United States Department of Agriculture
Agricultural Marketing Service
Science & Technology

Pesticide Data Program

Annual Summary Calendar Year 1994

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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 (AMS) 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, 1992, and 1993. This is the summary for calendar year 1994.

PDP's data on pesticides in selected commodities strengthen the Government's ability to respond to food safety and marketing 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 pesticides under a statutory standard that requires balancing the benefits of a pesticide use against its potential risks to human health and the environment. In making risk estimates, EPA uses a stepwise approach to minimize resource expenditures. As an initial worst case assessment, EPA assumes that all acres of all crops are treated with all pesticides for which they have a registered use. EPA also assumes that residues in treated crops are present at the maximum allowable level. A theoretical risk based on these worst case assumptions may significantly exceed the actual risk of pesticide residues in the food supply and jeopardize the registration of pesticides important to American agriculture. Further refinements to the risk assessment are done if needed. These stepwise refinements include the use of percent of crop treated; statistical analyses of field data; considerations of the effects of washing, cooking, processing, storage, etc.; and use of monitoring data, if available and reliable. This is where PDP data are pivotal. PDP's sampling procedures were designed to capture actual residues in the food supply as close as possible to the time of consumption, thereby significantly upgrading the statistical reliability and extent of information needed for risk assessment.

PDP continues to focus on the National Academy of Sciences'conclusions as shown in the 1993 report *Pesticides in the Diets of Infants and Children.* In this report, the Academy recommends that food monitoring programs target foods highly consumed by children, and that methods used be standardized, validated, and subject to strict quality control and quality assurance programs. Consequently, during 1994, canned and frozen sweet corn and sweet peas were selected for inclusion in the program.

The States participating in PDP deserve special recognition for their contributions to the program. Sample collectors' vigilance and commitment allow AMS to adjust sampling protocols in response to changing trends in commodity distribution. Laboratory staff have formulated recommendations to increase productivity and improve methodologies. PDP also thanks Phillip Kott of USDA's National Agricultural Statistics Service (NASS), Edward Zager of EPA, John Jones of the Food and Drug Administration (FDA), and the staff at the Federal laboratories providing their services to the program.

The 1993 PDP summary elicited comments from our readers, mostly on the need to explore other avenues of communicating our findings to the general public. Suggestions included making the summary "less technical" and more appealing to general audiences, and expanding our participation in public outreach programs.

In preparing the 1994 annual summary, we continued our efforts to improve our communication strategies, and welcome your input. Please send your comments and suggestions to the Residue Branch, Centreville Road, Suite 200, Manassas, VA 20110.

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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 its risk assessment process, and for the reregistration and special review of pesticides. PDP has issued summaries of data for calendar years 1991, 1992, and 1993. This summary contains PDP findings for calendar year 1994.

During 1994, pesticides monitored by PDP included insecticides, herbicides, fungicides, and growth regulators in fresh and processed 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.

PDP planning and policy are coordinated through an Executive Steering Committee consisting of representatives of USDA, EPA, and the Food and Drug Administration (FDA). USDA representatives to the committee include: Agricultural Marketing Service (AMS), National Agricultural Statistics Service (NASS), Economic Research Service (ERS), and Agricultural Research Service (ARS). PDP's financial and administrative issues are handled by the Science and Technology Division of AMS. The Residue Branch oversees database operations and day-to-day sampling and technical procedures.

PDP operations are managed through cooperative agreements with nine States, which are responsible for sample collection and analysis. Seven of the participating States (California, Florida, Michigan, New York, Ohio, Texas, and Washington) collected and analyzed samples during 1994. Two of the States (Colorado and North Carolina) collected samples but shipped them to one or more of the other participating laboratories for analysis. Together, these nine States represent approximately 50 percent of the Nation's population.

PDP was designed to provide information on the levels of pesticide residues found on agricultural commodities in order to improve the quality of data that EPA uses to determine the residue levels in foods and estimate exposure to consumers. Without actual residue data, initial risk assessments are based on the theoretical maximum amounts of pesticide use and may overstate dietary exposure. A theoretical risk based on these worst case assumptions may significantly exceed the actual risk of pesticide residues in the food supply and jeopardize the registration of pesticides important to American agriculture. Where needed, EPA conducts further refinements to the risk assessment by using additional information that includes monitoring data, if available and reliable. This is where PDP data are pivotal. PDP data, which are collected as close to the point of consumption as possible, follow statistically reliable sampling protocols, thereby upgrading their usefulness for risk assessment.

PDP samples are collected without regard for commodity origin or variety, and generally reflect what is available to the consumer throughout the year. PDP's sampling protocol takes into account the different volumes of produce distributed annually by each sampling site, thus removing a potential source of bias for estimates of residues.

Samples collected during 1994 consisted of 13 commodities: apples, bananas, broccoli, carrots, celery, grapes, green beans, lettuce, oranges, peaches, potatoes, sweet corn, and sweet peas. Sweet corn and sweet peas, collected as processed products (either canned or frozen), were added to the program in April. All other PDP samples were fresh. Samples collected originated from 39 States and 17 foreign countries. Of the 7,589 samples collected, 1,260 (16.6 percent) were imported, with bananas, grapes, peaches, and green beans accounting for most imports. Overall, the pesticide residues detected in sampled commodities continue to be at low levels, substantially below currently established tolerances.

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.

Pesticide Data Program (PDP) Annual Summary CalendarYear 1994

This summary presents PDP data for calendar year 1994, and consists of the following four sections: Introduction, Sampling Protocol, Laboratory Operations, and Sample Results and Discussion.

I. Introduction

To implement the Pesticide Data Program (PDP), the United States Department of Agriculture (USDA) utilized the expertise available in four of its agencies: 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 determine the impact various production practices and policies might have on the Nation's agricultural production, 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.

AMS selected its Science and Technology Division to oversee PDP's policy planning and program direction. The Division's Residue Branch coordinates and manages day-to-day program activities with the participating State and Federal facilities.

Figure 1, Overview of PDP Management and Operations, describes the program's three major components - sample collection, laboratory analysis, and database management. PDP sampling and/or 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. Accordingly, a significant part of PDP's financial resources (75 percent) goes directly to the States for operating expenses. An additional 10 percent of PDP funding is given to USDA laboratory facilities to support State testing activities. These laboratories perform analyses requiring selective residue methods which the States agreed were best conducted by Federal laboratories.

Figure 2 shows the States participating in the program, which together represent about 50 percent of the Nation's population. Also shown are nine other States (Alaska, Connecticut, Hawaii, Massachusetts, Nevada, New Jersey, New Mexico, Vermont, and Wyoming) where 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 portion of their population as well.

AMS works closely with EPA to select the commodities and pesticides to be placed in PDP. Commodities chosen for inclusion are those most often consumed by the American public, with emphasis on those consumed by infants and children. Thirteen commodities (apples, bananas, broccoli, carrots, celery, grapes, green beans, lettuce, oranges, peaches, potatoes, sweet corn, and sweet peas) were sampled and analyzed in 1994. Three of these commodities were in the program for only part of the year. Celery, introduced in February 1992, was removed from the program in March 1994. Canned/frozen sweet corn and sweet peas were introduced in April 1994 and will continue to be tested

Figure 1. Overview of PDP Management and Operations

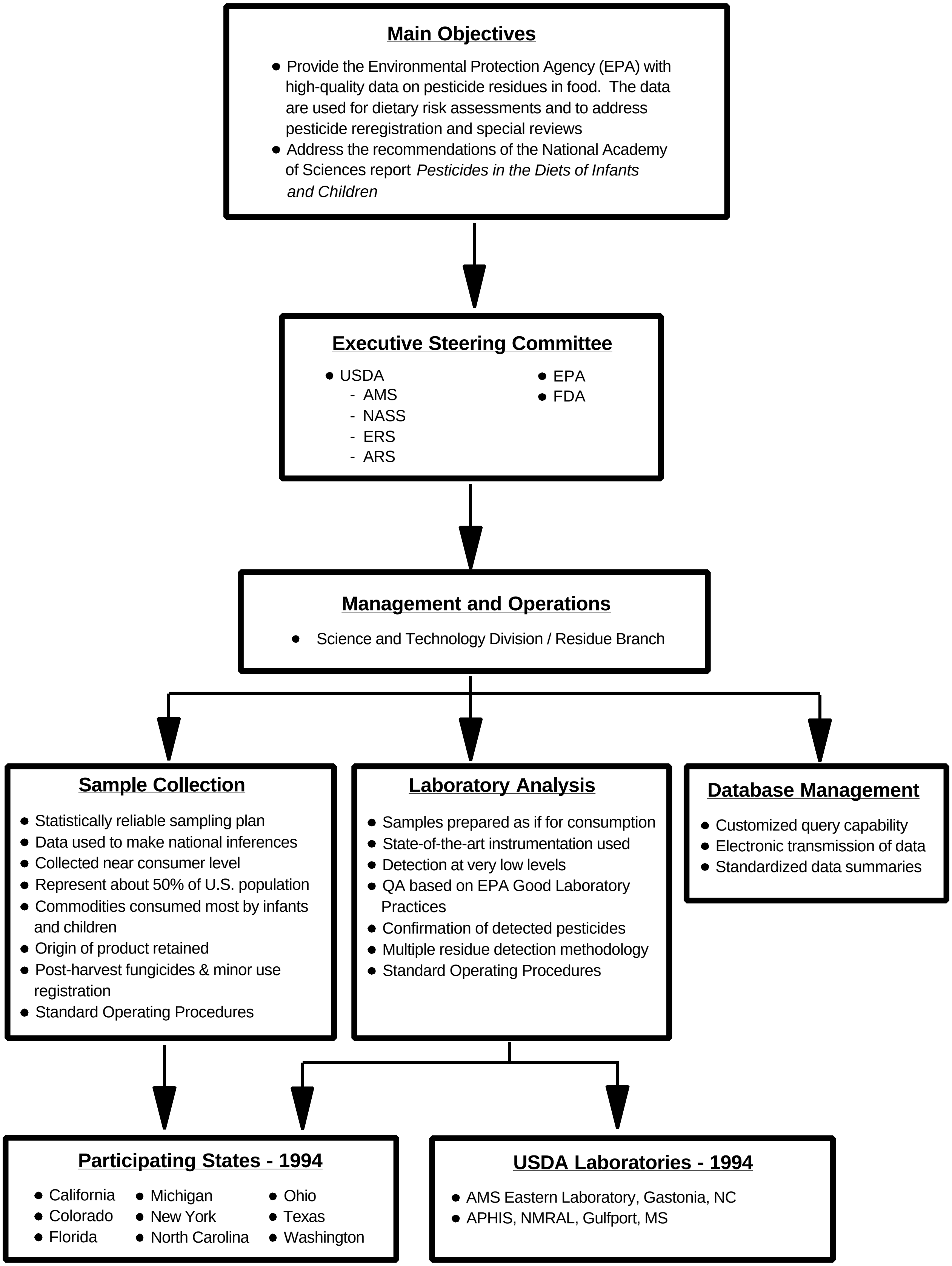
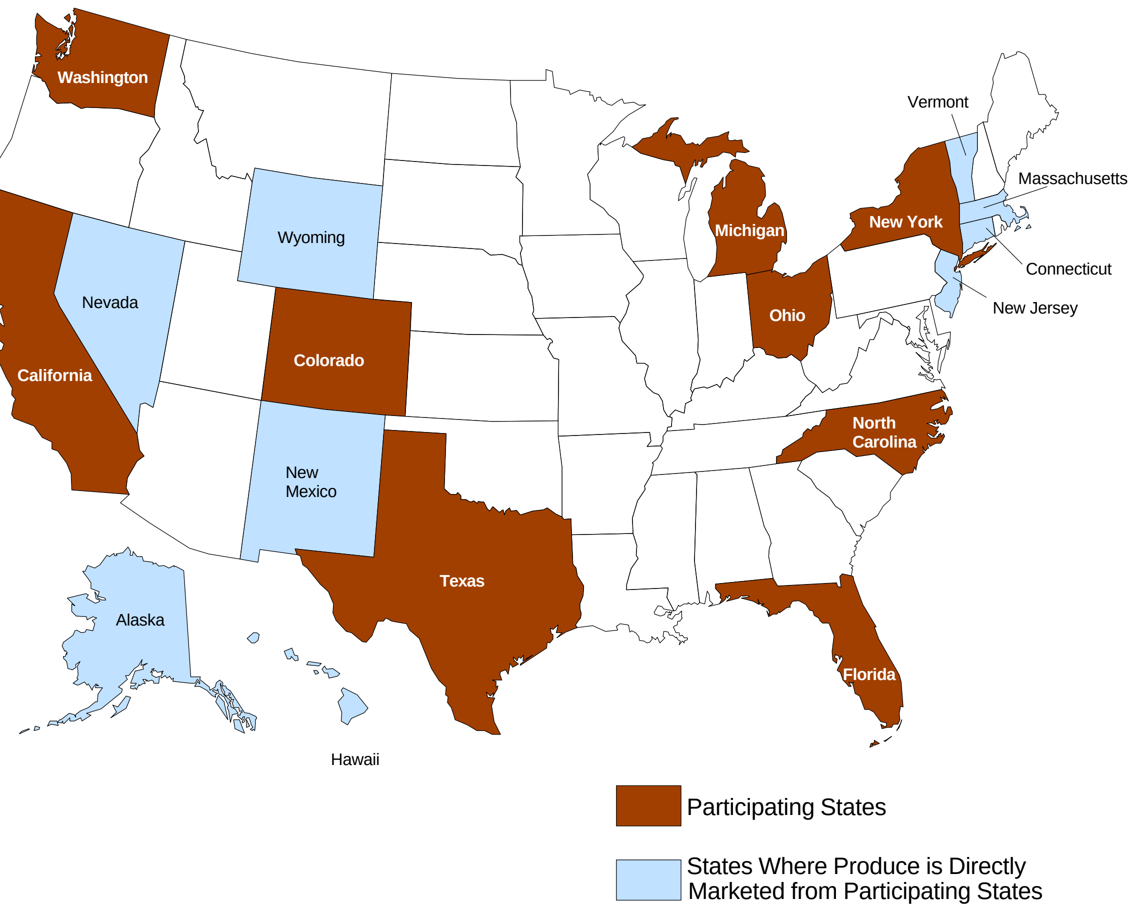


Figure 2. Participating States and Their Geographical Distribution Areas



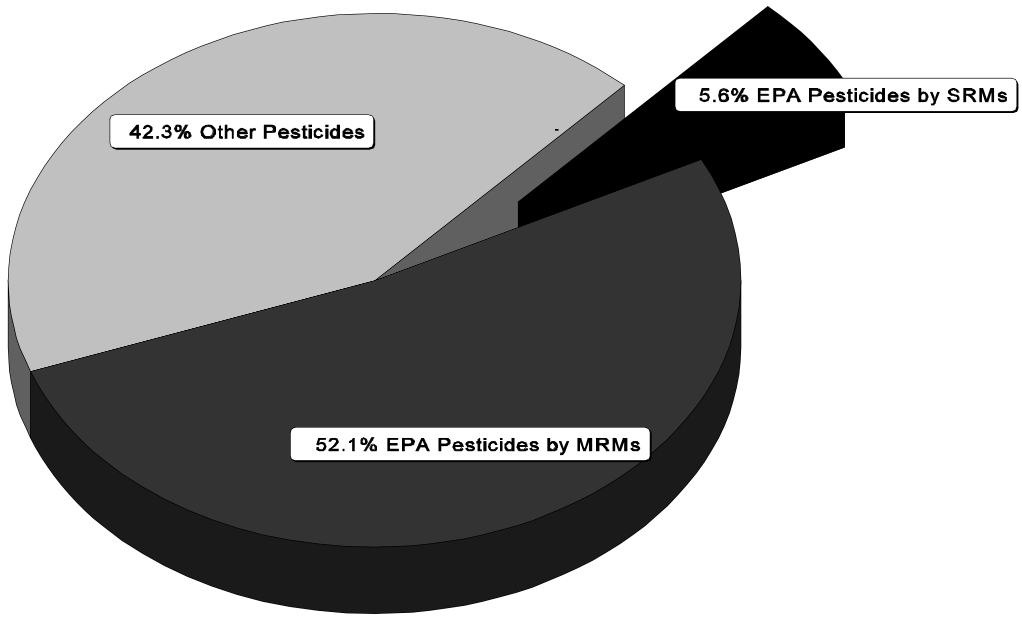
through part of 1996. The pesticides EPA suggests for monitoring consist mainly of those whose toxicities and estimated dietary exposures indicate the need for more refined exposure estimates. The list is revised periodically to address EPA's data needs.

Figure 3 provides a list of all the pesticides included in PDP during 1994.

Although EPA continues to be the main recipient of PDP data, over the past year PDP has received requests for data from other agencies seeking to promote American agricultural products in international markets. PDP data have also been solicited by chemical companies surveying use and residues of their products. Currently, PDP collects data for over 400 pesticide and commodity combinations whose uses are legal under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Data are also collected for other pesticide and commodity combinations with pending use registrations, or where uses have been granted under other provisions of FIFRA. In many of these cases, these uses are granted to alleviate the lack of effective pesticides registered for minor use crops (fruits and vegetables). Consequently, PDP data might also be used for re-registration of pesticides for minor use crops.

PDP has also provided information to the Codex Alimentarius Commission, which operates under the auspices of the United Nations. The information

Figure 3. Pesticides in PDP



Screened by Multiresidue Methods (MRMs)

EPA Requested Pesticides - 37

Acephate
Aldicarb + sulfone & sulfoxide
Atrazine
Azinphos methyl
Carbaryl + 1-Napthol
Carbofuran + 3-OH Carbofuran
Chlorothalonil
Chlorpyrifos
Diazinon
Dichlorvos (DDVP)
Dicloran
Dicofol
Disulfoton + sulfone & sulfoxide
Endosulfan I, II & sulfate
Esfenvalerate/Fenvalerate
Ethion
Fenamiphos + sulfone & sulfoxide
Iprodione
Lindane
Malathion
Methamidophos
Methidathion
Methomyl
Methoxychlor
Mevinphos
Oxamyl
Parathion methyl
Permethrin cis & trans
Phorate + sulfone & sulfoxide
Phosphamidon
Propargite
Quintozene (PCNB)
  Hexachlorobenzene (HCB)
  Pentachloroaniline (PCA)
  Pentachlorobenzene (PCB)
Terbufos + sulfone & O-analog
Thiodicarb (methomyl metabolite)

Other Pesticides - 30

Allethrin
Anilazine
Azinphos ethyl
Benfluralin
Captan
Chlorpropham
Cypermethrin
Dacthal (DCPA)
DDT + DDD + DDE
Demeton + sulfone
Demeton-S
Dieldrin
Dimethoate
Diphenylamine
Diuron
Ethoprop
Imazalil
Linuron
MCPA
Methiocarb + sulfoxide
Myclobutanil
o-Phenylphenol
Omethoate
Ovex
Parathion
Phosalone
Phosmet
Thiabendazole
Trifluralin
Vinclozolin

Screened by Selective Residue Methods (SRMs)

EPA Targeted Pesticides - 4

2,4-D, Benomyl, Formetanate, and Abamectin provided was on extraneous residues in foods (environmental contaminants), pesticide residue stability data, and PDP's Proficiency Check Sample Program.

Modifications to PDP's information management system, which allows for customized query capability, were introduced in 1994 to accommodate program expansion and a rapidly growing database. Program expansion also made it necessary to accelerate implementation of electronic transmission of data to reduce, and eventually eliminate, the use of hard (paper) copies. Laboratory sites transmit data to the central database using standardized reporting formats.

To obtain data as close to the point of consumption as possible, samples are collected at distribution points just before release to supermarkets and grocery stores. Sampling at these locations allows for residue measurements that include fungicides and growth regulators, and takes into account degradation of pesticides while in storage. Participation of PDP sampling sites is voluntary, which sets it apart from State and Federal enforcement programs. Over 650 potential sites grant access and provide information to sample collectors. Their cooperation makes it possible to adjust sampling protocols in response to fluctuations in food distribution.

PDP differs markedly from regulatory monitoring programs (tolerance enforcement) which require quick turnaround time for analysis of enforcement samples. Under tolerance enforcement, the sampled commodity may be detained at the distribution facility while awaiting sample results. PDP places emphasis on searching for residues at the lowest detectable levels, rather than on quick sample turnaround; therefore, analysis of PDP samples may take 1 to 2 months, and does not affect commodity distribution.

II. Sampling Protocol

PDP's statistically reliable sampling protocol allows for making nearly unbiased estimates of pesticide residues for commodities collected in the participating States and makes it possible to quantify the accuracy of the estimates for the Nation as a whole. The protocol also reflects the relative proportion of imported versus domestic produce available to the consumer. This has been corroborated by comparing the composition of PDP samples with import data compiled by the Economic Analysis Branch, AMS Fruit and Vegetable Division.

Adjustments to the protocol for 1994 included: (1) developing and implementing a method of trans-shipping samples between State laboratories; (2) revising the Standard Operating Procedures (SOPs) to provide additional information for State sampling managers and collectors; and (3) modifying the sampling protocol to include two processed commodities--canned and frozen sweet corn and sweet peas.

■ Statistical Sampling Procedures

Participating States are responsible for compiling and maintaining lists of sites used for sample collection. Since PDP strives to collect samples as close to the consumer as possible, while maintaining sample origin, most of the sites for fresh fruits and vegetables are either terminal markets or large chain store distribution centers. Both of these locations serve as the last stopover before produce reaches retailers and, ultimately, consumers. This provides a better picture of actual dietary exposure to pesticide residues by taking into account pesticide degradation that occurs during transit and storage. Sampling at these locations also provides information on post-harvest application of fungicides and growth regulators.

Processed samples are collected at distribution centers or large warehouses. To provide PDP with data on both canned and frozen sweet corn and peas, collection of the two types of processed commodity were alternated monthly.

After establishing their site lists, States are required to provide AMS and NASS with annual volume information for each site (quantity of commodity distributed in 1 year). This information is used to "weight" the site to determine the probability for selection. For example, a site that distributes 100,000 pounds of produce annually might be given a weight of "10," and a site that distributes 10,000 pounds might be weighted "1." The probability-proportionate-to-size method of site selection would then result in the larger site (distributing 100,000 pounds) being 10 times more likely to be selected for sampling than the smaller site (distributing 10,000 pounds). Participating States are required to work with NASS to develop their statistical procedures for site weighting and selection. States are also given the option of having NASS perform their quarterly site selection for them. The number of sampling sites and the volume of produce distributed by the sites varies greatly from State to State.

State population figures are used to assign the number of fruit and vegetable samples scheduled for collection per commodity each month. For 1994, these numbers were: 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 per commodity. Sample size was approximately 5 pounds for each applicable testing facility.

■ Quarterly Sampling Plans

Sampling plans, which were prepared by the States on a quarterly basis, included sampling dates, sites, and commodities for collection during each month of the quarter. Although sites could only be sampled once per month for the same commodity, States were allowed to collect two different commodities at the same site on the same date. This "pairing" of commodities reduced the number of sampling dates and, therefore, the cost of sample collection. States were also instructed to collect all samples of the same commodity on one sampling date, or, if needed, within two consecutive dates. Collection of commodities was randomly assigned to various weeks of the month, prior to selecting specific sampling dates within the week. Since sampling sites were selected for the entire quarter, States were allowed to assign the sites to particular months based on geographic location.

■ Trans-shipping of Samples

In October 1994, Colorado, Michigan, and Washington began a trans-shipping pilot program, whereby all samples of one commodity, collected by these three States, were combined for analytical testing by one State laboratory. Up until this time, each State laboratory tested all of the PDP commodities collected by their State, unless they were unable to do so. For the pilot program, testing of commodities was divided between the Michigan and Washington laboratories, (Colorado does not test samples for PDP), with approximately half the commodities going to the Michigan laboratory for analysis and the other half going to the Washington laboratory. For example, all apple samples (2 from Colorado, 6 from Michigan, and 4 from Washington), which combined make a set of 12, were sent to the Washington laboratory for analysis. Likewise, all 12 banana samples collected by these three States were sent to the Michigan laboratory for analysis, and so on. The main objectives of this pilot were to increase output of samples at the testing facilities and reduce the cost of analysis per sample. The pilot program was successful at accomplishing both objectives, and has since been adopted voluntarily by other participating States.

■ Chain-of-Custody

Chain-of-custody for PDP samples is documented through the use of "Sample Information Forms." These forms are used by the sample collectors to record all pertinent sample information, such as: (1) the State where the sample was collected; (2) the date of collection; (3) the 3-digit code for the sampling site; and (4) the commodity code. These four pieces of information are combined to form a unique "sample identification number" for recording in the PDP database. Other information included on the form is: (1) whether the sample is domestic or imported and, if imported, the country of origin; (2) the name of the sampling site, grower, packer, or distributor; and (3) a list of potential or known post-harvest applications. The Sample Information Forms are also used to keep track of any missing samples that are not collected, lost in transit, or damaged and unable to be analyzed when received at the laboratory.

Sampling managers in the participating States have been given SOPs for PDP sampling, which cover sample administration; collection, packing, and shipping procedures; and documentation. These SOPs, which are updated as needed, are provided to sample collectors, and used as a guide for determining compliance during sampling reviews.

Synopsis on Sample Collection

A total of 7,589 samples of fresh and processed fruits and vegetables were collected during 1994. As shown in Table 1, the number of samples collected per State was: California - 1,646, Colorado - 264, Florida - 846, Michigan - 793, New York - 1,171 , North Carolina - 531, Ohio - 794, Texas - 1,054, and Washington - 490. These figures are less than the total number of assigned samples for 1994 due to the unavailability of product at either the original or alternate sampling site, which is often due to the commodity growing season.

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

Appendix A provides a more detailed breakdown of sample origin by State or Country. As indicated, samples collected during 1994 originated from 39 States and 17 foreign countries.

III. Laboratory Operations

Ten laboratories (eight State and two Federal) performed analyses for PDP during 1994. These laboratories are equipped with advanced technical instrumentation capable of detecting residues at very low levels. The laboratory staff receives intensive training and must demonstrate analytical proficiency on an ongoing basis. Scientists continuously test new technologies and develop new techniques to improve the levels of detection. Major changes in methodology are evaluated, and their soundness demonstrated and documented in accordance with PDP Standard Operating Procedures.

Table 1. Samples Collected Per Commodity by Each Participating State

	Commodity													
State	AP	BN	BR	CE	CR	CS	GB	GR	LT	OG	PC	PO	PS	Total
California	155	142	163	40	164	69	147	152	159	156	93	156	50	1646
Colorado	24	23	24	6	23	18	19	24	24	24	13	24	18	264
Florida	83	67	75	21	83	57	58	77	80	77	41	78	49	846
Michigan	72	63	69	18	71	53	63	71	72	72	48	68	53	793
New York	107	102	103	26	105	79	89	103	99	106	65	107	80	1171
North Carolina	48	48	47	12	48	36	48	48	48	48	24	48	28	531
Ohio	72	72	68	18	71	52	62	70	71	72	44	71	51	794
Texas	93	95	95	23	93	66	82	94	94	95	61	95	68	1054
Washington	48	44	42	12	45	34	31	45	44	43	19	47	36	490
Total	702	656	686	176	703	464	599	684	691	693	408	694	433	7589

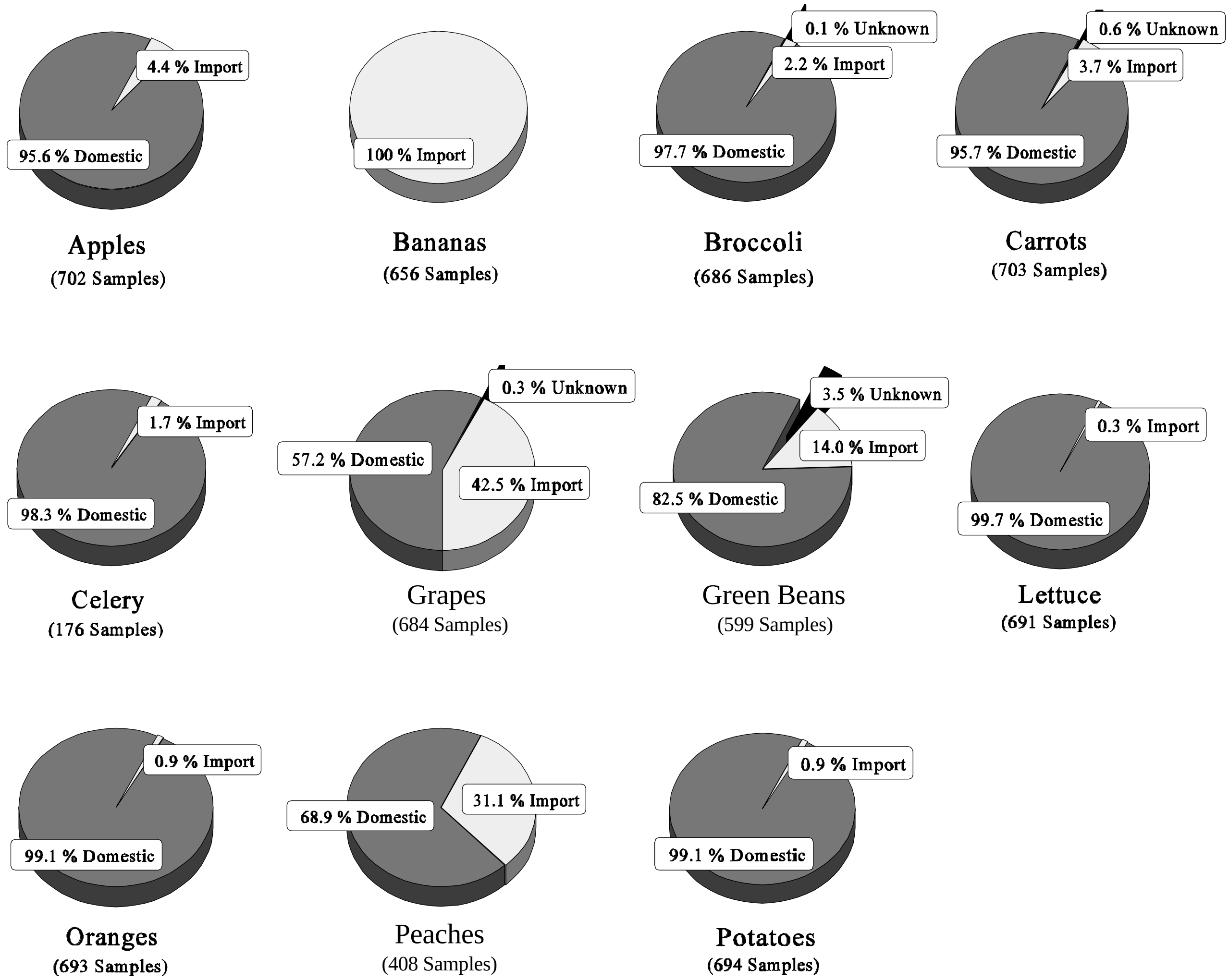
Commodities

AP - Apples
BN - Bananas
BR - Broccoli
CE - Celery (Jan. - Mar.)
CR - Carrots
CS - Sweet Corn (Apr. - Dec.)
GB - Green Beans
GR - Grapes
LT - Lettuce
OG - Oranges
PC - Peaches
PO - Potatoes
PS - Sweet Peas (Apr. - Dec.)

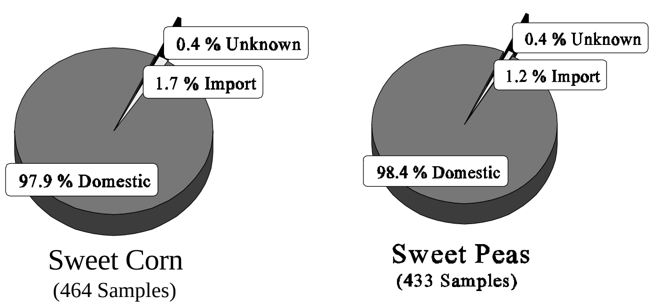
Figure 4. Commodity Origin by Grower, Packer, or Distributor

(Percentage of Domestic vs. Imported)

A. Fresh Commodities



B. Processed Commodities*



* For processed commodities, percentages were mainly derived from packer and/or distributor information

PDP participating laboratories monitored 71 compounds (plus metabolites where applicable), 41 of which were specifically requested by EPA. Of these, 37 are detectable by multiresidue methods (MRMs) and 4 can be detected only by single or selective residue methods (SRMs). Since SRMs are resource intensive, this type of analysis was performed only at selected laboratories for specific commodities as indicated below:

Laboratories Performing SRMs

1. APHIS, NMRAL, Gulfport, MS

Pesticide:	Benomyl
Commodities:	Apples, Bananas, Broccoli, Carrots, Grapes, Green Beans, Oranges, Peaches, and Sweet Corn

2. AMS Eastern Laboratory, Gastonia, NC

Pesticide:	Abamectin
Commodities:	Oranges
Pesticide:	Formetanate
Commodities:	Apples, Oranges, and Peaches

3. APHIS, NMRAL, Gulfport, MS and Selected State Laboratories

Pesticide:	2,4-D
Commodities:	Apples, Grapes, Oranges, Peaches, Peas, Potatoes, and Sweet Corn

In addition to the EPA-requested pesticides, laboratories tested for approximately 30 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. Direction for PDP's Quality Assurance Program is provided by the Residue Branch, through SOPs based on EPA's Good Laboratory Practices (GLPs). However, for day-to-day quality assurance oversight, PDP relies on the Quality Assurance Unit (QAU) at each participating facility. As required under EPA's GLPs, the QAU operates independently from laboratory staff and reports directly to the State administrative manager and the Residue Branch. Preliminary QA/QC review procedures are performed on-site by each laboratory's QAU. Final review procedures are performed by Residue Branch staff, who are responsible for collating and reviewing data for conformance with SOPs. Additionally, Branch staff monitor the participants' performance through proficiency samples, QAU quarterly internal reviews, and on-site visits. Additional information on PDP's quality assurance program is provided in Appendix B.

■ Sample Preparation

Laboratories are permitted to refrigerate fresh incoming samples of the same commodity for up to 72 hours, to allow for different sample arrival times from the collection sites. Frozen and canned commodities can be held in storage (freezer or shelf) until the entire sample set is ready to be homogenized.

Upon arrival at the testing facility, samples are visually examined for acceptability and discarded if determined to be inedible (decayed, extensively bruised). Accepted samples are then prepared emulating the practices of the average consumer, to more closely represent actual exposure to residues. Fresh samples are prepared as follows: (1) apples and peaches are washed and cored; (2) bananas and oranges are peeled; (3) broccoli, celery, and lettuce are washed and the inedible portions removed; (4) green beans and grapes are washed and stems removed; and (5) carrots and potatoes are washed. For processed commodities, the entire contents of the sample is homogenized--including any liquid present.

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, Ohio, 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. Residues are extracted from samples using organic solvents followed by various cleanup procedures. Selective residue methods, used for 2,4-D, benomyl, formetanate, and abamectin, 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, depending on the concentration reported. Limits of detection for various selective detectors are lower than those achieved by mass spectrometry detectors. 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

During 1994, pesticide residue detections overall continued to be at low levels, substantially below tolerances, as illustrated in Appendices C, D, E, and F. A tolerance is the maximum allowable quantity of a pesticide residue for a particular commodity.

Appendix C shows the distribution of detected residues per pesticide per commodity. Also shown are the minimum and maximum concentrations detected, tolerances, and samples for which there is no tolerance established or for which the concentration detected exceeds the tolerance. Non-detected residues are discussed in a separate section.

The graphs in Appendix D show the percentages of occurrences at 9 separate concentration ranges (including a range for non-detected) for pesticide/commodity pairs with residue detections in at least 25 percent of the samples.

■ National Estimates

One objective of PDP is to use the data collected by the nine participating States, which represent approximately 50 percent of the Nation's population (see Figure 2, Section I), to project national estimates of pesticide residues for the commodities included in the program. Some of these national estimates are shown in Appendices E and F. Although the availability of certain commodities may vary, depending on the season, PDP sampling procedures require that the same number of samples be collected each month. As a result, the relative sample composition for these seasonal commodities may not exactly match product availability throughout the year. Availability of peaches is the most pronounced example of this (limited availability in April and November, including both domestically grown and imported peaches). According to independent USDA data (*Fresh Fruit and Vegetable Arrival Totals for 22 Cities-FVAS-3 Calendar Year 1994,* published in 1995 by Fruit and Vegetable Division, AMS, Washington, DC) approximately 90 percent of all peaches available for consumption in 1994 arrived at wholesalers during the May-September time period. However, during this 5-month time period, PDP collected only 64 percent of the yearly total, or 26 percent less than what USDA's figures indicate was nationally available. This percentage is still substantially higher than the 42 percent scheduled for collection if peaches had been readily available throughout the year. Consequently, the fact that peaches are not always available actually provides an automatic adjustment to the monthly sample numbers, causing them to more closely represent national availability. To further adjust for the remaining difference in actual sample numbers versus availability, the sampling data have been weighted to reflect U.S. wholesale arrivals. For more information on the weighting process used to determine national estimates, and on the statistical attributes of those estimates, refer to Kott, P.S., 1996, *Estimating Pesticide Residues in Selected Fruits and Vegetables for the 1994 Pesticide Data Program;* National Agricultural Statistics Service; Washington, DC.

Appendix E focuses on the 58 commodity/pesticide pairs with detectable residues in at least 10 percent of the samples tested. A range of values for the estimated national mean (or average) level of residue concentration for each pair is provided. The lower value for the range was determined by treating a sample without detectable residues as if it had a residue concentration equal to zero. The upper value for the range was determined by treating such a sample as if it had a residue concentration equal to the limit of detection. In addition, Appendix E also provides national estimates for the 50th, 75th, and 90th percentiles for each of the pairs. The ratio of the 90th percentile to the tolerance, as a normalization factor, is also shown. This demonstrates that, in most cases, the levels of detected residues are a small fraction of the tolerances for the listed commodity/pesticide pairs.

Appendix F displays the estimated distributions of eight pesticide/commodity pairs in graphical form, as well as providing the range of values estimated for the mean. These graphs visually demonstrate that the overwhelming majority of pesticide testing results, and the respective average value (mean), are at low concentrations.

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

Commodity	Total Samples Analyzed	Samples with Pesticides Detected	% of Samples with Pesticides Detected	Different Residues Detected	Total Residue Detections
Fresh:					
Apples	702	669	95	29	2461
Bananas	656	362	55	2	407
Broccoli	686	179	26	12	198
Carrots	703	484	69	23	838
Celery	176	169	96	16	453
Grapes	684	514	75	29	1145
Green Beans	599	367	61	28	841
Lettuce	691	368	53	17	687
Oranges	693	597	86	18	1133
Peaches	408	378	93	30	1132
Potatoes	694	540	78	24	840
Processed:					
Sweet Corn	464	2	<1	2	2
Sweet Peas	433	42	10	8	54

Number of Samples Analyzed = 7,589
Number of Samples with Pesticides Detected = 4,671
Percent with Pesticide Detections = 61.5%
Total Number of Residue Detections = 10,191
Total Number of Different Residues Detected = 62

■ Post-Harvest Applications

Before PDP began collecting data, most available information on pesticide use in the United States was limited to pesticides applied to sustain agricultural production (pre-harvest applications). Little was known about pesticides applied to preserve the product after harvest (post-harvest applications). PDP's database has since become one of the most comprehensive sources of post-harvest pesticide use patterns because samples are collected at points where such uses have already taken place. Most post-harvest applications are confined to fungicides (to control mold and fungus) and growth regulators (to prevent sprouting). PDP compounds with mostly post-harvest applications are the fungicides diphenylamine, o-phenylphenol, thiabendazole, and the growth regulator chlorpropham. Other compounds with post-harvest uses on selected commodities are the fungicides dicloran (carrots and peaches) and imazalil (citrus). Consequently, residues from these pesticides can be assumed to result from post-harvest applications. To illustrate the impact of post-harvest uses, detections including and excluding residues of these compounds are listed in Tables 2A and 2B respectively. As shown in these tables, all 407 residues detected in bananas resulted from post-harvest applications. Significant differences in the number of residue detections are also shown for apples, oranges, potatoes, and, to a lesser extent, peaches and celery. As these tables indicate, the 5 fungicides listed above, along with chlorpropham, accounted for 3,074 detections (30 percent of the number of residue detections). The pesticide most frequently found (1,315 detections) was the fungicide thiabendazole, representing about 13 percent of all detections.

Table 2B. Number of Samples and Residues Detected, by Commodity
(Excludes Post-Harvest Applications -- Chlorpropham, Dicloran on carrots and peaches, Diphenylamine, Imazalil on citrus, o-Phenylphenol, and Thiabendazole)

Commodity	Total Samples Analyzed	Samples with Pesticides Detected	% of Samples with Pesticides Detected	Different Residues Detected	Total Residue Detections
Fresh:					
Apples	702	619	88	25	1571
Bananas	656	0	0	0	0
Broccoli	686	179	26	12	198
Carrots	703	482	69	19	824
Celery	176	159	90	15	362
Grapes	684	510	75	26	1114
Green Beans	599	360	60	26	832
Lettuce	691	366	53	16	681
Oranges	693	236	34	15	288
Peaches	408	375	92	27	955
Potatoes	694	178	26	20	238
Processed:					
Sweet Corn	464	1	<1	1	1
Sweet Peas	433	41	9	7	53

Number of Samples Analyzed = 7,589
Number of Samples with Pesticides Detected = 3,506
Percent with Pesticide Detections = 46.2%
Total Number of Residue Detections = 7,117
Total Number of Different Residues Detected = 56

■ Environmental Contaminants

DDT, DDD, and DDE

A total of 7,589 samples were screened for DDT and its metabolites--DDD and DDE. 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 5.5 percent of all samples tested. Residues were found primarily in root crops and none were above the allowable levels established by FDA.

■ Single/Selective Residue Screens

2,4-D

A total of 4,086 samples were tested for 2,4-D. Commodities tested were apples, grapes, oranges, peaches, peas, potatoes and sweet corn. Approximately 2 percent of the samples tested were found to contain residues, all well below tolerance levels. No 2,4-D residues were detected in sweet corn.

ABAMECTIN

A total of 687 samples of oranges were tested for abamectin. No residues were detected in any of the samples tested.

BENOMYL

A total of 5,526 samples of apples, bananas, broccoli, carrots, grapes, green beans, oranges, peaches, and sweet corn were tested for benomyl. Approximately 5.3 percent were found to contain residues of benomyl, all at levels below the established tolerances. No benomyl residues were detected in any of the banana, broccoli, or carrot samples.

FORMETANATE

A total of 1,770 samples of apples, oranges, and peaches were tested for formetanate. Approximately 6 percent of the samples were found to contain residues of this compound, all at levels below the established tolerance.

■ Non-Detected Residues

Approximately 38 percent of the samples analyzed had no detectable levels of pesticide residues. If post-harvest applications of pesticides are excluded, the percentage becomes approximately 54. Non-detected residues could also happen because a pesticide was not applied, because it dissipates rapidly, or for various other reasons. Appendix G shows the number of non-detected residues by pesticide/commodity pair. The appendix shows pairs with established tolerances and pairs with no tolerances tested at EPA's request (abamectin in oranges and atrazine in all PDP commodities). There were other pesticide/commodity pairs with non-detected residues which were not included in Appendix G because they did not meet the criteria given above (i.e., established tolerances or EPA requested) or because they were analyzed by fewer than five PDP laboratories.

Four pesticides--abamectin, atrazine, fenamiphos, and terbufos were not detected in any of the samples tested. Abamectin undergoes rapid photolysis and degradation by soil microorganisms. Atrazine, depending on soil conditions, is very likely to degrade to its metabolites, which are not extractable by any multiresidue screening methods (testing for atrazine metabolites would require using a single analyte screening method). Fenamiphos dissipates fairly quickly and likely was not present at detectable levels at the time samples were collected. Terbufos is not widely used in any of the two commodities for which it is registered.

■ Multiple-Residue Detections

The PDP database provides information that EPA can use in evaluating the incidence of multiple residues. These multiple residues may derive from various sources, such as applications of more than one pesticide on a crop during a growing season, possible spray drift, or persistent environmental residues. The multiple-residue information is particularly useful in responding to the 1993 National Research Council report *Pesticides in the Diets of Infants and Children*, which recommended that coordinated recording of multiple-residue scans would make possible more accurate evaluation of exposure distributions for multiple chemicals.

The distribution of multiple residues in PDP's database is included as Appendix H. Any exposure assessment of individual or multiple residues depends on the actual levels of the residues detected. PDP 1994 data indicate that the total pesticide level in a sample is independent of the number of residues detected. In other words, very low residue levels may be present in situations where more than one residue is detected. Furthermore, there is no relationship between the number of residues and presumptive tolerance violations.

■ Presumptive 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 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. With the exception of meat, poultry, and egg products, for which USDA is responsible, tolerances for all other foods are enforced by FDA. When agencies with regulatory enforcement authority collect samples for tolerance enforcement purposes, they must adhere to a quick turnaround time and chain of custody protocols which allow them to detain the sampled lot until results are available. PDP is not an enforcement program. Consequently, emphasis is placed on searching for residues at the lowest detectable levels--not on quick turnaround time--and sample collection does not interfere with commodity distribution. Therefore, when samples are reported to have residues for which no tolerance is established or which exceed the tolerance, they are designated as "presumptive tolerance violations" and reported as such to FDA regional and headquarters 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 needed. FDA enforcement action on PDP samples generally is not a viable option due to the time lag from sample collection to data reporting. Presumptive tolerance violations for 1994 data are indicated in Appendix C.

■ Synopsis

In 1994, a total of 7,589 samples were analyzed using MRMs. As stated before, analysis using SRMs was performed in certain commodities only. Accordingly, 687 samples were tested for abamectin; 5,526 were tested for benomyl; 4,086 were tested for 2,4-D; and 1,770 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 existing environmental contamination, not the result of recent prohibited crop application.

Approximately 83 percent of samples tested were domestic, and 16.6 percent were imported (0.4 percent were of unknown origin). Of all samples tested, 1.3 percent were reported as presumptive tolerance violations, 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.

For more information on the Pesticide Data Program, contact William J. Franks, Jr., Director, AMS Science and Technology Division, at (202) 720-5231; or Robert L. Epstein, Deputy Director, at (202) 720-2158, or by facsimile at (202) 720-6496. For more copies of the PDP summaries, contact Martha Lamont, Chief of the Residue Branch, at (703) 330-2300, or by facsimile at (703) 330-6110. Messages may be sent electronically to: 1)William_J_Franks @usda.gov; 2) Robert_L_Epstein@usda.gov; and 3) Martha_N_Lamont@usda.gov.

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Appendix A

Sample Origin by Grower, Packer, or Distributor

Appendix A gives the number of samples per State or country of origin and the number of samples of unknown origin. Where available, origin of fresh commodities is determined by grower or packer information. For processed commodities, origin is determined primarily by packer or distributor.

As shown in Appendix A, samples collected during 1994 originated from 39 States and 17 foreign countries.

APPENDIX A. SAMPLE ORIGIN BY GROWER, PACKER, OR DISTRIBUTOR (Number of Samples per State/Country)

Part 1.	AP	BN	BR	CE	CR	CS	GB	GR	LT	OG	PC	PO	PS	No. of Domestic	% of Total
States = 39						Domestic Samples									
Alabama											1	3		4	<0.1
Arizona			17		11			9	18	11	1	3		70	0.9
Arkansas			1											1	<0.1
California	58		610	121	399	129	116	367	610	516	185	116	115	3342	44.0
Colorado	1		4		31	1	9		2	3	4	52		107	1.4
Connecticut						1								1	<0.1
Deleware						1						1	1	3	<0.1
Florida	2			35	44	11	162	2	23	124	5	28	13	449	5.9
Georgia						2	49		1		22	1	5	80	1.0
Idaho	16				1	15					1	118	15	166	2.2
Illinois	2					37	3	1			1	5	33	82	1.0
Indiana	1													1	<0.1
Kentucky												1		1	<0.1
Maine	3		6			5						16	4	34	0.5
Maryland	3		3				1	1					1	9	0.1
Massachusetts	7											3		10	0.1
Michigan	64		1	1	112	15	11	2	5	3	2	39	14	269	3.5
Minnesota	1					53						20	45	119	1.6
Missouri	3												1	4	<0.1
Montana												1		1	<0.1
Nevada												4		4	<0.1
New Jersey					9	3	7		1		19	2	1	42	0.6
New Mexico									6					6	<0.1
New York	56		7	2	15	45	21	4	8	9	3	51	36	257	3.4
North Carolina	9		2			3	37		1	1	1	6	5	65	0.9
North Dakota												5		5	<0.1
Ohio	9		1			4	27	1		1		18	5	66	0.9
Oklahoma	2					11						2	10	25	0.3
Oregon	7				3	22			1			48	24	105	1.4
Pennsylvania	11					10	3				1	2	7	34	0.5
South Carolina	3					4				1	20		3	31	0.4
Tennessee						13	18						8	39	0.5
Texas	7		8	13	26	27	17	1	4	17	2	25	29	176	2.3
Utah	1				2							2		5	<0.1
Vermont	4													4	<0.1
Virginia	13					3	2						3	21	0.3
Washington	386		10	1	20	3	11	3	9	1	13	93	4	554	7.3
West Virginia	2													2	<0.1
Wisconsin						36						23	44	103	1.4
No. of Domestic	671	0	670	173	673	454	494	391	689	687	281	688	426	6297	--
% of Total (nearest %)	96	0	98	98	96	98	82	57	99	99	69	99	98		83.0

APPENDIX A. (cont'd) SAMPLE ORIGIN BY GROWER, PACKER, OR DISTRIBUTOR (Number of Samples per State/Country)

Part 2.	AP	BN	BR	CE	CR	CS	GB	GR	LT	OG	PC	PO	PS	No. of Import	% of Total
Countries = 17						Imported Samples									
Australia										6				6	<0.1
Brazil	2													2	<0.1
Canada	4		1		23	6	1		1		1	6	5	48	0.6
Chile	4							258			126			388	5.1
Colombia		109												109	1.4
Costa Rica		144												144	1.9
Ecuador		141												141	1.9
Guatemala		89												89	1.2
Honduras		70												70	0.9
Israel						1								1	<0.1
Mexico		38	14	3	3		83	32	1					174	2.3
New Zealand	13													13	0.2
Nicaragua		3												3	<0.1
Panama		46												46	0.6
South Africa	8							1						9	0.1
Thailand						1								1	<0.1
Venezuela		2												2	<0.1
Unknown Country		14												14	0.2
No. of Import	31	656	15	3	26	8	84	291	2	6	127	6	5	1260	--
% of Total (nearest %)	4	100	2	2	4	2	14	42	<1	1	31	1	1		16.6

Part 3.	AP	BN	BR	CE	CR	CS	GB	GR	LT	OG	PC	PO	PS	No. of Unknown	% of Total
						Unknown Origin									
No. of Unknown Origin			1		4	2	21	2					2	32	--
% of Total (nearest %)	0	0	<1	0	<1	<1	4	<1	0	0	0	0	<1		0.4
GRAND TOTALS =	**702**	**656**	**686**	**176**	**703**	**464**	**599**	**684**	**691**	**693**	**408**	**694**	**433**	**7589**	

Commodities

AP	- Apples	GR	- Grapes
BN	- Bananas	LT	- Lettuce
BR	- Broccoli	OG	- Oranges
CE	- Celery	PC	- Peaches
CR	- Carrots	PO	- Potatoes
CS	- Sweet Corn	PS	- Sweet Peas
GB	- Green Beans		

Appendix B

Quality Assurance Program Elements

PDP's Quality Assurance (QA) program covers all aspects of data gathering, from sample collection to data reporting. QA protocols for sampling are designed to protect sample integrity from the time of collection to the time of delivery to the testing facilities. QA protocols for testing comprise all laboratory operations from the time of sample receipt to the time data are reported to PDP's central database. As described in this appendix, the QA program has five elements: 1) Standard Operating Procedures; 2) On-site reviews; 3) Proficiency Check Samples; 4) Quality Control Procedures; and 5) Method Performance and Confirmation Procedures.

APPENDIX B. QUALITY ASSURANCE PROGRAM ELEMENTS

1. 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 Quality Assurance Unit for completeness and adherence to PDP requirements.

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

3. Proficiency Check Samples - All facilities are required to participate in PDP's Check Sample Program. Check samples are issued to laboratories performing analysis with multiresidue methods and/or single/ selective residue methods. 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. During 1994, PDP laboratories received 3 proficiency sample sets consisting of 9 samples for multiresidue screening, and 5 sets consisting of 15 samples for single/selective residue screening.

4. Quality Control Procedures - PDP operating procedures for quality control (QC) are intended to assess method and analyst performance during sample preparation, clean-up, extraction, and, where applicable, derivatization. To maximize sample output and decrease the QC/sample ratio, samples are analyzed in analytical sets, which include 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): Prior to extraction, a portion(s) of matrix blank is spiked with marker pesticides to determine the accuracy of the analyst and instrument performance. Marker pesticides are compounds selected from different pesticide classes (organochlorines, organophosphates, carbamates), which have physical and chemical characteristics similar to those in the class they represent. The use of marker pesticides to monitor recoveries is a modification of PDP's previous requirements that called for spiking with all pesticides. Because of the large number of pesticides in the program, spiking with all compounds required several spike mixtures (to avert coelution problems), which, in turn, resulted in lengthy run times.

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.

5. Method Performance and Confirmation Procedures - 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 determinations. If a detected residue does not have a tolerance, or it exceeds the established tolerance, the sample is reanalyzed in duplicate from the frozen homogenate, along with the appropriate blanks and a spike of the residue at the suspected level.

Appendix C

Distribution of Residues Detected by Pesticide

Appendix C shows residue detections for all pesticide/commodity pairs tested, including minimum and maximum concentrations reported and whether a tolerance is established for each pair.

Of the 7,589 samples analyzed, 88 samples (1.2 percent) contained 88 residues where no tolerance was established and 4 residues exceeded the tolerance. Presumptive violations were reported in 21 samples (1.7 percent) of imported commodities and in 67 samples (1.1 percent) of domestic commodities. Established tolerances for PDP's commodity/pesticide pairs cover several orders of magnitude--from as low as 0.05 ppm for chlorpyrifos/peaches, to as high as 100 ppm for captan/lettuce. The highest level detected was 60 ppm for iprodione/grapes. Four of the samples contained two residues each for which no tolerance was established by EPA. Most of the detections (60 percent) were at levels between the Limit of Detection (LOD) and Limit of Quantitation (LOQ) and were reported as "below quantifiable levels."

In some cases, a tolerance may or may not apply, depending on whether certain conditions are met. For example, residues of o-phenylphenol which were detected in 14 potato samples could have resulted from paper packaging materials. If such had been the case, they would have been covered under food additive tolerances. Since there was no evidence that the potato samples found to contain o-phenylphenol had come in contact with this type of packaging material, PDP reported them to FDA as presumptive tolerance violations. Similarly, residues of methamidophos in green beans are covered by a tolerance only if residues of acephate are also present. Of the 127 green beans samples found to contain residues of methamidophos, 121 were found in combination with acephate. Only six samples had methamidophos residues where acephate was not present and were reported as presumptive violations. There were also two samples where the 3 ppm acephate plus methamidophos tolerance expression was exceeded.

APPENDIX C. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

Pesticide	Number of Samples Screened	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	683	2	0.3	0.010	0.032	5
Grapes	658	1	0.2	0.015	0.015	0.5
Oranges	682	33	4.8	0.005	0.020	5
Peaches	396	1	0.3	0.005	0.005	0.2
Potatoes	677	29	4.3	0.005	0.13	0.2
Sweet Peas	431	3	0.7	0.005	0.028	1.0
Total		**69**				
2. Acephate						
Celery	176	73	41.5	0.005	1.3	10
Grapes (V-1)	669	1	0.1	0.006	0.006	NT
Green Beans (X-2)	591	132	22.3	0.005	3.3	3
Lettuce	691	88	12.7	0.005	0.25	10
Potatoes (V-1)	694	1	0.1	0.005	0.005	NT
Total		**295**				
3. Aldicarb (parent)						
Aldicarb Sulfone (metabolite)						
Green Beans (V-1) S1	479	1	0.2	0.013	0.013	NT
Total		1				
Aldicarb sulfoxide (metabolite)						
Green Beans (V-1) S1	590	1	0.2	0.076	0.076	NT
Oranges	683	1	0.1	0.025	0.025	0.3
Total		**2**				
4. Azinphos methyl						
Apples	687	291	42.4	0.015	0.29	2.0
Grapes	669	17	2.5	0.020	0.47	5.0
Green Beans	590	4	0.7	0.020	0.040	2.0
Peaches	396	79	19.9	0.020	0.72	2.0
Total		**391**				

APPENDIX C. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

Pesticide	Number of Samples Screened	No. of Samples with Detections	% of Samples with Detections	Minimum Value Detected, ppm	Maximum Value Detected, ppm	Tolerance Level, ppm
5. Benomyl (analyzed as carbendazim)						
Apples	701	72	10.3	0.050	0.35	7.0
Grapes	675	33	4.9	0.050	0.79	10.0
Green Beans	582	76	13.1	0.050	1.6	2.0
Oranges	686	5	0.7	0.050	0.084	10.0
Peaches	399	108	27.1	0.050	2.0	15.0
Sweet Corn	455	1	0.2	0.084	0.084	0.2
Total		**295**				
6. Captan						
Apples	677	109	16.1	0.010	1.4	25
Carrots	552	9	1.6	0.020	0.020	2
Grapes	662	208	31.4	0.010	2.5	50
Green Beans	472	2	0.4	0.020	0.12	25
Peaches	392	53	13.5	0.010	0.95	50
Potatoes	608	1	0.2	0.020	0.020	25
Total		**382**				
7. Carbaryl						
Apples	686	144	21.0	0.007	1.2	10
Broccoli	679	1	0.1	0.007	0.007	10
Grapes	669	12	1.8	0.020	0.54	10
Green Beans	591	26	4.4	0.007	1.4	10
Oranges	683	52	7.6	0.007	0.16	10
Peaches	396	62	15.7	0.020	2.3	10
Sweet Peas	433	4	0.9	0.060	0.43	10
Total		**301**				
8. Carbofuran (parent)						
Green Beans (V-3)	528	3	0.6	0.010	0.030	NT
Oranges	558	1	0.2	0.030	0.030	2.5
Potatoes	603	2	0.3	0.030	0.067	1
Total		**6**				
3-Hydroxycarbofuran (metabolite)						
Grapes (X-1)	577	1	0.2	0.34	0.34	0.2
Potatoes	585	1	0.2	0.035	0.035	1
Total		**2**				

APPENDIX C. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

Pesticide	Number of Samples Screened	No. of Samples with Detections	% of Samples with Detections	Minimum Value Detected, ppm	Maximum Value Detected, ppm	Tolerance Level, ppm
9. Chlorothalonil						
Broccoli	631	2	0.3	0.013	0.094	5
Celery	176	119	67.6	0.002	0.59	15
Green Beans	589	99	16.8	0.005	1.1	5
Lettuce (V-1)	637	1	0.2	0.005	0.005	NT
Peaches	355	1	0.3	0.010	0.010	0.5
Total		**222**				
10. Chlorpropham						
Apples (V-2)	687	2	0.3	0.007	0.007	NT
Carrots	687	4	0.6	0.029	0.033	0.1
Potatoes	693	419	60.5	0.010	16	50
Total		**425**				
11. Chlorpyrifos						
Apples	687	132	19.2	0.003	0.27	1.5
Broccoli	679	11	1.6	0.005	0.025	1
Carrots (V-2)	687	2	0.3	0.005	0.005	NT
Celery (V-4)	176	4	2.3	0.005	0.045	NT
Grapes	669	34	5.1	0.005	0.11	0.5
Lettuce (V-1)	691	1	0.1	0.010	0.010	NT
Oranges	683	32	4.7	0.005	0.023	1.0
Peaches	396	15	3.8	0.005	0.030	0.05 *
Potatoes (V-1)	694	1	0.1	0.024	0.024	NT
Total		**232**				
12. Cypermethrin						
Lettuce	98	1	1.0	0.10	0.10	10.0
Peaches (V-1)	66	1	1.5	0.62	0.62	NT
Total		**2**				
13. Dacthal (DCPA)						
Broccoli	679	150	22.1	0.003	0.13	5
Celery (V-4)	176	4	2.3	0.007	0.027	NT
Green Beans	591	27	4.4	0.009	0.13	2
Lettuce	691	36	5.2	0.007	0.24	2
Total		**217**				

APPENDIX C. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

Pesticide	Number of Samples Screened	No. of Samples with Detections	% of Samples with Detections	Minimum Value Detected, ppm	Maximum Value Detected, ppm	Tolerance Level, ppm
14. DDT (parent)						
Carrots	420	22	5.2	0.010	0.056	3 ##
Lettuce	423	1	0.2	0.013	0.013	0.5 ##
Potatoes	496	19	3.8	0.010	0.013	1 ##
Total		**42**				
DDD (metabolite)						
Carrots	404	9	2.2	0.002	0.015	3 ##
Total		**9**				
DDE (metabolite)						
Broccoli	679	3	0.4	0.011	0.033	0.5 ##
Carrots	672	256	38.1	0.003	0.16	3 ##
Celery	176	14	8.0	0.004	0.012	0.5 ##
Grapes	669	1	0.1	0.004	0.004	0.05 ##
Green Beans	591	4	0.7	0.010	0.013	0.2 ##
Lettuce	691	21	3.0	0.004	0.026	0.5 ##
Peaches	396	1	0.3	0.011	0.011	0.2 ##
Potatoes	694	66	9.5	0.004	0.027	1 ##
Total		**366**				
15. Diazinon						
Apples	687	9	1.3	0.005	0.12	0.5
Carrots	687	34	4.9	0.005	0.078	0.75
Celery	176	8	4.5	0.005	0.027	0.7
Grapes	669	12	1.8	0.005	0.15	0.75
Green Beans	591	2	0.3	0.005	0.012	0.5
Lettuce	691	27	3.9	0.005	0.16	0.7
Peaches	396	30	7.6	0.005	0.029	0.7
Sweet Peas	433	1	0.2	0.005	0.005	0.5
Total		**123**				
16. Dichlorvos (DDVP)						
Green Beans	591	**1**	0.2	0.012	0.012	0.5 @@
Total		**1**				

APPENDIX C. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

Pesticide	Number of Samples Screened	No. of Samples with Detections	% of Samples with Detections	Minimum Value Detected, ppm	Maximum Value Detected, ppm	Tolerance Level, ppm
17. Dicloran						
Carrots	687	7	1.0	0.010	0.37	10
Celery	176	91	51.7	0.005	1.3	15
Grapes	669	27	4.0	0.005	0.59	10
Green Beans	591	9	1.5	0.010	0.47	20
Lettuce	691	6	0.9	0.008	0.15	10
Peaches	396	149	37.6	0.005	11	20
Potatoes	694	4	0.6	0.005	0.15	0.25
Total		**293**				
18. Dicofol						
Apples	687	26	3.8	0.019	3.7	5
Grapes	669	22	3.3	0.008	1.8	5
Oranges	683	10	1.5	0.008	0.049	10
Peaches	396	1	0.3	0.38	0.38	10
Total		**59**				
19. Dieldrin						
Carrots	65	1	1.5	0.005	0.005	0.1
Potatoes	36	4	11.1	0.003	0.023	0.1
Total		**5**				
20. Dimethoate (see Omethoate)						
Apples	687	81	11.8	0.004	0.44	2
Broccoli	673	11	1.6	0.002	0.016	2
Grapes	669	77	11.4	0.004	0.36	1
Green Beans	591	47	8.0	0.004	0.96	2
Lettuce	691	83	12.0	0.003	1.4	2
Oranges	683	12	1.8	0.004	0.010	2
Peaches (V-1)	396	1	0.3	0.006	0.006	NT
Potatoes	694	1	0.1	0.005	0.005	0.2
Sweet Peas	433	31	7.2	0.004	0.054	2
Total		**344**				
21. Diphenylamine						
Apples	629	438	69.6	0.013	5.4	10
Grapes (V-1)	537	1	0.2	0.034	0.034	NT
Total		**439**				

Pesticide	Number of Samples Screened	No. of Samples with Detections	% of Samples with Detections	Minimum Value Detected, ppm	Maximum Value Detected, ppm	Tolerance Level, ppm
22. Disulfoton (parent)						
Carrots (V-1) S2	687	1	0.1	0.035	0.035	NT
Total		**1**				
Disulfoton sulfone (metabolite)						
Carrots (V-1) S2	86	1	1.2	0.037	0.037	NT
Total		**1**				
23. Endosulfans						
Apples	687	96	14.0	0.004	0.23	2.0
Broccoli	679	5	0.7	0.003	0.036	2.0
Carrots	673	16	2.4	0.005	0.024	0.2
Celery	176	1	0.6	0.005	0.005	2.0
Grapes	669	55	8.2	0.004	0.32	2.0
Green Beans	591	169	28.6	0.005	1.3	2.0
Lettuce	691	145	21.0	0.005	0.88	2.0
Oranges (V-10)	683	10	1.5	0.005	0.005	NT
Peaches	396	21	5.3	0.005	0.12	2.0
Potatoes	694	84	12.1	0.005	0.12	0.2
Total		**602**				
24. Esfenvalerate						
Green Beans	289	4	1.4	0.020	0.11	2.0
Total		**4**				
Fenvalerate						
Green Beans	436	3	0.7	0.038	0.038	2.0
Peaches	277	2	0.7	0.080	0.080	10.0
Total		**5**				
25. Ethion						
Apples	687	6	0.9	0.005	0.60	2.0
Oranges	683	24	3.5	0.002	0.047	2.0
Total		**30**				
26. Formetanate						
Apples	702	19	2.7	0.050	0.25	3
Oranges	669	70	10.5	0.085	1.3	4
Peaches	399	17	4.3	0.085	0.85	5
Total		**106**				

APPENDIX C. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

Pesticide	Number of Samples Screened	No. of Samples with Detections	% of Samples with Detections	Minimum Value Detected, ppm	Maximum Value Detected, ppm	Tolerance Level, ppm
27. Imazalil						
Bananas (X-1)	640	77	12.0	0.012	0.36	0.20
Oranges	683	360	52.7	0.012	0.74	10.0
Total		**437**				
28. Iprodione						
Apples (V-5)	687	5	0.7	0.014	0.55	NT
Carrots	673	167	24.8	0.010	0.37	5.0
Celery (V-1)	176	1	0.6	0.030	0.030	NT
Grapes	669	245	36.6	0.010	1.6	60.0
Green Beans	591	13	2.2	0.014	1.8	2.0
Peaches	396	*270*	68.2	0.014	17	20.0
Potatoes	694	1	0.1	0.088	0.088	0.5
Total		**702**				
29. Lindane						
Grapes	669	1	0.1	0.005	0.005	1
Peaches	396	2	0.5	0.010	0.71	1
Total		**3**				
30 Linuron						
Carrots	105	33	31.4	0.005	0.11	1
Potatoes	178	1	0.6	0.012	0.012	1
Total		**34**				
31. Malathion						
Lettuce	691	2	0.3	0.019	0.047	8
Total		**2**				
32. Methamidophos						
Broccoli	630	3	0.5	0.020	0.056	1.0
Celery	176	45	25.6	0.004	0.082	1
Grapes (V-1)	669	1	0.1	0.004	0.004	NT
Green Beans @ (V-6)	591	127	21.5	0.004	2.0	NT
Lettuce	691	41	5.9	0.004	0.042	1.0
Potatoes	694	5	0.7	0.006	0.026	0.1
Total		**222**				

APPENDIX C. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

Pesticide	Number of Samples Screened	No. of Samples with Detections	% of Samples with Detections	Minimum Value Detected, ppm	Maximum Value Detected, ppm	Tolerance Level, ppm
33. Methidathion						
Oranges	683	32	4.7	0.004	0.030	2.0
Total		**32**				
34. Methomyl						
Apples	687	26	3.8	0.013	0.12	1
Broccoli	679	5	0.7	0.015	0.070	3
Celery	176	7	4.0	0.013	0.099	3
Grapes	669	58	8.7	0.013	1.3	5
Green Beans	591	21	3.6	0.013	0.70	2
Lettuce	691	35	5.1	0.013	1.5	5
Peaches	395	1	0.3	0.033	0.033	5
Sweet Peas	433	2	0.5	0.025	0.025	5
Total		**155**				
35. Methoxychlor						
Apples	687	121	17.6	0.010	1.0	14
Peaches	396	2	0.5	0.23	1.4	14
Sweet Peas	433	1	0.2	0.055	0.055	14
Total		**124**				
36. Mevinphos						
Broccoli	675	1	0.1	0.033	0.033	1.0
Celery	176	4	2.3	0.003	0.021	1.0
Grapes	669	3	0.4	0.007	0.24	0.5
Lettuce	691	77	11.1	0.002	0.46	0.5
Peaches	396	1	0.3	0.010	0.010	1.0
Total		**86**				
37. Myclobutanil						
Apples	687	3	0.4	0.025	0.079	0.5
Grapes	669	134	20.0	0.013	0.26	1.0
Peaches	396	1	0.3	0.033	0.033	2.0
Total		**138**				

APPENDIX C. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

Pesticide	Number of Samples Screened	No. of Samples with Detections	% of Samples with Detections	Minimum Value Detected, ppm	Maximum Value Detected, ppm	Tolerance Level, ppm
38. Omethoate (see Dimethoate)						
Apples	577	62	10.7	0.005	0.12	2
Broccoli	556	3	0.5	0.005	0.020	2
Grapes	576	66	11.5	0.003	0.14	1
Green Beans	462	32	6.9	0.005	0.13	2
Lettuce	490	25	5.1	0.005	0.050	2
Oranges	587	5	0.9	0.008	0.016	2
Sweet Peas	365	11	3.0	0.005	0.023	2
Total		**204**				
39. Oxamyl						
Apples	687	23	3.3	0.014	0.32	2
Celery	176	29	16.5	0.014	0.28	3
Total		**52**				
40. Parathion						
Apples	663	2	0.3	0.005	0.005	1
Carrots	647	10	1.5	0.003	0.030	1
Grapes	645	4	0.6	0.005	0.025	1
Peaches	382	1	0.3	0.003	0.003	1
Total		**17**				
41. Parathion methyl						
Apples	687	45	6.6	0.004	0.083	1
Carrots	687	6	0.9	0.004	0.020	1
Celery	176	1	0.6	0.005	0.005	1
Grapes	669	14	2.1	0.005	0.50	1
Oranges	683	1	0.1	0.004	0.004	1
Peaches	396	117	29.5	0.004	0.29	1
Total		**184**				
42. Permethrins						
Apples	687	1	0.1	0.038	0.038	0.05
Broccoli	679	3	0.4	0.016	0.35	1.0
Celery	176	51	29.0	0.008	0.93	5.0
Green Beans (V-3)	591	3	0.5	0.072	0.18	NT
Lettuce	693	97	14.0	0.008	5.6	20.0
Peaches	396	14	3.5	0.016	0.37	5.0
Total		**169**				

APPENDIX C. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

Pesticide	Number of Samples Screened	No. of Samples with Detections	% of Samples with Detections	Minimum Value Detected, ppm	Maximum Value Detected, ppm	Tolerance Level, ppm
43. o-Phenylphenol						
Apples	356	64	18.0	0.014	0.61	25
Carrots	308	1	0.3	0.014	0.014	20
Oranges	352	64	18.2	0.010	0.12	10
Peaches	177	20	11.3	0.017	0.036	20
Potatoes (V-14)	358	14	3.9	0.017	0.46	NT **
Sweet Corn (V-1)	245	1	0.4	0.017	0.017	NT
Sweet Peas (V-1)	219	1	0.5	0.017	0.017	NT
Total		**165**				
44. Phorate (parent)						
Phorate sulfone (metabolite)						
Potatoes	265	6	2.3	0.005	0.17	0.5
Total		**6**				
Phorate sulfoxide (metabolite)						
Potatoes	202	4	2.0	0.015	0.16	0.5
Total		**4**				
45. Phosalone						
Apples	430	1	0.2	0.010	0.010	10.0
Total		**1**				
46. Phosmet						
Apples	687	53	7.7	0.010	0.53	10
Grapes	669	3	0.4	0.017	0.13	10
Peaches	396	60	15.2	0.010	0.86	10
Total		**116**				
47. Phosphamidon						
Apples	488	21	4.3	0.003	0.11	1
Total		**21**				
48. Propargite						
Apples	687	221	32.2	0.018	2.8	3
Grapes	669	35	5.2	0.033	0.89	10
Peaches	396	86	21.7	0.033	3.0	7
Total		**342**				

APPENDIX C. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

Pesticide	Number of Samples Screened	No. of Samples with Detections	% of Samples with Detections	Minimum Value Detected, ppm	Maximum Value Detected, ppm	Tolerance Level, ppm
49. Quintozene (PCNB, parent)						
Carrots (V-2)	687	2	0.3	0.007	0.007	NT
Green Beans	591	20	3.4	0.005	0.012	0.1
Potatoes	694	4	0.6	0.005	0.038	0.1
Total		**26**				
Hexachlorobenzene (HCB, impurity)						
Carrots (V-2)	687	2	0.3	0.005	0.005	NT
Total		**2**				
Pentachlorobenzene (PCB, metabolite)						
Potatoes	694	7	1.0	0.003	0.009	0.1
Total		**7**				
Pentachloroaniline (PCA, metabolite)						
Carrots (V-3)	51	3	5.9	0.005	0.015	NT
Total		**3**				
50. Thiabendazole						
Apples	686	386	56.3	0.013	6.1	10
Bananas	640	330	51.6	0.013	0.40	0.4 ***
Carrots	678	2	0.3	0.013	0.037	10
Grapes	669	3	0.4	0.013	0.30	10.0
Oranges	683	421	61.6	0.005	1.3	10
Peaches (V-9)	396	8	2.0	0.013	0.44	NT
Potatoes	694	165	23.8	0.008	3.3	10.0
Total		**1315**				
51. Trifluralin						
Carrots	535	250	46.7	0.005	0.31	1.0
Celery	67	1	1.5	0.013	0.013	0.05
Green Beans	432	1	0.2	0.013	0.013	0.05
Potatoes	475	1	0.2	0.014	0.014	0.05
Total		**253**				

APPENDIX C. DISTRIBUTION OF RESIDUES DETECTED BY PESTICIDE

Pesticide	Number of Samples Screened	No. of Samples with Detections	% of Samples with Detections	Minimum Value Detected, ppm	Maximum Value Detected, ppm	Tolerance Level, ppm
52. Vinclozolin						
Grapes	668	76	11.4	0.007	0.74	6.0
Green Beans # (V-5)	479	14	2.9	0.008	0.32	NT
Peaches	391	7	1.8	0.007	3.0	25.0
Total		**97**				

Total No. of Different Residues Detected: 62
Total No. of Samples Analyzed: 7589
Total No. of Residues Detected: 10191

KEY

S1 Metabolic products of Aldicarb.
S2 Metabolic products of Disulfoton.
(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.
@ All other residues were detected in combination with acephate, for which a tolerance exists.
@@ Dichlorvos is also a breakdown product of Naled. Except for lettuce, tolerances shown are listed under Naled.
 # All other residues detected were exempted under FIFRA Section 18 (crisis exemptions).
Numbers shown for DDT and metabolites (DDD & DDE) are Action Levels established by FDA.
** Temporary tolerance (01/28/94 - 01/28/96), previous tolerance (01/01/94-01/28/94 = 0.01 ppm).*
*** May be subject to Food Additive Tolerance due to packaging materials.*
**** Tolerance applies to banana pulp only.*

Appendix D

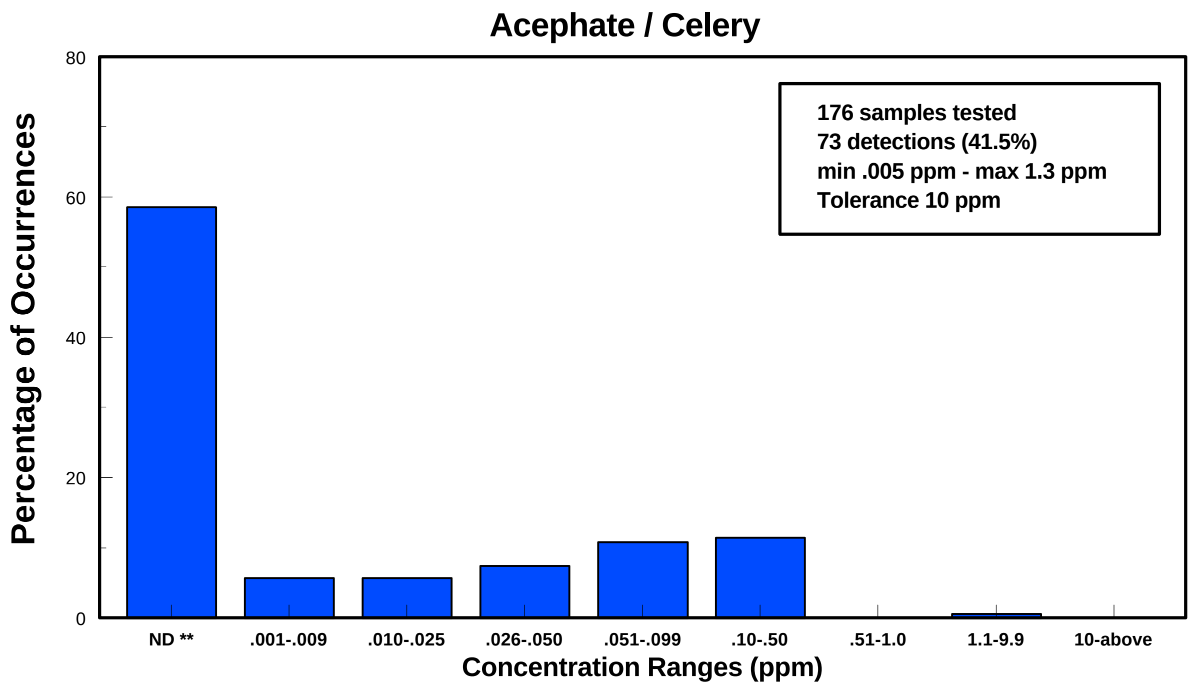
Frequency of Occurrences at Various Concentration Ranges for Selected Pesticide/Commodity Pairs

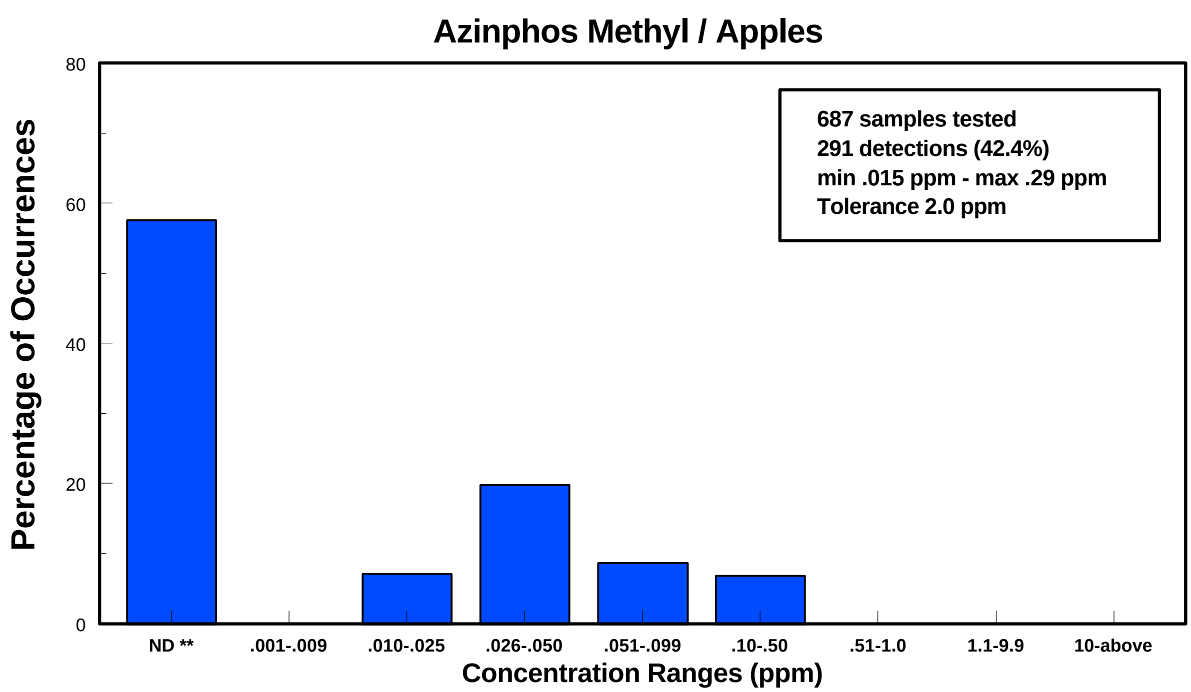
This appendix shows pesticide/commodity pairs with detections in at least 25 percent of the samples tested. Residue detections are grouped in 8 different concentration ranges, from a low of 0.001 ppm to a high of 10 ppm. Also shown is a range for non-detects, which are determinations below the limit of detection of the reporting laboratory and are not necessarily below 0.001 ppm.

The graphs depict 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, as seen in page 9 of this appendix, for parathion-methyl/peaches, 70.5 percent of samples had no detectable residues, 2.5 percent had residues between 0.001 and 0.009 ppm, 9 percent had residues between 0.010 and 0.025 ppm, 7.8 percent had residues between 0.026 and 0.050 ppm, 6.3 percent had residues between 0.051 and 0.099 ppm, 3.8 percent had residues between 0.10 and 0.50 ppm. No residues were detected at or above 0.51 ppm.

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

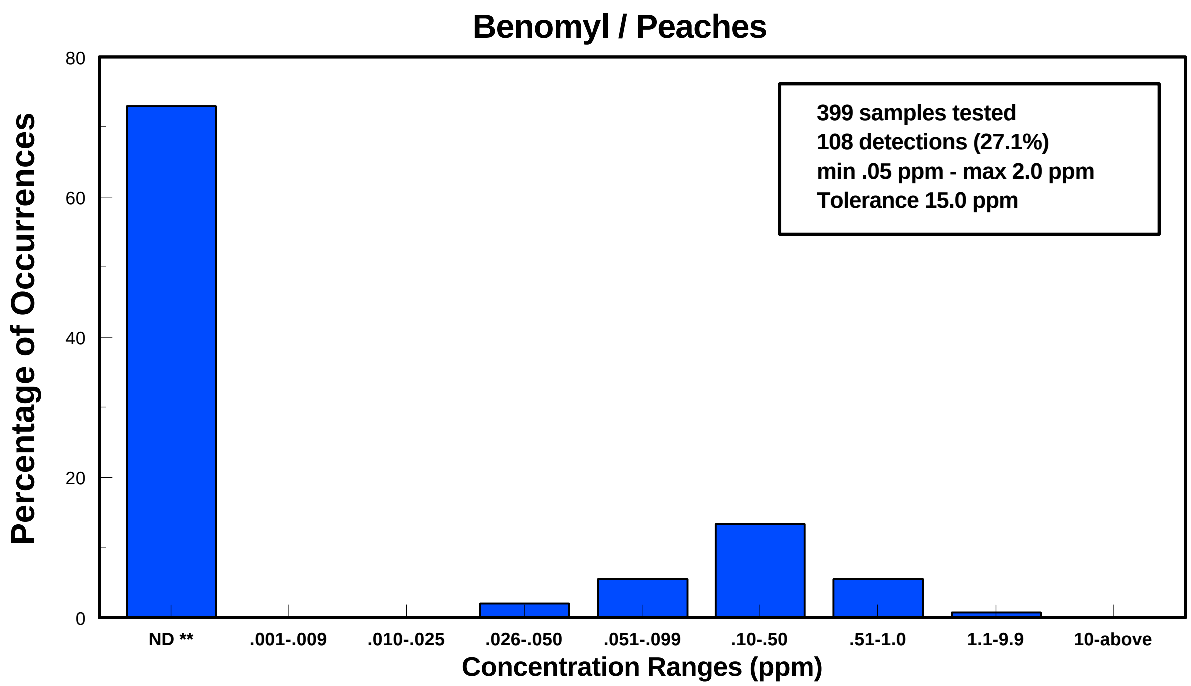
(Pairs with Residue Detections in at Least 25 Percent of Samples)

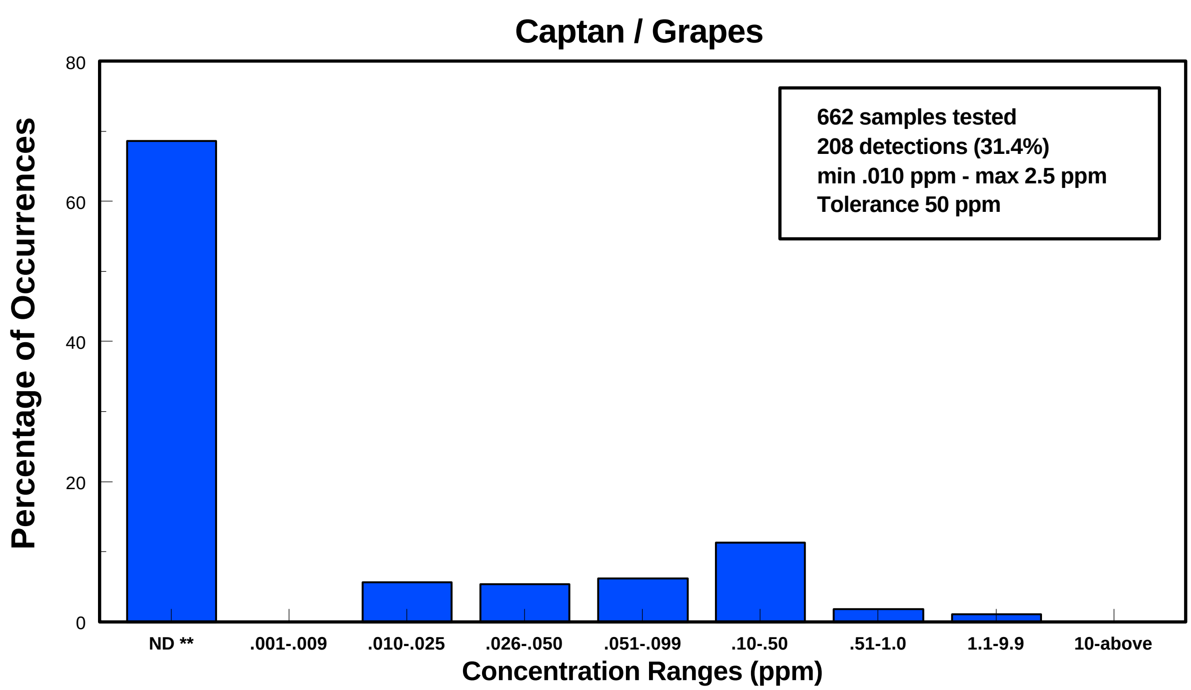




APPENDIX D. (cont'd) FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

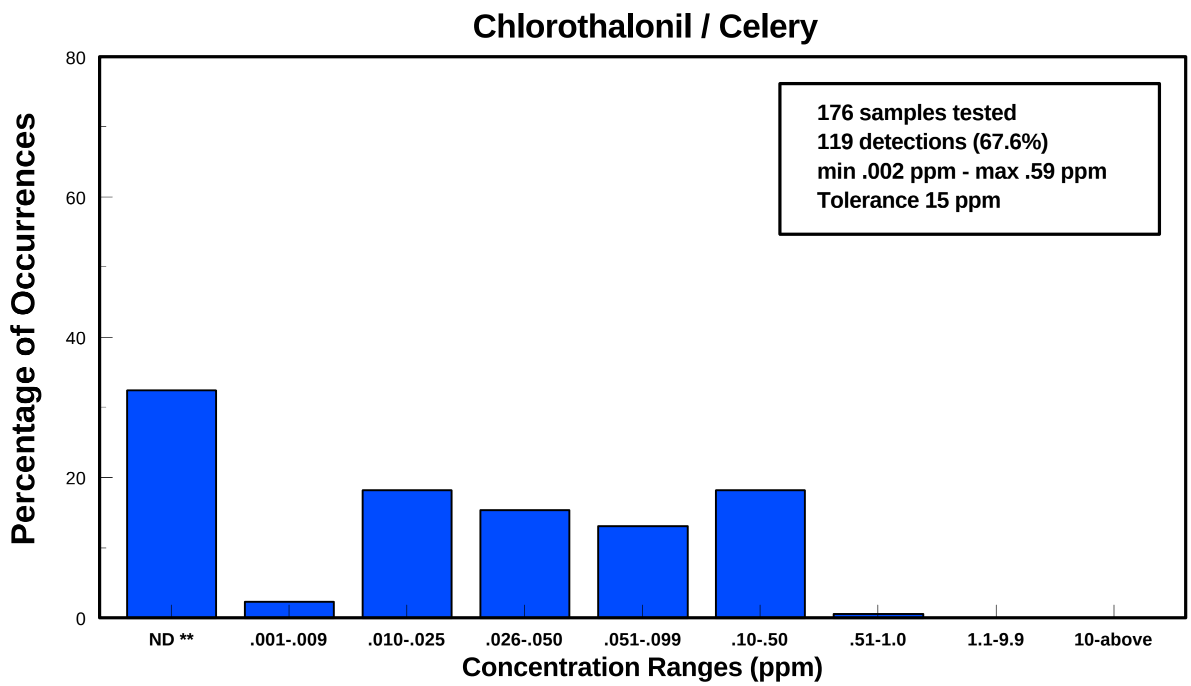
(Pairs with Residue Detections in at Least 25 Percent of Samples)

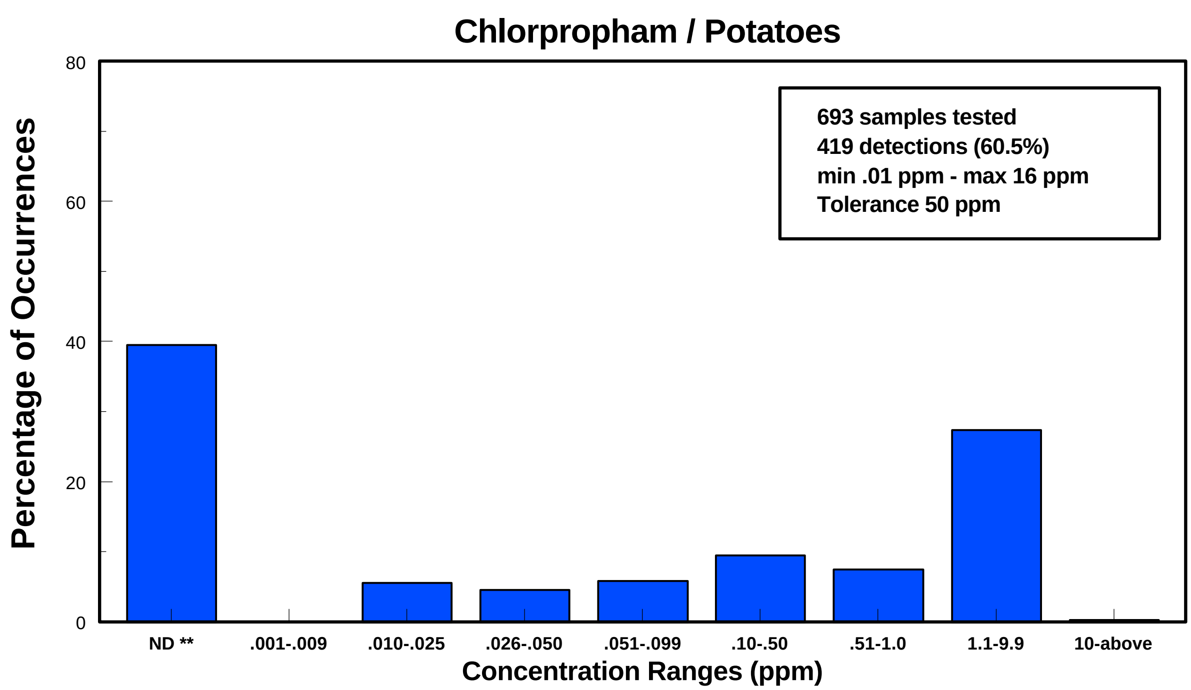




APPENDIX D. (cont'd) FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

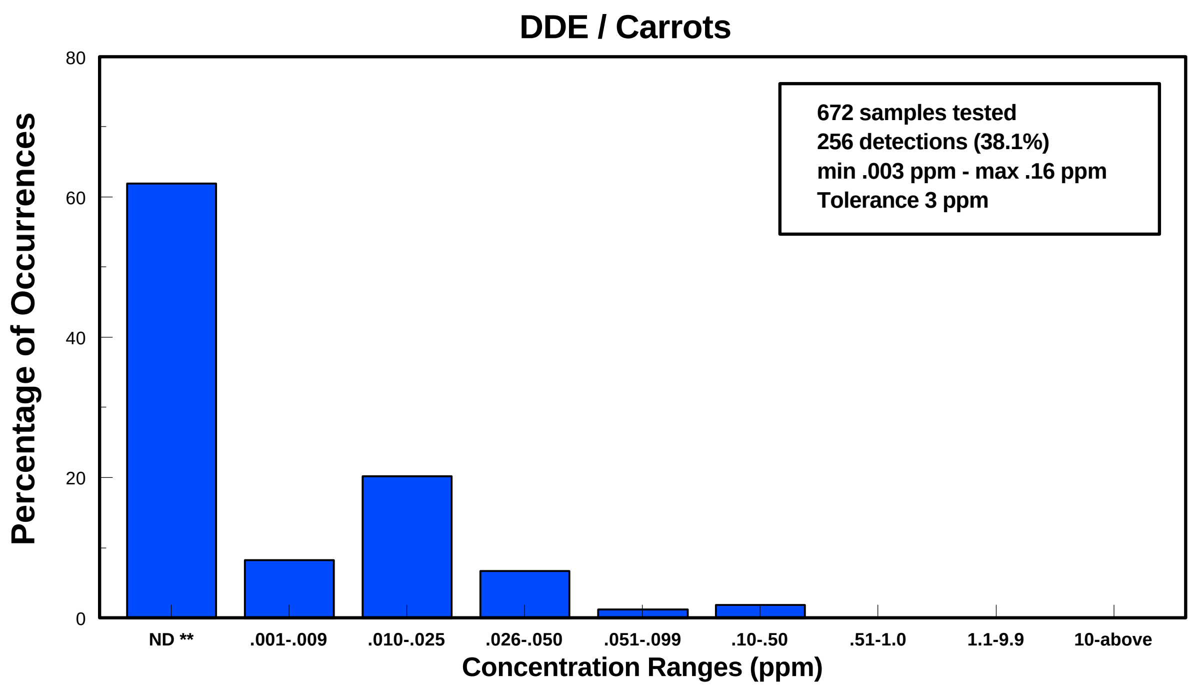
(Pairs with Residue Detections in at Least 25 Percent of Samples)

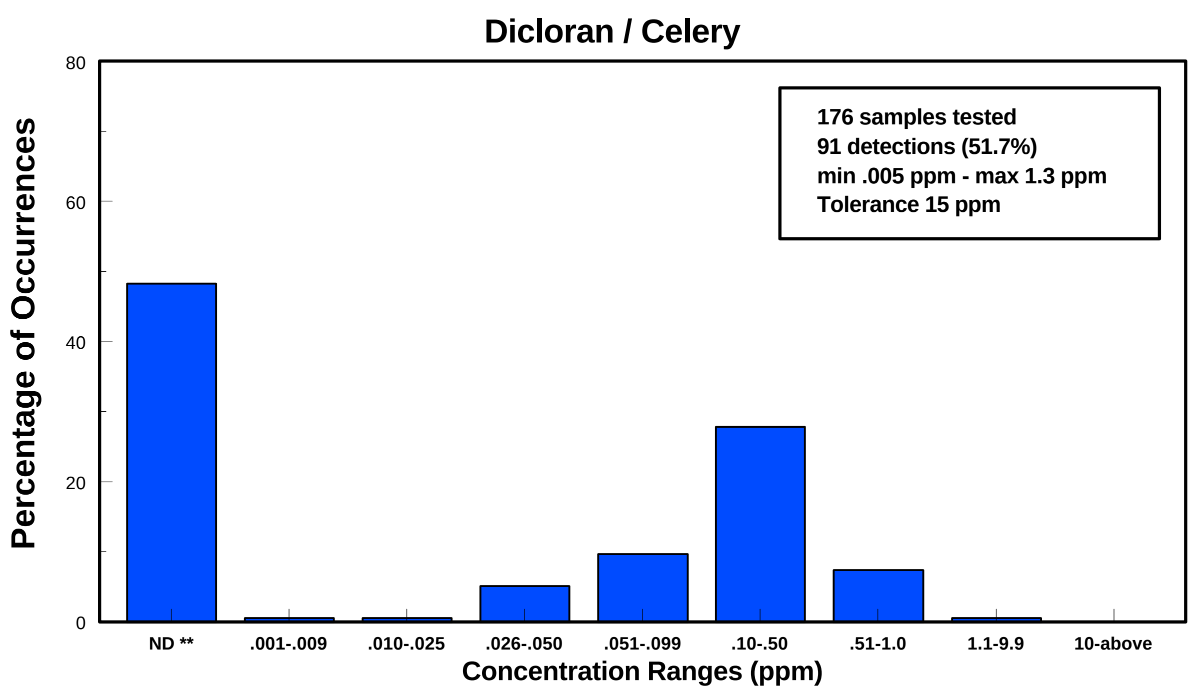


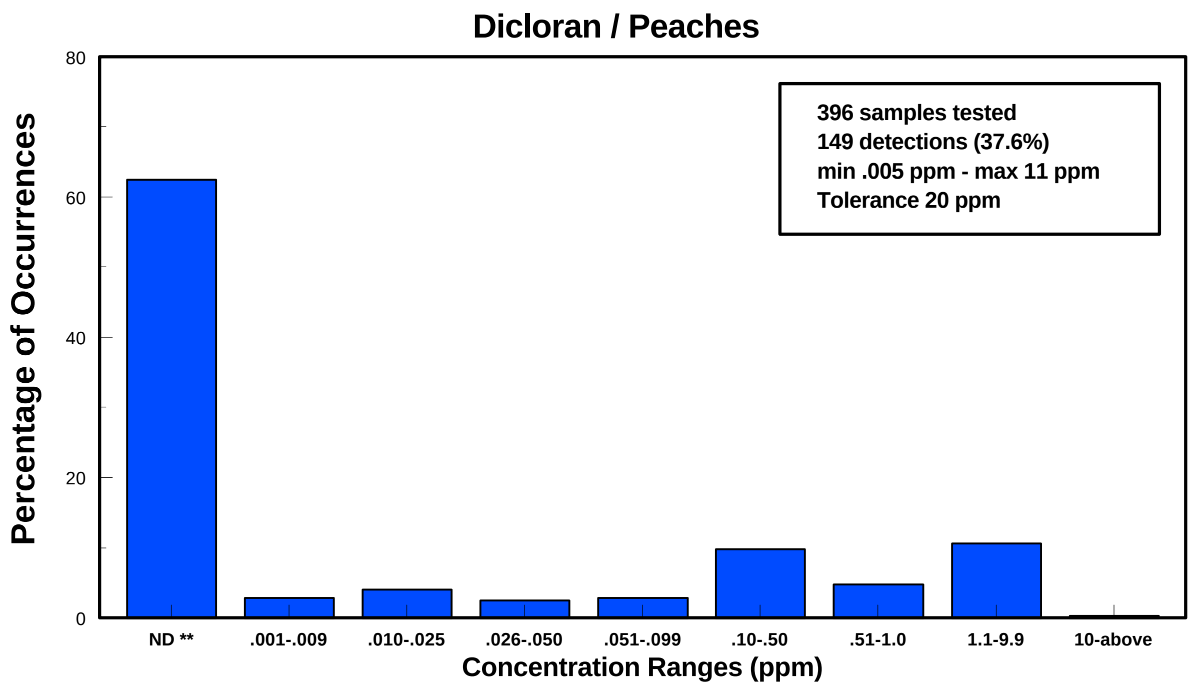


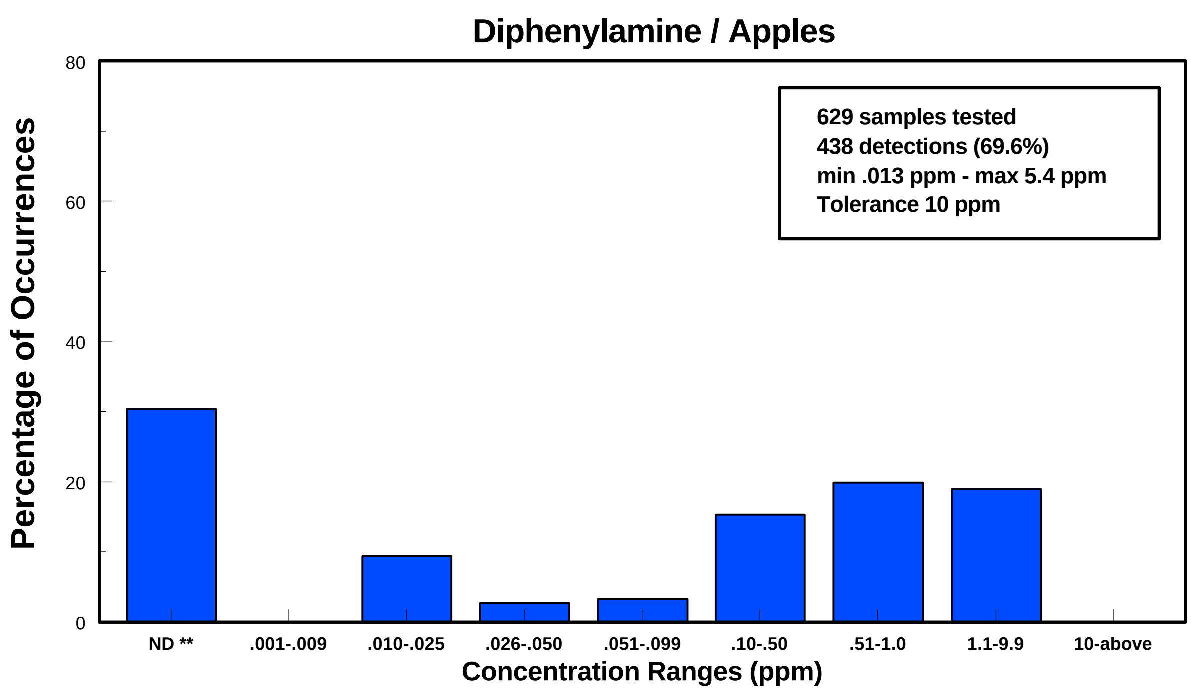
APPENDIX D. (cont'd) FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

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



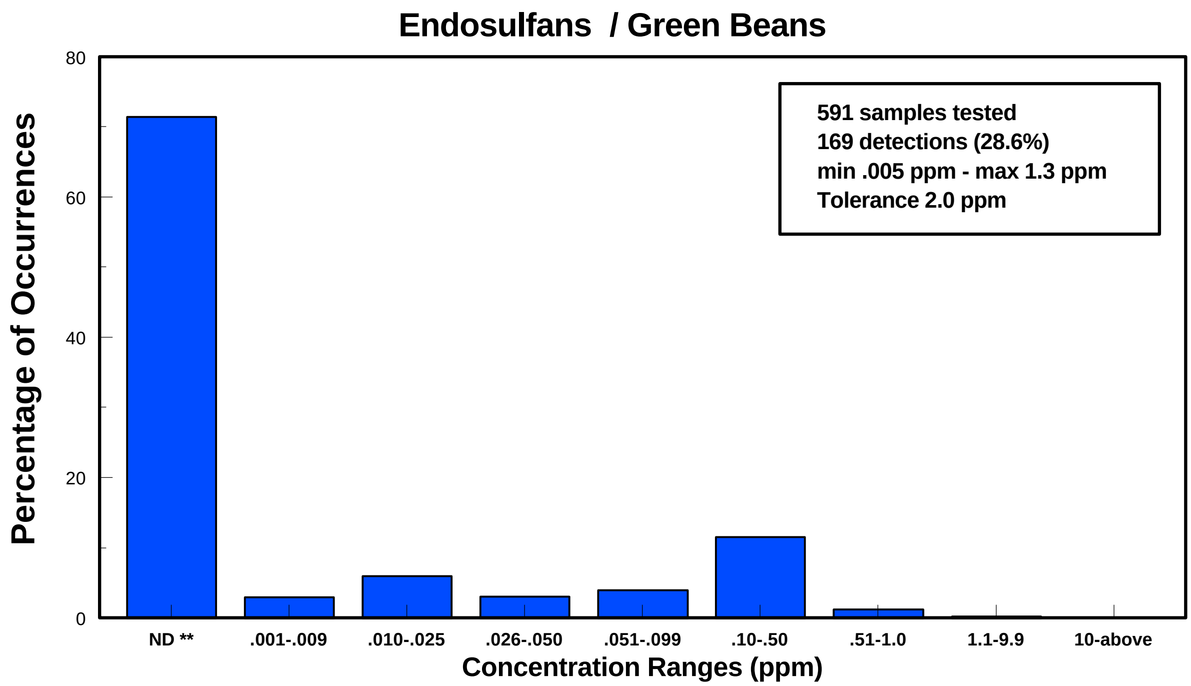


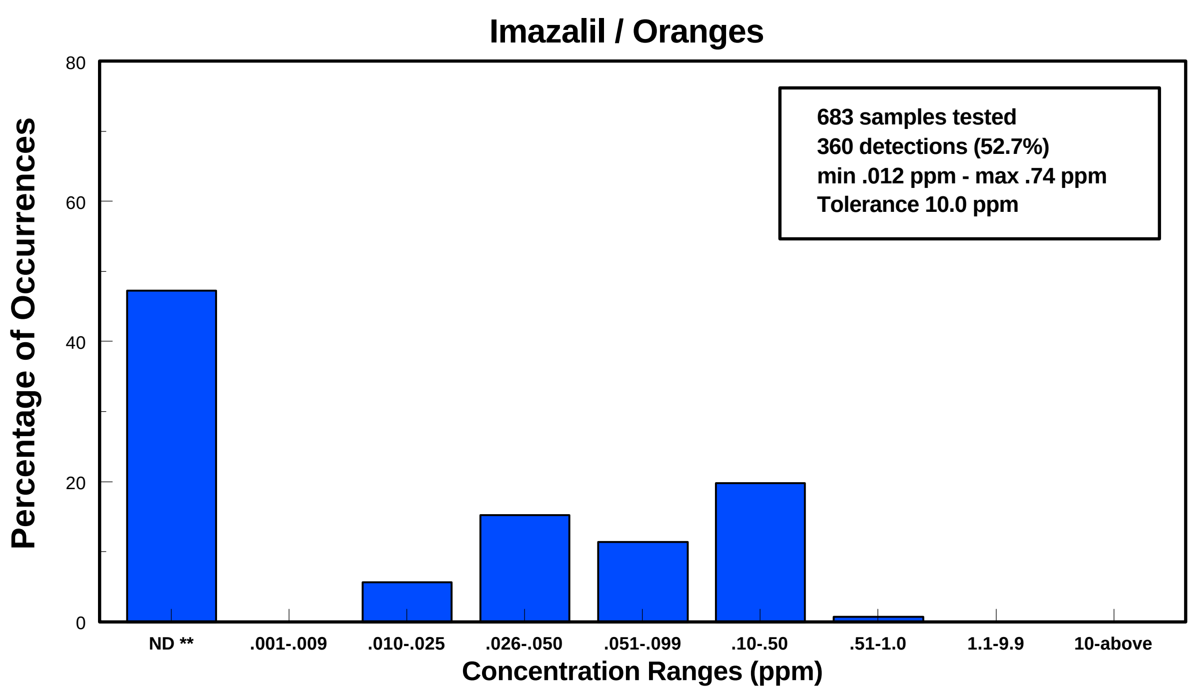

Dicloran / Peaches
396 samples tested
149 detections (37.6%)
min .005 ppm - max 11 ppm
Tolerance 20 ppm
Percentage of Occurrences
80
60
40
20
0
ND **
.001-.009
.010-.025
.026-.050
.051-.099
.10-.50
.51-1.0
1.1-9.9
10-above
Concentration Ranges (ppm)


Diphenylamine / Apples
629 samples tested
438 detections (69.6%)
min .013 ppm - max 5.4 ppm
Tolerance 10 ppm
Percentage of Occurrences
80
60
40
20
0
ND **
.001-.009
.010-.025
.026-.050
.051-.099
.10-.50
.51-1.0
1.1-9.9
10-above
Concentration Ranges (ppm)

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

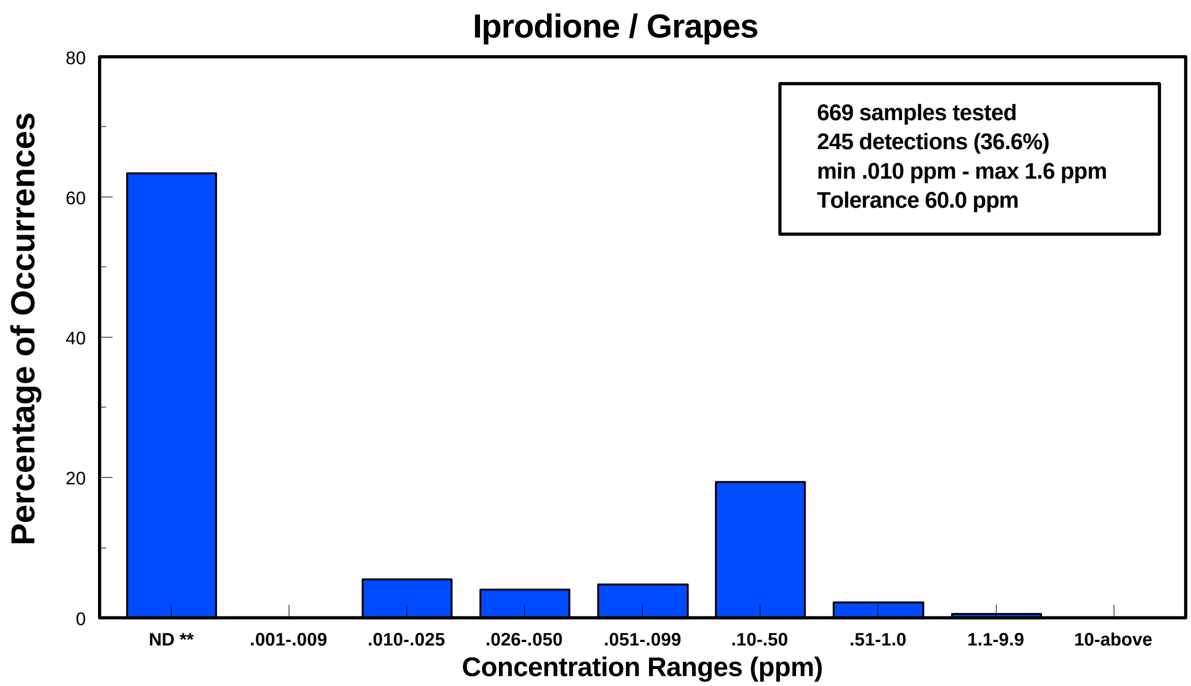
(Pairs with Residue Detections in at Least 25 Percent of Samples)

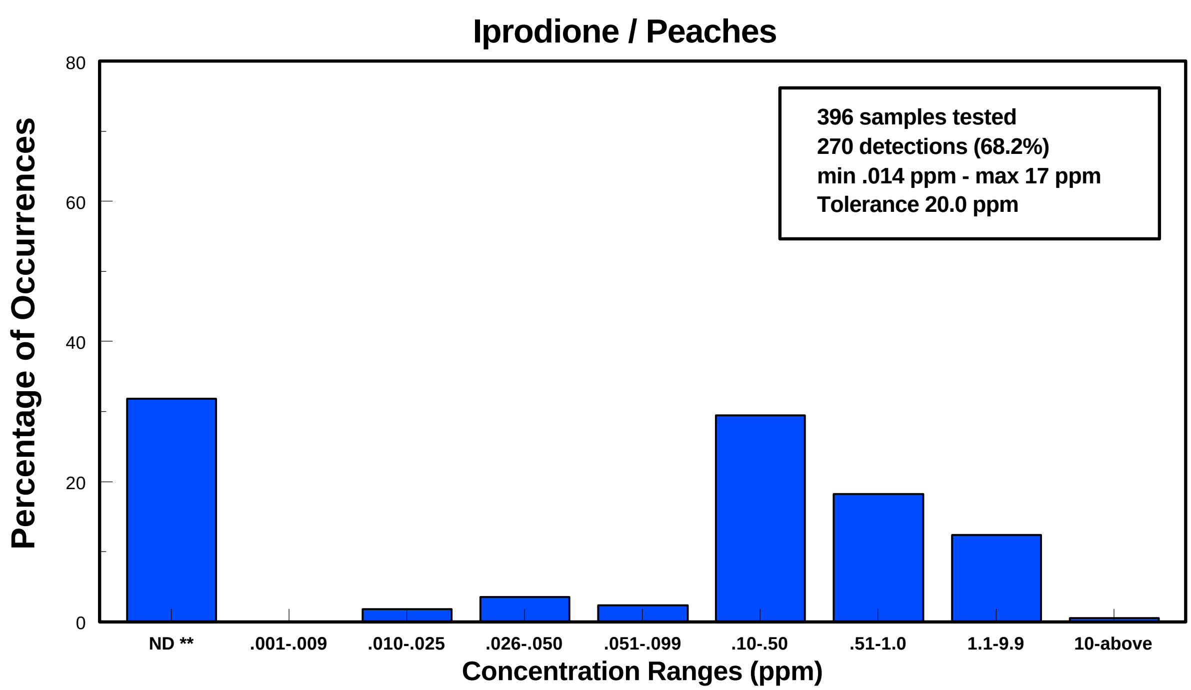




APPENDIX D. (cont'd) FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

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

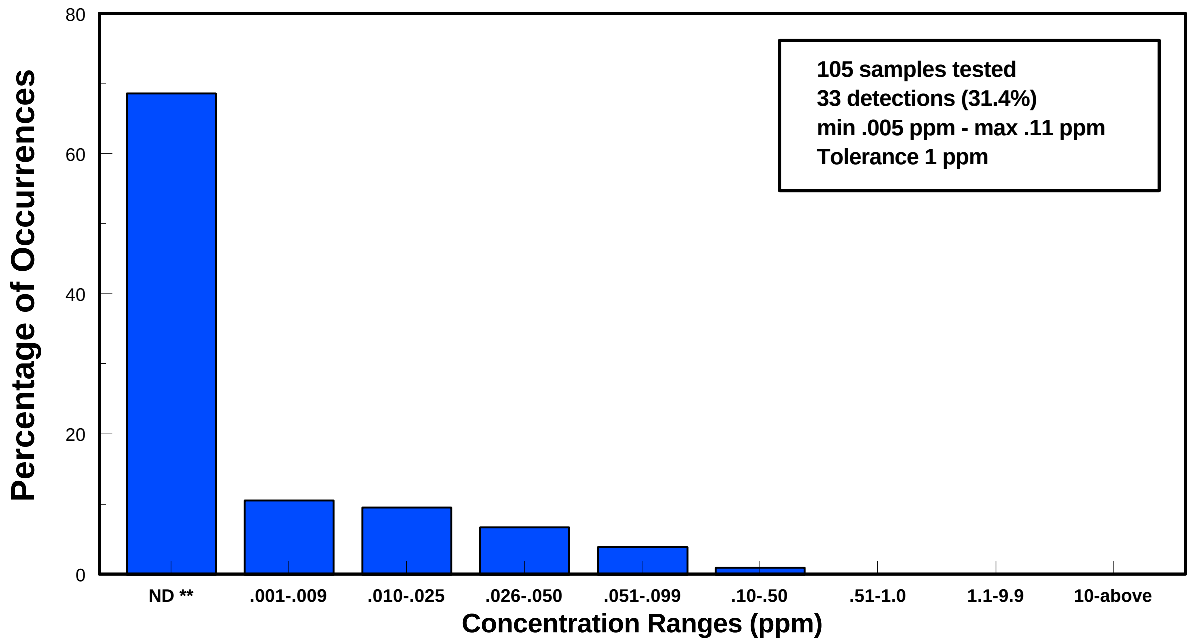




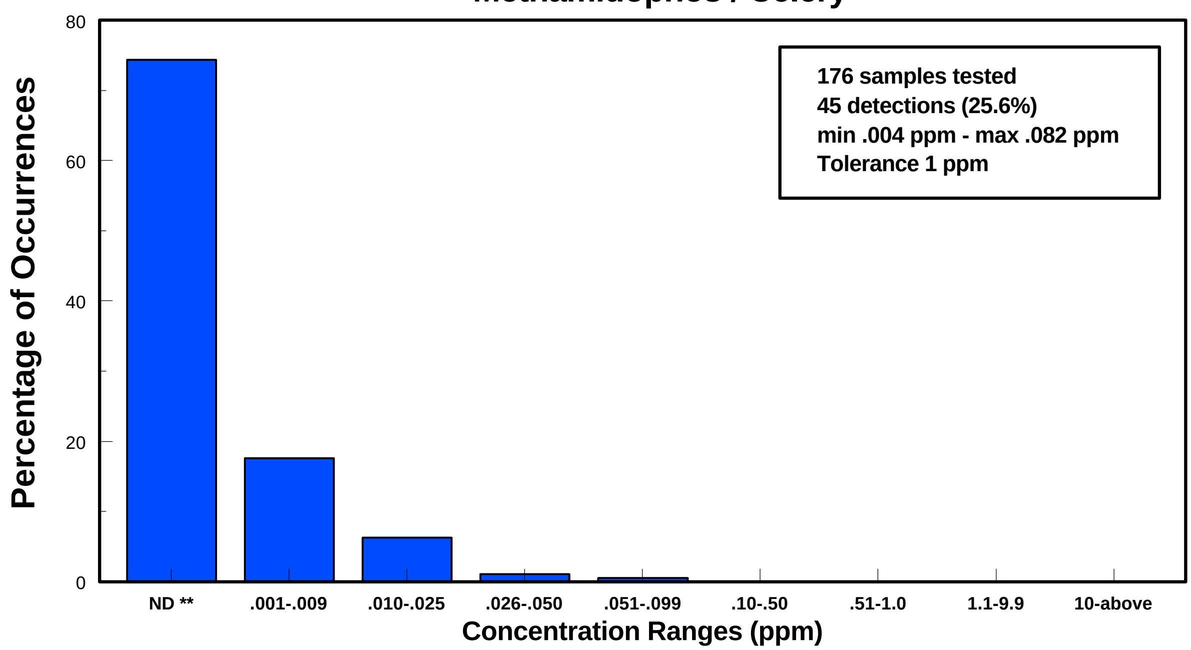
APPENDIX D. (cont'd) FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

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

Linuron / Carrots

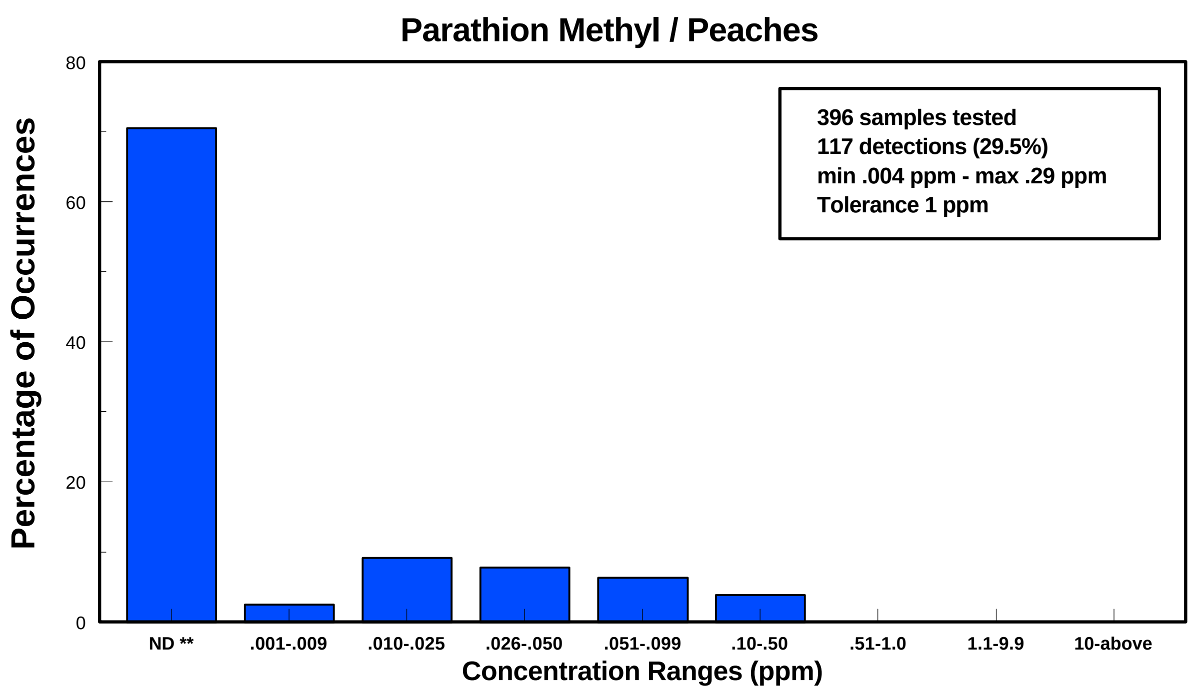


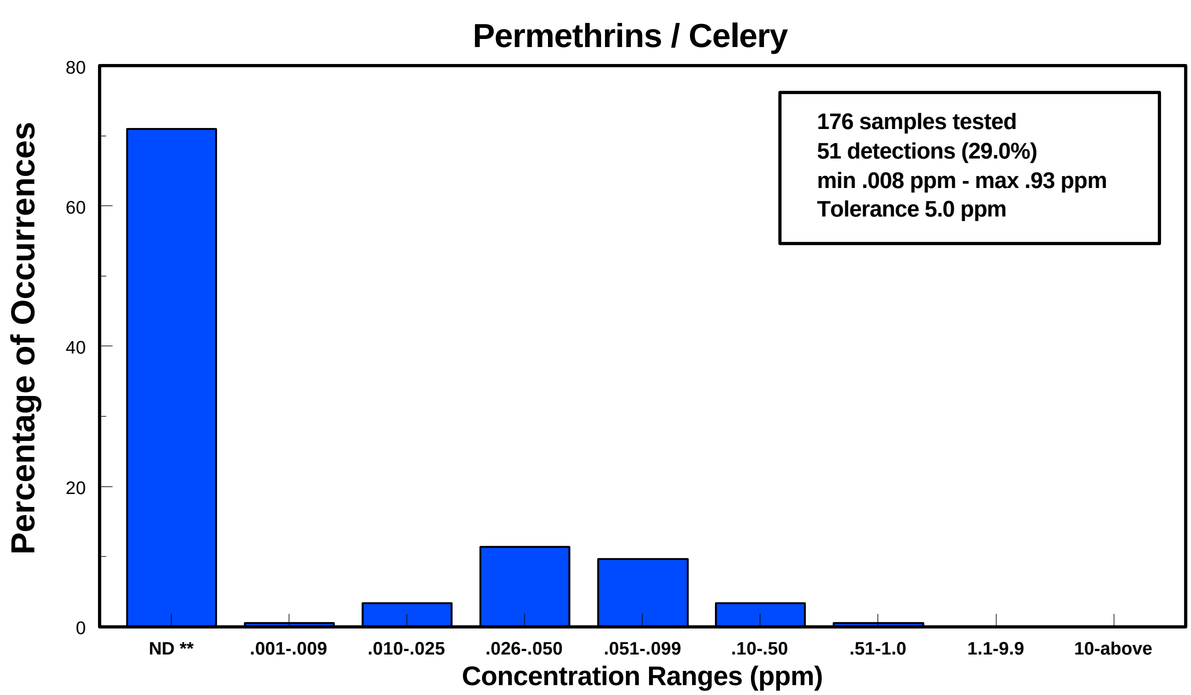
Methamidophos / Celery



APPENDIX D. (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)

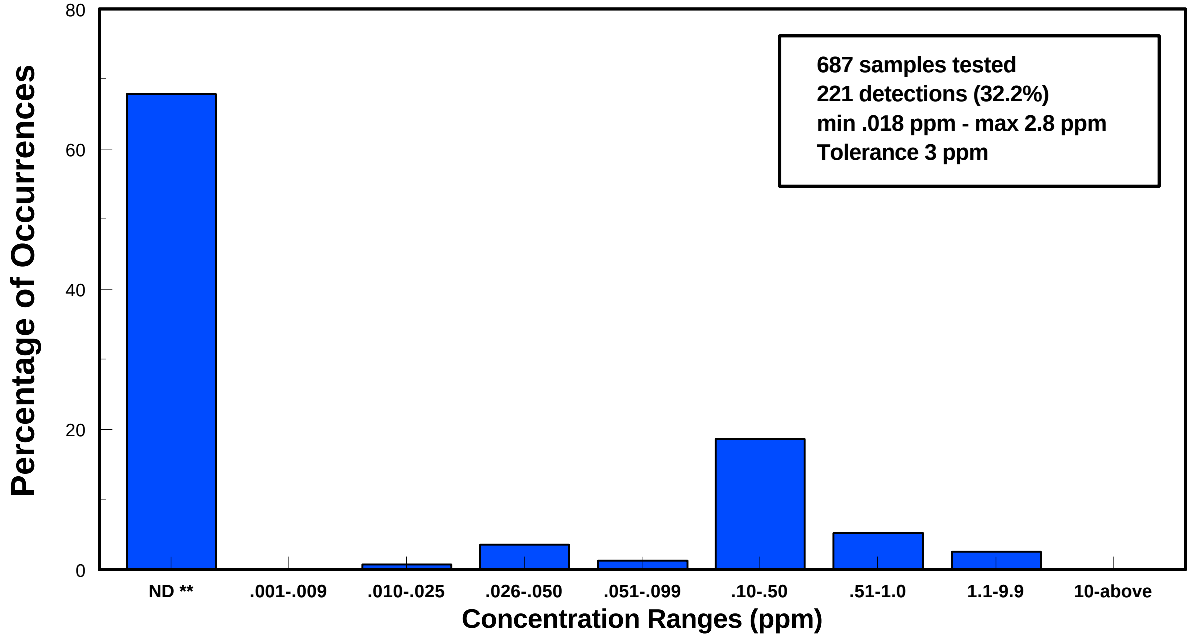




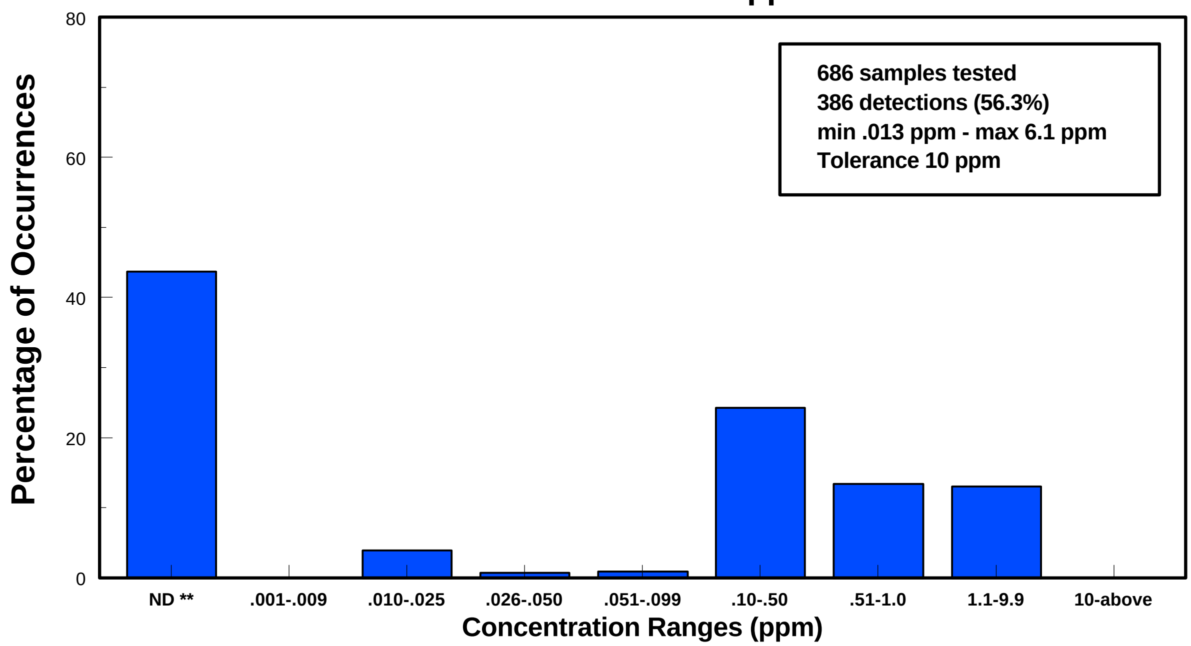
APPENDIX D. (cont'd) FREQUENCY OF OCCURRENCES AT VARIOUS CONCENTRATION RANGES FOR SELECTED PESTICIDE/COMMODITY PAIRS*

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

Propargite / Apples

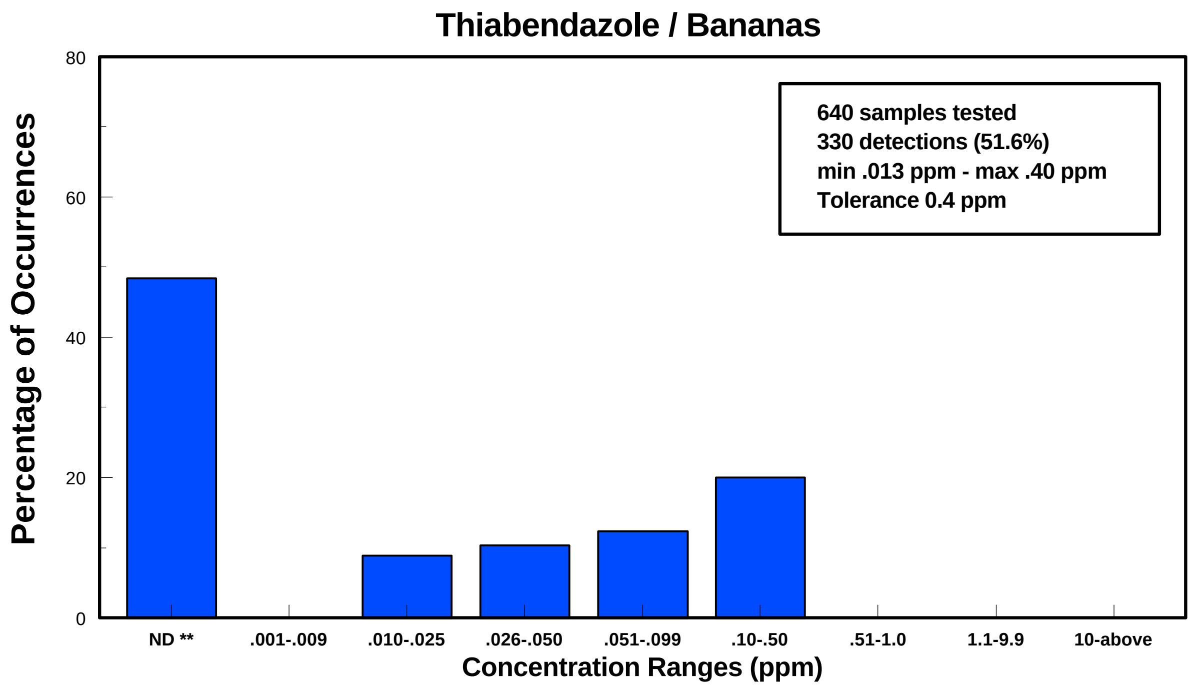


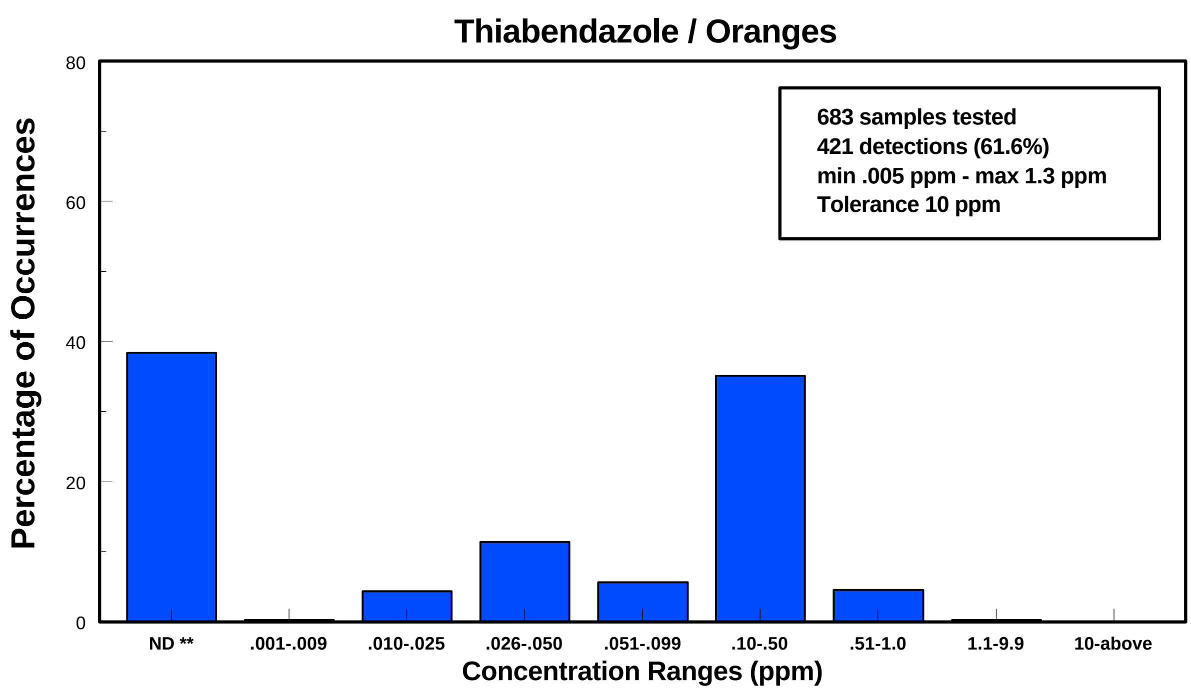
Thiabendazole / Apples



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

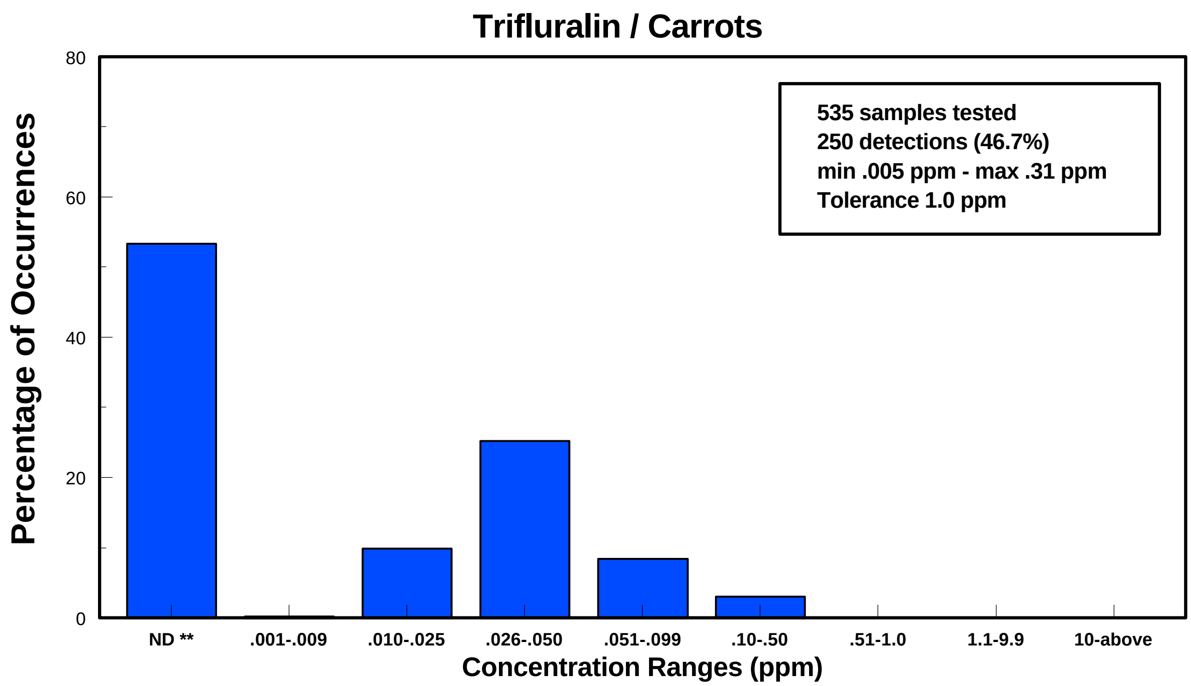
(Pairs with Residue Detections in at Least 25 Percent of Samples)





APPENDIX D. (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 are below the limit of detection of the reporting laboratory, and are not necessarily below .001 ppm.**

Appendix E

National Estimates for Concentration Percentiles vs. Tolerance

Appendix E shows 58 pesticide/commodity pairs with detections in at least 10 percent of the samples tested. Concentrations detected are arranged in percentiles. The 90th percentile is compared to the tolerance established for each pesticide/commodity pair.

The meaning of a percentile can be most easily explained through an example. For the bananas-thiabendazole pair, the 50th percentile is estimated to be 0.013 ppm. This means that PDP estimates that at least 50 percent of bananas available to U.S. consumers had thiabendazole residues of 0.013 ppm or less, while at least 50 percent had residues of 0.013 ppm or more (since more than 1 percent of bananas can, in principle, have residues of exactly 0.013 ppm, the phrase “at least” is included in the description). Similarly, the 75th percentile (or the upper quartile) for this pair is estimated to be 0.075 ppm, which means that at least 75 percent of bananas had residues of 0.075 ppm or less, while at least 25 percent had residues of 0.075 ppm or more. Finally, the 90th percentile (or the last decile) is estimated to be 0.17 ppm, meaning that at least 90 percent of all bananas had thiabendazole residues of 0.17 ppm or less, while at least 10 percent had residues of 0.17 ppm or more.

When calculating the national estimates, PDP sampling data were weighted to more accurately reflect U.S. wholesale arrivals. This weighting had the most profound effect for the pair peaches/azinphos methyl (see page 3 of this appendix), for which detectable residues were found in 19.9 percent of the samples. Although over 90 percent of all peaches reached wholesalers during the May through September 1994 period, only approximately 6 percent of those samples contained detectable residues of azinphos methyl. In contrast, about 45 percent of the remaining peaches available (for the periods January-April 1994 and October-December 1994) had detectable levels of azinphos methyl. When the sampling data were weighted to accurately reflect U.S. arrivals, slightly less than 9 percent of the total product available for consumption in 1994 was estimated to have detectable residues, resulting in no azinphos methyl values for the 90th percentile. Seasonal effects, on a smaller scale, were also observed for grapes, where dimethoate, omethoate, and vinclozolin were detected in approximately 11.5 percent of the samples tested. Nevertheless, when the sampling data were adjusted to accurately reflect U.S. availability of import versus domestic product, the level of residue detections fell below 10 percent, also resulting in no value for the 90th percentile (see page 2).

APPENDIX E. NATIONAL ESTIMATES FOR CONCENTRATION PERCENTILES vs. TOLERANCE

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

Commodity Pesticide	% of Samples with Detections	Mean ** Lower	Mean ** Upper	Percentiles 50th	Percentiles 75th	Percentiles 90th	Ratio of 90th Percentile to Tolerance
1. Apples							
Azinphos-methyl	42.4	0.029	0.043	*	0.042	0.092	0.046
Benomyl	10.3	0.016	0.061	*	*	0.05	0.007
Captan	16.1	0.017	0.024	*	*	0.031	0.001
Carbaryl	21.0	0.031	0.052	*	*	0.088	0.009
Chlorpyrifos	19.2	0.005	0.009	*	*	0.013	0.009
Dimethoate	11.8	0.005	0.011	*	*	0.005	0.002
Diphenylamine	69.6	0.502	0.506	0.15	0.81	1.3	0.130
Endosulfans	14.0	0.004	0.008	*	*	0.008	0.004
Methoxychlor	17.6	0.030	0.042	*	*	0.096	0.007
Omethoate	10.7	0.003	0.018	*	*	0.006	0.003
O-Phenylphenol	18.0	0.018	0.032	*	*	0.049	0.002
Propargite	32.2	0.126	0.161	*	0.11	0.45	0.150
Thiabendazole	56.3	0.440	0.466	0.058	0.55	1.2	0.120
2. Bananas							
Imazalil	12.0	0.008	0.037	*	*	0.033	0.165
Thiabendazole	51.6	0.054	0.091	0.013	0.075	0.17	0.425
3. Broccoli							
DCPA	22.1	0.003	0.008	*	*	0.014	0.003
4. Carrots							
DDE	38.1	0.009	0.013	*	0.009	0.029	0.010
Iprodione	24.8	0.015	0.036	*	0.009	0.058	0.012
Linuron	31.4	0.009	0.011	*	0.006	0.029	0.029
Trifluralin	46.7	0.024	0.036	*	0.038	0.072	0.072
5. Celery							
Acephate	41.5	0.043	0.047	*	0.035	0.13	0.013
Chlorothalonil	67.6	0.063	0.065	0.029	0.061	0.19	0.013
Dicloran	51.7	0.121	0.124	0.037	0.15	0.36	0.024
Methamidophos	25.6	0.003	0.007	*	0.003	0.011	0.011
Oxamyl	16.5	0.015	0.044	*	*	0.051	0.017
Permethrins	29.0	0.024	0.034	*	0.025	0.079	0.004

APPENDIX E. (cont'd) NATIONAL ESTIMATES FOR CONCENTRATION PERCENTILES vs. TOLERANCE

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

Commodity Pesticide	% of Samples with Detections	Mean ** Lower	Mean ** Upper	Percentiles 50th	Percentiles 75th	Percentiles 90th	Ratio of 90th Percentile to Tolerance
6. Grapes							
Captan	31.4	0.046	0.053	*	*	0.11	0.002
Dimethoate	11.5	0.004	0.009	*	*	***	***
Iprodione	36.6	0.071	0.088	*	0.060	0.25	0.004
Myclobutanil	20.0	0.017	0.037	*	*	0.067	0.067
Omethoate	11.5	0.004	0.015	*	*	***	***
Vinclozolin	11.4	0.010	0.017	*	*	***	***
7. Green Beans							
Benomyl	13.1	0.041	0.085	*	*	0.12	0.060
Chlorothalonil	16.8	0.015	0.021	*	*	0.028	0.006
Endosulfans	28.6	0.042	0.047	*	0.007	0.16	0.081
Methamidophos	21.5	0.022	0.026	*	*	0.066	0.066
8. Lettuce							
Acephate	12.7	0.004	0.010	*	*	0.006	0.001
Dimethoate	12.0	0.005	0.010	*	*	0.004	0.002
Endosulfans	21.0	0.009	0.014	*	*	0.024	0.012
Mevinphos	11.1	0.006	0.020	*	*	0.005	0.010
Permethrins	14.0	0.053	0.067	*	*	0.055	0.003
9. Oranges							
Formetanate	10.5	0.051	0.096	*	*	0.06	0.015
Imazalil	52.7	0.056	0.071	*	0.087	0.17	0.017
O-Phenylphenol	18.2	0.005	0.019	*	*	0.016	0.002
Thiabendazole	61.6	0.121	0.154	0.041	0.18	0.32	0.032

APPENDIX E. (cont'd) NATIONAL ESTIMATES FOR CONCENTRATION PERCENTILES vs. TOLERANCE

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

Commodity Pesticide	% of Samples with Detections	Mean ** Lower	Mean ** Upper	Percentiles 50th	Percentiles 75th	Percentiles 90th	Ratio of 90th Percentile to Tolerance
10. Peaches							
Azinphos-methyl	19.9	0.009	0.031	*	*	***	***
Benomyl	27.1	0.038	0.081	*	*	0.139	0.009
Captan	13.5	0.021	0.030	*	*	0.038	0.001
Carbaryl	15.7	0.067	0.089	*	*	0.18	0.018
Dicloran	37.6	0.418	0.422	*	0.32	1.4	0.070
Iprodione	68.2	0.559	0.568	0.17	0.6	1.2	0.060
o-Phenylphenol	11.3	0.003	0.014	*	*	0.013	0.001
Parathion Methyl	29.5	0.021	0.024	*	0.029	0.064	0.064
Phosmet	15.2	0.018	0.033	*	*	0.035	0.003
Propargite	21.7	0.119	0.155	*	0.038	0.4	0.057
11. Potatoes							
Chlorpropham	60.5	0.940	0.952	0.053	1.2	3.4	0.068
Endosulfans	12.1	0.002	0.007	*	*	0.004	0.019
Thiabendazole	23.8	0.108	0.143	*	*	0.4	0.040

(*) The percentile value is estimated to be below the Limit of Detection (LOD).

(**) The Mean is estimated with a range of values. The lower bound is calculated with non-detections valued at zero. The upper bound is calculated with non-detections valued at the level of detection for that test.

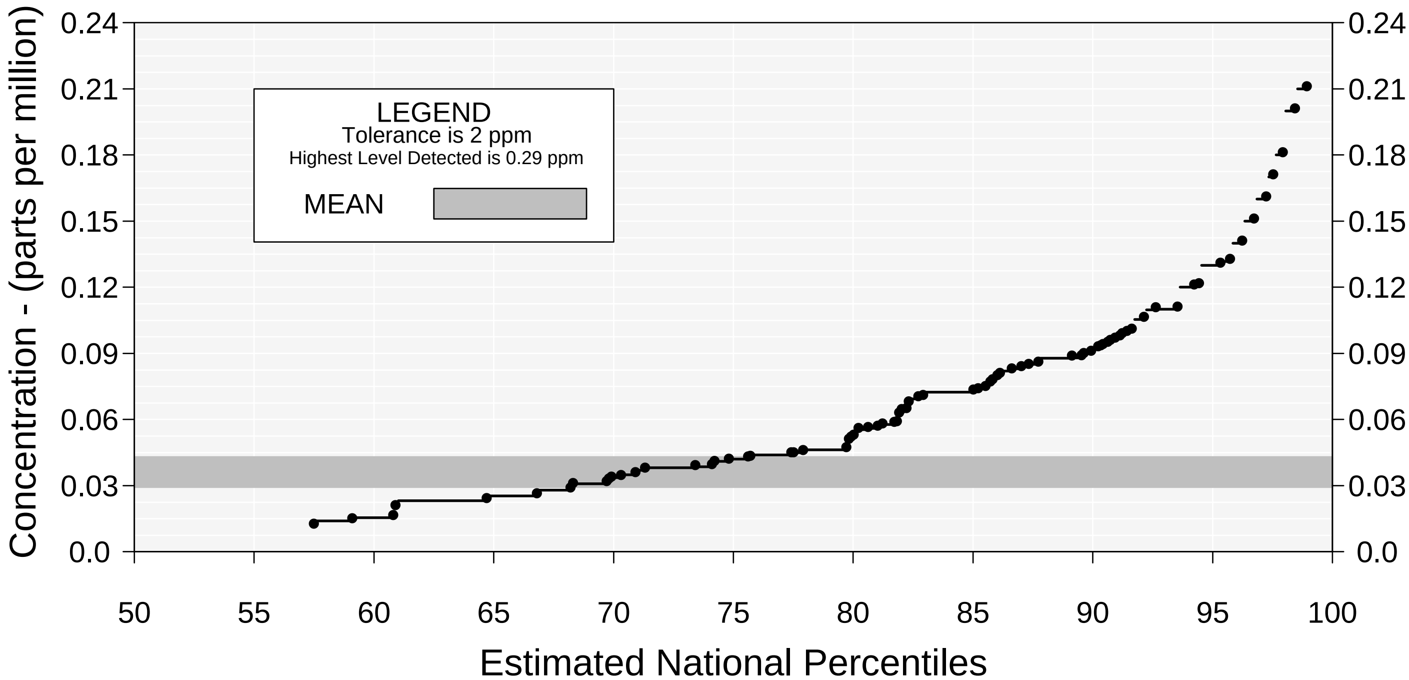
Appendix F

Cumulative Distributions of Residue Concentrations for Selected Commodity/Pesticide Pairs

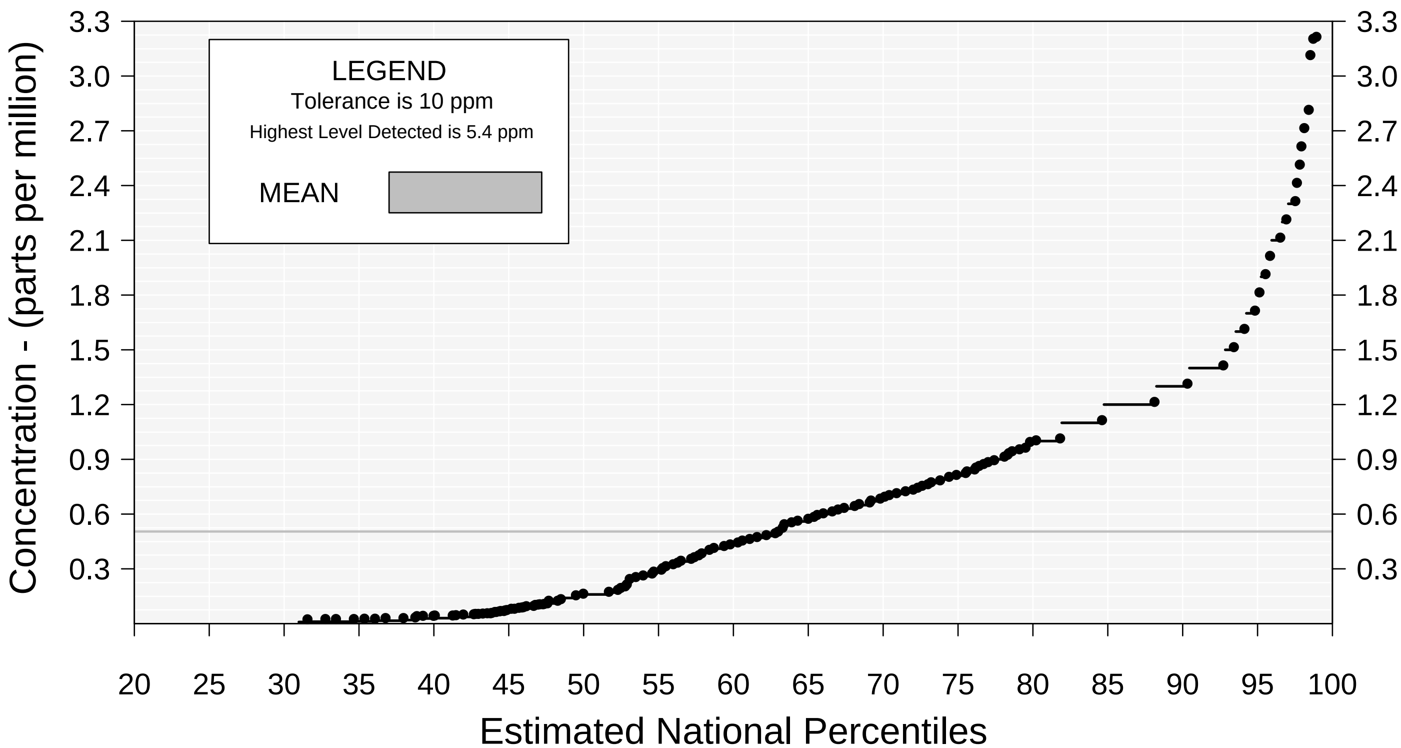
In Appendix F, the concentrations detected (in parts per million) are plotted against the estimated national percentiles for eight pesticide/commodity pairs. The distributions of residues for all PDP pesticide/commodity pairs have this same curved shape. The highest percentile graphed in the appendix is the 99th, which is often considerably lower than the highest concentration detected in the sample (refer to the value shown in each graph's legend). Inclusion of the highest concentration would cause graph distortion, which would obscure concentrations in the low ranges. The tolerance for the pesticide/commodity pair is also indicated in the legend of each graph. The large dots show the percentage of the commodity at, or below, a given level of residue concentration. For example, an estimated 65 percent of bananas available to U.S. consumers in 1994 had thiabendazole residue concentrations of 0.050 ppm or less. The solid lines, tailing the large dots, depict percentile values. Thus, the estimated 75th percentile of thiabendazole for bananas is 0.075 ppm. The lowest value of these solid lines indicates the estimated percentage of the commodity available to U.S. consumers with no detectable residues. For thiabendazole in bananas, this is 48.4 percent. The shaded bar denotes the range of values estimated for the mean.

Appendix F. Cumulative Distributions of Residue Concentrations for Selected Commodity/Pesticide Pairs

Apples / Azinphos-methyl

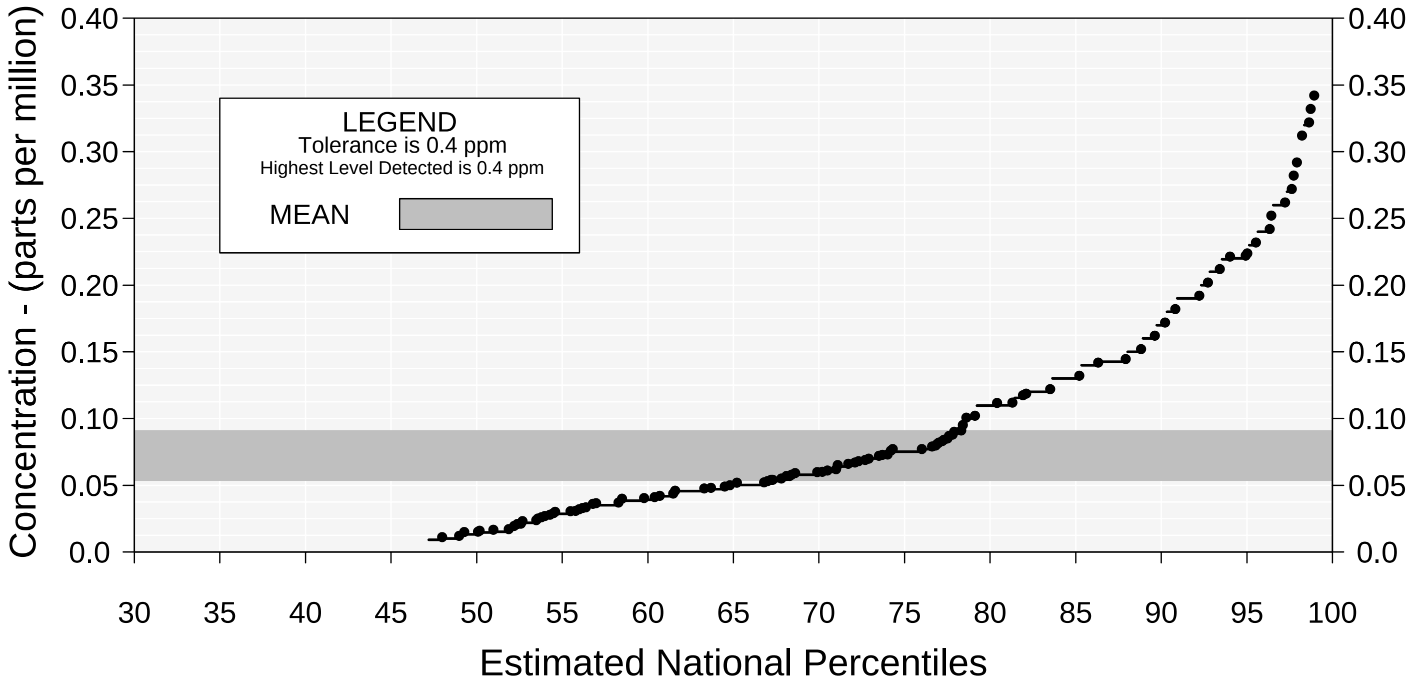


Apples / Diphenylamine

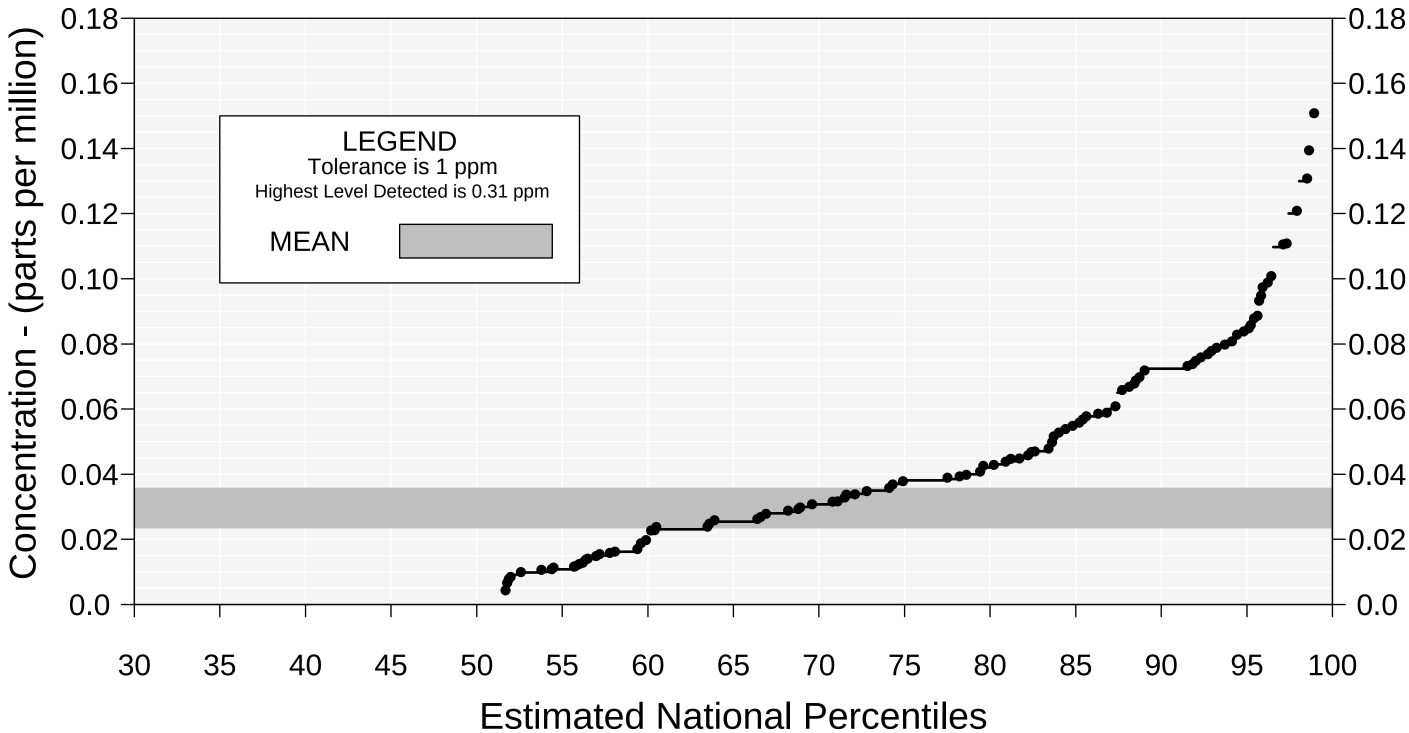


Appendix F.(cont'd) Cumulative Distributions of Residue Concentrations for Selected Commodity/Pesticide Pairs

Bananas / Thiabendazole

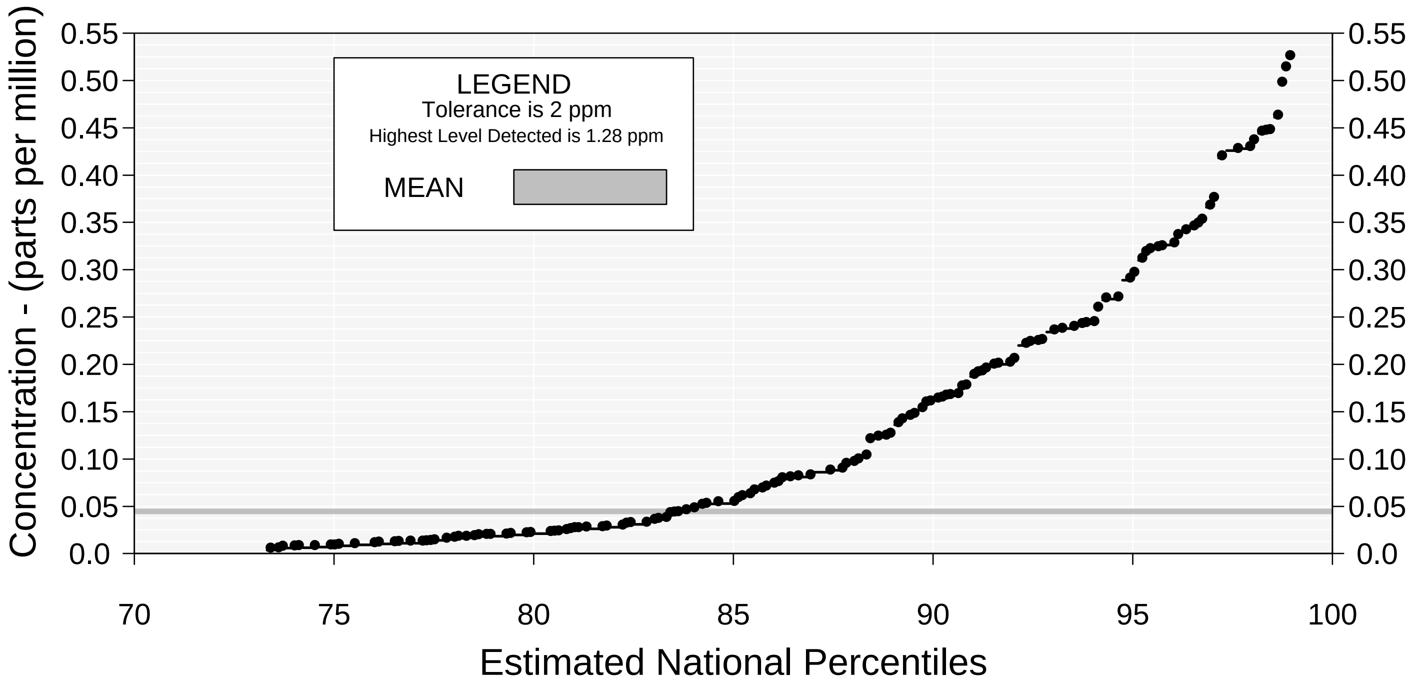


Carrots / Trifluralin

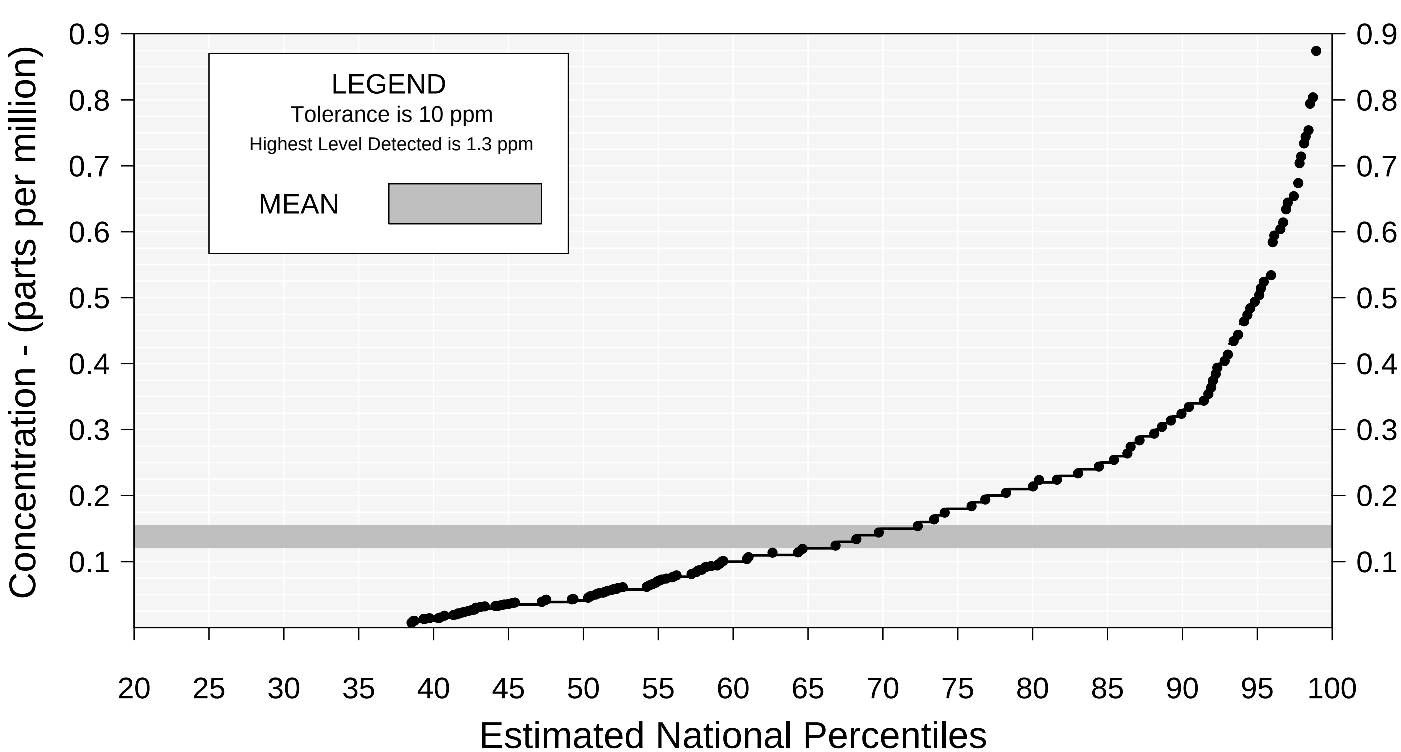


Appendix F.(cont'd) Cumulative Distributions of Residue Concentrations for Selected Commodity/Pesticide Pairs

Green Beans / Endosulfans

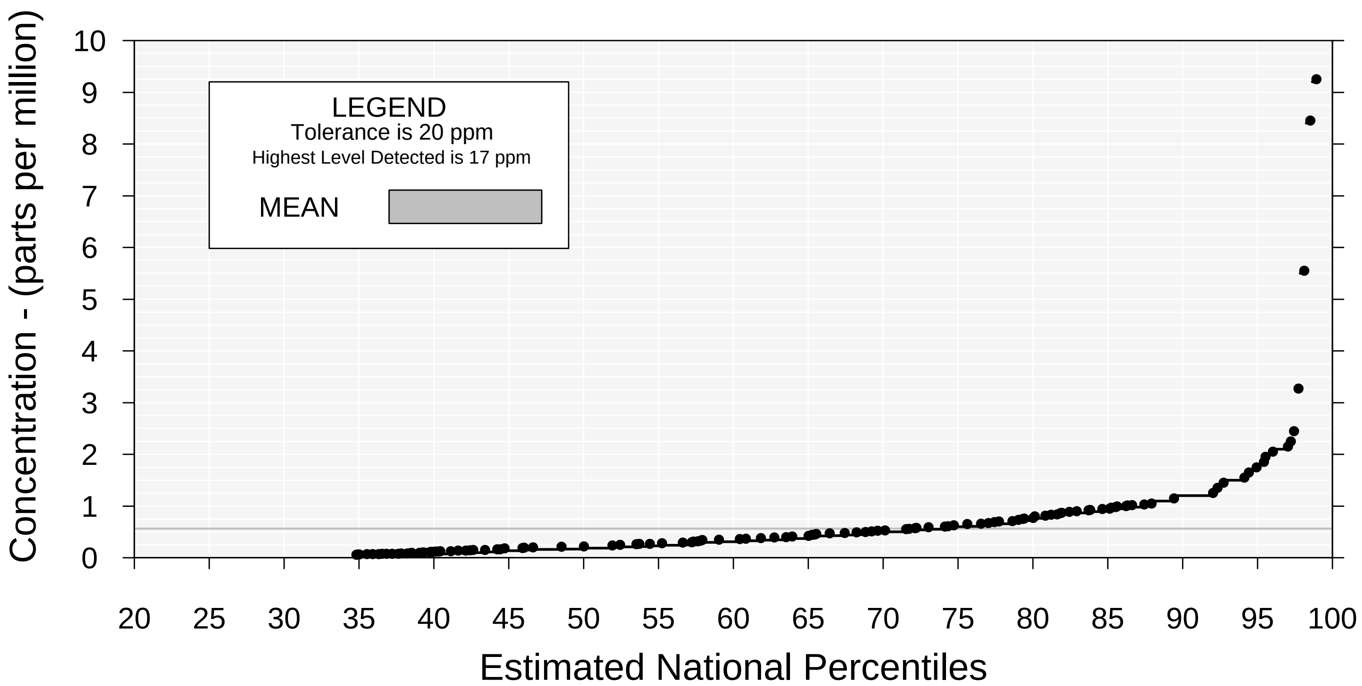


Oranges / Thiabendazole

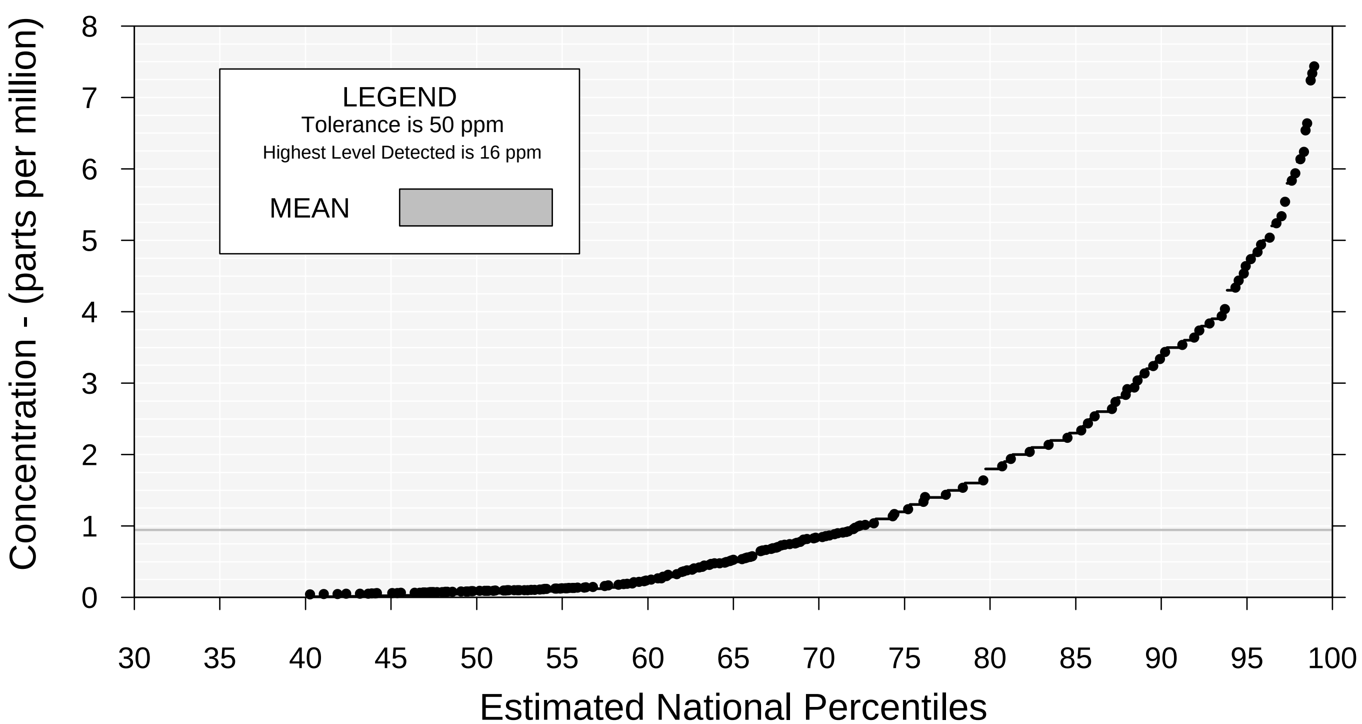


Appendix F.(cont'd) Cumulative Distributions of Residue Concentrations for Selected Commodity/Pesticide Pairs

Peaches / Iprodione



Potatoes / Chlorpropham



Appendix G

Number of Non-Detected Residues by Pesticide/Commodity Pairs
(Pairs with established tolerances and pairs requested by EPA)

Appendix G gives the number of samples per commodity for which no pesticide residues were detected (non-detected) by the participating laboratories. Only pesticides with registered uses (i.e., established tolerances) and pesticides specifically requested by EPA (atrazine and abamectin) are included. The appendix also shows the range of limits of detection for each pesticide.

The laboratories reported other non-detected residues which are not shown in this appendix but are available upon request. These include pesticides not expected to be present (i.e., not registered for use in PDP commodities). These data resulted from the laboratories' need to simplify spiking requirements for pesticides analyzed by multiresidue screens. For example, chlorpropham was tested in all samples although it is registered for use in only four PDP commodities--carrots, green beans, potatoes, and sweet peas. The number of non-detected residues for green beans and sweet peas is given in this appendix. Residues of chlorpropham were detected in carrots and potatoes; therefore, this information is shown in Appendix C. Non-detected residues for the remaining nine commodities are not provided in the summary but are available upon request. Also not included are pesticides tested by fewer than five laboratories.

APPENDIX G. NUMBER OF NON-DETECTED RESIDUES BY PESTICIDE/COMMODITY PAIRS
(Pairs with established tolerances and pairs requested by EPA)

Pesticide		No. of Samples Analyzed	Range of LODs for Non-Detects, ppm	Tolerance Level, ppm
1.	**2,4-D**			
	Sweet Corn	459	.003 - .016	0.5
2.	**Aldicarb & Metabolites**			
	Oranges	588	.004 - .032	0.3
	Potatoes	599	.004 - .032	1
3.	**Atrazine**			
	Apples	687	.003 - .056	NT
	Bananas	640	.003 - .056	NT
	Broccoli	679	.003 - .048	NT
	Carrots	687	.003 - .048	NT
	Celery	176	.003 - .048	NT
	Grapes	669	.003 - .048	NT
	Green Beans	591	.003 - .048	NT
	Lettuce	691	.003 - .048	NT
	Oranges	683	.015 - .048	NT
	Peaches	396	.003 - .048	NT
	Potatoes	694	.003 - .048	NT
	Sweet Corn	462	.003 - .048	0.25
	Sweet Peas	433	.003 - .048	NT
4.	**Abamectin**			
	Oranges	686	.002 - .002	NT
5.	**Azinphos Methyl**			
	Broccoli	678	.009 - .033	2.0
	Celery	176	.020 - .033	2.0
	Oranges	683	.012 - .033	2.0
	Potatoes	694	.012 - .033	0.3
6.	**Benomyl**			
	Bananas	651	.050 - .050	0.2
	Broccoli	685	.050 - .050	0.2
	Carrots	692	.050 - .050	0.2

APPENDIX G. NUMBER OF NON-DETECTED RESIDUES BY PESTICIDE/COMMODITY PAIRS
(Pairs with established tolerances and pairs requested by EPA)

Pesticide		No. of Samples Analyzed	Range of LODs for Non-Detects, ppm	Tolerance Level, ppm
7.	**Captan**			
	Broccoli	521	.006 - .040	2
	Celery	158	.006 - .014	50
	Lettuce	637	.006 - .014	100
	Oranges	629	.006 - .040	25
	Sweet Corn	397	.006 - .016	2.0
	Sweet Peas	398	.006 - .014	2
8.	**Carbaryl**			
	Bananas	640	.004 - .076	10
	Carrots	687	.004 - .076	10
	Celery	176	.004 - .076	10
	Lettuce	691	.004 - .076	10
	Potatoes	694	.004 - .076	0.2
	Sweet Corn	462	.004 - .076	5
9.	**Carbofuran & Carbofuran-3 OH**			
	Bananas	567	.006 - .076	0.1
	Sweet Corn	462	.006 - .076	1.0
10.	**Chlorothalonil**			
	Bananas	527	.003 - .020	0.05
	Carrots	558	.003 - .020	1
	Potatoes	609	.003 - .020	0.1
	Sweet Corn	392	.003 - .008	1.0
11.	**Chlorpropham**			
	Green Beans	591	.008 - .120	0.3
	Sweet Peas	433	.008 - .120	0.3
12.	**Chlorpyrifos**			
	Bananas	640	.003 - .020	0.01
	Green Beans	591	.003 - .020	0.1
	Sweet Corn	462	.003 - .011	0.1
	Sweet Peas	433	.003 - .011	0.1
13.	**Dacthal (DCPA)**			
	Potatoes	694	.002 - .008	2
	Sweet Corn	462	.002 - .008	0.05

APPENDIX G. NUMBER OF NON-DETECTED RESIDUES BY PESTICIDE/COMMODITY PAIRS
(Pairs with established tolerances and pairs requested by EPA)

Pesticide	No. of Samples Analyzed	Range of LODs for Non-Detects, ppm	Tolerance Level, ppm
14. DDT & Metabolites			
Apples	687	.002 - .010	0.1 (1)
Oranges	683	.002 - .008	0.1 (1)
Sweet Corn	462	.002 - .008	0.1 (1)
Sweet Peas	433	.002 - .008	0.2 (1)
15. Diazinon			
Bananas	640	.003 - .022	0.2
Broccoli	634	.003 - .022	0.7
Oranges	683	.003 - .012	0.7
Potatoes	694	.003 - .012	0.1
Sweet Corn	462	.003 - .012	0.7
16. Dichlorvos (DDVP)			
Apples	687	.002 - .008	0.5 (2)
Bananas	640	.002 - .010	0.5 (2)
Broccoli	630	.002 - .010	1 (2)
Carrots	687	.002 - .010	0.5 (2)
Celery	176	.002 - .008	3 (2)
Grapes	669	.002 - .008	0.5 (2)
Lettuce	691	.002 - .008	1 (2)
Oranges	683	.002 - .008	3 (2)
Peaches	396	.002 - .008	0.5 (2)
Potatoes	694	.002 - .008	0.5 (2)
Sweet Corn	462	.002 - .008	0.5 (2)
Sweet Peas	433	.002 - .008	0.5 (2)
17. Dicofol			
Green Beans	591	.005 - .024	5
18. Dimethoate & Omethoate			
Celery	176	.002 - .016	2

APPENDIX G. NUMBER OF NON-DETECTED RESIDUES BY PESTICIDE/COMMODITY PAIRS
(Pairs with established tolerances and pairs requested by EPA)

Pesticide	No. of Samples Analyzed	Range of LODs for Non-Detects, ppm	Tolerance Level, ppm
19. Disulfoton			
Broccoli	673	.002 - .036	0.75
Green Beans	591	.002 - .036	0.75
Lettuce	691	.002 - .036	0.75
Potatoes	694	.002 - .036	0.75
Sweet Corn	462	.003 - .036	0.3
Sweet Peas	433	.003 - .036	0.75
20. Endosulfans			
Sweet Corn	462	.003 - .009	0.2
Sweet Peas	433	.003 - .009	2
21. Ethion			
Grapes	669	.001 - .008	2.0
Green Beans	591	.001 - .008	2.0
Peaches	396	.001 - .008	1.0
22. Fenamiphos			
Apples	687	.002 - .013	0.25
Bananas	640	.002 - .013	0.10
Grapes	669	.002 - .013	0.10
Oranges	683	.002 - .011	0.60
Peaches	396	.002 - .013	0.25
23. Fenvalerate & Esfenvalerate			
Apples	486	.012 - .350	2.0
Broccoli	459	.005 - .440	2.0
Carrots	446	.012 - .340	0.5
Potatoes	495	.005 - .350	0.02
Sweet Corn	420	.012 - .340	0.1
Sweet Peas	395	.012 - .067	1.0
24. Iprodione			
Broccoli	679	.008 - .060	25.0
Lettuce	691	.008 - .060	25.0

APPENDIX G. NUMBER OF NON-DETECTED RESIDUES BY PESTICIDE/COMMODITY PAIRS
(Pairs with established tolerances and pairs requested by EPA)

Pesticide	No. of Samples Analyzed	Range of LODs for Non-Detects, ppm	Tolerance Level, ppm
25. Lindane			
Apples	687	.003 - .006	1
Broccoli	679	.003 - .006	1
Carrots	687	.003 - .006	0.5 (3)
Celery	176	.003 - .006	1
Green Beans	591	.003 - .006	0.5 (3)
Lettuce	691	.003 - .006	3
Oranges	683	.003 - .006	0.5 (3)
Potatoes	694	.003 - .006	0.5 (3)
Sweet Corn	462	.003 - .006	0.5 (3)
Sweet Peas	433	.003 - .006	0.5 (3)
26. Malathion			
Apples	687	.002 - .045	8
Broccoli	679	.002 - .045	8
Carrots	687	.002 - .045	8
Celery	176	.002 - .045	8
Grapes	669	.002 - .045	8
Green Beans	591	.002 - .045	8
Oranges	683	.002 - .045	8
Peaches	396	.002 - .045	8
Potatoes	694	.002 - .050	8
Sweet Corn	462	.002 - .045	2.0
Sweet Peas	433	.002 - .045	8
27. Methidathion			
Apples	687	.002 - .015	0.05
Peaches	396	.002 - .015	0.05
Potatoes	694	.002 - .015	0.2
28. Methomyl			
Carrots	687	.008 - .076	0.2
Oranges	683	.008 - .076	2
Potatoes	694	.008 - .076	0.2
Sweet Corn	462	.008 - .076	0.1

APPENDIX G. NUMBER OF NON-DETECTED RESIDUES BY PESTICIDE/COMMODITY PAIRS
(Pairs with established tolerances and pairs requested by EPA)

Pesticide	No. of Samples Analyzed	Range of LODs for Non-Detects, ppm	Tolerance Level, ppm
29. Methoxychlor			
Broccoli	621	.003 - .030	14
Carrots	673	.003 - .030	14
Grapes	669	.006 - .026	14
Green Beans	591	.006 - .028	14
Lettuce	691	.003 - .026	14
Potatoes	694	.003 - .026	1
Sweet Corn	462	.006 - .026	14
30. Mevinphos			
Apples	687	.002 - .096	0.5
Carrots	687	.002 - .096	0.25
Green Beans	591	.002 - .096	0.25
Oranges	683	.002 - .096	0.2
Potatoes	694	.002 - .096	0.25
Sweet Corn	462	.002 - .096	0.25
Sweet Peas	433	.002 - .096	0.25
31. Oxamyl			
Bananas	640	.008 - .076	0.3
Carrots	687	.008 - .076	0.1
Oranges	683	.008 - .076	3
Potatoes	694	.008 - .076	0.1
32. Parathion			
Broccoli	635	.002 - .013	1
Celery	143	.002 - .013	1
Green Beans	553	.002 - .013	1
Lettuce	655	.002 - .013	1
Oranges	659	.002 - .013	1
Potatoes	670	.002 - .013	0.1
Sweet Corn	462	.002 - .013	1
Sweet Peas	433	.002 - .013	1

Pesticide	No. of Samples Analyzed	Range of LODs for Non-Detects, ppm	Tolerance Level, ppm
33. Parathion Methyl			
Broccoli	637	.002 - .013	1
Green Beans	591	.002 - .013	1
Lettuce	691	.002 - .013	1
Potatoes	694	.002 - .013	0.1
Sweet Corn	462	.002 - .013	1
Sweet Peas	433	.002 - .050	1
34. Permethrins			
Potatoes	694	.005 - .040	0.05
Sweet Corn	462	.005 - .040	0.1
35. Phorate			
Green Beans	463	.002 - .044	0.1
Lettuce	540	.002 - .044	0.1
Sweet Corn	420	.001 - .044	0.1
36. Phosmet			
Oranges	683	.006 - .024	5
Potatoes	694	.006 - .030	0.1
Sweet Corn	462	.006 - .030	0.5
Sweet Peas	433	.006 - .030	0.5
37. Phosphamidon			
Broccoli	459	.002 - .040	0.5
Oranges	448	.002 - .047	0.75
Potatoes	494	.002 - .093	0.1
38. Propargite			
Green Beans	586	.010 - .15	20
Oranges	682	.008 - .30	5
Potatoes	687	.014 - .18	0.1
Sweet Corn	462	.020 - .15	0.1
39. Quintozene (PCNB) (Includes PCB & HCB)			
Bananas	640	.003 - .007	0.1
Broccoli	679	.003 - .007	0.1

APPENDIX G. NUMBER OF NON-DETECTED RESIDUES BY PESTICIDE/COMMODITY PAIRS
(Pairs with established tolerances and pairs requested by EPA)

Pesticide	No. of Samples Analyzed	Range of LODs for Non-Detects, ppm	Tolerance Level, ppm
40. Terbufos			
Bananas	429	.002 - .030	0.025
Sweet Corn	420	.002 - .030	0.05
41. Trifluralin			
Broccoli	491	.003 - .030	0.05
Grapes	423	.003 - .025	0.05
Lettuce	539	.003 - .029	0.05
Oranges	468	.003 - .074	0.05
Peaches	273	.003 - .029	0.05
Sweet Peas	333	.003 - .054	0.05
42. Vinclozolin			
Lettuce	636	.004 - .014	10

KEY

(1) Numbers listed for DDT and metabolites are Action Levels established by FDA.

(2) Dichlorvos is also a breakdown product of Naled. Except for lettuce, tolerances shown are listed under Naled.

(3) Numbers listed for this commodity are Action Levels established by FDA

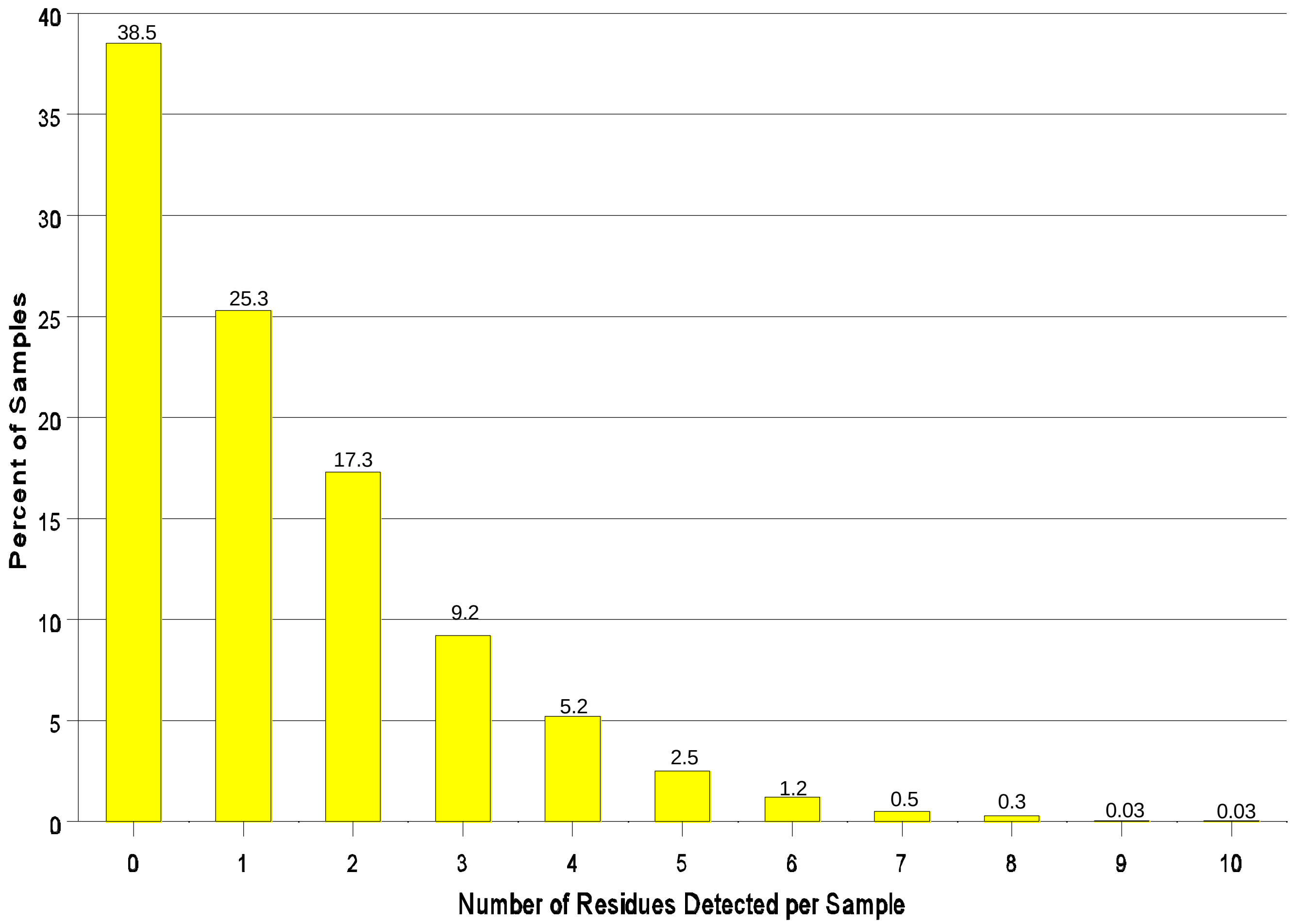
Appendix H

Percentage of Samples vs. Number of Residues Detected per Sample

(Fresh and Processed Commodities)

Appendix H shows the percentage of samples per commodity containing 0 to 10 residues per sample. Shown at the bottom of the graph are the overall number of samples and percentages (of the total number of samples analyzed) for each detection group. For example, of the 7,589 samples tested, 38.5 had no detectable residues and 36.3 percent had more than one residue.

APPENDIX H. PERCENTAGE OF SAMPLES vs. NUMBER OF RESIDUES DETECTED PER SAMPLE (Fresh and Processed Commodities)



Number of Residues Detected per Sample

	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Number of Samples	2918	1918	1313	700	396	193	89	38	20	2	2

TOTAL NUMBER OF SAMPLES = 7,589