

Research Paper :

Influence of liming and nutrients on the changes in pH, nutrients availability and yield of wetland banana in a flooded valley soil

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ABSTRACT

Field experiment was conducted in flooded valley Fe toxicity polluted coastal acid soil of the high rainfall zone of Tamil Nadu state in India to determine the effect of application of nutrients with and without lime (9.6t/ha) (to bring pH to neutral range) on the changes in soil fertility status and yield of wetland banana. The results showed that the soil pH, availability of major nutrients, hot water soluble B and yield of bunch increased, while all forms of Fe got appreciably reduced for liming. Although the application of fertilizers played significant role in masking the toxicity pollution of excess Fe, the soil application of lime, N, P and K together with foliar spray of multinutrients (1% Diammonium phosphate, 1% Muriate of potash, 0.5% ZnSO₄, 0.2% CuSO₄ and 0.2% borax) thrice at early and late vegetative stages and inflorescence initiation stage accounted highest bunch yield of 39.4 t/ha besides without expression of any toxicity pollution symptoms.

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Wetland banana grown in the flooded valley soils of the high rainfall zone of Tamil Nadu state in India, contributes more than ten per cent share in the total production of the state. Although trenches have been dug to improve the drainage, Fe toxicity is often encountered due to high rainfall, presence of artesian wells, low water table depth, laterisation process and lateral seepage of iron from adjacent hills. The soil is a deep red loam and majority of the area are developed over colluvium and alluvium deposits in ferruginous rocks. Besides drainage the extreme acidity and nutritional imbalance caused due to excess Fe are among the most important factors to be considered in order to improve the potential of these soils. The objective of this investigation was, therefore, aimed to study the effect of nutrients with and without lime on the soil characteristics and yield of wetland banana in Fe toxic flooded valley soil.

MATERIALS AND METHODS

A field experiment was conducted in the flooded valley acid soil (Aquic Hapludalf) in the high rainfall zone of Tamil Nadu state in India during 1996-97 where Fe toxicity in banana is the norm. The soil receives interflow water from adjacent hilly lands, Fe ooze and segregation are a common feature. The treatments comprised of F₀ - control (no fertilizers) F₁ - recommended N,P and K (210 : 35 : 40 g/plant), F₂ - N,P,K and ZnSO₄ 10 g/plant, F₃ - N,P,K and CuSO₄ 5g/plant, F₄ - N,P,K and borax 5 g/plant, F₅ - N,P,K, ZnSO₄ and CuSO₄, F₆ - N,P,K, ZnSO₄, CuSO₄ and borax, F₇ - N, P, K and foliar spray of 0.5 per

cent ZnSO₄ with 0.5 per cent CuSO₄ and 0.2 per cent borax, F₈ - N, P, K and foliar spray of 1 per cent DAP, 1 per cent MOP, 0.5 per cent ZnSO₄, 0.2 per cent CuSO₄ and 0.2 per cent borax, each treatment with and without sufficient lime (9.6 t/ha) to bring pH to neutral range. The banana variety nendran which has been normally grown and susceptible to Fe toxicity was grown. Lime of 60 mesh was applied by broadcast in the respective plots one month before planting and mixed well with soil upto 15 cm depth. Nitrogen as urea and potash as muriate of potash (MOP) were applied in three equal split doses during 3rd, 5th and 7th months planting.

The whole P as mussoorie rock phosphate (MRP) and the micronutrient fertilizers viz., ZnSO₄, CuSO₄ and borax were applied in first application in the third month. The fertilizers were applied 0.5 m away encircling the pseudostem and covered with trench soil. The foliar spray was done at 3rd, 5th and 7th month for the plants in the respective treatment plots. The experiment was conducted in a randomized block design replicated thrice and earthing up was done at stages. Trenches were formed inbetween alternate rows and cross trenches at every fifth row to collect the flood water. Surface digging was done at bimonthly interval. Surface soil samples were collected at 45 cm away from pseudostem in an encircled manner during harvest and analyzed for pH, available macronutrients, different forms of Fe, DTPA-micronutrients by AAS and hot water soluble B by Azomethine method. The yield of bunch was recorded at harvest .