



ISSN (E): 2277- 7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.03  
TPI 2018; 7(5): 39-41  
© 2018 TPI  
www.thepharmajournal.com  
Received: 10-03-2018  
Accepted: 11-04-2018

**SA Samoon**  
Division of Horticulture,  
Allahabad Agricultural Institute,  
Allahabad, Uttar Pradesh, India

**Neelofar**  
Division of Floriculture,  
Sher-e-Kashmir University of  
Agricultural Sciences and  
Technology of Kashmir,  
Shalimar, Srinagar,  
Jammu and Kashmir, India

**Zaffar Bashir**  
Division of Microbiology,  
Sher-e-Kashmir University of  
Agricultural Sciences and  
Technology of Kashmir,  
Shalimar, Srinagar,  
Jammu and Kashmir, India

**KS Kirad**  
Division of Horticulture,  
Allahabad Agricultural Institute,  
Allahabad, Uttar Pradesh, India

**AA Lone**  
Division of Floriculture,  
Sher-e-Kashmir University of  
Agricultural Sciences and  
Technology of Kashmir,  
Shalimar, Srinagar,  
Jammu and Kashmir, India

**Correspondence**  
**SA Samoon**  
Division of Horticulture,  
Allahabad Agricultural Institute,  
Allahabad, Uttar Pradesh, India

## Effect of nitrogen and phosphorus levels on flowering of calendula (*Calendula officinalis* L) var. touch of red Mixture

SA Samoon, Neelofar, Zaffar Bashir, KS Kirad and AA Lone

### Abstract

An experiment entitled “effect of different levels of nitrogen and phosphorus on Calendula under sub-tropical agro-climatic conditions of Allahabad was carried out during the winter season 2007-2008 with four levels each of nitrogen viz., 0 kg, 100 kg, 150 kg and 200 kg/ha and phosphorus viz., 0 kg, 50 kg, 80 kg, and 110 kg/ha respectively. Nitrogen had a significant effect on floral parameters with nitrogen at 150 kg/ha recording significantly minimum days (64.55) to first flowering and days to 50% flowering (78.16), maximum flower weight (4.48 g/flower), number of flowers per plant (31.66), flower diameter (6.32 cm) and flower yield (136.04 q/ha. Among phosphorus applications significantly minimum numbers of days to first flowering (78.10) were recorded under phosphorus 80 kg/ha. The same treatment recorded significantly maximum flower weight (4.51 g/flower), number of flowers/plant (31.83), flower diameter (6.35 cm) and flower yield (140.8 q/ha). Interaction between nitrogen and phosphorus revealed that N<sub>2</sub> P<sub>2</sub> @ 150 kg N and 80 kg P/ha gave significantly superior results in relation to the flowering parameters which included days to first flowering (62.33), number of flowers per plant (35.77) and flower yield (165.58 q/ha).

**Keywords:** Calendula, nitrogen, phosphorus, flowering parameters, yield

### Introduction

Calendula (*Calendula officinalis* L.) commonly known as pot marigold is one of the most commonly cultivated seasonal flower. It has a long flowering period bearing large yellow or orange, single or double flowers with many petals. Calendula has both medicinal and culinary values. It has soothing effects on Skin complaints such as eczema and itching. The brightly coloured petals are used as a greenish and sparingly in salads. It consists of constituents carotenoids (carotene, calenduline and lycopene), triterpens, pentacyclic, alcohol and flavonoids. Among the primary nutrients (Nitrogen, phosphorus and potassium) are very important. Nitrogen is a major structural part of the cell cytoplasm, important constituent of amino-acids, proteins, purines and pyrimidines and acts as a biological catalyst phosphorus is an essential constituent of majority of enzymes, which are of great importance in carbohydrate and fat metabolism (Das, P.C., 2000) [2]. It stimulates root growth, flowering and helps in fruiting (Singh, A.K. *et al.*, 1991 [7]). According to climatic conditions the area comes under subtropical belt in the South-East of Uttar Pradesh. The soil of the area are sandy loam in texture with slightly alkaline pH, poor in nitrogen and phosphorus but rich in potassium, so the present investigations were carried out with the objectives of.

1. To ascertain the effect of nitrogen and phosphorus on flowering and seed yield of calendula.

### Materials and methods

Investigations were carried out at the horticultural research station of division of horticulture Allahabad Agricultural institute deemed University Allahabad during 2007-2008. The experiment comprised of 4×4 factorial randomized block design with three replications. The treatments consisted of four levels of nitrogen at 0, 100, 150 and 200 kg /ha and four levels of phosphorus at 0, 50, 80 and 110 kg/ha. Potassium as basal dose was applied uniformly at the rate of 90 kg/ha.

Mechanical and chemical analysis of the soil was done before the start of the experiment. Twenty five days old uniform seedlings of calendula var. Touch of red mixture having 3-5 fully opened leaves were transplanted in the main research plot at a distance of 30×30 cm.

Phosphorus and potassium in full dose and 1/3<sup>rd</sup> of nitrogen was applied as basal dose at the time of transplanting, remaining 2/3<sup>rd</sup> quantity of nitrogen was top dressed in two split doses after the 35 and 60 days of transplanting respectively. The observations were recorded on various flowering parameters of calendula and statistical data analysed as per the method of analyses of variance technique.

## Results and discussion

### Days to first flowering

The minimum days required for first flowering were recorded with nitrogen at 150 kg N/ha (64.55 days) followed by (200 kg N/ha i. e (64.97 days). The maximum days (69.33) were however, recorded with control (Table 1).

Similarly, among the different levels of phosphorus at 80 kg p/ha took minimum days for first flowering i. e (165.58 days) and maximum days required for first flowering were recorded with control (68.19 days) (Table 2).

The interaction effect of nitrogen and phosphorus showed that minimum days taken for first flowering (62.33) were recorded with N<sub>2</sub>P<sub>2</sub> (100 kg N/ha + 80 Kg P/ha) and maximum days required for 1<sup>st</sup> flowering were recorded with N<sub>0</sub>P<sub>0</sub> (control) (69.55) (Table 3). the significant influence of nitrogen and phosphorus levels on days to first flowering were in conformity with the findings of in French marigold (Karuppaiah, P. and Krishna, G., 2005) [5].

### Days to 50% flowering

The minimum number of days taken to 50% flowering (78.16) were recorded with 150 kg N/ha and maximum number of days required for 50% flowering i.e. 83.77 days were recorded with control plot (Table 1).

Similarly minimum number of days required to 50% flowering (78.10) were recorded with 80 kg p/ha and maximum number of days required for 50% flowering were recorded with control (81.77 days).

The results are in consonance with the earlier findings of in African Marigold (Baboo, R. and Sharma, K.S.K., 1997) [1].

### Flower weight (g)

Among various nitrogen and phosphorus levels tried N<sub>2</sub> at 150 kg N/ha and P<sub>2</sub>O<sub>5</sub> 80 kg P/ha showed similar trends in increasing the flower weight. Nitrogen at 150 kg N/ha recorded the maximum flower weight (4.48g) and minimum flower weight (3.44 g) was recorded with control.

Similarly maximum flower weight (4.51g) was recorded with P<sub>2</sub>O<sub>5</sub> at 80 kg P/ha and minimum with control (Table 2).

Similar results were earlier obtained by in African marigold (Hameed, A.S. and Sekar, K., 1999) [3].

### Number of flowers per plant

Maximum number of flowers per plant (31.66) were recorded with N<sub>2</sub> 150 kg N/ha followed by N<sub>3</sub> 200 kg N/ha (i.e. 30.33) while minimum number of flowers per plant (22.00) were recorded with control (Table 1).

Similarly among different levels of phosphorus maximum number of flowers per plant (31.83) were recorded with P<sub>2</sub> 80 kg P/ha followed by P<sub>3</sub> 110 kg p/ha (30.17). The minimum number of flowers per plant (24.80) were recorded with control (Table 2).

The highest number of flowers per plant i.e. (35.77) were recorded with N<sub>2</sub>P<sub>2</sub> (150 kg N/ha +80 kg P/ha) followed by N<sub>3</sub> P<sub>2</sub> (34.00) and the lowest number of flowers per plant (19.55) were recorded with control (Table 3).

Findings were in conformity with the findings of in calendula. (Shasidhara, G.R., S. S and Gopinath, G., 2005) [6].

### Flower Diameter

Among nitrogen and phosphorus levels maximum flower diameter of 6.32cm and 6.35 cm was recorded with N<sub>2</sub> (150 kg N/ha) and P<sub>2</sub> (80 kg p/ha) respectively.

Interaction between nitrogen at 150 kg N/ha and phosphorus at 80 kg P/ha produced maximum flower diameter i.e. (6.80cm) (Table 3).

Similar results were obtained by in chrysanthemum (John. A.Q., and Paul, T. M., 1999) [4].

### Flower yield q/ha

Among various nitrogen levels maximum flower yield (136.04 q/ha) was found with N<sub>2</sub> (150 kg N/ha). Among various levels of phosphorus maximum flower yield (140.87 q/ha) was recorded with Phosphorus 80 kg P/ha.

The interaction effect between levels of nitrogen and phosphorus indicated that the highest flower yield /ha (163.58 q/ha) was found with N<sub>2</sub>P<sub>2</sub> (150 kg N/ha + 80 kg P/ha) (Table 3).

Highest flower yield at different levels of Nitrogen and phosphorus were earlier obtained by in African Marigold (Hameed, A.S. and Sekar, K., 1999) [3].

**Table 1:** Effect of different levels of nitrogen, on flowering parameters of Calendula (*Calendula officinalis* L.)

Treatment	Days to 1 <sup>st</sup> flowering	Days to 50% flowering	Flower weight (g)	Number of flowers per plant	Flower diameter	Flower yield (q/ha)
N <sub>0</sub> (0 kg ha <sup>-1</sup> )	69.33	83.77	3.44	22.00	5.53	93.54
N <sub>1</sub> (100kg ha <sup>-1</sup> )	65.55	79.61	4.26	29.61	6.11	127.04
N <sub>2</sub> (150kg ha <sup>-1</sup> )	64.55	78.16	4.48	31.66	6.32	136.04
N <sub>3</sub> (200kg ha <sup>-1</sup> )	64.97	78.69	4.34	30.33	6.16	127.47
CD at 5%	0.28	2.44	0.11	0.24	0.12	2.00

**Table 2:** Effect of different levels of phosphorus, on flowering parameters of Calendula (*Calendula officinalis* L.)

Treatment	Days to 1 <sup>st</sup> flowering	Days to 50% flowering	Flower weight (g)	Number of flowers per plant	Flower diameter	Flower yield (q/ha)
P <sub>0</sub> (0 kg ha <sup>-1</sup> )	68.19	81.77	3.70	24.80	5.82	97.10
P <sub>1</sub> (50kg ha <sup>-1</sup> )	66.25	80.72	4.07	26.80	5.92	118.74
P <sub>2</sub> (80kg ha <sup>-1</sup> )	64.39	78.10	4.51	31.83	6.35	140.81
P <sub>3</sub> (110kg ha <sup>-1</sup> )	65.58	79.64	4.23	30.17	6.03	127.38
CD at 5%	0.28	2.44	0.11	0.24	0.12	2.00

**Table 3:** Interaction effect (N×P) on days to first flowering, days to 50% flowering, flower weight (g) number of flowers per plant, flower diameter (cm) and flower yield (q/ha) of calendula (*Calendula officinalis* L.).

	Days to 1 <sup>st</sup> flowering	Days to 50% flowering	Flower weight (g)	Number of flowers per plant	Flower diameter (cm)	Flower yield (q/ha)
N <sub>0</sub> P <sub>0</sub>	67.55	84.55	3.10	19.55	5.33	52.27
N <sub>0</sub> P <sub>1</sub>	64.44	84.00	3.45	21.33	5.46	104.99
N <sub>0</sub> P <sub>2</sub>	69.00	83.07	3.75	23.77	5.85	110.60
N <sub>0</sub> P <sub>3</sub>	69.33	83.44	3.48	23.33	5.48	106.33
N <sub>1</sub> P <sub>0</sub>	68.89	82.11	3.82	26.00	5.92	112.78
N <sub>1</sub> P <sub>1</sub>	65.22	80.11	4.19	27.55	6.03	119.92
N <sub>1</sub> P <sub>2</sub>	63.55	77.66	4.65	33.77	6.38	144.20
N <sub>1</sub> P <sub>3</sub>	64.55	78.55	4.36	31.11	6.13	131.24
N <sub>2</sub> P <sub>0</sub>	66.67	80.22	4.04	27.44	6.03	113.36
N <sub>2</sub> P <sub>1</sub>	65.11	79.00	4.35	30.22	6.11	128.07
N <sub>2</sub> P <sub>2</sub>	62.33	75.44	4.97	35.77	6.80	165.58
N <sub>2</sub> P <sub>3</sub>	64.11	78.00	4.58	33.22	6.35	139.15
N <sub>3</sub> P <sub>0</sub>	67.67	80.22	3.84	26.22	6.02	109.98
N <sub>3</sub> P <sub>1</sub>	65.22	79.77	4.30	28.11	6.08	121.99
N <sub>3</sub> P <sub>2</sub>	62.67	76.22	4.67	34.00	6.39	145.10
N <sub>3</sub> P <sub>3</sub>	64.33	78.55	4.53	33.00	6.17	132.81
CD at 5%	0.55	-	-	0.48	-	4.01

### References

1. Baboo R, Sharma KSK. Effect of nitrogen and phosphorus on growth and flowering of chrysanthemum. J Orna. Hort. 1997; 5(1-2):28-30.
2. Das PC. In plant nutrients, manures and fertilizers, published by Kalyani publishers, 2000, 12-26.
3. Hameed AS, Sekar K. Effect of graded levels of nitrogen and phosphorus on yield and quality of African marigold (*T. erecta*) South Indian Hort. 1999; 1(6):339-341.
4. John AQ, Paul TM. Response of *Chrysanthemum morifolium* Ramat of different levels of nitrogen and phosphorus. Appl. Biol. Res. 1999; 1:35-38.
5. Karuppaiah P, Krishna G. Response of spacing and nitrogen levels on growth, flowering and yield characters of French marigold (*Tagetes patula* L.). J Orna Hort. 2005; 8(2):96-99.
6. Shasidhara GRSS, Gopinath G. Growth, flowering, yield, quality and economics of calendula, (*Calendula officinalis* L.) as influenced by nutrients and bionoculants. J Orna. Hort. 2005; 8(4):249-253.
7. Singh AK, Tewari GN, Pathak RK, Lodhi AKS. Effect of various levels of nitrogen and phosphorus on flowering of chrysanthemum (*Chrysanthemum morifolium* Ram), Hort. Journal. 1991; 3(1-2):56-58.