

ABSTRACT

A survey of farms in the Black River and Yallahs River watersheds was conducted to collect data on the crops grown and the types and amounts of pesticides used. Majority (81%) of farms in the Black River watershed were smaller than 4 ha, were located largely in the Hectors River valley on steep slopes and grew mostly yams, coffee and banana. Farms in the One Eye River valley were mostly on flat to gentle slopes and grew coffee, yams and citrus. The Upper and Lower Black River valleys were dominated by sugarcane and pasture on flat to gently sloping land. The herbicide 2,4-D, which was used on sugarcane, was the most used pesticide; 5.77 kg/ha/annum in the Lower Black River and 4.17 kg/ha/annum in the Upper Black River. Endosulfan was applied to coffee at a rate of 0.39 kg/ha/annum in the Hectors River valley, and 0.0016 kg/ha/annum in the One Eye river valley. Diazinon and dieldrin were also used in the watershed at a rate of 0.020 and 0.0077 kg/ha/annum respectively in the One Eye River and 0.0026 kg/ha/annum dieldrin in the Hectors River valley.

Eighty five percent of farms in the Yallahs River watershed were < 4 ha, and 68% of those in the Upper Yallahs valley and 25% in the Lower Yallahs were on steep slopes. Coffee was grown by the most farmers (60%) on the greatest area (83%) in the Yallahs River valley. Endosulfan, copper fungicides and glyphosate were applied at a rate of 1.3, 4.98 and 1.98 kg/ha/annum in the Upper Yallahs. Diazinon was also used in the watershed at a rate of 0.852 kg/ha/annum in the Upper Yallahs River. Pesticide use in the Lower Yallahs was much lower; paraquat, dimethoate and copper were applied at a rate of 0.36, 0.27 and 0.62 kg/ha/annum.

Residues of α - and β -endosulfan, endosulfan sulfate, dieldrin and diazinon were present in the two watersheds. Levels of α -endosulfan, β -endosulfan, endosulfan sulfate, dieldrin and diazinon were 0.157 ± 0.0483 , 0.373 ± 0.0786 ,

0.149 ± 0.0311 , 0.156 ± 0.0366 and 0.776 ± 0.0846 ppb respectively in Black River water and 1.30 ± 0.738 , 0.594 ± 0.113 , 14.9 ± 5.99 , 0.285 ± 0.166 and 1.75 ± 0.176 ppb respectively in Yallahs River water. Levels (ppb) in the Black River sediment were; α - endosulfan, 30.5 ± 3.55 ; β -endosulfan, 43.7 ± 10.1 ; endosulfan sulfate, 107 ± 14.3 ; dieldrin, 23.9 ± 2.03 ; and diazinon, 214 ± 28.6 . In the Yallahs River sediment the levels (ppb) were; α - endosulfan, 2330 ± 589 ; β -endosulfan, endosulfan sulfate, 1430 ± 615 ; 27.5 ± 2.43 ; diazinon, 20.3 ± 0.665 ; and dieldrin, 148 ± 14.2 . The presence of dieldrin in Yallahs water and sediment samples was not expected since the questionnaire survey did not reveal its usage by any farmer. Dangerously high levels of dieldrin residues detected in both the watersheds must be harmful to the river fauna.

Levels of endosulfans were generally higher during wet periods than dry periods and during the spray period than outside the spray period. About 20% of samples from the Yallahs River and 11% of samples from the Black River exceeded the USEPA maximum of $0.22 \mu\text{g/L}$ for the protection of aquatic life. Levels unacceptable for human health ($110 \mu\text{g/L}$) were not observed. It is imperative that sustainable soil, crop, pest and pesticide management practices be implemented without delay.