THE MINERAL COMPOSITION
OF THE ROBUSTA BANANA PLANT
I. METHODS AND PLANT GROWTH STUDIES
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SUMMARY

The problem of the nutrition of the banana plant and the limitations of traditional field fertilizer trials are described. Complementary studies of total uptake are valuable and have been carried out at various sites in the Eastern Caribbean. In this paper, dry-matter production at different stages of growth of Robusta bananas is presented. Differences in pattern are related to site factors. Distribution and redistribution of dry matter amongst the various plant organs are given for the different stages of growth. Calculations of fresh and dry matter for a field production of 25 and 50 tonnes per ha have been made.

INTRODUCTION

The banana plant is well known to be extremely demanding of nutrients and therefore addition of mineral fertilizers is of the highest importance in its cultivation on many soils. Normally, crop fertilizer requirements are estimated from field experiments and there have been large numbers of trials carried out with bananas. These have been reviewed by de Geus and Twyford. However, there are peculiar difficulties associated with this type of work in bananas due to the cultivation methods used and an alternative method of estimating requirements is desirable.

In the natural state, a banana corm (rhizome + bud) continually produces basal buds which develop into fruiting plants, each with its own corm, so that a single corm soon becomes a large clump comprising plants at all stages of growth from bearing to sucker. Under cultivation however, the
clump size is continually restricted by pruning so that usually only a few fruiting plants are allowed on the stool. In normal practice a corm is set in the soil as planting material and the first crop (plant crop) develops from a basal bud. All other plants (suckers) which grow are cut back until about half-way through the life of the plant crop when one is allowed to develop to comprise the second crop (first ratoon crop). This is called 'setting the follower'. At about the time of harvest of the plant crop a further sucker is allowed to remain, which becomes the second ratoon crop. After harvesting the bunch, the above-ground parts of the plant are usually cut down and left on the soil to decompose. Thus the stool in a properly run commercial banana field after a time comprises one plant of advanced growth, one at an early stage and one small sucker.

The time needed for one plant to grow from the bud to harvest varies greatly with variety, climate and nutrition but usually takes from eight to 24 months. In most parts of the world where the increasingly popular Cavendish varieties are grown, the period is eight to 15 months; at lower elevation on lands without a severe dry season from eight to 12 months.

In any one field it would be expected that the plant crop would be virtually completely harvested over a period of three to four months. This also applies for the first ratoon crop but later ratoon bunches are cut more or less continuously.

Thus in the first year, the nutrient supply must be large enough to promote not only the growth of the plant crop to harvest but also a good part of the first ratoon as well. In each subsequent year, there are generally also one to two crops to nurture but crop residues play an increasingly important part in this process, both through the soil and also within the stool itself. Thus eventually, the situation should develop where the chief reason for applying fertilizers is to offset losses from exported bunches and from leaching. However, in practice this is not always the case as nematodes can take an increasingly heavy toll on root function and thus more fertilizer is required to compensate.

In a fertilizer experiment, the treatments given in the early months would be expected to affect the plant crop and this type of trial should give useful indications about the needs of the plant crop for fertilizers on the particular site. The ratoon crops however, nourished as they are by residues as well as by fertilizers and soil, depend to a much lesser extent on the fertilizer given in ratoon years and thus responses are quite likely to change or disappear completely. In fact this has been observed many times in trials in the Windward Islands. Whilst it is true therefore, that over a three or four year trial, average responses to fertilizers can be computed, these are of little practical value as they give no indication of the optimum for each year.

A farmer growing bananas is especially interested in good returns from early crops because in time, nematode infestation builds up causing debility in the field and also because his later crops, unlike the plant crop, cannot easily be timed to avoid windstorms nor to catch the best market