



E-ISSN: 2278-4136  
P-ISSN: 2349-8234  
JPP 2019; 8(4): 998-1000  
Received: 16-05-2019  
Accepted: 18-06-2019

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## Bunch yield in banana var. Nendran as influenced by application of boron

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### Abstract

Nutrient deficiencies are widespread in banana growing soils which is attributed to the intensive cultivation of high yielding varieties, leaching and erosion losses, limited recycling of residues and gap between removal and supplementation of secondary and micronutrients. Boron is an important micronutrient deciding the bunch yield and quality of banana. The experiment entitled "Bunch Yield in Banana var. Nendran as influenced by application of boron" was conducted to evaluate the nutrient status of banana growing soils and to find the effect of micronutrient boron on the bunch yield of banana in farmers field at Ayarkunnam of Kottayam district, Kerala. There were five treatments in the experiment with four replications in RBD design. Treatments were based on different nutrient recommendations of banana var. Nendran which included Absolute control, farmers practice and NPK Recommendation of Kerala Agricultural University (190:115:300 g/plant) with and without boron application. Micronutrient boron was applied as borax either through soil application (6kg/acre) or foliar application (0.5% borax upto 6<sup>th</sup> month) along with NPK as per treatments. Acidic soil of the experimental site was deficient in potassium and boron with excess levels of phosphorus (P) and iron (Fe). Among the treatments foliar application of borax at 0.5% along with other nutrients significantly enhanced the bunch yield. An additional average yield of 2-3 kg was obtained in treatment with foliar application of boron and was found to be beneficial compared to treatments without foliar application of borax.

**Keywords:** Banana, nutrient deficiency, bunch yield, boron

### Introduction

Widespread deficiency of secondary and micronutrients nutrients due to climatic as well as soil factors and cultivation practices are observed throughout the country. Banana cultivation is an important agricultural activity in Kerala. Many of the landless poor farmers cultivate banana in leased land for their livelihood. The area under banana cultivation in Kerala is increasing however, the lower productivity reflects lower average yield per unit area. Nutrient disorders are prevalent in the banana fields mainly due to reduced use of organic manures, large scale and unbalanced application of NPK fertilizers, extension of banana cultivation to marginal lands which are poor in fertility, unawareness of role of secondary and micronutrients on bunch yield and quality of banana. Hence, the use of adequate rates of nutrients is essential to improve yield of banana crop. Adequate amounts of essential nutrients in appropriate balance are fundamental for various physiological processes in plants (Fageria *et al.*, 2006) [1]. Since banana is a heavy nutrient exhaustive crop it requires high amount of macronutrients and micronutrients for normal growth and producing good quality, high yielding bunches. (Pathak *et al.*, 2011) [5]. Micronutrients are vital to plant growth and they are required in smaller quantities. They are generally deficient in most of the cultivated soils (Mathew, 2007) [3]. Boron is the most often deficient micronutrient in banana plantations (Prasad *et al.*, 2014) [6] which is required for basic functions of plants, their deficiency disturbs the major metabolic activities of plants. It acts as a key factor in vital processes such as structure integrity of cell walls, cell division, root development, and membrane permeability of potassium. In this circumstances, a field experiment in farmers field was conducted to evaluate the nutrient status of the soil and the influence of boron on bunch yield of banana.

### Materials and Methods

An experiment was conducted to evaluate the nutrient status of banana growing soils and to find the effect of micronutrient boron on the bunch yield of banana in farmers field at Ayarkunnam of Kottayam district, Kerala. There were five treatments in the experiment with four replications. Treatments were based on different nutrient recommendations of banana var. Nendran. The different treatments were as follows.

- T<sub>1</sub>-Absolute control
- T<sub>2</sub>-Farmers' practice

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- T3-NPK (190:115:300 g/ plant) as per Package of practices recommendation of Kerala. Agricultural University (POP of KAU, 2011) [2].
- T4-T3 + Boron was applied as borax through soil (6kg/acre).
- T5-T3 + Boron was applied monthly upto 6th month (five sprays) as borax.

The soil of experimental site was acidic with pH 4.5, electric conductivity (0.004dSm-1), organic carbon (0.5%), available phosphorus (53kg ha-1), available potassium (78 kg ha-1). Secondary nutrients were calcium (96 mg kg-1), magnesium (38 mg kg-1), sulphur (12 mg kg-1) and micronutrients were in sufficient quantity except for boron which was deficient (0.03mg kg-1) below the critical level of 0.5 mg kg-1.

All the nutrients were applied based on soil test values except boron which was applied as per treatments. Liming was done @ 500g per plant at the time of planting followed by 100 g during the 2nd month. All the cultural practises were done as per package of practices of KAU, except for T1 and T2. The N, P and K were applied as urea (46 per cent nitrogen), Rajphos (20 per cent P2O5) and muriate of potash (60 per cent K2O), respectively. Magnesium was applied as magnesium sulphate (MgSO4) @ 80kg ha-1.

## Results and discussion

The experimental results showed that micronutrient boron has a major role in deciding the bunch yield of banana var Nendran. The results of soil analysis (Table 1) showed that some of the extractable levels of macro and micronutrients were low for banana plants while the P and Fe were high. Among the major nutrients a wide spread deficiency of K was observed while the available P was very high. With regard to P it is in the soil class IX and as per the results only 25% of the general requirement of P was applied with regard to potassium the soil was in class II and 106 % of the general K requirement was applied based on soil test results. Banana being a nutrient exhaustive crop specifically it is a potential consumer of potassium compared to N and P among major nutrients. On an average the potassium requirement is three times higher than phosphorus. The potassium uptake efficiently contributes to bunch yield and impart pest and disease resistance and maintain water balance. But here in the farmers' field they applied more of phosphorus by means of Factamphos and bone meal and applied potassium was less than 30 per cent of the crop requirement. There was deficiency of secondary and micronutrients also. In all treatments except T4 and T5 boron was not applied and hence significantly lower yield was observed compared to T5.

**Table 1:** Effect of treatments on yield attributes of banana

Treatment	Bunch yield kg/plant	No. of hands /bunch	No. of figures/bunch
T <sub>1</sub>	8.75	4.25	40.75
T <sub>2</sub>	9.075	4.75	43.00
T <sub>3</sub>	10.850	5.00	45.25
T <sub>4</sub>	10.750	5.00	46.00
T <sub>5</sub>	13.075	6.00	53.25
CD (0.05) %	1.01	NS	1.85

Among the yield characteristics observations on bunch weight, number of hands, number of fingers and were recorded. No of hands/bunch and average weight of fingers were not significantly influenced by various treatments, however average weight of fingers was highest for T5. There was significant influence of treatments on total number of fingers per bunch and bunch weight. The highest bunch weight was recorded in T5 with 13.07 kg as against 10.75 kg in T4. Total number of fingers were also significantly high in T5 compared to all other treatments. In T4 where boron is applied in the soil could not produce significant increase in

number of fingers per bunch and bunch weight compared to other treatments without boron application. This is because plants are unable to absorb the boron in the soil due to interaction effect of boron with other nutrients.

High level of phosphorus in the soil which results in anionic competition of phosphate ions with borate ions might be inhibiting the uptake of boron from the soil. (Nair *et al.* 2013) [4].

## Acknowledgements State Planning Board



**Fig 2:** General view of borax sprayed plots



**Fig 2:** General view of boron deficient plot at 2<sup>nd</sup>-month stage

### Conclusion

Farmers preferably apply nutrients based on its availability rather than crop requirement. In boron deficient soil supplementing the deficient nutrient enhance bunch yield in banana. But depending upon soil conditions foliar nutrition is found to be advantageous. Monthly foliar application of borax @ 5 g/litre can enhance the yield compared to soil application. The positive response to the foliar application indicated that mere presence of boron in the soil do not favour the uptake of the element which is hindered due to other reasons like nutrient interactions in the soil. Farmers income can be increased by boosting the plant health through scientific nutrient management practices.

### References

1. Fageria VD. Nutrient interactions in crop plants. *J Plant Nutrition*. 2006; 24(8):1269-1290.
2. [KAU] Kerala Agricultural University. Package of Practices Recommendations: Crops (14th Ed.), Kerala Agricultural University, Thrissur, 2011, 360.
3. Mathew U. Assessment of micronutrients in the soils of Kerala. KSCSTE project report, 2007, 105.
4. Nair KM, Saifuddin N, Suresh Kumar P. Fertility of soils of Kerala. In: Soil fertility assessment and information management for enhancing crop productivity in Kerala. Kerala State Planning Board, 2013, 136-139.
5. Pathak NL, Bauri FK, Misra DK, Bandyopadhyay B, Chaigiaborty K. Application of micronutrients on growth, yield and quality of banana. *J Crop Weed*. 2011; 7(1):52-54.
6. Prasad R, Kumar D, Shivay YS, Rana DS. Boron in Indian agriculture: A review. *Indian J Agron*. 2014; 59(4):511-517.