

OPTIMALISASI KERJA MYCOFER DENGAN AUGMENTASI MIKROORGANISME TANAH POTENSIAL DAN ASAM HUMAT UNTUK REHABILITASI LAHAN MARGINAL DAN TERDEGRADASI DI INDONESIA

(OPTIMIZATION OF MYCOFER PLUS AND AUGMENTATION OF POTENTIAL SOIL
MICROORGANISM AND HUMIC ACID FOR REHABILITATION OF MARGINAL AND
DEGRADED LAND IN INDONESIA)

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ABSTRACT

Marginal and degraded lands in Indonesia are considerably extensive and include many kinds of soil, for instance acid soil and post mining soil. Efforts to overcome the problem of acid soils and post mining soil are the use of biological fertilizer such as arbuscular mycorrhizal fungi (FMA), phosphate dissolving microorganism (MPP), and nitrogen fixer microorganism (MPN). The objective of this research was seeking new formulation of biological fertilizer which constitute a consortium between Mycofer with MPP, MPN, and humic acid which could increase its ability for supplying nutrients and help to increase plant survival in less favorable environment. The first year research comprised the following research stages: (i), Preparation of augmentation materials, namely multiplication of potential microbe (FMA, MPP and MPN) and humic acid; (ii) Formulation of biological fertilizer which constitute the consortium of Mycofer with MPP, MPN and humic acid. There were 6 formulas of biological fertilizer which were tested in this research, namely (a) Mycofer with addition of MPP isolates 1, 2 dan 3; (b) Mycofer with addition of Azospirillum isolates 1, 2 and 3; (c) Mycofer with addition of Rhizobium isolates 1, 2 and 3; (d) Mycofer with addition of humic acid; (e) Mycofer with addition of MPP, Azospirillum and Rhizobium; (f) Mycofer with addition of MPP, Azospirillum, Rhizobium and humic acid; (iii) Test of Mycofer plus formulation in post mining acid soil and latosol soil at laboratory scale with corn crop and Legum Cover Crop (LCC) which comprised (a) *Centrosema pubesens* (b) *Pueraria phaseoloides*, and grasses which comprised (a) *Panicum maximum*, and (b) *Setaria splendida* in pots with 5 kg capacity for 3 months. In the second year research, the first factor was microbe treatment, which comprised 4 levels, namely P1 (control), P2 (mycofer), P3 (mycofer with Azospirillum/Rhizobium) and P4 (mycofer, Azospirillum/Rhizobium, and MPP); whereas the second factor was technological treatment which comprised 3 kinds of technology, namely T1 (SOP of gold mining), T2 (technology of soil amelioration), and T3 (hydroseeding technology). Result of the first year research indicate that the five crops species tested gave different responds weather in latosol soil or in post mining soil. In general, all plant species tested indicate that they not only need single microorganism but need consortium of microorganism. The plants were better growth when inoculated with consortium of microorganism combined with humic acid both in latosol soil and post gold mining soil respectively. The second year research was conducted in post gold mining land of PT Aneka Tambang, in Pongkor, Bogor. The results showed the tolerant crops that did not require technology and addition of microbe for their growth are *Calopogonium muconoides* and *Setaria splendida* whereas *Brahiaria humidicola* and *Centrosema pubesescens* only required treatment P3, P4 and P2. *Pueraria phaseoloides* and *Panicum maximum* were categorized as sensitive plants because they required additio of microbes and technology, namely treatments T3P3 an treatment T3P4.

Keywords : Marginal land, Arbuscular Mycorrhizal Fungi, Phosphate Dissolving Microorganism, Nitrogen Fixer Microorganism, Humic Acid.

ABSTRAK

Tanah marginal dan terdegradasi di Indonesia cukup banyak, antara lain tanah masam dan tanah pasca penambangan. Untuk mengatasinya dengan penggunaan pupuk hayati yaitu fungi mikoriza arbuskula (FMA), mikroorganisme pelarut fosfat (MPP) dan mikroorganisme penambat nitrogen (MPN). Penelitian ini bertujuan untuk mendapatkan formulasi baru pupuk hayati yang merupakan konsorsium antara Mycofer (FMA) dengan MPP, MPN, dan asam humat agar dapat lebih meningkatkan kemampuannya dalam menyediakan unsur hara dan

membantu ketahanan tanaman pada lingkungan yang kurang menguntungkan. Penelitian ini terdiri dari penelitian tahun pertama terdiri dari 3 tahap yaitu: (i) Persiapan bahan augmentasi: perbanyak mikroba

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