

INTRODUCTION

Herbicides such as diuron are often used to control broad-leaf weeds. However, wide spread use of diuron in oil palm plantations has led to concern on its impact on the environment. Diuron is easily taken up from soil solution by the root system and translocated to the stem and leaf. Therefore, it is necessary to develop an analytical method to detect and quantify diuron residue in oil palm leaf. Diuron (Figure 1) is the common name for 3-(3,4-dichlorophenyl)-1,1-dimethyl urea (C₉H₁₀Cl₂N₂O). Some of its trade names include *Karmex*, *Crisuron*, *Di-on*, *Diater*, *Diurex*, *Toterbane* and *Unidron*. In the pure form, it is an odourless crystal while at 93% purity is a viscous semi-solid. Its melting point is in the range of 158°C-159°C. Diuron has low solubility in water (42 mg litre⁻¹ at 25°C), high adsorption rate on soil particles (K_{oc} = 418 – 560) and low n-octanol-water partition coefficients (log K_{ow}), around 2.87.

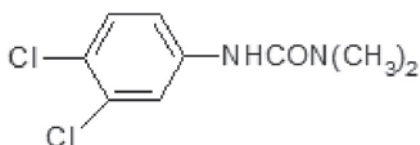


Figure 1. Chemical structure of diuron.

METHODOLOGY

This method to detect and quantify diuron involves the extraction of diuron from the oil palm leaf using acetone. The extract is then subjected to gel permeation chromatography (GPC) and clean-up with ethyl acetate: cyclohexane (1:1, v/v) as the eluting solvent. The detection and quantification of diuron is by high performance liquid chromatography using an ultra violet detector (HPLC-UV) (Figure 2).



Figure 2. High performance liquid chromatography – ultra violet (HPLC-UV).

RECOVERY STUDIES

Recoveries of diuron from leaf samples spiked with 0.2 – 2.0 µg g⁻¹ standard diuron ranged from 79.4%-96.1% with coefficients of variation between 0.5% and 5.9%. Figure 3 is the

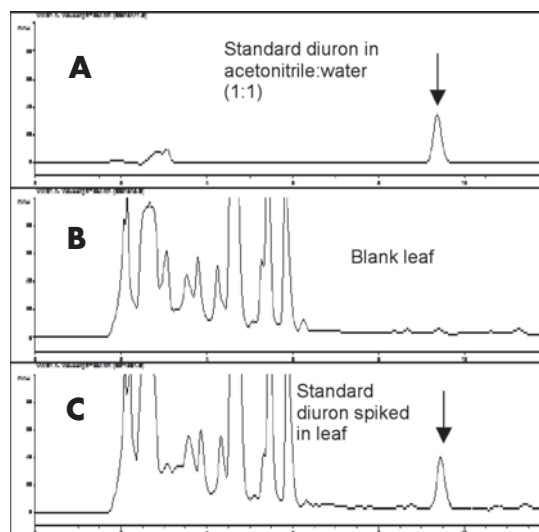


Figure 3. HPLC-UV chromatograms of (A) standard diuron 1.0 µg ml⁻¹, (B) blank leaf and (C) leaf spiked with 2.0 µg g⁻¹ diuron standard.

HPLC-UV chromatograms of (A) standard diuron, $1.0 \mu\text{g ml}^{-1}$, (B) blank leaf and (C) leaf spiked with $2.0 \mu\text{g g}^{-1}$ diuron standards. The method detection limit and limit of quantification of diuron in leaf are $0.06 \mu\text{g g}^{-1}$ and $0.199 \mu\text{g g}^{-1}$ respectively.

BENEFITS

- Precise and reliable method for detection and quantification of diuron residue in oil palm leaf.
- Generation of environmental data on diuron.

OBJECTIVES

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

TYPES OF SERVICE

- Quantification of diuron in oil palm leaf.
- Private laboratories are encouraged to adopt this method as part of their scope of analyses.

Services are offered in Peninsular Malaysia, Sabah and Sarawak.

The cost of method transfer, including competency training for analyst, is negotiable.

CLIENTS

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