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EFFECT OF P-PLACEMENT ON MAIZE RESPONSE ON AN ANDEPT IN THE PHILIPPINES AND ON ULTISOL IN SUMATRA, INDONESIA.

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There are two possible strategies for improving the economic attractiveness of P fertilization on P-deficient soils in the tropics such as those of the Benchmark network:

1. To use other P sources, such as phosphate rock, for direct application in place of acidulated phosphates, particularly where indigenous rock sources occur;
2. To use restricted placement of soluble phosphate fertilizers where financial constraints limit fertilizer use by farmers, in order to maximize the return from low rates of applied P.

To evaluate these two strategies on selected sites of the Benchmark experimental network, a collaborative research project

between the University of Hawaii/Benchmark Soils Project and the International Fertilizer Development Center (IFDC), Muscle Shoals, Alabama, was initiated in early 1979. Field experiments were conducted on P-sources and P-placement at a *Hydric Dystrandept* (HD) site on Luzon, Philippines and a *Typic Paleudult* (TP) site on Sumatra, Indonesia.

Maize yield data were collected on each of the four principal experiments for a minimum of three crops. The potential for direct application of phosphate rock or non-conventional products made from rock has been frequently presented here by the IFDC/CIAT Phosphorus Project staff, so today's presentation will mention alternate sources only briefly and deal mainly with placement.

Placement is widely known to affect the efficiency of fertilization with soluble P sources; however, the factors affecting placement response are widely misunderstood and most studies have compared the two extreme treatment:

1) Broadcast and incorporated and;
2) Very restricted placement in the row or by the seed.

The experiments undertaken in this study were based on the concepts of Dr. C.T. de W.T. of Wageningen and were designed to examine the interaction between rate and a fairly complete range of placements.

On the *Typic Paleudult*, over three seasons very little difference between placement was observed, the one significant effect observed in the crops which received new applications of TSP (1st and 3rd crops) was the inferiority of the most restricted placement at low and intermediate rates.

For both the *Typic Paleudult* and the *Hydric Dystrandept*, the inferiority of the most restricted placement when the P is freshly applied suggests the importance of spatial availability in addition to chemical availability in determining plant response to phosphorus.

This concept is particularly important in highly P-deficient soils. However, in the socio-economic context the problem is particularly vexing, since the method of very restricted placement, which is easiest for the unmechanized, small farmer to carry out, generally is the least efficient method of application. Clearly, there is a need to study methods of efficient placement of P taking into account labor and mechanization costs to develop technologies which are adoptable by the farmer and have improved economic return on fertilizer investment.