

Influence of different NPK levels on the impact of growth and development of Sweet Orange (*Citrus sinensis* Osbeck) plants

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Abstract

The current study, which was conducted at the Fruit Research Farm at Rama University in Kanpur (2019), examined the effects of varying concentrations of nitrogen (N), phosphorus (P₂O₅), and potassium (K₂O) on the growth and development of sweet orange (*Citrus sinensis* Osbeck) plants. The results showed that the best treatments were T3 (350 g/plant Nitrogen, 250 g/plant Phosphorus, and 450 g/plant Potash), T9 (300 g/plant Nitrogen, 250 g/plant Phosphorus, and 500 g/plant Potash), and T12 (300 g/plant Nitrogen, 250 g/plant Phosphorus, and 300 g/plant Potash). The maximum plant height (83.57 cm), maximum number of leaves (421.04), maximum number of branches (26.36), maximum stem diameter (3.04 cm), maximum spread of canopy (42.36 cm), and maximum length of inter-nodes (9.68 cm) were found to be the best.

Keywords: Sweet Orange, Nitrogen, Phosphorus, Potassium and Growth.

Introduction

After mangoes and bananas, citrus fruits are the most popular and widely farmed tropical and subtropical fruits in India. Mandarin (*Citrus sinensis* Osbeck) is grown commercially in several specific regions of the country, such as Sweet Orange in Central India, and is regarded as one of the most important cultivated species among citrus. In terms of area and productivity, this crop is the most dominant citrus variety in India. Applying fertilizers and manures depends on a variety of factors, including the soil, climate, plant age, and location. In Uttar Pradesh, N, P₂O₅ and K₂O are applied @ 850: 600 and 850 g/tree for the crops at the age of 10 years or above old. Nutrition constitutes an important component in the cultivation of all the crops. Citrus groves require 17 essential nutrients for its growth and development. Among these, carbon, oxygen,

hydrogen and part of nitrogen are provided by rain water or air; the remaining nitrogen and rest of the essential nutrients are replenished by soil, irrigation water, organic or synthetic fertilizers

It has endured and continues to enjoy great popularity among low-income and marginal farmers. The majority of farmers continue to cultivate local varieties. The agroclimatic conditions of Allahabad are deficient in suitable cultivars. Therefore, in order to determine the appropriate fertilizer dosage for the area to promote growth, development, and increased productivity, it is necessary to assess the performance of sweet orange grafted plants in the agroclimatic conditions of Allahabad.

MATERIALS AND METHODS

At the experimental field of Rama University, Kanpur (2019), the study examined the effects of varying concentrations of Nitrogen (N), Phosphorus (P₂O₅), and Potassium (K₂O) on the growth and development of Sweet Orange plants in the Kanpur agroclimatic conditions. The whole randomized block design of the experiment included twelve treatments, each of which applied insufficient amounts of potassium (K₂O), phosphorus (P₂O₅), and nitrogen (N). After weeding, the initial fertilizer doses were sprayed. Weeding, watering, pruning, disease and insect control, and other intercultural activities were carried out as needed. Characters' growth and development data were collected correctly. Data were statistically examined with the MSTATC computer application

Treatment Combination

Treatment	Nitrogen (gm)	Phosphorus (gm)	Potassium (gm)
T ₁	300	250	450
T ₂	250	250	450
T ₃	350	250	450
T ₄	400	250	450
T ₅	300	300	450
T ₆	300	400	450
T ₇	300	250	450
T ₈	300	200	450
T ₉	300	250	500

T ₁₀	300	250	550
T ₁₁	300	250	350
T ₁₂	300	250	300

RESULTS AND DISCUSSION

The results of the investigation at 30 days, regarding the growth and development of Sweet Orange have been presented.

The maximum plant height was recorded in T₃{83.57 cm (350 g / plant Nitrogen, 250 g / plant Phosphorus and 450 g / plant Potash)} followed by T₉{79.45 cm (300 g / plant Nitrogen, 250 g / plant Phosphorus and 500 g / plant Potash)}. However minimum plant height was recorded in T₁₂{62.34 cm (300 g / plant Nitrogen, 250g / plant Phosphorus and 300 g / plant Potash)}

The maximum number of leaves was recorded in T₃ {421.04(350 g / plant Nitrogen, 250 g / plant Phosphorus and 450 g / plant Potash)} followed by T₉{418.05 (350 g / plant Nitrogen, 250 g / plant Phosphorus and 450 g / plant Potash)}. However minimum number of leaves was recorded in T₁₂{352.08((300 g / plant Nitrogen, 250 g / plant Phosphorus and 300 g / plant Potash))}.

The maximum number of branches per plant was recorded T₃ {26.36 (350 g / plant Nitrogen, 250 g / plant Phosphorus and 450 g / plant Potash)} followed by T₉{22.54(350 g / plant Nitrogen, 250 g / plant Phosphorus and 450 g / plant Potash)}. However minimum number of branches per plant was recorded in T₁₂{16.45(300 g / plant Nitrogen, 250 g / plant Phosphorus and 300 g / plant Potash)}.

The maximum stem diameter (cm) was recorded in T₂ {3.04 cm ((350 g / plant Nitrogen,

250 g / plant Phosphorus and 450 g / plant Potash}} followed by T₉{2.70 cm (350 g / plant Nitrogen, 250 g / plant Phosphorus and 450 g / plant Potash)}. However minimum stem diameter was recorded in T₄{1.21 cm (300 g / plant Nitrogen, 250 g / plant Phosphorus and 300 g / plant Potash)}.

The maximum spread of canopy(cm) was recorded in T₃ {42.36 cm (350 g / plant Nitrogen, 250 g / plant Phosphorus and 450 g / plant Potash)} followed by T₉{30.06 cm (350 g / plant Nitrogen, 250 g / plant Phosphorus and 450 g / plant Potash)}. However minimum spread of canopy(cm) was recorded in T₁₂{27.74 cm (300 g / plant Nitrogen, 250 g / plant Phosphorus and 300 g / plant Potash)}

The maximum length of inter-nodes (cm) was recorded in T₃ {9.68 cm (350 g / plant Nitrogen, 250 g / plant Phosphorus and 450 g / plant Potash)} followed by T₉{9.50 cm (350 g / plant Nitrogen, 250 g / plant Phosphorus and 450 g / plant Potash)}. However minimum length of inter-nodes (cm) was recorded in T₁₂{7.68 cm (300 g / plant Nitrogen, 250 g / plant Phosphorus and 300 g / plant Potash)}

CONCLUSION

The treatment T₃ (350 g/plant nitrogen, 250 g/plant phosphorus, and 450 g/plant potash) was determined to be the most effective in terms of the maximum plant height (83.57 cm), maximum number of leaves (421.04), maximum number of branches (26.36), maximum stem diameter (3.04 cm), maximum spread of canopy (42.36 cm), maximum length of inter-nodes (9.68 cm), and minimum incidence of disease percentage (1.51%) based on the experimental results obtained during the current investigation.

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