T Benarji Patrudu, J Geol Geophys 2018, Volume 7
DOI: 10.4172/2381-8719-C1-017

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Application of zinc oxide nanoparticles as catalyst in dissipation kinetics of imidacloprid insecticide in different pH water and soil under direct sunlight

The dissipation behavior of imidacloprid under direct sunlight using Zinc oxide nanoparticles as catalyst has been studied. Zinc oxide nanoparticles are synthesized and characterized by Scanning Electron Microscopy (SEM), X-ray Diffraction (XRD), Transmission Electron Microscope (TEM) and Fourier Transform Infrared Spectroscopy (FT- IR). The experiment was conducted by spiking in three different aqueous buffer solutions having pH 4.0, 7.0 and 9.0 to give the uniform concentrations of T0–Untreated Control, T1–Imidacloprid 60% w/v Flowable for Seed Treatment (FS) at 1 mg/L of water and T2–Imidacloprid 60% w/v Flowable for Seed Treatment (FS) at 2 mg/L of water. The spiked samples were kept under sunlight. The sampling occasions were 0, 6th, 12th, 24th, 48th, 72nd and 96th hour for acidic water (pH 4.0), neutral (pH 7.0) and basic water (pH 9.0). The collected samples were quantified using a validated High Performance Liquid Chromatography With Ultra Violet Detector (HPLC-UV) at a wavelength of 254 nm with a flow rate of 1.0 ml/min, injection volume 5 µL, column oven temperature being 30°C, with mobile phase as acetonitrile:water (30:70 (v/v)) and Phenomenex C18, 250x4.6 mm, 5 µm column was used. The method has the limit of detection 0.03 mg L^{-1} and the Limit of Quantification (LOQ) 0.05 mg L^{-1} based on signal to noise ratio 3:1 and 10:1, respectively for all the molecules investigated. The residues of imidacloprid in aqueous buffer solutions dissipated to below the detectable level by 96th hour. The DT50 (half-life) of imidacloprid was calculated by regression analysis from the dissipation data.

Biography

T Benarji Patrudu has completed his PhD from Andhra University, Visakhapatnam. He is currently working as an Associate Professor in the Department Of Chemistry, Gandhi Institute of Technology and Management University, Hyderabad, India. His area of research includes analytical methods for bio, environmental and pharmaceutical samples. He has published 40 research articles in reputed international and national journals and has published 18 papers in national conferences.

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