NEW JERSEY FOOD MONITORING & EVALUATION PROGRAM 2007-2009

NJ Department of Environmental Protection
Pesticide Control Program

Introduction

The New Jersey Food Monitoring & Evaluation Program (NJFMEP) was initiated in 2000. The project was designed to identify pesticide residues on fresh produce being grown and sold in New Jersey. While the project was initially envisioned to examine New Jersey grown produce exclusively, the scope has expanded to include fresh produce that is being sold in New Jersey, regardless of where it is grown. These non-New Jersey grown items make up a large percentage of the fresh produce available to New Jersey consumers. This project examines fresh produce from roadside markets. While expanding into other sampling venues throughout the last decade, roadside markets continue to be the focus.

NJFMEP is intimately related to the 1996 Food Quality Protection Act (FQPA). Accurate measurement of the pesticide residues present on various New Jersey grown crops will provide insight into actual pesticide residue levels as opposed to theoretical or calculated levels. The US Environmental Protection Agency (EPA) has determined allowable levels for pesticide residues on raw and processed agricultural commodities. These EPA Tolerance Levels are the only legal means to control the amount of pesticide residues on commodities consumed by the public.

The information gathered through NJFMEP is critical in maintaining the quality of the food supply while also assuring risk estimates (EPA Tolerance Levels) are not exceeded, and allows the New Jersey Department of Environmental Protection (NJDEP), Pesticide Control Program (PCP) to accurately determine pesticide exposure levels. Realistic assessments of proposed Tolerance revisions would also be achieved utilizing the data collected through NJFMEP.

This report covers the 2007 through 2009 growing seasons. Fresh produce samples were collected during 2007 and 2008, while the 2009 season was used to develop new extraction and analytical methods. These new methods will be incorporated into the SOP for the 2010 season.

Methods

Sample collection occurs for the duration of the growing season in New Jersey (approximately April through November) from locations throughout the State's 21 counties. Pesticide applications occur throughout the growing season while the crops are in the fields and after they are harvested. To capture both pre- and postharvest applications, samples are collected at the point of purchase when all applications have already occurred.

NJFMEP currently includes 22 commodities likely to be found at roadside markets. "Staple" commodities routinely found at roadside markets include apples, cucumbers, peppers, peaches, squash and tomatoes. Items such as Asian vegetables have also become popular as added value products. All of the 22 commodities may not be represented in the sample pool every season; commodities selected for sampling are based on national trends or current issues being faced by New Jersey's growers.

The samples are processed and analyzed by the NJDEP's PCP Laboratory. The samples are chopped and placed in a blender in accordance with the PCP Laboratory SOP entitled "Preparation of Pesticide Residue Extracts from Fruit and Vegetable Samples Using Liquid Solid Phase Extraction". Unlike the national USDA Pesticide Data Program (PDP), samples are not washed or rinsed to remove any dirt or debris before they are extracted. The multi-residue extracts are analyzed by a gas chromatograph/mass spectrometer (GC/MS) for a large list of targeted pesticide compounds consisting of fungicides, herbicides, and insecticides from various chemical families. The current GC/MS scan consists of approximately 300 different pesticide residues. In addition to the targeted compounds, unknowns will be examined with the intention of identifying potential

pesticides using mass spectral library searches and interpretation.

Results

A total of 30 fresh produce samples were collected and analyzed during 2007 and 2008 (Table 1). Nineteen out of the 38 pesticides detected from 2000-2008 were insecticides (Chart 1). A total of 278 residues have been identified since 2000. Insecticides account for 60% of the total number of detections. Of the nine fungicides identified, chlorothalonil represents nearly half of all the fungicide detections and 17% of the overall total number of detections. Herbicide detections only account for 5% of the total number of detections. The synergist PBO was only detected twice.

Because both pre- and postharvest applications are captured and the samples are not washed or peeled, these results represent the maximum exposure risk to pesticide residues from each individual sample. Of the 30 samples analyzed, 17 contained no pesticides (57%), six contained one pesticide (20%) and 7 samples contained more than one pesticide (23%). While the USDA PDP had a significantly larger sample pool, their 2007 data appear to show nearly the opposite results. Only 23% contained no detectable pesticides, 30% contained one pesticide and 47% contained more than one pesticide. Examination of multiple resides from the same commodity is significant because pesticides with common mechanisms of toxicity can lead to cumulative exposures.

While more than half (55%) of the samples collected from 2000-2008 did not contain any detectable residues (Table 2), it is not uncommon to find pesticides residues in fresh produce. What is notable, however, is the concentration of these detections as compared to the associated Tolerance Level. For example, chlorothalonil is a commonly used fungicide and the Tolerance Level for cholorothalonil on cherries is 0.5 ppm. The detections for chlorothalonil on cherries in 2007 were 0.005 and 0.014 ppm—well below the Tolerance Level and just above the reporting level for the GC/MS.

The most common source of non-compliant results is a misapplication (drift, etc.) that results in a residue on a commodity when the pesticide is not labeled for use on that commodity. While residue concentrations resulting from a misapplication are typically just above the GC/MS reporting level, these results are turned over to the Pesticide Control Program's Enforcement Element for further investigation. Although not nearly as common as a misapplication, Tolerance violations do occur. These samples are also turned over for further investigation. Since the program began in 2000, only 2% of the samples collected have contained residues exceeding EPA Tolerance and only 7% have had residues with no associated EPA Tolerance (Table 2). These results are comparable to the 2007 USDA PDP program results in which 0.4% contained residues exceeding EPA Tolerance and 3.3% contained residues with no associated EPA Tolerance.

The draw of fresh produce has made roadside markets increasingly popular in the past few years. The phrase "buying local" has become mainstream and consumers are increasingly concerned about their food sources. Consumers use "tools" like *The Shopper's Guide to Pesticides,* published by the Environmental Working Group, to make decisions about what produce to buy. *The Guide* identifies the "dirty dozen" and the "clean fifteen" of fresh produce based on residue data from the national USDA PDP. Future NJFMEP monitoring efforts will focus on the produce identified in *The Guide* in order to determine how New Jersey compares to the national data and whether or not *The Guide* accurately represents New Jersey's fresh produce.

More information regarding NJFMEP can be found under the Publications link on the Pesticide Control Program's website (www.pcpnj.org).

Table 1. Residues found on fresh produce samples in 2007-2008.

Commodity	Samples With Residues	Pesticide	Number of Times Detected	Residue Range (ppm)	EPA Tolerance (ppm)
Apples (1 samples)	1				
		Chlorpyrifos	1	0.014	1.5
Beans (9 samples)	2	Bifenthrin	1	0.017	0.6
		Chlorothalonil	1	0.43	5.0
		Myclobutanil	1	0.19	1.0
Cauliflower (1 sample)	0				
		None Detected	--	--	--
Cherries (5 samples)	5				
		Azinphos-methyl	1	0.028	2.0
		Captan	1	Identified	100
		Chlorothalonil	2	0.005-0.014	0.5
		Esfenvalerate	1	0.36	10
		Fenarimol	1	0.038	1.0
		Lambda-cyhalothrin	1	0.042	0.50
		Permethrin	1	0.87	3.0
		Phosmet	2	0.080-0.38	10.0
		Trifloxystrobin	1	0.38	2.0
Eggplant (2 samples)	0				
		None Detected	--	--	--
Peppers (2 samples)	2				
		Acephate	1	2.3	4
		Metalaxyl	2	0.022-0.055	1.0
		Methamidiphos	1	0.55	1
Potatoes (1 samples)	0				
		None Detected	--	--	--
Squash (6 samples)	3				
		Chlorothalonil	1	0.012	5.0
		Endosulfan sulfate	1	0.036	2.0
		PBO	1	0.008	**
		Trifluralin	1	<0.008	0.05
Tomatoes (3 samples)	0				
		None Detected	--	--	--

** There is currently no tolerance for this chemical on this commodity.

Table 2. Summary of New Jersey sample results for 2000 through 2009.

Year	Total Samples Collected	Samples With No Residues	Samples With Residues Within EPA Tolerances	Samples With Residues Over EPA Tolerances	Samples With Residues With No EPA Tolerances
2000	24	15	9	0	0
2001	105	59	39	0	8
2002	66	30	24	2*	10
2003	61	36	22	1	3
2004	51	32	16	1	3
2005	42	23	12	1	2
2006	8	5	2	1	0
2007	15	7^	6	0	0
2008	15	8	6	0	1
2009**	--	--	--	--	--
	387	215	136	6	27
		55%	35%	2%	7%

*FDA Action Level.
^Two samples from 2007 were considered qualified and rejected.
**No samples were collected during this season to accommodate extraction and analytical method development.

Chart 1. Occurrence of the pesticides found from 2000-2009.

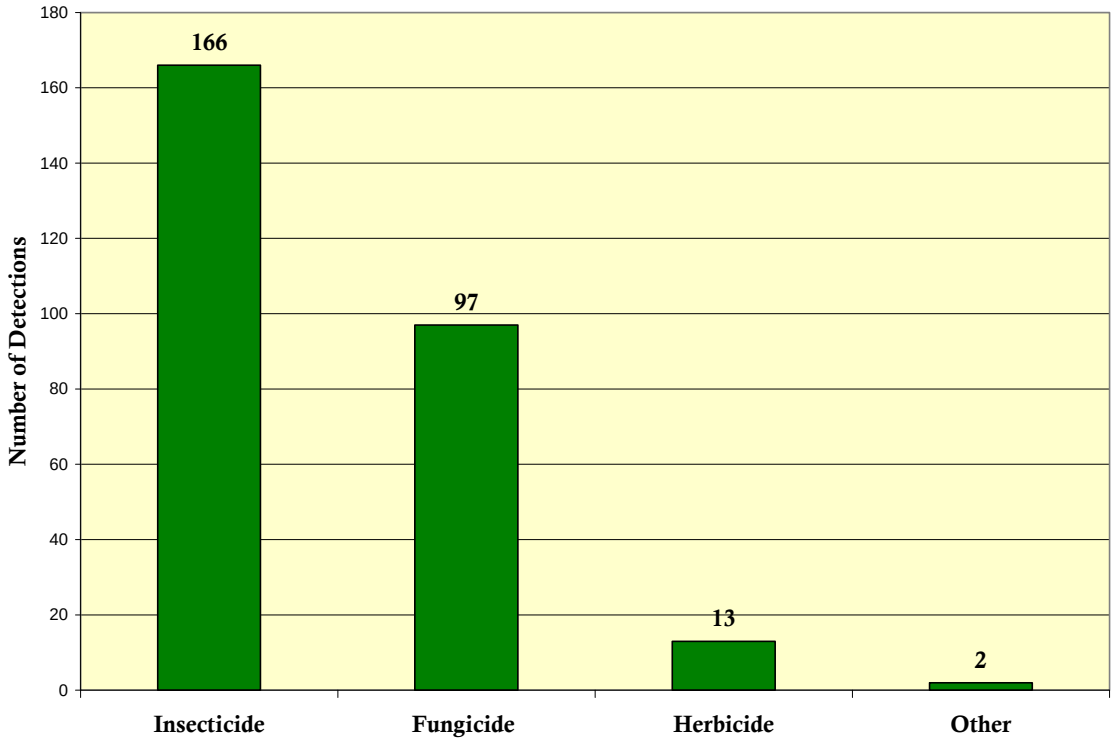

Chart 2. Chlorothalonil on Cherries 2007.