

## Study on effect of INM on economics of gladiolus (*Gladiolus grandiflorus* L.) cv. American Beauty

E. SATHYANARAYANA, S. PATIL AND S. L. CHAWLA

Department of Floriculture and Landscape Architecture, ASPEE College of Horticulture and Forestry Navsari Agricultural University, Navsari - 396 450 (Gujarat)

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### ABSTRACT

A field experiment on "Effect of INM on growth and yield of gladiolus cv. American Beauty" was conducted at Floriculture Research Farm, Navsari Agricultural University, Navsari (Gujarat) during the year 2015-16. The experiment was laid out in Randomized Block Design (RBD) with three replications and ten treatments consisting of FYM, bio-fertilizers (*Azotobacter*, PSB and KMB), different levels of inorganic fertilizers and their combinations. The results revealed that application of 100% RDF + FYM @ 7.5 t ha<sup>-1</sup> + *Azotobacter* + PSB + KMB + 1% foliar spray of *Neuroji Novel Organic Liquid Fertilizer* (T<sub>10</sub>) was found most effective in number of spikes per hectare (401234.57), number of corms per hectare (404998.38), weight of cormels (2111.67 kg ha<sup>-1</sup>), gross realization (Rs.1272699.42 ha<sup>-1</sup>), net realization (Rs. 644435.42 ha<sup>-1</sup>) and benefit cost ratio (1: 1.02) in gladiolus cv. American Beauty.

**Keywords:** Benefit cost ratio, corm, gladiolus, gross realization, net realization, spike

Gladiolus (*Gladiolus grandiflorus* L.), a herbaceous plant belonging to family Iridaceae and is grown for its magnificent spike and useful both as cut flower and garden display. For good quality flowers, nutrition plays an important role and preferably nitrogen and phosphorus has been found more effective in improving vegetative growth of many flowering plants as reported by Bankar and Mukhopadhyay (1985). Indiscriminate use of chemical fertilizers has caused serious damage to the soil rendering them, often times, saline and less suitable for cultivation. However, considering the concept of integrated nutrient management system, which has currently a special significance in crop production to address the sustainability issue. Integration of bio-fertilizers and organic manures reduces the consumption of inorganic fertilizers. Efficacy of the inorganic fertilizers was increased when they are combined with organic manures. Application of farmyard manure (FYM) increases the population of micro-flora mainly *Azotobacter*. The combined application of *Azotobacter* and phosphorus solubilizing bacteria along with chemical fertilizers was found to be most effective in increasing the flower yield of gladiolus. Keeping in view the above facts, this experiment was carried out to study the effect of integrated nutrient management on spike, corm yield and economics of gladiolus cv. American Beauty.

### MATERIALS AND METHODS

The experiment was conducted at Floriculture Research Farm, Navsari Agricultural University, Navsari (Gujarat) during the year 2015-16 on gladiolus cv. American Beauty. The experiment was laid out in Randomized Block Design (RBD) with three replications. The experiment was consisted of ten

treatments viz., 100% recommended dose of fertilizers i.e. 200:200:200 kg NPK ha<sup>-1</sup> (T<sub>1</sub>), 50% RDF + FYM @ 15 t ha<sup>-1</sup> (T<sub>2</sub>), 75% RDF + FYM @ 7.5 t ha<sup>-1</sup> (T<sub>3</sub>), 100% RDF + FYM @ 7.5 t ha<sup>-1</sup> (T<sub>4</sub>), 50% RDF + FYM @ 15 t ha<sup>-1</sup> + *Azotobacter* + PSB + KMB (T<sub>5</sub>), 75% RDF + FYM @ 7.5 t ha<sup>-1</sup> + *Azotobacter* + PSB + KMB (T<sub>6</sub>), 100% RDF + FYM @ 7.5 t ha<sup>-1</sup> + *Azotobacter* + PSB + KMB (T<sub>7</sub>), T<sub>1</sub> + *Azotobacter* + PSB + KMB (T<sub>8</sub>), T<sub>1</sub> + 1% foliar spray of *Neuroji Novel Organic Liquid Fertilizer* (T<sub>9</sub>), T<sub>7</sub> + 1% foliar spray of *Neuroji Novel Organic Liquid Fertilizer* (T<sub>10</sub>). Bio-fertilizers (*Azotobacter*, PSB and KMB each @ 2 lit ha<sup>-1</sup>) were mixed well with FYM and applied at the time of land preparation. Half dose of N and full dose P & K was applied after 10 days of planting in each treatment. Remaining half dose of N and foliar spray of *Neuroji Novel Organic Liquid Fertilizer* was applied after 40 days of planting in each treatment. All the recommended cultural operations were carried out during the course of study. The effect of different treatments was studied and data recorded on flower spike, corm, cormel yield and economics of the crop were calculated and subjected to statistical analysis as suggested by Nigam and Gupta, 1979.

### RESULTS AND DISCUSSIONS

The results showed that maximum numbers of spikes per hectare (401234.57), number of corms per hectare (404998.38), weight of cormels (2111.67 kg ha<sup>-1</sup>) were recorded under treatment T<sub>10</sub> i.e. 100% RDF + FYM @ 7.5 t ha<sup>-1</sup> + *Azotobacter* + PSB + KMB + 1% foliar spray of *Neuroji Novel Organic Liquid Fertilizer* followed by T<sub>7</sub> i.e. 100% RDF + FYM @ 7.5 t ha<sup>-1</sup> + *Azotobacter* +

**Table 1 : Economics of different treatment combinations of INM of gladiolus cv. American Beauty**

Treatments	Number of spikes production ha <sup>-1</sup>	Spikes realization (Rs ha <sup>-1</sup> )	Number of corms ha <sup>-1</sup>	Corms realization (Rs ha <sup>-1</sup> )	Weight of cormels (kg ha <sup>-1</sup> )	Cormels realization (Rs ha <sup>-1</sup> )	Total investment (Rs ha <sup>-1</sup> )	Gross realization (Rs ha <sup>-1</sup> )	Net realization (Rs ha <sup>-1</sup> )	BCR
T <sub>1</sub>	283950	425926	288332	432498	1395	41850	623069	900274	277205	0.44
T <sub>2</sub>	296296	444444	299999	449998	1400	42000	621857	936443	314586	0.51
T <sub>3</sub>	308641	462963	316665	474998	1638	49150	622463	987111	364648	0.59
T <sub>4</sub>	324074	486111	328332	492498	1645	49350	627344	1027959	400615	0.64
T <sub>5</sub>	341049	511574	338332	507498	1667	50000	622577	1069072	446495	0.72
T <sub>6</sub>	364198	546296	361665	542498	1717	51500	623183	1142644	519461	0.83
T <sub>7</sub>	370370	555556	378332	567498	1967	59000	628064	1182053	553989	0.88
T <sub>8</sub>	333333	500000	344999	517498	1722	51650	623789	1069148	445359	0.71
T <sub>9</sub>	327160	490741	333332	499998	1645	49350	623689	1040089	416400	0.67
T <sub>10</sub>	401235	601852	404998	607498	2112	63350	628264	1272699	644435	1.02

**Selling price:-** Spike- Rs. 1.5 per spike, Corms- Rs. 1.5 per Corm,, Cormels- Rs. 30 per kg

PSB + KMB and T<sub>6</sub> i.e. 75% RDF + FYM @ 7.5 t ha<sup>-1</sup> + *Azotobacter* + PSB + KMB, whereas minimum number of spikes per hectare (283950.62), number of corms per hectare (288332.18), weight of cormels (1395.00 kg), were recorded in treatment T<sub>1</sub> (100% RDF 200:200:200 NPK kg). Similar results were reported by Kumari Vasantha *et al.* (2014) in gladiolus and Sunitha *et al.* (2007) in marigold.

Flower yield attributes were positively affected by bio-fertilizers like *Azotobacter* which is an associative living diazotroph and has been certified as potential microbial inoculants for increasing the productivity of various crops. These organisms plays role in fixation, synthesizing and secretion of many amino acids, which influence plant growth that ultimately affects the various flower parameters and yield. These findings corroborate with that of Yadav *et al.* (2005) in tuberose and Basoli *et al.* (2012) in gladiolus. Better corm and cormels production might be due to corms inoculated with bio-fertilizers have stored more carbohydrates through effective photosynthesis. The increase in corms weight might be due to good growth of plant which helps in storage of carbohydrates and nitrogen compounds in the corms. Similar findings have been reported by Baboo and Singh (2006) in gladiolus and Swaminathan *et al.* (1999) in tuberose.

### Economics

The net realization in rupees per hectare worked out from number of spikes, corms and weight of cormels at prevailing market price of spikes, corms and cormels of gladiolus and inputs used during experiment. The data (Table 1) revealed that the highest number of spikes, corms and weight of cormels per hectare gave maximum net realization (Rs. 644435.42) was recorded in treatment T<sub>10</sub> (100% RDF + FYM @ 7.5 t ha<sup>-1</sup> + *Azotobacter* + PSB + KMB + 1% foliar spray of *Nauroji* Novel Organic Liquid Fertilizer) which was at par with the treatment

T<sub>7</sub> i.e. 100% RDF + FYM @ 7.5 t ha<sup>-1</sup> + *Azotobacter* + PSB + KMB (Rs. 553989.29) and T<sub>6</sub> i.e. 75% RDF + FYM @ 7.5 t ha<sup>-1</sup> + *Azotobacter* + PSB + KMB (Rs. 519461.13). This clearly indicated that T<sub>10</sub>, T<sub>7</sub> and T<sub>6</sub> treatments are most beneficial for gladiolus cultivation.

Treatment T<sub>10</sub> (100% RDF + FYM @ 7.5 t ha<sup>-1</sup> + *Azotobacter* + PSB + KMB + 1% foliar spray of *Nauroji* Novel Organic Liquid Fertilizer) gave the highest benefit cost ratio (1:1.02) which was followed by treatments T<sub>7</sub> i.e. 100% RDF + FYM @ 7.5 t ha<sup>-1</sup> + *Azotobacter* + PSB + KMB (1:0.88) and T<sub>6</sub> i.e. 75% RDF + FYM @ 7.5 t ha<sup>-1</sup> + *Azotobacter* + PSB + KMB (1:0.83). One can earn more by using less input and reduced the cost of cultivation as per treatment T<sub>7</sub> and T<sub>6</sub> which found at par to T<sub>10</sub>.

As per economics point of view, highest net realization of Rs. 644435.42 ha<sup>-1</sup> along with benefit cost ratio of 1: 1.02 was recorded with the treatment T<sub>10</sub> (100% RDF + FYM @ 7.5 t ha<sup>-1</sup> + *Azotobacter* + PSB + KMB + 1% foliar spray of *Nauroji* Novel Organic Liquid Fertilizer) followed by T<sub>7</sub> i.e. 100% RDF + FYM @ 7.5 t ha<sup>-1</sup> + *Azotobacter* + PSB + KMB (Rs. 553989.29 with CBR 1: 0.88) and T<sub>6</sub> i.e. 75% RDF + FYM @ 7.5 t ha<sup>-1</sup> + *Azotobacter* + PSB + KMB (Rs. 519461.13 with benefit cost ratio 1: 0.83). This clearly indicated that T<sub>7</sub> and T<sub>6</sub> treatments are also economically viable for gladiolus cultivation besides T<sub>10</sub>.

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