

PREMATURE LEAF SENESCENCE OF BANANA—A SYMPTOM OF POTASSIUM EXHAUSTION

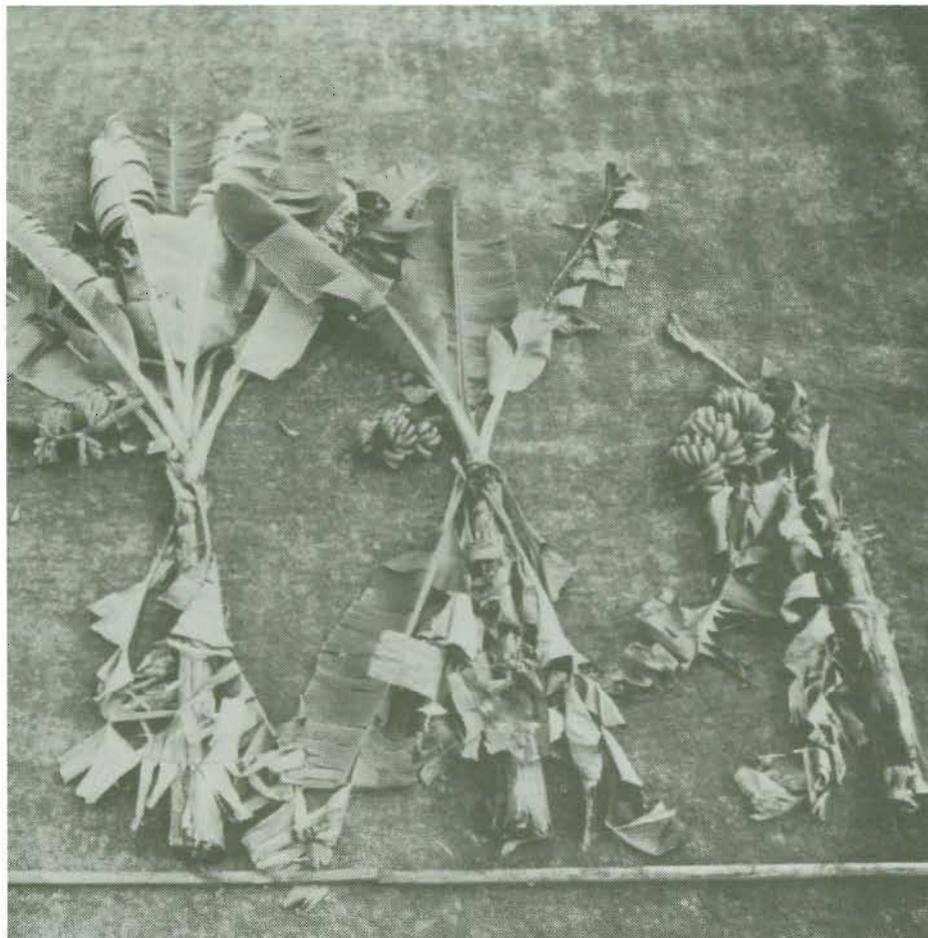


Fig. 1. Potassium deficient banana plants arranged, left to right, to demonstrate increasing potassium stress in the leaves as fruit bunches developed.

Many soils of the tropics have been so intensively weathered that primary minerals containing potassium (K) have disappeared from the plant root zone. Such soils may not be deficient in K as long as nutrients are recycled in the soil-plant system. However, if K-rich crops are harvested, exchangeable soil K becomes exhausted. Acute K-deficiency symptoms will eventually appear, because there is no slowly available K in reserve.

Crops that extract great quantities of K can thus produce extreme depletion in a short span of time. Similarly, during flowering and fruit development, plants that have displayed mild symptoms or incipient K deficiency during vegetative growth may be brought to an acute stage of K deficiency, even to the point of death, if the fruit itself has a high demand for K.

The concept of nutrient depletion is illustrated here. During the first three years of production there were no obvious symptoms of K deficiency (although there was some evidence of decreased yields if K was not sup-

plied). Then followed a period of three years during which occasional *premature yellowing* of the lower leaves could be observed. This symptom of K deficiency is associated with the transfer of K from old leaves to young leaves during periods of vigorous growth.

Finally, after six years of depletion, an acute stage was reached. The soil was unable to sustain the plant during the time of greatest demand—bunch development. In this extreme case, K was depleted from the vegetative parts to such an extent that all of the leaves died, leaving a green bunch of bananas on a deteriorating pseudostem.

The plants in the photograph were arranged to illustrate the progressive deterioration of banana plants as bunch development proceeded. The nutrient composition of bunches is relatively constant (0.36% K on a fresh weight basis), and at maturity about 50% of the total K absorbed by the banana plant is in the bunch. Thus the fruit serves as a considerable sink for K, a sink, which, in this case, neither the soil nor the plant was able to fill.