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Pesticide Residues in Produce Sold in Connecticut 1991

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A cooperative study by The Connecticut
Agricultural Experiment Station and
the Food Division of the Connecticut
Department of Consumer Protection

SUMMARY

Of the 285 samples of produce tested in 1991, 96 samples (34%) contained pesticide residues. One of the samples contained a pesticide residue for which there is no EPA tolerance. Ten samples labeled as "organically grown" contained no pesticide residues. There was a 27% decrease in the pesticide residues found on 1991 samples when compared to produce tested in 1990.

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The U. S. Environmental Protection Agency (EPA) registers all pesticides and approves their use on specific agricultural commodities. The residues of pesticides that remain in or on those commodities at harvest must be below allowable tolerances (Code of Federal Regulations, 1991). Testing for pesticides is performed at this Station to determine if residues are present in produce sold in Connecticut and assures consumers that produce grown in this state, other states, and foreign countries meets EPA tolerances.

In accordance with the Charter of this Station to report results of analyses (General Statutes, 1991), we now present information on pesticide residues in produce sold in Connecticut in 1991.

METHODS

Samples were collected from January 2, 1991 to January 2, 1992, at farms, roadside stands, and retail food stores by inspectors of the Food Division of the Connecticut Department of Consumer Protection.

All samples were tested for pesticide residues by official and recommended multi-residue methods (Pesticide Analytical Manual, 1968, Luke et al, 1981, Okumura et al, 1991). The basic principle of these methods is the analysis for a selected group of 110 pesticides using the combined techniques of extraction and cleanup, followed by compound separation and quantitation by capillary gas chromatography or high performance liquid chromatography. The methods we used to test our samples are sensitive to a detection limit of 0.002 parts-per-million (ppm).

RESULTS AND DISCUSSION

In 1991, a total of 285 samples representing 49 different varieties and types of produce were tested and 96 contained residues of pesticides. Table 1 lists the type of

samples and the concentrations of all residues that were found. Ten samples of produce labeled as "organically grown" also were tested, and none contained a residue. One sample of cabbage contained a residue of the herbicide Dacthal for which no tolerance is listed for this crop (Code of Federal Regulations, 1991).

Ten samples, three of cucumbers, one of lettuce, two of squash, one of beet greens, one of kale, and two of potatoes, contained traces of DDE, a soil metabolite of DDT. DDT has not been in agricultural use since 1972, but has persisted in the soil (Pylypiw et al, 1991). Even though there is no tolerance for DDT or its metabolites, the Food and Drug Administration (FDA) recognizes their persistence in the environment and has set action levels (allowable amounts) for these compounds in produce (Compliance Policy Guides, 1986). These action levels are 0.1 ppm of DDE on cucumbers and squash, 0.2 ppm on beet greens, 0.5 ppm on kale and lettuce, and 1 ppm on potatoes. All 10 samples that contained DDE were below the action levels for their respective crop.

Table 2 lists all pesticides that were found, synonyms if available, their use, and their frequency of occurrence. Thiodan was the most frequently detected residue followed by Ronilan, DDE and Permethrin. In a few cases more than one residue was found on the same crop. Three samples of strawberries contained three different pesticide residues each, while 19 other samples, mostly strawberries and apples, contained two different residues each.

Table 3 lists the number and source of the samples. Overall, 58% of the samples were from Connecticut farms and orchards, 32% from other states and 10% from foreign countries. Commodities from foreign countries included bananas from South America and macaroni from Italy. Produce grown in other states included cauliflower and lettuce from California; potatoes from Idaho and Maine; mushrooms from Pennsylvania; and apples from New York, Washington, and Massachusetts.

We compared the data obtained in our 1991 study to data obtained in 1990 (Pylypiw and Hankin, 1991). Four commodities, cucumbers, peppers, spinach, and squash were selected for this comparison. Specifically, there was a 12% increase in residues on cucumbers, and a 1% increase on peppers, while there was a 42% and 14% decrease in residues on spinach and squash, respectively. Overall, we noted a 27% decrease in pesticide residues in the samples we tested in 1991 when compared to 1990.

We also compared our 1991 data to those published by the FDA in 1990 and 1989. The FDA reported that 36% of the fruit and vegetable samples that they tested in 1989 contained residues, and in 1990, 37% contained residues (Food and Drug Administration, 1990, 1991). For 1991 we report that 34% of the fruits and vegetables we tested contained residues. Our 1991 data are similar to the FDA findings of previous years.

In summary, residues found in fruits and vegetables sold in Connecticut are generally well below established safety standards.

ACKNOWLEDGEMENTS

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Table 1. Concentrations of pesticide residues in produce sold in Connecticut in 1991. The numbers in parentheses following the product name are the number of samples tested, the number of positive findings for a pesticide residue, and the number of samples labeled as organic if applicable. The number in parentheses following the pesticide name is the number of times that pesticide was found.

Produce Pesticide/(number)	Residue range (ppm)	EPA tolerance (ppm)
Apples, for Cider (7 tested, 2 pos.)		
Kelthane (1)	0.35	5
Thiodan (1)	0.02	2
Apples, Empire (7 tested, 1 pos.)		
Dursban (1)	0.005	1.5
Apples, Granny Smith (5 tested, 0 pos.)		
Apples, Idared (2 tested, 1 pos.)		
Thiodan (1)	0.05	2
Apples, Macoun (2 tested, 2 pos.)		
Guthion (1)	0.11	2
Kelthane (1)	0.15	5
Apples, McIntosh (11 tested, 6 pos.)		
Dursban (5)	0.003-0.09	1.5
Kelthane (1)	0.3	5
Thiodan (1)	0.015	2
Apples, Northern Spy (1 tested, 1 pos.)		
Thiodan (1)	0.1	2
Apples, Opalescent (1 tested, 0 pos.)		
Apples, Red Delicious (8 tested, 5 pos.)		
Dursban (4)	0.005-0.02	1.5
Kelthane (1)	0.1	5
Thiodan (1)	0.005	2
Apples, Rome (4 tested, 3 pos.)		
Dursban (1)	0.003	1.5
Kelthane (1)	0.3	5
Thiodan (1)	0.03	2
Apples, Yellow Delicious (2 tested, 2 pos.)		
Dursban (1)	0.01	1.5
Guthion (1)	0.025	2
Thiodan (1)	0.1	2
Bananas (13 tested, 0 pos.)		
Beans, Green-Snap (3 tested, 0 pos.)		
Beet Greens (1 tested, 1 pos.)		
DDE (1)	0.023	0
Broccoli (1 tested, 0 pos.)		
Broccoli (3 tested, 0 pos.)		

Table 1. Concentrations of pesticide residues in produce sold in Connecticut in 1991 (continued).

Produce Pesticide/(number)	Residue range (ppm)	EPA tolerance (ppm)
Cabbage (4 tested, 1 pos.) Dacthal (1)	0.03	0
Cantaloupe (1 tested, 0 pos.)		
Carrots (1 tested, 0 pos.) (1 organic)		
Cauliflower (7 tested, 0 pos.) (1 organic)		
Celery (4 tested, 4 pos.) Dichloran (4)	0.05-0.61	15
Cider, Apple (27 tested, 0 pos.)		
Corn, Bi-Color (7 tested, 0 pos.)		
Corn, White (1 tested, 0 pos.)		
Cucumbers (5 tested, 4 pos.) (1 organic) Diazinon (1) DDE (3) Thiodan (2)	0.08 0.01-0.02 0.1-0.12	0.75 0 2
Eggplant (2 tested, 0 pos.) (1 organic)		
Grapes, Table-Green (1 tested, 0 pos.) (1 organic)		
Grapes, Table-Red (1 tested, 0 pos.) (1 organic)		
Kale (2 tested, 1 pos.) DDE (1)	0.018	0
Lettuce (16 tested, 4 pos.) DDE (1) Malathion (1) Permethrin (2) Thiodan (1)	0.014 0.1 1.1-4.8 0.02	0 8 20 2
Macaroni (17 tested, 7 pos.) Pirimiphos-Methyl (7)	0.011-0.057	8
Mushrooms (4 tested, 2 pos.) Diazinon (2)	0.011-0.03	0.75
Oranges (3 tested, 0 pos.)		
Peas, with Pod (1 tested, 0 pos.)		
Peaches (3 tested, 2 pos.) Pencap-M (1) Thiodan (1)	0.05 0.09	1 2
Pears, D'Anjou (1 tested, 1 pos.) Thiodan (1)	0.21	2
Pears, Bosc (3 tested, 3 pos.) Kelthane (1) Thiodan (3)	0.05 0.011-0.1	5 2

Table 1. Concentrations of pesticide residues in produce sold in Connecticut in 1991 (continued).

Produce Pesticide/(number)	Residue range (ppm)	EPA tolerance (ppm)
Peppers, Frying (2 tested, 0 pos.)		
Peppers, Bell (7 tested, 2 pos.) Thiodan (2)	0.024-0.06	2
Potatoes (10 tested, 4 pos.) (1 organic) DDE (2)	0.003-0.005	0
Malathion (1)	0.10	8
Thiodan (1)	0.04	0.2
Spinach (12 tested, 7 pos.) Methomyl (2)	0.05-0.18	6
Permethrin (6)	0.08-1.1	20
Thiodan (1)	0.05	2
Squash, Butternut (1 tested, 0 pos.)		
Squash, Italian-Delicata (1 tested, 0 pos.)		
Squash, Green (5 tested, 1 pos.) (2 organic) Bravo (1)	0.02	5
Squash, Yellow (13 tested, 5 pos.) Diazinon (1)	0.02	0.5
DDE (2)	0.013-0.022	0
Thiodan (3)	0.01-0.07	2
Strawberries (30 tested, 18 pos.) Dacthal (4)	0.013-0.030	2
Diazinon (1)	0.02	0.5
Dursban (1)	0.042	0.5
Guthion (1)	1.7	2
Kelthane (1)	2.0	5
Ronilan (14)	0.003-0.46	10
Thiodan (11)	0.005-0.040	2
Swiss Chard (1 tested, 0 pos.) (1 organic)		
Tomatoes (20 tested, 6 pos.) Bravo (3)	0.005-0.04	5
Thiodan (4)	0.007-0.12	2
Watermelon (1 tested, 0 pos.)		

Table 2. Pesticides found, agricultural use, total findings, and frequency of occurrence.

Common name	Synonym	Use (a)	Total No. of Findings (b)	Percent Occurrence (b)
Bravo	Chlorthalonil	F	4	1.4
Dacthal	DCPA	H	5	1.8
DDE (c)		I	10	3.5
Diazinon		I,N	5	1.8
Dicloran	DCNA	F	4	1.4
Dursban	Chlorpyrifos	I	13	4.6
Guthion	Azinophos-methyl	I	3	1.1
Kelthane	Dicofol	A	7	2.5
Malathion		I	2	0.7
Methomyl	Lannate	I	2	0.7
Permethrin	Pounce	I	8	2.8
Pirimiphos-Methyl	Actellic	I	7	2.5
Pennacp-M	Methyl Parathion	I	1	0.4
Ronilan	Vinclozolin	F	14	4.9
Thiodan	Endosulfan	I,A	37	13.0

(a) From Farm Chemical Handbook (1989), 75th edition. Meister Publishing Co., Willoughby, OH 44094
A = Acaricide, F = Fungicide, H = Herbicide, I = Insecticide, N = Nematocide.

(b) Based on 285 samples.

(c) Metabolite of DDT.

Table 3. Number of samples from various sources of produce tested in 1991.

Produce	Connecticut	U.S.	Foreign	Total
Apples	30	20	0	50
Bananas	0	0	13	13
Beans, Snap	3	0	0	3
Beet Greens	0	1	0	1
Broccoflower	0	1	0	1
Broccoli	0	3	0	3
Cabbage	3	1	0	4
Cantaloupe	1	0	0	1
Carrots	0	1	0	1
Cauliflower	0	7	0	7
Celery	0	4	0	4
Cider, Apple	25	2	0	27
Corn	8	0	0	8
Cucumbers	5	0	0	5
Eggplant	2	0	0	2
Grapes, Table	0	2	0	2
Kale	0	2	0	2
Lettuce	0	16	0	16
Macaroni	0	7	10	17
Mushroom	1	3	0	4
Oranges	0	0	3	3
Peas, with Pod	1	0	0	1
Peaches	3	0	0	3
Pears	3	1	0	4
Peppers	9	0	0	9
Potatoes	1	8	1	10
Spinach	0	12	0	12
Squash	20	0	0	20
Strawberries	29	1	0	30
Swiss Chard	1	0	0	1
Tomatoes	20	0	0	20
Watermelon	1	0	0	1
TOTALS	166	92	27	285



The Connecticut Agricultural Experiment Station,
founded in 1875, is the first experiment station in America. It is chartered by the General Assembly to make scientific inquiries and experiments regarding plants and their pests, insects, soil and water, and to perform analyses for State agencies. The laboratories of the Station are in New Haven and Windsor; its Lockwood Farm is in Hamden. Single copies of bulletins are available free upon request to Publications; Box 1106; New Haven, Connecticut 06504.

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