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Efficacy of varying nitrogen levels on growth, flower yield and leaf N contents of *Rosa Chinensis* cv. Gruss-an-teplitz

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The effects of nitrogen (N) fertilizer (0, 20, 30, 40 and 50 g N plant^{-1}) applied in two splits, first on 1st Mar. 2003, before the onset of flowering and 60 days after application of first dose, on *Rosa chinensis* cv. Gruss-an-teplitz were studied to observe the impact of nitrogen on plant growth, flower production and nitrogen contents in leaves at various stages of flowering as a mean of achieving better management, production and ascertaining nitrogen utilization by plants. Number of leaves plant^{-1}, leaf area, number of flowers and fresh weight of flowers plant^{-1} were maximum with 30 g N plant^{-1} whereas leaf N contents were maximum with 20 g N plant^{-1}. Moreover, number of leaves plant^{-1}, leaf area and leaf N contents were maximum in June whereas number of flowers and fresh weight of flowers plant^{-1} was more in April followed by March as compared to May and June. Nitrogen application @ 30 g N plant^{-1} in April produced maximum flower yield whereas vegetative growth was maximum with same dose of N in June.

Key words: Nitrogen efficiency, *Rosa chinensis*, Gruss-an-teplitz, leaf N % age

INTRODUCTION

Gruss-an-teplitz, locally known as 'Surkha', is one of the few truly red roses of the old garden rose section. Gruss-an-teplitz is usually classified as a Bourbon (old garden rose) but is a mixture of Bourbon, china and Tea. It was hybridized in 1897 by Rudolph Geschwind of Slovakia (then part of the Austro-Hungarian Empire) and is regarded as one of the best Bourbon rose. It is grown in the vicinity of cities on agricultural lands and is a crop of interest for the people due to its long blooming period. In Indo-Pak subcontinent, it is mainly used as cut flower for making garlands and as loose flower on religious occasions, wedding ceremonies and several other social events. But due to poor stalk and flower shape, it is merely used as cut flower for making bouquets.

Roses respond well to well balanced nutrition for maximum production and better growth. Inadequate plant nutrition causes serious disorders in rose cultivation and may eventually lead to decline of plant vigorosity and yield. Nitrogen application not only enhances the vegetative growth but also assists the plant during blooming period to mobilise the processes of flower opening. Flower production can be increased with the increased level of nitrogen (Young *et al.,* 1976, Uma and Gowda, 1986). While Bik (1973) argued that high N application produced more flower number but high K had significant effect on flower yield. The proper amount of compound fertilizer increases yield by enhancing the number and size of flowers. Nitrogen enhances the vegetative growth (Natarajan *et al.*, 1981) and increases flower buds (Kumar and Gill,1983). Nitrogen application and low plant density increases plant height and flower yield (Pal *et al.*, 1985). Whereas, Kumar and Gill (1988) stated that 30 g N application plant^{-1} resulted the maximum flower number and weight of flowers plant^{-1}.

Fertilizer application to one year old budded rose plants at 50, 75 and 100 g N plot^{-1} significantly increased plant height, number of leaves and total number of flowers plant^{-1} (Rajamani and Sundaram, 1997). Flower weight increases with increasing N levels (Yadav *et al.*, 2000) and it has significant effect on growth, dry matter production, flower yield and floral parameters (Halepyati *et al.*, 2001).

The present study was designed to optimize fertilizer requirement for enhancing growth and flower yield of *Rosa chinensis* cv. Gruss-an-teplitz and to ascertain at what stage plants utilize more nitrogen.

MATERIALS AND METHODS

The study was conducted on a loamy soil with a pH value of 7.4 and 1.0% organic matter, in Institute of Horticultural Sciences, University of Agriculture, Faisalabad, during 2003. Prior to this study, annual floricultural crops were grown in the area where the experiment was conducted.

One year old plants of *Rosa chinensis* cv. Gruss-an-teplitz were grown to observe the impact of different levels of nitrogen on various stages of growth and flowering. Prior to commencing the experiment, the plants were pruned to equal height and planted on well-prepared soil during 2nd week of February, 2003. Geometric dimensions in terms of planting distance were 3 ft between plant to plant in the rows 3 ft apart. Randomized complete block design was employed with factorial arrangements having five treatments replicated thrice.

Fig. 1. Leaf Area (cm^2) and leaf N content (%) as influenced by various levels of N.

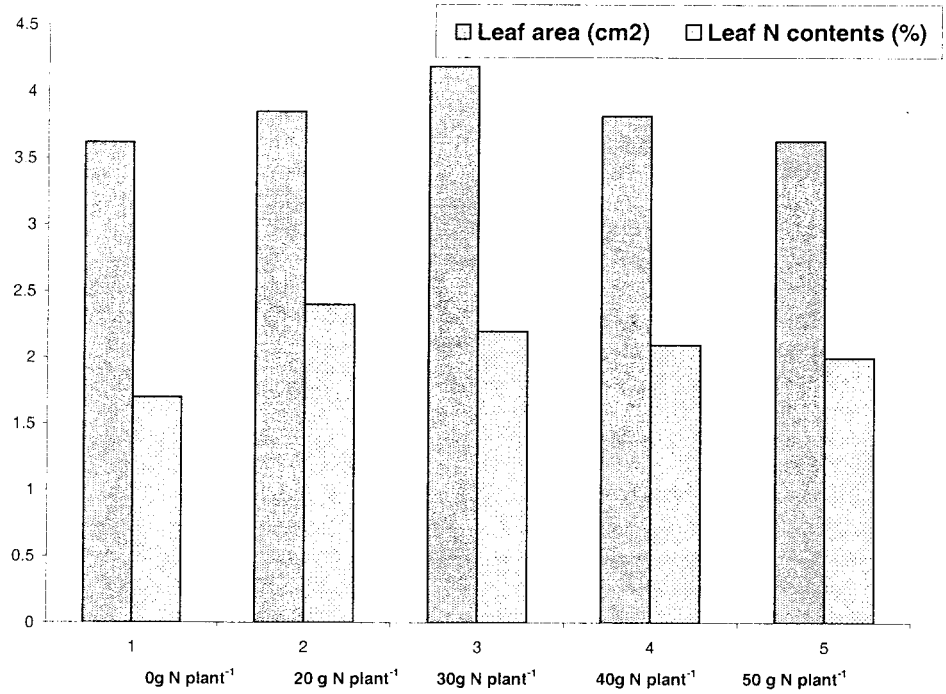


Fig. 2. Number of flowers per plant and fresh weight of flowers per plant as influenced by various levels of N.

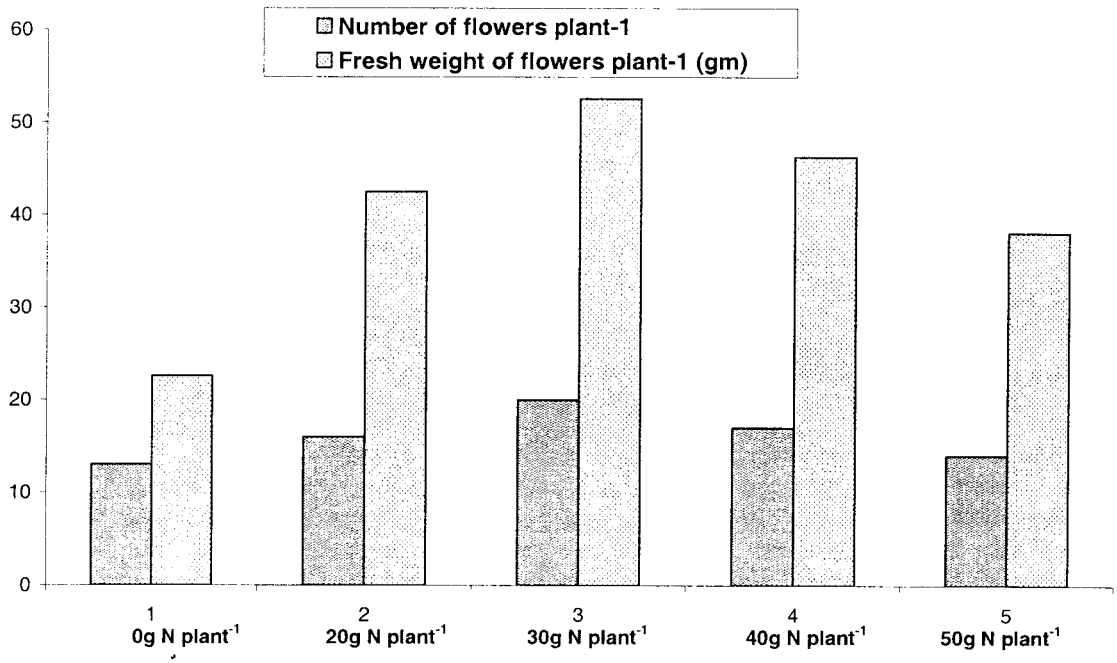


Fig. 3. Leaf area (cm^2) and leaf N contents (%) during March, April, May and June

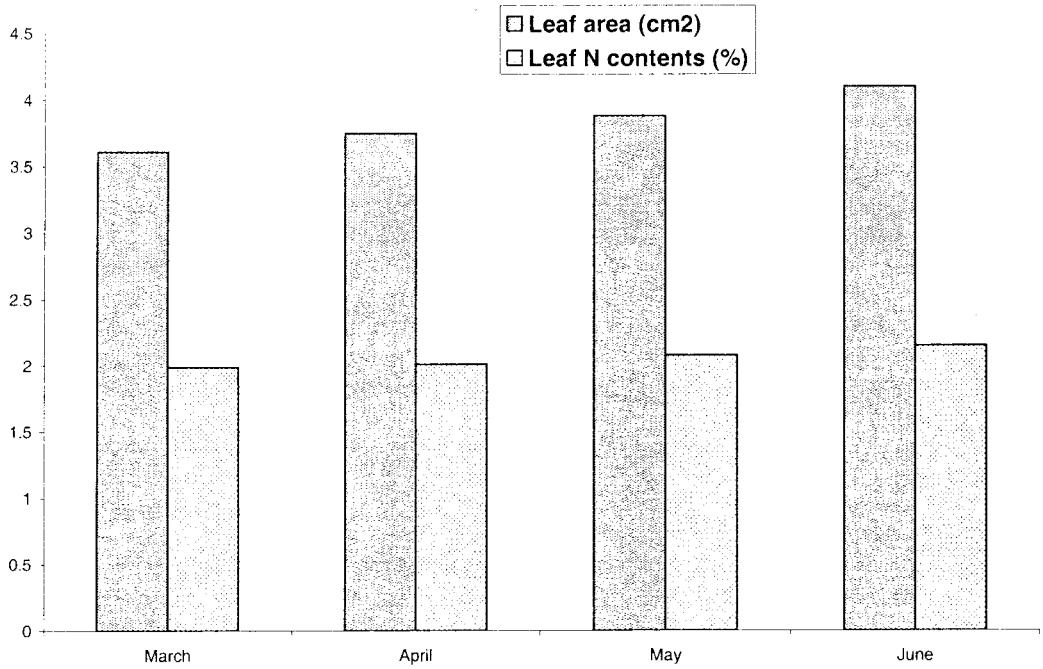


Fig. 4. Number of flowers per plant and fresh weight of flower per plant during March, April, May and June

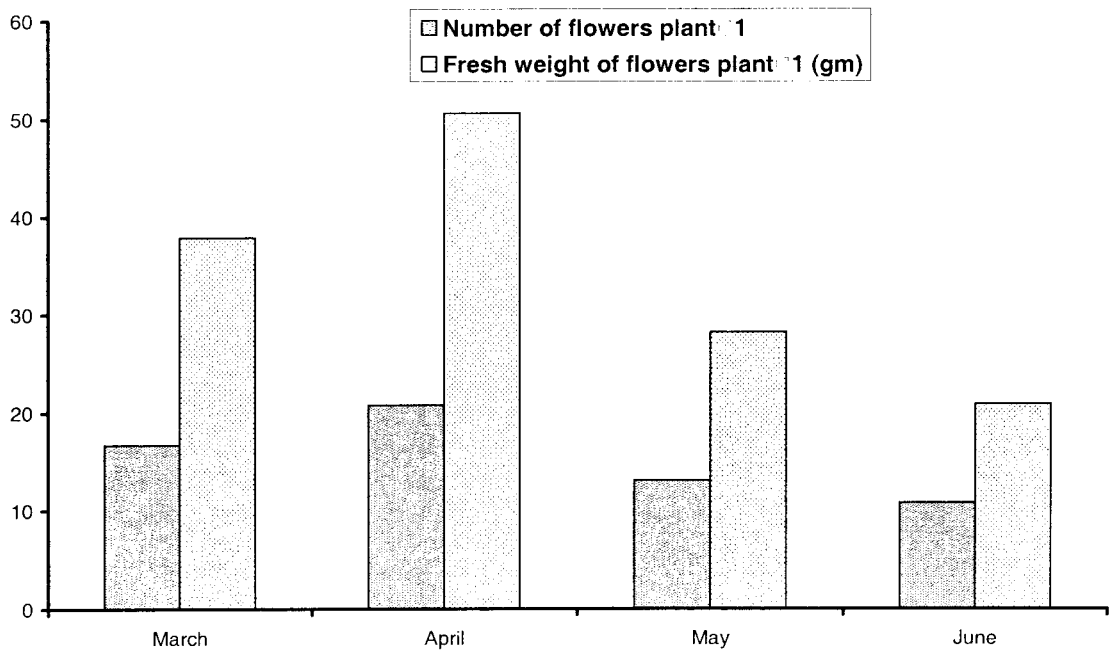
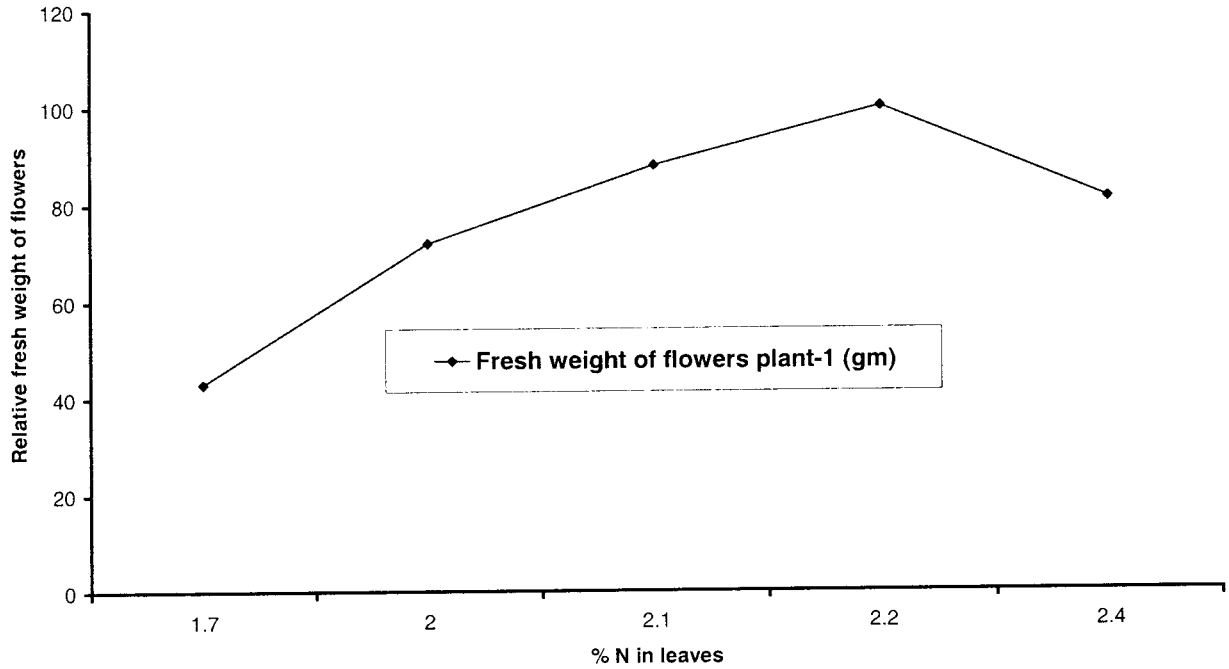


Fig. 5. Relationship of % N in leaves with relative fresh weight of flowers per plant.



Source of nitrogen was urea (46%) applied @ 0, 20, 30, 40 and 50 g N plant^{-1}. Fertilizer treatments were applied in two splits. First half on 1st March, 2002, before the onset of flowering and remaining half was applied 60 days after application of first dose. The fertilizer was applied to individual plants according to the treatments and then thoroughly mixed in the soil followed by irrigation whereas other management practices like irrigation and weeding were same for all treatments during entire period of study.

Plants were allowed to grow and data on different growth and biomass indices of rose were collected for four months from March to June by adopting standard procedures during the conduct of the experiment. Number of leaves and total number of flowers plant^{-1} were calculated by counting. Leaf area was measured with the help of leaf area meter and for leaf N % age, method described by Chapman and Parker (1961) was followed. Fresh weight of flowers plant^{-1} was calculated by weighing total flowers produced by each plant during the experiment on electric balance.

All the data were analyzed statistically and means were separated using Duncan's Multiple Range test at 5% probability level (Steel and Torrie, 1984).

RESULTS AND DISCUSSION

Influence of N on Plant Growth

Number of leaves plant^{-1} revealed that 30 g N plant^{-1} excelled rest of the treatments. Moreover, maximum number of leaves was produced in June followed by May. The increase in number of leaves from April to June might be due to high photosynthetic rate, increase in temperature or less reproductive growth during May and June. Application of 30 g N plant^{-1} exhibited significantly better results in relation to leaf area as compared to other treatments by producing 4.19 cm^2 leaf area. Leaf area was maximum in June followed by May and April. Leaf area was minimum in March as shown in Fig. 3.

Influence of N on Flower Yield

Number of flowers depicted significant superiority of 30 g N plant^{-1} over rest of the treatments as shown in Fig. 2. However, maximum number of flowers plant^{-1} was produced in April followed by March as compared to May and June (Fig. 4).

In case of fresh weight of flowers plant^{-1}, 30 g N plant^{-1} presented its significant supremacy over all other treatments (Fig. 2). *Rosa chinensis* cv. Grus-an-teplitz produced maximum flower weight plant^{-1} in April