Plant Archives Vol. 18 No. 1, 2018 pp. 220-222 ***ISSN 0972-5210***

EFFECT OF NITROGEN, PHOSPHORUS AND THEIR INTERACTION ON VEGETATIVE GROWTH AND FLOWER YIELD OF SNAPDRAGON

Somendra Verma[1] and Ashok Kumar*

[1]Ph.D. Scholar, Department of Floriculture & Landscape, Collage of Horticulture & Forestry, Narendra Deva University of Agriculture & Technology, Faizabad-224229 (U.P.) India
*Head, Department of Floriculture & Landscape, Collage of Horticulture & Forestry, Narendra Deva University of Agriculture & Technology, Faizabad-224229 (U.P.) India

Abstract

A field experiment was carried out to study the effect of nitrogen, phosphorus and their interaction on snapdragon at the Main Experiment Station, Department of Floriculture & Landscape, Narendra Deva University of Agriculture & Technology, Narendra Nagar (Kumarganj), Faizabad (U.P.) during winter season in the year 2016-2017. The experiment was conducted in Randomized Block Design (Factorial) with 12 treatment combinations and three replications to assess the effect of nitrogen, phosphorus and their interaction on snapdragon. Results reveal that the application of nitrogen 60 kg per hectare (N_2) proved maximum plant height (33.51cm), plant spread (21.72cm), number of branches/plant (17.70) and yield of spike per hectare (343.39 q) however number of leaves (193.97) was obtained by application of nitrogen 90 kg/ha. Spike initiation and opening of first floret were earliest (107.36 & 121.31 days) in control in both the cases of fertilizers. Application of phosphorus had also responses well on vegetative growth and yield of snapdragon. Phosphorus at 60 kg per hectare resulted maximum plant height (32.14 cm), plant spread (21.3. cm), number of branches per plant (16.88), number of leaves (185.28) and yield of spike per hectare (308.07 q). The interaction effect of nitrogen and phosphorus left significant response only on vegetative growth.

Key Word: Nitrogen, Phosphorus, Snapdragon, Spike, Yield.

Introduction

Snapdragon is an important annual grown in the winter season for garden decoration and production of cut flowers. It is popularly called as snapdragon, dog flower, bunny rabbit or bunny mouth because of its curious shape of flowers, which resemble a dog, rabbit or dragon. It is ideally suited for beds, pots, edging, window boxes, rockery and mixed borders or with herbaceous plants. Snapdragon flowers are used as garland, floral arrangements and in bouquets. The Russians used to cultivate snapdragon is a large scale, extract oil from its seeds which is equal to olive oil. They are used as diuretic, for scurvy, tumor, as detergent and astringent. Snapdragons thrive in cold weather when many flowering plants are still dormant or just emerging. Snapdragons bloom not according to the calendar but according to the temperature. Expect these plants to be happiest when temperatures are between 20 and 80^0F. The flowers come in a wide range of colors from reds, orange, yellow, and maroon. Plants with dark colored flowers have dark green or reddish stems and those with white or pale flowers have pale green stems. Snapdragons may be propagated by seeds, or by cuttings. The seed germinates in 10 to 14 days at 70-degrees F.

Nitrogen is one of the very important major plant nutrients which directly affect the plant growth and flowering behavior. It is constituent of nucleic acid, protoplasm and might have increased carbohydrates synthesis, amino acid etc. from which the phyto-harmones like auxins, gibberellins and cytokinins have been synthesizes resulting plant growth. Very little work has been done on nitrogen requirements of snapdragon. Proper manuring and fertilization is very important for better growth and flowering of the plants. Application of appropriate amount of nitrogen is important as its deficiency causes several abnormalities like over growth and less flowering.

Phosphorus is one of the important elements for plant

***Author for correspondence :** E-mail : akmnduat@yahoo.com.

growth and metabolism. It plays key roles in many plant processes such as energy metabolism, the synthesis of nucleic acid and membranes, photosynthesis, respiration, nitrogen fixation and enzyme regulation. Adequate phosphorus nutrition enhances many aspects of plant development including flowering and root development. Keeping in view the importance of nitrogen and phosphorus on the plant present experiment was conducted to assess the effect of nitrogen, phosphorus and their interaction on snapdragon.

Material and Methods

The present study was under taken at Main Experimental Station, Horticulture, N.D.U.A. & T., Kumarganj, Faizabad (U.P.) India during winter season of 2016- 17. Geographically, it is situated in typical saline alkali belt of Indo-gangetic plains of eastern U.P. at 26.47-0 N latitude, 88.120 E longitudes and at an altitude of 113 meter from mean sea level. The region enjoys sub humid and subtropical climate receiving a mean annual rainfall of about 1215 mm out of which about 85% is concentrated from mid June to end of September. The winter months are cold and dry and occasional frost occurs during this period. The experiment was laid out in Randomized Block Design (factorial) with three replications and twelve treatment combinations either alone or in combination of nitrogen and phosphorus to evaluate the effect of nitrogen and phosphorus on snapdragon. 30 days old seedlings of snapdragon, African mix variety were transplanted at 30 × 20 cm in well prepared seed bed in the month of November. The FYM were mixed with soil at final field preparation. Nitrogen and phosphorus were applied in the form of urea and single superphosphate. Urea was applied in two split doses as first dose applied at the time of transplanting and second dose after 30 days of transplanting, while phosphorus was used in single dose as basal application. Murat of potash (MOP) was applied as recommended dose at the time of final field preparation. Observations were recorded on vegetative characters at bud initiation stage. The obtained data had

Table 1: Effect of nitrogen, phosphorus and their interaction on vegetative growth and flower yield of snapdragon.

Treatments	Plant height (cm)	Plant spread (cm)	No. of branches per plant	No. of leaves /plant	Days taken to opening of first florets	Weight of spikes (g)	Yield of Spike (q)
N_0	27.51	15.27	11.71	146.24	121.31	26.09	154.29
N_1	30.56	16.98	13.73	175.16	123.36	37.67	268.28
N_2	33.51	21.72	17.70	193.91	126.50	45.16	343.39
N_3	32.34	21.39	17.54	193.97	124.49	42.39	295.31
S.Em±	0.59	0.55	0.57	3.63	0.77	0.68	10.15
CD at 5%	1.74	1.61	1.68	10.66	2.25	2.00	29.79
P_0	29.97	16.88	13.58	167.43	122.48	35.50	221.99
P_1	30.83	18.34	15.06	179.25	124.15	37.58	265.90
P_2	32.14	21.30	16.88	185.28	125.12	40.39	308.07
S.Em±	0.51	0.47	0.49	3.15	0.66	0.59	8.79
CD at 5%	1.51	1.39	1.45	9.23	1.95	1.73	25.80
N_0P_0	26.73	14.60	10.67	130.33	119.13	24.47	133.59
N_0P_1	27.27	15.43	11.53	152.93	122.20	25.40	140.75
N_0P_2	28.53	15.77	12.93	155.47	122.60	28.40	188.52
N_1P_0	29.60	16.43	12.93	161.73	122.47	33.60	183.07
N_1P_1	30.53	17.00	13.27	177.27	123.33	37.80	282.40
N_1P_2	31.53	17.50	15.00	186.47	124.27	41.60	339.38
N_2P_0	32.03	18.23	15.60	188.73	124.90	43.27	295.14
N_2P_1	33.57	20.47	13.23	191.80	126.80	44.33	340.67
N_2P_2	34.93	26.47	20.27	201.20	127.80	47.87	394.36
N_3P_0	31.53	18.23	15.13	188.90	123.40	40.67	276.14
N_3P_1	31.93	20.47	18.20	195.00	124.27	42.80	299.78
N_3P_2	33.57	25.47	19.30	198.00	125.80	43.70	310.02
S.Em±	1.03	0.95	1.02				17.59
CD at 5%	NS	2.79	NS	NS	NS	NS	51.60

N=Nitrogen, N_0= 0 kg/ha, N_1=30 kg/ha, N_2=60 kg/ha, N_3=90 kg/ha, P=Phosphorus, P_0=0 kg/ha, P_1=30 kg/ha, P_2=60 kg/ha statistically analyzed adopting procedure as given by Panse and Sukhatme (1985).

Results and Discussion

The statistical analysis of data (table-1) revealed that plant height at first flower bud initiation stage influenced with different treatments. The maximum plant height (33.51 cm), plant spread (21.72 cm) and number of branches per plant (17.70) were obtained with application of nitrogen at 60 kg/ha. Application of higher doses of nitrogen delayed the spike initiation and opening of first floret. However maximum yield of spike (343.39q/ha) was obtained with application of nitrogen at 60 kg/ha. The vegetative growth of plants enhanced with nitrogen application because nitrogen is a very important constituent of nucleic acid, protoplasm and its might have increased carbohydrate synthesis, amino acids etc. from which the phyto- hormones like auxins, gibberellins, cytokines have been synthesized resulting in increased plant growth and yield of flowers. Higher doses of nitrogen could not influence significantly growth and yield of snapdragon. These results are in close conformity with those of Swaroop *et al.* (2007), Sharma *et al.* (2006) and Sreekanth *et al.,* (2008) in marigold, Umrao *et al.,* (2008) in china aster, Kumar and Singh (2011), Dhaked *et al.,* (2013) in calendula and Verma *et al.* (2015) in gladiolus.

The plant height increased significantly influenced with different level of phosphorus. Phosphors at 60 kg/ha exhibited significantly maximum plant height (32.14 cm), plant spread (21.30 cm), number of branches (16.88) and number of leaves per plants (185.28). Application of higher doses of phosphorus delayed the spike initiation and opening of first floret. However maximum yield of spike (308.07q/ha) was obtained with application of phosphorus at 60 kg/ha. Phosphorus governs the root growth and constituent of nuclic acid phytin ATP which plays a vital role in plant for proper growth of plants and ultimately yields of flowers. These results are in close conformity with those of Khan *et al.* (2012) in gladiolus, Chauhan and Kumar (2007) in calendula, Singh *et al.* (2005) and Kadu *et al.* (2009) in tuberose.

The interaction effect between nitrogen and phosphorus was found significant only upto vegetative growth.

References

Chauhan, A. and V. Kumar (2007). Effect of graded levels of nitrogen and VAM on growth and flowering in calendula (*Calendula officinalis* Linn.). *Journal of Ornamental Horticulture,* **10(1)**: 61- 63.

Dhaked, R., S. Chand and R. Srivastava (2013). Effect of spacing and levels of nitrogen on growth, flowering and yield of calendula (*Calendula officinalis*). *Pantnagar Jounral,* **11(3)**: 365-368.

Kadu, A.P., P.R. Kadu and A.S Sable (2009). Effect of nitrogen, phosphorus and potassium on growth, flowering and bulb production in tuberose cv. Single. *Journal Soils and Crops;* **19 (2)**: 367-370.

Khan, F.N., M.M Rahman, A.J. Karim and K.M. Hossain (2012). Effects of nitrogen and potassium on growth and yield of gladiolus corms. *Bangladesh Journal of Agriculture Research,* **37(4)**: 607-616.

Kumar, A. and A.K. Singh (2011). Effect of spacing and nitrogen levels on vegetative growth, flowering behavior and yield of calendula *(Calendula officinalis L.). Plant Archives,* **11(2)**: 941 -944.

Panse, V.G. and P.V. Sukhatme (1985). Statistical methods for agricultural workers. Indian Council of Agricultural Research, New Delhi. 2,197 pp.

Sharma, D.P., M. Patil and N. Gupta (2006). Influence of nitrogen, phosphorus and pinching on vegetative growth and floral attributes in African marigold (*Tagetes ereacta* L.), *Journal of Ornamental Horticulture*, **9(1)**: 25-28.

Singh, S.R.P., Dhiraj Kumar; V.K. Singh and R. Dwivedi (2005). Effect of NPK fertilizers on growth and flowering of tuberose cv. Single *Haryana journal of Horticultural Science,* **1(l/2)**: 84.

Sreekanth, P., M. Padma, R. Chandraskekhar and T.Y. Madhulety (2008). Effect of planting time, spacing and nitrogen levels on growth of African marigold (*Tagetes erecta* L.) cv. Sierra orange, *The Orissa Journal of Horticulture*, **36(1)**: 69-74.

Swaroop, K, D.V.S Raju and K. P. Singh (2007). Effect of nitrogen and phosphorus on growth flowering and seed yield of African marigold variety Pusa Narangi Gainda (*Tagetes erecta* L.). *Orissa Journal of Horticulture,* **35(2)**: 15-20

Umrao, V.K., M. Monish, A.K. Tyagi and F.M. Meena (2008). Effect of nitrogen and phosphorus levels on growth flowering and yield of China aster, *Agricultural Digest,* **28(2)**: 97-100.

Verma, R.P., A. Kumar, S.K. Verma, A. Verma and P.K. Verma (2015). Influence of nitrogen, planting geometry and corm size on vegetative growth and corm and cormel production of gladiolus cv. Nova Lux. *Environmental and Ecology*, **33 (1)**: 199-201.