

In Malaysia, crude palm oil (CPO) and crude palm kernel oil (CPKO) are the main feedstock for the production of a wide variety of palm-based derivatives for both food and non-food applications including oleochemicals. These derivatives are widely used in the production of candles, cosmetics, soap, lubricants, grease, agrochemicals, *etc.* There are a number of fatty acids produced from palm kernel oil. One of them is oleic fatty acid (C18:1) and it is normally used in palm-based food products.

The use of cypermethrin insecticide in oil palm plantations has resulted in a growing concern for the presence and danger of its residue in palm oil. Cypermethrin is commonly used to treat bagworms, nettle caterpillars and rhinoceros beetles. In order to ensure that C18:1 fatty acid used for palm-based food products are free from cypermethrin residue, a method has been developed to monitor the presence of this insecticide in C18:1 fatty acid.

Cypermethrin (*Figure 1*) is the common name for (RS)- α -cyano-3 phenoxybenzyl (1RS)-*cis*, *trans*-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropane-carboxylate (C₂₂H₁₉Cl₂NO₃). *Aimcocyper*, *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.

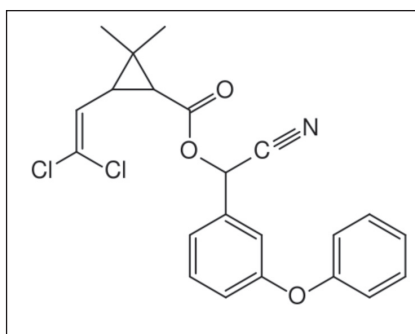


Figure 1. Chemical structure of cypermethrin.

OBJECTIVE

To detect and quantify residual cypermethrin in C18:1 palm-based fatty acid.

METHODOLOGY

The method developed involves the extraction of cypermethrin from C18:1 fatty acid sample using a low-temperature precipitation technique. The detection and quantification of cypermethrin is by gas chromatography using micro-electron capture detector (GC- μ ECD) (*Figure 2*).



Figure 2. Gas chromatography with micro-electron capture detector (GC- μ ECD).

RECOVERY STUDIES

Average recoveries of cypermethrin from C18:1 fatty acid samples spiked with 0.08-1.0 μ g ml⁻¹ of standard cypermethrin ranged from 78.14%-96.74% with coefficients of variation between 0.019%-0.069%. *Figure 3* is the GC- μ ECD chromatograms of (A) blank C18:1 fatty acid, (B) standard cypermethrin 1.0 μ g ml⁻¹ and (C) C18:1 fatty acid spiked with 1.0 μ g ml⁻¹ cypermethrin standard. The limit of detection of cypermethrin in C18:1 fatty acid is 0.08 μ g g⁻¹.

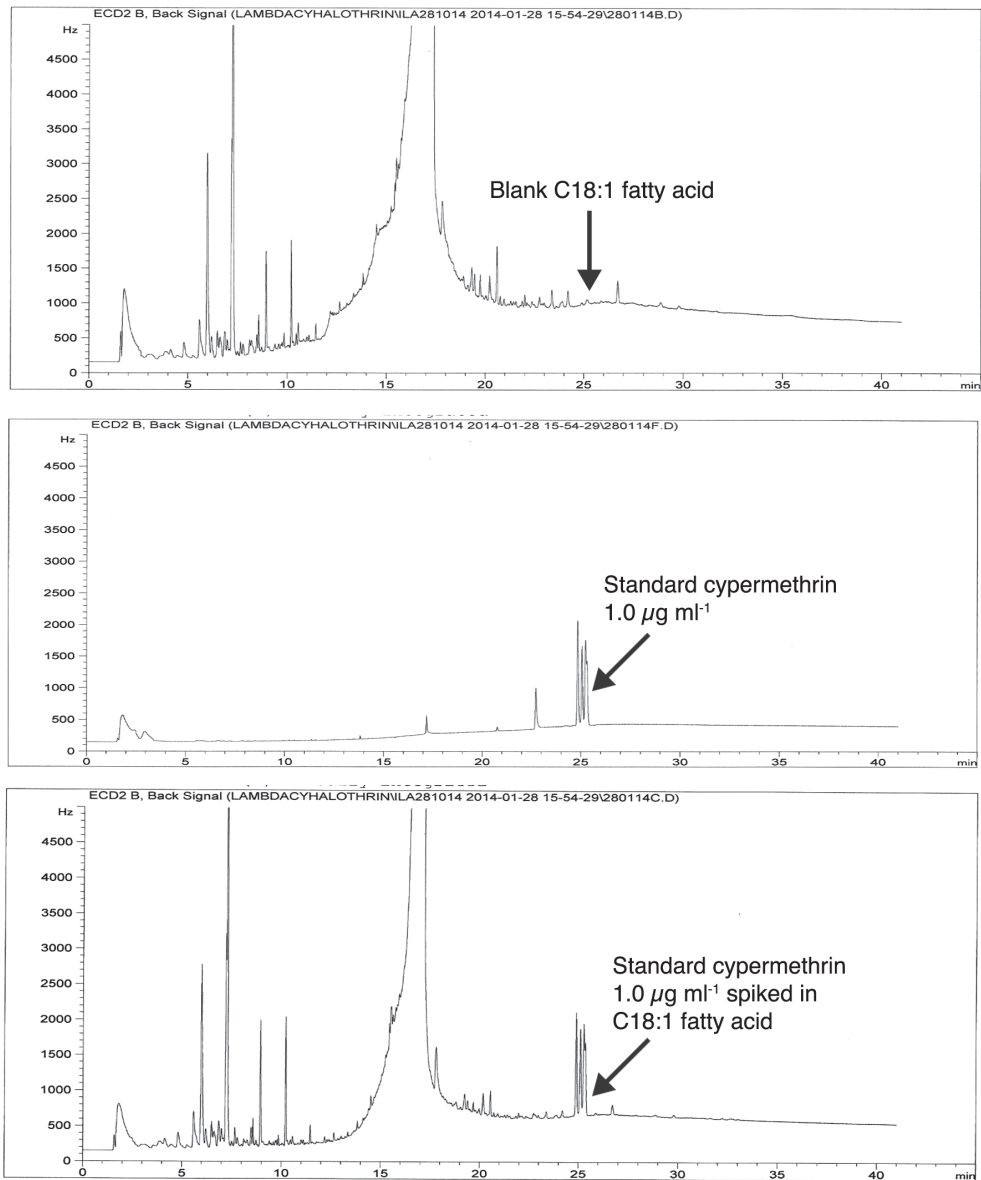


Figure 3. GC- μ ECD chromatograms of (A) blank C18:1 fatty acid, (B) standard cypermethrin $1.0 \mu\text{g ml}^{-1}$ and (C) C18:1 fatty acid spiked with $1.0 \mu\text{g ml}^{-1}$ cypermethrin standard.

BENEFITS

- A precise and reliable method for the detection and quantification of cypermethrin residue in C18:1 fatty acid.
- Generate information for the establishment of database for cypermethrin in C18:1 fatty acid at the national level.

TYPE OF SERVICE

Detection and quantification of residual cypermethrin in C18:1 fatty acid samples.

INDICATIVE COST

The cost for this analysis in 2014 is approximately RM 300 per sample and is subject to change.

For more information, kindly contact:

Director-General
MPOB
6, Persiaran Institusi,
Bandar Baru Bangi,
43000 Kajang, Selangor,
Malaysia
Tel: 03-8769 4400
Fax: 03-8925 9446
www.mpob.gov.my