# Principal component analysis of factors determining phosphate rock dissolution on acid soils

## ABSTRACT

Many of the agricultural soils in Indonesia are acidic and low in both total and available phosphorus which severely limits their potential for crops production. These problems can be corrected by application of chemical fertilizers. However, these fertilizers are expensive, and cheaper alternatives such as phosphate rock (PR) have been considered. Several soil factors may influence the dissolution of PR in soils, including both chemical and physical properties. The study aimed to identify PR dissolution factors and evaluate their relative magnitude. The experiment was conducted in Soil Chemical Laboratory, Universiti Putra Malaysia and Indonesian Center for Agricultural Land Resources Research and Development from January to April 2002. The principal component analysis (PCA) was used to characterize acid soils in an incubation system into a number of factors that may affect PR dissolution. Three major factors selected were soil texture, soil acidity, and fertilization. Using the scores of individual factors as independent variables, stepwise regression analysis was performed to derive a PR dissolution function. The factors influencing PR dissolution in order of importance were soil texture, soil acidity, then fertilization. Soil texture factors including clay content and organic C, and soil acidity factor such as P retention capacity interacted positively with P dissolution and promoted PR dissolution effectively. Soil texture factors, such as sand and silt content, soil acidity factors such as pH, and exchangeable Ca decreased PR dissolution.