

DETERMINATION OF FLUROXYPYR IN DIFFERENT MATRICES

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The pesticides used in oil palm plantations are mainly herbicides and insecticides. As herbicides are relatively cheap, they have become the most cost-effective mode of weed control. Herbicides are regularly applied to immature oil palm especially palms less than eight years old when the canopy is less dense. Fluroxypyr is one of the commonly used herbicides.

The use of herbicides may have adverse effects on the environment, and consequently on human health. Pesticides residues in the soil and groundwater are major environmental concerns, and there is need to determine their levels to control the level of contamination.

DEFINITION

Fluroxypyr is the common name for 4-amino-3,5-dichloro-6-fluoro-2-pyridyloxy acetic acid ($C_7H_5Cl_2FN_2O_3$). It is available in a variety of formulations under the trade name of *Strane*®. Fluroxypyr is grouped under pyridyloxyacetic acid weedicides and is a colourless crystal with a melting point of 232°C-233°C. It has low solubility in water at about 91 $\mu\text{g litre}^{-1}$ at 27.7°C. Its chemical structure is shown in Figure 1.

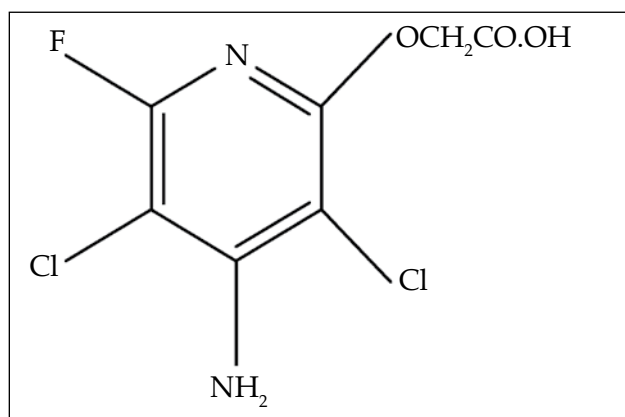


Figure 1. Chemical structure of fluroxypyr.

SCOPE

The test methods prescribe the requirements for determination of fluroxypyr in (a) soil and (b) water.

Determination of Fluroxypyr in Soil

Principle. This method involves extracting the herbicide from the soil matrix using acetone: water (95:5 v/v). The extract is then diluted 10 times with fluroxypyr-free water, before cleaning-up using solid phase extraction (SPE) with acetonitrile as eluting solvent. The detection and quantification of fluroxypyr is by high performance liquid chromatography with diode array detector (HPLC-DAD).

Recovery. Recoveries of fluroxypyr from soil samples spiked with the herbicide standard in the range 1-50 $\mu\text{g kg}^{-1}$ were 82%-107%. The coefficients of variation were 0.5% to 4.7%. The limit of detection is 1 $\mu\text{g kg}^{-1}$.

Determination of Fluroxypyr in Water

Principle. Fluroxypyr is extracted from water using solid phase extraction (SPE), followed by elution with acetonitrile (Figure 2). The detection



Figure 2. Analysis of fluroxypyr in water.

and quantification of fluroxypyr is by HPLC-DAD (Figure 3).

Recovery. Recoveries of fluroxypyr from water samples spiked with fluroxypyr in the range 1-25 $\mu\text{g litre}^{-1}$ were 91%-102%. The coefficients of variation were 2.5% to 5.3%. The limit of detection is 1 $\mu\text{g litre}^{-1}$.

SERVICES AVAILABLE

- Quantification of fluroxypyr in soil or water;
- Cost of analysis per sample per matrix – RM 350; and
- Private laboratories are encouraged to adopt this method as part of their scope for analyses. The cost of method transfer including competency training for the analyst is negotiable.



Figure 3. HPLC for fluroxypyr analysis.

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