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Impact of Various Combinations of NPK on the Growth, Yield and Quality Parameters of Rose

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Abstract: A trial was conducted to observe the effect of various combinations of NPK on the performance of rose, during the year 1996-97. The data was recorded and analyzed for plant growth yield and quality attributes. The data recorded in this trail indicates that days to sprouting, number of branches per bush and days to flowering were non-significant. Whereas, all other parameters remained significant with different doses of NPK fertilizers. Maximum flowers per plant (20 Flowers), longest pedicle length (5.85 cm), largest flower size (8.08 cm) and maximum petals per flower (50.38) were recorded in T6 treatment viz. (20-00-12) gm of NPK per plant. Maximum flower duration (4.45 days) and flower vase life (3.08 days) were also recorded in the same treatment.

Key words: Rose, NPK, fertilizer, growth, flower yield, quality

Introduction

Rose (*Rose* spp.) belongs to the family Rosaceae. Rose is figured prominently in literature, art and medicine as well as in horticulture. Roses are the major cut flower of the world. There is a great potential for export of roses in Europe, United States, Middle East and other parts of the world. Pakistan has fetched $ 0.72 million from the export of rose flower during the year 1997-98 (Export Promotion Beurea records). Roses like other perennial plants requires well balanced fertilizer application for optimum flowers production (Feigin *et al*., 1986; Amitabha *et al*., 1989; Iskenderov, 1986). The fertility of soil is always accomplished by nutrients, their proper method and in time application. The other cardinal point, which diminishes the quantity in soil, is the extensive use of exhaustive crops. In Pakistan, the ratio of NPK fertilizer application is very wide (Ahmad and Jalil, 1992) and quite different doses are required for different areas. Gowda *et al*., (1991) also reported greatest number of flower spikes, number of flowers/spike and the longest duration of flowering of *P. tuberosa* with 200 kg N + 75 kg P_2O_5 + 125 kg K_2O/ha. Hazan *et al*. (1994) concluded that lower fertilizer rates are preferable for growing roses in rock wool. No work has been reported regarding the NPK application of roses in this part of the country. Since the application of N, P and K gave best growth, flower yield and quality of rose (Anamika and Lavania, 1990). The present study was, therefore, carried out to determine the effect of various combinations of N, P and K on the flower yield and quality of rose in D.I. Khan, Pakistan which can provide maximum benefit to the growers.

Materials and Methods

The research project was conducted at the Nursery Area of Horticulture Department, Gomel University, D.I. Khan., during the year 1996-97. The experiment was laid out in Randomized Complete Block Design (RCBD) having eight treatments and three replicates. The pot size was 30 cm. There were two plants per treatment and the total number of plants in the whole experiment was 48. One year old saplings of uniform size and age were selected and transplanted on September 23, 1998 in pots filled with potting mixture (Clay + FYM = 2:1). Sources of N, P and K were Urea, Single Super Phosphate (SSP) and Sulphate of Potash (SOP). The fertilizers were applied on November 21, 1998 after pruning at a distance of 10 cm from the trunk of plant and thoroughly incorporated into the soil. The pots were immediately irrigated after fertilizer application. The experiment comprised of 8 treatments viz.

T1 = (Control 00-00-00), T2 = (N 20-00-00), T3 =(P 00-15-00)
T4 = (K 00-00-12), T5 =(NP 20-15-00), T6 =(NK 20-00-12)
T7 = (PK 00-15-12) and T8 = (NPK 20-15-12). The observations on plant growth and flowering characters were recorded. The data were analyzed statistically by using Analysis of Variance Technique (Steel and Torrie, 1980) and the Duncan's Multiple Range Test (Duncan, 1955) at 5% level was used to compare the differences among the different treatment means, using MSTATC software package.

Results and Discussion

Days to sprouting (vegetative bud sprouting): Data recorded on days to sprouting (Table 1) was found non-significant. However, T4 (00-00-12) took maximum days of 102 to sprout followed by T3 (00-15-00) and T5 (20-15-00) taking 101 and 100.7 days to sprouting respectively. 16 (20-00-12) took minimum number of days. i.e, 95.67 days. Its reason may be due to the improved efficiency of the two applied nutrients and their good effects on the sprouting of the vegetative buds. The findings are in agreement to those reported by Iskenderov (1986).

Plant height (cm): T6 (20-00-12) produced maximum height of 57.67 cm followed by T8 (20-15-12) and T3 (00-15-00) with 54.67 cm and 52.53 cm respectively. Minimum plant height of 45.33 cm was measured in T4 (00-00-12), as shown in the Table 1. This might be due to calcareous nature of experimental soil,deficient in organic matter, Nitrogen and medium in Phosphorus. These findings are in line with Uma and Gowda (1987) who obtained maximum plant height in rose plants with the application of highest N and K rates.

Number of branches per bush: Number of branches per plant were not significantly affected by different combination of NPK fertilizers. Among the treatments, T6 (20-00-12) produced maximum branches (4) closely followed by T8 (20-15-12) and T7 (00-15-12) with 3.86 and 3.33 branches. T1 (00-00-00) and T2 (20-00-00) behaved alike having 3 branches each. Similarly

T3 (00-15-00), T4 (00-00-12) and T5 (20-15-00) did not show significant differences to each other by producing 2.66 branches. Anamika and Lavania (1990) investigated that the fertilizer application gave more number of branches per bush (Table 1).

Days to flowering: Data concerning the days to flowering (Table 2) showed that fertilizer treatments N + K, P + K and N + P + K reduced the number of days taken to flowering as compared to the other treatments. Although the results were non-significant but the differences among the treatments were observed.

Table 1: Effect of NPK Fertilizers on the vegetative growth of Rose

Treatments and NPK Dose	Days to Sprouting	Plant Height (cm)	Branches per Bush
Control	99.670$^{N.S}$	45.67 d	3.00$^{N.S}$
T2 20-00-00	99.33	48.67 bed	3.00
13 00-15-00	101.00	48.33 cd	2.66
T4 00-00-12	102.00	45.33 d	2.66
T5 20-15-00	100.70	46.00 d	2.66
T6 20-00-12	95.67	57.67 a	4.00
T7 00-15-12	98.67	52.33 abc	2.33
T8 20-15-12	97.67	54.67 ab	3.66

Means not followed by the same letters are significant at 5% level of probability

Table 2: Effect of NPK Fertilizers on the reproductive growth fo flower yield of Rose

Treatments and NPK Dose	Days to Flowering	Flower per plant	Pedicel Length (cm)
T1 Control	99.67 $^{N.S}$	16.00 b	4.68 be
T2 20-00-00	97.67	16.33 b	4.84 bc
T3 00-15-00	102.70	13.33 c	4.37 c
T4 00-00-12	104.00	13.00 c	4.53 a
T5 20-15-00	101.00	15.67 b	4.64 bc
T6 20-00-12	88.00	20.33 a	5.85 a
T7 00-15-12	93.67	19.33 a	5.09 bc
T8 20-15-12	90.67	20.33 a	5.29 ab

Means not followed by the same letters are significant at 5% level of probability

Table 3: Effect of NPK Fertilizers on flower quality parameters of Rose

Treatments and NPK Dose (g)	Flowers size (cm)	Petals Flower	Flower Weight
T1 Control	6.60 b	45.33 ab	3.93 ab
T2 20-0-0	6.73 b	46.67 a	3.96ab
T3 0-15.0	6.11 b	44.00 ab	3.45 b
T4 0-0-12	6.40 b	39.67 b	3.43 b
T5 20-15-0	6.46 b	44.33 ab	3.47 b
T6 20-0-12	8.08a	50.33a	4.60 a
T7 0-15-12	6.75 b	47.67 a	4.08 ab
T8 20-15-12	7.19 ab	49.00 a	4.18 ab

Means not followed by the same letters are significant at 5% level of probability

Table 4: Effect of NPK Fertilizers on the flower quality parameteres of Rose

Treatments and NPK Dose	Daysto Flower Persistence	Flower Vase Life (Days)
Control	3.54 abc	2.62 abc
T2 20-0-0	3.74 abc	2.62 abc
T3 0-15-0	2.87 c	2.29
T4 0-0-12	3.24 bc	2.33 bc
T5 20-15-0	3.29 bc	2.35 bc
T6 20-0-12	4.45 a	3.08 a
T7 0-15-12	3.87 ab	2.78 ab
T8 20-15-12	3.91 ab	2.97 a

Means not followed by the same letters are significant at 5% level of probability

Treatments receiving (20-00-12) NPK gm per plant produced flowering (88 days) early as compared to other treatments. Whereas T4 (00-00-12) took maximum number of 104 days to flowering. This might be due to the sufficient amount of nutrients in the soil. This means that the fertilizer application may be affected on the number of days to flowering. Similar results were reported by Amitabha *et al*. (1989).

Number of flowers per plant: The treatments T6 (20-00-12) and T8 (20-15-12) produced more number of flowers than other treatments and also behaved alike with 20.33 flowers each, while T7 (00-15-12) was ranked second with 19.33 flowers per plant (Table 2). It is obvious from the results, that by increasing the fertilizer rates will also increase the production of flowers. Similar findings were also observed by Bankar and Mukhopadhyay (1990).

Pedicel length (cm): It is evident from the results that NPK application to the plants had significant effect on the pedicel length of the flowers. Maximum pedicel length was recorded in T6 (20-00-12) i.e, 5.85 cm, while T8 (20-15-12) attained 5.28 cm and T7 (00-15-12) attained 5.09 cm pedicel length. However, treatments T7 (00-15-12), T2 (20-00-00), T1 (control) and T5 (20-15-00) were at par (Table 2). These results might be due to the sufficient nutrients available in the soil.

Flower size (cm): T6 (20-00-12) got the largest flower size of 8.08 cm among all the other treatments followed by T8 (20-1512) with 7.19 cm flower size. Most of the treatments were at par and have flower size more than 6.00 cm. The results are supported by those of Amitabha *et al*. (1989) who studied that 100 g N + 150 g P per 1.44 m^2 plot had a beneficial effect on the flower size.

Number of petals per flower: Comparative study of the treatment means of petals/flower showed significant results. Statistically T6 (20-00-12), T8 (20-15-12) and T7 (00-15-12) treatments were at par and produced more number of petals per flower i.e, 50.33, 49.00 and 47.67 petals respectively. The treatments T1, T3 and T5 were at par and produced nonsignificant results with each other. Minimum number of petals (39.67) were recorded in T4 (00-00-12) and maximum of 50.33 in T6 (20-00-12). It is obvious that number of petals per flower were significantly influenced by the fertilizer application (Table 3).

Flower weight (g): T6 (20-00-12) showed maximum flower weight (4.70 g) followed by T8 (20-15-12) with 4.18 g flower weight. Uma and Gowda (1987) obtained maximum flower weight with the application of N and P as shown in the Table 3.

Days to flower persistence: T6 (20-00-12) had the maximum flowering period of 4.45 days. The mean difference for the flowering period noted in T8 (20-15-12) and T7 (00-15-12) were at par with 3.91 and 3.87 days to flower persistence while T3 (00-15-00) showed minimum days to flower persistence (Table 4). Similar indications were reported by Sutapradia (1989) who observed long flowering duration with the application of fertilizers.

Flower vase life: Comparison of different treatment means revealed that T8 (20-00-12) had the maximum (3.08 days)

vase life. It was followed by T8 (20-15-12) with (2.97 days) and T7 (00-15-12) was ranked third with 2.78 days vase life. Shortest vase life was recorded in T3 (00-15-00) which was 2.29 days. These results may be due to the fact that adequate supply of K ensured and enhanced the quality of the crop. These results have got confirmations with the results obtained by Orlova (1984).

Keeping in view the findings achieved in this project, it is concluded that fertilizer level 20-00-12 is the most suitable for roses specially under the agro-climatic conditions of D.I. Khan. Furthermore, it is a simple research trail to check the response of rose against various fertilizer levels.

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