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Impact of integrated nutrient management (INM) on flowering and corm production in gladiolus

Abstract

A field experiment was carried out to evaluate the impact of Integrated Nutrient Management (INM) on flowering and corm production of gladiolus during rabi season of 2010-11 at OUAT Bhubaneswar. The result of the study revealed that INM practices involving inorganic fertilizer, Vermicompost and Bio-fertilizer (Azospirillum and Phosphate solubilising bacteria) in different combinations had no significant influence on sprouting of corms. However, it had significant influence on flowering and corm production in gladiolus. Application of 75% RDF(100:50:60 Kg NPK/ha) in combination with Vermicompost and Biofertilizer increased spike length (70.53 cm), rachis length (55.55 cm), number of florets per spike (13.12), and number of florets remained open at time (7.46) as compared to other treatments. As far as corm characters were concerned, combined application of 75% RDF, Vermicompost and Biofertilizers resulted in maximum weight (75.66 g) and diameter (6.59 cm) of daughter corm as well as number (58.36) and weight (32.43 g) of cormels per plant.

Keywords: corm, cormel, flowering, gladiolus, INM

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Introduction

Gladiolus occupies a significant place among various flower crops of the world commercially grown for cut flower production. It is commonly known as sword lily, corn flag, gladioli and regarded as "queen of bulbous flower" which belongs to family Iridaceae. Due to its magnificent inflorescence with varying range of colour with attractive shades and forms has gained popularity in the international floriculture trade. It is grown in herbaceous border, bed, rockery, pot and also for cut flowers.

Flowering and corm production in gladiolus are affected by non-availability of various nutrients. Integrated Nutrient Management (INM) practices involving complementary use of chemical fertilizers, organic maure, Bio-fertilizers and other organics in judicious combination appear to be a feasible option to maintain and sustain a higher level of soil fertility and productivity thus causing less environmental problems. Biofertilizers have been found beneficial in flower crops like gladiolus, tuberose, rose, chrysanthemum and marigold.[1] Keeping in view the need and importance, present study was carried out to study the impact of integrated nutrient management on flowering and corm production in gladiolus under Odisha conditions.

Materials and methods

The present experiment was undertaken at OUAT Bhubaneswar during the year 2010-11. Before planting of corms, soil samples were collected from several randomly selected spots up to a depth of 15 cm and were mixed together to draw a composite sample. After proper processing of the soil sample, analysis was done to know the characteristics with respect to its physical and chemical properties (Table 1).

Table 1 Physical and chemical characteristics of soil

A: Mechanical composition of soil			
S.No	Constituents	Percentage (air dry basis)	Methods followed
1	Sand	67	
2	Silt	15	Bouyoucos hydrometer,[8]
3	Clay	18	
4	Textural class	Sandy loam	International triangle
B: Chemical composition of the soil			
1	Available nitrogen	270 kg/ha	Alkaline permanganate method,[9]
2	Available phosphorus	43 Kg/ha	Bray's-1-P,[10]
3	Available potash	278 kg/ha	NH4OAC method,[11]
4	Organic carbon	6.39%	Walkley and Black wet extraction method,[9]
5	pH	6.54	Potentiometric method,[11]

Treatments

The experiment consisted of 10 treatments, which included 50, 75 and 100% of recommended dose of chemeical fertilizers (RDF) *i.e.* 100:50:60 kg NPK/ha, Vermicompost (VC) @5 t/ha and Biofertilizers (BF) @ 10 kg/ha comprising of Azospirillum & PSB at 1:1 proportion in various combinations. These treatments were compared with an untreated control. The experiment was laid out in randomized block design with three replications.

Result and discussion

Impact of integrated nutrient management (INM) on flowering in gladiolus

The data given in Table 2 clearly indicates that all the treatments were significantly effective in improving the flowering characters. Among all the treatment maximum length of spike (70.53 cm), maximum length of rachis (55.55 cm), maximum number of florets per spike (13.12) and number of florets remained open at a time was observed to be maximum in T7 (75% RDF +5t/ha VC+ 10kg/ha Azospirillum and 10 kg/ha PSB). Increase in spike and rachis length due to application of inorganic fertilizer along with vermicompost and biofertilizer might have enabled the plants to produce more photosynthates which was subsequently supplied to spike for their development.[2] This may also be due to increased availability of all essential macro- and micro-nutrients in easily available form.[3] Barman et al.,[4] reported significant improvement in flower production and flower quality in terms of spike length and number of florets per spike in tuberose with application of *Azotobactor* along with FYM.

Table 2 Impact of integrated nutrient management (INM) on flowering in gladiolus

S. no	Treatments	Length of spike (cm)	Length of rachis (cm)	Length of floret (cm)	Width of floret (cm)	Number of florets per spike	Number of florets remained open at a time
1	T1 (Control)	48.9	36.91	6.47	5.64	6.29	5.2
2	T2 (50% RDF)	57.66	42.33	7.61	5.53	9.55	5.6
3	T3 (50% RDF +VC)	59.13	46.96	8.28	5.77	9.74	5.8
4	T4 (50% RDF + VC+ BF)	67.06	53.59	8.55	5.94	10.26	6.23
5	T5 (75 % RDF)	68.2	54.7	8.68	6.21	12.83	6.33
6	T6 (75% RDF +VC)	68.93	54.94	8.59	6.51	9.53	6
7	T7 (75% RDF +VC+ BF)	70.53	55.55	8.43	7.53	13.12	7.46
8	T8 (100% RDF)	62.8	50.32	8.23	5.37	10.22	5.36
9	T9 (100% RDF +VC)	65.33	51.68	8.38	7.62	7.48	5.93
10	T10 (100% RDF + VC+ BF)	66.96	53.47	8.55	7.51	7.37	6.06
	SE m ±	1.24	0.73	0.07	0.07	0.13	0.21
	CD (P = 0.05)	3.69	2.17	0.2	0.22	0.4	0.63

Table 3 Impact of integrated nutrient management (INM) on corm and cormel parameters in gladiolus

S. no	Treatment	Weight of daughter corm (g)	Diameter of daughter corm (cm)	Number of cormels	Weight of cormels (g)
1	T1 (Control)	51.49	5.36	19.43	15.57
2	T2 (50% RDF)	71.69	5.43	28.03	18.48
3	T3 (50% RDF + VC)	72.51	5.58	45.03	24.67
4	T4 (50% RDF + VC+ BF)	74.91	5.89	53.87	31.48

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Table Continued

S. no	Treatment	Weight of daughter corm (g)	Diameter of daughter corm (cm)	Number of cormels	Weight of cormels (g)
5	T5 (75 % RDF)	68.53	6.1	27.98	23.47
6	T6 (75% RDF + VC)	68.47	6.24	42.24	31.73
7	T7 (75% RDF + VC+ BF)	75.66	6.59	58.36	32.43
8	T8 (100% RDF)	65.8	5.96	35.55	25.68
9	T9 (100% RDF +VC)	69.49	6.21	38.44	30.14
10	T10 (100% RDF + VC+ BF)	72.72	6.34	48.66	31.67
	SE m ±	0.16	0.07	0.26	0.2
	CD (P = 0.05)	0.5	0.22	0.77	0.59

It was observed that length of florets was found to be maximum (8.68 cm) in T5 (75% RDF) followed by T6 (75% RDF+ VC), T4 (50% RDF +VC+BF) and T10 (100 %RDF +VC+BF). Maximum width of florets (7.62 cm) was recorded under treatment T9 (100% RDF + VC) followed T7 (75% RDF +VC+BF) and T10 (100% RDF+VC+BF).

Beneficial effect of vermicompost and bio-fertilizers in combination with chemical fertilizers at an optimum level on flower size of carnation has been reported by Bhalla et al.,[5]

The data presented in Table 3 revealed that weight and diameter of daughter corm were significantly influenced due to different levels of nutrients applied. It was found that T7 (75% RDF +5t/ha VC+ 10kg/ha Azospirillum and 10 kg/ha PSB) recorded maximum weight (75.66g) and diameter of daughter corm (6.24 cm) among all the treatments. Increase in diameter and weight of corm due to application of bio fertilizers might be due to the fact that it increased nutrients availability to the plants, which might have increased photosynthetic activity of the plants, thereby, hastening the movement of photosynthetic sink towards the source (corm). Moreover, it might have also increased auxin concentration in the roots resulting in thicker and well branched roots. The result of the present study is in conformity with Srivastava & Govil[6] and Kathiresan & Venkatesha[7] who also reported similar findings in tuberose and gladiolus respectively.

It was observed that various levels of nutrients significantly influenced the number and weight of cormels produced by individual plants. It was found that number (58.36) and weight of cormels per plant (32.43g) were significantly higher in T7 (75% RDF +5t/ha VC+ 10kg/ha Azospirillum and 10 kg/ha PSB).

Earlier report[7,12] indicated that better availability and uptake of nutrients facilitated by bio fertilizers and vermicompost might have resulted in better growth, production of photosynthates and diversion of photosynthates to reproductive and storage organs as a result there was an increase in weight and diameter of corms as well as number and weight of cormels per plant in gladiolus.

Acknowledgement

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Conflict of interest

None.

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