



Relationship between root and shoot growth traits during the plant crop and first ratoon in banana and plantain (*Musa* spp.) and its implications for perennial cultivation on degraded Ultisols in south-eastern Nigeria.

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Abstract

Root studies of *Musa spp* are limited and mainly devoted to observations during the first months after initial planting. This study assessed the relationships of root and shoot growth within and across two consecutive crop cycles in 32 widely differing *Musa* spp. genotypes. A reduction in leaf area, corm

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weight, root dry weight, cord root number and cord root length occurred during the reproductive stage of both the plant crop and the first ratoon cycle. Most leaves died off during the reproductive stage, while the decay of the outer leaf sheets resulted in a reduction of the pseudostem circumference. The corm fresh weight was reduced by 20 % and 13 % during the reproductive stage of the first and the second cycle, respectively. In this study, a moderate reduction in cord root number of 8 and 12 % was observed during the reproductive stage in respectively the first and second cycle. However, a strong reduction in cord root length and root dry weight was observed. For example, cord root length was reduced by 40 % during the reproductive phase of both cycles. The effect of crop cycle was significant on the different corm traits and the cord root diameter. The corm of the first ratoon plants was bigger and taller than the corm of the plant crop, resulting in a slight increase in number and diameter of cord roots. In contrast, cord root length of the first ratoon was inferior to that of the plant crop. There was a significant effect of crop cycle on the number of suckers and the height of the tallest sucker. Number of suckers decreased from 16 to 12, while height of the tallest sucker was respectively 120 cm and 68 cm at flower emergence of the plant crop and the first ratoon. There was a reduction in sucker vigour during the reproductive phase of the ratoon crop. The reduction in sucker vigor during the ratoon crop may be attributed to the observed high mat and possible soil degradation. This would affect plant anchorage and stability, and limit possibilities for perennial production of bananas and plantains under mono-cropping conditions on degraded Ultisols. Significant positive correlations were observed between mother plant (plant crop) and sucker growth characteristics, mostly within but not across genotypes. Thus,

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while fast-growing plants may also have better developed suckers, it was unclear that breeding for genotypes with a larger root system would lead to a better suckering.

Key words: banana, plantain, plant crop, ratoon crop, root system