A STUDY OF NON-SYMBIOTIC NITROGEN-FIXING BACTERIA IN SOME KENYA SOILS

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A thesis submitted in Part fulfilment for the degree of Master of Science in the University of Nairobi.

FEB. 1981

ABSTRACT

Investigations were carried out on three Kenya soils for the occurrence, distribution and relative contribution of free-living nitrogen fixing bacteria in these soils. The three soils had a rich flora of N_2-fixing bacteria which was composed mainly of Beijerinckia spp. The Kabete soil had in addition to Beijerinckia spp., Azotobacter chroccocum and Derxia gummosa. The isolates showed acetylene reduction rates ranging from 3299.06 to 1.30 nmole of ethylene per hour and fixed between 0.728 to 0.098 mg of N per ml of culture in 21 days.

Several physico-chemical characteristics of the soils were analysed in relation to the viable numbers of N_2-fixing bacteria present in the soil. In the Kabete and Muguga soils increases in organic carbon resulted in increases in numbers of N_2-fixing bacteria. However, this was not observed in the Naivasha soil. In the three soils studied, moisture did not have a direct influence on the numbers of non-symbiotic N_2-fixing bacteria.

Initially none of the soils studied showed any nitrogenase activity (acetylene reduction) when incubated for 48 hours with acetylene, but after amending with 2% sucrose solution acetylene reduction in the Naivasha soil increased from trace amounts to 62.15 nmole of ethylene per gram dry soil in 48 hours.