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**Pesticide Residues  
in Produce Sold  
in Connecticut 1992**

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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 282 samples of produce tested in 1992, 99 samples (35%) contained pesticide residues. One sample was above the EPA tolerance and nine samples contained pesticide residues for which there are no EPA tolerances. Thirteen samples labeled as "organically grown" contained no pesticide residues. The percentage of samples containing residues in 1992 showed little change when compared to 1991.

Over the period from 1988 to 1992, 46% of the samples contained pesticide residues and 2% of them were violative. This indicates that pesticide residues on the produce sold in Connecticut is generally below EPA safety limits.

# Pesticide Residues in Produce Sold in Connecticut 1992

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The Environmental Protection Agency (EPA) registers all pesticides that are sold in the United States and approves their use on specific agricultural crops. The residues of pesticides that remain in or on the produce after harvest must be below allowable tolerances (Code of Federal Regulations, 1992). Testing is performed at this Station to determine if pesticides are present in products sold in Connecticut and whether the concentrations found are within the EPA tolerances. These tests assure consumers that produce sold in Connecticut meets EPA pesticide tolerance levels.

This report, in accordance with the Charter of this Station to report results of analyses (General Statutes, 1992), presents the results of our marketbasket study on pesticide residues in produce sold in Connecticut in 1992.

## METHODS

Produce was collected at farms, roadside stands, and food stores by an inspector of the Connecticut Department of Consumer Protection.

All products were tested for pesticide residues using a multi-residue method (Pylypiw, 1993). The basic principle of the multi-residue method is the analysis of the product for a selected group of pesticides using extraction and cleanup techniques, followed by compound separation and quantitation by capillary gas chromatography. The method we use to test our samples has a general sensitivity limit of 0.002 parts-per-million (ppm).

## RESULTS AND DISCUSSION

In 1992, a total of 282 samples representing 50 different varieties and types of produce were tested for pesticide residues. Thirteen of those 282 samples were labeled as "organically grown." When tested, none of the 13 samples contained a detectable residue. The sample commodities and concentration ranges of all residues found are given in Table 1.

Overall, 99 samples (35%) were found to contain pesticide residues. Of those 99 samples, one sample of peaches contained a residue of Dursban above the EPA tolerance for Dursban on peaches, and nine samples contained residues for which no EPA tolerance exists for that product. Eight of the "no tolerance" samples involved the fungicide Bravo, which was misapplied to blueberries and also found on hot peppers and raspberries as a result of spray drift. Five out of the six violative samples of blueberries (see Table 1) were samples taken at one Connecticut farm (one initial sample & four resamples). Ten violations (3.5%) were found in 1992; however, if this number is corrected for resamples, only five (1.8%) were violative.

Only two samples, one of beets and one of squash, contained a trace of DDE, a soil metabolite of DDT. The agricultural use of DDT in the United States has been banned since 1972. However, DDT has persisted in the soil (Pylypiw et al., 1991). Although 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). No sample that contained DDE was above the FDA action level.

Table 2 lists all pesticides found in the commodities tested, synonyms if available, their use, and their frequency of occurrence. As in past years, Thiodan was the most frequently detected residue followed by Captan, Ronilan, Iprodione, and Bravo. In a few cases, more than one residue was found on the same crop. This usually occurred on fruits, especially strawberries and apples.

Table 3 details the sources of the samples. Overall, 59% of the samples were from Connecticut farms and orchards, 27% from other states and 15% from foreign countries. Commodities from foreign countries included grapes from Chile, melons and pineapple from Costa Rica, and snow peas from Mexico. Produce grown in other states included blueberries from New Jersey and Maine; citrus fruits from

California and Florida; mushrooms from Pennsylvania; and apples from New York and Washington.

We compared our 1992 data to our data from previous years and to data published by the FDA. The FDA has reported that approximately 35% of the samples tested in FDA labs over the past 3 years contained pesticide residues and less than 1% contained violative residues (Food and Drug Administration 1990, 1991, 1992). In previous years we reported from 34% to 61% of the fruit and vegetable samples tested contained a residue (Hankin and Pylypiw 1989, Pylypiw and Hankin 1990, 1991, 1992). For 1992 we found 35% of the fruits and vegetables tested contained residues. Figure 1 details data from 1988-1992.

Table 4 and Figure 2 present the cumulative data from the past 5 years, 1988-1992. Out of 1662 samples tested, 46.2% (768 samples) were found to contain detectable pesticide residues. Two percent of these samples contained a violative residue level. Our data over the past 5 years suggest that pesticides found in fruits and vegetables sold in Connecticut are well below established safety standards.

#### ACKNOWLEDGEMENTS

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Table 1. Concentrations of pesticide residues in produce sold in Connecticut in 1992. 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 samples in which the pesticide was detected. An asterisk (\*) indicates a violative sample.

Produce Pesticide/(number)	Residue range (ppm)	EPA tolerance (ppm)
Alfalfa/Radish Sprouts (3 tested, 0 pos.) (3 organic)		
Apples (35 tested, 15 pos.) (1 organic)		
Captan (1)	0.16	25
Dursban (6)	0.09-0.007	1.5
Ethion (2)	0.26-0.02	2
Guthion (1)	0.064	2
Kelthane (1)	0.1	5
Imidan (2)	0.075-0.063	10
Pennacap-M (1)	0.02	1
Thiodan (4)	0.24-0.006	2
Apple Cider (36 tested, 0 pos.) (1 organic)		
Apple Juice (4 tested, 0 pos.) (2 organic)		
Apricots, Fresh (2 tested, 1 pos.)		
Captan (1)	0.42	50
Artichokes (1 tested, 0 pos.)		
Asparagus (4 tested, 0 pos.)		
Bananas (1 tested, 0 pos.)		
Beans-Snap (3 tested, 1 pos.)		
Bravo (1)	0.04	5
Beets (1 tested, 1 pos.)		
DDE (1)	0.004	0
Beet-Tops (1 tested, 0 pos.)		
Blueberries (18 tested, 9 pos.) (1 organic)		
Bravo (6)	0.043-0.01	0*
Captan (3)	0.08-0.04	25
Thiodan (1)	0.08	0.1
Brussels Sprouts (1 tested, 0 pos.)		
Cabbage (4 tested, 1 pos.)		
Thiodan (1)	0.007	2
Cantaloupe (3 tested, 0 pos.)		
Carrots (3 tested, 0 pos.)		
Celery (2 tested, 1 pos.)		
Bravo (1)	7.5	15
Dicloran (1)	0.4	15
Cherries (1 tested, 1 pos.)		
Dicloran (1)	0.45	20
Iprodione (1)	0.38	20

Table 1. Concentrations of pesticide residues in produce sold in Connecticut in 1992 (continued).

Produce Pesticide/(number)	Residue range (ppm)	EPA tolerance (ppm)
Clementines (1 tested, 0 pos.)		
Cole Slaw (2 tested, 1 pos.) Thiodan (1)	0.035	2
Corn (7 tested, 0 pos.)		
Cucumbers (4 tested, 2 pos.) Thiodan (2)	0.03	2
Eggplant (2 tested, 0 pos.)		
Grapefruit (4 tested, 1 pos.) Ethion (1)	0.2	2
Grapes, Table (3 tested, 1 pos.) Kelthane (1)	0.02	5
Kiwi Fruit (1 tested, 0 pos.)		
Lemons (1 tested, 0 pos.)		
Lettuce (2 tested, 0 pos.) (1 organic)		
Limes (3 tested, 1 pos.) Ethion (1)	0.44	2
Mangoes (2 tested, 0 pos.)		
Melons, Honeydew (3 tested, 0 pos.)		
Mushrooms (10 tested, 1 pos.) Diazinon (1)	0.048	0.75
Oat Cereal (1 tested, 0 pos.) (1 organic)		
Oat Flour (1 tested, 0 pos.) (1 organic)		
Oranges (2 tested, 0 pos.) (1 organic)		
Peaches (9 tested, 8 pos.) Captan (1)	1.73	50
Dursban (1)	0.55	0.05*
Imidan (2)	0.3-0.25	10
Iprodione (3)	0.19-0.017	20
Pennacap-M (2)	0.026-0.024	1
Permethrin (2)	0.095-0.033	5
Thiodan (2)	0.03-0.013	2
Pears (9 tested, 4 pos.) Thiodan (4)	0.1-0.014	2
Peppers, Bell (4 tested, 1 pos.) Permethrin (1)	0.01	1
Thiodan (1)	0.07	2
Peppers, Hot (4 tested, 3 pos.) Bravo (1)	1.1	0*
Thiodan (3)	0.05-0.036	2
Pineapple (2 tested, 0 pos.)		

Table 1. Concentrations of pesticide residues in produce sold in Connecticut in 1992 (continued).

Produce Pesticide/(number)	Residue range (ppm)	EPA tolerance (ppm)
Plums (4 tested, 3 pos.) Dicloran (3)	0.76-0.065	15
Potatoes (4 tested, 0 pos.) (1 organic)		
Potatoes, Sweet (2 tested, 2 pos.) Dicloran (2)	1.84-0.16	10
Radicchio (1 tested, 0 pos.)		
Raspberries (10 tested, 9 pos.)		
Bravo (1)	0.04	0*
Captan (3)	2.0-0.082	25
Imidan (1)	0.3	0*
Iprodione (8)	5.0-0.25	15
Ronilan (2)	0.041-0.036	15
Thiodan (1)	0.01	0.1
Snow Peas (3 tested, 2 pos.) Thiodan (2)	0.92-0.008	2
Spinach (2 tested, 1 pos.) Permethrin (1)	0.1	20
Squash, Summer (7 tested, 3 pos.)		
Bravo (1)	0.015	5
DDE (1)	0.01	0
Thiodan (3)	0.1-0.04	2
Strawberries (37 tested, 24 pos)		
Captan (10)	10-0.038	25
Dacthal (2)	0.46-0.011	2
Iprodione (2)	0.62-0.59	15
Kelthane (3)	0.056-0.015	5
Ronilan (17)	0.37-0.014	10
Thiodan (14)	0.04-0.006	2
Tomatoes (11 tested, 2 pos.)		
Bravo (2)	0.02	5
Thiodan (1)	0.003	2
Watermelon (1 tested, 0 pos.)		

Table 2. Pesticides found in 1992, agricultural use, total findings and frequency of occurrence.

Common name	Synonym	Use (a)	Total No. of Findings (b)	Percent Occurrence (b)
Bravo	Chlorthalonil	F	13	4.6
Captan		F	19	6.7
Dacthal	DCPA	H	2	0.7
DDE (c)		I	2	0.7
Diazinon		I,N	1	0.4
Dicloran	DCNA	F	7	2.5
Dursban	Chlorpyrifos	I	7	2.5
Ethion		I,A	4	1.4
Guthion	Azinophos-methyl	I	1	0.4
Imidan	Phosmet	I	5	1.8
Iprodione	Rovral	F	14	5.0
Kelthane	Dicofol	A	5	1.8
Permethrin	Pounce	I	4	1.4
Pennacp-M	Methyl Parathion	I	3	1.1
Ronilan	Vinclozolin	F	19	6.7
Thiodan	Endosulfan	I,A	40	14.2

(a) From Farm Chemical Handbook (1992), 78th edition. Meister Publishing Co., Willoughby, OH 44094  
A= Acaricide, F= Fungicide, H= Herbicide, I= Insecticide, N= Nematocide.

(b) Based on 282 samples.

(c) Metabolite of DDT.



Table 3. Source of produce tested in 1992.

Produce	Connecticut	U.S.	Foreign	Total
Alfalfa/Radish Sprouts	3	0	0	3
Apples	29	4	2	35
Apple Cider	31	5	0	36
Apple Juice	0	4	0	4
Apricots, Fresh	0	1	1	2
Artichokes	0	0	1	1
Asparagus	0	3	1	4
Bananas	0	0	1	1
Beans-Snap	1	2	0	3
Beets	1	0	0	1
Beet-Tops	1	0	0	1
Blueberries	11	5	2	18
Brussels Sprouts	0	1	0	1
Cabbage	3	0	1	4
Cantaloupe	0	1	2	3
Carrots	0	3	0	3
Celery	0	2	0	2
Cherries	0	1	0	1
Clementines	0	0	1	1
Cole Slaw	0	2	0	2
Corn	6	1	0	7
Cucumbers	1	1	2	4
Eggplant	1	1	0	2
Grapefruit	0	3	1	4
Grapes	0	0	3	3
Kiwi Fruit	0	0	1	1
Lemons	0	1	0	1
Lettuce	0	2	0	2
Limes	0	2	1	3
Mangoes	0	0	2	2
Melons	0	0	3	3
Mushrooms	3	7	0	10
Oat Cereal	0	1	0	1
Oat Flour	0	1	0	1
Oranges	0	2	0	2

Table 3. Source of produce tested in 1992 (continued).

Produce	Connecticut	U.S.	Foreign	Total
Peaches	7	0	2	9
Pears	7	1	1	9
Peppers, Bell	1	0	3	4
Peppers, Hot	4	0	0	4
Pineapple	0	0	2	2
Plums	0	3	1	4
Potatoes	1	5	0	6
Radicchio	0	1	0	1
Raspberries	10	0	0	10
Snow Peas	0	0	3	3
Spinach	0	2	0	2
Squash	4	2	1	7
Strawberries	32	3	2	37
Tomatoes	8	2	1	11
Watermelon	0	1	0	1
<b>TOTALS</b>	<b>165</b>	<b>76</b>	<b>41</b>	<b>282</b>

Table 4. Five year summary of samples tested.

Year	Number Tested	Number with Residues	Number Over EPA Tolerances	Number with No EPA Tolerances
1988	310	138	2	8 (3)*
1989	349	170	3	7 (5)*
1990	436	265	0	3 (2)*
1991	285	96	0	1
1992	282	99	1	9 (5)*
Total	1662 (1647)*	768	6	28 (16)*

\* -- Numbers in parenthesis were corrected for resamples.

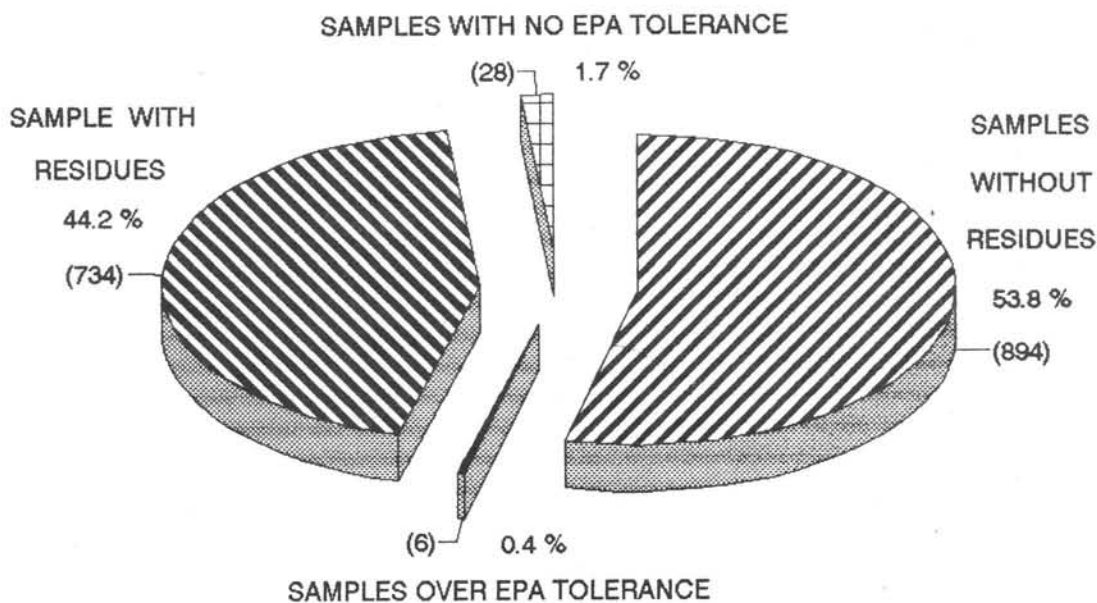


Figure 1. Five-year summary of samples tested for pesticide residues 1988-1992.



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