

Diazinon and Chlorpyrifos Residues in Food after Insecticidal Treatment in Rooms¹

by M. D. JACKSON² and C. G. WRIGHT³

*Pesticide Residue Research Laboratory
and*

*Department of Entomology
North Carolina State University
Raleigh, N. C. 27607*

Insecticide treatment of food handling and eating areas has been common without a thorough knowledge of the insecticide residues in prepared foods accidentally exposed during and following treatment. The present study was undertaken to determine residues in foods present at time of treatment and those placed in treated areas after treatment.

METHODS

A vacant nine-story dormitory was used. Since the dormitory was of an "H" shape, one outside room in each wing on alternate floors was used. This procedure allowed sufficient space between treated rooms to prevent insecticide transfer between rooms. Since most food establishments have air circulation, fans placed in windows provided one change of air per minute in the rooms.

Commercially processed, sliced potatoes, removed and drained directly from the cans, and TV dinners, heated according to label instructions and cooled to room temperature, were placed in the rooms prior to and 4.5 hr after insecticide application.⁴ The potatoes were placed in a 20 cm china dish and the dinners left in their aluminum trays. The potatoes and dinners were positioned in a row 85 and 194 cm, respectively, from the center of the outside wall.

Diazinon and chlorpyrifos were applied as aerosol-type crack and crevice sprays at the recommended and twice the recommended

¹Paper No. 4490 of the Journal Series of the North Carolina Agricultural Experiment Station, Raleigh, N.C. Use of trade names in this publication does not imply endorsement of the products named or criticism of similar ones not mentioned. Partial support furnished by the Whitmire Research Laboratories, Inc., Saint Louis, Missouri 63122.

²Present address, Environmental Protection Agency, Research Triangle Park, North Carolina 27711.

³Person to whom reprint requests should be sent.

⁴The TV dinner contained Salisbury steak with gravy, mashed potatoes, whole kernel corn, and chocolate cake.

concentrations.⁵ These sprays containing diazinon (1 or 2%) or chlorpyrifos (0.5 or 1%), with a pressure of 1.9 to 2.4 kg/cm² at the orifice, were injected into crevices with an injection tube supplied with the container, at an application rate of about 1 sec of spray for each 30.5 cm of crevice. All treatments were applied with the fans off and with the fans operating (air or no air).

The potatoes and TV dinners were removed at 0.5 and 5 hr after insecticide application, placed in glass jars, sealed, and frozen until analysis.

The samples were blended with known amounts of water (60 ml per sample) to a smooth consistency. One hundred grams of sample were extracted by the aqueous-acetonitrile method given by GAUL et al. (1972). No additional cleanup was employed. The samples were checked by gas chromatography as described previously by WRIGHT and JACKSON (1971). Sample weights were corrected for the water added in blending. All results were expressed as ppm on a wet weight basis. Recoveries were determined by adding known amounts of insecticides to the homogenate before the aqueous-acetonitrile extraction. Recoveries with this technique averaged 90 and 82% for diazinon and chlorpyrifos, respectively. Residue values were not corrected for recoveries.

RESULTS

The amounts of diazinon and chlorpyrifos residues found in food left in the room for 0.5 hr after treatment are shown in Table 1. No detectable residues of either diazinon or chlorpyrifos were found in the potatoes or TV dinners placed in the rooms 4.5 hr after treatment and removed 5.0 hr.

A person consuming a TV dinner (average weight of 306 g) at the highest residue found (0.05 ppm) would ingest 0.0153 mg of diazinon. For a person weighing 70 kg this would amount to 0.000218 mg/kg. Since the LD₅₀ of diazinon is 76 mg/kg for female rats there is a safety factor⁵ of over 250,000 (FAO 1965).

If the same person were to ingest the TV dinner containing 0.02 ppm of chlorpyrifos, his intake would be 0.000087 mg/kg, a safety factor of over 1,000,000. (The LD₅₀ of rats is 135 mg/kg, THOMSON, 1967.)

⁵Formulated specifically for crack and crevice applications. Prescription Treatment[®] No. 260 and No. 270, manufactured by the Whitmire Research Laboratories, Inc., Saint Louis, Missouri 63122.

REFERENCES

1. Food and Agricultural Organization of the U.N. 1965. FAO Meeting Report No. PL/1965/10/1.
2. GAUL, J. A., B. M. McMAHON, and P. E. CORNELIUNSEN, Pesticide Analytical Manual Vol. 1, Sec. 212.13a, U.S. Dept. of Health, Education, and Welfare, Washington, D.C. (1972).
3. THOMSON, W. T., Agricultural Chemicals Book 1, Insecticides, Acaricides, and Ovicides. Thomson Publications, Davis, Calif., (1967).
4. WRIGHT, C. G. and M. D. JACKSON, J. Econ. Entomol. 64, 457 (1971).

TABLE 1

Residues of diazinon or chlorpyrifos found in food 0.5 hr after treatment.^a

Insecticide	Fan running	Conc. of spray (%)	TV dinner (ppm)	Potatoes (ppm)
Diazinon	No	1.0	0.02 ^b	0.02 ^b
		2.0	0.05	0.04
	Yes	1.0	0.02	0.02
		2.0	0.02	0.01
Chlorpyrifos	No	0.5	<0.02	<0.02
		1.0	<0.02	<0.02
	Yes	0.5	<0.02	<0.02
		1.0	<0.02	<0.02

^aAll checks and residues at 5.0 hr were below detectable levels (diazinon 0.01; chlorpyrifos 0.02).

^bAll values are the average of three replications.