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GRADED LEVEL OF PHOSPHORUS ON GROWTH AND FLOWERING OF GLADIOLUS CV. WHITE (GLADIOLUS GRANDIFLORUS)

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Abstract-A field experiment was conducted during during 2013 to 2014 at the Horticulture farm, School of Agricultural sciences and Rural Development, Nagaland University, Medziphema Campus to evaluate the performance of Gladiolus grandiflorus cv. White Prosperity with the fertilization of phosphorus (0, 150, 200 and 250 kg/ha). The experiment was laid out in Randomized Block Design (RBD) with three replication. Application of phosphorus at 200 kg ha^{-1} significantly took minimum days to spike emergence (30.65 days), maximum numbers of leave at spike emergence (10.30), tallest plant (79.63 cm) and largest leaf area (113.63 cm^2), minimum days to spike emergence (65.48 days) as well as first floret opening (78.13 days), largest floret size (10.22 cm), longest rachis (43.08 cm), longest inter nodal length between two floret (4.05 cm), maximum number of florets per spike (15.48), longest spike length (111.57 cm) and maximum vaselife (12.65 days). The data show that phosphorus @ 200 kg ha^{-1} show significant effect on both growth and flowering of Gladiolus grandiflorus cv. White Prosperity.

Key words: Phosphorus, gladiolus, growth, flowering.

1. INTRODUCTION

Among the bulbous flowering ornamentals, gladiolus is the most ideal one mainly for its garden display and cut flower with it majestic spike having massive florets of wide spectrum of colour, attractive shapes, varying size and excellent keeping quality. It is an important commercial flower crop and having pivotal place as cut flower both in domestic and international market. It is estimated that throughout India gladiolus is grown in about 1167 ha, producing 5070 MT loose flower and 9289 MT cut spike. (NHB, 2015).

Phosphorus has a great role in energy storage and transfer. An adequate supply of phosphorus in early stage of plant life is important for the reproductive part of the plants. Phosphorus is closely related to cell division and development, it stimulate early root development, growth and thereby help to established seedling quickly. In gladiolus, phosphorus application significantly increased plant height, spike length and number of florets. (Baweja et al., 2001). The vegetative parameters like plant height, number of leaves, leaf area, dry weight of leaves, dry weight of flower, growth parameters like leaf area index (LAI), crop growth rate (CGR) and net assimilation rate (NAR) are increased with the application of phosphorus (Chandana and Dorajeerao, 2014). NEH region has immense scope and potential for commercializing gladiolus cultivation. In addition, progressive markets within and outside the state makes it a potential crop for earning profits. Therefore, it was felt pertinent to undertake the present investigation to ascertain and recommend the standard agro technique specially the package of fertilization in gladiolus.

2. MATERIALS AND METHODS

The present investigation was carried out in the Horticulture Experimental Farm, School of Agricultural Sciences and Rural Development (SASRD), Nagaland University, Medziphema, during the year 2014 to 2015. The experiment consists of four levels of phosphorus i.e P_0:0, P_1:150, P_2:200 and P_3:250 kg Phosphorus/ha with three replication and was laid out in Randomized Block Design. phosphorus was applied at the time of planting as basal dose. The statistical analysis was carried out as per procedure given by Panse and Sukhatme, 1978.

RESULTS AND DISCUSSION

Growth characters

It is evident from the data Table 1 and Fig. 1 that there was a significant difference in the growth attributing character among the different treatments. Application of phosphorus in varied doses significantly reduced the days taken to three leave stage. The minimum days(30.65) taken for three leave stage were recorded in 200 kg Phosphorus which is statistically at par with 250 kg P_2O_5 ha^{-1} and 150 kg ha^{-1} (30.77 and 31.86) days respectively. Phosphorus stimulates generation of rootlets and nurtures the roots. It is also an important constituent in energy rich compounds and thus an indispensable element in energy metabolism. This is involved

in the synthesis of growth stimulating compound absorption of nutrients, cell division and cell growth which might result in vigorous growth (Chandana and Dorajeerao, 2014).

Phosphorus fertilization showed significant difference on the number of leaves, the maximum number of leaves (10.30) was noted in 200 kg P_2O_5 ha^{-1} which is statistically at par with 250 kg P_2O_5 ha^{-1} (10.28) leaves. The present experimental findings are in line Chandana and Dorajeerao (2014) in gladiolus cv. White Prosperity and Gaurav (2011) in gladiolus.

Application of phosphorus had a significant effect on the height of the plant. Tallest plant (79.63 cm) was observed in 200 kg P_2O_5 ha^{-1} which is statistically at par with 250 kg P_2O_5 ha^{-1} (78.63 cm) and 150 kg P_2O_5 ha^{-1} (77.58 cm) respectively. These finding are in accordance with Chandana and Dorajeerao (2014) in gladiolus cv. White Prosperity.

Application of phosphorus in graded level showed significant effect on the leaf area. The maximum leaf area (113.63 cm^2) was recorded in 200 kg P_2O_5 ha^{-1} which is statistically at par with 250 kg P^2O^5 kg ha^{-1} (113.50 cm^2). The present experimental finding are in confirmation with the finding of Chandana and Dorajeerao (2014) in gladiolus cv. White Prosperity, Gangwar et al. (2012).

Table-1Effect of phosphorus levels on the growth characteristic of Gladiolus grandiflorus cv. White prosperity

Treatment	Days taken to three leave stage	No. of leave at spike emergence	Height of plant at spike emergence (cm).	Leaf area at spike emergence (cm^2).
Control (P_0)	33.08	9.95	75.18	105.05
150 kg N ha^{-1} (P_1)	31.86	10.14	77.58	108.22
200 kg N ha^{-1} (P_2)	30.65	10.30	79.63	113.63
250 kg N ha^{-1} (P_3)	30.77	10.28	78.78	113.50
CD 5%	1.29	0.25	2.51	3.13

Table-2 Effect of phosphorus levels on the flowering characteristic of Gladiolus grandiflorus cv. White prosperity

Treatment	Days to spike emergence	Days to opening of first floret	Floret size (cm)	Rachis length (cm)	No. of floret per spike	Spike length (cm)
Control (P_0)	68.08	80.71	9.93	40.15	14.91	107.01
150 kg P ha^{-1} (P_1)	67.19	78.88	10.04	42.09	15.25	109.66
200 kg P ha^{-1} (P_2)	65.48	78.13	10.22	43.08	15.48	111.57
250 kg P ha^{-1} (P_3)	65.95	78.33	10.20	42.98	15.44	110.54
CD 5%	1.55	**1.52**	0.22	1.93	0.41	2.24

Flowering characters

Perusals of the results pertaining to the influence of phosphorus on flowering characters are depicted in Table 2. Application of phosphorus in varied dose show significant effect on the flowering characters in gladiolus cv. White Prosperity. The shortest days (65.48) taken to spike emergence was recorded in 200 kg P_2O_5 ha^{-1} which is statistically at par with 250 kg P_2O_5 and 150 kg phosphorus (65.95 and 67.19) days respectively. These results are in line with the findings of Atta-Alla et al. (2003) in gladiolus cvs. Eurovision, Novolux, Peter Pears and Rose Supreme, Haokip (2005) in gladiolus cv. Green Bay.

The minimum days (77.76) taken to opening of first floret was recorded with the application of 200 kg P_2O_5 ha^{-1} which is statistically at par with in 350 kg N ha^{-1} (78.51) days which is statistically at par with in 250 kg ha^{-1} and 150 P_2O_5 kg ha^{-1} (78.33 and 78.88) days respectively. These results are in line with the findings of Atta-Alla et al. (2003) in gladiolus and Haokip (2005) in gladiolus cv. Green Bay.

Application of 200 kg P_2O_5 ha^{-1} recorded the largest floret size (10.22 cm) which are in line with the finding of kumar and Misra (2003) in gladiolus cv. Sylvia.

The longest rachis/scape lenght (43.08 cm) was observed in 200 kg P_2O_5 ha^{-1} which is statistically at par with 250 kg P_2O_5 ha^{-1} and 150 P_2O_5 kg ha^{-1} (42.98 cm and 42.09 cm) respectively. The shortest rachis length (40.15 cm) was recorded in control. The present experimental finding are in line with the finding of kumar (2009) in gladiolus cv. Jester Gold.

The highest number of floret (15.48) was observed in 200 kg P_2O_5 ha^{-1} which was statistically at par with in 250 kg P_2O_5 ha^{-1} and 150 kg P_2O_5 ha^{-1} (15.44 and 15.25) respectively. The increase in the number of florets per

spike might be due to the fact that sulphur in the single super phosphate which might have participated in higher protein synthesis and thus improved the vegetative growth, dry matter accumulation and partitioning of nutrient toward the developing spikes (Kumar and Misra, 2003). The present finding are in accordance with the finding of Patel et al. (2006) in tuberose cv. Single, Niengboi (2005) in gladiolus cv. Green Bay and Kawarkhe et al. (2001) in gladiolus cv. Dabonoir.

Application of phosphorus @200 kg P_2O_5 ha^{-1} record the longest spike length (111.57 cm) which is statistically at par with 250 kg P_2O_5 ha^{-1} and 150 kg P_2O_5 ha^{-1} (110.54 cm 109.66 cm) respectively. The present findings are in line with the finding of Kumar (2009) in gladiolus cv. Jester Gold, Patel et al., (2006) in tuberose cv. Single, Kawarkhe et al. (2001) in gladiolus cv. Dabonoir and Sehrawat and Gupta (2000) in gladiolus.

CONCLUSION

Thus, from the overall result of this investigation, it may be recommended that application of 200 kg phosphorus ha^{-1} was found to be the best treatment for vegetative growth and and quality flower production of Gladilous grandiflorus cv. White Prosperity.

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