ABSTRACT

Studies of Slow Release Formulations:
Encapsulation of Diazinon by Starch Matrices

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Diazinon, O,O,-diethyl O-[6-methyl-2-(1-methylethyl)-4-pyrimidinyl] phosphorothioate, in the form of Basudin was encapsulated in three starch matrices — a calcium adduct, and two starch borate complexes, one prepared by using sodium hydroxide to solubilize the starch (borate 1) and the other solubilized with boiling boric acid solution (borate 2). Endosulfan was also encapsulated in a corn starch xanthide matrix.

The starch borate 1 complex encapsulation was done using three starches; corn, cassava and dasheen. The percent recovery was in the order dasheen (100%) > cassava (96%) > corn (91%), percent encapsulation was in the reverse order, 94, 96 and 97% respectively. The recovery rate obtained for encapsulation using the four different methods was starch borate 1 ≅ starch borate 2, (95 and 100% respectively) > xanthide ≅ calcium adduct 37 and 32 % respectively.

The highest percent active ingredient that could be encapsulated that gave a recovery rate of 90 percent and over was 10 percent.

The release of diazinon from the matrix into water was in the order borate 1 > borate 2; 100 percent release was achieved in 3 hours for the borate 1 matrix, and 80 percent release was realised in 24 hours for the borate 2 matrix. The release of diazinon into acetone was considerably less; after one month less than 2 percent of the active ingredient was released.

The release of diazinon from the borate matrix into air was comparatively faster than the release of chlorpyrifos, O,O-diethyl O-3,5,6-trichloro-2-pyridyl phosphorothioate, from Suscon (a commercially available slow release formulation with a plastic encapsulating matrix).

The results of the release of diazinon and chlorpyrifos into soil was not very conclusive and field work studies are neccessary to arrive at definite conclusions.

The borate 1 encapsulated diazinon leached significantly less than the EC formulation.