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Full Length Research Paper

Manure placement effects on root and shoot growth and nutrient uptake of 'PITA 14' Plantain hybrid (*Musa sp.* AAAB)

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Abstract

Low soil organic matter and associated poor soil fertility cause yield decline in *Musa* species, necessitating external nutrient input to maintain yield. Best fertilization practices include applying the correct fertilizer at the correct rate, time and place. In this regard, manure placement effects on growth, root system development and nutrient uptake of a plantain hybrid were evaluated in a screen-house. Three manure placement methods, whereby the full dose of manure was applied as top-dressing (T1), bottom-dressing (T2), or a split combination thereof (T3), were assessed together with a no manure control (T4). There was significant ($P < 0.05$) treatment effects on most of the parameters studied. T1 gave the best growth indices 3 months after transplanting (MAT) but not at 5 MAT. The highest root NPK and leaf N at 3 MAT was associated with T3. T3 also induced the best

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plant growth at 5 MAT, followed by T2. Expectedly, the control treatment produced plants with the poorest growth. Whole-plant biomass yield and distribution were influenced by manure placement as was specific leaf area. Significantly large correlations between leaf-3 parameters and whole-plant growth indices were observed. Thus, dry weight of leaf-3 predicted whole-plant biomass yield with high reliability ($r^2 = 94.1\%$), supporting leaf-3 analysis as a non-destructive alternative for assessment of plant performance in response to manure. It was apparent from the study that plant performance indices at 3 and 5 MAT showed that split dressing at the top and the bottom of the pots (T3) was a more sustainable method for manure application to *Musa*.

Key words: Plantain hybrid, manure placement, root and shoot growth, nutrient uptake, biomass yield.

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