Supplement

SOIL MICROBES-PLANT COMPETITION FOR P IN THE SOIL AMENDED WITH PLANT MATERIALS FROM FALLOW VEGETATION

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Abstract

The use of plant materials for sustaining soil nutrient in slash-and mulch agricultural system has been reported causing nutrient immobilization by soil microbes, which in turn leads to inhibition of crop growth. Nutrient immobilization occurs mainly at the beginning of plant materials amendment. Immobilization period is very crucial to recognize in order to set a strategy of mulching management in sustainable agricultural system.

A simulation on soil microbes-maize competition was carried out in green house experiment to answer the question whether amendment with plant materials could improve P uptake by maize or whether it would cause reduction of available P due to microbial consumption (immobilization) during growing period.

Three percent (w/w of soil) of the fallow vegetation materials (Ficus, Albizia, Chromolaena, Macaranga and Trycospermum) were mixed with the top part of pre-incubated soil in the pots (1-3 cm). This set of treatment was contrasted with control (without amendment). Seeds of maize were sown at the time of plant materials amendment. Maize growth, soil P availability, P uptake and soil microbial P were investigated during growing period.

Amendment with plant materials into the soil significantly declined the maize biomass and P uptake particularly at 4th and 6th week after sowing. Extension of growing period up to 10 week enables the recovery of P uptake by maize grown on amended soil. The reduction of P uptake was due to declining of P concentration in the plant and inorganic P in the soil solution. At the period, in which, the biomass and uptake of maize grown on the amended soil were lower than those of control, the microbial-biomass P in the amended soil was significantly higher than in the control. The presence of plant on the amended soil resulted in a reduction of microbial biomass P.

Key words: plant material amendment, P-uptake, microbial-biomass P, inorganic P

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