DETERMINATION OF GLYPHOSATE IN CRUDE PALM OIL USING HIGH PERFORMANCE LIQUID CHROMATOGRAPHY WITH FLUORESCENCE DETECTOR

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In Malaysia, glyphosate is a commonly used herbicide in oil palm plantation to control broad-leaved weeds and grasses. However, herbicides usage may have adverse effects on human if presence in food products. Therefore, a reliable method has to be developed to detect and quantify glyphosate residue in crude palm oil, to safeguard public health.

Glyphosate (*Figure 1*) is the common name for [N-(phosphonomethyl)glycine] $C_3H_8NO_5P$. *Roundup*, *Sting*, *Tender* and *Glider* are some of the trade names of glyphosate. In its pure form, glyphosate is an odourless and colourless crystal. Its melting point is 200°C and molecular weight is 169.07. Glyphosate is highly soluble in water (12.0 g litre^{-1}), but insoluble in common organic solvents.

OBJECTIVES

- To detect and quantify residual glyphosate in crude palm oil (CPO).
- To monitor the level of glyphosate residue in CPO samples from mills.

METHODOLOGY

The method involves the liquid-liquid extraction of glyphosate from CPO followed by derivatisation using FMOC-Cl. The detection and quantification of glyphosate is by high performance liquid chromatography with a fluorescence detector (HPLC-FLD) (*Figure 2*).

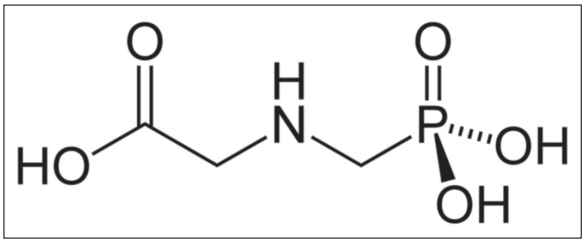

Figure 1. Chemical structure of glyphosate.

Figure 2. High performance liquid chromatography with fluorescence detector (HPLC-FLD).

RECOVERY STUDIES

Recoveries of glyphosate from CPO samples spiked with 0.05 – 1.0 mg kg^{-1} standard glyphosate ranged from 81% – 97% with coefficients of variation between 1.1% – 2.5%. *Figure 3* is the HPLC-FLD chromatograms of (A) blank CPO, (B) standard glyphosate, 1.0 μg ml^{-1} and (C) CPO spiked with glyphosate standard. The limit of detection of glyphosate in CPO using HPLC-FLD is 0.05 μg ml^{-1}.

BENEFITS

- A precise and reliable method for the detection and quantification of glyphosate residue in CPO.
- Generation of data on the level of glyphosate in CPO.

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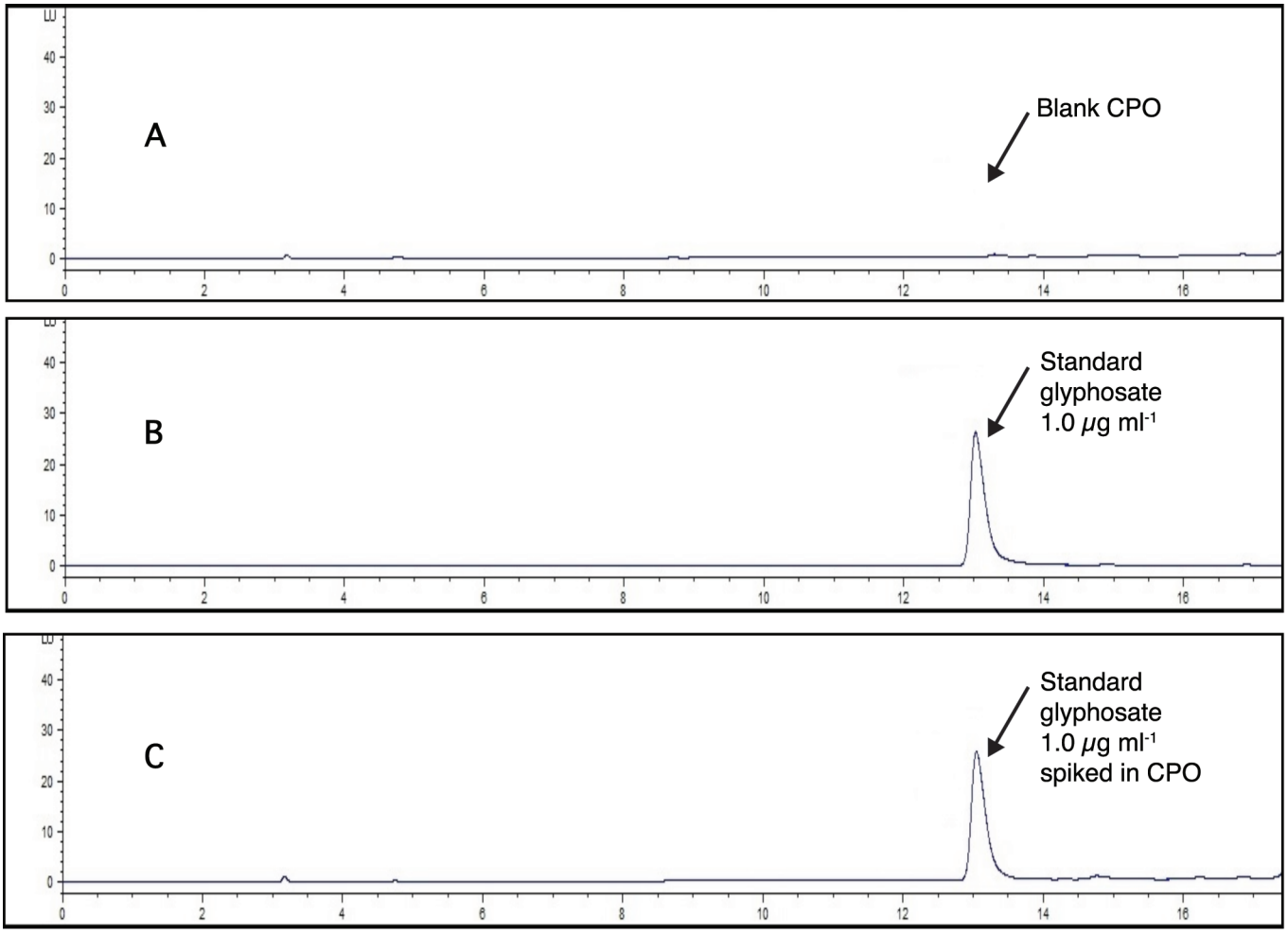

Figure 3. HPLC-FLD chromatograms of (A) blank CPO, (B) standard glyphosate, 1.0 µg ml^{-1} and (C) CPO spiked with 1.0 µg ml^{-1} glyphosate standard.

TYPE OF SERVICE

Detection and quantification of glyphosate in CPO samples.

INDICATIVE COST

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

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