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Module 4.6-3 Optimal nitrogen and potassium rates balance banana yield and quality in Guangdong.

Unlike most other crops, banana requires more potassium (K) than nitrogen (N) to achieve high yield and quality. Not only the fertilizer quantity, but also the ratio of K to N in the fertilizer program significantly affects banana growth and yield. Right rates in combination with right ratio of K to N are crucial in banana production.

Experimental design: A field experiment was conducted in Guangdong province of south China to test effects of different rates and ratios of N and K fertilizers on banana growth, yield and quality. The experiments consisted of four N rates (0, 228, 555, and 833 kg N/ha), and four K rates (0, 306, 611, and 917 kg K_2O/ha). These treatments received the same P rate of 167 kg P_2O_5/ha. The sources of fertilizers were urea for N, single superphosphate for P and potassium chloride for K. The fertilizer applications were split into seven times, including one basal application, three topdressings during the vegetative period and three topdressings during the reproductive period. The basal fertilizers were incorporated into the soil at soil bed preparation; the topdress fertilizers were banded during the vegetative growth and hill-applied with irrigation during the reproductive growth. Budding rates were measured in the reproductive period; fruit yield and quality traits were determined after harvest.

Results: At the same K levels, banana yield increased with an increase in N rates up to 555 kg N/ha (**Table 1**). Similarly, at the same N level, banana yield increased with an increase in K rates up to 611 kg K_2O/ha. The combined optimal N and K rates produced the highest fruit yield and profit. However, the quality trait – soluble sugar – responded differently to N than to K. The omission of N reduced quality, but the omission of K did not. Regression analysis of this study indicates that the optimal fertilizer rates for banana production in this region were 570 kg N/ha and 710 kg K_2O/ha corresponding to a K_2O:N ratio of 1.25. These rates produce the highest yields and profits, with acceptable quality.

Optimal rates of fertilizer N and K can significantly increase banana yield and profit. The soluble sugar content responded to N, but not to K. The results in good agreement with other studies in the region, are accepted by crop advisers, and have been incorporated into the banana fertilizer guide for banana growers' use.

Table 1. Banana fruit yield, quality traits and profit as affected by application rates of N and K.

Applied fertilizer rate, kg/ha		Fruit yield, kg/ha	Soluble sugar, %	Profit, US$/ha
N	K_2O			
0	611	9,450 d	18.1 c	583
228	611	35,100 ab	19.1 abc	19,682
555	611	37,620 a	20.2 ab	21,386
833	611	34,560 ab	18.8 bc	18,851
555	0	27,945 c	20.4 a	14,616
555	306	36,630 ab	18.7 bc	20,904
555	917	38,460 a	19.2 abc	21,748

Prices (US$) of fertilizers and banana: $0.75/kg N, $0.82/kg K_2O and $0.71/kg of banana.

References

Yang, B.M., et al. 2012. Better Crops China 29(2):16-21.

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