

## Dislodgable Insecticide Residues on Cotton (1975)<sup>1</sup>

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It is the purpose of this paper to report the quantities of various insecticides remaining on cotton foliage over a 4-day period after application, considered as dislodgable residues.

### MATERIALS AND METHODS

Cotton test plots were located in a field of Pima, long staple cotton, located at La Palma, Pinal County, Arizona. The plots were treated on August 18, 1975, when the cotton averaged 31" in height, varying from 21" to 40", and supported squares, blooms and bolls in approximately equal numbers. Plots consisted of 12 rows with 40" spacing, 950' long, approximating 1.0 acre. Sprays were applied at 10 gallons per acre with a 12-row, International high-clearance (Hi-Boy), ground sprayer using 3 #TX-6 nozzles per row, at 40 psi and 5.5 mph. Because of a limited amount of formulated toxicant and the minimal level of liquid required in the spray tank for the sprayer to function satisfactorily, the Vydate and FMC-33297 (currently identified as POUNCE®) were sprayed twice at one-half concentration. The materials in application sequence, rate of active ingredient (AI) per acre, and formulations were:

Vydate, 1.0 lb, 2 lb/gal EC  
Lannate, 0.5 lb, 1.8 lb/gal Liquid  
Pounce (FMC-33297), 0.2 lb, 3.2 lb/gal EC  
Fundal, 1.0 lb, 4.0 lb/gal EC  
Furadan, 1.0 lb, 4.0 lb/gal EC  
Toxaphene-Methyl Parathion, 2.0 + 1.0 lb, 6 + 3 lb/gal EC  
Sevimol, 1.5 lb, 4.0 lb/gal EC  
Sevin, 1.5 lb, 80% WP  
Control

Maximum and minimum temperatures during the study were: Aug. 18, 104° - 59°; Aug. 19, 103° - 65°; Aug. 20, 101° - 71°; Aug. 21, 101° - 74°; and Aug. 22, 105° - 70°F. For the 4-day study, weather conditions were hot, dry and windy with no rain-fall.

Leaf-disc samples, 25 mm diameter, were collected in triplicate from each plot from the middle six rows, using a leaf-punch at 0, 24, 48, 72 and 96 hours after treatment. Each sample consisted of 100 leaf-discs punched individually and consecutively from the top, middle, and bottom leaves in the plant canopy. In the Sevin-treated plot, six leaf-disc samples were collected for extraction comparisons.

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At the temporary field laboratory, each 100-disc sample was extracted by shaking with 100 ml of the appropriate solvent for one minute. These were tap water for Lannate and Vydate, hexane for Pounce and Fundal, water (pH 5-6) for Furadan, benzene for toxaphene-methyl parathion, acetone for Sevin and Sevimol and methylene chloride for the comparative extraction of Sevin. The extracts were held on ice in the field until returned to the laboratory where they were stored in the walk-in freezer.

Furadan and FMC-33297 extracts were analyzed by the FMC Corporation, Agricultural Chemicals Division, Richmond, California. Vydate and Lannate residues were analyzed by Chemonics Laboratories, Phoenix, Arizona, and the Fundal determinations were made by Nor-Am Agricultural Products laboratories in Woodstock, Illinois.

Methyl parathion-paraoxon residues were measured in our laboratory by flame photometric detection gas chromatography, using a Micro Tek Model MT-220, equipped with a 4' Pyrex column, 4 mm I.D., packed with 1.5% OV-17, 2% QF 1 on 100/120 mesh Chromosorb W (H.P.). Nitrogen carrier was set at 40 PSI, with 62 ml/min flow. Operating temperatures were: inlet, 208°C; column, 210°C; and detector, 250°C. Quantitation was by peak height, using standards of 1 ng/μl in benzene, and injected in 2 to 6 μl volumes of standard and samples.

Sevin extracts were analyzed by high pressure liquid chromatography using a 25 cm column packed with Partisil 10, eluted with 10% absolute ethanol in hexane. The detector was set at 280 nm. Prior to analysis the extracts were cleaned-up on 1.5 inch silica gel (60-200 mesh) columns, eluted with 200 ml of absolute ethanol.

The results appear in Table 1 expressed as milligrams of insecticide or metabolite per square meter of leaf surface (mg/m<sup>2</sup>). From these data it is evident that both acetone and methylene chloride are equal as extraction solvents for Sevin, and that the molasses formulation of Sevin, (Sevimol) is not readily extracted by methylene chloride. This may be due to the "protected" nature of Sevin in the presence of molasses which is non-soluble in methylene chloride.

The disappearance rate of FMC-33297, a synthetic pyrethroid, is truly phenomenal, indicating that some 61% of the dislodgable residue remains 4 days after application. The 4-day residues, as a percentage of the initial deposit, were: FMC-33297, 61%; Sevin, 16%; Fundal, 13%; Furadan, 7%; methyl parathion with toxaphene, 3%; Vydate, 3%, and Lannate <1%.

Despite its persistence, FMC-33297 (Pounce®) should offer no dermal hazard whatsoever to humans entering treated fields, because of its low dermal toxicity (>2000 mg/kg), and reduced rate of application (0.1 - 0.2 lb/acre). Potentially, Furadan could offer a reentry hazard to field workers at 24 hours because of its persistence, however its very low dermal toxicity (>10,200 mg/kg) precludes this possibility.

