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Effect of graded levels of nitrogen and phosphorus on growth parameters of Glory lily (*Gloriosa superba* L.)

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Abstract : An experiment was conducted to study the effect of graded levels of nitrogen and phosphorus on growth and yield of glory lily. The treatment consisted of three graded levels of nitrogen *viz*., 90,120,150 kg N ha^{-1} and phosphorus *viz*., 37.5, 50, 62.5 kg P ha^{-1} and constant level of potassium (75 kg ha^{-1}) was used for the experiment. Entire dose of phosphorus, potassium and one third of nitrogen were given as basal. The experiment was conducted in Randomized Block Design with three replications. The results revealed that the growth parameters *viz*., plant height (230.58 cm), number of branches (7.81), number of leaves (98.53) and yield attributes *viz*., number of tubers per plant, tuber weight and tuber yield per plant when compared to the control.

Key words : Glory lily, Nitrogen, Phosphorus, Growth, Yield parameters

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Glory lily (*Gloriosa superba* L.) belongs to the family Liliaceae. It is one of the important medicinal plants which has attained commercial in Tamil nadu in recent times. The plant is native to Tropical Asia and Africa and is found growing throughout tropical India from North west Himalayas to Assam and Deccan peninsula extending upto an elevation of 2120 m. The medicinal value of glory lily is due to the presence of alkaloids chiefly colchicine and gloriosine. Colchicine extracted from the tubers and seeds are used in the treatment of gout and rheumatism and also used to induce polyploidy in crop plants. Glory lily tubers are used as tonic, antiperiodic, antihelmintic and also against snake bites and scorpion stings. Nutrition plays an important role in the overall improvement in growth and yield in many medicinal and aromatic plants and any interruption in plant nutrition even for a short period has a negative effect on yield. Therefore, balanced supply of major nutrients combined with appropriate cultural practices are important for obtaining higher yields. Considering the above facts, the present investigation was carried out to study the influence of graded levels of nitrogen and phosphorus on the growth and yield of glory lily.

RESEARCH METHODS

The experiment was conducted at a farmer's field at kachiperumal village in Jayamkondam taluk of perambalur district during July to December, 2009. The experiment was laid out in Randomized Block Design with three replications.The treatments consisted of application of major nutrients like nitrogen(90,120,150 kg ha^{-1}), phosphorus (37.5, 50, 62.5 kg ha^{-1}) with a constant dose of potassium(75 kg ha^{-1}). Uniform sized tubers weighing around 70 g were planted in the field at a spacing of 60 cm x 45 cm. One third nitrogen along with entire dose of phosphorus and potassium was applied as basal, and the remaining two third nitrogen was applied in 50-60 days after planting .The fertilizers were applied in the form of urea, super phosphate and muriate of potash. Irrigation and weeding were done as per the requirement of the crop. The observation on growth parameters like plant height, number of branches, number of leaves and yield attributes like number of tubers per plant, tuber weight and tuber yield per plant were recorded at 180 DAP and were analysed statistically (Panse and Sukhatme, 1978).

RESEARCH FINDINGS AND DISCUSSION

The results pertaining to the effect of nitrogen and phosphorus on plant height showed significant differences among the various treatments (Table 1). Plant height was highest (230.58cm) with the application of nitrogen and phosphorus @ 150:50 kg ha^{-1} followed by the treatment which received the application of nitrogen and phosphorus @120:50 kg ha^{-1} which recorded 224.88 cm. Similar findings on the increase in plant height due to application of higher dose of N and P fertilizers were reported by Kumaraswamy *et al*. (1994) in glory lily and Ghosh and Pal (2002) in galangal. Increased plant height due to application of higher levels of nitrogen may be attributed to the fact that N, being the chief constituent of protein is essential for the formation of protoplasm, which leads to cell division and cell enlargement resulting in increased plant growth (Bakley, 1974).

It was observed from the present study that increasing levels of nitrogen and phosphorus consistently enhanced the number of branches per plant (Table 1). It was found that (7.81) with the application of nitrogen and phosphorus @ 150:50 kg ha^{-1} followed by the graded level of N and P (120:50 kg ha^{-1})which recorded a value of 7.30 and least number of branches (4.10) were registered in the control. The results are in conformity with the findings of Birbal *et al*.(1995). The increase in the application of higher levels of N and P fertilizers may be attributed to the increased meristematic activities in the plant and also due to the enhanced photosynthesis as reported by Medhi and Borah(1993).

Maximum leaf production (98.53) were observed when nitrogen and phosphorus were applied @ 150:50 kg ha^{-1} followed in the level of N and P (120:50 kg ha^{-1}) which recorded a value of 94.40 and least values (73.14) were registered in the control. Maximum leaf production due to application of higher doses of fertilizers could be due to the increase in chlorophyll content, a component responsible for high rate of photosynthesis. The adequate net assimilation of photosynthesis resulted in greater leaf

Table 1: Influence of graded levels of nitrogen and phosphorus on growth characters of glory lily

Treatment No.	Treatment details (kg ha^{-1})	Plant height(cm)	Number of branches per plant	Number of leaves per plant
T_1	90:37.5	204.66	5.22	78.71
T_2	90:50	205.77	4.90	77.80
T_3	90:62.5	209.87	5.70	82.12
T_4	120:37.5	218.57	6.82	90.51
T_5	120:50	224.88	7.30	94.40
T_6	120:62.5	219.68	6.50	89.34
T_7	150:37.5	213.77	6.11	85.70
T_8	150:50	230.58	7.81	98.53
T_9	150:62.5	200.54	4.46	74.20
T_{10}	Control	196.63	4.10	73.14
	S.E.±	3.40	0.46	3.0
	C.D. (P=0.05)	7.21	0.95	6.2

Table 2: Influence of graded levels of nitrogen and phosphorus on yield characters of glory lily

Treatment No	Treatment details(kg ha^{-1})	Number of pods per plant	Pod weight (g)	Seed yield per plant(g)
T_1	90:37.5	17.02	1.68	13.54
T_2	90:50	17.31	1.98	13.01
T_3	90:62.5	18.82	2.20	15.23
T_4	120:37.5	25.31	3.06	21.50
T_5	120:50	29.52	4.09	23.40
T_6	120:62.5	26.43	3.59	20.32
T_7	150:37.5	22.51	2.46	18.91
T_8	150:50	32.50	4.59	25.71
T_9	150:62.5	15.31	1.45	12.00
T_{10}	Control	14.32	1.31	11.83
	S.E.±	0.71	0.15	1.22
	C.D. (P=0.05)	1.20	0.30	2.65

area as suggested by Upadhyay and Misra (1999).

Application of inorganic fertilizers significantly influenced the yield components like number of pods, pod weight and seed yield per plant (Table 2). In the present study, it was observed that application of N and P @ 150:50 kg ha^{-1} increased the number of pods (32.50) and pod weight (4.59 g).The results of the present study are in accordance with the findings of Pavithra(1989) in glory lily and Saraf and Tiwari(2004) in ambrette. The increase in yield components due to application of N and P fertilizerzs may be due to the favourable influence of both N and P and also due to the improved nutritional environment for growth and development of the crop.

The seed yield increased significantly with the application of nitrogen and phosphorus and it was maximum (25.71 g) per plant at 150:50 kg ha^{-1}. It was followed by the N and P @ 120:50 kg ha^{-1} in which a value of 23.40 g per plant was recorded(Table 2). The results are in conformity with the findings of Sundharaiya *et al*. (2000) in *Solanum khasianum*. High dose of nitrogen was significantly favourable for production of highest number of pods per plant.

From the present investigation it can be concluded that application of N and P @ 150:50 kg ha^{-1} resulted in improving the vegetative and yield characters, thereby enhancing the yield of *Gloriosa superba* L.

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