Abstract

The low availability of phosphorus (P) in many tropical agricultural lands is a major constraint to crop production. Management of legumes that can grow well on low P soils while fixing optimal amounts of N may be a useful strategy to improve the efficiency of fertilizer use in these soils Experiments were designed to measure P dynamics and microbial biomass P (MBP) following incorporation of selected legume residues. Crop residues were obtained from field- grown pigeon pea (Cajanus cajan), groundnut (Arachis hypogaea), white lupin (Lupinus albus), soybean (Glycine max) lablab (Lablab purpureus) and maize (Zea mays). The residues and Minjingu phosphate rock (MRP) were incubated in different soils to follow labile P dynamics. Greater anion exchange membrane (AEM) P values were obtained in the less degraded Kereri soil, and varied across sampling times ($p < 0.0001$) in both soils with similar patterns. While all the plant residues depressed AEM P during the most part of the incubation period in the highly degraded soil, the control soil values remained lower than for the residues throughout the incubation period in the less degraded soil. Whether alone or mixed with residue, MRP caused a gradual increase in AEM P. A decrease with increasing length of continuous cultivation occurred in MBP and was increased by the plant residues in the highly degraded Bukuga soil to the level comparable to the non- degraded Koiben soil, ranging from 151 % in maize to 352 % in lablab. The most degraded Bukuga soil adsorbed more than twice the amount of P adsorbed by the non-degraded Koiben. Maize and soybean crop residues reduced P adsorption significantly while white lupine had no effect.