

EFFECT OF DIFFERENT NPK LEVELS AND CHLOROPHYLL CONTENT ON GROWTH AND DEVELOPMENT OF GRAPEFRUIT (CITRUS×PARADISI).

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Abstract

The present investigation entitled Effect of different levels of Nitrogen (N) Phosphorus (P_2O_5) and Potassium (K_2O) on growth and development of **Grapefruit (Citrus×paradisi)** plants were carried out at Agricultural Research Farm, Rama University, Mandhana, Kanpur. The results revealed that the treatment T_2 (850 g / plant Nitrogen, 600 g / plant Phosphorus and 850 g / plant Potash) was found to be the best in terms of maximum plant height (83.57cm), 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 (9.68cm) & maximum in chlorophyll content (4.58 mg/g) followed by treatment T_9 (800 g / plant Nitrogen, 400 g / plant Phosphorus and 500 g / plant Potash) and the minimum was recorded in T_4 (700g / plant Nitrogen, 400g / plant Phosphorus and 400g / plant Potash).

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

Introduction

In India citrus fruits have a prominent place among popular and extensively grown tropical and subtropical fruits after mango and banana in India. **Grapefruit (Citrus×paradisi)** is considered to be one of the most important cultivated species among citrus and is being commercially grown in certain specific region of the country like Sweet Orange in Central India. The crop occupies the first position among the citrus in India with respect to area and production. Manures and fertilizers are applied on the basis of soil, climate, age of plant and location etc. In Uttar Pradesh, N, P_2O_5 and K_2O 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 stood the test of time and is still very popular among the poor and marginal farmers. Majority of farmer are still growing local cultivar. There is lack of suitable cultivars in Allahabad agro-climatic condition. Therefore, there is need to evaluate grafted plants of Sweet

Orange for their performance in Allahabad agro-climatic conditions so the suitable dose of fertilizer can be identified for the region for growth, development and higher productivity.

MATERIALS AND METHODS

The experiment was carried out using Grapefruit plants on different levels of Nitrogen (N) Phosphorus (P_2O_5) and Potassium (K_2O) on growth and development in the Kanpur agro climatic conditions at the experimental field of the Agricultural Research Farm, Rama University, Mandhana, Kanpur. The experimental design was complete randomized block with twelve treatments of the following as inadequate levels of Nitrogen (N) Phosphorus (P_2O_5) and Potassium (K_2O) was applied for all the treatments. The first doses of fertilizers were applied immediately after weeding. Intercultural operations like weeding, irrigation, pruning, disease and insect management were done as per necessary. Data on growth and development characters were taken duly. Data were statistically analyzed using computer MSTATC program.

Treatment Combination

Treatment	Nitrogen (g)	Phosphorus (g)	Potassium (g)
T ₁	900	400	400
T ₂	850	400	400
T ₃	750	400	400
T ₄	700	400	400
T ₅	800	350	400
T ₆	800	400	400
T ₇	800	450	400
T ₈	800	500	400
T ₉	800	400	500
T ₁₀	800	400	450
T ₁₁	800	400	400
T ₁₂	800	400	350

RESULTS AND DISCUSSION

The maximum plant height was recorded in T₂{83.57 cm (850 g / plant Nitrogen, 400 g / plant Phosphorus and 400 g / plant Potash)} followed by T₉{79.45 cm (800 g / plant Nitrogen, 400 g / plant Phosphorus and 500 g / plant Potash)}. However minimum plant height was recorded in T₄{62.34 cm (700 g / plant Nitrogen, 400 g / plant Phosphorus and 400 g / plant Potash)}.

The maximum number of leaves was recorded in T₂ {421.04(850 g / plant Nitrogen, 400

g / plant Phosphorus and 400 g / plant Potash)} followed by T_9 {418.05 (800 g / plant Nitrogen, 400 g / plant Phosphorus and 500 g / plant Potash)}. However minimum number of leaves was recorded in T_4 {352.08 (700 g / plant Nitrogen, 400 g / plant Phosphorus and 400 g / plant Potash)}.

The maximum number of branches per plant was recorded T_2 {26.36 (850 g / plant Nitrogen, 400 g / plant Phosphorus and 400 g / plant Potash)} followed by T_9 {22.54 (800 g / plant Nitrogen, 400 g / plant Phosphorus and 500 g / plant Potash)}. However minimum number of branches per plant was recorded in T_4 {16.45 (700 g / plant Nitrogen, 400 g / plant Phosphorus and 400 g / plant Potash)}.

The maximum stem diameter (cm) was recorded in T_2 {3.04 cm (850 g / plant Nitrogen, 400 g / plant Phosphorus and 400 g / plant Potash)} followed by T_9 {2.70 cm (800 g / plant Nitrogen, 400 g / plant Phosphorus and 500 g / plant Potash)}. However minimum stem diameter was recorded in T_4 {1.21 cm (700 g / plant Nitrogen, 400 g / plant Phosphorus and 400 g / plant Potash)}.

The maximum spread of canopy (cm) was recorded in T_2 {42.36 cm (850 g / plant Nitrogen, 400 g / plant Phosphorus and 400 g / plant Potash)} followed by T_9 {30.06 cm (800 g / plant Nitrogen, 400 g / plant Phosphorus and 500 g / plant Potash)}. However minimum spread of canopy (cm) was recorded in T_4 {27.74 cm (700 g / plant Nitrogen, 400 g / plant Phosphorus and 400 g / plant Potash)}.

The maximum length of inter-nodes (cm) was recorded in T_2 {9.68 cm (850 g / plant Nitrogen, 400 g / plant Phosphorus and 400 g / plant Potash)} followed by T_9 {9.50 cm (800 g / plant Nitrogen, 400 g / plant Phosphorus and 500 g / plant Potash)}. However minimum length of inter-nodes (cm) was recorded in T_4 {7.68 cm (700 g / plant Nitrogen, 400 g / plant Phosphorus and 400 g / plant Potash)}.

The maximum Chlorophyll content (mg/g) was recorded in T_2 {4.58 mg/g (850 g / plant Nitrogen, 400 g / plant Phosphorus and 400 g / plant Potash)} followed by T_9 {4.20 mg/g (800 g / plant Nitrogen, 400 g / plant Phosphorus and 500 g / plant Potash)}. However minimum length of inter-nodes (cm) was recorded in T_4 {1.75 mg/g (700 g / plant Nitrogen, 400 g / plant Phosphorus and 400 g / plant Potash)}.

	Plant Height(cm)	No. of Leave	No. of Branches	Stem Diameter(cm)	Spread of Canopy(cm)	Length of Internode(cm)	Chlorophyll Content (mg/g)
Treatments							
T1	75.70	367.50	17.45	2.47	29.90	7.90	3.47

T2	83.57	421.04	26.36	3.04	42.36	9.68	4.58
T3	64.45	400.91	18.63	1.98	27.98	8.10	2.52
T4	62.34	352.08	16.45	1.21	27.74	7.68	1.75
T5	70.50	386.87	20.28	2.80	28.54	9.47	3.91
T6	74.32	357.98	19.57	1.60	28.00	8.86	2.15
T7	72.62	410.90	18.56	1.98	29.50	9.23	3.21
T8	66.57	374.69	17.1	2.12	28.34	7.80	2.81
T9	79.45	418.05	22.54	2.70	30.06	9.50	4.20
T10	68.89	394.63	21.07	2.36	29.40	7.98	2.95
T11	67.90	378.59	18.5	1.58	29.86	8.12	3.80
T12	65.09	405.80	19.43	1.86	28.76	9.30	2.30

Table No.1: Effect of different NPK levels and Chlorophyll content on growth and development of Grapefruit (*Citrus×paradisi*).

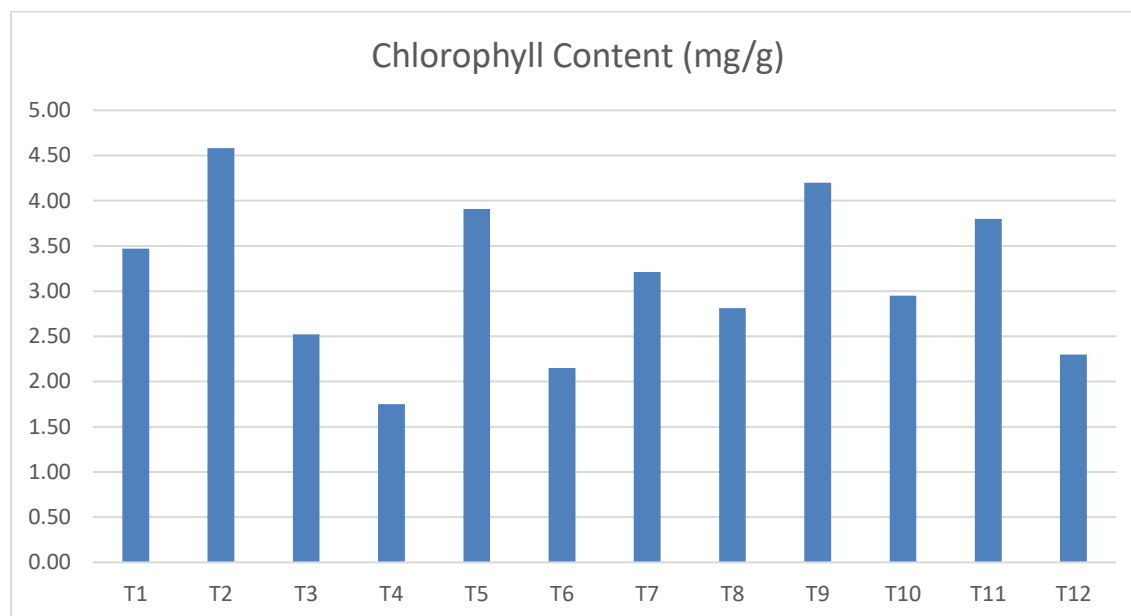


Fig No.- 1 Effect of different NPK levels and Chlorophyll content on growth and development of Grapefruit (*Citrus×paradisi*) plants

CONCLUSION

In view of the experimental results obtained during the present investigation, the treatment T₂ (850 g / plant Nitrogen, 400 g / plant Phosphorus and 400 g / plant Potash) was found to be the best in terms of 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 %) & in chlorophyll content (4.59 mg/g)

REFERENCES

- Abou Sayed-Ahmed, T. A., Al-Ashkar, R. A., El-Mashad, L. A. and Bdr El-Deen, A. R. (2005).** Comparative study of some integrated weed control treatments on Washington navel orange trees and associated weeds. *Zagazig Journal Agriculture Research (Egypt)*. 32: 35–56.
- Albrigo, L.G. (2002).** Foliar uptake of N-P-K sources and urea biuret tolerance in citrus. *Acta Hort.*, 594: 627–633.
- Amir-Shapira, D.; Goldschmidt, E.E.; Altman (1987), A.** Chlorophyll catabolism in senescing plant tissues: In vivo breakdown intermediates suggest different degradative pathways for citrus fruit and parsley leaves. *Proceedings of the National Academy of Sciences of the United States of America, Washington*, v.84, n.7, p.1901-1905, 1987
- Barakat, M.R., Yehia, T. A. and Sayed, B.M. (2012).** Response of Newhall navel orange to bio-organic fertilization under newly reclaimed area conditions I : Vegetative growth and nutritional status. *J. Horticultural Science and Ornamental Plants* 4(1): 18-25.
- Bihari, M. and Surya, Narayan. (2009).** Infestation of *Phyllocnistis citrella* in citrus. *Ann. Pl. Protec. Sci.*, 17: 488-489.
- Dalal, N. R. Gohil, S. N. Shaik, N. B. and Gaikwad, B. T. (2009)** Standardization of time for N and K fertilizer application in sweet orange. *Asian J. Horti.*, 4(1): 116-118.
- Dheware, R. M. and Waghmare, M. S. (2009).** Influence of organic-inorganic and biofertilizers and their interactions on flowering and fruit set of sweet orange (*Citrus sinensis* Osbeck L.). *Asian J. Horti.*, 4(1): 194-197.
- Dheware, R. M. Gajbhiye, R. P. Munde, G. R. Gawai, M. P. and Patil, V. O. K. (2010).** Influence of organic, inorganic and biofertilizers on fruit yield of sweet orange. *J. MH. Agri. Univ.*, 35(2): 313-314.
- Etebu, E. and Nwauzoma, A. B. (2014).** A review on sweet orange (*Citrus Sinensis* Osbeck): health, diseases, and management. *American J. Res. Communication*, 2(2): 33-70.