Research findings

I Effect of potassium nutrition on growth, yield and quality of papaya

This report is based on the IPI - Tamil Nadu Agricultural University, Horticultural College & Research Institute project conducted in Coimbatore, Periyakulam, Tamil Nadu, India.

Potassium Nutrition of Papaya

The effect of potash fertilizer on the growth, yield and quality of papaya fruits (cultivars Co-2 and Co-7) and latex (cultivar Co-2) has been investigated by Kumar *et al.* The study was carried out during 2004-05 in India in Tamil Nadu using four locations in farmers' fields. Four treatments with increasing levels of potash were applied: 300:300:0; 300:300:150; 300:300:300 and 300:300:450 g $N:P_2O_5:K_2O$/plant/year.

General effects on growth

Tree growth parameters were assessed at the first flowering phase, a critical one influencing the yield of papaya. Stem girth was not affected significantly by K nutrition at three of the four locations, but at the other, K exerted a significant detrimental influence such that the greater the K supply, the lesser was the stem girth. This negative effect of K might possibly have been associated with the high availability of N in the soil as excess 'N' is known to decrease trunk diameter and also plant height at the flowering phase.

The continuous production of vegetative growth, flowering and fruiting is a characteristic of Papaya so that for papaya plants a high number of leaves as well as a high leaf surface area are important criteria in assessment of plant vigour. In this investigation, leaf number was significantly increased by K nutrition at two locations while the same was true for leaf area only at one site. A high number of leaves and leaves with a high surface area enhance the production of photosynthates and the synthesis of large quantities of metabolites during growth and development.

Fruit growth and quality

Fruit weight of Papaya, which is a very important economic character as far as marketing is concerned, was significantly influenced by K nutrition at all four locations. In general, an increase in K supply was accompanied by an increase in fruit weight up to K_{300} (Fig. 1). However, with the variety Co-7, maximum fruit weight was observed with 450 g K_2O/plant/year, this variation in response to K being attributed to varietal difference. With an increase in K rates up to $K_{150-300}$, there was also a corresponding increase in the number of fruits per plant at three of the locations, although the effect was non-significant.

Latex tapping in Tamil Nadu. Photo by V. Nosov.

Fruit yield per plant as well as fruit yield per hectare was significantly influenced by K nutrition as revealed in the findings from three sites. The general trend was that fruit yield rose with the increased rate of K application up to K_{300} and then declined (Fig. 1). The exception, the Co-7 variety responded to K fertilization up to highest rate of application. These findings have been interpreted that fertilization with K not only resulted in a higher uptake of K but also increased the availability of other nutrients in the soil, leading to optimum vegetative growth, enhanced uptake of nutrients, with the promotion of photoassimilation and translocation of assimilates from source to sink, the result of which was reflected by increased fruit yields.

K nutrition significantly affected pulp thickness of papaya fruits in all the locations (the maximum being with K_{300} in three sites and with K_{450} in one location). This increase in pulp thickness may be related to the role of K in influencing the developing fruit which acts as a stronger sink for K than for other nutrients. It may also relate, as discussed

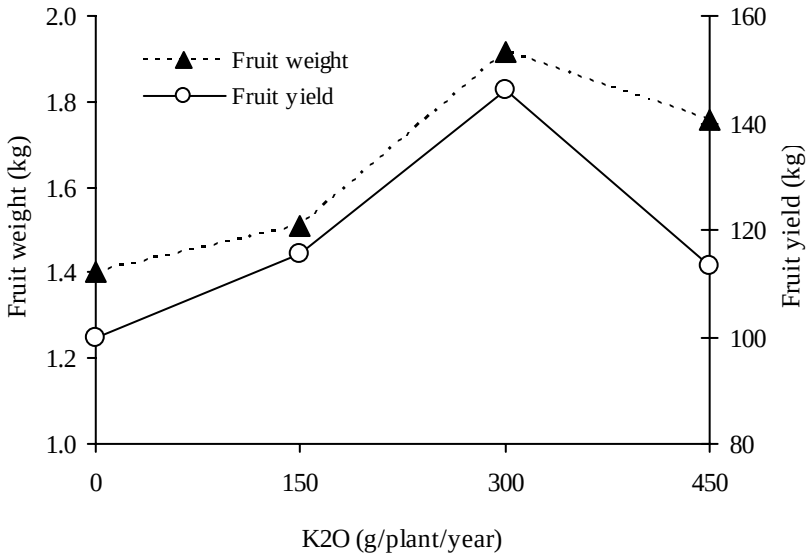


Fig. 1. Effect of K application on fruit weight and fruit yield per plant in papaya (average for four locations).

Research findings

earlier, to the greater number of leaves with a higher surface area that are produced at higher levels of K nutrition, which enable efficient transfer of K from source to sink, in the development of fruit with thicker flesh.

The sweetness of papaya, mainly assessed by TSS (total soluble solids) content, was found to be significantly influenced by K. At all the locations, an increase in the level of K application resulted in a substantial increase in TSS content. Potassium is known to promote sugar translocation in plants, thus its application increased the sugar content as well as TSS in the papaya fruit. Acidity is another important fruit quality trait and should be at its minimum value during ripening. At three locations, the acidity content significantly decreased with increase in K supply.

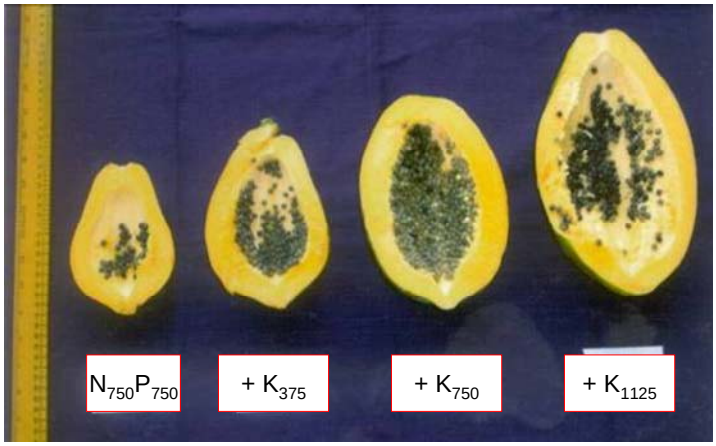
Latex yield and quality

No definite trend was observed on the effect of K application on latex yield, as recorded at the two sites investigated (Table 1). This lack of response may possibly have been due to the inherent problems at field level in tapping the latex at fixed intervals. On the other hand, however, the quality of latex assessed in terms of increased quantity of TSS was raised by increased potash fertilization as revealed in both locations. This finding is of particular interest since TSS content is an important quality criterion by which the latex procuring industries make payments to growers. Additionally this work appears to be the first recorded evidence of a positive effect of K on the quality of papaya latex.

Reference

Kumar, N., Meenakshi, N., Suresh, J. and Nosov, V., 2006. Effect of potassium nutrition on growth, yield and quality of papaya (*Carica papaya* L.). Indian Journal of Fertilizers, 2 (4): 43-47. Go to IPI web site.

Edited by E. A. Kirkby.

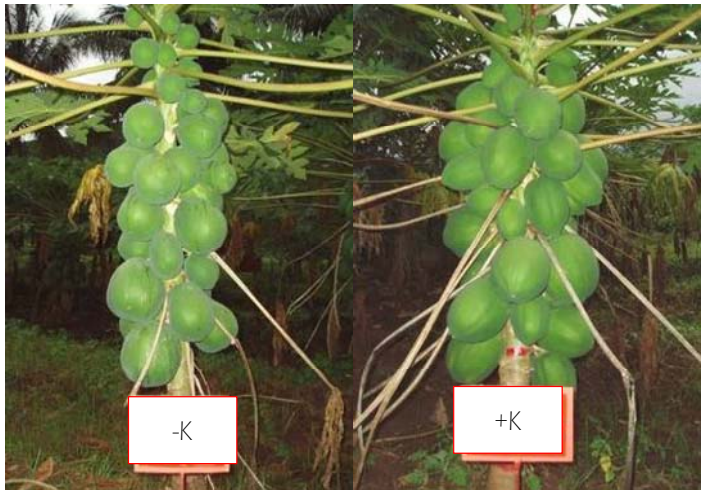


Potassium effect on size of fruit and yield of papaya. IPI-TNAU project in Vadipatti, Theni district, Tamil Nadu, India. The pictures and more are also available on IPI's K Gallery (http://www.ipipotash.org/k-center/detail.php?i=11). Photo by V. Nosov.

K_2O, g/plant/year	Total latex yield (kg/plot*)		TSS of the latex (°Brix)	
	A	B	A	B
0	181.23	32.00	16.70 ± 0.07	15.84 ± 0.11
150	181.00	36.60	16.83 ± 0.04	15.76 ± 0.10
300	155.22	35.00	16.91 ± 0.08	16.62 ± 0.10
450	137.40	34.10	17.00 ± 0.06	16.80 ± 0.10

* 1,000 sq.m; A - Chandrapuram, B - Thondamuthur.

Table 1. Effect of potassium application on the latex yield and its quality in papaya.



Effect of potassium on number of and size of papaya fruit. Photo by V. Nosov.