetative growth and sufficient amount of photosynthates could have accumulated which were transferred into the corms at the end of the crop growth period. The results of Gangadharan and Gopinath (2000) revealed similar facts.

Corm weight (g)

The corm weight per plant was found maximum (48.29 g) by application of T₈: 75% RDF + 25% RDN through vermicompost + *Azotobacter* + PSB + KMB and minimum corm weight (30.05 g) was observed by application of T₉: 100% RDF (30N: 20P: 9K g m⁻²). Increased weight of the corms might be due to better uptake of nutrients better vegetative growth and consequently accumulation of more photosynthetic assimilates during the active crop growth period. The result was in accordance with Godse *et al.*, (2006) and Bhalla *et al.*, (2006) in gladiolus.

Number of cormels produced per mother corm

There were significant differences with respect to the number of cormels produced per mother corm among the various treatments. The maximum number of cormels produced per mother corm (28.70) was found by application of T₈: 75% RDF + 25% RDN through vermicompost + *Azotobacter* + PSB + KMB and minimum number of cormels produced per mother corm (21.63) was observed by application of T₉: 100% RDF (30N: 20P: 9K g m⁻²). In gladiolus the number of cormels per plant seems to be influenced by different substitutions of inorganics with organics and bio-fertilisers. Better nutrient uptake, more growth attributes and dry matter accumulation in the above treatments might have resulted in more cormel production. The result was in accordance with Godse *et al.*, 2006 and Bhalla *et al.*, 2006 in gladiolus.

Table.1 Effect of substitution of nutritional source through organics and bio inputs on corm and cormel production in gladiolus (*Gladiolus grandiflorus* L.) cv. American Beauty

Treatments	No of corms/ mother corm	Corm diameter (cm)	Corm weight (g)	No of cormels/mother corm	Cormel weight per plant (g)	Corm number ha ⁻¹ (000)
T ₁	2.18	4.06	33.15	23.33	26.76	218.66
T ₂	3.10	4.90	41.62	26.66	28.03	310.00
T ₃	2.48	4.27	37.09	25.30	26.33	248.66
T ₄	2.33	4.23	37.01	23.70	26.16	233.33
T ₅	3.30	5.14	44.23	27.63	28.03	330.00
T ₆	3.22	5.05	42.37	26.66	27.86	322.00
T ₇	2.53	4.35	37.47	26.10	27.90	253.33
T ₈	3.88	5.65	48.29	28.70	29.26	388.66
T ₉	1.80	3.70	30.05	21.63	23.46	180.00
S Em±	0.14	0.12	1.12	0.58	0.82	14.17
CD at 5%	0.42	0.38	3.41	1.75	2.48	42.86

Cormel weight per plant (g)

The cormel weight per plant was found significantly different among different nutritional source substitutions with or without bio-fertilisers. The maximum cormel weight (29.26 g) was found by application of 75% RDF + 25% RDN through vermicompost + *Azotobacter* + PSB + KMB (T₈) and minimum cormel weight per plant (23.46 g) was observed by application of (T₉) 100% RDF (30N: 20P: 9K g m⁻²). Increased weight of cormels might be due to better uptake of nutrients, enhanced growth parameters, accumulation of metabolites, leading to more proliferation of cormels with a higher individual weight. Dongardive *et al.*, (2007) and Godse *et al.*, (2006) revealed similar results in gladiolus.

Corm number per ha (000)

There were significant differences with respect to number of corms per ha among the various treatments. The maximum number of corms produced per ha (1.88 thousands) was found in T₈ containing 75% RDF + 25%

RDN through vermicompost + *Azotobacter* + PSB + KMB and the minimum number of corms per ha (8.13 thousands) was recorded by T₉ containing 100% RDF (30N: 20P: 9K g m⁻²). The increase in number of corms per mother corm, corm weight, corm diameter, number of corms ha⁻¹ might be due to the better soil environment with the application of organics such as vermicompost, biofertilizers. This application of organics might have resulted in higher uptake of the nutrients into the plants. This higher uptake of nutrients which resulted in good vegetative growth might have played a role in the transfer of more food substance into the corms at the end of the crop growth period. The results of Gangadharan and Gopinath (2000) revealed similar results.

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