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ORGANIC FERTILIZER DOSAGES AND BIOFILMED BIOFERTILIZER FORMULA ON NITROGEN UPTAKE AND SHALLOT YIELDS IN SLIGHTLY ACID SOIL

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INTRODUCTION

Shallot has a high economic value. It is used as a spice seasoning and traditional medicine for maagh, diabetes, and cholesterol. In Indonesia, it production continues to increase, but has not been able to meet the increasing demand (Elisabeth 2013) so is necessary to improve it. On the other hand, Alfisols is a marginal land with 12,749 ha in Indonesia (Munir 1996) potencial for shallot cultivation. However, Alfisols are soils characterized by low pH, low organic matter, shallow solum, high Al and Fe levels and macro nutrient deficiencies, especially nitrogen. The lack of available-N often results low shallot yields. Nitrogen deficiency can inhibit growth and produced small tubers (Abdissa et al 2011). This can be overcome by fertilization. Inorganic fertilizers can provide macro nutrients quickly (Minardi et al 2009) but excessive use of inorganic fertilizers can damage the soil structure. It is necessary to use fertilizers can improve the nature of chemistry, physics, and soil biology. Biofilmed biofertilizers are biological fertilizers that can be used as decomposers in the manufacture of organic fertilizers. Organic materials decomposed with biofilmed biofertilizer has the advantage of containing functional microbes from synergistic plant roots, and forming a thin layer of microbial consortia so as to increase nutrient availability through N fixation, P solubilization, K solubility and inhibit the growth of Fusarium oxysporum fungus (Sudadi et al 2011). The study was conducted to determine the dosage of organic fertilizer and the formula of biofilmed biofertilizer to decomposed it which increased N uptake and the shallot yield in Alfisols.

MATERIAL AND METODE

Experimental research was conducted in Alfisols of Jumantono, Karanganyar, Central Java, Indonesia. Soil and plant tissue analysis was conducted at Soil Chemistry and Soil Fertility Laboratory, Faculty of Agriculture, Sebelas Maret University, Surakarta. Red Shallot seeds used was Bima variety of Brebes. Experimental design used was Randomized Completely Block Design (RCBD) with two factor, i.e organic fertilizer doses (0, 10, and 20 ton ha^{-1}) and biofilmed biofertilizer formula (F0 = without biofilmed biofertilizer, F1 = formula 1 biofilmed biofertilizer, F2 = formula 2 biofilmed biofertilizer and F3 = commercial biofertilizer). Composition of organic fertilizer material is 20 kg of chicken manure, 20 kg dung, phosphate rock 5 kg, feldspar 1 kg, 0.5 kg sulphur, and dolomite 2 kg, 1.5 kg ash). Composition of Biofilmed Biofertilizer Formula 1 is phosphate solubilizing bacteria (PSB) (isolate TBH 18, PBH), phosphate solubilizing fungus (PSF) (*Aspergillus niger*, isolate YD 17), potassium solubilizing bacteria (isolate PPH 7), sulphur oxidizing bacteria (SoB) (isolate HBH12), *Beauveria*, *Trichoderma* sp., JPF (JPF isolates), *Aspergillus japonicas* (AJU isolates), nitrogen fixing bacteria (FP1), liquid media composition (coconut water 10 L, rice water 5 L water, ½ L molasses, SP-36 20 gr, KCl 10 gr and urea 10 gr). F2 is formula 1 without nitrogen fixing bacteria (NBI), F3 commercial biofertilizer inoculum. Organic fertilizer used is made by composting organic materials using the decomposer of F0, F1, F2, and F3. The ingredients are mixed evenly with the decomposer formula and made the water content ranges from 40-60% by adding water, then incubated for 2 weeks before used as organic fertilizer treatment. The data were analyzed using F test at 95% level confidence, followed by Duncan Multiple Range Test (DMRT) test if any significant differences.

RESULT AND DISCUSSION

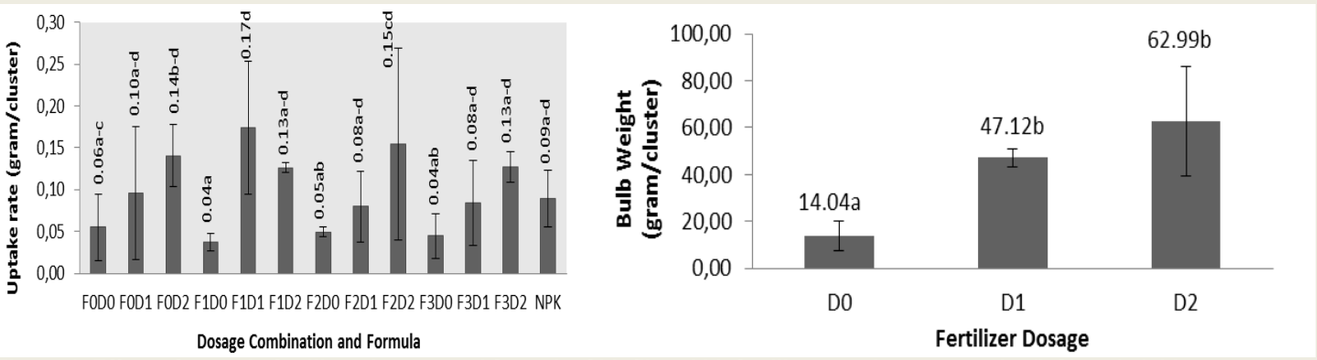

Figure 1. Effect of organic fertilizer dosage and formulaof biofilmed biofertilizer on nitrogen uptake (left) and yield (right) of shallot in Alfisols

The dose of organic fertilizer had significant effect on the weight of shallot bulbs, but the dosage and formula interactions as well as biofilmed biofertilizer formula had no significant effect. The application of organic fertilizer until 20 ton ha^{-1} increase shallot yield linierly, maybe because of low level of indigenous soil organic matter. Application of 20 tons ha^{-1} organic fertilizer decomposed with biofilmed biofertilizer give shallot yield of 62,9 g $clump^{-1}$ which inrease 348,65% from control treatment (14.04 g $clump^{-1}$). The highest N uptake resulted from the treatment combination of 10 tons ha^{-1} organic fertilizer and F1 i.e 0.17 gram N $cluster^{-1}$ which increase 183,33% from control treatment (0.06 g $clump^{-1}$).

CONCLUSION

Interaction of organic fertilizer dosage and biofilmed biofertilizer formula affect N uptake, while organic fertilizer dosages affect shallot yield. Combintation treatment of 10 $tonha^{-1}$ organic fertilizer and formula 1 biofilmed biofertilizer increase N utpake to 0.17 g N $clumb^{-1}$, which increase 183,3% than control treatment (0,06 g N $clumb^{-1}$). The application 20 $tonha^{-1}$ organic fertilizer increase shallot yield to 62,99 g $clump^{-1}$ which 348,6% more than control treatment (14.04 g clump-1). The increase of shallot bulb yield is still linear with the increase of fertilizer dose up to 20 ton ha^{-1} allegedly because of low inisial soil organic matter content.