

Assessment of Al/Fe Humus, pH, and P Retention to Differentiate Andisols under Different Cultivation, Karanganyar, Central Java, Indonesia

Authors : Miseri Roeslan Afany, Nur Ainun Pulungan

Abstract : The unique characteristics of Andisol differentiate them from other soils. These characteristics become a guideline in determining management and usage with regards to agriculture. Especially in the tropical area, Andisols may have fast mineral alteration due to intensive water movement in the soils. Four soil chemical tests were conducted for evaluating soils in the study area. Al/Fe humus, allophane, pH, and P retention were used to differentiate Andisols under different practices. Non-cultivation practice (e.g. natural forest) and cultivation practices (e.g. horticulture systems and intensive farming systems) are compared in this study. We applied Blackmore method for P retention analysis. The aims of this study are: (i) to analyze the specific behavior of Al/Fe humus, pH, and allophane towards P retention in order (ii) to evaluate the effect of cultivation practices on their behavior changes among Andisols, and (iii) to gain the sustainable agriculture through proposing an appropriate soil managements in the study area. 5 observation sites were selected, and 75 soil sampling were analyzed in this study. The results show that the cultivation decreases P retention in all sampling sites. There is a declining from $\pm 90\%$ to $\pm 50\%$ of P retention in the natural forest where shifts into cultivated land. The average of P retention under 15 years of cultivation down into 63%, whereas, the average of P retention more than 15 years of cultivation down into 54%. Many factors affect the retention of P in the soil such as: (1) type and amount of clay, (2) allophane and/or imogolite, (3) Al/Fe humus, (4) soil pH, (5) type and amount of organic material, (6) Exchangeable bases (Ca, Mg, Na, K), (7) forms and solubility of Al/Fe. To achieve the sustainable agriculture in the study area, conventional agriculture practices should be preserved and intensive fertilizing practices should be applied in order to increase the soil pH, to maintain the organic matter of andisols, to maintain microba activities, and to release Al/Fe humus complex, and thus increase available P in the soils.

Keywords : Andisols, cultivation, P retention, sustainable agriculture

Conference Title : ICSAEF 2017 : International Conference on Sustainable Agriculture, Environment and Forestry

Conference Location : London, United Kingdom

Conference Dates : June 28-29, 2017