

INTISARI

Kualitas air merupakan syarat penting untuk irigasi pertanian. Pembuangan limbah industri gula dan spiritus ke saluran irigasi berpotensi memengaruhi kualitas air serta sifat fisika tanah di sekitarnya. Penelitian ini bertujuan untuk mengetahui pengaruh limbah cair Pabrik Gula dan Spiritus Madukismo terhadap sifat fisika tanah sawah di Desa Tirtonirmolo. Penelitian dilakukan dengan pengambilan sampel tanah pada 15 titik lahan kontrol dan 15 titik lahan yang teraliri limbah, serta pengambilan sampel limbah pabrik gula, limbah pabrik spiritus, air Sungai Winongo, dan air irigasi yang terkontaminasi limbah. Hasil penelitian menunjukkan bahwa limbah Pabrik Gula dan Spiritus Madukismo meningkatkan kadar BOD, COD, dan sulfida hingga melebihi ambang batas baku mutu air sungai. Limbah tersebut juga meningkatkan kadar TSS, TDS, DHL, dan mengubah pH air irigasi Sungai Winongo menjadi sesuai untuk irigasi pertanian. Adanya limbah pabrik gula dan spiritus dalam air irigasi berpengaruh pada peningkatan kandungan bahan organik, porositas, pori drainase cepat, dan jeluk padas olah serta penurunan berat volume tanah secara signifikan dibanding kontrol. Jarak lahan teraliri limbah dari pabrik hanya berpengaruh signifikan pada penurunan air drainase. Jarak lahan teraliri limbah mencapai 2.498 m tidak berpengaruh signifikan pada perubahan fraksi debu, fraksi lempung, fraksi pasir, bahan organik, berat jenis, berat volume, porositas, PDC, PDL, air tersedia, permeabilitas, kemantapan agregat, dan jeluk padas olah serta cenderung memiliki arah hubungan yang berbeda dengan pengaruh limbah terhadap sifat fisika tanah.

Kata kunci: kualitas air, pencemaran, porositas tanah, Sungai Winongo, volume tanah

ABSTRACT

Water quality is an essential requirement for agricultural irrigation. The discharge of sugar and distillery industry effluents into irrigation channels may affect both water quality and the physical properties of surrounding soils. This study examined the effects of liquid waste from the Madukismo Sugar Mill and Distillery on the physical properties of paddy soils in Tirtonirmolo Village. Soil samples were collected from 15 control plots and 15 effluent-irrigated plots, along with samples of sugar mill effluent, distillery spent wash, Winongo River water, and effluent-contaminated irrigation water. The results showed that effluents from the Madukismo Sugar Mill and Distillery increased BOD, COD, and sulfide levels beyond the permissible limits for river water quality standards. The effluents also raised TSS, TDS, and electrical conductivity, and altered the pH of Winongo River water, classifying it under irrigation water quality standards. Irrigation with effluents significantly increased soil organic matter, porosity, rapid drainage pores, and plow pan depth, while reducing bulk density compared to the control. The distance of effluent-irrigated fields from the factory had a significant effect only on drainage water. Up to 2,498 m, effluent irrigation did not significantly affect soil texture (silt, clay, sand), organic matter, particle density, bulk density, porosity, drainage pores, available water, permeability, aggregate stability, or plow pan depth, although some variables showed contrasting trends compared to the direct effects of effluents on soil physical properties.

Keywords: pollution, soil porosity, soil volume, water quality, Winongo River