

DETERMINATION OF CYPERMETHRIN IN LEAF SAMPLES USING GAS CHROMATOGRAPHY WITH MASS SPECTROMETER DETECTOR

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Insecticides are used in the oil palm plantation to control insect pests. Insecticides such as cypermethrin are commonly used to treat bagworms, nettle caterpillars and rhinoceros beetles. The use of pesticides in oil palm plantations has resulted in a growing concern for the presence and danger of the residues in the environment. A method has been developed to monitor leaching and the persistence of insecticides such as cypermethrin in the oil palm agroenvironment.

Cypermethrin (Figure 1) is the common name for (RS)- α -cyano-3 phenoxybenzyl (1RS)-*cis,trans*-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate (C₂₂H₁₉Cl₂NO₃). *Aimcoyper*, *Ambush*, *Ammo*, *Cynoff* and *Cypercopal* are some of the trade names of cypermethrin. In its pure form, cypermethrin, is an odourless crystal, while a sample of 93% purity is a viscous semi-solid. Its melting point is in the range of 60°C-80°C. Cypermethrin is less soluble in water (0.01 mg litre⁻¹). Its molecular weight is 416.3.

OBJECTIVES

- To detect and quantify residual cypermethrin in leaf.
- Information on the fate of cypermethrin in the oil palm agroenvironment.

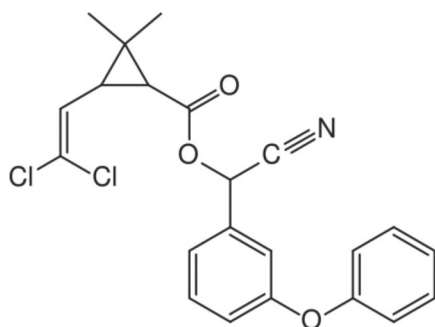


Figure 1. Chemical structure of cypermethrin.

METHODOLOGY

The method involves the extraction of cypermethrin from leaf by solid phase extraction (SPE) technique. The detection and quantification of cypermethrin is by gas chromatography with a mass spectrometer detector (GC-MSD) (Figure 2).

RECOVERY STUDIES

Recoveries of cypermethrin from leaf samples spiked with 0.3 - 2.0 $\mu\text{g g}^{-1}$ standard cypermethrin ranged from 98.1% - 104.0% with coefficients of variation between 0.002% - 0.05%. Figure 3 is the GC-MSD chromatograms of (A) blank leaf, (B) standard cypermethrin, 1.0 $\mu\text{g g}^{-1}$ and (C) leaf sample spiked with 1.0 $\mu\text{g g}^{-1}$ cypermethrin standard. The limit of detection of cypermethrin in leaf using GC-MSD is 0.05 $\mu\text{g g}^{-1}$.



Figure 2. Gas chromatography with mass spectrometry detector (GC-MSD).

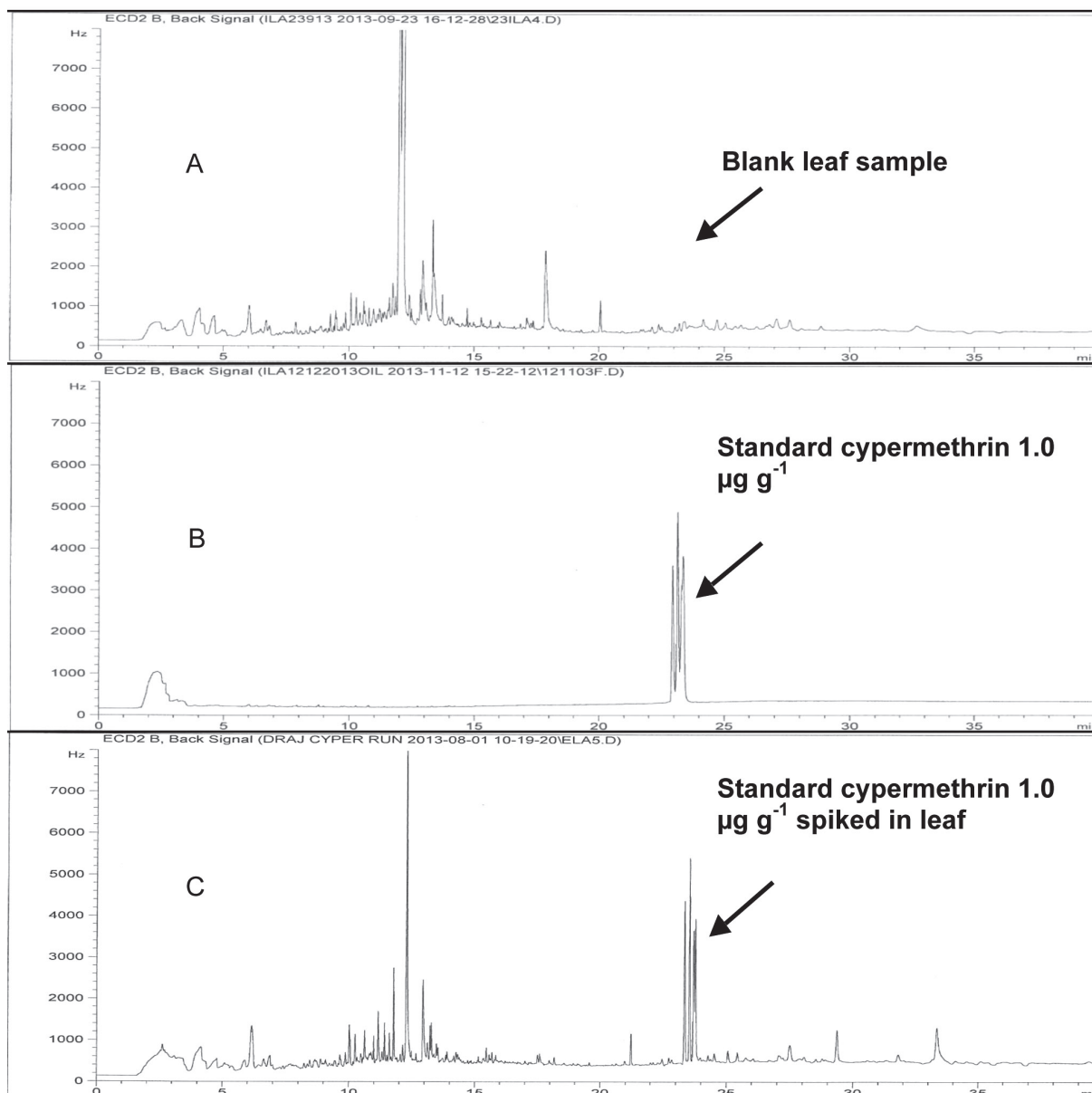


Figure 3. GC-MSD chromatograms of (A) blank leaf, (B) standard cypermethrin $1.0 \mu\text{g g}^{-1}$ and (C) leaf spiked with $1.0 \mu\text{g g}^{-1}$ cypermethrin standard.

BENEFITS

- A precise and reliable method for the detection and quantification of cypermethrin residue in leaf.
- Generation of environmental data on cypermethrin in leaf.

TYPE OF SERVICE

Detection and quantification of cypermethrin in leaf samples.

INDICATIVE COST

The cost for this analysis in 2014 is approximately RM 150 per sample and is subject to change.

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