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# Adaptability of Exotic Variety of Carnation (*Dianthus Caryophyllus Var. Chabaud*) under Different Doses of Nitrogen

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## Abstract

Nitrogen (N) is said to be an important limiting factor in carnation. A low level of N causes weak stems and stunted plants whereas excess N causes delayed flowering and reduces post harvest quality of flowers. Present experiment was conducted to evaluate the effects of different doses of N on growth and flowering of exotic variety of carnation (*Dianthus caryophyllus var. chabaud*). Pot experiment was carried out at green house in IAAS, Lamjung during November, 2016 to May, 2017 in Completely Randomized Design with five treatments (0 kg, 100kg, 200 kg, 300 kg and 400 kg N/ha) and three replications each. Parameters including plant height, plant width, length of flower stalk, flower width, number of branches, days to flowering and flower number were observed and analyzed using SPSS. Results were found to be significant for all the parameters and revealed that maximum flower number (9.83) was recorded at 400 kg N/ha whereas minimum (2.16) was found in controlled while 100kg, 200kg and 300 kg application were found to be statistically at par. Maximum day to flowering (115) was recorded with control treatment while minimum day to flowering was recorded with 300 kg N/ha and 0kg, 100kg and 200kg were statistically at par. Maximum plant height, length of flower stalk, number of branches and plant width were recorded at the rate of 400 kg N/ha except flower width which was maximum at the rate of 300 kg N/ha and the minimum was recorded in controlled treatment for all parameters. These results suggested that increasing the doses of N has positive effect on most of the growth and flowering attributing parameters while excess N causes delay in flowering.

**Keywords:** Carnation; Growth; Flowering; Nitrogen;

## Introduction

Carnation (*Dianthus caryophyllus*) or clove pink belongs to the family Caryophyllaceae. Carnation is a beautiful and one of the most important commercial cut flower. Excellent keeping quality, wide range of forms and color, ability to withstand for long distance transportation and to rehydrate along with its lighter weight have made carnation a unique item in cut flower trade. In Nepal, it ranks the third most important cut flower [1]. Carnation can be successfully grown in mild temperature (not more than 30ºc). However these flowers can be planted throughout the year in green house. Out of several factors affecting its growth and production, nutrition is one of the most important factor. Carnation is a heavy feeder. In carnation, nitrogen is said to be an important limiting factor as it is needed for both, vegetative as well as reproductive stage of growth. Nitrogen is the most important mineral nutrient requiring for formation and maintenance of plant cells. Low level of N produces stunted plants. Excess nitrogen, on the other hand causes delayed flowering and reduces post harvest quality of flowers. Due to inappropriate and unbalanced use of nitrogen, the yield and quality of carnation flower is poor in Nepal. Therefore, this experiment was undertaken with the objective to increase the production of carnation by optimum application of nitrogen and to determine the suitable dose of nitrogen in growth and flowering of carnation.

## Materials and Methods

The research was conducted in green house within horticulture farm of IAAS, Lamjung campus, Sundarbazar from November, 2016 to May of 2017. Seeds of "Chabaud" variety of carnation were sown in seed trays consisting the media of sand and FYM in the ratio 2:1. Transplanting was done after 7 weeks of sowing. Pot experiment was carried out using media consisting of soil, FYM and sand (3:3:1) in Completely Randomized Design with five treatments (0 kg, 100kg, 200 kg, 300 kg and 400 kg N/ha) and three replications each. Intercultural operations like irrigation and weeding was done as required. Since carnation has the tendency to bend unless supported properly, staking was done. Pinching was done on fifth week after planting. At the date of 5$^{th}$ May, 2017, final data was taken and harvesting was done. Parameters including plant height, flower number, length of flower stalk, numbers of branches, plant width, days to flowering and flower width were observed and analyzed using SPSS (Table 1).

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**Table 1:** Effect of different doses of N on growth parameters

| Treatments | Plant ht (cm) | No of branches | Plant width (cm) | Length of flower stalk |
|---|---|---|---|---|
| 0 kg N/ha | 64.583$^{c}$ | 11.50$^{c}$ | 11.35$^{c}$ | 3.23$^{b}$ |
| 100 kg N/ha | 69.333$^{bc}$ | 18.33$^{bc}$ | 14.05$^{b}$ | 4.45$^{ab}$ |
| 200 kg N/ha | 71.717$^{abc}$ | 21.17$^{abc}$ | 14.05$^{b}$ | 5.16$^{ab}$ |
| 300 kg N/ha | 75.333$^{ab}$ | 22.67$^{ab}$ | 14.35$^{ab}$ | 5.35$^{ab}$ |
| 400 kg N/ha | 79.700$^{a}$ | 29.50$^{a}$ | 16.50$^{a}$ | 7.06$^{a}$ |
| Significance | ** | ** | ** | ** |

Means in column followed by similar letter/s are not significantly different

* = significant at 5% level of significance, ** = significant at 1% level of significance

## Results and Discussion

The results revealed that plant height, number of branches, plant width and length of flower stalk increased significantly with application of successive doses of nitrogen. Maximum value for all the growth parameters was observed when 400 kg N/ha was applied whereas minimum value was found in control treatment.

**Plant height:** Increase in plant height due to nitrogen application may be attributed to the role of N in cell division as well as in protein synthesis which ultimately enhances the vegetative growth [2]. N is a constituent of amino acids, nucleic acid and the building blocks of proteins. These amino acids are then used in forming protoplasm, the site of cell division and plant growth. Similar results were found [3,4].

**Number of branches:** With the nitrogen application, increased vegetative growth resulted in more number of branches per plant. Similar findings were reported by [5] in carnation cv. Crimson.

**Plant width:** The increase in plant spread with nitrogen application might be due to the increase in vegetative growth as nitrogen is component of chlorophyll, which results in more vegetative growth [3].

**Length of flower stalk:** The increase in nitrogen helps in more amount of assimilates that are needed for improvement in length of stalk. This result is in accordance with findings of [6] in chrysanthemum (Table 2).

**Table 2:** Effect of different doses of Nitrogen in flowering of carnation

| Treatments | Days to flowering | Flower number | Flower width (cm) |
|---|---|---|---|
| 0 kg N/ha | 115.0$^{a}$ | 2.16$^{e}$ | 3.85 $^{b}$ |
| 100 kg N/ha | 113.5$^{abc}$ | 4.50$^{bcd}$ | 4.41 $^{b}$ |
| 200 kg N/ha | 112.6$^{ab}$ | 4.67$^{bc}$ | 4.53 $^{b}$ |
| 300 kg N/ha | 102.5$^{e}$ | 6.50$^{b}$ | 5.73 $^{a}$ |
| 400 kg N/ha | 105.3$^{d}$ | 9.83$^{a}$ | 4.83$^{ab}$ |
| Significance | ** | ** | ** |

Means in column followed by similar letter/s are not significantly different.

* = significant at 5% level of significance, ** = significant at 1% level of significance

**Days to flowering:** Observation recorded on days taken to flowering showed that maximum day to flowering was recorded with control treatment while minimum day to flowering was recorded with 300 kg N/ha [7]. Reported that a positive linear relationship was found between N content of leaves and days taken to flowering. However excess N was found to cause delay in flowering. Recorded the delayed spike emergence in tuberose with application of nitrogen and described that delay in spike emergence was due to prolonged vegetative phase.

**Number of flowers:** Number of flowers increased significantly with increasing dose of N with maximum number of flowers when N was applied at 400 kg/ha and minimum in control treatment. With increasing application of N, vegetative growth and metabolism increases. As the photosynthesis of the plant increases, synthesis of dry matter i.e. carbohydrates, proteins, and sugar also increases. Due to increased level of carbohydrate, sufficient nutrient will be supplied to bud resulting more number of flower per plant.

**Flower width:** Flower width improved with increasing level of nitrogen and was maximum at 300 kg N/ha while minimum value for plant width was found in control treatment. The increase in size of flower was due to more cell division and cell enlargement and high availability of metabolites as proteins, amino-acids and nucleoproteins. Similar result was found by [8].

## Conclusion

Considering the superiority in most of the parameters in the study, it showed that with the increasing doses of N fertilizer there is increasing trend in the growth and flowering attributing characters of the carnation. But with excess nitrogen there may be delay in flowering. Hence, above results indicated that for exotic carnation application of 400 kg N $ha^{-1}$ is more productive considering most of the parameters.

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