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**Pengaruh Fly Ash Batubara, Pupuk Kandang Dan Kalium Humat Terhadap Sifat Kimia Tanah Dan Pertumbuhan
Gama Umami Pada Inceptisol Patuk, Gunungkidul**
Gilang Saputra Syahrul Ramadhan, Dr. Agr. Cahyo Wulandari, S.P., M.P.; Imas Masithoh Devangsari, S.P., M.Sc., P
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INTISARI

Inceptisol di Kecamatan Patuk, Gunungkidul, memiliki kendala kemasaman yang membatasi produktivitas pertanian. Pemanfaatan *fly ash* batubara, pupuk kandang sapi, dan kalium humat berpotensi sebagai amelioran, namun efektivitas kombinasinya belum banyak dikaji. Penelitian ini bertujuan untuk mengkaji pengaruh *fly ash* batubara yang diperkaya pupuk kandang sapi dan kalium humat terhadap sifat kimia Inceptisol Patuk dan sifat agronomis Rumput Gama Umami, serta menentukan kombinasi perlakuan optimalnya. Penelitian menggunakan Rancangan Acak Lengkap non-faktorial dengan sepuluh perlakuan: F0 (tanpa perlakuan), F1 (urea 100 kg/ha), FA (*Fly ash* 20 ton/ha), PK10 (pupuk kandang 10 ton/ha), FAPK10 (FA + PK 10 ton/ha), FAPK5 (FA + PK 5 ton/ha), FAKH (FA + KH 10 kg/ha), FAPK10KH (FA + PK 10 ton/ha + KH), FAPK5KH (FA + PK 5 ton/ha + KH), dan FAPK2,5KH (FA + PK 2,5 ton/ha + KH), masing-masing diulang empat kali. Hasil penelitian menunjukkan penambahan *fly ash*, pupuk kandang, dan kalium humat berpengaruh sangat nyata terhadap pH H_2O, pH KCl, C-organik, bahan organik, serta ketersediaan Ca, Mg, dan K pada fase inkubasi maupun panen dibandingkan tanpa pemberian pembenah tanah. Perlakuan FAPK5KH secara konsisten menghasilkan nilai tertinggi pada mayoritas parameter sifat kimia tanah meliputi C-organik (2,17%), Ca tersedia (25,53 cmol(+)/kg), dan K tersedia (1,67 cmol(+)/kg) pada 56 HST, serta parameter agronomis meliputi berat basah akar (176,70 gram), berat basah tajuk (953,75 gram), berat kering akar (15,83 gram), dan berat kering tajuk (184,63 gram). Rumput Gama Umami terbukti berpotensi sebagai agen fitostabilisasi Cr dengan BCF akar >72,01 dan TF <1. Temuan ini membuktikan bahwa substitusi 50% pupuk kandang dengan kalium humat dalam sistem ameliorasi berbasis *fly ash* mampu meningkatkan efisiensi penggunaan bahan organik tanpa mengurangi efektivitas perbaikan sifat kimia tanah Inceptisol Patuk, Gunungkidul.

Kata kunci: *Fly ash*, kalium humat, pupuk kandang sapi, inceptisol masam, substitusi, rumput gama umami

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ABSTRACT

Inceptisols in Patuk District, Gunungkidul, are constrained by soil acidity, which limits agricultural productivity. Coal fly ash, cattle manure, and potassium humate have potential as soil amendments, but the effectiveness of their combination has been little studied. This study aimed to examine the effects of coal fly ash enriched with cattle manure and potassium humate on the chemical properties of Patuk Inceptisol and on the agronomic traits of Gama Umami grass, and to determine the optimal treatment combination. The study used a non-factorial Completely Randomized Design with ten treatments: F0 (no treatment), F1 (urea, 100 kg/ha), FA (fly ash, 20 tons/ha), PK10 (cattle manure, 10 tons/ha), FAPK10 (FA + PK 10 tons/ha), FAPK5 (FA + PK 5 tons/ha), FAKH (FA + KH 10 kg/ha), FAPK10KH (FA + PK 10 tons/ha + KH), FAPK5KH (FA + PK 5 tons/ha + KH), and FAPK2.5KH (FA + PK 2.5 tons/ha + KH), each with four replications. The results showed that the addition of fly ash, cattle manure, and potassium humate had a highly significant effect on soil pH (H_2O), pH (KCl), organic carbon, organic matter, and the availability of Ca, Mg, and K during both the incubation and harvest phases, compared with the control without soil amendments. The FAPK5KH treatment consistently gave the highest values for most soil chemical parameters, including organic carbon (2.17%), available Ca (25.53 cmol(+)/kg), and available K (1.67 cmol(+)/kg) at 56 days after planting (DAP), as well as for agronomic parameters, including root fresh weight (176.70 g), shoot fresh weight (953.75 g), root dry weight (15.83 g), and shoot dry weight (184.63 g). Gama Umami grass showed potential as a Cr phytostabilization agent, with a root BCF of >72.01 and a TF of <1. These findings demonstrate that replacing 50% of the cattle manure with potassium humate in a fly ash–based amelioration system can improve the efficiency of organic matter use without reducing the effectiveness of improving the chemical properties of Patuk Inceptisol, Gunungkidul.

Keywords: Fly ash, potassium humate, cattle manure, acidic inceptisol, substitution, gama umami grass