

AN AMPEROMETRIC SENSOR FOR THE DETECTION OF 3,4-DPA (PROPANIL)

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N-(3,4-dichlorophenyl) propanamide (3,4-DPA) is used for selective post-emergence control of grasses (*Echinochloa*) and broadleaf weeds in cultivated rice in Sri Lanka.

3,4-DPA is highly toxic (inhibit photosynthesis) to most leaf plants and relatively non-toxic to the tolerance plants which contain the enzyme acylamidase. The enzyme acylamidase converts the substrate 3,4-DPA in to 3,4-dichloroaniline and propionic acid as metabolic products. 3,4-DPA is only slightly soluble in water and highly soluble in most common organic solvents. The acute oral LD₅₀ of technical propanil for rats is 1384 mg/kg.

Glassy carbon electrodes coated with stearic acid (1% w/v , CH₂Cl₂) provide a steady state amperometric sensor (at +0.70 V) for the detection of 3,4-DPA in 0.1 mol dm⁻³ phosphate buffer (pH = 7) as the supporting electrolyte. The mixture (1:1 (v/v)) of water and ethanol was used as the solvent to dissolve propanil. Dependence of the cyclic voltammetric behavior of the pesticide and expected metabolic products was also carefully investigated.

The linear dynamic range of the sensor for 3,4-DPA is from 1.0×10^{-4} to 5.3×10^{-3} mol dm⁻³ with minimum detection limit of 2.0×10^{-5} mol dm⁻³ (S/N =3). The coefficient of variation of the sensor response is 4.8%. The proposed method could be extended to detect 3,4-DPA which is present in environmental samples.