



Title: Characterization of the Presence of Selected Carbamate and Organo-phosphate pesticides in Surface Discharge Water leaving a Typical South Florida Agricultural Watershed

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Theme: Pollution Assessment and Prevention

Situation: Natural resources within the Indian River Lagoon and St. Lucie Estuary are currently being negatively impacted by a variety of water quality issues. Pesticides from the surrounding watersheds have been suspected of impacting the aquatic resources in the past. However, very little information on pesticide inputs was available. Few conclusions regarding temporal variability in concentrations could be made since samples were collected on a quarterly basis. More information was needed to characterize inputs of pesticides from agricultural watersheds in South Florida.

Objectives: The Objective of this study was to characterize the presence (temporal patterns and concentrations) of selected carbamate and organophosphate pesticides in Ten Mile Creek, a tributary creek that discharges into the North Fork of the St. Lucie River, which ultimately discharges into the St. Lucie Estuary (SLE) and Indian River Lagoon (IRL). The headwaters for Ten Mile Creek originate in a completely channelized drainage basin, dominated by citrus groves and pastures.

Methods: Samples were collected at the outlet for the North St. Lucie River Water Control District. Samples were taken at a discharge structure daily when water was flowing past the structure, and every-other-day when no water was flowing. Pesticides monitored for included: azinphos-methyl, chlorpyrifos, diazinon, dimethoate, ethion, fenamiphos, malathion, methidathion, aldicarb, Aldicarb sulfoxide, aldicarb sulfone, carbaryl, methomyl, and oxamyl. Most of these pesticides are labeled for use in citrus production.

Partnerships: This project formed a partnership between UF/IFAS (grantee), the South Florida Water Management District (grantor), and The Florida Department of Agriculture and Consumer Services - Bureau of Pesticides. Upon recognition that one of their insecticides was being detected in the study, another significant partnership was made with Aventis/Bayer CropSciences. They were interested in determining whether product stewardship programs were needed in the watershed.

Resources: A team consisting of a UF/IFAS faculty member and three research technicians carried out the entire project.

Results: A total of 461 samples were analyzed for the carbamates analysis, and 332 samples were analyzed for the organo-phosphates. Aldicarb and two of its' degradates (aldicarb sulfone and aldicarb sulfoxide) were detected in 7, 13, and 1 samples, respectively. Aldicarb detections were generally separated by several days to weeks, except in April (16th & 17th) where it was present on two consecutive days at concentrations of 3.62 and 1.59 ng/mL, respectively. The majority of aldicarb sulfone detections occurred in June and July 2001, following the application season. Carbaryl was detected in 8 samples. Half of the carbaryl detections occurred on four consecutive days from October 26 through October 29th, at concentrations ranging from 0.33 to 0.95 ng/mL. Methomyl was detected in samples collected on five consecutive days from March 30th through April 3rd, at concentrations ranging from 1.0 to 2.2 ng/mL. Oxamyl was detected in 4 samples, three of which occurred on consecutive days from February 17th through the 19th at concentrations ranging from 6.2 to 6.8 ng/mL. The carbamates propoxur, 3-hydroxy carbofuran, carbofuran, and methiocarb were never detected. Diazinon and ethion were the only organo-phosphates ever detected. Diazinon was detected at 0.9 and 0.7 ng/mL on January 5th and 6th, 2002, respectively. Ethion was detected in 19 consecutive samples collected from August 1st through the 19th, 2002. The mean, maximum, minimum, and median concentrations were: 0.38, 0.61, 0.30, and 0.33 ng/L, respectively. From these results, it is apparent that monitoring on a more frequent than quarterly basis is needed to better characterize the presence of pesticides in surface water flowing from typical, channelized, South Florida agricultural watersheds.



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