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BIOSULFO FERTILIZER DEVELOPMENT FOR HORTICULTURE CROPS II. THE EFFECT OF PHOSPHATE ROCK CONTENT AND INOCULUM RATIO OF BIOSULFO ON P AND S UPTAKE AND YIELD OF RED ONION IN ACID AND ALKALINE SOILS

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ABSTRACT

Research aimed to study the influence of phosphate rock-sulfur (PRS) content and inoculum ratios of biosulfo on P and S uptake and red onion yield on acid (Alfisol) and alkaline (Vertisol) soils. Two factors evaluated were PRS content (0%, 60%, 80%) and inoculums of *A.niger* / *P.nalgiovensis* ratio of biosulfo (0:0, 1:1 and 3:1). As much of 12 kg of soil (Ø 2 mm) mixed thoroughly with biosulfo, basic fertilizer and manure, put into polybag then watering at field capacity moisture content. One bulb of red onion was planted to each polybag and incubated in the green house. The experiments arranged in completely randomized design with three replications. Variables observed included P and S uptake, and onion yield. Data analyzed with F test at 5% level of significant followed with DMRT if any significant influences. The result shows that the increases of PRS content as well as *A. niger* ratio of biosulfo tend to increase P and S uptake, especially on acid Alfisol. Highest P and S uptake and onion yield were achieved with treatment combinations of $P_{80}I_{11}$, $P_{80}I_{31}$, and $P_{60}I_{11}$ for Alfisol, and $P_{80}I_{11}$, $P_{60}I_{11}$ and $P_{60}I_{11}$ for Vertisol respectively.

Keywords: phosphate, rock content, inoculums ratio,P and S uptake, onion yield

INTRODUCTION

Efforts to increase the solubility of phosphate (P) from phosphate rock (PR) has been done by exploiting the role of phosphate solubilizer microbes, either of bacteria (Stevenson, 1986; Salih *et al.*, 1989; Tisdale *et al.*, 1990; Bar-Yosef *et al.*, 1999; Ariyanti, 2003) or fungi (Salih *et al.*, 1989; Singal, 1994; Goenadi *et al.*, 2000; Fenice *et al.*, 2000; Reddy *et al.*, 2002; Sastro, 2006). Microbes dissolve the PR-P by their acids produced, both organic (Stevenson, 1986; Bar-Yousef *et al.*, 1999; Fenice *et al.*, 2000; Gadagi and Sa, 2002; Sastro, 2006), as well as inorganic acids (Coyne, 1999). Partially acidulated with mineral or organic acid is an alternative way to increase the availability of P from phosphate rock to meet equal effectiveness with soluble phosphate fertilizers such as single super phosphate (SSP) or triple super phosphate (TSP) (Chien and Hammond, 1989; Bationo *et al.*, 1990; Menon *et al.*, 1991; Kpomblekou and Tabatabai, 2003). Partially acidulated can also be done with sulfuric acid produced by sulfur oxidizing microbes. Farmers in Australia have long been used Biosuper fertilizer made by mixing compost, phosphate rock and sulfur in order to increase the amount of available P (Tisdale *et al.*, 1990). The research of Supriyani (2006) showed the addition of sulfuric acid increased P dissolution of phosphate rock by the fungus of *A.niger* in Pikovskaya liquid medium. This opens up opportunities for joint use of elemental sulfur and its oxidizer to improve the dissolution of phosphate rock-P by phosphate solubilizer fungus. Phosphate solubilizer fungus *A. niger* and sulfur oxidizer fungus *P. nalgiovensis* individually have been known to dissolve the PR-P, but combining them into a formula of fertilizer such biosulfo to improve the dissolution of the PR-P is still not well known. Previous research has shown that P-solubilizer fungus *A. niger* and sulfur-oxidizer fungus *P. nalgiovensis* capable of dissolving PR-P and oxidize elemental sulfur of biosulfo fertilizer to available phosphate and sulfate significantly