ABSTRACT

With the increasing encroachment of urban sprawl, there has been a dramatic shift in land use within the San Diego Watershed from agricultural to urban landscapes. There is a concern that this shift in land use will result in an increase of non-source pollution of pesticides. The use of synthetic pyrethroids has increased as a replacement for many banned organophosphate pesticides, and their presence in the environment has magnified. There is little information currently available of synthetic pyrethroid presence and transport in urban watersheds. A survey was designed to a) determine presence and spatial distribution of pyrethroids within the San Diego Watershed b) determine effect of storm-water runoff on pesticide movement, and c) evaluate the bioavailability of the pyrethroids using two different analytical techniques. Pyrethroid concentrations associated with stormwater runoff were compared to baseflow concentrations. Samples were collected during the wet and dry seasons from various locations within the watershed and analyzed for synthetic pyrethroids. Pyrethroids were detected at various concentrations within the San Diego Watershed with various associated bioavailability.

OBJECTIVES

1) Determine presence and spatial distribution of synthetic pyrethroids within the San Diego Watershed.
2) Determine bioavailable concentrations of pyrethroids.

RESULTS and DISCUSSION

- Synthetic pyrethroids are present at various concentrations in sediment samples within the San Diego Watershed.
- Stormwater runoff generally higher than baseflow concentrations in urban stream sediments. This is similar to other survey findings.
- Many of the nursery outlet samples contained dry sediments during both sampling periods. Therefore variance in concentrations could not be explained by stormwater effect.
- Bifenthrin concentrations generally higher using LLE than SPME.
- Highest bioavailable concentrations associated with agricultural samples.
- Bifenthrin concentrations in sediment samples and pore water were found at levels above those reported toxic for aquatic invertebrates.

MATERIALS and METHODS

Sample Collection
- Sites were chosen based on accessibility and sediment loading. Sampling was biased for finer sediments within the drainage.
- Samples were collected after storm water events (April 2005) and during the dry season (August 2005).

Sediment analysis
- 100 g homogenized wet sediment extracted using a modified method SW-3550B.
- Extract cleaned with Florisil column using method SW-3620.
- Sulfur removed using activated copper.
- Aliquots analyzed using high performance gas chromatography with electron capture detector (GC-ECD).

SPME analysis of porewater
- Pore water removed using vacuum pump and centrifuged for 30 min at 7000 rpm.
- SPME fiber (30 μm PDMS) immersed into 10 mL pore water for 15 min
- Fibers injected into GC-ECD.

LLE analysis of porewater
- Pore water extracted with ethyl acetate three times.
- Combined extracts concentrated to dryness and resuspended in hexane/acetone (1:1)
- Aliquots analyzed using GC-ECD.

REFERENCES


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