
United States Department of Agriculture
Agricultural Marketing Service
Science & Technology

# Pesticide Data Program

## Annual Summary Calendar Year 1993

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# *Preface*

In 1991, the United States Department of Agriculture (USDA) was charged with implementing a program to collect data on pesticide residues in food. USDA's Agricultural Marketing Service was appointed to undertake the creation and implementation of such a program, currently known as the Pesticide Data Program (PDP). PDP has been in operation since May 1991, and has published its findings for calendar years 1991 and 1992. This is the summary for calendar year 1993.

PDP was created to collect data on selected pesticides in fresh fruits and vegetables to strengthen the Government's ability to respond to food safety concerns, to protect public health, and to provide the Environmental Protection Agency (EPA) with data needed to assess the actual dietary risk posed by pesticides. EPA registers specific uses for pesticides based on the assumption that all pesticides are used at the maximum allowable amounts for the maximum number of applications. This theoretical risk may significantly exceed the actual risk of pesticide residues in the food supply and jeopardize the registration of pesticides important to American agriculture. The Food and Drug Administration (FDA) protects consumers from pesticide residues by performing tests on commodities suspected of containing violative residues. PDP data significantly upgrade the statistical reliability and extent of information available on the use of pesticides and the presence of pesticide residues in the food supply.

The program began in May 1991 by testing 16 pesticides and 3 commodities in fresh fruits and vegetables. By 1993, PDP had expanded to encompass 42 additional pesticides and 12 commodities. This summary does not include data on processed commodities, as sample collection and analysis did not begin until April 1994. However, research on collection sites and methodologies for analysis of these processed commodities started in late 1993. Findings for processed commodities will be published in the next summary.

It must also be pointed out that, as PDP was going through its first year of operations, the National Academy of Sciences was concluding its report on *Pesticides in the Diets of Infants and Children*. The report, released in June 1993, identifies the limitations of existing pesticide residue databases. To underline this point, the Academy examined the availability of data for foods highly consumed by nursing and non-nursing infants and concluded that, for most of these food items, there were no comprehensive data on pesticide residues derived from actual sampling. Six of the foods listed in the report were among PDP commodities in 1993. (More recent surveys place seven of the PDP commodities among those highly consumed by children.) Also, PDP sampling and analysis protocols conform to the recommendations made by the Academy in these two areas.

PDP acknowledges the contributions of all sampling and technical staff in the participating States, on whose expertise it relies on a daily basis. The program also thanks Phillip Kott of USDA's National Agricultural Statistics Service, Richard Schmitt and Edward Zager of EPA, and John Jones of FDA, for their cooperation and support.

The data presented in this summary were collected and processed through the efforts of the following:

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California Department of Food and Agriculture
California Department of Pesticide Regulations
Colorado Department of Agriculture
Florida Department of Agriculture and Consumer Services
Michigan Department of Agriculture
New York Department of Agriculture and Markets
North Carolina Department of Agriculture
Ohio Department of Agriculture
Texas Department of Agriculture
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# *Executive Summary*

The Pesticide Data Program (PDP) was implemented by the United States Department of Agriculture (USDA) in May 1991, to collect data on pesticide residues in foods. The data are used by the Environmental Protection Agency (EPA) for their risk assessment process, and for the reregistration and special review of pesticides. PDP has issued summaries of data for calendar years 1991 and 1992. This summary contains PDP findings for calendar year 1993.

During 1993, pesticides monitored by PDP included insecticides, herbicides, fungicides, and growth regulators in fresh fruits and vegetables. Pesticides and commodities were chosen for inclusion in the program based on EPA's data needs and USDA's food consumption surveys.

Planning and policy for PDP are coordinated by an Executive Steering Committee consisting of the following USDA agencies: (1) Agricultural Marketing Service (AMS), (2) National Agricultural Statistics Service (NASS), (3) Economic Research Service (ERS), and (4) Agricultural Research Service (ARS), as well as EPA and the Food and Drug Administration (FDA). PDP's financial and administrative issues are handled by the Science Division of AMS, and the Residue Branch oversees day-to-day sampling and technical procedures.

Program operations are managed through cooperative agreements with nine State agencies, which are responsible for sample collection and analysis. Six of the participating States (California, Florida, Michigan, New York, Texas, and Washington) collected and analyzed samples during 1993. The other three States (Colorado, North Carolina, and Ohio) collected samples, but shipped them to one or more of the other participating laboratories for analysis. Together, these 9 States represent approximately 50 percent of the Nation's population.

PDP was designed to detect, verify, and report low-level concentrations of pesticides in order to determine the actual residue levels to which consumers are exposed. Without actual residue data, risk assessment studies for pesticides are based on the theoretical maximum amounts of pesticide use. Such studies may overstate the exposure to consumers and may jeopardize EPA's registration of pesticides important to American agriculture. Consequently, PDP data are collected as close to the point of consumption as possible; and, to emulate consumer practices, only the edible portion of the sample is analyzed. PDP samples are collected without regard for commodity origin or variety, and generally reflect what is available to the consumer throughout the year.

An automated information management system has been designed by the Residue Branch to meet the data storage needs of PDP. This system allows for electronic transmission of data from the laboratories to the database maintained by the Branch.

Enhancements to PDP's sampling protocol were developed by NASS and introduced in January 1993. The enhanced protocol takes into account the different volumes of produce that are distributed annually by each sampling site, and removes a potential source of bias for estimates of residues in PDP commodities.

A total of 7,328 samples of 12 commodities (apples, bananas, broccoli, carrots, celery, grapefruit, grapes, green beans, lettuce, oranges, peaches, and potatoes) were analyzed. Of these samples, 1,237 (16.9 percent) were imports, most of which were limited to bananas, grapes, peaches, and green beans. Samples collected originated in 38 States and 15 foreign countries.

The number of pesticides routinely monitored increased during 1993. This increase led to a higher number of detections and, in some cases, residues of several pesticides were found in individual samples. However, most of these detections continue to be at very low levels--substantially below tolerances. For example, 94 percent of all residues detected were below 1 part per million (ppm), 60 percent were below 0.1 ppm, and about 10 percent were below 0.01 ppm.

Of the 7,328 samples analyzed, 110 samples (1.5 percent) were found to contain 114 violative residues (4 samples had 2 violative residues). Violations were reported in 30 samples (2.4 percent) of imported commodities, and in 80 samples (1.3 percent) of domestic commodities. Of the 114 violations reported, 100 (88 percent) were for residues where no tolerance was established for that particular commodity/pesticide pair.

PDP data also indicate that post-harvest application of fungicides and growth regulators contributes significantly to the number of residues detected in bananas, grapefruit, oranges, and potatoes, and, to a lesser extent, in apples. Post-harvest applications accounted for 3,441 detections (33 percent) of the total 10,329 residues detected. The pesticide most frequently found (1,689 detections) was the fungicide thiabendazole, representing about 16 percent of all detected residues.

PDP continuously strives to improve methodologies for the collection, testing, and reporting of data. PDP data are available to EPA and other Federal and State agencies charged with regulating and setting policies on the use of pesticides. The data are also available to nongovernment organizations upon request.

# *Pesticide Data Program (PDP) Annual Summary Calendar Year 1993*

*This summary presents PDP data for calendar year 1993, and consists of the following four sections: (I.) Background and Organization, (II.) Sampling Protocol, (III.) Laboratory Operations, and (IV.) Sample Results and Discussion.*

## I. Background and Organization

Instead of creating a new departmental organization to implement the Pesticide Data Program (PDP), the United States Department of Agriculture (USDA) charged four of its agencies with identifying their respective expertise and needs, then melded them into a comprehensive program. The four USDA agencies are the Agricultural Marketing Service (AMS), the National Agricultural Statistics Service (NASS), the Economic Research Service (ERS), and the Agricultural Research Service (ARS). AMS was selected as the lead agency to coordinate and implement the various facets of the residue program, and manage all program operations. NASS provides statistically reliable data on chemical usage at the State level, and collects economic input data that link chemical usage with economic characteristics. ERS analyzes AMS and NASS data to understand producer behavior and to determine the impact that various production practices and policies might have on the Nation's agricultural production, the food supply, and consumers. ARS conducts nationwide surveys of individual food intake and household use, and is developing a Food Grouping System to translate data on foods as consumed into forms that can be linked with pesticide residue data.

As the lead agency for implementing PDP, AMS selected its Science Division to oversee policy planning and program development. The Residue Branch of the Science Division is responsible for coordinating and managing day-to-day program activities with the participating State and Federal facilities. Figure 1 provides an organizational flowchart of PDP management and operations, including a breakdown of the three major program components--sample collection, laboratory analysis, and database management.

As illustrated in Figure 1, PDP sampling and analytical operations are performed by nine States (California, Colorado, Florida, Michigan, New York, North Carolina, Ohio, Texas, and Washington) through agreements with their respective State agencies. Thus, a significant amount of PDP's financial resources (75 percent) goes directly to the States to cover their operating expenses. An additional 10 percent of PDP funding is given to USDA facilities to support State testing activities. These laboratories provide support services to the States by performing certain selective residue analyses that the States agreed were best conducted by Federal laboratories.

Four States in the program have a net outflow of produce to other States. These are: (1) California - which ships produce to Hawaii and Nevada; (2) Colorado - to Wyoming and New Mexico; (3) New York - to the New England States and New Jersey; and (4) Washington - to Alaska. This is partly due to the proximity of warehouses and terminal markets to retail distribution centers. For the other five States (Florida, Michigan, Ohio, North Carolina, and Texas) the volume of produce coming in and

Figure 1. Overview of PDP Management and Operations

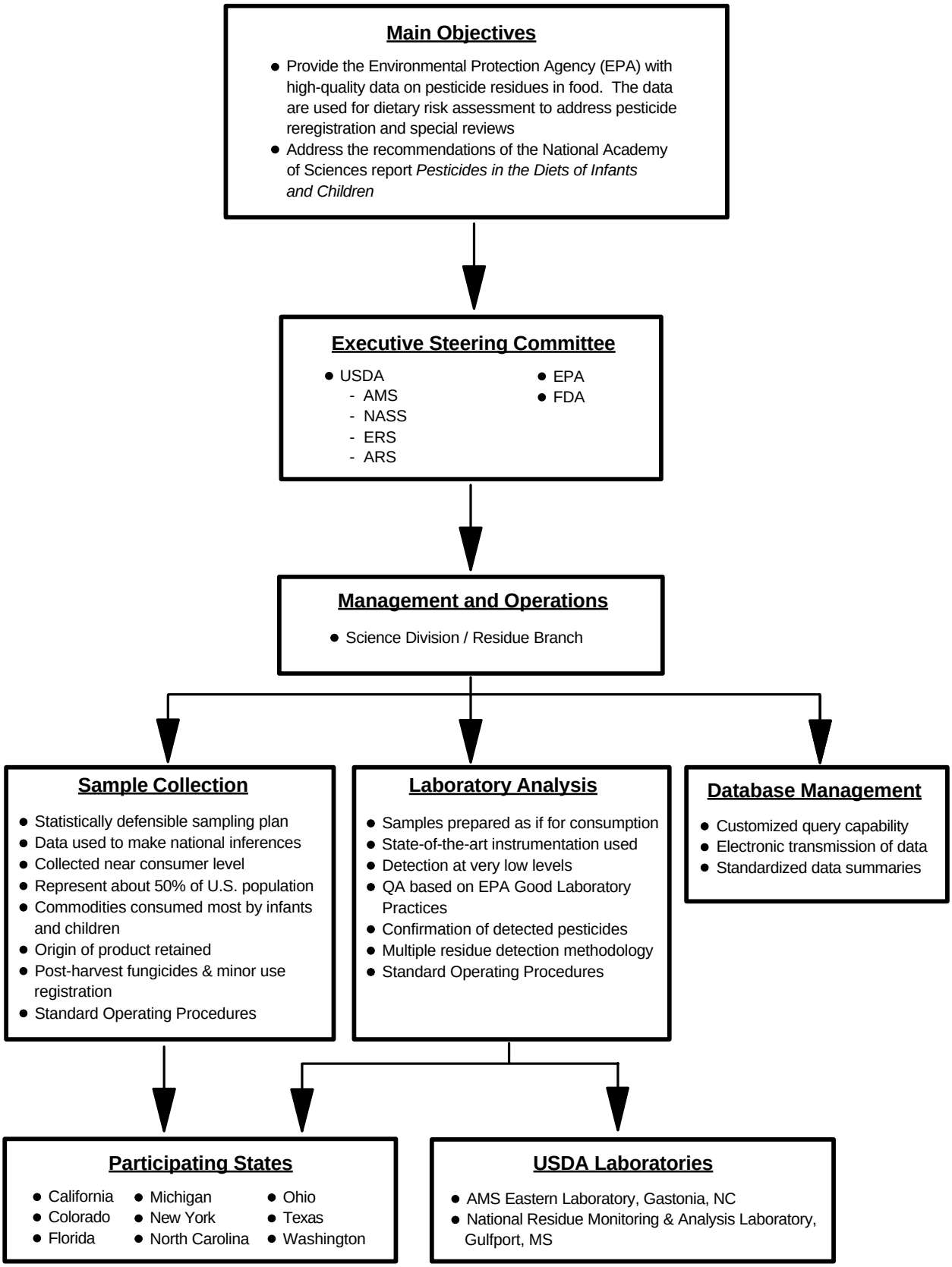
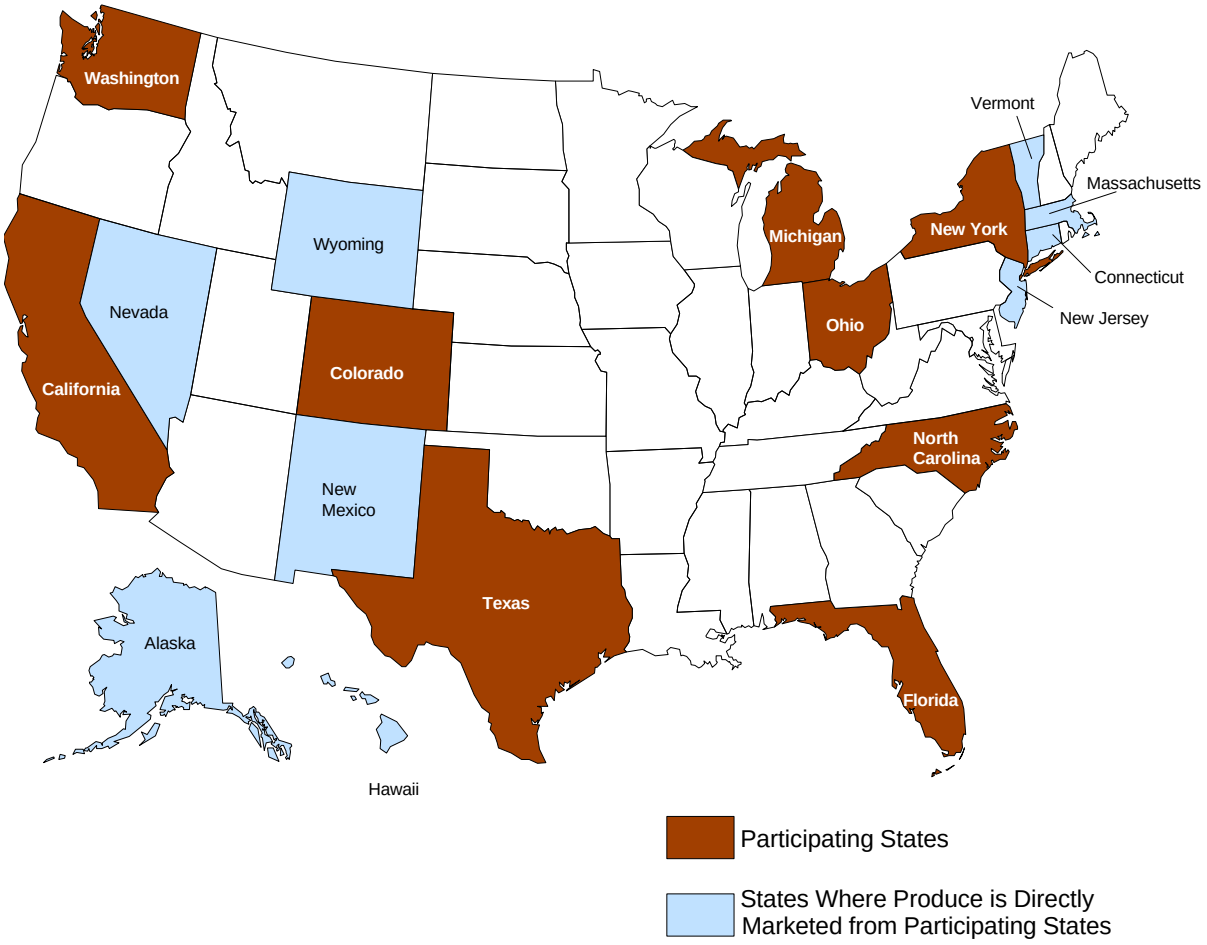


Figure 2. Participating States and Their Geographical Distribution Areas

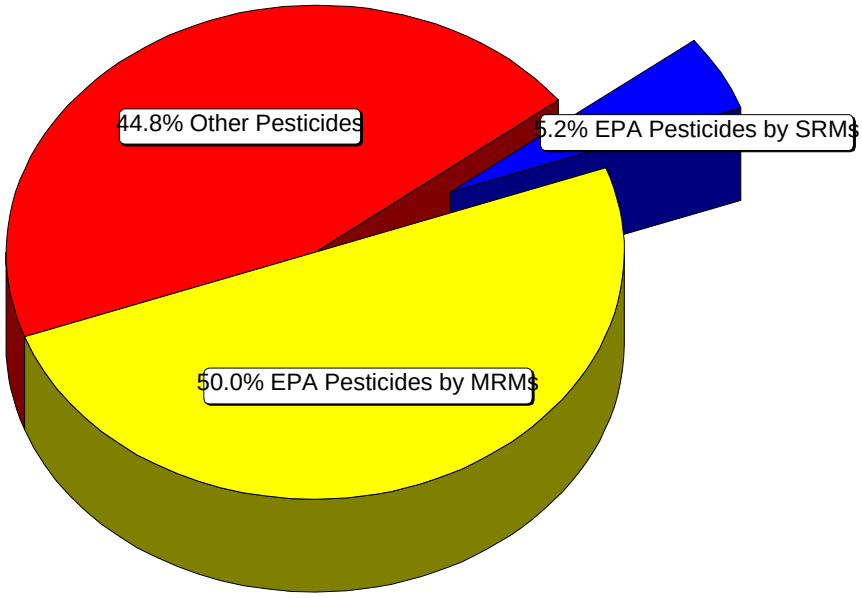



going out of the State is about the same. For example, Florida produce shipped to Georgia is offset by produce entering the Florida panhandle from the Mobile, Alabama, area.

Figure 2 shows the States participating in the program, which together represent about 50 percent of the Nation's population. Also shown are the nine other States (Alaska, Connecticut, Hawaii, Massachusetts, Nevada, New Jersey, New Mexico, Vermont, and Wyoming) where, as indicated above, a significant amount of produce is directly marketed from the participating States. Although these additional States are not active program participants, PDP data will apply to a large portion of their population as well.

AMS works closely with EPA on a regular basis to develop the list of pesticides and commodities targeted for data collection by PDP. Commodities chosen for inclusion in the program are among those most prevalently consumed by the American public. Twelve commodities (apples, bananas, broccoli, carrots, celery, grapes, grapefruit, green beans, lettuce, oranges, peaches, and potatoes) were sampled and analyzed throughout 1993. The pesticides requested by EPA consist mainly of those whose toxicity is under evaluation by the agency (pesticides with acute and chronic endpoints, including suspected carcinogens) and are revised periodically to address current EPA data needs. Figure 3 provides a list of all the pesticides included in PDP during 1993.

Figure 3. Pesticides in PDP




## Detected by Multiresidue Methods (MRMs)

### EPA Targeted Pesticides - 29

Acephate
Aldicarb
Atrazine*
Azinphos-Methyl
Bromoxynil*
Chlorothalonil
Chlorpyrifos
Diazinon
Dichlorvos*
Dicloran
Dicofol
Disulfoton
Endosulfans
Ethion
Fenamiphos*
Hexachlorobenzene*
Iprodione
Lindane
Malathion
Methamidophos
Methidathion
Methomyl + Thiodicarb**
Methoxychlor
Mevinphos
Oxamyl
Parathion-Methyl
Pentachlorobenzene
Permethrins
Quintozene (PCNB)

### Other Pesticides Found - (26)

Anilazine
Benfluralin
Captan
Carbaryl
Carbofuran + 3 OH Carbofuran
Chlorpropham
DCPA
DDE + DDT + TDE
Demeton-S
Dimethoate and Omethoate
Diphenylamine
Imazalil
Linuron
Methiocarb
Myclobutanil
O-Phenylphenol
Ovex
Parathion
Phorate Sulfone
Phosmet
Propargite***
Thiabendazole
Toxaphene
Trifluralin
Vinclozolin

## Detected by Selective Residue Methods (SRMs)

### EPA Targeted Pesticides - 3

2,4-D, Benomyl, and Formetanate

* Residues of these pesticides were not detected in 1993.
** As the Methomyl Metabolite.
*** Propargite became a required pesticide in October 1993.

An extensive information management system was developed to compile and store PDP data, which has been enhanced over time to allow for customized query capability and standardized data summaries. The PDP database also allows for electronic transmission of data from the individual laboratory facilities to the Residue Branch.

PDP is different from other Federal and State regulatory monitoring programs in that participation in the program is completely voluntary. No comparisons should be made between PDP and these enforcement programs because of the differences in mission and operational structure. Enforcement programs are designed primarily to target tolerance violations; therefore, their sampling protocols are not required to be statistically defensible. Also, as specified by Federal regulations, samples are analyzed as the unwashed, whole, raw commodity--that is, with the peel or skin intact; and only tolerance violations are confirmed by testing laboratories. PDP is designed to produce virtually unbiased, objective data that can be used for risk assessment; therefore, the sampling protocol is required to be statistically defensible. PDP samples are prepared as if for human consumption, and all residues are verified--regardless of the level of detection.

Another major distinction between the two types of programs is the quick turnaround time required for analysis of enforcement samples. Many programs require that the sampled commodity be detained at the distribution facility while awaiting the results of the analysis. PDP places emphasis on searching for residues at the lowest detectable levels, rather than on quick sample turnaround. Analysis of PDP samples may take approximately 1 to 2 months, and does not affect commodity distribution.

## II. Sampling Protocol

The PDP sampling protocol, in place from the beginning of the program through December 31, 1992, was objective and random in nature, and allowed users of the data to make reasonably good estimates of pesticide residues in the food supply. However, since PDP data would ultimately be used for making national inferences for dietary risk assessment, AMS, with the assistance of NASS, developed an enhanced protocol that was implemented in January 1993. The revised, statistically defensible protocol allows for making nearly unbiased estimates of residues for commodities collected in the participating States. It also makes it possible to quantify the accuracy of these estimates for both the participating States and the Nation as a whole.

Increasing the number of participating States for sample collection, from 6 to 9, raised the proportion of the Nation's population represented by PDP data to approximately 50 percent. This percentage may be even higher when the amount of produce distributed from the nine participating States directly to other States is taken into account. (See Figure 2, Participating States and Their Geographical Distribution Areas.)

Other amendments to the protocol for 1993 included: (1) increasing the number of samples collected per commodity each month from 52 to 60; (2) providing the States with Standard Operating Procedures (SOPs) for developing and maintaining sampling documentation and performing sample collection; (3) training for Sampling Managers on SOP-related requirements; and (4) performing on-site reviews of each State's sampling program to confirm compliance with the SOPs, and make recommendations for improvements.

### ■ Statistical Sampling Procedures

The participating States were assigned a number of samples to collect per commodity each month based on the population of the State. The sample numbers remained the same for all of 1993, and were as follows: California-14, Colorado-2, Florida-7, Michigan-6, New York-9, North Carolina-4, Ohio-6, Texas-8, and Washington-4--for an annual total of 720 samples per commodity. Sample size was 5 pounds for each applicable testing facility, and the following 12 commodities were included in the program: apples-AP, bananas-BN, broccoli-BR, carrots-CR, celery-CE, grapefruit-GF, grapes-GR, green beans-GB, lettuce-LT, oranges-OG, peaches-PC, and potatoes-PO.

Each State is responsible for compiling and updating a list of sampling sites. The number of locations on a State's sampling site list varies greatly, from 29 in Washington to 358 in California. The majority of PDP sampling sites are either terminal markets or large chain store distribution centers because they are the last stopover before produce reaches retailers, and, ultimately, consumers. PDP data are collected as close to the consumer as possible, because this provides a better picture of actual exposure to pesticide residues by taking into account pesticide degradation that occurs during transit and storage. Also, sampling at these locations provides information on post-harvest applications of fungicides and growth regulators.

The selection of sampling dates and sites was performed by the States quarterly, and sampling plans were provided to the Residue Branch. State Sampling Managers were given the option of obtaining assistance and advice from USDA's NASS on developing their sampling plans, particularly with regard to implementing a more statistically defensible and accurate method of site selection. This method required that each site be given a "size" factor based on the amount of produce distributed annually. For instance, a sampling site that distributes 100,000 pounds of produce might be given a size of "10," and a site that distributes 10,000 pounds of produce might be given a "1." This would result in the larger site (distributing 100,000 pounds) being 10 times more likely to be selected in a given month than the smaller site (distributing 10,000 pounds). The volume of produce distributed by the sampling sites varies depending on their size and geographic location. This is true within a State, as well as among the nine participating States.

States were allowed to collect two different commodities at the same site on the same date. However, a site could not be sampled twice within 1 month for a single commodity. States were asked to collect all samples of the same commodity on one date, or within two consecutive dates. Collectors were also asked to ship the samples as soon as possible after collection, to ensure they would arrive at the appropriate testing facility(ies) within 24 hours. Sample dates continued to be selected at random.

Participating States were provided with Sample Information Forms, on which to collect the sample data. Four items of information on the form are combined to generate a unique identification number for each sample. These items are: (1) the 2-letter State postal code where the sample was collected; (2) the date of collection; (3) the site number; and (4) the 2-letter commodity code. A 3-digit numerical code is used for the site numbers--which are assigned by the States. The 2-letter commodity codes are determined by the Residue Branch, and are used by all States. Other pertinent information included on the form is: (1) whether the sample is domestic or imported; (2) if imported, country of origin; (3) name of sampling site, grower, and/or packer; and (4) a list of potential or known post-harvest applications.

## ■ Synopsis on Sample Collection

A total of 7,328 samples of fresh produce was collected during 1993. As shown in Table 1, the number of samples collected per State was: California - 1,697, Colorado - 246, Florida - 847, Michigan - 743, New York - 1,090 , North Carolina - 501, Ohio - 742, Texas - 1,003, and Washington - 459.

**Table 1.** Samples Collected Per Commodity by Each Participating State

| State | Commodity AP | BN | BR | CE | CR | GB | GF | GR | LT | OG | PC | PO | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| California | 149 | 138 | 149 | 152 | 149 | 140 | 146 | 139 | 147 | 144 | 95 | 149 | 1697 |
| Colorado | 22 | 22 | 22 | 22 | 22 | 18 | 21 | 21 | 22 | 21 | 11 | 22 | 246 |
| Florida | 77 | 68 | 74 | 68 | 74 | 69 | 75 | 76 | 77 | 73 | 39 | 77 | 847 |
| Michigan | 66 | 61 | 64 | 64 | 62 | 59 | 64 | 64 | 65 | 65 | 44 | 65 | 743 |
| New York | 99 | 95 | 96 | 92 | 97 | 81 | 95 | 97 | 97 | 97 | 46 | 98 | 1090 |
| North Carolina | 44 | 44 | 44 | 43 | 44 | 41 | 44 | 44 | 44 | 43 | 22 | 44 | 501 |
| Ohio | 66 | 66 | 66 | 65 | 64 | 56 | 66 | 65 | 66 | 64 | 33 | 65 | 742 |
| Texas | 88 | 86 | 82 | 87 | 87 | 81 | 84 | 87 | 87 | 88 | 62 | 84 | 1003 |
| Washington | 43 | 40 | 43 | 44 | 43 | 21 | 42 | 38 | 42 | 43 | 17 | 43 | 459 |
| Total | 654 | 620 | 640 | 637 | 642 | 566 | 637 | 631 | 647 | 638 | 369 | 647 | 7328 |

Commodities

AP - Apples
BN - Bananas
BR - Broccoli
CE - Celery
CR - Carrots
GB - Green Beans
GF - Grapefruit
GR - Grapes
LT - Lettuce
OG - Oranges
PC - Peaches
PO - Potatoes

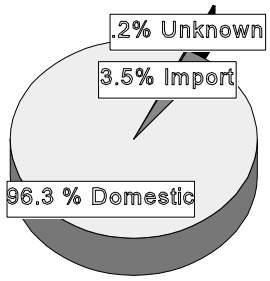
These figures are less than the total number of assigned samples for 1993 due to the unavailability of product at either the original or alternate sampling site. This was often caused by the unique growing season of each commodity. For example, 51 percent of the 720 peach samples were unavailable at the time of collection, particularly during the winter months.

Figure 4 shows the total number of samples per commodity, and the percentage of each that were either domestic or imported.

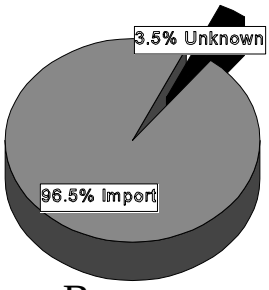
Appendix A is divided into three parts (sample origin as domestic, imported, and unknown) and lists the number of samples originating (grown, packed, or distributed) from each State or country per commodity. As indicated, samples collected during 1993 originated from the 9 participating States, 29 other States, and 15 foreign countries. The figures listed in the last two columns of Appendix A are the total number of samples per State/country, and the percentage this number represents of all samples collected. The total number of samples per commodity, and percentage of all 1993 samples, is listed in the last row of each part.

Because PDP samples represent market availability of produce to the consumer throughout the year, and the PDP sampling protocol does not require sampling a specific number of imports, the total samples collected for the year may not always correlate to the percentage of actual imports for a particular commodity.

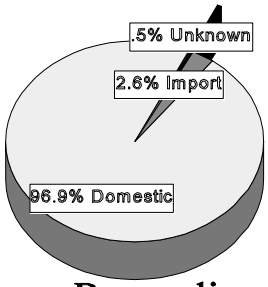
Figure 4. Commodity Distribution Percentages - Imported vs. Domestic



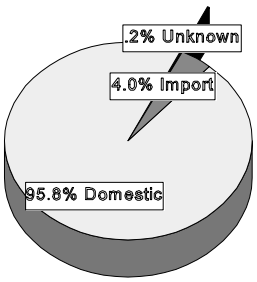

Apples
(654 Samples)



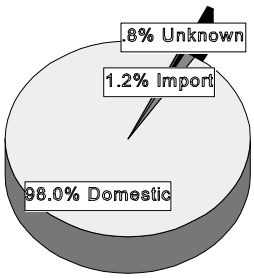

Bananas
(620 Samples)



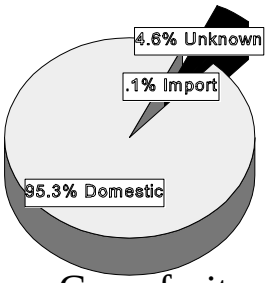

Broccoli
(640 Samples)



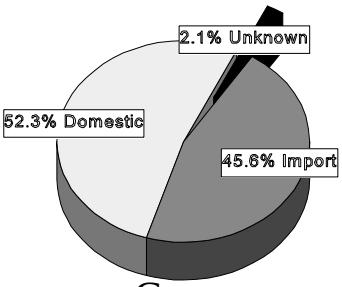

Carrots
(642 Samples)



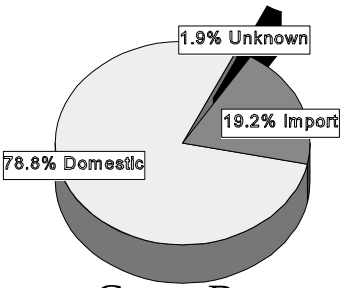

Celery
(637 Samples)



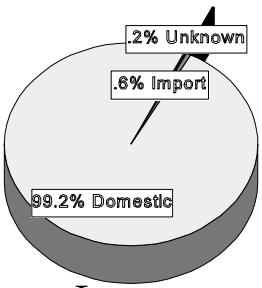

Grapefruit
(637 Samples)



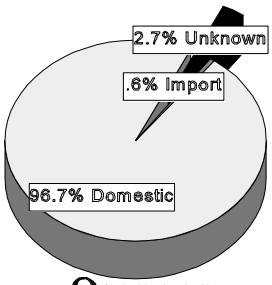

Grapes
(631 Samples)



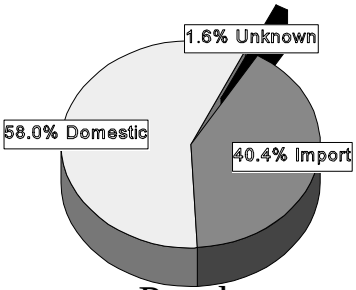

Green Beans
(566 Samples)



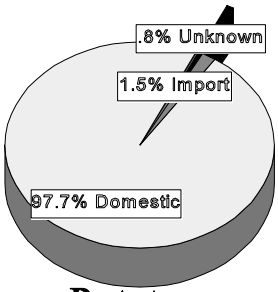

Lettuce
(647 Samples)




Oranges
(638 Samples)




Peaches
(369 Samples)




Potatoes
(647 Samples)

# III. Laboratory Operations

During 1993, nine laboratories (seven State and two Federal) were performing analyses for PDP. These laboratories are equipped with state-of-the-art instrumentation capable of detecting residues at very low levels. The laboratory staff receives intensive training and must demonstrate analytical proficiency on an ongoing basis. Senior scientists continuously test new technologies and develop new techniques to improve the levels of detection. Changes in methodology are validated and documented in accordance with PDP Standard Operating Procedures before being implemented.

PDP required participating laboratories to monitor 32 compounds (plus metabolites where applicable) for which EPA needs data. Of these, 29 are detectable by multiresidue methods (MRMs) and 3 can be detected only by selective residue methods (SRMs). Since SRMs are resource intensive, this type of analysis was performed only at selected laboratories and in specific commodities as indicated below:

**Laboratories Performing SRMs**

1. NRMAL, Gulfport, MS
   Pesticide: Benomyl
   Commodities: Apples, Bananas, Broccoli, Green Beans, and Peaches

2. AMS Eastern Laboratory, Gastonia, NC
   Pesticide: Formetanate
   Commodities: Apples, Oranges, and Peaches

3. NRMAL, Gulfport, MS and other Selected State Laboratories
   Pesticide: 2,4-D
   Commodities: Apples, Grapefruit, Grapes, Oranges, Peaches, and Potatoes

In addition to the EPA-targeted pesticides, laboratories routinely tested for approximately 26 other compounds that are detectable by MRMs. For a complete list of pesticides, see Figure 3 in Section I.

## ■ Quality Assurance Program

The main objectives of the quality assurance/quality control (QA/QC) program are to ensure the reliability of PDP data, and the performance equivalency of the participating laboratories.

To accomplish these objectives, PDP established SOPs based on EPA's Good Laboratory Practices. PDP SOPs outline program requirements that all facilities must follow. Preliminary QA/QC review procedures are performed on-site by each laboratory's Quality Assurance Unit (QAU). Final review procedures are performed by AMS staff, who are responsible for collating and reviewing data for conformance with SOPs. Additionally, AMS staff monitor the participants' performance through proficiency samples and on-site visits, during which records are reviewed and laboratory operations are observed.

PDP's quality assurance program encompasses five elements:

1. Proficiency Check Samples - All facilities are required to participate in PDP's Check Sample Program. Check samples are issued to laboratories performing analysis with MRMs and/or SRMs. Periodically, one to four prepared commodities, containing pesticide(s) of known quantities, are sent to the participating laboratories and tested under the same conditions as routine samples. The resulting data are used to determine performance equivalency among the testing laboratories, and to evaluate individual laboratory performance.

2. Quality Control - Since quality control requirements are the same for one sample as for several samples, it is more economical and efficient to collect and process the samples as a set. Laboratories are permitted to refrigerate incoming samples of the same commodity for up to 72 hours, to allow for different sample arrival times from the collection sites. PDP quality control guidelines require that samples be tested as part of an analytical set, which includes the sample set and the following components:

**a. Reagent Blank:** An amount of distilled water, equivalent to the natural moisture content of the commodity, is run through the entire analytical process to determine glassware cleanliness and system integrity.

**b. Matrix Blank:** A previously analyzed sample of the same commodity, which contains either very low concentrations of known residues or no detectable residues, is divided into two portions. The first portion is used to give background information on naturally occurring chemicals, and the second one is used to prepare a matrix spike.

**c. Matrix Spike(s):** A portion(s) of matrix blank is spiked with all pesticides of interest to PDP, prior to extraction. The matrix spike is used to determine the accuracy of the analyst and instrument performance.

**d. Process Control Spike:** A compound of physical and chemical characteristics, similar to those of the pesticides being tested, is used to evaluate the analytical process on a sample-by-sample basis. Each of the analytical set components, except the reagent and matrix blanks, is spiked with process controls.

**e. Storage Spikes:** If a sample set is going to be frozen as a homogenate for more than 72 hours prior to analysis, analysts are required to prepare storage spikes. Storage spikes provide information on whether degradation has occurred while the sample was frozen, and are prepared in the same manner as matrix spikes. However, they do not replace the requirement to run a fresh matrix spike at the time of analysis.

3. Method Performance and Confirmation - Laboratories are required to determine the limits of detection (LOD) and limits of quantitation (LOQ) for each commodity/pesticide pair. LODs depend on matrix, analyte, and detector used, and range from 0.001 to 0.150 ppm. (*Information on specific LODs and LOQs is available upon request.*) Confirmation by mass spectrometry, or a suitable alternate detection system, is required for all initial findings. If a finding is violative, the sample is reanalyzed in duplicate from the frozen homogenate, along with the appropriate blanks and a spike of the violative residue at the suspected level.

4. Standard Operating Procedures - Written SOPs are in place to provide uniform administrative, sampling, and laboratory procedures. SOPs are revised annually to accommodate changes in the program. Before submission, data are reviewed by each QAU for completeness and adherence to PDP requirements.

5. On-Site Reviews - On-site reviews are performed to determine compliance with SOPs. Improvements in sampling, chain of custody, recordkeeping, and laboratory procedures were made as a result of the on-site reviews.

## ■ Sample Preparation

Upon arrival at the testing facility, samples are visually examined for acceptability and discarded if determined to be inedible (e.g., decayed, extensively bruised). Accepted samples are then prepared emulating the practices of the average consumer, to more closely represent actual exposure to residues. Samples are prepared as follows: (1) apples and peaches are washed and cored; (2) bananas, grapefruit, and oranges are peeled; (3) broccoli, celery, and lettuce are washed and the inedible portions are removed; (4) green beans and grapes are washed and stems are removed; and (5) carrots and potatoes are washed.

Samples are homogenized using choppers and/or blenders and separated into analytical portions (aliquots) for analysis. If testing cannot be performed immediately, the entire analytical set (sample set plus all quality control samples) is frozen at -40° C, or lower, according to PDP's QA/QC requirements. Surplus aliquots, not used for the initial testing, are retained frozen in the event that replication of analysis or verification testing is needed.

## ■ Sample Analysis

Variations of the Luke extraction procedures developed by FDA are used by Florida, Michigan, New York, and Texas. California and Washington use the multiresidue method developed by the California Department of Food and Agriculture. These two methods were determined to produce equivalent data for PDP analytical purposes. Sample extraction and cleanup preparation procedures, to achieve the levels of detection required by the program, are based on organic solvent/partition procedures. Selective residue methods, used for 2,4-D, benomyl, and formetanate, were independently validated by the laboratory(ies) performing analysis.

Various types of chromatography are used for the initial identification and quantitation of pesticides. Confirmation is accomplished by mass spectrometry or by alternate detection systems when applicable. Confirmation is deemed necessary due to the complexity of commodity matrices and the low concentration levels of detected residues. The confirmatory analysis provides an extra measure of confidence in the identification of both the pesticide residue and its concentration.

## IV. Sample Results and Discussion

### ■ Sample Results

Because the number of pesticides routinely monitored by PDP increased during 1993, the number of detections also increased. However, these detections continue to be at levels substantially below tolerances. For example, 94 percent of all residues detected were below 1 ppm, 60 percent were below 0.1 ppm, and about 10 percent were below 0.01 ppm. The low levels of detections are also illustrated in Appendix B, C, D, and E.

Appendix B shows the distribution of residues per pesticide per commodity. The minimum and maximum concentrations detected, tolerances, and violations are also shown.

Appendix C shows the distribution of residues for PDP commodity/pesticide pairs with residue detections in at least 10 percent of the samples. As seen in this appendix, for most of these selected commodity/pesticide pairs, residues were detected in the very low ppm ranges--substantially lower than tolerances. For example, for thiabendazole/bananas, 90 percent of the detections were at 0.13 ppm or below. Similarly, 75 percent of detections were at 0.075 ppm or lower, and 50 percent were at 0.017 ppm or lower. A ratio of the 90th percentile to tolerance (0.40 ppm) is shown in the last column as equal to 0.33. In other words, the amount of residue detected is 33 percent of the tolerance.

In Appendix D, the distribution frequency has been converted into a cumulative distribution in which the percentages of samples with residue detections at or below specific concentrations are displayed. (This was done for 8 of the 12 commodity/pesticide pairs with detections in at least 40 percent of the samples.) The lowest percentile graphed indicates, approximately, the percent of samples without detectable residues. Using the same bananas/thiabendazole pair, approximately 45 percent of all detections were at or below the LOD of the reporting laboratory, 75 percent of the samples were at or below 0.075 ppm, and 95 percent were at or below 0.19 ppm. The highest percentile graphed is the 99th, and does not include the highest concentration detected. (Inclusion of the highest concentration causes graph distortion, which obscures concentrations in the low ranges.) Tolerances and highest concentrations detected are shown in the graphs' boxes.

Appendix E shows the percentages of occurrences at 8 separate concentration ranges for pesticide/commodity pairs with residue detections in at least 25 percent of the samples. The graphs' boxes show the number of samples tested, the number and percentage of samples with detections for each individual pair, and the minimum and maximum concentrations detected. For example,

for endosulfans/green beans, 59.7 percent of samples had no detectable residues, 5.5 percent had residues between 0.001 and 0.009 ppm, 7.6 percent had residues between 0.010 and 0.025 ppm, etc.

## ■ Post-Harvest Applications

PDP collects samples at points in the distribution chain where produce is ready to be released to the consumer, and where post-harvest applications of pesticides have already taken place. Most post-harvest applications are limited to fungicides (to control mold and fungus) and growth regulators (to prevent sprouting). PDP compounds with mostly post-harvest applications are: diphenylamine, o-phenylphenol, thiabendazole (fungicides), and chlorpropham (growth regulators). Other compounds with post-harvest uses on selected commodities are the fungicides dicloran (carrots and peaches) and imazalil (citrus). Therefore, residues from these pesticides can be assumed to result from post-harvest uses. PDP data indicate that post-harvest applications contribute significantly to the number of residues detected in bananas, grapefruit, oranges, and potatoes, and, to a lesser extent, in apples. Table 2A shows totals of samples analyzed, number and percentage of samples with residues, number of different residues, and total residue detections for each commodity. Table 2B displays the same information, excluding residues resulting from post-harvest applications.

**Table 2A.** Number of Samples and Residues Detected, by Commodity (Includes Post-Harvest Applications)

| Commodity | Total Samples Analyzed | Samples with Residues Detected | % of Samples with Residues Detected | Different Residues Detected | Total Residue Detections |
|---|---|---|---|---|---|
| Apples | 654 | 634 | 97 | 33 | 2010 |
| Bananas | 620 | 379 | 61 | 6 | 405 |
| Broccoli | 640 | 162 | 25 | 15 | 189 |
| Carrots | 642 | 416 | 65 | 21 | 687 |
| Celery | 637 | 595 | 93 | 26 | 1429 |
| Grapefruit | 637 | 460 | 72 | 13 | 703 |
| Grapes | 631 | 472 | 75 | 26 | 981 |
| Green Beans | 566 | 371 | 66 | 25 | 822 |
| Lettuce | 647 | 327 | 51 | 19 | 532 |
| Oranges | 638 | 507 | 79 | 19 | 955 |
| Peaches | 369 | 337 | 91 | 29 | 887 |
| Potatoes | 647 | 511 | 79 | 19 | 729 |

Number of Samples Analyzed = 7328
Number of Samples with Residues Detected = 5171
Percent with Residue Detections = 70.6%
Total Number of Residue Detections = 10,329
Total Number of Different Pesticides Detected = 58

**Table 2B.** Number of Samples and Residues Detected, by Commodity (Excludes Post-Harvest Applications*)

| Commodity | Total Samples Analyzed | Samples with Residues Detected | % of Samples with Residues Detected | Different Residues Detected | Total Residue Detections |
|---|---|---|---|---|---|
| Apples | 654 | 542 | 83 | 27 | 1217 |
| Bananas | 620 | 7 | 1 | 4 | 7 |
| Broccoli | 640 | 162 | 25 | 15 | 189 |
| Carrots | 642 | 413 | 64 | 18 | 673 |
| Celery | 637 | 578 | 91 | 24 | 1296 |
| Grapefruit | 637 | 92 | 14 | 10 | 107 |
| Grapes | 631 | 465 | 74 | 23 | 947 |
| Green Beans | 566 | 370 | 65 | 22 | 806 |
| Lettuce | 647 | 326 | 50 | 18 | 531 |
| Oranges | 638 | 179 | 28 | 16 | 211 |
| Peaches | 369 | 329 | 89 | 25 | 716 |
| Potatoes | 647 | 160 | 25 | 15 | 188 |

Number of Samples Analyzed = 7328
Number of Samples with Residues Detected = 3623
Percent with Residue Detections = 49.4%
Total Number of Residue Detections = 6888
Total Number of Different Pesticides Detected = 52
* Excludes Residues of Chlorpropham, Dicloran (carrots and peaches), Diphenylamine, Imazali (citrus), o-Phenylphenol, and Thiabendazole

As these tables indicate, the 5 fungicides listed above, along with chlorpropham, accounted for 3,441 detections (33 percent of the number of residue detections). The pesticide most frequently found (1,689 detections) was the fungicide thiabendazole, representing about 16 percent of all detections.

## ■ Environmental Contaminants

DDT, DDE, and TDE

A total of 7,328 samples were screened for DDT and its metabolites--DDE and TDE. Use of DDT has been prohibited in the United States since 1972. However, due to the persistence of this chemical in the environment, residues of this insecticide, and/or its metabolites, were found in approximately 5.6 percent of all samples tested. Residues were found primarily in root crops and none were above action levels.

## ■ Acid Herbicides

2,4-D and Bromoxynil

A total of 3,267 samples were tested for 2,4-D, and 869 were tested for bromoxynil. (Bromoxynil was removed from the testing profile at the end of March 1993.) Commodities tested were apples, grapefruit, grapes, oranges, peaches, and potatoes. Approximately 2.3 percent of the samples tested

were found to contain residues, all well below tolerance levels. No residues of bromoxynil were detected in any of the samples tested.

## ■ Multiple Residues Detected

Multiple residues on a commodity could derive from various sources, such as applications of different pesticides to the crop during a growing season, spray drift, or environmental contamination. The need to evaluate the effects of residues of different compounds in single samples was pointed out by the National Academy of Sciences in its 1993 report *Pesticides in the Diets of Infants and Children*. In this report, the academy recommended that, "When using multiresidue scans to detect different compounds in one scan of one food sample, all results should be recorded together. This will make possible more accurate evaluation of exposure distributions for multiple chemicals."

PDP's rigorous analytical standards have resulted in the detection of residues at very low concentrations (less than 0.05 ppm for most pesticides). These residues have been frequently found in the same sample, as illustrated in Appendix F. As shown in this appendix, samples are grouped by the number of pesticides detected in individual samples, the number and percentage of samples found in each group, the number of different residues detected, and the three most prevalent pesticides. For example, in celery, there were six samples (or 0.9 percent of samples analyzed), each containing six different pesticides. In this case, the three most frequently detected pesticides were: permethrins with six detections, chlorothalonil with five, and oxamyl with five. PDP data could be used to assess the potential effects of simultaneous exposure to multiple pesticides with a common mechanism of action.

## ■ Non-Detected Residues

Approximately 30 percent of the samples analyzed had no detectable levels of pesticide residues.

If post-harvest applications of pesticides are excluded, the percentage becomes approximately 50. Non-detected residues can result because all analytical methods and instruments have a limit below which analytes cannot be detected even if present. Non-detected residues could also occur because a pesticide was not applied, because it dissipates rapidly, or for various other reasons.

Of the 32 EPA-targeted pesticides; atrazine, bromoxynil, dichlorvos, fenamiphos, and HCB were not detected in any of the 7,328 samples. Atrazine, bromoxynil, and HCB have no registered uses for any of the PDP commodities. Dichlorvos does not have registered uses in PDP commodities either, although it could be present as a breakdown product of the pesticide naled (naled is registered for use in all 12 commodities). However, dichlorvos and fenamiphos dissipate fairly quickly, and likely were not present at detectable levels at the time samples were collected.

## ■ Tolerance Violations

Tolerances are defined under Section 408 of the Federal Food, Drug, and Cosmetic Act as the maximum quantity of a pesticide residue allowable on a raw agricultural commodity. Tolerances are established by EPA for all pesticides used on food crops. A violation occurs when a residue is found which exceeds the tolerance level, or when a residue is found for which there is no tolerance for that particular crop. As shown in Appendix B, the tolerances for the commodity/pesticide pairs cover several orders of magnitude--from as low as 0.01 ppm for peaches/chlorpyrifos, to as high as 100 ppm for lettuce/captan.

With the exception of meat, poultry, and egg products, for which USDA is responsible, tolerances for all other foods are enforced by FDA. Although PDP samples are not collected for enforcement purposes, all tolerance violations are reported to FDA regional and headquarter offices. This is done in accordance with a Memorandum of Understanding between USDA and FDA, for the purpose of pinpointing areas where closer surveillance may be required. Enforcement action by FDA on PDP samples is

not generally a viable option due to the time lag from sample collection to data reporting.

Appendix G shows that of the 7,328 samples analyzed, 110 samples (1.5 percent) contained 114 violative residues. Violations were reported in 30 samples (2.4 percent) of imported commodities, and in 80 samples (1.3 percent) of domestic commodities. In some cases, these residues were detected in separate subsamples by both the State and Federal laboratories, using different analytical methods (MRMs and SRMs). Appendix G also shows double violations (2 violative residues in the same sample) in 4 of the samples tested, and 14 samples with residues exceeding the tolerance. The remainder of the violations reported, 100 (88 percent), were for residues where no tolerance was established for that particular commodity/pesticide pair. For this last group (no tolerance established), most of the violative residues were at levels between the LOD and LOQ, and were reported as "below quantifiable levels."

## ■ Synopsis

In 1993, a total of 7,328 samples were analyzed using MRMs. As stated before, analysis using SRMs was performed in certain commodities only. Accordingly, 2,552 samples were tested for benomyl, 3,267 were tested for 2,4-D, 869 for bromoxynil, and 415 for formetanate. Pesticides detected included insecticides, herbicides, fungicides, and growth regulators. Also detected were DDT and its metabolites, although their presence is almost certainly due to environmental contamination, not the result of prohibited crop application. Eighty-one percent of samples tested were domestic, and 17 percent were imported. Of all samples tested, 1.5 percent were found to contain violative residues, although most of these were for residues where no tolerance was established. It was also observed that, for certain commodities, post-harvest applications contribute significantly to the number of residues detected. Overall, levels of residues detected were substantially below tolerances, with 94 percent of all residues detected below 1 ppm.



June 1995

# APPENDIX A. SAMPLE ORIGIN BY GROWER, PACKER, OR DISTRIBUTOR (Number of Samples /Commodity)

| Part 1. | AP | BN | BR | CE | CR | GB | GF | GR | LT | OG | PC | PO | No. of Domestic | % of Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| States = 38 | | | | | | Domestic Samples | | | | | | | | |
| Alabama | | | | | | | | | | | | 1 | 1 | <0.1 |
| Arizona | | | 15 | | 4 | | 37 | 8 | 16 | 5 | | 1 | 86 | 1.2 |
| Arkansas | | | 1 | | | | | | | | | | 1 | <0.1 |
| California | 64 | | 526 | 445 | 414 | 95 | 198 | 311 | 568 | 467 | 139 | 98 | 3325 | 45.4 |
| Colorado | 13 | | 7 | 5 | 18 | 4 | | | 5 | 1 | | 37 | 90 | 1.2 |
| Connecticut | | | 1 | | | | | | | | | 1 | 2 | <0.1 |
| Delaware | | | | | | | | | | | | 4 | 4 | 0.1 |
| Florida | | | 2 | 80 | 39 | 207 | 294 | | 11 | 126 | 4 | 19 | 782 | 10.7 |
| Georgia | | | | | | 32 | | | | 1 | 13 | 1 | 47 | 0.6 |
| Idaho | 12 | | | | | | | | | | 1 | 126 | 139 | 1.9 |
| Illinois | 1 | | | | | | | | | | | 2 | 3 | <0.1 |
| Indiana | | | | | | | | | | | | 2 | 2 | <0.1 |
| Maine | 3 | | 5 | | | | | | | | | 16 | 24 | 0.3 |
| Maryland | 1 | | | | | 2 | | | | | | | 3 | <0.1 |
| Massachusetts | 8 | | | | | | | | | | | 3 | 11 | 0.2 |
| Michigan | 47 | | 3 | 28 | 76 | 3 | 1 | | 4 | | 6 | 31 | 199 | 2.7 |
| Minnesota | | | | 1 | | | | | | | | 14 | 15 | 0.2 |
| Missouri | 4 | | | | | | | | | | | 1 | 5 | 0.1 |
| Nebraska | | | | | | | | | | | | 1 | 1 | <0.1 |
| Nevada | | | | | | | | | | | | 5 | 5 | 0.1 |
| New Jersey | 1 | | 1 | | 1 | 6 | | | 2 | | 7 | 1 | 19 | 0.3 |
| New Mexico | | | | | | | | | | | | 2 | 2 | <0.1 |
| New York | 70 | | 7 | 10 | 19 | 10 | 1 | 6 | 7 | 1 | 1 | 46 | 178 | 2.4 |
| North Carolina | 8 | | | | | 16 | 1 | | | | | 4 | 29 | 0.4 |
| North Dakota | | | | | | | | | | | | 9 | 9 | 0.1 |
| Ohio | 11 | | | 3 | | 21 | | 1 | 1 | | | 18 | 55 | 0.8 |
| Oklahoma | | | | | | | | | | | | 2 | 2 | <0.1 |
| Oregon | 5 | | | | 2 | | | | | | 1 | 53 | 61 | 0.8 |
| Pennsylvania | 6 | | 1 | | | | | | | | 3 | 1 | 11 | 0.2 |
| South Carolina | 1 | | 1 | | | | | | | | 20 | | 22 | 0.3 |
| Tennessee | | | | | | 26 | | | | | | | 26 | 0.4 |
| Texas | 4 | | 21 | 25 | 19 | 14 | 75 | 2 | 3 | 16 | 4 | 33 | 216 | 2.9 |
| Utah | 3 | | | | 1 | | | | | | | 1 | 5 | 0.1 |
| Vermont | 3 | | | | | | | | | | | | 3 | <0.1 |
| Virginia | 8 | | 1 | | | 3 | | | | | | | 12 | 0.2 |
| Washington | 354 | | 28 | 27 | 22 | 7 | | 2 | 25 | | 15 | 75 | 555 | 7.6 |
| West Virginia | 3 | | | | | | | | | | | | 3 | <0.1 |
| Wisconsin | | | | | | | | | | | | 24 | 24 | 0.3 |
| No. of Domestic | 630 | 0 | 620 | 624 | 615 | 446 | 607 | 330 | 642 | 617 | 214 | 632 | 5977 | -- |
| % of Total (nearest %) | 96 | 0 | 97 | 98 | 96 | 79 | 95 | 52 | 99 | 97 | 58 | 98 | | 81.6 |

# APPENDIX A. SAMPLE ORIGIN BY GROWER, PACKER, OR DISTRIBUTOR (Number of Samples /Commodity)

| Part 2. | AP | BN | BR | CE | CR | GB | GF | GR | LT | OG | PC | PO | No. of Import | % of Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Countries = 15 | | | | | | Imported Samples | | | | | | | | |
| Australia | | | | | | | | | | 3 | | | 3 | <0.1 |
| Bahamas | | | | | | | 1 | | | | | | 1 | <0.1 |
| Brazil | 2 | | | | | | | | | | | | 2 | <0.1 |
| Canada | 5 | | 3 | 3 | 18 | | | | | | | 10 | 39 | 0.5 |
| Chile | 7 | | | | | | | 258 | | | 147 | | 412 | 5.6 |
| Colombia | | 104 | | | | | | | | | | | 104 | 1.4 |
| Costa Rica | | 144 | | | | | | | | | | | 144 | 2.0 |
| Ecuador | | 141 | | | | | | | | | | | 141 | 1.9 |
| Guatemala | | 68 | | | | 1 | | | | | | | 69 | 0.9 |
| Honduras | | 58 | | | | | | 1 | | | | | 59 | 0.8 |
| Mexico | | 61 | 14 | 5 | 8 | 108 | | 29 | 4 | 1 | 1 | | 231 | 3.2 |
| New Zealand | 8 | | | | | | | | | | 1 | | 9 | 0.1 |
| Panama | | 13 | | | | | | | | | | | 13 | 0.2 |
| South Africa | 1 | | | | | | | | | | | | 1 | <0.1 |
| Venezuela | | 9 | | | | | | | | | | | 9 | 0.1 |
| No. of Import | 23 | 598 | 17 | 8 | 26 | 109 | 1 | 288 | 4 | 4 | 149 | 10 | 1237 | -- |
| % of Total (nearest %) | 4 | 96 | 3 | 1 | 4 | 19 | <1 | 46 | 1 | 1 | 40 | 2 | | 16.9 |

| Part 3. | AP | BN | BR | CE | CR | GB | GF | GR | LT | OG | PC | PO | No. of Unknown | % of Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Unknown Origin | | | | | | | | |
| No. of Unknown Origin | 1 | 22 | 3 | 5 | 1 | 11 | 29 | 13 | 1 | 17 | 6 | 5 | 114 | -- |
| % of Total (nearest %) | <1 | 4 | <1 | 1 | <1 | 2 | 5 | 2 | <1 | 3 | 2 | 1 | | 1.6 |
| | | | | | | | | | | **TOTAL** | | = | **7328** | |

Commodities

AP - Apples
BN - Bananas
BR - Broccoli
CE - Celery
CR - Carrots
GB - Green Beans
GF - Grapefruit
GR - Grapes
LT - Lettuce
OG - Oranges
PC - Peaches
PO - Potatoes

# APPENDIX B. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

| Pesticide | Total Number of Samples | No. of Samples with Detections | % of Samples with Detections | Minimum Value Detected, ppm | Maximum Value Detected, ppm | Tolerance Level, ppm |
|---|---|---|---|---|---|---|
| **1. 2,4-D** | | | | | | |
| Apples | 622 | 7 | 1.1 | 0.005 | 0.092 | 5 |
| Grapefruit | 630 | 12 | 1.9 | 0.006 | 0.035 | 5 |
| Grapes | 623 | 2 | 0.3 | 0.01 | 0.037 | 0.5 |
| Oranges | 634 | 23 | 3.6 | 0.01 | 0.039 | 5 |
| Peaches | 132 | 4 | 3.0 | 0.01 | 0.01 | 0.2 |
| Potatoes | 626 | 27 | 4.3 | 0.006 | 0.085 | 0.2 |
| **Total** | | **75** | | | | |
| **2. Acephate** | | | | | | |
| Celery | 634 | 169 | 26.7 | 0.005 | 1.3 | 10 |
| Green Beans | 562 | 108 | 19.2 | 0.005 | 2.4 | 3 |
| Grapes (V-1) | 621 | 1 | 0.2 | 0.005 | 0.005 | NT* |
| Lettuce | 647 | 75 | 11.6 | 0.005 | 0.099 | 10 |
| **Total** | | **353** | | | | |
| **3. Aldicarb Sulfoxide** | | | | | | |
| Bananas | 614 | 1 | 0.2 | 0.065 | 0.065 | 0.3 |
| Grapefruit | 624 | 7 | 1.1 | 0.065 | 0.15 | 0.3 |
| Oranges | 623 | 3 | 0.5 | 0.065 | 0.065 | 0.3 |
| **Total** | | **11** | | | | |
| **4. Anilazine** | | | | | | |
| Celery | 637 | 3 | 0.5 | 0.01 | 0.01 | 10 |
| **Total** | | **3** | | | | |
| **5. Azinphos methyl** | | | | | | |
| Apples | 643 | 208 | 32.3 | 0.023 | 1.8 | 2.0 |
| Broccoli | 630 | 2 | 0.3 | 0.04 | 0.12 | 2.0 |
| Celery | 634 | 6 | 0.9 | 0.025 | 0.2 | 2.0 |
| Green Beans | 562 | 3 | 0.5 | 0.04 | 0.12 | 2.0 |
| Grapefruit | 632 | 1 | 0.2 | 0.05 | 0.05 | 2.0 |
| Grapes | 621 | 18 | 2.9 | 0.025 | 0.68 | 5.0 |
| Oranges | 633 | 1 | 0.2 | 0.05 | 0.05 | 2.0 |
| Peaches | 367 | 78 | 21.3 | 0.025 | 0.93 | 2.0 |
| **Total** | | **317** | | | | |

# APPENDIX B. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

| Pesticide | Total Number of Samples | No. of Samples with Detections | % of Samples with Detections | Minimum Value Detected, ppm | Maximum Value Detected, ppm | Tolerance Level, ppm |
|---|---|---|---|---|---|---|
| **6. Benfluralin** | | | | | | |
| Carrots (V-3) | 642 | 3 | 0.5 | 0.015 | 0.033 | NT* |
| **Total** | | **3** | | | | |
| **7. Benomyl** | | | | | | |
| Apples | 638 | 110 | 17.2 | 0.05 | 3.1 | 7.0 |
| Bananas | 610 | 4 | 0.7 | 0.05 | 0.12 | 0.2*** |
| Broccoli | 611 | 2 | 0.3 | 0.05 | 0.05 | 0.2 |
| Green Beans (X-3) | 561 | 106 | 18.9 | 0.05 | 3.4 | 2.0 |
| Peaches | 132 | 31 | 23.5 | 0.05 | 0.64 | 15.0 |
| **Total** | | **253** | | | | |
| **8. Captan** | | | | | | |
| Apples | 648 | 76 | 11.7 | 0.005 | 0.46 | 25 |
| Celery | 637 | 8 | 1.3 | 0.02 | 0.069 | 50 |
| Green Beans | 563 | 1 | 0.2 | 0.27 | 0.27 | 25 |
| Grapes | 619 | 189 | 30.5 | 0.01 | 1.4 | 50 |
| Lettuce | 645 | 2 | 0.3 | 0.01 | 0.48 | 100 |
| Peaches | 366 | 34 | 9.3 | 0.01 | 0.85 | 50 |
| **Total** | | **310** | | | | |
| **9. Carbaryl** | | | | | | |
| Apples | 650 | 145 | 22.3 | 0.007 | 0.8 | 10.0 |
| Bananas | 614 | 1 | 0.2 | 0.065 | 0.065 | 10 |
| Broccoli | 622 | 11 | 1.8 | 0.02 | 0.49 | 10 |
| Celery | 620 | 15 | 2.4 | 0.015 | 0.28 | 10 |
| Green Beans | 554 | 24 | 4.3 | 0.02 | 0.56 | 10 |
| Grapefruit | 624 | 34 | 5.4 | 0.02 | 0.82 | 10 |
| Grapes | 612 | 17 | 2.8 | 0.06 | 2.6 | 10 |
| Oranges | 623 | 52 | 8.3 | 0.007 | 0.5 | 10 |
| Peaches | 358 | 45 | 12.6 | 0.007 | 1.3 | 10 |
| Potatoes | 638 | 1 | 0.2 | 0.065 | 0.065 | 0.2 |
| **Total** | | **345** | | | | |
| **10. Carbofuran** | | | | | | |
| Green Beans (V-1) | 554 | 1 | 0.2 | 0.034 | 0.034 | NT* |
| **Total** | | **1** | | | | |

# APPENDIX B. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

| Pesticide | Total Number of Samples | No. of Samples with Detections | % of Samples with Detections | Minimum Value Detected, ppm | Maximum Value Detected, ppm | Tolerance Level, ppm |
|---|---|---|---|---|---|---|
| **11. 3-Hydroxycarbofuran (carbofuran metabolite)** | | | | | | |
| Grapes | 612 | 5 | 0.8 | 0.073 | 0.17 | 0.2 |
| **Total** | | **5** | | | | |
| **12. Chlorothalonil** | | | | | | |
| Broccoli | 630 | 7 | 1.1 | 0.002 | 0.27 | 5 |
| Celery | 637 | 318 | 49.9 | 0.005 | 7.1 | 15 |
| Carrots | 642 | 1 | 0.2 | 0.059 | 0.059 | 1 |
| Green Beans | 563 | 65 | 11.5 | 0.007 | 1.6 | 5 |
| Lettuce (V-3) | 645 | 3 | 0.5 | 0.012 | 0.025 | NT* |
| Peaches | 366 | 1 | 0.3 | 0.025 | 0.025 | 0.5 |
| **Total** | | **395** | | | | |
| **13. Chlorpropham** | | | | | | |
| Apples (V-2) | 648 | 2 | 0.3 | 0.013 | 0.02 | NT* |
| Green Beans | 563 | 1 | 0.2 | 0.033 | 0.033 | 0.3 |
| Potatoes | 646 | 399 | 61.8 | 0.013 | 9.7 | 50 |
| **Total** | | **402** | | | | |
| **14. Chlorpyrifos** | | | | | | |
| Apples | 643 | 124 | 19.3 | 0.005 | 0.36 | 1.5 |
| Broccoli | 630 | 9 | 1.4 | 0.005 | 0.3 | 1 |
| Celery (V-6) | 634 | 6 | 0.9 | 0.005 | 0.018 | NT* |
| Carrots (V-3) | 641 | 3 | 0.5 | 0.005 | 0.005 | NT* |
| Green Beans (X-2) | 562 | 5 | 0.9 | 0.005 | 0.38 | 0.05 |
| Grapefruit | 632 | 2 | 0.3 | 0.005 | 0.005 | 1.0 |
| Grapes | 621 | 28 | 4.5 | 0.005 | 0.15 | 0.5 |
| Oranges | 633 | 30 | 4.7 | 0.003 | 0.014 | 1.0 |
| Peaches (X-5) | 367 | 42 | 11.4 | 0.005 | 0.18 | 0.01 |
| **Total** | | **250** | | | | |
| **15. DCPA** | | | | | | |
| Broccoli | 630 | 102 | 16.2 | 0.003 | 0.035 | 5 |
| Celery (V-14) | 637 | 14 | 2.2 | 0.003 | 0.054 | NT* |
| Green Beans | 563 | 19 | 3.4 | 0.012 | 0.12 | 2 |
| Lettuce | 645 | 28 | 4.3 | 0.002 | 0.11 | 2 |
| **Total** | | **163** | | | | |

# APPENDIX B. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

| Pesticide | Total Number of Samples | No. of Samples with Detections | % of Samples with Detections | Minimum Value Detected, ppm | Maximum Value Detected, ppm | Tolerance Level, ppm |
|---|---|---|---|---|---|---|
| **16. DDD (DDT metabolite)** | | | | | | |
| Carrots | 642 | 1 | 0.2 | 0.042 | 0.042 | 3 |
| **Total** | | **1** | | | | |
| **17. DDE** | | | | | | |
| Broccoli | 630 | 5 | 0.8 | 0.002 | 0.012 | 0.5 |
| Celery | 637 | 45 | 7.1 | 0.002 | 0.046 | 0.5 |
| Carrots | 642 | 245 | 38.2 | 0.002 | 0.21 | 3 |
| Green Beans | 563 | 3 | 0.5 | 0.002 | 0.013 | 0.2 |
| Grapes | 619 | 3 | 0.5 | 0.005 | 0.011 | 0.05 |
| Lettuce | 645 | 16 | 2.5 | 0.004 | 0.051 | 0.5 |
| Potatoes | 646 | 58 | 9.0 | 0.002 | 0.033 | 1 |
| **Total** | | **375** | | | | |
| **18. DDT** | | | | | | |
| Carrots | 642 | 23 | 3.6 | 0.01 | 0.083 | 3 |
| Potatoes | 646 | 8 | 1.2 | 0.01 | 0.013 | 1 |
| **Total** | | **31** | | | | |
| **19. Demeton S** | | | | | | |
| Apples | 643 | 1 | 0.2 | 0.01 | 0.01 | 0.75 |
| **Total** | | **1** | | | | |
| **20. Diazinon** | | | | | | |
| Apples | 643 | 15 | 2.3 | 0.003 | 0.33 | 0.5 |
| Celery | 634 | 61 | 9.6 | 0.005 | 0.3 | 0.7 |
| Carrots | 641 | 30 | 4.7 | 0.005 | 0.042 | 0.75 |
| Grapes | 621 | 3 | 0.5 | 0.007 | 0.016 | 0.75 |
| Lettuce | 647 | 17 | 2.6 | 0.005 | 0.51 | 0.7 |
| Oranges | 633 | 2 | 0.3 | 0.005 | 0.007 | 0.7 |
| Peaches | 367 | 39 | 10.6 | 0.005 | 0.066 | 0.7 |
| **Total** | | **167** | | | | |

# APPENDIX B. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

| Pesticide | Total Number of Samples | No. of Samples with Detections | % of Samples with Detections | Minimum Value Detected, ppm | Maximum Value Detected, ppm | Tolerance Level, ppm |
|---|---|---|---|---|---|---|
| **21. Dicloran** | | | | | | |
| Apples (V-2) | 648 | 2 | 0.3 | 0.005 | 0.013 | NT* |
| Celery | 637 | 132 | 20.7 | 0.005 | 8.1 | 15 |
| Carrots | 642 | 2 | 0.3 | 0.008 | 0.95 | 10 |
| Green Beans | 563 | 3 | 0.5 | 0.008 | 0.048 | 20 |
| Grapes | 619 | 32 | 5.2 | 0.005 | 0.71 | 10 |
| Peaches | 366 | 153 | 41.8 | 0.005 | 12 | 20 |
| Potatoes | 646 | 2 | 0.3 | 0.024 | 0.057 | 0.25 |
| **Total** | | **326** | | | | |
| **22. Dicofol** | | | | | | |
| Apples | 648 | 18 | 2.8 | 0.008 | 0.14 | 5 |
| Grapefruit | 616 | 1 | 0.2 | 0.045 | 0.045 | 10 |
| Grapes | 619 | 11 | 1.8 | 0.008 | 1.5 | 5 |
| Oranges | 591 | 1 | 0.2 | 0.081 | 0.081 | 10 |
| Peaches | 366 | 2 | 0.5 | 0.05 | 0.05 | 10 |
| **Total** | | **33** | | | | |
| **23. Dimethoate** | | | | | | |
| Apples | 643 | 54 | 8.4 | 0.004 | 0.6 | 2 |
| Broccoli | 630 | 5 | 0.8 | 0.004 | 0.21 | 2 |
| Celery | 634 | 4 | 0.6 | 0.004 | 0.098 | 2 |
| Green Beans | 562 | 41 | 7.3 | 0.004 | 1.4 | 2 |
| Grapes | 621 | 67 | 10.8 | 0.003 | 0.44 | 1 |
| Lettuce | 647 | 69 | 10.7 | 0.004 | 0.47 | 2 |
| Oranges | 633 | 7 | 1.1 | 0.004 | 0.018 | 2 |
| Peaches (V-2) | 367 | 2 | 0.5 | 0.005 | 0.68 | NT* |
| Potatoes | 645 | 2 | 0.3 | 0.005 | 0.005 | 0.2 |
| **Total** | | **251** | | | | |
| **24. Diphenylamine** | | | | | | |
| Apples | 653 | 343 | 52.5 | 0.005 | 4.8 | 10 |
| Celery ** | 625 | 1 | 0.2 | 0.015 | 0.015 | NT* |
| Grapes (V-1) | 587 | 1 | 0.2 | 0.15 | 0.15 | NT* |
| Peaches ** | 366 | 1 | 0.3 | 0.015 | 0.015 | NT* |
| **Total** | | **346** | | | | |

# APPENDIX B. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

| Pesticide | Total Number of Samples | No. of Samples with Detections | % of Samples with Detections | Minimum Value Detected, ppm | Maximum Value Detected, ppm | Tolerance Level, ppm |
|---|---|---|---|---|---|---|
| **25. Disulfoton** | | | | | | |
| Broccoli | 630 | 1 | 0.2 | 0.11 | 0.11 | 0.75 |
| **Total** | | **1** | | | | |
| **26. Endosulfans** | | | | | | |
| Apples | 648 | 94 | 14.5 | 0.003 | 1.3 | 2.0 |
| Broccoli | 630 | 20 | 3.2 | 0.003 | 0.054 | 2.0 |
| Celery | 637 | 26 | 4.1 | 0.005 | 0.35 | 2.0 |
| Carrots | 642 | 17 | 2.6 | 0.003 | 0.09 | 0.2 |
| Green Beans | 563 | 227 | 40.3 | 0.002 | 1.22 | 2.0 |
| Grapes | 619 | 41 | 6.6 | 0.005 | 0.12 | 2.0 |
| Lettuce | 645 | 136 | 21.1 | 0.002 | 1.7 | 2.0 |
| Peaches | 366 | 25 | 6.8 | 0.005 | 0.12 | 2.0 |
| Potatoes | 646 | 73 | 11.3 | 0.005 | 0.1 | 0.2 |
| **Total** | | **659** | | | | |
| **27. Ethion** | | | | | | |
| Apples | 643 | 12 | 1.9 | 0.003 | 1 | 2.0 |
| Grapefruit | 632 | 45 | 7.1 | 0.002 | 0.031 | 2.0 |
| Oranges | 633 | 36 | 5.7 | 0.002 | 0.089 | 2.0 |
| **Total** | | **93** | | | | |
| **28. Formetanate HCL** | | | | | | |
| Apples | 298 | 4 | 1.3 | 0.085 | 0.23 | 3 |
| Peaches | 117 | 2 | 1.7 | 0.07 | 0.26 | 5 |
| **Total** | | **6** | | | | |
| **29. Hexachlorobenzene** | | | | | | |
| Carrots (V-1) | 642 | 1 | 0.2 | 0.006 | 0.006 | NT* |
| **Total** | | **1** | | | | |
| **30. Imazalil** | | | | | | |
| Apples (V-1) | 653 | 1 | 0.2 | 0.05 | 0.05 | NT* |
| Bananas (X-1) | 620 | 59 | 9.5 | 0.015 | 0.21 | 0.20*** |
| Grapefruit | 634 | 184 | 29.0 | 0.004 | 0.45 | 10.0 |
| Oranges | 636 | 311 | 48.9 | 0.009 | 0.85 | 10.0 |
| **Total** | | **555** | | | | |

# APPENDIX B. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

| Pesticide | Total Number of Samples | No. of Samples with Detections | % of Samples with Detections | Minimum Value Detected, ppm | Maximum Value Detected, ppm | Tolerance Level, ppm |
|---|---|---|---|---|---|---|
| **31. Iprodione** | | | | | | |
| Apples (V-4) | 648 | 4 | 0.6 | 0.014 | 0.11 | NT* |
| Broccoli | 630 | 1 | 0.2 | 0.16 | 0.16 | 25.0 |
| Celery (V-6) | 637 | 71 | 11.1 | 0.014 | 0.4 | NT* (S-18) |
| Carrots | 642 | 186 | 29.0 | 0.014 | 0.41 | 5.0 |
| Green Beans | 563 | 7 | 1.2 | 0.04 | 0.56 | 2.0 |
| Grapes | 619 | 197 | 31.8 | 0.014 | 2.7 | 60.0 |
| Lettuce | 645 | 4 | 0.6 | 0.025 | 0.35 | 25.0 |
| Peaches | 366 | 237 | 64.8 | 0.014 | 11 | 20.0 |
| **Total** | | **707** | | | | |
| **32. Lindane** | | | | | | |
| Celery | 637 | 5 | 0.8 | 0.005 | 0.098 | 1 |
| Lettuce | 645 | 1 | 0.2 | 0.005 | 0.005 | 3 |
| Peaches | 366 | 1 | 0.3 | 0.005 | 0.005 | 1 |
| **Total** | | **7** | | | | |
| **33. Linuron** | | | | | | |
| Carrots | 642 | 14 | 2.2 | 0.005 | 0.067 | 1 |
| **Total** | | **14** | | | | |
| **34. Malathion** | | | | | | |
| Apples | 643 | 1 | 0.2 | 0.006 | 0.006 | 8 |
| Celery | 634 | 7 | 1.1 | 0.003 | 0.084 | 8 |
| Carrots | 641 | 1 | 0.2 | 0.006 | 0.006 | 8 |
| Lettuce | 647 | 1 | 0.2 | 0.005 | 0.005 | 8 |
| Oranges | 633 | 2 | 0.3 | 0.005 | 0.005 | 8 |
| Potatoes | 645 | 1 | 0.2 | 0.006 | 0.006 | 8 |
| **Total** | | **13** | | | | |
| **35. Methamidophos** | | | | | | |
| Broccoli | 630 | 6 | 1.0 | 0.006 | 0.16 | 1.0 |
| Celery | 634 | 70 | 11.0 | 0.004 | 0.12 | 1 |
| Green Beans @ (V-8) | 562 | 113 | 20.1 | 0.004 | 0.49 | NT* |
| Grapes (V-1) | 621 | 1 | 0.2 | 0.004 | 0.004 | NT* |
| Lettuce | 647 | 21 | 3.2 | 0.003 | 0.049 | 1.0 |
| Potatoes | 645 | 5 | 0.8 | 0.005 | 0.028 | 0.1 |
| **Total** | | **216** | | | | |

# APPENDIX B. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

| Pesticide | Total Number of Samples | No. of Samples with Detections | % of Samples with Detections | Minimum Value Detected, ppm | Maximum Value Detected, ppm | Tolerance Level, ppm |
|---|---|---|---|---|---|---|
| **36. Methidathion** | | | | | | |
| Grapefruit | 632 | 3 | 0.5 | 0.004 | 0.014 | 2.0 |
| Oranges | 633 | 35 | 5.5 | 0.002 | 0.034 | 2.0 |
| **Total** | | **38** | | | | |
| **37. Methiocarb** | | | | | | |
| Apples (V-1) | 650 | 1 | 0.2 | 0.35 | 0.35 | NT* |
| Potatoes (V-3) | 638 | 3 | 0.5 | 0.08 | 0.13 | NT* |
| **Total** | | **4** | | | | |
| **38. Methomyl** | | | | | | |
| Apples | 650 | 13 | 2.0 | 0.15 | 0.15 | 1 |
| Broccoli | 622 | 3 | 0.5 | 0.015 | 0.065 | 3 |
| Celery | 620 | 35 | 5.6 | 0.011 | 0.52 | 3 |
| Green Beans | 554 | 23 | 4.2 | 0.013 | 0.49 | 2 |
| Grapefruit | 624 | 1 | 0.2 | 0.065 | 0.065 | 2 |
| Grapes | 612 | 39 | 6.4 | 0.013 | 2 | 5 |
| Lettuce | 639 | 27 | 4.2 | 0.013 | 1.6 | 5 |
| Oranges | 623 | 6 | 1.0 | 0.065 | 0.28 | 2 |
| Peaches | 358 | 4 | 1.1 | 0.065 | 0.21 | 5 |
| Potatoes | 638 | 1 | 0.2 | 0.065 | 0.065 | 0.2 |
| **Total** | | **152** | | | | |
| **39. Methoxychlor** | | | | | | |
| Apples | 648 | 45 | 6.9 | 0.01 | 1.5 | 14 |
| Lettuce | 645 | 1 | 0.2 | 0.015 | 0.015 | 14 |
| **Total** | | **46** | | | | |
| **40. Mevinphos** | | | | | | |
| Apples | 643 | 4 | 0.6 | 0.003 | 0.13 | 0.5 |
| Celery | 634 | 7 | 1.1 | 0.002 | 0.025 | 1.0 |
| Grapes | 621 | 4 | 0.6 | 0.003 | 0.005 | 0.5 |
| Lettuce (X-1) | 647 | 40 | 6.2 | 0.005 | 0.53 | 0.5 |
| Peaches | 367 | 1 | 0.3 | 0.08 | 0.08 | 1.0 |
| **Total** | | **56** | | | | |

# APPENDIX B. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

| Pesticide | Total Number of Samples | No. of Samples with Detections | % of Samples with Detections | Minimum Value Detected, ppm | Maximum Value Detected, ppm | Tolerance Level, ppm |
|---|---|---|---|---|---|---|
| **41. Myclobutanil** | | | | | | |
| Apples | 653 | 5 | 0.8 | 0.025 | 0.3 | 0.5 |
| Grapes | 587 | 110 | 18.7 | 0.015 | 0.34 | 1.0 |
| Peaches | 366 | 1 | 0.3 | 0.015 | 0.015 | 2.0 |
| **Total** | | **116** | | | | |
| **42. O-Phenylphenol** | | | | | | |
| Apples | 653 | 41 | 6.3 | 0.015 | 9.6 | 25 |
| Carrots | 637 | 7 | 1.1 | 0.015 | 0.036 | 20 |
| Grapefruit | 634 | 13 | 2.1 | 0.015 | 0.055 | 10 |
| Oranges | 636 | 47 | 7.4 | 0.015 | 0.057 | 10 |
| Peaches | 366 | 14 | 3.8 | 0.005 | 0.042 | 20 |
| Potatoes (V-1) | 637 | 1 | 0.2 | 0.12 | 0.12 | NT* |
| **Total** | | **123** | | | | |
| **43. Omethoate #** | | | | | | |
| Apples | 643 | 40 | 6.2 | 0.005 | 0.1 | 2 |
| Broccoli | 630 | 2 | 0.3 | 0.014 | 0.092 | 2 |
| Celery | 634 | 6 | 0.9 | 0.005 | 0.026 | 2 |
| Green Beans | 562 | 30 | 5.3 | 0.014 | 0.21 | 2 |
| Grapes | 621 | 60 | 9.7 | 0.005 | 0.38 | 1 |
| Lettuce | 647 | 12 | 1.9 | 0.005 | 0.3 | 2 |
| Peaches (V-1) | 367 | 1 | 0.3 | 0.089 | 0.089 | NT* |
| **Total** | | **151** | | | | |
| **44. Ovex** | | | | | | |
| Apples (V-1) | 648 | 1 | 0.2 | 0.14 | 0.14 | NT* |
| **Total** | | **1** | | | | |
| **45. Oxamyl** | | | | | | |
| Apples | 650 | 45 | 6.9 | 0.014 | 0.68 | 2 |
| Bananas | 614 | 1 | 0.2 | 0.065 | 0.065 | 0.3 |
| Celery | 620 | 140 | 22.6 | 0.014 | 0.82 | 3 |
| Green Beans (V-4) | 554 | 4 | 0.7 | 0.057 | 0.22 | NT* |
| Grapefruit | 624 | 1 | 0.2 | 0.3 | 0.3 | 3 |
| Oranges | 623 | 9 | 1.4 | 0.065 | 0.31 | 3 |
| Peaches (V-1) | 358 | 1 | 0.3 | 0.014 | 0.014 | NT* |
| Potatoes | 638 | 1 | 0.2 | 0.065 | 0.065 | 0.1 |
| **Total** | | **202** | | | | |

# APPENDIX B. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

| Pesticide | Total Number of Samples | No. of Samples with Detections | % of Samples with Detections | Minimum Value Detected, ppm | Maximum Value Detected, ppm | Tolerance Level, ppm |
|---|---|---|---|---|---|---|
| **46. Parathion** | | | | | | |
| Apples | 643 | 2 | 0.3 | 0.003 | 0.015 | 1 |
| Celery | 634 | 4 | 0.6 | 0.022 | 0.055 | 1 |
| Carrots | 641 | 5 | 0.8 | 0.003 | 0.013 | 1 |
| Green Beans | 562 | 1 | 0.2 | 0.38 | 0.38 | 1 |
| Grapes | 621 | 6 | 1.0 | 0.003 | 0.045 | 1 |
| Lettuce | 647 | 2 | 0.3 | 0.009 | 0.029 | 1 |
| Oranges | 633 | 1 | 0.2 | 0.009 | 0.009 | 1 |
| Peaches | 367 | 1 | 0.3 | 0.14 | 0.14 | 1 |
| **Total** | | **22** | | | | |
| **47. Parathion methyl** | | | | | | |
| Apples | 643 | 35 | 5.4 | 0.004 | 0.074 | 1 |
| Celery | 634 | 7 | 1.1 | 0.005 | 0.16 | 1 |
| Carrots | 641 | 2 | 0.3 | 0.005 | 0.008 | 1 |
| Grapes | 621 | 17 | 2.7 | 0.005 | 1 | 1 |
| Peaches | 367 | 79 | 21.5 | 0.005 | 0.69 | 1 |
| **Total** | | **140** | | | | |
| **48. Pentachlorobenzene** | | | | | | |
| Carrots (V-1) | 642 | 1 | 0.2 | 0.01 | 0.01 | NT* |
| Green Beans | 563 | 1 | 0.2 | 0.01 | 0.01 | 0.1 |
| Potatoes | 646 | 3 | 0.5 | 0.003 | 0.009 | 0.1 |
| **Total** | | **5** | | | | |
| **49. Pentachlorophenyl** | | | | | | |
| Potatoes | 646 | 1 | 0.2 | 0.005 | 0.005 | 0.1 |
| **Total** | | **1** | | | | |
| **50. Permethrins** | | | | | | |
| Broccoli | 630 | 13 | 2.1 | 0.025 | 0.2 | 1.0 |
| Celery | 637 | 268 | 42.1 | 0.008 | 1.1 | 5.0 |
| Green Beans (V-7) | 563 | 7 | 1.2 | 0.016 | 0.2 | NT* |
| Lettuce | 645 | 76 | 11.8 | 0.008 | 6.7 | 20.0 |
| Peaches | 366 | 12 | 3.3 | 0.016 | 0.12 | 5.0 |
| **Total** | | **376** | | | | |

# APPENDIX B. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

| Pesticide | Total Number of Samples | No. of Samples with Detections | % of Samples with Detections | Minimum Value Detected, ppm | Maximum Value Detected, ppm | Tolerance Level, ppm |
|---|---|---|---|---|---|---|
| **51. Phorate Sulfone** | | | | | | |
| Potatoes | 645 | 2 | 0.3 | 0.005 | 0.005 | 0.5 |
| **Total** | | **2** | | | | |
| **52. Phosmet** | | | | | | |
| Apples | 643 | 55 | 8.6 | 0.013 | 0.9 | 10 |
| Carrots (V-1) | 641 | 1 | 0.2 | 0.015 | 0.015 | NT* |
| Grapes | 621 | 3 | 0.5 | 0.013 | 0.17 | 10 |
| Oranges | 633 | 2 | 0.3 | 0.013 | 0.04 | 5 |
| Peaches | 367 | 34 | 9.3 | 0.013 | 1.4 | 10 |
| **Total** | | **95** | | | | |
| **53. Propargite** | | | | | | |
| Apples | 282 | 98 | 34.8 | 0.015 | 2.4 | 3 |
| Grapes | 190 | 35 | 18.4 | 0.015 | 0.74 | 10 |
| Oranges | 195 | 1 | 0.5 | 0.05 | 0.05 | 5 |
| Peaches | 96 | 32 | 33.3 | 0.062 | 1.6 | 7 |
| **Total** | | **166** | | | | |
| **54. Quintozene** | | | | | | |
| Celery (V-1) | 637 | 1 | 0.2 | 0.005 | 0.005 | NT* |
| Green Beans | 563 | 12 | 2.1 | 0.005 | 0.019 | 0.1 |
| Potatoes | 646 | 2 | 0.3 | 0.005 | 0.007 | 0.1 |
| **Total** | | **15** | | | | |
| **55. Thiabendazole** | | | | | | |
| Apples | 653 | 404 | 61.9 | 0.015 | 7.6 | 10 |
| Bananas (X-2) | 620 | 339 | 54.7 | 0.006 | 0.53 | 0.4*** |
| Carrots | 637 | 5 | 0.8 | 0.1 | 0.21 | 10 |
| Green Beans (V-12) | 564 | 12 | 2.1 | 0.006 | 0.19 | NT* |
| Grapefruit | 634 | 399 | 62.9 | 0.005 | 0.77 | 10 |
| Grapes | 587 | 1 | 0.2 | 0.015 | 0.015 | 10 |
| Lettuce (V-1) | 646 | 1 | 0.2 | 0.015 | 0.015 | NT* |
| Oranges | 636 | 386 | 60.7 | 0.006 | 1.7 | 10 |
| Peaches (V-3) | 366 | 3 | 0.8 | 0.004 | 0.065 | NT* |
| Potatoes | 637 | 139 | 21.8 | 0.012 | 2.1 | 10 |
| **Total** | | **1689** | | | | |

# APPENDIX B. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

| Pesticide | Total Number of Samples | No. of Samples with Detections | % of Samples with Detections | Minimum Value Detected, ppm | Maximum Value Detected, ppm | Tolerance Level, ppm |
|---|---|---|---|---|---|---|
| **56. Toxaphene** | | | | | | |
| Carrots | 642 | 1 | 0.2 | 0.92 | 0.92 | 7 |
| **Total** | | **1** | | | | |
| **57. Trifluralin** | | | | | | |
| Carrots | 642 | 138 | 21.5 | 0.01 | 0.28 | 1.0 |
| **Total** | | **138** | | | | |
| **58. Vinclozolin** | | | | | | |
| Green Beans (V-3) | 563 | 5 | 0.9 | 0.008 | 0.07 | NT* (S-18) |
| Grapes | 619 | 90 | 14.5 | 0.008 | 0.88 | 6.0 |
| Peaches | 366 | 7 | 1.9 | 0.007 | 0.62 | 25.0 |
| **Total** | | **102** | | | | |

**Total No. of Different Residues Detected:** **58**
**Total No. of Samples Analyzed:** **7328**

(V) Residue was found where no tolerance was established by EPA. Following V are the number of occurrences.
(X) Residue was found which exceeds EPA tolerance. Following X are the number of occurrences.
NT* No tolerance level was set for that pesticide/commodity pair.
NT* (S-18) The number of residues detected is not the same as the number of violations due to exemptions under 40 CFR, part 66.1 of FIFRA Section 18 (crisis exemptions).
** Estimated values reported to FDA for informational purposes only.
*** Tolerance applies to banana pulp only.
@ All other residues were detected in combination with acephate, for which a tolerance exists.
# Tolerances listed are for combined residues of dimethoate and omethoate.

# APPENDIX C. CONCENTRATION PERCENTILES vs. TOLERANCE in COMMODITY/PESTICIDE PAIRS

## (Pairs with Residue Detections in at Least 10 Percent of Samples)

| Commodity | % of Samples with Detections | Percentiles 50th | 75th | 90th | Maximum Value Detected, ppm | Ratio of Tolerance to 90th Percentile |
|---|---|---|---|---|---|---|
| **1. Apples** | | | | | | |
| Azinphos-methyl | 32.3 | * | 0.038 | 0.095 | 1.8 | 0.048 |
| Benomyl | 17.2 | * | * | 0.10 | 3.1 | 0.014 |
| Captan | 11.7 | * | * | 0.014 | 0.46 | 0.001 |
| Carbaryl | 22.3 | * | * | 0.11 | 0.8 | 0.011 |
| Chlorpyrifos | 19.3 | * | * | 0.015 | 0.36 | 0.01 |
| Diphenylamine | 52.5 | 0.023 | 0.78 | 1.5 | 4.8 | 0.15 |
| Endosulfans | 14.5 | * | * | 0.01 | 1.3 | 0.005 |
| Propargite | 34.8 | * | 0.16 | 0.49 | 2.4 | 0.16 |
| Thiabendazole | 61.9 | 0.21 | 0.6 | 1.1 | 7.6 | 0.11 |
| **2. Bananas** | | | | | | |
| Thiabendazole | 54.7 | 0.017 | 0.075 | 0.13 | 0.53 | 0.33 @ |
| **3. Broccoli** | | | | | | |
| DCPA | 16.2 | * | * | 0.014 | 0.035 | 0.003 |
| **4. Carrots** | | | | | | |
| DDE | 38.2 | * | 0.013 | 0.027 | 0.21 | 0.009 |
| Iprodione | 29 | * | 0.028 | 0.085 | 0.41 | 0.017 |
| Trifluralin | 21.5 | * | * | 0.048 | 0.28 | 0.048 |
| **5. Celery** | | | | | | |
| Acephate | 26.7 | * | 0.008 | 0.078 | 1.3 | 0.008 |
| 'Chlorothalonil | 49.9 | * | 0.062 | 0.21 | 7.1 | 0.014 |
| Dicloran | 20.7 | * | * | 0.15 | 8.1 | 0.01 |
| Iprodione | 11.1 | * | * | 0.028 | 0.40 | ** |
| Methamidophos | 11 | * | * | 0.004 | 0.12 | 0.004 |
| Oxamyl | 22.6 | * | * | 0.105 | 0.82 | 0.035 |
| Permethrins | 42.1 | * | 0.053 | 0.11 | 1.1 | 0.022 |
| **6. Grapefruit** | | | | | | |
| Imazalil | 29 | * | 0.023 | 0.12 | 0.45 | 0.012 |
| Thiabendazole | 62.9 | 0.044 | 0.12 | 0.23 | 0.77 | 0.023 |

# APPENDIX C. CONCENTRATION PERCENTILES vs. TOLERANCE in COMMODITY/PESTICIDE PAIRS

## (Pairs with Residue Detections in at Least 10 Percent of Samples)

| Commodity | % of Samples with Detections | Percentiles 50th | 75th | 90th | Maximum Value Detected, ppm | Ratio of Tolerance to 90th Percentile |
|---|---|---|---|---|---|---|
| **7. Grapes** | | | | | | |
| Captan | 30.5 | * | 0.027 | 0.16 | 1.4 | 0.003 |
| Dimethoate | 10.8 | * | * | 0.004 | 0.44 | 0.004 |
| Iprodione | 31.8 | * | 0.048 | 0.20 | 2.7 | 0.003 |
| Myclobutanil | 18.7 | * | * | 0.041 | 0.34 | 0.041 |
| Propargite | 18.4 | * | * | 0.163 | 0.74 | 0.016 |
| Vinclozolin | 14.5 | * | * | 0.069 | 0.88 | 0.012 |
| **8. Green Beans** | | | | | | |
| Acephate | 19.2 | * | * | 0.15 | 2.4 | 0.05 |
| Benomyl | 18.9 | * | * | 0.19 | 3.4 | 0.095 |
| Chlorothalonil | 11.5 | * | * | 0.019 | 1.6 | 0.004 |
| Endosulfans | 40.3 | * | 0.033 | 0.16 | 1.22 | 0.08 |
| Methamidophos | 20.1 | * | * | 0.056 | 0.49 | ** |
| **9. Lettuce** | | | | | | |
| Acephate | 11.6 | * | * | 0.006 | 0.099 | 0.001 |
| Dimethoate | 10.7 | * | * | 0.004 | 0.47 | 0.002 |
| Endosulfans | 21.1 | * | * | 0.022 | 1.7 | 0.011 |
| Permethrins | 11.8 | * | * | 0.057 | 6.7 | 0.003 |
| **10. Oranges** | | | | | | |
| Imazalil | 48.9 | * | 0.091 | 0.19 | 0.85 | 0.019 |
| Thiabendazole | 60.7 | 0.05 | 0.15 | 0.30 | 1.7 | 0.03 |
| **11. Peaches** | | | | | | |
| Azinphos-methyl | 21.3 | * | * | 0.091 | 0.93 | 0.046 |
| Benomyl | 23.5 | * | * | 0.17 | 0.64 | 0.011 |
| Carbaryl | 12.6 | * | * | 0.039 | 1.3 | 0.004 |
| Chlorpyrifos | 11.4 | * | * | 0.006 | 0.18 | 0.55 |
| Diazinon | 10.6 | * | * | 0.004 | 0.066 | 0.005 |
| Dicloran | 41.8 | * | 0.21 | 1.7 | 12 | 0.085 |
| Iprodione | 64.8 | 0.19 | 0.6 | 1.2 | 11 | 0.06 |
| Parathion-methyl | 21.5 | * | * | 0.038 | 0.69 | 0.038 |
| Propargite | 33.3 | * | 0.19 | 0.35 | 1.6 | 0.05 |

# APPENDIX C. CONCENTRATION PERCENTILES vs. TOLERANCE in COMMODITY/PESTICIDE PAIRS

## (Pairs with Residue Detections in at Least 10 Percent of Samples)

| Commodity | % of Samples with Detections | Percentiles 50th | 75th | 90th | Maximum Value Detected, ppm | Ratio of Tolerance to 90th Percentile |
|---|---|---|---|---|---|---|
| **12. Potatoes** | | | | | | |
| Chlorpropham | 61.8 | 0.084 | 1.3 | 2.9 | 9.7 | 0.058 |
| Endosulfans | 11.3 | * | * | 0.006 | 0.10 | 0.003 |
| Thiabendazole | 21.8 | * | * | 0.26 | 2.1 | 0.026 |

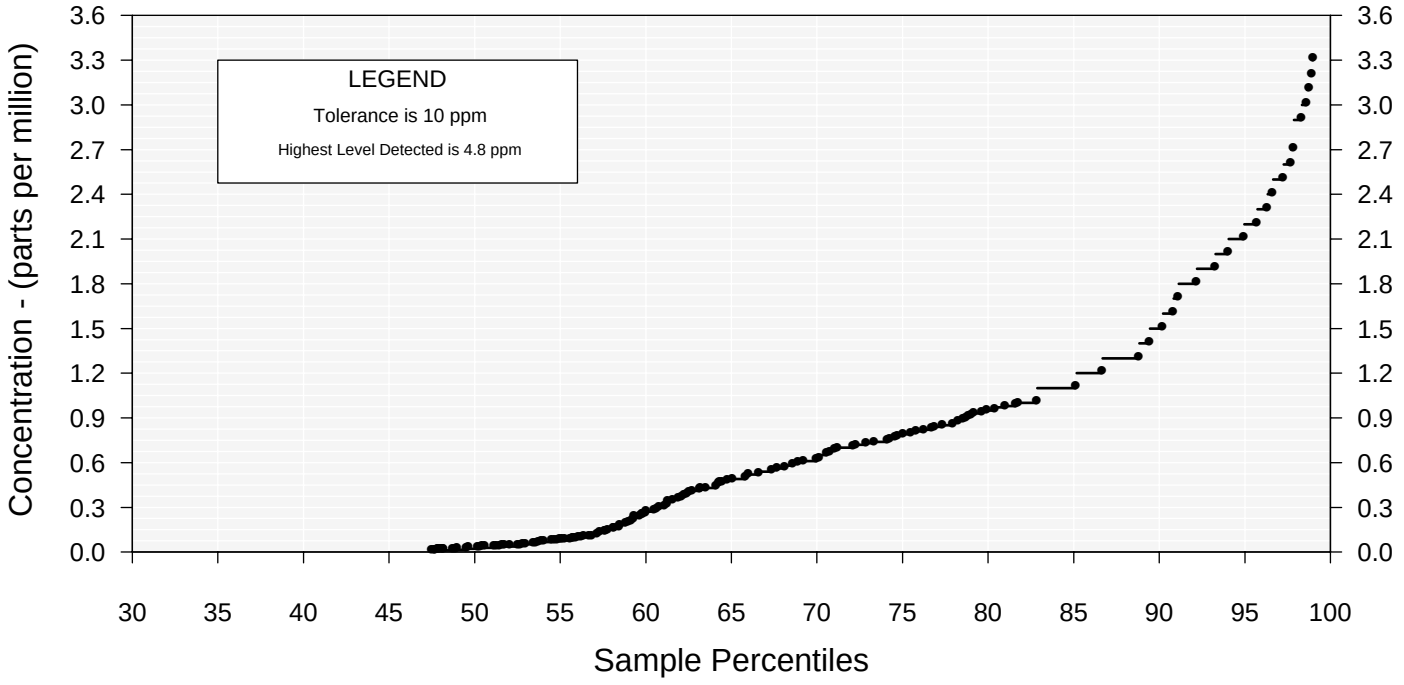
(*) Value is Below the limit of detection (LOD).

(**) Ratio is not calculated if tolerance is not established.

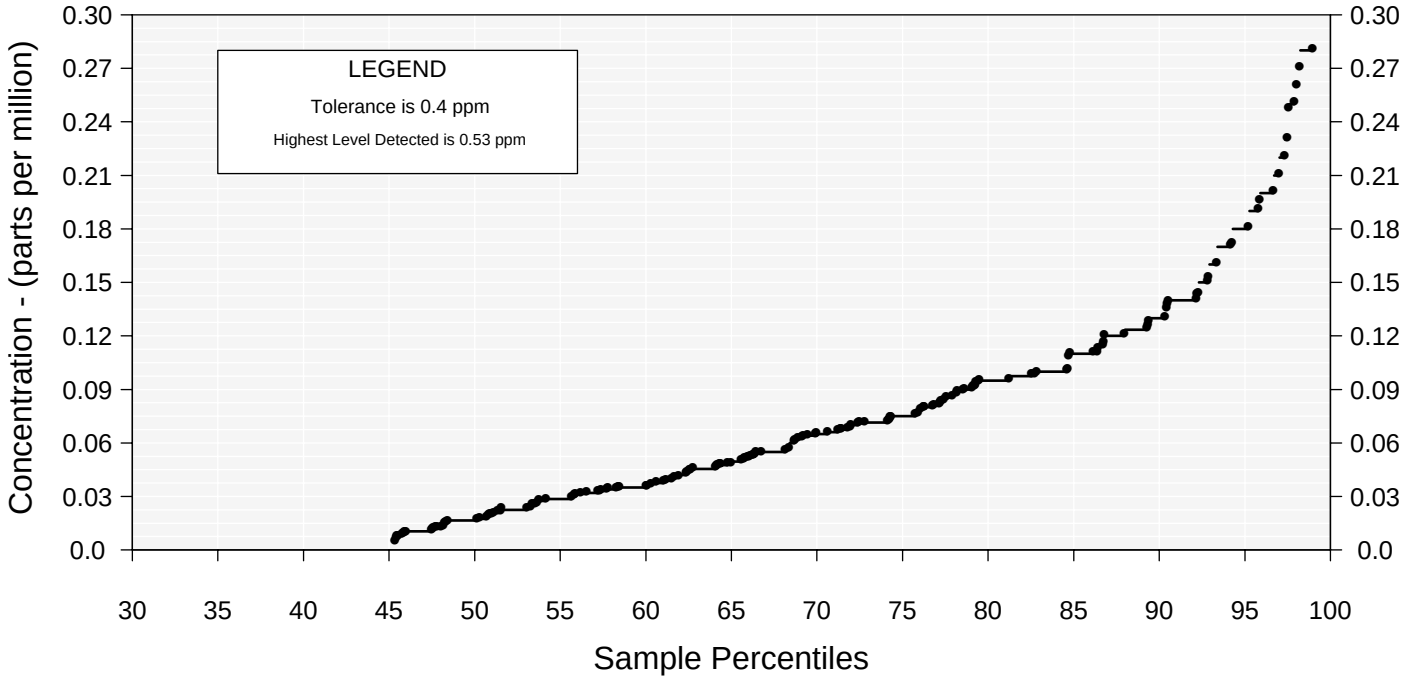
@ Tolerance (0.40) used in ratio applies to banana pulp only.

# APPENDIX D. CUMULATIVE DISTRIBUTIONS OF RESIDUE CONCENTRATIONS FOR SELECTED COMMODITY/PESTICIDE PAIRS

Apples / Diphenylamine

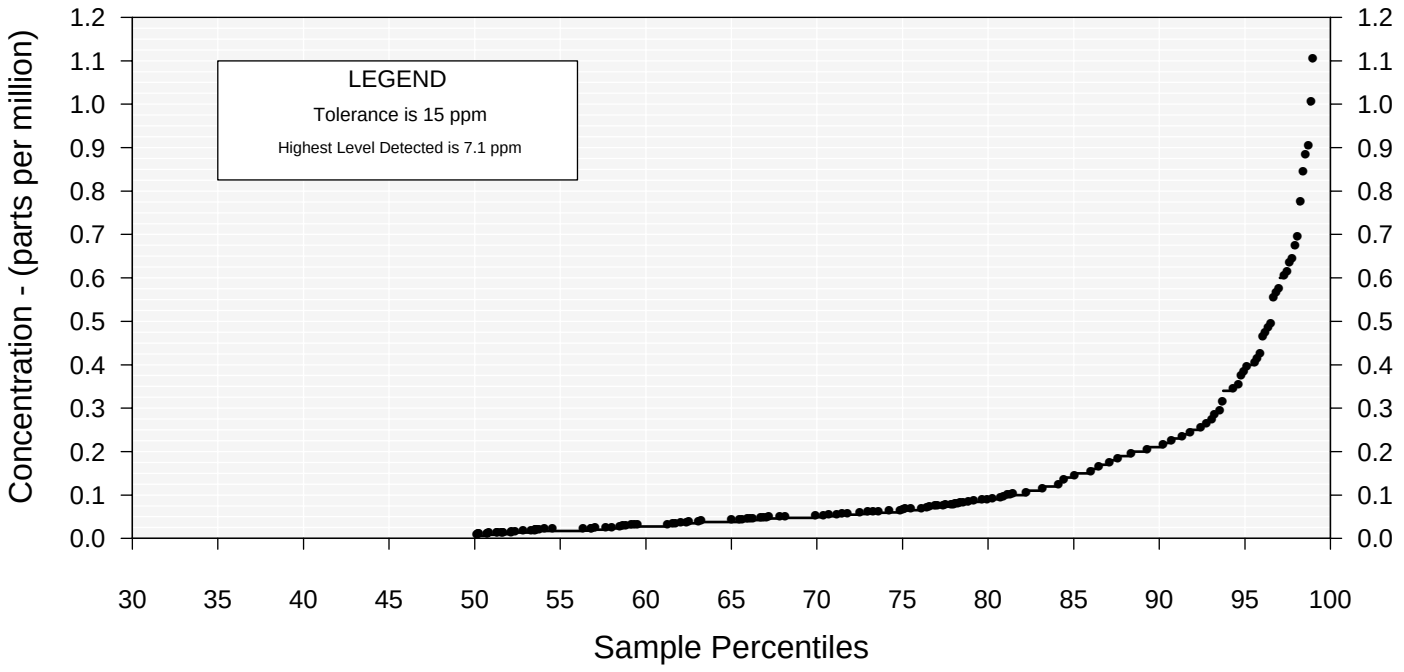



Bananas / Thiabendazole

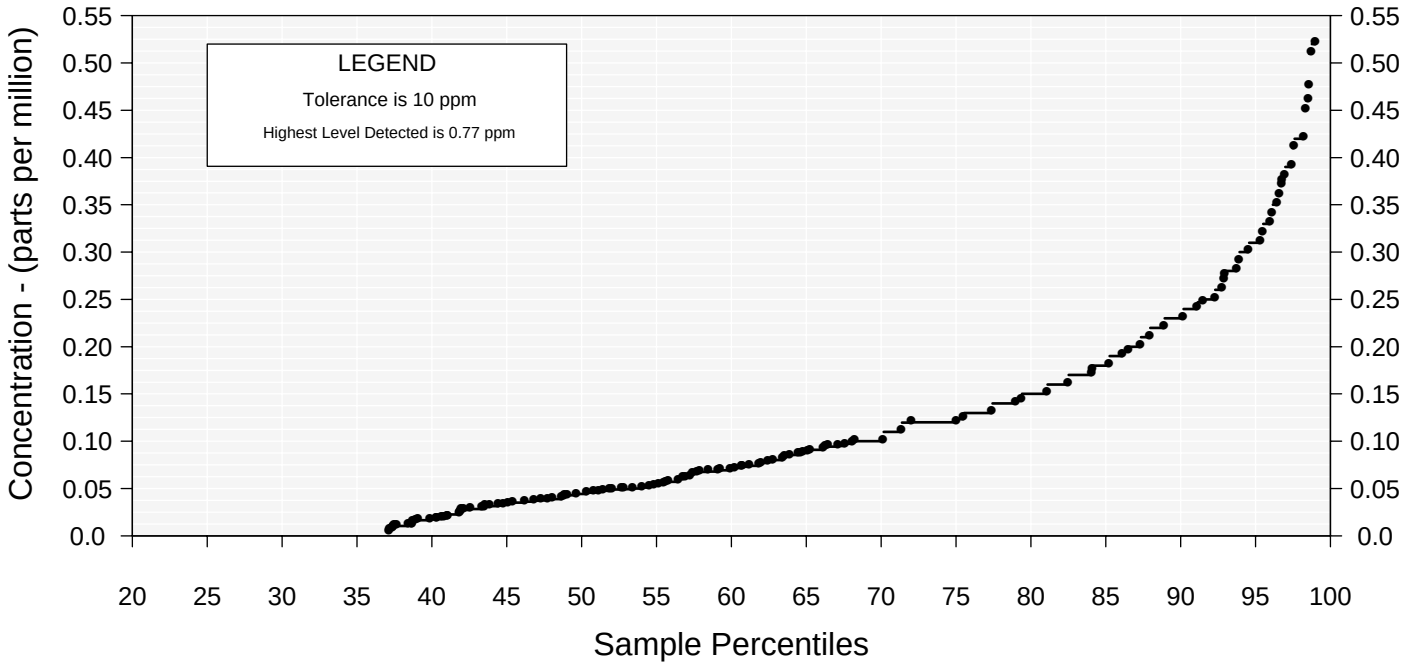


# APPENDIX D.(CONT'D) CUMULATIVE DISTRIBUTIONS OF RESIDUE CONCENTRATIONS FOR SELECTED COMMODITY/PESTICIDE PAIRS

Celery / Chlorothalonil

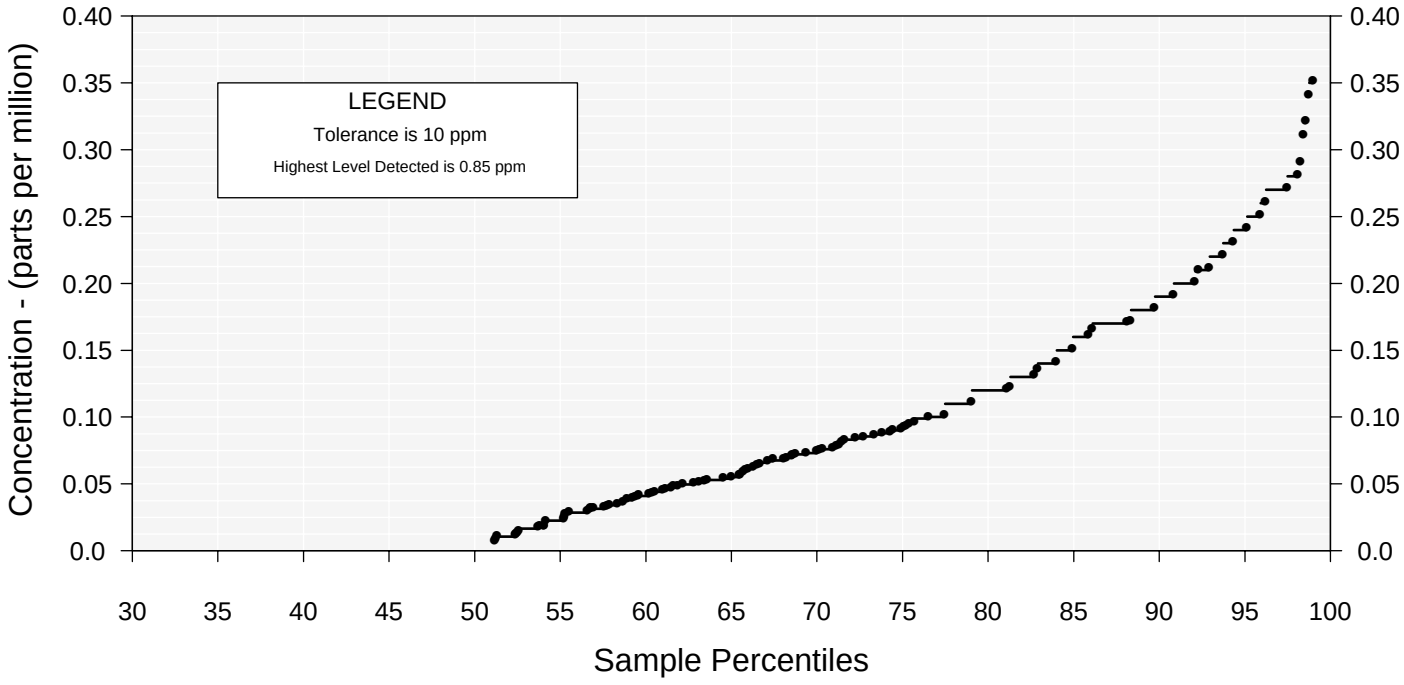



Grapefruit / Thiabendazole

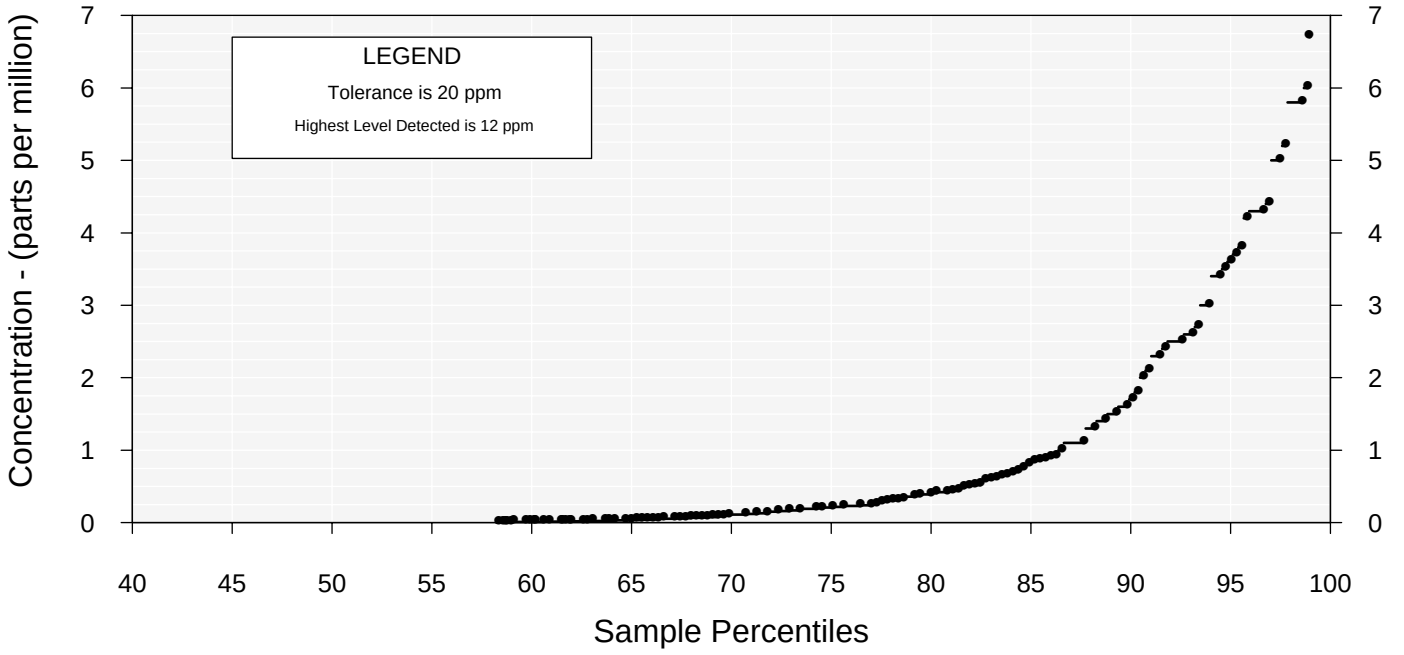


# APPENDIX D.(CONT'D) CUMULATIVE DISTRIBUTIONS OF RESIDUE CONCENTRATIONS FOR SELECTED COMMODITY/PESTICIDE PAIRS

Oranges / Imazalil

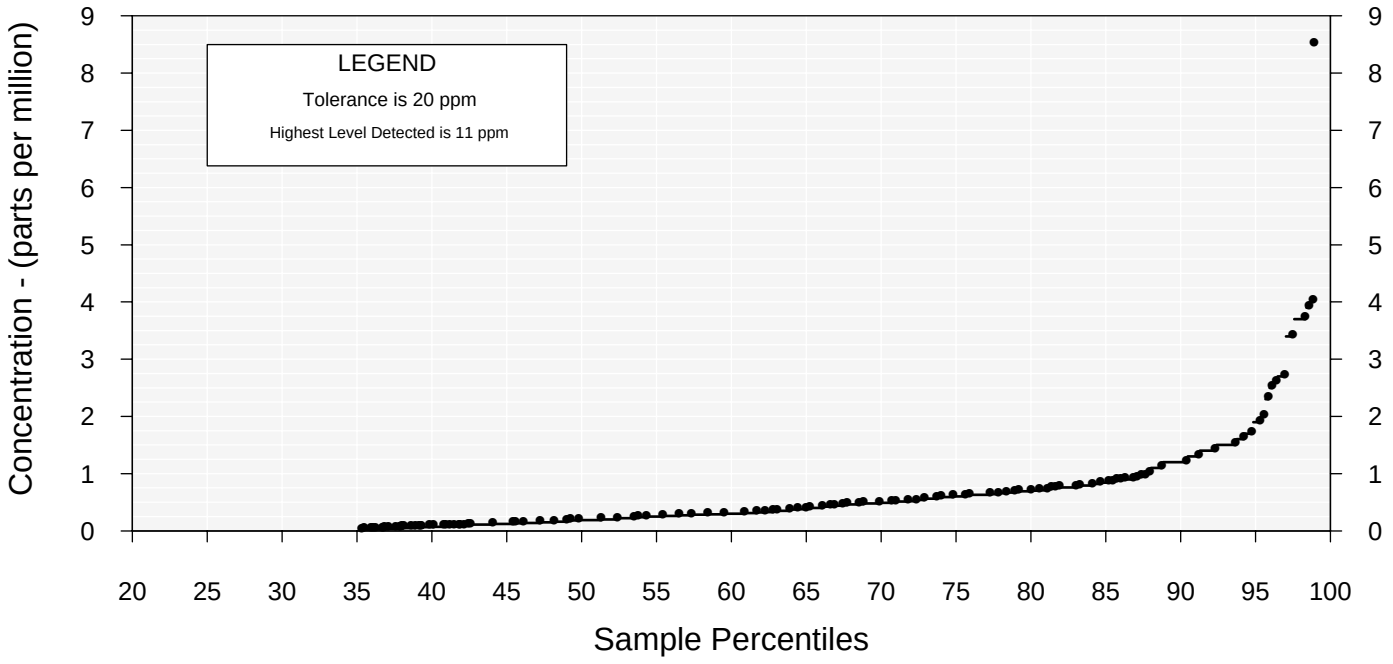



Peaches / Dicloran

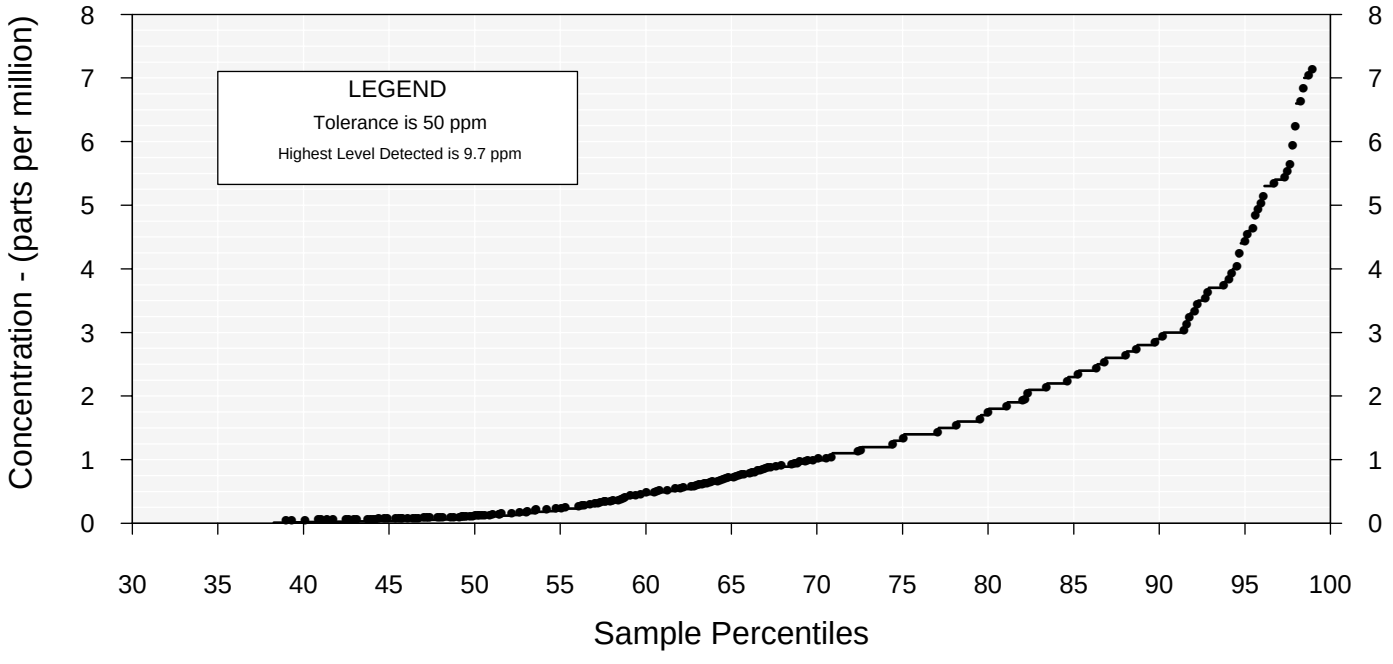


# APPENDIX D.(CONT'D) CUMULATIVE DISTRIBUTIONS OF RESIDUE CONCENTRATIONS FOR SELECTED COMMODITY/PESTICIDE PAIRS

Peaches / Iprodione

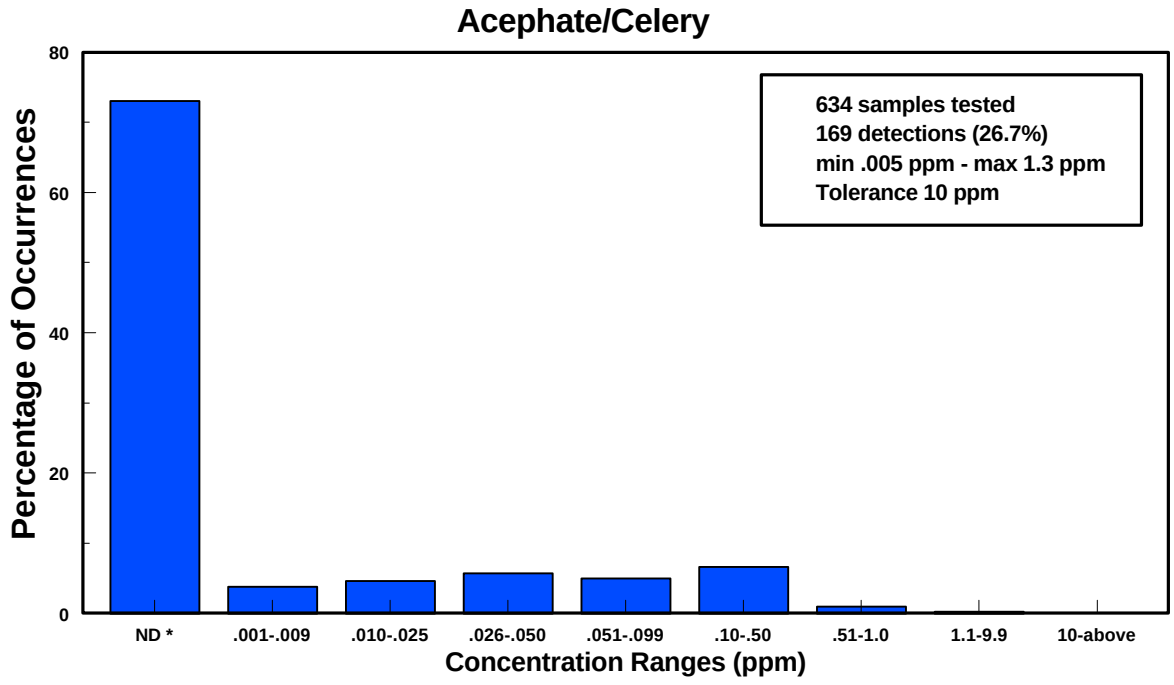


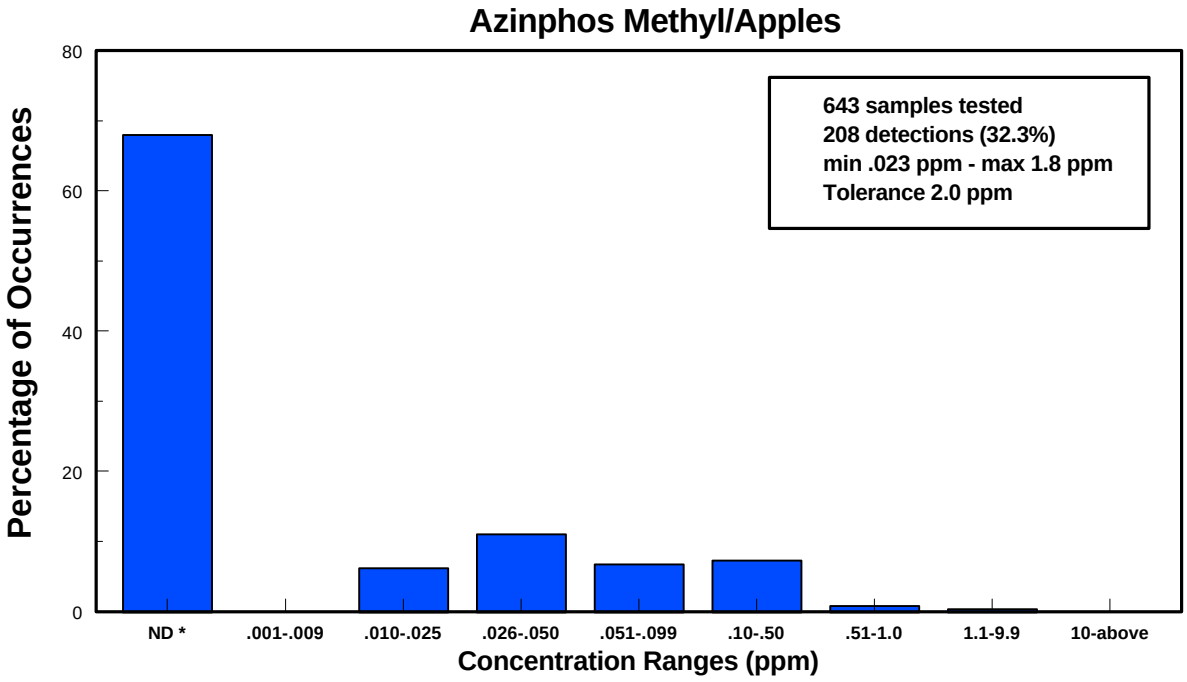

Potatoes / Chloropropham



APPENDIX E. FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

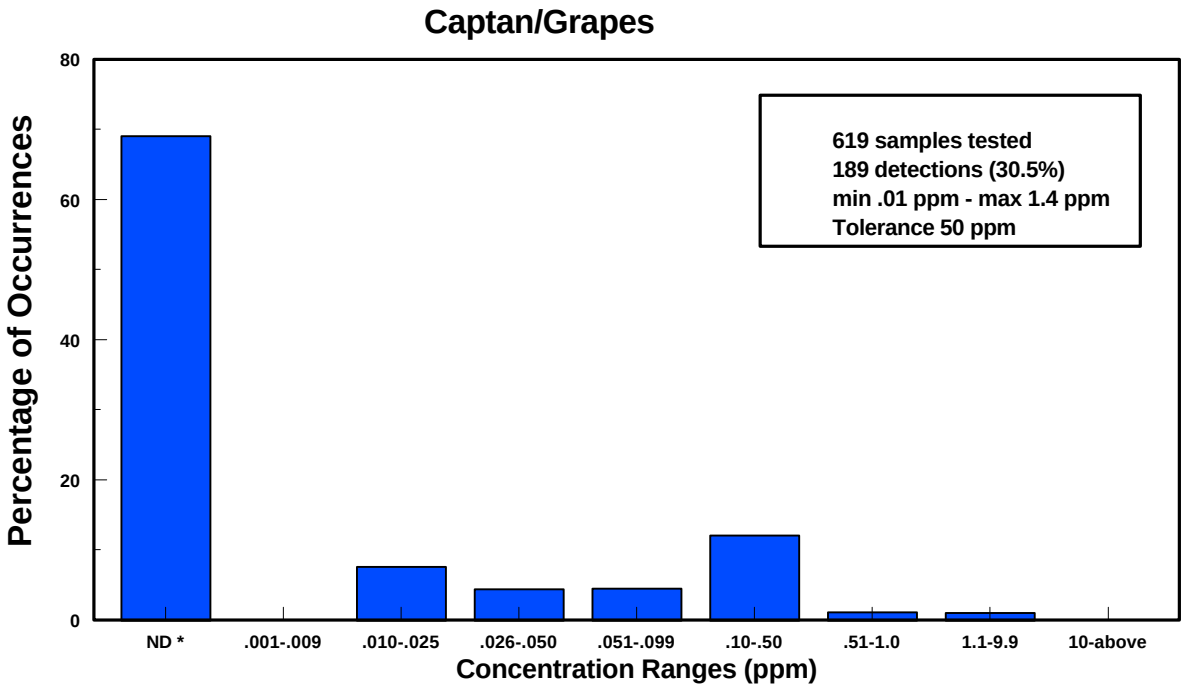
(Pairs with Residue Detections in at Least 25 Percent of Samples)

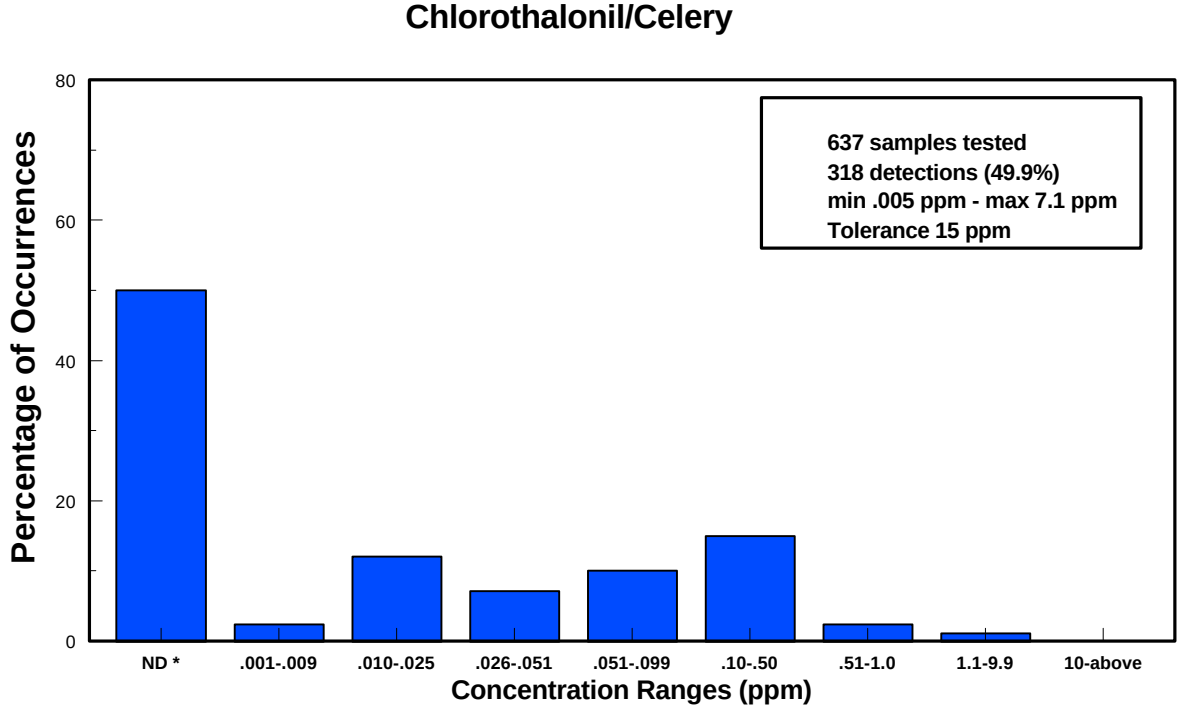


APPENDIX E. (cont'd) FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

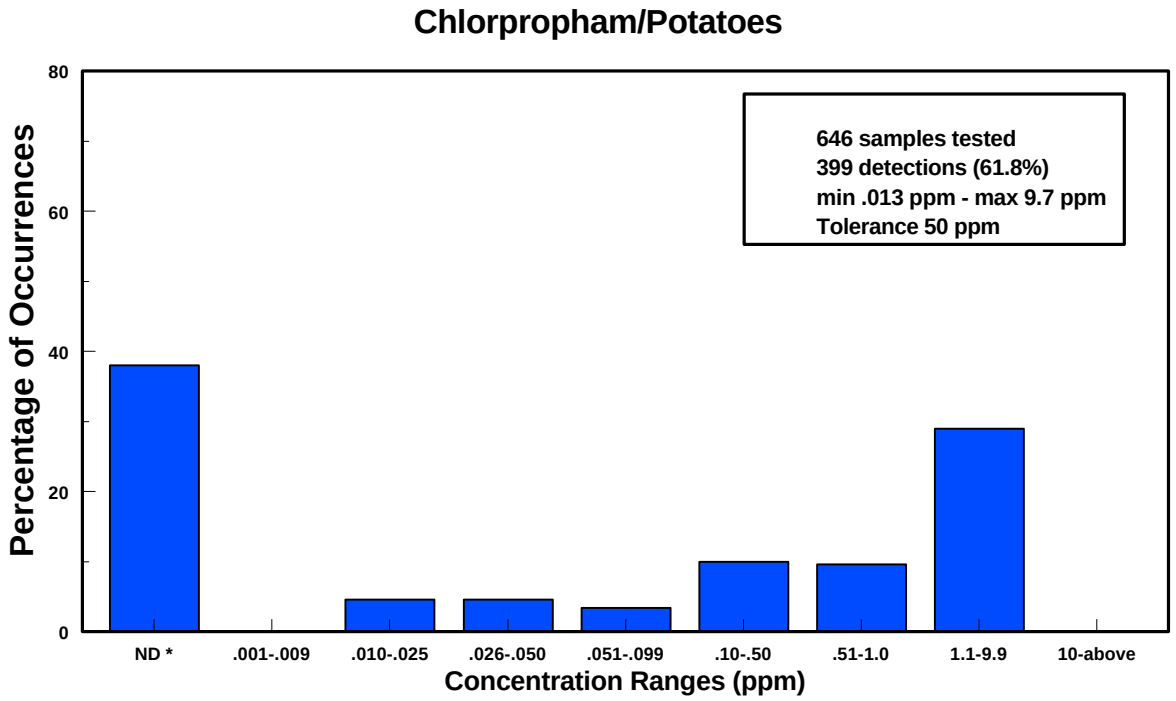
(Pairs with Residue Detections in at Least 25 Percent of Samples)

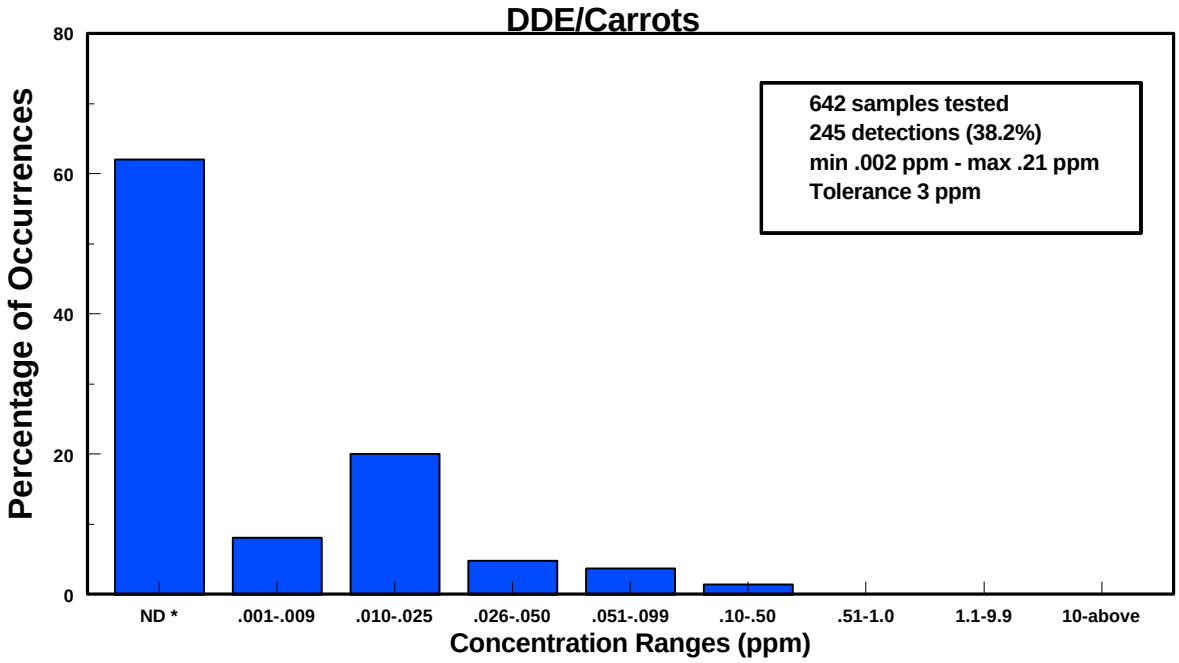


APPENDIX E. (cont'd) FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

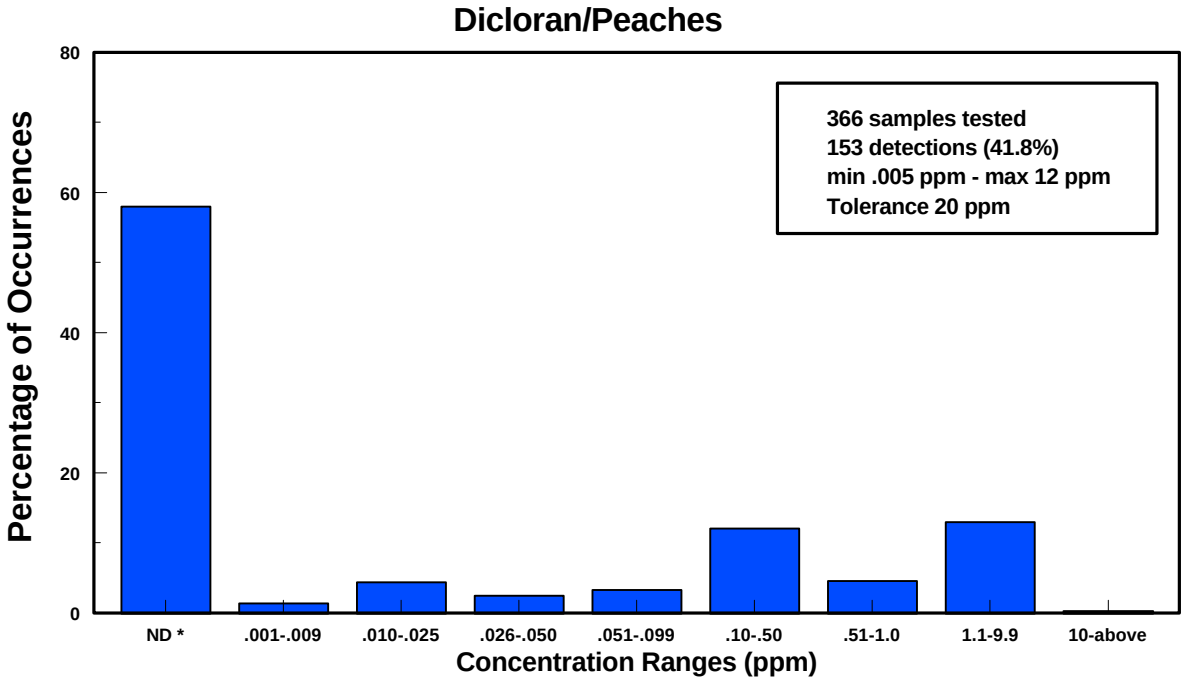
(Pairs with Residue Detections in at Least 25 Percent of Samples)

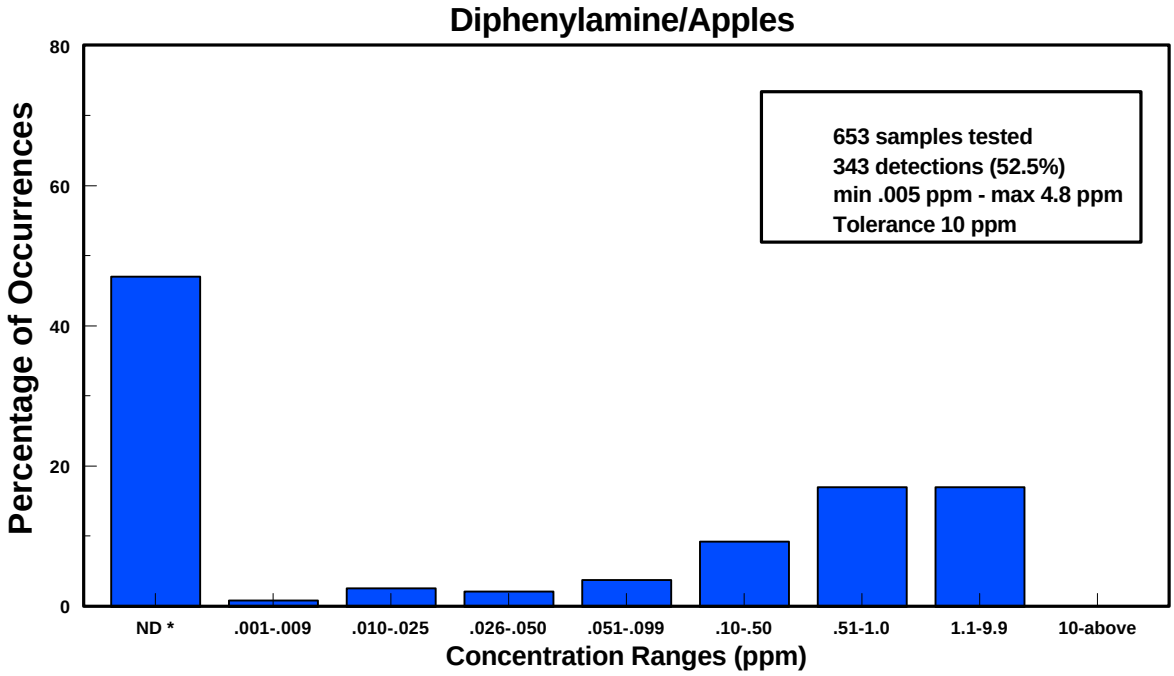


APPENDIX E. (cont'd) FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

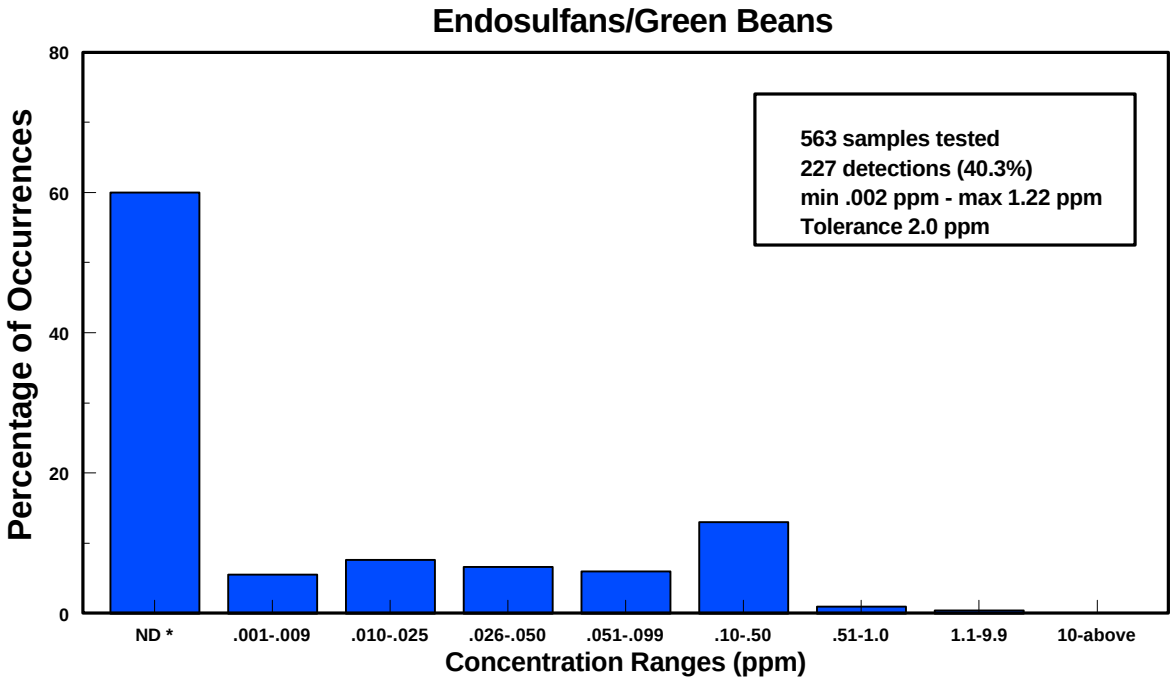
(Pairs with Residue Detections in at Least 25 Percent of Samples)

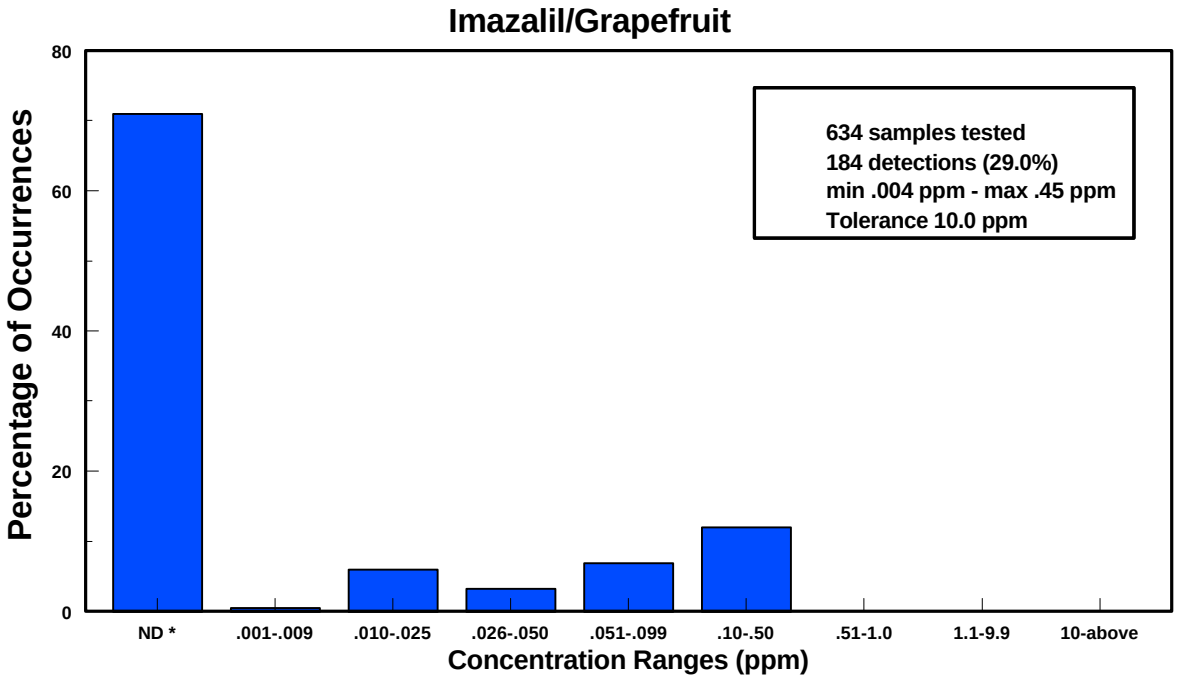


APPENDIX E. (cont'd) FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

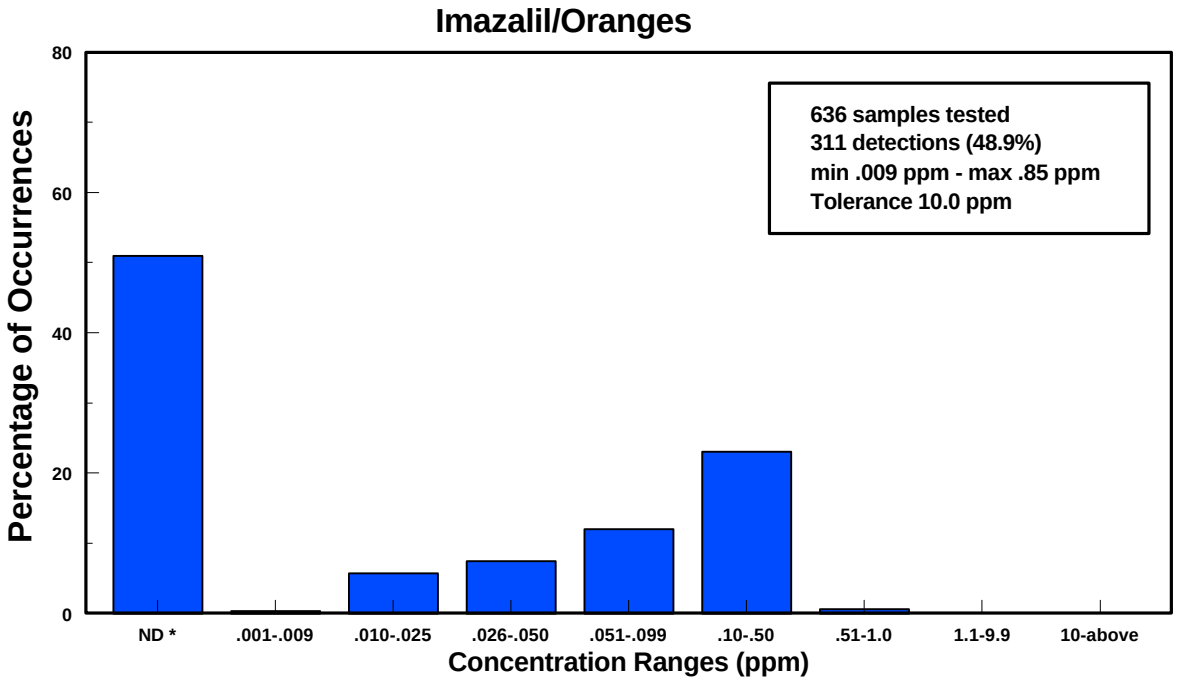
(Pairs with Residue Detections in at Least 25 Percent of Samples)

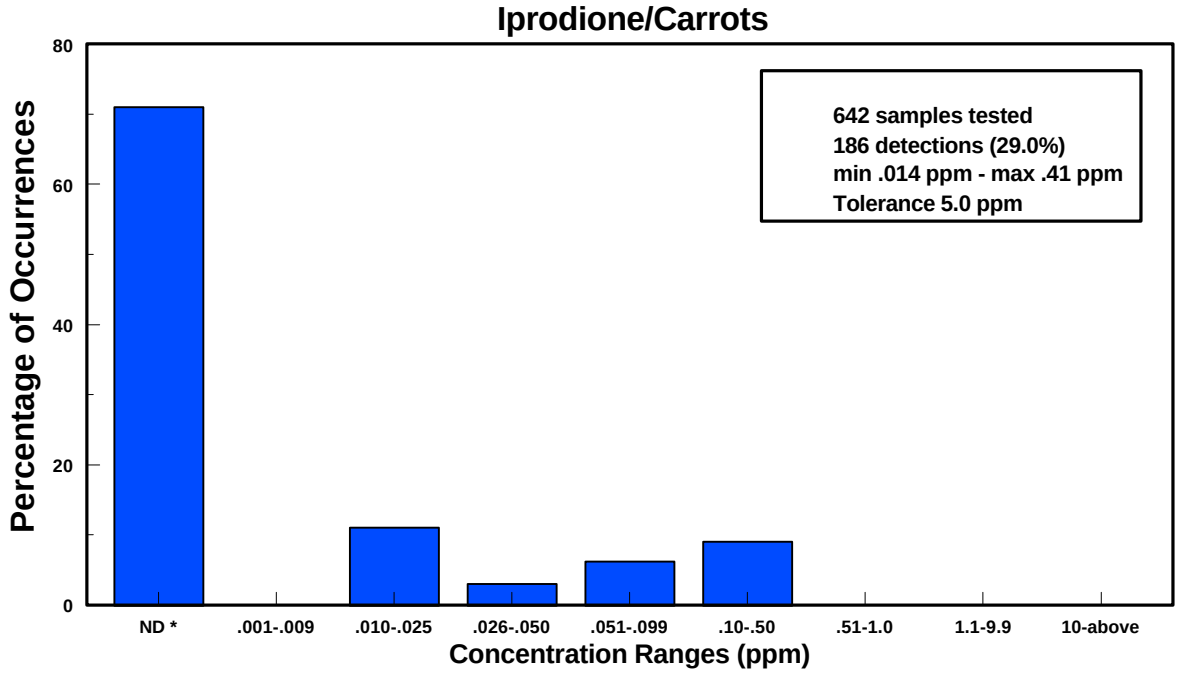


APPENDIX E. (cont'd) FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

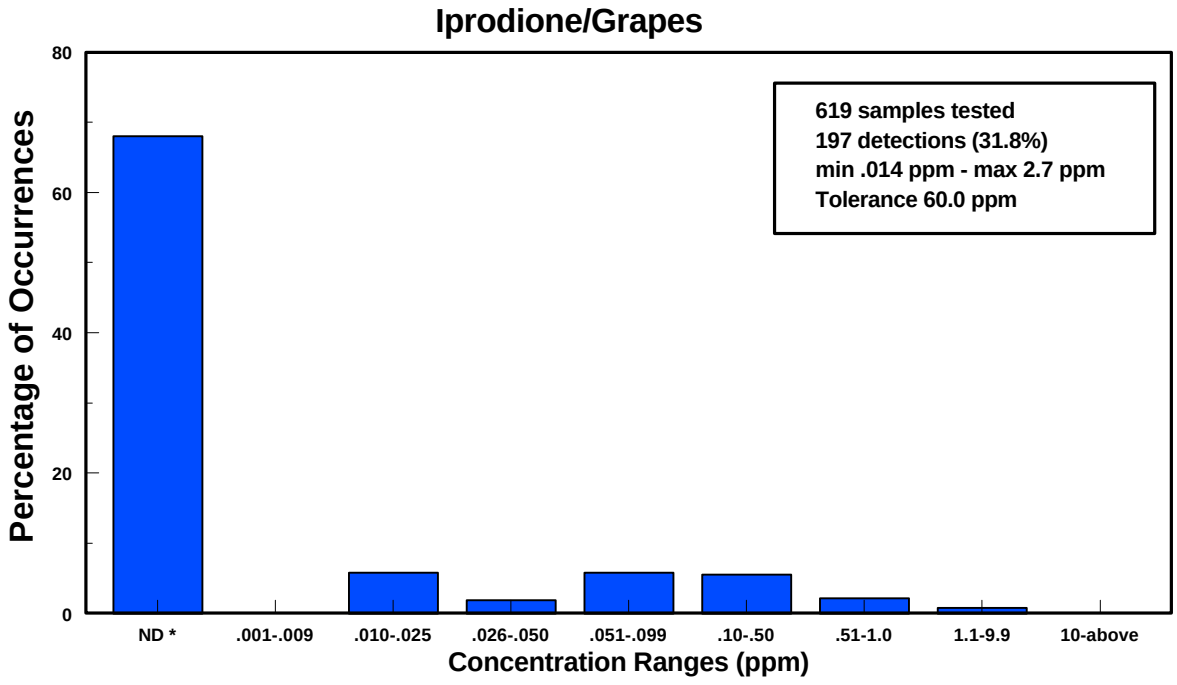
(Pairs with Residue Detections in at Least 25 Percent of Samples)

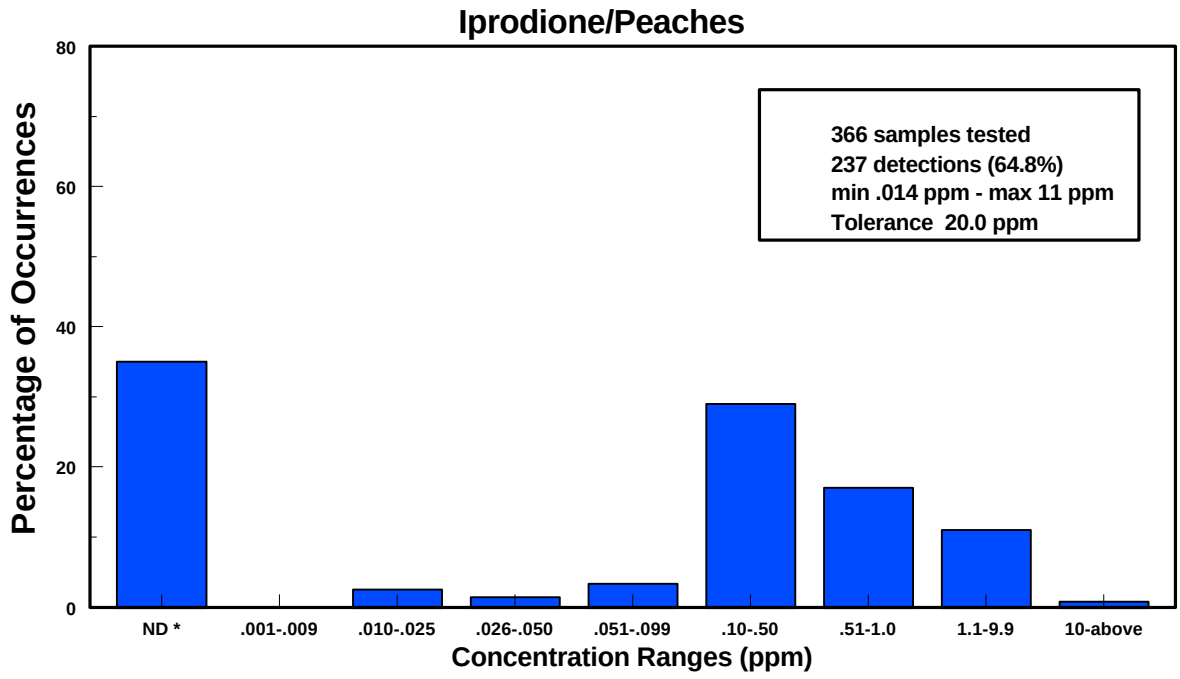


APPENDIX E. (cont'd) FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

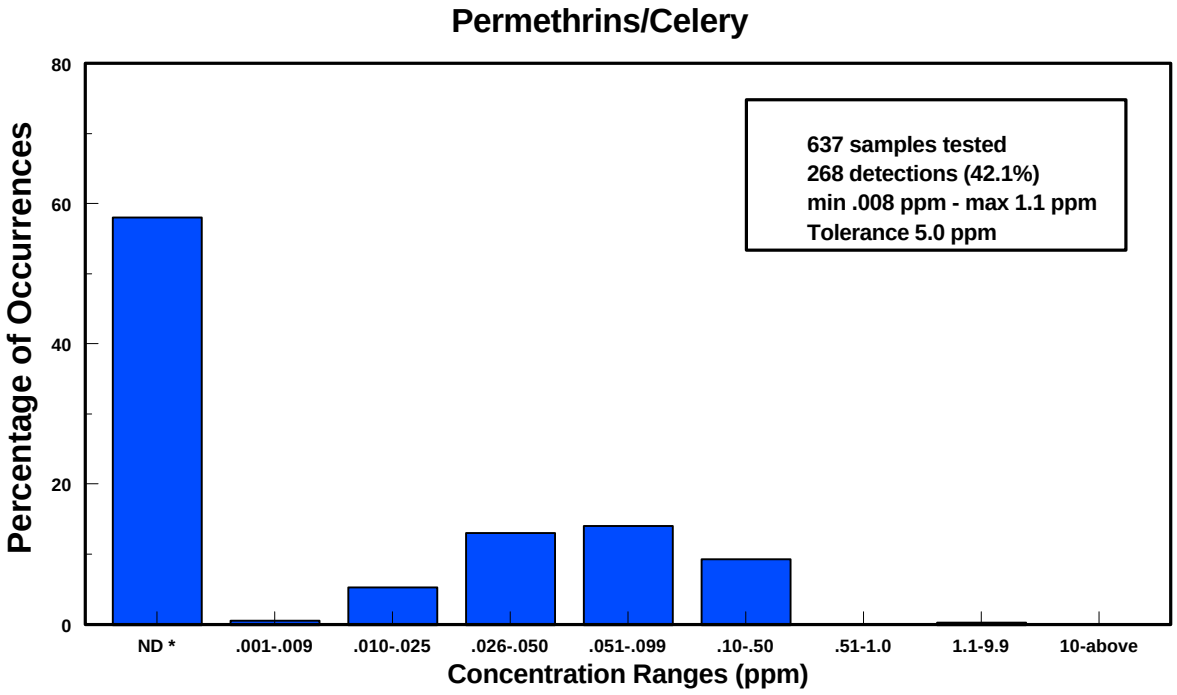
(Pairs with Residue Detections in at Least 25 Percent of Samples)

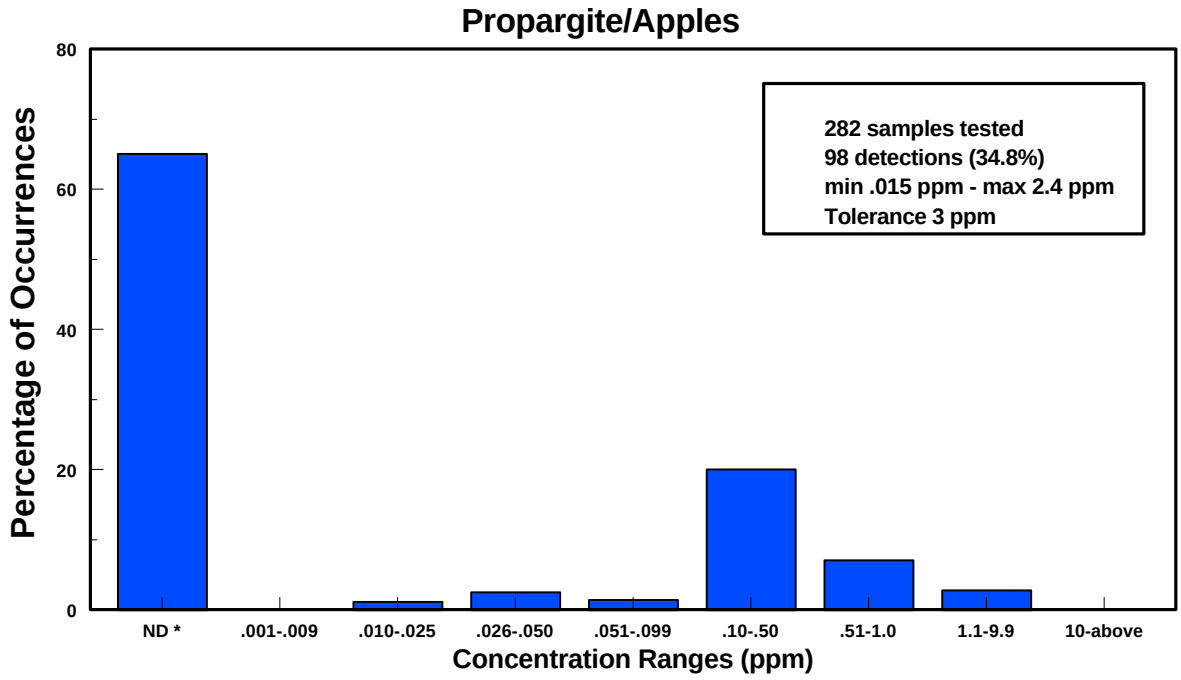


APPENDIX E. (cont'd) FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

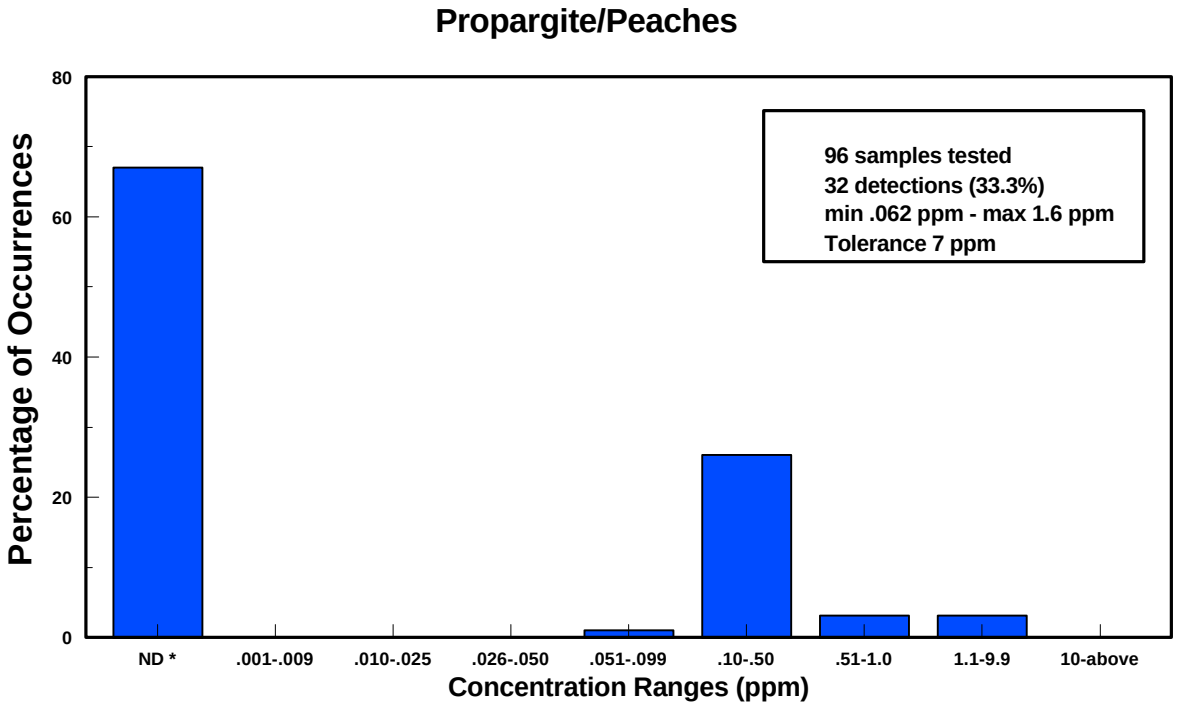
(Pairs with Residue Detections in at Least 25 Percent of Samples)

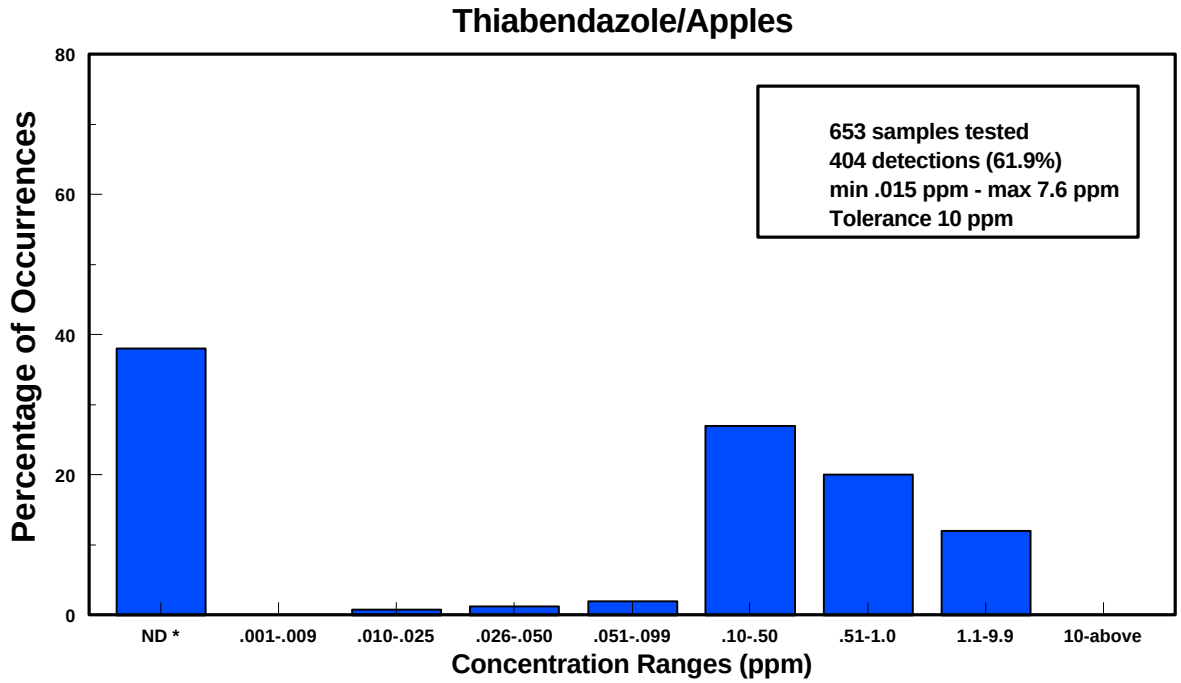


APPENDIX E. (cont'd) FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

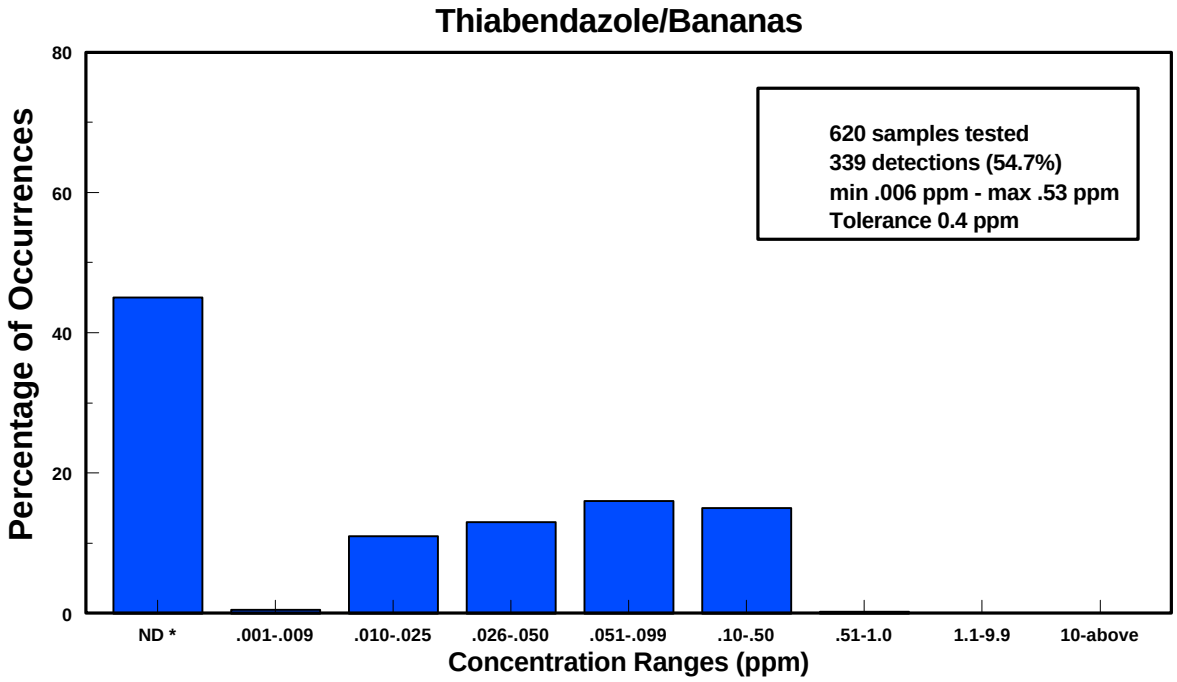
(Pairs with Residue Detections in at Least 25 Percent of Samples)

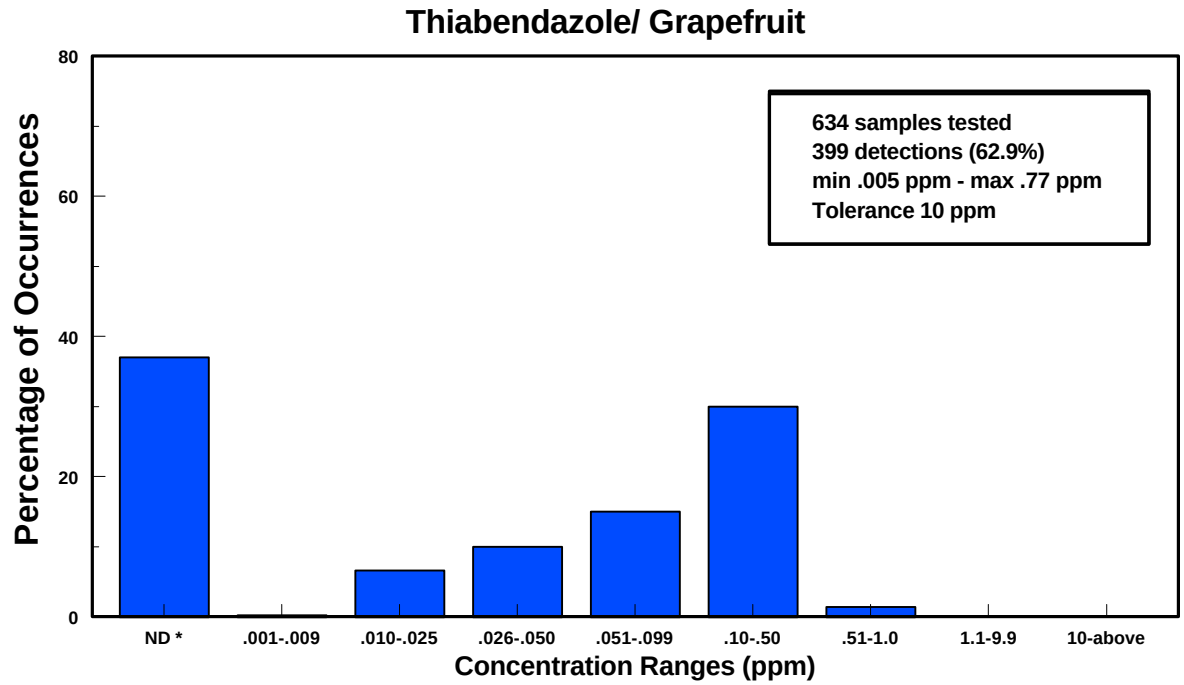


APPENDIX E. (cont'd) FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

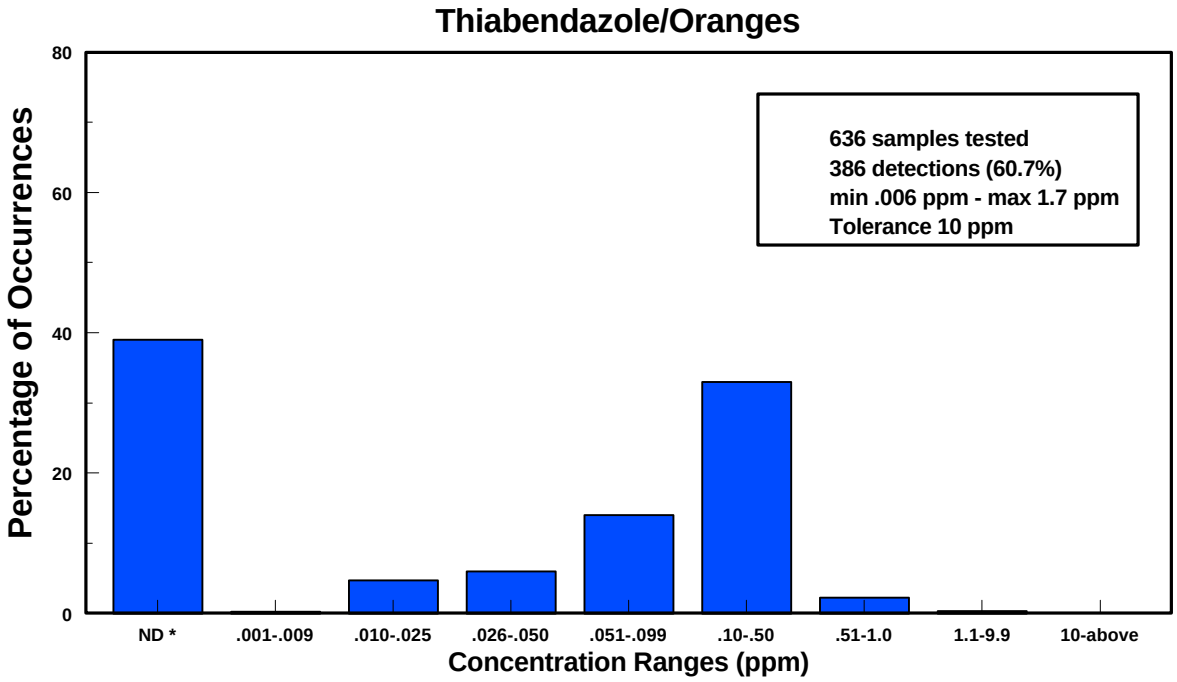
(Pairs with Residue Detections in at Least 25 Percent of Samples)



APPENDIX E. (cont'd) FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

(Pairs with Residue Detections in at Least 25 Percent of Samples)




*** Pesticides found in less than 25 percent of the samples are not included.**

**** These determinations were below the limit of detection of the reporting laboratory, and are not necessarily below .001ppm.**

# APPENDIX F. MULTIPLE PESTICIDE RESIDUES DETECTED

## APPLES

| No. of Residues Detected / Sample | Samples # | Samples % | No. of Different Residues | 3 Most Frequently Detected Pesticides (*) |
|---|---|---|---|---|
| 9 | 1 | 0.2 | 9 | AZINPHOS-METHYL (1), METHOXYCHLOR (1), DIPHENYLAMINE (1) **AP |
| 8 | 6 | 0.9 | 19 | AZINPHOS-METHYL (5), DIMETHOATE (5), ENDOSULFANS (4) |
| 7 | 14 | 2.1 | 20 | AZINPHOS-METHYL (11), THIABENDAZOLE (11), DIPHENYLAMINE (10) |
| 6 | 31 | 4.7 | 24 | DIPHENYLAMINE (25), THIABENDAZOLE (25), AZINPHOS-METHYL (16) |
| 5 | 60 | 9.2 | 24 | THIABENDAZOLE (48), DIPHENYLAMINE (44), AZINPHOS-METHYL (28) |
| 4 | 119 | 18.2 | 26 | THIABENDAZOLE (87), DIPHENYLAMINE (81), AZINPHOS-METHYL (51) |
| 3 | 169 | 25.8 | 24 | THIABENDAZOLE (122), DIPHENYLAMINE (108), AZINPHOS-METHYL (55) |
| 2 | 152 | 23.2 | 23 | THIABENDAZOLE (78), DIPHENYLAMINE (63), AZINPHOS-METHYL (37) |
| 1 | 82 | 12.5 | 17 | THIABENDAZOLE (28), PROPARGITE (9), DIPHENYLAMINE (8) |
| 0 | 20 | 3.1 | 0 | |

Total No. of Samples = 654 Total # of Residues = 2010

## BANANAS

| No. of Residues Detected / Sample | Samples # | Samples % | No. of Different Residues | 3 Most Frequently Detected Pesticides (*) |
|---|---|---|---|---|
| 2 | 26 | 4.2 | 4 | THIABENDAZOLE (26), IMAZALIL (23), BENOMYL (2) |
| 1 | 353 | 56.9 | 5 | THIABENDAZOLE (313), IMAZALIL (36), BENOMYL (2) |
| 0 | 241 | 38.9 | 0 | |

Total No. of Samples = 620 Total # of Residues = 405

## BROCCOLI

| No. of Residues Detected / Sample | Samples # | Samples % | No. of Different Residues | 3 Most Frequently Detected Pesticides (*) |
|---|---|---|---|---|
| 3 | 4 | 0.6 | 8 | DCPA (4), CARBARYL (2), ENDOSULFANS (1) |
| 2 | 19 | 3.0 | 11 | DCPA (13), ENDOSULFANS (6), CARBARYL (4) |
| 1 | 139 | 21.7 | 12 | DCPA (85), ENDOSULFANS (13), PERMETHRINS (11) |
| 0 | 478 | 74.7 | 0 | |

Total No. of Samples = 640 Total # of Residues = 189

# APPENDIX F. MULTIPLE PESTICIDE RESIDUES DETECTED

## CARROTS

| No. of Residues Detected / Sample | Samples # | Samples % | No. of Different Residues | 3 Most Frequently Detected Pesticides (*) |
|---|---|---|---|---|
| 4 | 6 | 0.9 | 10 | DDE (6), TRIFLURALIN (4), DDT (3) |
| 3 | 57 | 8.9 | 12 | DDE (51), IPRODIONE (47), TRIFLURALIN (36) |
| 2 | 139 | 21.7 | 16 | IPRODIONE (97), DDE (86), TRIFLURALIN (57) |
| 1 | 214 | 33.3 | 13 | DDE (102), TRIFLURALIN (41), IPRODIONE (39) |
| 0 | 226 | 35.2 | 0 | |
| Total No. of Samples = | 642 | | | Total # of Residues = 687 |

## CELERY

| No. of Residues Detected / Sample | Samples # | Samples % | No. of Different Residues | 3 Most Frequently Detected Pesticides (*) |
|---|---|---|---|---|
| 6 | 6 | 0.9 | 13 | PERMETHRINS (6), CHLOROTHALONIL (5), OXAMYL (5) |
| 5 | 24 | 3.8 | 20 | ACEPHATE (17), PERMETHRINS (17), DICLORAN (14) |
| 4 | 81 | 12.7 | 20 | CHLOROTHALONIL (57), PERMETHRINS (53), ACEPHATE (50) |
| 3 | 140 | 22.0 | 21 | CHLOROTHALONIL (96), PERMETHRINS (74), ACEPHATE (52) |
| 2 | 185 | 29.0 | 20 | CHLOROTHALONIL (93), PERMETHRINS (89), OXAMYL (44) |
| 1 | 159 | 25.0 | 16 | CHLOROTHALONIL (54), PERMETHRINS (29), ACEPHATE (18) |
| 0 | 42 | 6.6 | 0 | |
| Total No. of Samples = | 637 | | | Total # of Residues = 1,429 |

## GRAPEFRUIT

| No. of Residues Detected / Sample | Samples # | Samples % | No. of Different Residues | 3 Most Frequently Detected Pesticides (*) |
|---|---|---|---|---|
| 4 | 1 | 0.2 | 4 | ETHION (1), THIABENDAZOLE (1), CHLORPYRIFOS (1) **GF |
| 3 | 32 | 5.0 | 8 | THIABENDAZOLE (29), IMAZALIL (29), ETHION (23) |
| 2 | 176 | 27.6 | 12 | THIABENDAZOLE (161), IMAZALIL (131), ETHION (20) |
| 1 | 251 | 39.4 | 6 | THIABENDAZOLE (208), IMAZALIL (23), CARBARYL (15) |
| 0 | 177 | 27.8 | 0 | |
| Total No. of Samples = | 637 | | | Total # of Residues = 703 |

# APPENDIX F. MULTIPLE PESTICIDE RESIDUES DETECTED

## GRAPES

| No. of Residues Detected / Sample | Samples # | Samples % | No. of Different Residues | 3 Most Frequently Detected Pesticides (*) |
|---|---|---|---|---|
| 6 | 4 | 0.6 | 15 | DIMETHOATE (3), OMETHOATE (3), CAPTAN (2) |
| 5 | 20 | 3.2 | 17 | DIMETHOATE (12), OMETHOATE (12), MYCLOBUTANIL (11) |
| 4 | 31 | 4.9 | 16 | DIMETHOATE (20), CAPTAN (19), VINCLOZOLIN (18) |
| 3 | 80 | 12.7 | 23 | IPRODIONE (44), CAPTAN (36), VINCLOZOLIN (26) |
| 2 | 156 | 24.7 | 18 | IPRODIONE (88), CAPTAN (87), VINCLOZOLIN (32) |
| 1 | 181 | 28.7 | 20 | IPRODIONE (46), MYCLOBUTANIL (46), CAPTAN (37) |
| 0 | 159 | 25.2 | 0 | |
| Total No. of Samples = | 631 | | | Total # of Residues = 981 |

## GREEN BEANS

| No. of Residues Detected / Sample | Samples # | Samples % | No. of Different Residues | 3 Most Frequently Detected Pesticides (*) |
|---|---|---|---|---|
| 8 | 1 | 0.2 | 8 | ENDOSULFANS (1), CHLOROTHALONIL (1), METHAMIDOPHOS (1) **GB |
| 7 | 3 | 0.5 | 10 | ENDOSULFANS (3), DIMETHOATE (3), OMETHOATE (3) |
| 6 | 5 | 0.9 | 10 | CHLOROTHALONIL (5), ENDOSULFANS (4), METHAMIDOPHOS (4) |
| 5 | 19 | 3.4 | 14 | METHAMIDOPHOS (17), ENDOSULFANS (16), ACEPHATE (14) |
| 4 | 32 | 5.7 | 16 | METHAMIDOPHOS (25), ACEPHATE (25), ENDOSULFANS (21) |
| 3 | 57 | 10.1 | 18 | METHAMIDOPHOS (38), ACEPHATE (38), ENDOSULFANS (33) |
| 2 | 115 | 20.3 | 16 | ENDOSULFANS (82), BENOMYL (46), METHAMIDOPHOS (26) |
| 1 | 139 | 24.6 | 13 | ENDOSULFANS (67), BENOMYL (21), DCPA (14) |
| 0 | 195 | 34.5 | 0 | |
| Total No. of Samples = | 566 | | | Total # of Residues = 822 |

## LETTUCE

| No. of Residues Detected / Sample | Samples # | Samples % | No. of Different Residues | 3 Most Frequently Detected Pesticides (*) |
|---|---|---|---|---|
| 5 | 8 | 1.2 | 13 | PERMETHRINS (7), MEVINPHOS (5), DIMETHOATE (4) |
| 4 | 14 | 2.2 | 13 | METHOMYL (8), PERMETHRINS (8), DIAZINON (7) |
| 3 | 27 | 4.2 | 11 | DIMETHOATE (19), ENDOSULFANS (12), ACEPHATE (10) |
| 2 | 77 | 11.9 | 16 | ENDOSULFANS (30), PERMETHRINS (27), ACEPHATE (25) |
| 1 | 201 | 31.1 | 13 | ENDOSULFANS (88), ACEPHATE (34), DIMETHOATE (26) |
| 0 | 320 | 49.5 | 0 | |
| Total No. of Samples = | 647 | | | Total # of Residues = 532 |

# APPENDIX F. MULTIPLE PESTICIDE RESIDUES DETECTED

## ORANGES

| No. of Residues Detected / Sample | Samples # | Samples % | No. of Different Residues | 3 Most Frequently Detected Pesticides (*) |
|---|---|---|---|---|
| 6 | 1 | 0.2 | 6 | DIAZINON (1), AZINPHOS-METHYL (1), ETHION (1) **OG |
| 5 | 2 | 0.3 | 7 | THIABENDAZOLE (2), METHIDATHION (2), IMAZALIL (2) |
| 4 | 15 | 2.4 | 10 | THIABENDAZOLE (15), IMAZALIL (14), CARBARYL (9) |
| 3 | 83 | 13.0 | 13 | THIABENDAZOLE (80), IMAZALIL (74), O-PHENYLPHENOL (21) |
| 2 | 224 | 35.1 | 13 | THIABENDAZOLE (194), IMAZALIL (170), CARBARYL (17) |
| 1 | 182 | 28.5 | 11 | THIABENDAZOLE (94), IMAZALIL (51), 2 4-D (6) |
| 0 | 131 | 20.5 | 0 | |
| Total No. of Samples = | 638 | | | Total # of Residues = 955 |

## PEACHES

| No. of Residues Detected / Sample | Samples # | Samples % | No. of Different Residues | 3 Most Frequently Detected Pesticides (*) |
|---|---|---|---|---|
| 6 | 6 | 1.6 | 14 | CARBARYL (5), DICLORAN (5), PROPARGITE (5) |
| 5 | 15 | 4.1 | 18 | IPRODIONE (13), DICLORAN (11), PARATHION-METHYL (9) |
| 4 | 66 | 17.9 | 20 | IPRODIONE (58), DICLORAN (46), PARATHION-METHYL (25) |
| 3 | 75 | 20.3 | 24 | IPRODIONE (58), DICLORAN (36), AZINPHOS-METHYL (23) |
| 2 | 112 | 30.4 | 18 | IPRODIONE (71), DICLORAN (49), AZINPHOS-METHYL (21) |
| 1 | 63 | 17.1 | 11 | IPRODIONE (33), AZINPHOS-METHYL (8), DICLORAN (6) |
| 0 | 32 | 8.7 | 0 | |
| Total No. of Samples = | 369 | | | Total # of Residues = 887 |

## POTATOES

| No. of Residues Detected / Sample | Samples # | Samples % | No. of Different Residues | 3 Most Frequently Detected Pesticides (*) |
|---|---|---|---|---|
| 4 | 4 | 0.6 | 7 | CHLORPROPHAM (3), ENDOSULFANS (3), THIABENDAZOLE (3) |
| 3 | 27 | 4.2 | 10 | CHLORPROPHAM (23), THIABENDAZOLE (18), DDE (18) |
| 2 | 152 | 23.5 | 14 | CHLORPROPHAM (130), THIABENDAZOLE (100), ENDOSULFANS (30) |
| 1 | 328 | 50.7 | 10 | CHLORPROPHAM (243), ENDOSULFANS (33), THIABENDAZOLE (18) |
| 0 | 136 | 21.0 | 0 | |
| Total No. of Samples = | 647 | | | Total # of Residues = 729 |

* Number of samples with detectable residues

**AP - Additional compounds detected: Thiabendazole, Methomyl, Dimethoate, Omethoate, Benomyl, and Propargite

**GF - Additional compound detected: Imazalil

**GB - Additional compounds detected: Dimethoate, Omethoate, Carbofuran, Benomyl, and Acephate

**OG - Additional compounds detected: Thiabendazole, Chlorpyrifos, and Phosmet

# APPENDIX G. TOLERANCE VIOLATIONS REPORTED

| Commodity | Tolerance, ppm | Concentration, ppm |
|---|---|---|
| **1. Apples** | | |
| Chlorpropham | NT | 0.02 (2) |
| Chlorpropham | NT | 0.013 (2) |
| Dicloran | NT | 0.013 (2) |
| Dicloran | NT | 0.005 (2) |
| Imazalil | NT | 0.05 (2) |
| Iprodione | NT | 0.025 (2) |
| Iprodione * | NT | 0.014 (2) |
| Iprodione * | NT | 0.014 (2) |
| Iprodione | NT | 0.11 |
| Methiocarb | NT | 0.35 |
| Ovex | NT | 0.14 |
| **2. Bananas** | | |
| Imazalil * | 0.2 | 0.21 |
| Thiabendazole * | 0.4 | 0.47 |
| Thiabendazole * | 0.4 | 0.53 |
| **3. Carrots** | | |
| Benfluralin | NT | 0.033 |
| Benfluralin | NT | 0.015 (2) |
| Benfluralin | NT | 0.015 (2) |
| Chlorpyrifos | NT | 0.005 (2) |
| Chlorpyrifos | NT | 0.005 (2) |
| Chlorpyrifos | NT | 0.005 (2) |
| HCB | NT | 0.006 (2) |
| Pentachlorobenzene | NT | 0.01 |
| Phosmet * | NT | 0.015 (2) |
| **4. Celery** | | |
| Chlorpyrifos | NT | 0.005 (2) |
| Chlorpyrifos | NT | 0.018 (2) |
| Chlorpyrifos | NT | 0.005 (2) |
| Chlorpyrifos | NT | 0.005 (2) |
| Chlorpyrifos, DCPA (1) | NT, NT | 0.005 (2), 0.005 (2) |
| Chlorpyrifos, DCPA (1) | NT, NT | 0.005 (2), 0.005 (2) |
| DCPA | NT | 0.012 (2) |
| DCPA | NT | 0.010 (2) |
| DCPA | NT | 0.012 (2) |
| DCPA | NT | 0.012 (2) |

| Commodity | Tolerance, ppm | Concentration, ppm |
|---|---|---|
| **4. Celery (cont'd)** | | |
| DCPA | NT | 0.012 (2) |
| DCPA | NT | 0.002 (2) |
| DCPA | NT | 0.007 (2) |
| DCPA | NT | 0.012 (2) |
| DCPA | NT | 0.012 (2) |
| DCPA | NT | 0.012 (2) |
| DCPA * | NT | 0.013 (2) |
| DCPA * | NT | 0.054 |
| Iprodione | NT | 0.014 (2) |
| Iprodione | NT | 0.011 (2) |
| Iprodione | NT | 0.025 (2) |
| Iprodione | NT | 0.05 (2) |
| Iprodione | NT | 0.18 (2) |
| Iprodione | NT | 0.025 (2) |
| PCNB (Quintozene) | NT | 0.005 (2) |
| **5. Grapes** | | |
| Acephate | NT | 0.005 (2) |
| Diphenylamine * | NT | 0.018 (2) |
| Methamidophos * | NT | 0.004 (2) |
| **6. Green Beans** | | |
| Benomyl * | 2.0 | 3.4 |
| Benomyl * | 2.0 | 2.3 |
| Benomyl * | 2.0 | 2.2 |
| Carbofuran | NT | 0.034 |
| Chlorpyrifos | 0.05 | 0.38 |
| Chlorpyrifos | 0.05 | 0.36 |
| Methamidophos | NT | 0.006 (2) |
| Methamidophos | NT | 0.025 |
| Methamidophos | NT | 0.006 (2) |
| Methamidophos | NT | 0.006 (2) |
| Methamidophos | NT | 0.006 (2) |
| Methamidophos | NT | 0.006 (2) |
| Methamidophos * | NT | 0.006 (2) |
| Methamidophos, Permethrins (1) | NT, NT | 0.004 (2), 0.016 (2) |
| Oxamyl | NT | 0.13 (2) |
| Oxamyl | NT | 0.22 |
| Oxamyl | NT | 0.057 |
| Oxamyl | NT | 0.062 |
| Permethrins | NT | 0.2 |

| Commodity | Tolerance, ppm | Concentration, ppm |
|---|---|---|
| **6. Green Beans (cont'd)** | | |
| Permethrins | NT | 0.14 |
| Permethrins | NT | 0.16 |
| Permethrins | NT | 0.2 |
| Permethrins | NT | 0.063 |
| Permethrins | NT | 0.2 |
| Thiabendazole * | NT | 0.05 (2) |
| Thiabendazole * | NT | 0.05 (2), 0.15 (4) |
| Thiabendazole * | NT | 0.21 (3), 0.05 (4) (2) |
| Thiabendazole * | NT | 0.18 (3), 0.12 (4) |
| Thiabendazole * | NT | 0.13 (2) |
| Thiabendazole * | NT | 0.20 (3), 0.13 (4) |
| Thiabendazole * | NT | 0.10 (3), 0.05 (4) (2) |
| Thiabendazole * | NT | 0.12 (3), 0.05 (4) (2) |
| Thiabendazole * | NT | 0.13 (3), 0.12 (4) |
| Thiabendazole * | NT | 0.05 (2) |
| Thiabendazole * | NT | 0.27 (3), 0.11 (4) (2) |
| Thiabendazole * | NT | 0.20 (3), 0.10 (4) |
| Vinclozolin | NT | 0.008 (2) |
| Vinclozolin | NT | 0.029 |
| Vinclozolin | NT | 0.027 |
| **7. Lettuce** | | |
| Chlorothalonil | NT | 0.012 (2) |
| Chlorothalonil | NT | 0.025 (2) |
| Chlorothalonil * | NT | 0.012 (2) |
| Mevinphos | 0.5 | 0.53 |
| Thiabendazole | NT | 0.015 (2) |
| **8. Peaches** | | |
| Chlorpyrifos | 0.01 | 0.019 |
| Chlorpyrifos | 0.01 | 0.014 |
| Chlorpyrifos | 0.01 | 0.079 |
| Chlorpyrifos | 0.01 | 0.012 |
| Chlorpyrifos | 0.01 | 0.18 |
| Dimethoate | NT | 0.005 (2) |
| Dimethoate, Omethoate (1) * | NT, NT | 0.68, 0.089 |
| Oxamyl | NT | 0.014 (2) |
| Thiabendazole | NT | 0.045 (2) |
| Thiabendazole * | NT | 0.044 (2) |
| Thiabendazole * | NT | 0.065 (2) |

# APPENDIX G. TOLERANCE VIOLATIONS REPORTED

| Commodity | Tolerance, ppm | Concentration, ppm |
|---|---|---|
| **9. Potatoes** | | |
| Methiocarb | NT | 0.12 |
| Methiocarb | NT | 0.08 |
| Methiocarb | NT | 0.13 |
| o-Phenylphenol | NT | 0.12 |

**KEY**

NT No tolerance established

* Imported commodity

(1) The sample reported contained two violative pesticide residues

(2) The reported concentration is above the limit of detection (LOD), but less than the limit of quantitation (LOQ)

(3) The samples are subsamples pulled at the same site from the same lot on the same day
The results are from a laboratory which used a multiresidue screen

(4) The samples are the subsamples pulled at the same site from the same lot on the same day;
The results are from a laboratory that uses a procedure specific for benzimidazole-type pesticides