

ABSTRACT

Bioactivity and persistence of three pyrethroids (decis, permethrin and phenothrin) and two organochlorines (dieldrin and chlordane) in three types of Jamaican soils (Chudleigh clay loam, CCL, 32.12% clay, 47.07% sand; Syndenham clay loam, SCL, 36.30% clay, 46.11% sand; Marvelly sandy loam, MSL, 14.48% clay, 65.42% sand) at three moisture levels (5, 10 and 15%) were assayed with adult Tribolium confusum. Residue analysis of dieldrin and chlordane was also conducted by gas chromatography.

The 24 hour LC_{50} values of the insecticides applied directly to insects in petri dish were 0.0000017%, 0.0000028%, 0.0000042%, 0.0000051% and 0.0000371% for dieldrin, chlordane, decis, permethrin and phenothrin respectively.

Bioactivity of the pyrethroids was not much affected by soil water contents. The 24 hour LC_{50} values at 5, 10 and 15% moisture levels respectively were 0.500, 0.380 and 0.344% in CCL, 0.292, 0.291 and 0.281 in SCL and 0.238, 0.228 and 0.195% in MSL for phenothrin; 0.169, 0.157 and 0.155 in CCL; 0.244, 0.210 and 0.195% in SCL and 0.155, 0.113 and 0.110 in MSL for permethrin, and 0.022, 0.019 and 0.011% in CCL; 0.038, 0.026 and 0.021% in SCL and 0.00042, 0.00025 and

0.00011% in MSL for decis.

Increased soil moisture enhanced the toxicity of organochlorines. The LC_{50} values for dieldrin at 5, 10 and 15% moisture levels were 0.280, 0.177 and 0.045% in CCL, 0.089, 0.032 and 0.021% in SCL and 0.043, 0.041 and 0.023% in MSL; these value for chlordane were 0.448, 0.241 and 0.023% in CCL, 0.129, 0.075, 0.042% in SCL and 0.226, 0.038 and 0.022% in MSL.

The toxicity of the pyrethroids displayed a negative temperatue coefficient between 17 and 28% in MSL.

Under laboratory conditions the persistence of the insecticides (as determined by LT_{50} for T. confusum) depended upon soil type, moisture, and concentration of insecticide. The insecticides were generally more persistent at a higher dose, lower moisture level and in clay loam rather than sandy loam. The LT_{50} values of the higher ($LC_{50} \times 4$) doses of the insecticide in CCL, SCL and MSL at 15% moisture level were, respectively, 2.56, 2.25, 3.10 for phenothrin, 3.86, 3.11 4.09 for pernethrin, 3.18, 3.98, 3.83 for decis, 12.00, 11.83, 8.87 for dieldrin and 7.16, 15.38, 6.84 for chlordane.

The GC residue data on the organochlorines confirmed the bioassay results.