



Impact of Major Mineral Nutrients on Fruit Quality Aspects of Papaya (*Carica papaya* L.)

Bindu B

Krishi Vigyan Kendra, Kollam, Kerala Agricultural University

Abstract

Papaya has gained commercial importance over the years because of its varied uses ; mainly for table purpose. The present experiment was undertaken to study the influence of major plant nutrients viz.,nitrogen, phosphorus and potassium on fruit quality of papaya. Three different levels of nitrogen, phosphorus and potassium (200, 250 and 300) gram per plant per year were applied to papaya plants at two month interval in six equal split doses. The trial was conducted in 3³ confounded factorial RBD, confounding NPK in replication-1 and NP²K² in replication-2. Results revealed that balanced nutrition had a positive effect on fruit quality characters of papaya.

Keywords - Papaya, Fruit, Acidity, Total sugar, Carotenoids

I. INTRODUCTION

Papaya is an ideal fruit for processing due to year round production and availability of fruits at cheaper rates. It is usually grown as a homestead crop in Kerala .In recent years isolated attempts have been made by some progressive farmers for commercial cultivation. The major production constraint encountered in papaya is difficulty in maximizing yield with unit time. Balanced nutrition plays a vital role on plant growth, yield and fruit quality. Papaya is very responsive to the application of inorganic fertilizers along with organic manures. As the export of papaya from India is rapidly increasing in the recent past, there is a pressing need to improve the fruit quality. Hence the present experiment was carried out to study the response of balanced nutrition on fruit quality attributes of papaya.

II. EXPERIMENTAL DETAILS

The present trial was conducted using papaya variety CO-2 at College of Agriculture, Vellayani, Thiruvananthapuram . The trial was designed in 3³ confounded factorial Randomized Block Design; confounding NPK in replication-1 and NP²K² in replication-2. Three different levels of nitrogen (200 (n₀), 250 (n₁), 300(n₂) gram per plant per year), phosphorus (200(p₀), 250 (p₁), 300 (p₂) gram per plant per year) and potassium (300 (k₀), 400 (k₁), 500 (k₂) gram per plant per year) were applied to papaya plants in six equal split doses at two months interval. The treatments involved 27 different combinations of N, P and K at different levels and control. Soil samples from the experimental area were analysed before and after experiment for available nitrogen, phosphorus and potassium [1],[2]. N, P and K content of leaf petioles were also assessed[3],[4]. Quality characters like Total soluble solids, acidity [5], total carotenoids [6] , ascorbic acid content[7] , total sugars, reducing sugars, non reducing sugars , colour of peel and pulp, firmness of pulp, organoleptic qualities and shelf life of fruits were noted.

III. RESULTS AND DISCUSSION

Among the major nutrients potassium at 500g plant⁻¹ had a positive effect on TSS of fruits. Nitrogen at 200 g plant⁻¹, phosphorus at 250 g plant⁻¹ had produced fruits of low acidity, while potassium did not significantly influenced. The combination of 200 g plant⁻¹ Nitrogen, 300 g plant⁻¹ phosphorus and 500g plant⁻¹ potassium was found to increase the carotenoid content. While different levels of Nitrogen, phosphorus and potassium did not markedly influence the ascorbic acid content(Table1)

Table 1. Effect of Nitrogen, Phosphorus and Potassium on Fruit Quality Attributes of Papaya

Treatments	TSS (per cent)	Acidity (per cent)	Total Carotenoids (mg100g ⁻¹)	Ascorbic Acid (mg100g ⁻¹)
T1 (n ₀ p ₀ k ₀)	11.60	0.13	2.17	41.85
T2 (n ₀ p ₀ k ₁)	10.63	0.26	2.56	38.85
T3 (n ₀ p ₀ k ₂)	13.84	0.23	1.52	42.75
T4 (n ₀ p ₁ k ₀)	10.80	0.20	2.13	40.40
T5 (n ₀ p ₁ k ₁)	10.76	0.22	2.33	40.55
T6 (n ₀ p ₁ k ₂)	14.43	0.19	2.54	42.28
T7 (n ₀ p ₂ k ₀)	13.92	0.26	1.28	43.80
T8 (n ₀ p ₂ k ₁)	12.41	0.13	2.31	39.35
T9 (n ₀ p ₂ k ₂)	16.67	0.07	3.73	51.65
T10 (n ₁ p ₀ k ₀)	14.80	0.24	1.80	47.56
T11 (n ₁ p ₀ k ₁)	11.70	0.29	2.93	41.85
T12 (n ₁ p ₀ k ₂)	12.00	0.36	1.62	44.55
T13 (n ₁ p ₁ k ₀)	12.70	0.18	1.85	36.70
T14 (n ₁ p ₁ k ₁)	10.82	0.20	1.62	43.45
T15 (n ₁ p ₁ k ₂)	14.98	0.33	3.10	42.90
T16 (n ₁ p ₂ k ₀)	12.65	0.31	1.61	44.95
T17 (n ₁ p ₂ k ₁)	12.46	0.23	2.02	39.25
T18 (n ₁ p ₂ k ₂)	10.02	0.34	2.44	48.92
T19 (n ₂ p ₀ k ₀)	12.25	0.34	1.79	41.67
T20 (n ₂ p ₀ k ₁)	10.02	0.22	2.35	44.65
T21 (n ₂ p ₀ k ₂)	15.21	0.21	2.60	41.25
T22 (n ₂ p ₁ k ₀)	11.43	0.10	2.20	41.20
T23 (n ₂ p ₁ k ₁)	12.50	0.29	2.57	47.45
T24 (n ₂ p ₁ k ₂)	11.57	0.11	1.61	41.20

T25 (n ₂ p ₂ k ₀)	12.32	0.15	2.53	45.91
T26 (n ₂ p ₂ k ₁)	9.91	0.24	2.11	39.25
T27 (n ₂ p ₂ k ₂)	13.00	0.15	1.86	47.20
Control	7.48	0.43	0.76	31.75
CD (0.05)	NS	0.08	0.71	NS

Nitrogen at 200 g plant⁻¹, phosphorus at 250 g plant⁻¹ and potassium at 500g plant⁻¹ was found to increase total sugar content of fruits. Main effect of 200 g plant⁻¹ of Nitrogen, 300 g plant⁻¹ of phosphorus and 500g plant⁻¹ of potassium and their interaction increased reducing sugars in papaya fruits. In general the treatments did not increase the non reducing sugar content (Table 2.).

Table 2. Effect of Nitrogen, Phosphorus and Potassium on Sugar Content of Papaya

Treatments	Total Sugars (per cent)	Reducing Sugars (per cent)	Non Reducing Sugars (per cent)
T1 (n ₀ p ₀ k ₀)	12.25	10.38	1.87
T2 (n ₀ p ₀ k ₁)	10.60	8.60	2.00
T3 (n ₀ p ₀ k ₂)	14.55	11.72	2.83
T4 (n ₀ p ₁ k ₀)	8.73	7.24	1.49
T5 (n ₀ p ₁ k ₁)	9.73	7.31	2.42
T6 (n ₀ p ₁ k ₂)	14.25	12.66	1.59
T7 (n ₀ p ₂ k ₀)	10.88	8.87	2.01
T8 (n ₀ p ₂ k ₁)	11.43	9.45	1.98
T9 (n ₀ p ₂ k ₂)	15.41	13.85	1.56
T10 (n ₁ p ₀ k ₀)	12.68	9.71	2.97
T11 (n ₁ p ₀ k ₁)	8.29	5.09	3.20
T12 (n ₁ p ₀ k ₂)	13.70	12.05	1.65
T13 (n ₁ p ₁ k ₀)	12.15	10.85	1.30
T14 (n ₁ p ₁ k ₁)	7.70	6.40	1.30
T15 (n ₁ p ₁ k ₂)	11.03	9.20	1.83
T16 (n ₁ p ₂ k ₀)	8.59	6.55	2.04
T17 (n ₁ p ₂ k ₁)	11.42	9.55	1.87
T18 (n ₁ p ₂ k ₂)	12.85	10.05	2.80
T19 (n ₂ p ₀ k ₀)	8.33	7.00	1.33
T20 (n ₂ p ₀ k ₁)	11.26	9.05	2.21
T21 (n ₂ p ₀ k ₂)	12.70	10.20	2.50

T22 (n ₂ p ₁ k ₀)	10.50	8.39	2.11
T23 (n ₂ p ₁ k ₁)	9.92	7.55	2.30
T24 (n ₂ p ₁ k ₂)	13.30	12.05	1.25
T25 (n ₂ p ₂ k ₀)	9.56	8.35	1.21
T26 (n ₂ p ₂ k ₁)	8.63	6.35	2.28
T27 (n ₂ p ₂ k ₂)	13.45	11.70	1.75
Control	5.65	4.35	1.30
CD (0.05)	0.47	0.23	NS

In general the combination of 200 g plant⁻¹ Nitrogen, 300g plant⁻¹ phosphorus and 500 g plant⁻¹ potassium was found to increase the organoleptic qualities of the fruits. Most of the treatments had light yellow peel colour, orange pulp colour and firm flesh. Nitrogen at 200g, phosphorus at 250 g and potassium at 500 g plant⁻¹ was found to increase shelf life of fruits.

IV. CONCLUSION

Over all assessment indicated that application of N,P and K at the rate of 250 : 250 : 500 g plant⁻¹ year⁻¹ in six equal splits improved fruit qualities of papaya.

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