

# Supercritical fluid extraction of pesticides in sediment from the Okavango Delta, Botswana, and determination by gas chromatography with electron capture detection (GC-ECD) and mass spectrometry (GC-MS)

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## Abstract

The study reports supercritical fluid extraction (SFE) of pesticides in sediment samples from the Okavango Delta, the headwaters of which originate from Angola and traverse through Namibia into Botswana. An acetone modifier and fractional extraction by pressure ramping gave recoveries ranging from 55 to 86% for the 15 pesticides studied. Hexachlorobenzene (HCB), aldrin and 4, 4-dichlorodiphenyltrichloroethane (4, 4'-DDT) were identified at concentration ranges of 1.1 to 30.3, 0.5 to 15.2 and 1.4 to 55.4 µg/g, respectively by gas chromatography with electron capture detection (GC-ECD) and were unequivocally confirmed by gas chromatography time-of-flight mass spectrometry (GC-ToF-MS). The study indicated an increase of pesticide concentrations in the direction of water flow from the Panhandle (point of entry) to the lower delta. The results show that there are ramifications associated with activities either upstream or downstream; hence close monitoring is required for the long-term preservation of the delta.

**Keywords:** organochlorine pesticides; sample preparation; modifier; static extraction; dynamic extraction; fractional extraction.