EFFECT OF MICRONUTRIENTS ON GROWTH AND YIELD OF BANANA (*Musa spp.*) Cv. RED BANANA

Abstract

The investigation on "Effect of micronutrients on growth and yield of banana (Musa spp.) cv. Red Banana (AAA)" was carried out to identify a suitable micronutrient concentration for enhancing the growth and yield of triploid banana cultivar Red Banana. The field experiment was laid out in Randomized Block Design in three replications with ten treatments. The treatments comprised of various micronutrient concentrations of NRCB Banana Sakthi applied at different intervals. The growth parameters viz., plant height, pseudostem girth, number of leaves plant^{-1}, leaf area was found to be the highest in the treatment which received 2.0 per cent micronutrients at 45 days interval while the control recorded the least values for growth characters. Application of 2.0 per cent micronutrients at 45 days interval was most effective in enhancing the bunch and finger characters viz., number of hands bunch^{-1}, number of fingers hand^{-1}, total number of fingers bunch^{-1}, length , girth and weight of the finger and weight of bunch,. It can be concluded that application of 2.0 per cent micronutrients at 45 days interval can be recommended as the best practice for enhancing the growth and yield of Red Banana (AAA).

Keywords : Red Banana, Micronutrient, NRCB Banana Sakthi, growth, yield characters

Introduction

Banana, one of the important fruit crops of tropical countries like India, China, Brazil, Philippines etc., belongs to Musaceae family and Musa genus of the order Zingeberales. In India banana is known for its antiquity and is interwoven with Indian heritage and culture. The plants are considered as the symbol of prosperity and fertility. Owing to its greater socio-economic significance and multifaceted uses, banana is popularly known as 'Kalpataru' (A plant with virtues). The area under banana cultivation in Tamil Nadu is 0.94 lakh hectares with a production of 3.302 lakh tonnes (NHB, 2018).

Red Bananas (AAA) are smaller, plumpier, softer and have a unique flavour. Redder the fruit, greater is the nutritive value. Red Bananas are more affluent than yellow ones with regard to the vitamin C and potassium contents. They also contain a rich supply of ß-carotene and vitamin B6. Red Banana has more health benefits viz., strengthens immune system, alleviates digestive problems and helps to stop smoking. They have no fat, cholesterol or sodium and contain more digestible carbohydrates than any other fruit .

Micronutrients are essential for the crop growth and are equally important as primary and secondary nutrients. They have an important role in the balance of plant nutrition for the stabilization of a crop yield and quality of a produce. Micronutrient deficiencies in soil and crops have become prevalent in recent years due to several factors like intensive cropping, loss of top soil, soil erosion, leaching, decreased use of FYM, increased use of high analysis fertilizers and lack of proper liming of acid soils (Singh *et al*., 2007). Banana crop removes 6 kg iron, 125 kg magnesium, 4.70 kg zinc, 12 kg manganese, 0.37 kg copper and 1.27 kg boron from one hectare of cultivable land (Krishnamoorthy and Hanif, 2017). To meet the required micronutrients demand, the present investigation was undertaken to study the effect of micronutrients on the growth and yield of Red Banana.

Materials and Methods

The experiment was conducted in a farmer's field at Chitharal village, Kanyakumari district of Tamil Nadu to study the effect of micronutrients on the growth and yield of banana (*Musa spp.*) cv. Red Banana (AAA). The field experiment was laid out in Randomized Block Design with three replications. The treatments comprised of various micronutrient concentrations (1%,1.5%,2%) of NRCB Banana Sakthi applied at different days intervals (30,45,60 days intervals) along with the recommended dose of fertilizers (110:35:330 NPK g/ plant). The micronutrient mixture contains 4.8 per cent iron, 5.3 per cent zinc, 2.8 per cent boron, 2.4 per cent copper and 4.6 per cent manganese. Planting was done at a spacing of 3 x 3 m. The foliar application was done at third month after planting at 45, 60 and 90 days interval. Standard cultural practices was followed along with treatments per the schedule.

Observations on growth and yield characters were recorded in three tagged plants under each treatment. Data on characters such as plant height, pseudostem girth, number of leaves plant^{-1}, leaf area , crop duration, number of hands bunch^{-1}, number of fingers hand^{-1}, total number of fingers bunch^{-1}, length, girth and weight of the finger and bunch weight were recorded and statistical analysis was done as per the procedure.

Results and Discussion

The results of the present study revealed that application of micronutrients (NRCB Banana Sakthi) at various concentrations increased the growth parameters like plant height, pseudostem girth, number of leaves and leaf area when compared to the control (Table 1). Among the various treatments, foliar application of 2.0 per cent micronutrients at 45 days interval (T_8) excelled the other treatments in increasing the growth characters, while the control (T_{10}) registered the least values. Improvement in growth of banana plants due to application of micronutrients might be attributed to the enhancement of photosynthetic and other metabolic activities which lead to an increase in various plant metabolites responsible for cell division and cell elongation as reported by Hatwar *et al*. (2003). Production of more number of leaves with greater leaf area might be attributed to the fact that zinc stimulates photosynthetic activity and its presence is important for enhancing the rate of leaf production. Production of more number of leaves is attributed to nutrient supplementation through foliar application of micronutrients as opined by Singh and Uma (1996) in banana.

Yield in banana is a function of bunch weight and number of plants hectare^{-1}. Among the various treatments, foliar application of 2.0 per cent micronutrients at 45 days interval (T_8) excelled the other treatments in increasing the yield attributes, while the control (T_{10}) registered the least values. Pathak *et al.* (2011) also observed maximum bunch weight with the application of micronutrients and they suggested that production of maximum number of hands per bunch due to the application of Zn, Fe, Cu and B might be attributed to the better nutritional status, biosynthesis and translocation of carbohydrates which led to increased yield.

Increase in yield might be due to the direct and indirect involvement of micronutrients, especially zinc and iron, in photosynthesis and fruit setting (Abijith *et al.*, 2018). Increased finger size along with the accumulation of sugar and higher pulp content might have led to greater finger weight. Research on similar lines was done by Satyanarayana (1985) in banana. Moreover, probably there was a greater diversion of photosynthates to sink (fruit), which ultimately added to the pulp weight. It can be observed from the results of the present study that the dry matter production was significantly influenced by the foliar application of micronutrients.

CONCLUSION

The results of the present study it can be concluded that application of 2.0 per cent micronutrients mixture at 45 days interval can be recommended as the best practice for enhancing the growth and yield of banana cv. Red Banana (AAA)

Table 1. Influence of micronutrient concentrations on growth characters in Red Banana (AAA)

Treatments	Plant height (cm)	Plant girth (cm)	Number of functional leaves plant^{-1}	Leaf area (m^2)	Total crop duration (days)
T_1	295.80	67.65	12.15	6.11	433.47
T_2	292.14	64.06	10.22	5.13	441.96
T_3	288.80	62.03	9.56	5.01	450.70
T_4	290.45	63.24	10.13	5.97	445.63
T_5	302.87	71.78	15.00	8.03	418.00
T_6	293.53	65.36	11.85	5.60	438.45
T_7	298.20	69.07	14.12	7.56	423.84
T_8	304.06	72.27	16.56	8.28	413.94
T_9	296.28	68.13	13.08	6.89	429.36
T_{10}	286.55	60.36	8.29	4.27	455.40
SE_D	0.70	0.71	0.52	0.20	1.46
CD at 5 %	1.40	1.15	1.11	0.40	2.92

Table 2. Influence of micronutrient concentrations on yield characters in Red Banana (AAA)

sTreatments	Number of hands bunch $^{-1}$	Number of fingers hand $^{-1}$	Total number of fingers bunch $^{-1}$	Length of the finger (cm)	Girth of the finger (cm)	Weight of the finger (g)	Weight of the bunch (kg)
T_1	7.11	9.75	69.32	22.68	15.21	188.47	13.06
T_2	6.55	8.81	57.70	22.31	14.10	184.12	10.62
T_3	6.03	8.04	48.48	21.97	13.01	179.84	8.71
T_4	6.28	8.42	52.87	22.18	13.57	181.96	9.62
T_5	7.94	10.86	83.29	23.18	16.90	195.00	16.24
T_6	6.87	9.13	62.72	22.52	14.63	186.31	11.68
T_7	7.63	10.49	80.03	22.93	16.32	192.81	15.43
T_8	8.40	11.22	94.24	23.35	17.45	197.10	18.57
T_9	7.31	10.07	73.61	22.84	15.77	190.63	14.03
T_{10}	5.72	7.63	43.64	20.96	12.36	177.61	7.75
SE_D	0.13	0.18	1.73	0.08	0.275	1.08	0.16
CD at 5 %	0.28	0.36	3.46	0.16	0.55	2.16	1.32

REFERENCES

Balaji, T., M. Pandiyan, P. Veeramani and M. Ramasamy. 2016. Effect of foliar spray of micronutrients on plant growth character and yield of banana. Adv. Res. J. Crop Improv, 7(1): 68-71.

Chadha, K. L. 2009. Handbook of Horticulture (2nd ed.). Indian Council of Agricultural Research, New Delhi,. pp: 76-82.

Hatwar,G.P.,S.V.Gondane,S.M.Urkude and O.V.Gahukar.2003.Effect of micronutrients on growth and yield of chilli. J.Soil Crop.13:1239-1254.

Hazarika, B.N. and S. Ansari. 2010. Effect of integrated nutrient management on growth and yield of banana cv. Jahaji. Indian J. Hort. 67(2): 270-27.

Jeyabaskaran, K.J., S.D. Pandey, M.M. Mustaffa and S. Sathiamoorthy. 2001. Effect of different organic manures with graded levels of inorganic fertilizers on ratoon of poovan banana. South Indian J. Hort., 49:105-109.

Krishnamoorthy, V. and Hanif. 2017. Influence of micronutrients on growth and yield of banana. J. Krishi Vigyan Kendra., 5(2): 87-89.

Lal, K.N. and M.S. Rao. 1954. Micronutrient nutrition of plant, BHU.Varanasi, India. pp. 166–175.

Murray, D.B. 1960. The effect of deficiencies of the major nutrients on growth and leaf analysis of banana. Trop. Agri., 37: 97-106.

NHB.2018 Indian Horticultural Database, Banana area, production and productivity. *http://www.nhb.gov. in*.

Pathak, M., F.K. Bauri, D.K. Misra, B. Bandyopadhyay and K. Chakraborty. 2011. Application of micronutrients on growth, yield and quality of banana cv. Martaman. J. Crop. Weed, 7(1): 52-54.

Satyanarayana, M. 1985. Effect of growth regulators on fruit development of Chakrakeli banana. Banana News, 8: 12-13

Singh, H.P. and S. Uma. 1996. Banana cultivation in India. Krishi Vistar Bhavan, Pusa, New Delhi, India.

Singh, J.K., J. Prasad, H.K. Singh. 2007. Effect of micronutrients and plant growth regulators on yield and physic- chemical characteristics of aonla fruits in cv. Narendra Aonla-10. Indian J. Hort., 64(2): 216-218.

Srivatsava, R.P. 1964. Effect of micronutrient on growth characteristics of banana. Indian. Copper. Fert. News, 9(2):13–26.

Supriya, L. and Bhattacharyya, R.K. 1993. Effect of foliar application of chelated and non-chelated zinc on growth and yield of Assam lemon. Hort. J. 6 (1): 35-38.

Yadav, M.K., N.L., Patel, B.R. Parmar, Kirtibardhan, and P. Singh. 2010. Effect of micronutrients on growth, yield and quality of banana (*Musa paradisiaca L.*) cv. Grand Naine. Intl. J. Agri. Med. Plant Res., 1(1): 1–7.

Yadlod, S.S. and B.A. Kadam. 2008b. Effect of plant growth regulators and micronutrients on physical and chemical characters of banana (*Musa sp*.) cv.Grand Naine. The Asian J. Hort., 3(2): 436–438