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Simultaneous determination and risk assessment of fipronil and its metabolites in sugarcane, using GC-ECD and confirmation by GC-MS/MS

Subrata Biswas^a, Rahul Mondal^b, Ayan Mukherjee^b, Mitali Sarkar^a, Ramen Kumar Kole^{b,*}

^aDepartment of Chemistry, University of Kalyani, Kalyani, Nadia, West Bengal-741235, India.

^bDepartment of Agricultural Chemicals, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal-741252, India.

*Corresponding author: rkkole@gmail.com

ABSTRACT

A sensitive gas chromatographic method using a modified QuEChERS technique is reported for simultaneous determination, dissipation and risk assessment of fipronil and its metabolites in sugarcane and soil. Recoveries were 80.7-98.5% with precision within 1.4-16.5% estimated at the limits of detection (LOD) 0.0015-0.002 $\mu\text{g g}^{-1}$ and limits of quantification (LOQ) 0.005 $\mu\text{g g}^{-1}$. Fipronil dissipated with half-life ($T_{1/2}$) of 2.8-4.3 days while for total fipronil it was 3.7-6.0 days following application of fipronil (5% SC) in sugarcane fields at recommended (100 g a.i. ha^{-1}) and double the recommended (200 g a.i. ha^{-1}) doses. Estimated pre-harvest intervals (PHI) for fipronil were 20.3-27.0 days in sugarcane plants, and for total fipronil the corresponding values were 28.2-37.8 days. No dietary risk was observed due to fipronil ($\text{RQ}_d < 1$) 5 days after application. Potential risk exists towards algae and soil macro-organism ($\text{RQ}_s > 1$), but for earthworms it was safe ($\text{RQ}_s < 1$).

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