THE RESPONSE OF GLADIOLUS TRISTIS L. TO N AND P₂O₅ FERTILIZERS

SHER MOHAMMED LEHRI*, AHMED AZIZ KURD**, MUNIR AHMED RIND* and NOOR AHMED BANGULZAI*

* Vegetable Seed Farm, Agricultural Research Institute, Sariab, Quetta – Pakistan.
** Coordinated Research Programme, Pakistan Agricultural Research Council, Quetta – Pakistan.

ABSTRACT

A field experiment was conducted to determine the response of different doses of N and P₂O₅ on the growth and flower quality of gladiolus at farmer field district Quetta during the summer season 2008. Six treatments were included in the trial viz; T1 (125+100); T2 (125+200); T3 (150+100); T4 (150+200); T5 (175+100) and T6 (175+200) NP kg/ha were tested in four replicated randomized complete block design. The results reveal that fertilizer treatments had significant response on leaves length, leaves number, florets number per spike, corms number per plant, corm lets number per corm and spike length. The highest N and P₂O₅ dose 175+200 kg/ha produced significantly maximum length of leaves (44.4 cm), greater number of leaves (13.75), number of florets per spike (14.00), number of corms per plant (4.00), number of cornlets per corm (18.62) and longer spike length (99.75cm). It was concluded that for obtaining maximum number of florets per spike, number of corms per plant, number of corm lets per corm and longer spike length application of nitrogen and phosphorus at 175+200 kg/ha may be applied.

Key Words: Gladius, fertilization, nitrogen, phosphorus, growth and flower production

Citation: Lehri, S. M., A.A. Kurd, M.A. Rind and N.A. Bangulzai. 2011. The response of gladiolus tristis L. to N and P₂O₅ fertilizers. Sarhad J. Agric. 27(2): 185-188

INTRODUCTION

The name gladiolus was originally coined by Pliny the Elder (A.D 23-79) deriving from the Latin word gladiolus, meaning a sword, on account of the sword like shape of its foliage, however, previously it was the name of ‘iris’ which ancient Greeks used to call as ‘xiphion’. As a genus it was christened by Tournefort and accepted in botanical literature by Linnaeus. The ‘swordlily’ is its common name because of its sword shaped foliage ‘Corn flag’ is its other common name in Europe because Gladiolus illyricus is found wild as weed in the corn-fields. *Gladiolus primulinus* is also known as ‘water fall gladiolus’ as it was found growing near the Victoria falls in the tropical forests of Africa. It was introduced into cultivation towards the end of the 16th century. In Indo-Pak, its cultivation dates back to nineteenth century (Rajput, 2003).

The search for new crops to supplement the income from traditional crops has followed many routes. Cut flower cultivation is one of the alternatives being as alternate income generating activity in many parts of the world (Dufault et al. 1990). Presently, a few growers in Balochistan have also started to produce some exotic flowers. Most of these flowers are sold to wholesaler and retail florists. Balochistan is famous for having wild flora landmass of Pakistan. Consequently the potential has exploited to opt for cut flowers farming as commercial enterprise. Recently, a series of exotic species of cut flowers are being commercially grown in the vicinities of Quetta, Kalat, and Pishin districts of the Province. The important cut flowers are Gladiolus, Rose, Carnation, Marigold, Static, Aster, Zinnia, and Goldenrod. With regard to benefit cost ration Gladiolus is highly profitable cut flower species among the cut flowers grown in Balochistan. In cases of gladiolus flowers, market rates varied depending on flowers quality and spike length (Kurd et al. 2008).

The flower quality and spike length of Gladiolus can be improved by adopting proper package of cultural practices like, timely planting, proper planting distances between rows and plants, weeding and proper irrigation. Beside theses cultural practices application of plant nutrients can play a vital role to produce good quality flowers, this statement is proved by the following reports: Soil and climate of a particular region are important factors influencing the fertilizer requirement of gladiolus. It also depends on cultivars and size of corms or cornlets. Cultivars showing rapid growth and developing large plants and large flower spikes responds more to fertilizer than those with low vigour and producing smaller plants and spike (Woltz, 2001). Smaller corms require more fertilizer than large corms mainly due to their stored reserve and partly to greater feeding ability of the extensive root system produced by large corms (Pale, 2000).

Nitrogen is one of the most important nutrients producing growth and yield response in gladiolus. Leaf analysis indicates that the leaves should contain on dry weight basis 2.5 to 3% nitrogen or more for optimum yield (Militiu et al. 2002). The quantity of phosphorus required by gladiolus is about one tenth of the nitrogen expressed in terms of foliar analysis (Militiu et al. 2002).
Keeping in view the positive effects of nitrogen and phosphorus, the present experiment was conducted to assess the effect of different nitrogen and phosphorus levels on growth and flower production of gladiolus, under soil and climatic conditions of Quetta.

MATERIALS AND METHODS

A field trial was laid out at a farmer field in district Quetta during the summer season of 2008 in order to study the response of gladiolus to various levels of nitrogen and phosphorus fertilizers. The experiment was laid out under Randomized Complete Block Design having a net plot size of 2.0 x 2.0 = 4m². The plot was thoroughly prepared by repeated working with spade. It was then leveled and divided into four equal sub blocks. Then six rows of bulbs were adjusted in each sub block.

The bulbs of gladiolus were sown on April 1, 2008 keeping the distance between row to row 40cm and bulb to bulb 20 cm thus accommodating 48 bulbs per bed. The nitrogen and phosphorus treatments tried in this trial were T1 = 125 kg N + 100 kg P ha⁻¹, T2 = 125 kg N + 200 kg P ha⁻¹, T3 = 150 kg N + 100 kg P ha⁻¹, T4 = 150 kg N + 200 kg P ha⁻¹, T5 = 175 kg N + 100 kg P ha⁻¹ and T6 = 175 kg N + 200 kg P ha⁻¹.

The full dose of phosphorus and half of the nitrogen was applied at the time of sowing. The remaining nitrogen was applied after 60 days and other cultural operations like, weeding, earthing up, etc were equally performed in all the treatments. A composite soil sample from experimental plot was collected before sowing and analyzed for physico-chemical characteristics. Detail of soil analysis is given below:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>8.3</td>
</tr>
<tr>
<td>Electrical conductivity (dS/m)</td>
<td>0.650</td>
</tr>
<tr>
<td>Ca + Mg (mg/l)</td>
<td>6.40</td>
</tr>
<tr>
<td>CO₃₂⁻ (mg/l)</td>
<td>Nil</td>
</tr>
<tr>
<td>HCO₃⁻ (mg/l)</td>
<td>1.48</td>
</tr>
<tr>
<td>Cl (mg/l)</td>
<td>2.38</td>
</tr>
<tr>
<td>Organic matter (%)</td>
<td>0.31</td>
</tr>
<tr>
<td>Nitrogen (%)</td>
<td>0.032</td>
</tr>
<tr>
<td>Phosphorus (%)</td>
<td>6.8</td>
</tr>
<tr>
<td>Texture</td>
<td>Silty clay loam</td>
</tr>
</tbody>
</table>

The observations were length of leaves (cm), number of leaves per plant, number of florets per spike, number of corms per plant, number of cormlets per corm and length of spike (cm). Observations were recorded on single plant study. For single plant study 10 plants from each plot were randomly selected and labeled for recording observations and the experiment was terminated after 150 days of sowing. The data were subjected to statistical analysis in a Randomized Complete Block Design with single factor and means were separated by LSD at 5 % (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

Length of Leaves (cm)

It is obvious from the data (Table I) that maximum length of leaves (44.4 cm) was recorded in case of higher N-P levels of 175+200 kg per hectare, however, lowest leaves length of 31.42 cm was recorded in case of N-P level of 125+100 kg per hectare. The present results are further proved by the reports of Shaikh (1998), Bose and Yadav (2004) and Afifty (2003), who reported that length of leaves responded positively to increased N.

Number of Leaves per Plant

The data (Table I) illustrated that higher N-P level of 175+200 kg per hectare produced significantly greater number of leaves per plant (13.75), followed by 12.25 and 11.50 number of leaves per plant recorded under N-P levels of 175+100 kg and 150+200 kg per hectare respectively. Statistically at 5% level there is no difference between N-P levels of 175+100 kg and 150+200 kg per hectare. However, the minimum number of leaves (7.75) was noticed in case of plots received 125+100 kg N-P hectare. These results are supported by findings of Deswai, et al. (2001), Chaungrahzy (2002), Shah and Seth (2002) and Shaikh (1998). They reported that the highest N application (170 kg ha⁻¹) produced significantly maximum values for all the quantitative characters studied. They further reported that decrease in N level decreased leaves length and N effect in the presence of P.
Number of Florets per Spike

The plots treated with 175+200 kg N-P per hectare produced significantly highest number of florets (14.00) per spike, followed by 12.50 and 11.25 number of florets per spike recorded under N-P level of 175+100 kg per hectare and 150+200 kg per hectare respectively, whereas, the minimum number of florets (8.25) was noticed where N-P was applied at the level of 125+100 kg hectare$^{-1}$. These results are in confirmation with the findings of Najjar and Rahalia (2005) and Bhattacharjee (2001). They stated that the maximum number of florets per spike and large flowers were obtained with 175 kg N ha$^{-1}$. The application of P and K with rising levels of each element tended to improve the flower spike quality and corm growth.

Number of Corms Plant$^{-1}$

It can be assessed from the results that the maximum number (4.00 and 3.57) of corms were recorded in case of higher N-P levels of 175+200 kg hectare$^{-1}$ and 175+100 kg hectare$^{-1}$, respectively, followed by 150+100 kg N-P level per hectare where corms number recorded was 2.77. However, the minimum corms number (2.3) observed under the N-P level of 125+100 kg per hectare. The present results are in agreement with the findings reported by Arora and Khanna (2003).

Number of Cormlets per Corn

The plants received highest N-P level of 175+200 kg per hectare produced significantly maximum number of cormlets (18.62), followed by 175+100 kg N-P hectare$^{-1}$ where average cormlets number obtained was 15.50, whereas lowest number of cormlets (6.37) was recorded in case of 125+100 N-P kg hectare$^{-1}$. The present results are further supported by the research findings of Shaikh (1998). The results further illustrated that as the N-P levels increased, there was a gradual improvement in the cormlets number, this proves that N-P are the essential nutrients for production of cormlets in gladiolus.

Spike Length (cm)

It is obvious from the data that the highest N-P level of 175+200 kg per hectare produced significantly maximum spike length (99.75 cm) followed by 84.00 cm and 75.8 cm spike length recorded under 175+100 kg and 150+200 kg N-P per hectare, respectively. However, minimum length of spike (42.00 cm) per plant was noticed in case of plots treated with 125+100 kg N-P per hectare. These results are in agreement with the findings of Afify (2003), Anserwedekar and Patil (2004). They all were of the opinion that increased N-P had remarkable effect on spike length.

Table-1 Mean values of leaves length, number of leaves plant$^{-1}$, number of florits spike$^{-1}$, number of corms plant$^{-1}$, number of cormlets corn$^{-1}$ and spike length.

<table>
<thead>
<tr>
<th>Treatments N+P kg ha$^{-1}$</th>
<th>Leaves length (cm)</th>
<th>Number of leaves plant$^{-1}$</th>
<th>Number of florits spike$^{-1}$</th>
<th>Number of corms plant$^{-1}$</th>
<th>Number of cormlets corn$^{-1}$</th>
<th>Spike Length (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 125+100</td>
<td>31.42 c</td>
<td>7.75 d</td>
<td>8.25 e</td>
<td>2.3 c</td>
<td>6.37 f</td>
<td>42.00 e</td>
</tr>
<tr>
<td>T2 125+200</td>
<td>33.80 de</td>
<td>8.5 d</td>
<td>8.75 e</td>
<td>2.67 c</td>
<td>9.52 e</td>
<td>55.87 d</td>
</tr>
<tr>
<td>T3 150+100</td>
<td>36.47 cd</td>
<td>9.75 c</td>
<td>10.00 d</td>
<td>2.77 c</td>
<td>12.15 d</td>
<td>65.62 c</td>
</tr>
<tr>
<td>T4 150+200</td>
<td>38.45 bc</td>
<td>11.50 b</td>
<td>11.25 c</td>
<td>3.47 b</td>
<td>14.25 c</td>
<td>75.87 b</td>
</tr>
<tr>
<td>T5 175+100</td>
<td>40.4 b</td>
<td>12.25 b</td>
<td>12.50 b</td>
<td>3.57 ab</td>
<td>15.50 b</td>
<td>84.00 b</td>
</tr>
<tr>
<td>T6 175+200</td>
<td>44.40a</td>
<td>13.75 a</td>
<td>14.00 a</td>
<td>4.0 a</td>
<td>18.62 a</td>
<td>99.75 a</td>
</tr>
</tbody>
</table>

Means followed by similar letters in the same columns are not significantly different at 5% level of probability.

CONCLUSION AND RECOMMENDATION

It is concluded that the N-P fertilizers combination levels (175+200 NP kg ha$^{-1}$) had highly significant influence on leaves length (44.4 cm), number of leaves plant$^{-1}$ (13.75), number of florits spike$^{-1}$ (14.00 cm), number of corms plant$^{-1}$ (4.00), number of cormlets corn$^{-1}$ (18.62) and spike length (99.75 cm). On the other hand plots treated with 125+100 NP kg per hectare recorded minimum leaves length (3.42 cm), lesser number of leaves plant$^{-1}$ (7.75), number of florits spike$^{-1}$ (8.25), number of corms plant$^{-1}$ (2.37), number of cormlets corn$^{-1}$ (6.37) and minimum spike length (42.00 cm). Based on the findings of this study it may be recommended that for obtaining marketable quality flowers/spike of gladiolus, the crop may be fertilized at 175+200 NP kg hectare$^{-1}$. 
REFERENCES