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Organophosphorous pesticides in stormwater runoff from southern California

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ABSTRACT

Large quantities of the organophosphorous (OP) pesticides diazinon and chlorpyrifos are applied to agricultural and urban watersheds in California every year. Although water quality managers recognize the need to reduce OP pesticide inputs from stormwater runoff, little data are available on the sources of OP pesticides in urban watersheds. The goal of this study was to characterize diazinon and chlorpyrifos concentrations from different land uses indicative of source categories in urban southern California watersheds. This characterization included analysis of 128 runoff samples from eight different land uses over five storm events. In addition, 41 samples were collected from two sites located at the mouth of large, mixed land use watersheds during three different storm events.

Diazinon was consistently detected (93% of samples) during this study, whereas chlorpyrifos was not (12% of samples). Mixed agricultural land use had the highest flow weighted mean (FWM) concentration of diazinon (4,076 ng/L), which exceeded the next highest land use categories (commercial, residential) by a factor of 10 to 100 (324 to 99 ng/L, respectively). Open space had the lowest concentration of diazinon (< 20 ng/L). Concentrations of diazinon at replicate land use sites and during replicate storm events at the same site were highly variable. The difference in diazinon FWM concentrations among replicate sites ranged from 1.5-fold to 45-fold. The difference in diazinon FWM concentrations among storms at the same site ranged from 1.25-fold to 30-fold. Part of this variability is a response to the temporal patterns observed within a storm event. The majority of land use site-events had peak concentrations prior to peak flow indicating a “first-flush” effect, but this was not always a predictable temporal trend. The first-flush effect was rarely evident in terms of mass loadings, which was mostly a reflection of flows in urban environments. Flow can range orders of magnitude during a single event in highly impervious urban watersheds, and this variability overwhelms the variability in diazinon concentrations attributable to first-flush effect.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2001_02AnnualReport/09_ar14-ken.pdf