

**PERAN HUMUS SINTETIS DALAM MENGENDALIKAN TRANSFER
ELEKTRON PADA LAHAN PERTANIAN
TANPA OLAH TANAH (TOT)**

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INTISARI

Penelitian tentang peran humus sintetis dalam mengendalikan transfer elektron pada lahan pertanian Tanpa Olah Tanah (TOT) telah dilakukan. Penelitian ini bertujuan untuk mengetahui pengaruh penambahan humus sintetis terhadap magnetisasi fraksi magnetik dan pengaruh penambahan humus sintetis terhadap pengendalian transfer elektron pada lahan pertanian TOT. Pengambilan sampel dilakukan di Jalan Cangkringan, Purwo Martani, Kalasan, Kabupaten Sleman, DIY pada koordinat 7°45'31,5756" LS, 110°27'53,0316" BT. Terdapat 2 petak lahan pertanian yang digunakan sebagai tempat pengambilan sampel, yaitu yang diberi humus sintetis dan tidak diberi humus sintetis. Analisis terhadap kandungan Bahan Organik Tanah (BOT) dan C organik dilakukan menggunakan metode Walkley and Black dan N total menggunakan metode Kjeldahl. Fraksi magnetit dipisahkan menggunakan medan magnet 100, 200, 300, 400, 500, 600, 700, 800, 900, dan 1000 Gauss. Persentase massa hasil pemisahan magnetit ditentukan dan dikarakterisasi dengan FTIR. Karakterisasi menggunakan XRF dan TEM juga dilakukan untuk mengkonfirmasi hasil karakterisasi FTIR.

Hasil pemisahan fraksi magnetit menunjukkan bahwa persentase massa fraksi magnetit yang tertarik pada tanah yang diberi humus sintetis sebesar 1,85%, sedangkan pada tanah yang tidak diberi humus sintetis sebesar 0,86%. Hasil karakterisasi dengan FTIR menunjukkan adanya ikatan O-H, C-H alifatik, C=O dan C=C aromatik, COO-, Si-O-Si, dan Fe-O magnetit. Data XRF menunjukkan kandungan Fe dan Fe₂O₃ tanah yang diberi humus sintetis sebesar 6,63% dan 9,47%, sedangkan tanah yang tidak diberi humus sintetis sebesar 5,64% dan 8,07%. Hasil TEM menunjukkan adanya nanopartikel magnetit yang dilapisi oleh bahan organik dengan diameter antara 3,85-43,65 nm.

**Kata kunci: humus sintetis, transfer elektron, partikel magnetik, pertanian
TOT**

ROLE OF SYNTHETIC HUMUS IN CONTROLLING ELECTRON TRANSFER IN NO-TILLAGE FARMING LAND

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ABSTRACT

Experiment about the role of synthetic humus in controlling electron transfer in no-tillage farming land was studied. This study aimed to determine the effect of synthetic humus to the magnetization of the magnetite particles and the effect of adding synthetic humus to control electron transfer in no-tillage farming land. Sampling was carried out at Jalan Cangkringan, Kalasan, Sleman, DIY, Indonesia at coordinate 7°45'31.5756" S, 110°27'53.0316" E. There were two plots of agricultural land used for sampling, which were added and not added by synthetic humus. The analysis of the content of soil organic matter (SOM), organic carbon and total N performed on both samples. Magnetite fraction of both samples were separated using magnetic fields 100, 200, 300, 400, 500, 600, 700, 800, 900, and 1000 Gauss, Mass percentage of magnetite separation results are determined and characterized by FTIR. Characterization using XRF and TEM were also performed to confirm the results of FTIR characterization.

Results of magnetite fraction separation show that the mass percentage of the magnetite fractions which were attracted to the soil which was added by synthetic humus was 1.85%, while on the soil which was not added by synthetic humus was 0.86%. The results of characterization by FTIR indicate the presence of O-H, C-H aliphatic, C=O and C=C aromatic, COO⁻, Si-O-Si, and Fe-O magnetite bond. XRF data shows the content of Fe and Fe₂O₃ soil which was added by synthetic humus were 6.63% and 9.47%, while the soil which was not added by synthetic humus were 5.64% and 8.07%. TEM result indicates the presence of magnetite nanoparticles coated with organic material with a diameter of between 3.85 to 43.65 nm.

Keywords: synthetic humus, electron transfer, magnetic particle, no-tillage farming