

C
631.4
RAT

**COMPARISON OF AGRONOMIC EFFECTIVENESS OF PRIMARY
APATITE CRYSTALS AND COMMERCIALY AVAILABLE
ROCK PHOSPHATE FROM EPPAWALA FOR SOME SELECTED
SHORT TERM CROPS**

**A THESIS PRESENTED
BY
MALA PUSHPA KUMARI RATNAYAKE**

*in partial fulfilment of the
requirement for the award of
the degree of*

PERMANENT REFERENCE
FOR USE IN THE
LIBRARY ONLY

MASTER OF PHILOSOPHY (M.Phil)

**of the
UNIVERSITY OF PERADENIYA
SRI LANKA**

February 1996

479277 0



ABSTRACT

In recent times a resurgence of interest has been noted in evaluating the feasibility of poorly soluble Eppawala rock phosphate as an alternative fertilizer for annuals.

A series of laboratory and greenhouse studies was conducted to investigate and compare the solubility and agronomic effectiveness of selectively mined primary apatite crystals from Eppawala (SERP) with that of commercially available Eppawala rock phosphate (ERP) and triple super phosphate (TSP) as a P- fertilizer.

Laboratory incubation studies have revealed that peat from Muthurajawela has a potential for increasing the solubility of Eppawala rock phosphate types (both SERP and ERP) and the maximum solubility was noted to occur at a ratio of 1:0.8 of phosphate : peat by weight. Very often SERP showed a solubility of twice that of the ERP, suggesting, the superiority of SERP as a phosphorus fertilizer. Both SERP-peat and ERP-peat mixtures used as P fertilizer in an Alfisol and an Ultisol from Sri Lanka indicated the capacity of releasing P to soils. SERP-peat mixtures consistently released significantly higher amounts of P over ERP-peat mixtures.

The agronomic effectiveness of SERP was compared with that of TSP and ERP in greenhouse experiments for rice (BG-94-1, *Oryza sativa* L.). In addition, the effect of mixing peat with rock phosphates on its effectiveness was investigated. The soils used

were an Alfisol, an Ultisol and a Histosol from Sri Lanka. Generally, TSP is considered the best source of P fertilizer for rice under particular crop-soil combinations. SERP is superior to ERP if it is to be used as a P fertilizer. All the residual experiments done using a second crop showed lower effectiveness of rock phosphates (both ERP and SERP) when compared to TSP. Thus, the complete substitution of TSP by rock phosphate (ERP or SERP) is found to be not practicable.

The agronomic effectiveness of 50% partially substituted TSP by SERP was compared separately with that of 100% SERP, and 100% TSP in greenhouse using an Alfisol, for the test crops of rice (BG-94-1) and maize (*Zea mays* L.). Application of SERP in combination with TSP does not seem to be more effective than the application of 100% SERP under these crop - soil combinations. However, this has to be analyzed further under long term field conditions with more crop- soil combinations.