

# Occurrence and potential risk of organophosphorus pesticides in urbanised Linggi River, Negeri Sembilan, Malaysia

## ABSTRACT

The application of organophosphorus pesticides (OPPs) increased gradually because of the rise in global food demand that triggered the agriculture sector to increase the production, leading to OPP residues in the surface water. This study elucidated the presence of OPPs and estimated its ecological risk in the riverine ecosystem of the urbanised Linggi River, Negeri Sembilan, Malaysia. The OPP concentration in surface water was determined using solid-phase extraction method and high-performance liquid chromatography coupled with diode array detection. Further, the ecological risk was estimated by using the risk quotient (RQ) method. The three OPPs, i.e. chlorpyrifos, diazinon, and quinalphos were detected with mean concentrations of 0.0275 µg/L, 0.0328 µg/L, and 0.0362 µg/L, respectively. The OPPs were at high risk (in general and worst cases) under acute exposure. The estimated risk of diazinon was observed as medium for general ( $RQ_m = 0.5857$ ) and high for worst cases ( $RQ_{ex} = 4.4678$ ). Notably, the estimated risk for chlorpyrifos was high for both general and worst cases ( $RQ_m = 1.9643$  and  $RQ_{ex} = 11.5643$ ) towards the aquatic ecosystem of the Linggi River. Chronic risk of quinalphos remains unknown because of the absence of toxicity endpoints. This study presented clear knowledge regarding OPP contamination and possible risk for aquatic ecosystems. Hence, OPPs should be listed as one of the main priority contaminants in pesticide mitigation management in the future.

**Keyword:** Organophosphorus pesticide (OPP); Surface water; SPE-HPLC-DAD; Risk assessment; Riverine ecosystem; Linggi River