



Int. J. New. Chem., 2020, Vol. 7, Issue 1, pp. 14-29.

International Journal of New Chemistry

Published online January 2020 in <http://www.ijnchem.ir/>.

Open Access

Print ISSN: 2645-7236

Online ISSN: 2383-188x



Original Research Article

Determination of Selected Pesticide Residues from Gilgel Gibe (I) Hydroelectric Dam Reservoir and Its Tributaries, Jimma Zone, Ethiopia

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Received: 2019-08-24

Accepted: 2019-09-15

Published: 2020-01-04

ABSTRACT

In this study, the level of selected organophosphorus and organochlorine pesticide residues from water samples of Gilgel Gibe (I) hydroelectric dam reservoir and its potential tributaries, Jimma zone, Ethiopia, was determined by gas chromatography-electron capture detector (GC-ECD). Low density based dispersive liquid-liquid microextraction (LD-DLLME) using toluene (as extractant) and acetonitrile (as disperser) was used for extraction of pesticide residues from the samples. Calibration curves constructed at six concentration points have good linearity with coefficient of determination (r^2) ranging from 0.995 - 0.999. The limits of detection (LOD) and quantification (LOQ) of the method which were determined as 3 and 10 times the signal-to-noise ratio were ranging from 0.0001 - 2.5810 $\mu\text{g/L}$ and 0.0005 - 8.6050 $\mu\text{g/L}$, respectively. The efficiency of the method was also evaluated using recovery studies by spiking the water samples with known concentrations of the analytes. The obtained recoveries were ranging from 67 - 105% with relative standard deviations of 0.79 - 12.5%. The findings revealed that the studied water samples contain significant amount of the target pesticides, but endrin was not detected in any of the water sample. Methidathion was also detected only in Nada Qalla and Nada Gudda river water samples. The detected residual concentrations of the target pesticides were above the maximum residue limits, except DDT in acute toxic level. The finding indicated that the studied water samples contain considerable amount of the studied residual pesticides that can influence the health of aquatic organisms and other consumers.

Keywords: Pesticide residues, Water samples, Dispersive liquid-liquid microextraction, Gas chromatography-electron capture detector