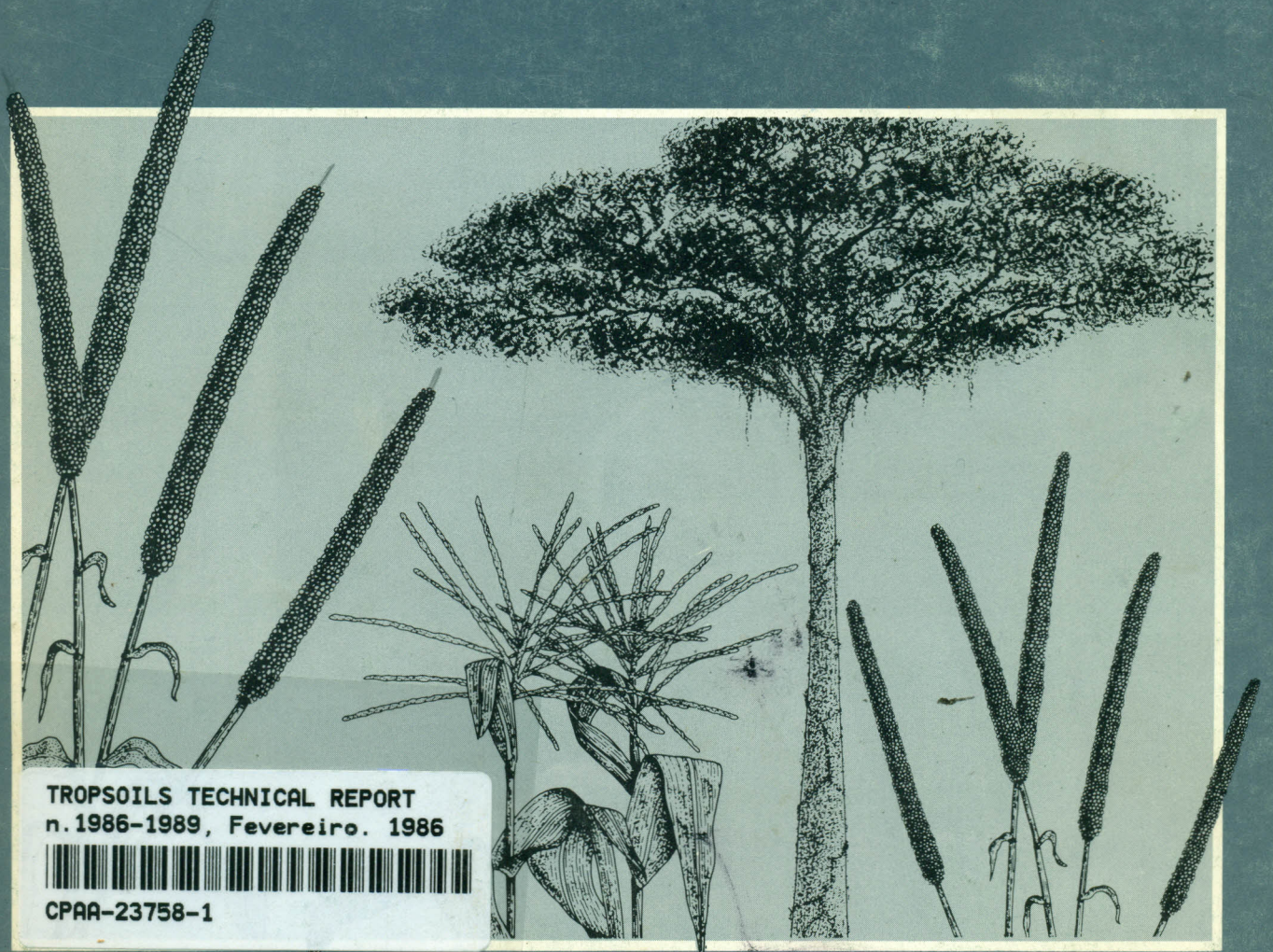


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Phosphorus Fertilizer Placement and Profitability

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Placement

The effects of P fertilizer placement methods were investigated during eight consecutive crops of a corn-cowpea annual rotation. Treatments included comparisons between rates of broadcast P (0, 22, 44, 88 and 176 kg/ha) applied before the initial corn crop, in factorial combination with banded P rates (0, 11, 22 and 44 kg/ha), applied to each crop. Cowpea required greater amounts of external soil P than did corn, with Bray 1-extractable critical soil P levels of 19 and 9 mg/kg, respectively. Total yields during four years of cultivation, for corn and cowpea or both species combined, increased as a function of total P applied, regardless whether P was applied in bands or broadcast. Although these results suggest that placement method is not an important parameter in P fertilization management for these Oxisols, economic considerations indicate advantages to banded P applications in small increments to each crop.

Profitability

Profitability for three P fertilization strategies during eight consecutive crops is shown in Figure 1. Without P fertilization, yields did not exceed 0.2 t/ha, obtained during the initial corn crop. Increasing economic losses resulted from expenses incurred by inputs other than P fertilizer. Cumulative yields for P treatments of both 176 kg/ha, broadcast-applied once before the initial crop, and 22 kg/ha, banded to each of the eight crops, were all similar, 17 t/ha. Similar profits were obtained after a total of eight crops, but banded P applications were advantageous during the initial four crops because P fertilizer costs were

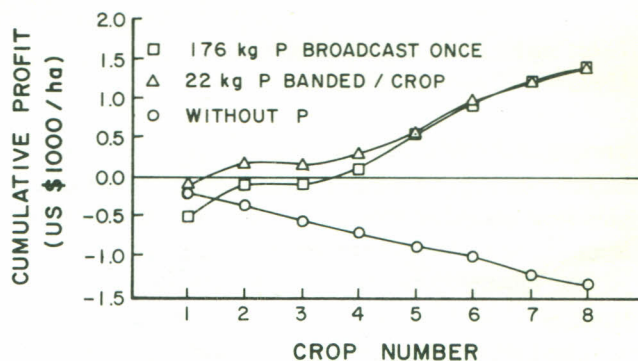


Figure 1. Cumulative profitability of P fertilizer levels and placement over a four-year growing period. Manaus, 1981-1985.

evenly distributed over each crop. Frequent banded applications of moderate amounts of P fertilizer are also compatible with the limited capital available to farmers in the region.

Implications

These data confirm that continuous cultivation of annual crop rotations involving corn and cowpea is possible in clayey Oxisols, the other extreme in the range of well-drained acid soils of the humid tropics from the sandy or loamy Ultisols of Yurimaguas.

Since P deficiency is the first constraint encountered, the profitability of continuous cultivation depended on how P was managed. Without P fertilizers, no annual crops were profitable regardless of other inputs applied. Removing P as a constraint with a broadcast application of 176 kg P/ha cost so much that the economic break-even point was not reached until the fourth crop. Banding small rates of P permitted continuous profits, beginning with the second crop. This is obviously the recommended option.