AGRONOMIC EVALUATION OF ROCK PHOSPHATES

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In the application of the phosphate fertilizers it is necessary to use the correct source of phosphorous and add the proper amount to a particular crop-soil combination in order to obtain the maximum profits. For this purpose the rock phosphates must be physically and chemically characterized, the crop and soil selected and field experiments conducted with different sources and rates of fertilizer.

While phosphate rocks can be ground to very low particle sizes to enhance solubility when added to soil, it would be desirable to have standard size such as 90% passing through 100 mesh when comparing different materials. In the chemical characterization of rock phosphates both water and strong acids may not be suitable as extractants. The water extract may yield extremely small quantities of P while strong acids may dissolve P minerals that may not available to plants. Mild extractants such as 2% citric acid are suitable. It is extremely important to standardize the analytical procedure with respect to weight of rock phosphate, volume of extractant, time of shaking the mixture and even the rate of shaking.

Since ultimately fertilizer recommendations are made for crops grown in particular ecosystems, there is a need to select carefully the crops for field testing and soils that are representative of large farming areas. The crops may be perennials or annuals. The former being usually slow growing, require small quantities of P per unit time and may therefore be fed with a relatively slow soluble rock phosphate. The annual crops are relatively fast growing, generate a large amount of biomass and remove significant quantities of P per unit time. The more soluble rock phosphates should be included when field testing annuals and high rates of application must be used.

The test soils must be fully characterized, preferably at series level. Soils with high available P content would not be suitable for testing P materials since a yield response to added P may not be obtained. Radioisotopic techniques may be useful here. However, even though crop yields at harvest may not differ, crops can show Early differences in growth. Therefore, it is useful to determine biomass production after about four weeks growth as well as the P content in the plants. This way, the more efficient rock phosphates can be identified. Experiments need to be conducted for a sufficient length of time so as to enable the residual effects of the P added to be evaluated. Three to four seasons for annual crops may be adequate.

Evaluation of rock phosphates need not be confined to testing them alone. Mixtures of rock phosphates and water 14 P sources such as triple superphosphate may bring more profits than use of either one of them under certain crop-soil conditions. While small quantities of the more expensive triple superphosphate in the mixture will provide the P for rapid early growth, the slowly available rock phosphate can meet the later requirements of the crop.