Analisis pengaruh saturasi fluida berdasarkan variasi konsentrasi larutan pupuk kompos, urea, dan NPK terhadap resistivitas tanah = Analysis of the effect of fluid saturation based on variations of the concentration of compost, urea, and NPK fertilizer solutions on soil resistivity

Ratna Maulidia, author

Abstrak

Karakterisasi tanah dan air yang meliputi pengambilan sampel tanah dan analisis laboratorium penting dilakukan dalam upaya pencegahan pencemaran lingkungan yang disebabkan oleh produksi pertanian secara intensif. Pengukuran resistivitas listrik tanah skala laboratorium dengan metode empat elektrode telah dilakukan untuk menganalisis pengaruh saturasi fluida terhadap resistivitas listrik tanah. Delapan sampel tanah disiapkan untuk pengukuran resistivitas listrik dengan menginjeksikan larutan pupuk kompos dengan konsentrasi larutan 28,6%, urea dengan konsentrasi larutan 0,013%; 0,022%; 0,038%, NPK dengan konsentrasi larutan 0,013%; 0,022%; 0,038% , serta akuades pada sampel tanah dengan tingkat saturasi 4%-100% dari volume porinya. Pengukuran estimasi sifat fisika-kimia fluida seperti resistivitas listrik larutan, TDS, salt, dan pH dari larutan pupuk juga dilakukan menggunakan alat water quality meter untuk dianalisis pengaruhnya terhadap resistivitas listrik tanah. Hasil menunjukkan, pada seluruh variasi konsentrasi larutan memiliki pola yang sama, penurunan resistivitas listrik terjadi seiring dengan bertambahnya saturasi fluida hingga pada saturasi fluida 80-90%. Setelah melewati saturasi tersebut, nilai resistivitas tanah cenderung konstan. Hubungan resistivitas listrik tanah dan saturasi fluida juga dijelaskan mengikuti Hukum Archie, diperoleh a = 0,7164-0,9149 dan eksponen saturasi (n) = 2,312-3,496 dengan koefisiden determinasi (R2) = 0,9187-0,9565. Sifat fisika-kimia dari larutan pupuk juga berkontribusi terhadap perbedaan nilai resistivitas listrik tanah. Dari penelitian ini diharapkan dapat menjadi referensi untuk memprediksi saturasi air pada suatu lahan serta menentukan zona batas toleransi tanaman terhadap salinitas.

.....Soil and water characterization is important in preventing environmental pollution caused by intensive agricultural production. Laboratory-scale soil electrical resistivity measurements using the four-electrode method have been carried out to analyze the effect of fluid saturation on the soil electrical resistivity. Eight soil samples were prepared for the measurement of electrical resistivity by injecting a solution of compost (solution concentration = 28.6%), urea (solution concentrations = 0.013%; 0.022%; 0.038, NPK (solution concentrations = 0.013%; 0.022%; 0.038%) and distilled water in soil samples with a saturation level of 4%-100%. Measurements of the estimation of the physico-chemical properties of the fluid such as the electrical resistivity, TDS, salt, and pH of the fertilizer solution using a water quality meter were also carried out to analyze the effect on the electrical resistivity of the soil. The results show that the electrical resistivity of the soil decreases along with the increase in fluid saturation until the fluid saturation is 80-90% at all solution concentrations. After passing through the saturation, the electrical resistivity of the soil tends to be constant. The relationship between the soil electrical resistivity and the saturation of the fluid is also explained according to Archie's Law, obtained a = 0,7164-0,9149 and the saturation exponent (n) = 2,312- 3,496 with coefficient of determination (R2) = 0,9187-0,9565. The physico-chemical properties of the fertilizer solution also contribute to the difference in the electrical resistivity of the soil. This research is expected to be a reference for predicting water saturation in agricultural land and determining the tolerance zone of plants to

salinity.