EFFECT OF INTEGRATED NITROGEN MANAGEMENT IN GROWTH, YIELD AND FLOWER QUALITY OF GLADIOLUS (*GLADIOLUS GRANDIFLOROUS*) CV. CANDYMAN

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Abstract: The field experiment was conducted during *Rabi* 2009-10 at the Research cum Instructional Farm, Department of Horticulture, Indira Gandhi Krishi Vishwavidyalaya, and Raipur (C.G.) to study the effect of integrated nitrogen management in growth, yield and flower quality of gladiolus cv. Candyman. The result indicated that the T_3 (50%N (Urea) +50%N (FYM) +P and K @ 20gm/m^2 each) performed better in different parameters namely, days to sprouting, numbers of sprouts per mother corm, number of leaves per plant, height of the plant up to tip of leaf, days to spike emergence, length of spike, number of florets per spike, vase life of cut spikes, and yield of corms and cormels.

Keywords: Gladiolus, FYM, Vermicompost

INTRODUCTION

Gladiolus is a popular flowering plant belonging to the family Iridaceae and is a native of South Africa and Asia Minor. It is one of the most important bulbous ornamental, occupying fifth positions in International floriculture trade (Sharma and Sharga, 1994). It is valued for its majestic spikes, beautiful colours, attractive shapes and excellent keeping quality or vase life.

There are heavy demands of flowers during marriages festivals and other social occasions and most of the requirements are fulfilled by growers /suppliers of Kolkata and Nagpur. Gladiolus is commercially propagated through corms and cormels. It is well established fact that the size of corm is a major factor influencing the quality and yield of gladiolus. Therefore, it is imperative that the size of corm should be enhanced before planting it for commercial production. Gladiolus being a highly nutrient responsive crop requires large doze of nutrient viz. nitrogen, phosphorus and potassium, which are the major nutrient effecting growth, development and yield.

MATERIAL AND METHODS

The field experiment was conducted at the Research cum instructional farm, Department of Horticulture, IGKV Raipur (C.G.) during the Rabi 2009-2010. The soil was prepared thoroughly and corms were planted on 26 November 2009. The experiment was laid out in randomized block design with three replications and thirteen treatments T_1: RDN (Urea) +P and K @ 20gm/m^2 each, T_2: 75%N (Urea) +25%N (FYM) +P and K @ 20gm/m^2 each, T_3: 50%N (Urea) +50%N (FYM) +P and K @ 20gm/m^2 each, $T_{4:}$ 25%N (Urea) +75%N (FYM) +P and K @ 20gm/m^2 each, T_5: 100% (FYM) +P and K @ 20gm/m^2 each T_6: 75%N (Urea) +25%N (GM) +P and K @ 20gm/m^2 each, T_7: 50%N (Urea) +50%N (GM) +P and K @ 20gm/m^2 each, T_8: 25%N (Urea) +75%N (GM) +P and K @ 20gm/m^2 each, T_9:100%N (GM) +P and K @ 20gm/m^2 each, $T_{10:}$ 75%N (Urea) +25%N (VC) +P and K @ 20gm/m^2 each, $T_{11:}$50%N (Urea) +50%N (VC) +P and K @ 20gm/m^2 each, $T_{12:}$25%N (Urea) +75%N (VC) +P and K @ 20gm/m^2 each, $T_{13:}$100%N (VC)+P and K @ 20gm/m^2 each. (GM=Goat Manure, VC = Vermicompost, RDN = Recommendad dose of nitrogen i.e. 40gm/m^2).

RESULTS AND DISCUSSION

Days to sprouting of corm

For 50 percentages sprouting the minimum number of days (5.33) was taken by treatment T_3 whereas the maximum number of days (9.00) for 50 percentages sprouting was recorded in the treatment $T_{1.}$The earliness in sprouting may be due to the application of chemical fertilizer in combination with FYM which promotes or induces early sprouting of corm. This result is confirmed with the findings of Bisen and Barhalia (1990) and Singh (1998) in potato and gladiolus respectively.

Number of sprouts per mother corm

The maximum number of sprouts per mother corm (1.53) was found in the treatment T_3.The minimum number of sprouts per mother corm (1.16) was recorded in treatment T_1.The superiority of treatment T_3 over the rest of the treatments might be due to availability of optimum amount of nutrient from inorganic fertilizer in combination with FYM. This result is in close conformity with the findings of Singh *et al.* (1971)

Number of leaves per plant

The number of leaves per plant was counted at 20, 40, 60 and 80 days after planting. The maximum number of leaves was observed in treatment T_3 Minimum number of leaves per plant was observed in treatment T_1.This might be due to continues availability of essential nutrient to the crop by the application of inorganic fertilizer in combination with organic FYM. These observations followed the results of Ahmed *et al.* (2004). They observed that the treatment which was comprised of 20 g urea/m^2+ 40 g (DAP)/m^2 +4 kg FYM/m^2 gave the maximum number of leaves in Dahlia.

Height of the plant up to tip of leaf (cm)

The data on height of the plant was recorded at 20, 40, 60 and 80 days after planting. The maximum height of the plant was observed in treatment T_3 and it was significantly superior over the all of the treatments. Minimum height of the plant was noted in treatment T_1.The maximum height of plant under the treatment T_3 might be associated with the availability of optimum nutrient to the plant throughout the growth period by the application of inorganic fertilizer in combination with FYM. This is in accordance with the findings of Widjajanto and Widodo (1982).

Days to spike emergence

The minimum number of days to spike emergence (64.67) was taken by the treatment T_3. The maximum number of days to spike emergence (77.67) was taken by the treatment T_1.The earliness in spike emergence by the application of FYM in combination of inorganic fertilizer may be due to optimum availability of nutrients to the plant due to which plant completed their vegetative growth soon resulting in early spike emergence. These results are in close conformity with the findings of Ahmed *et al* (2004). They observed that the treatment which was comprised of 20 g urea/m^2+ 40g (DAP)/m^2 + 4kg FYM/m^2 taken minimum number of days for emergence flower bud in Dahlia.

Length of the spike (cm)

The maximum length of spike (101.50cm) was recorded in the treatment T_3. The minimum length of the spike (84.03) was obtained in treatment T_1. The maximum length of the spike in treatment T_3 may be due to the availability of sufficient amount of nitrogen in different phases of growth and development of plants which promotes the length of the spike. Similar result was recorded by Gupta *et al*. (2008). They reported that the maximum length of the spike in gladiolus was obtained by applying FYM @2.5kg/m.^{2}

Number of florets per spike

The maximum number of florets per spike (14.53) was counted in the treatment T_3 and it was significantly superior over all the treatments. The minimum number of florets per spike (10.83) was observed in the treatment T_1. The superiority of treatment T_3 for number of florets over the other treatments may be due to the availability of organic and inorganic nitrogen and other essential nutrients for longer period at optimum level resulting in more number of florets per spike. This result is in close agreement with the findings of Ahmed *et al.* (2004). They reported that the treatment which was comprised of 20 g urea/m^2+ 40 g (DAP)/m^2 +4 kg FYM/m^2 gave the highest number of flowers in Dahlia.

Vase life of cut spikes (days)

Treatment T_3 had the longest vase (5 days) where as the minimum vase life (3.33 days) was obtained in treatment T_1.The maximum vase life in treatment T_3 may be due to the positive effect of inorganic nitrogen in combination with organic manure on the vase life and also due to more accumulation of carbohydrate which increased the vase life of cut spikes.

Yield of corms (q/ha)

The maximum yield of corms (112.37 q/ha) recorded in the treatment T_3 which was significantly superior over all the treatment except with the treatment T_7. The minimum yield of corms (61.80 q/ha) was found

in the treatment T_1. Increase in yield with treatment T_3 may be due to assimilation of carbohydrate and protein resulting in better vegetative growth of plant. This probably helped in better tuberization of corm and increase their weight and size. This is in accordance with the findings of Varu *et al.* (1994).They found that the treatment comprised of FYM + NPK + Dharatidhara gave the maximum bulb yield in onion.

Yield of cormels (q/ha)

The maximum yield of cormels (23.37 q/ha) was noticed in the treatment T_3 and it was significantly superior over all the treatments. The minimum yield of cormels (9.42 q/ha) was found in the treatment T_1. Increase in yield of cormels in treatment T_3 may due to availability of nutrient in both macro and micro nutrient to the plant for longer time at optimum level which resulted in better growth of cormels ultimately increasing the yield of cormels per plot. Similar result was recorded by Shankar (2001). He found that the yields of cormels were maximum in the treatment NPK@ 40:20:20g/m^2. + FYM @ 5kg/m^2; N in two splits (at planting and 60 DAP).

Table 1. Mean effect of integrated nitrogen management in growth, yield and flower quality of gladiolus cv.Candyman

Treatments	**Day to sprouting**	**No. of sprouts/corm**	**No. of leaves/plant**	**Plant height (cm)**	**Days to spike emergence**	**No. of florets/ spike**	**Spike Length (cm)**	**Vase life(days)**	**Corm yield (q/ha)**	**Cormels yield (q/ha)**
T_1	9.00	1.16	10.40	108.17	72.67	10.83	84.03	3.33	61.80	9.42
T_2	8.67	1.25	10.83	123.20	67.33	12.53	99.27	4.13	95.30	13.37
T_3	**5.33**	**1.53**	**15.80**	**129.73**	**63.00**	**14.53**	**101.50**	**5.00**	**112.37**	**23.37**
T_4	6.33	1.40	10.77	123.93	65.67	12.93	100.33	4.33	98.87	22.57
T_5	8.00	1.43	10.70	118.60	69.33	11.50	85.23	3.40	102.53	14.20
T_6	6.00	1.43	14.07	128.80	67.67	13.03	100.47	4.33	72.20	17.57
T_7	8.67	1.29	14.13	130.80	63.67	13.27	101.07	4.60	81.80	12.93
T_8	7.33	1.24	11.00	121.47	67.33	13.97	101.10	4.70	76.27	19.43
T_9	7.33	1.23	12.60	125.53	69.00	13.13	100.97	4.60	93.87	13.37
T_{10}	7.00	1.17	12.00	125.50	66.00	13.20	100.03	4.60	75.70	22.70
T_{11}	6.33	1.28	11.50	124.20	69.33	12.13	96.30	3.87	86.07	19.40
T_{12}	6.67	1.19	10.53	116.90	66.33	12.43	96.53	4.07	79.20	16.23
T_{13}	6.67	1.36	12.90	127.30	71.00	11.63	96.20	3.47	93.87	16.53
S.Em±	**0.07**	**0.07**	**0.35**	**2.00**	**2.98**	**3.97**	**0.67**	**0.33**	**7.63**	**2.46**
C.D (p=0.05)	**0.20**	**0.20**	**0.99**	**11.06**	**8.27**	**11.01**	**1.87**	**0.91**	**21.16**	**6.83**

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