Food and Drug Administration
Pesticide Program

Residue Monitoring 1999

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This is the thirteenth annual report summarizing the results of the Food and Drug Administration's (FDA) pesticide residue monitoring program. Eight of the twelve previous reports were published in the *Journal of the Association of Official Analytical Chemists/Journal of AOAC International*; these presented results from Fiscal Years (FY) 1987 through 1994. Results from FY 1995 through FY 1998 were published on FDA's World Wide Web site. This report includes findings obtained during FY 1999 (October 1, 1998 through September 30, 1999) under regulatory and incidence/level monitoring. Selected Total Diet Study findings for 1999 are also presented. Results in this and earlier reports continue to demonstrate that levels of pesticide residues in the U.S. food supply are well below established safety standards.

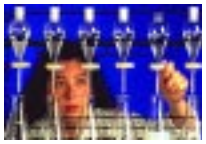
FDA Monitoring Program

Three federal government agencies share responsibility for the regulation of pesticides. The Environmental Protection Agency (EPA) registers (*i.e.,* approves) the use of pesticides and sets tolerances (the maximum amounts of residues that are permitted in or on a food) if use of a particular pesticide may result in residues in or on food (1). Except for meat, poultry, and certain egg products, for which the Food Safety and Inspection Service (FSIS) of the U.S. Department of Agriculture (USDA) is responsible, FDA is charged with enforcing tolerances in imported foods and in domestic foods shipped in interstate commerce. FDA also acquires incidence/level data on particular commodity/pesticide combinations and carries out its market basket survey, the Total Diet Study. Since 1991, USDA's Agricultural Marketing Service (AMS), through contracts with participating states, has carried out a residue testing program directed at raw agricultural products and various processed foods. FSIS and AMS report their pesticide residue data independently.

Regulatory Monitoring

Under this approach to pesticide residue monitoring, FDA samples individual lots of domestically produced and imported foods and analyzes them for pesticide residues to enforce the tolerances set by EPA. Domestic samples are collected as close as possible to the point of production in the distribution system; import samples are collected at the point of entry into U.S. commerce. Emphasis is on the raw agricultural product, which is analyzed as the unwashed, whole (unpeeled), raw commodity. Processed foods are also included. If illegal residues (above EPA tolerance or no tolerance for that particular food/pesticide combination) are found in domestic samples, FDA can invoke various sanctions, such as a seizure or injunction. For imports, shipments may be stopped at the port of entry when illegal residues are found. "Detention without physical examination" (previously called automatic detention) may be invoked for imports based on the finding of one violative shipment if there is reason to believe that the same situation will exist in future lots during the same shipping season for a specific shipper, grower, geographic area, or country.

Factors considered by FDA in planning the types and numbers of samples to collect include review of recently generated state and FDA residue data, regional intelligence on pesticide use, dietary importance of the food, information on the amount of domestic food that enters interstate commerce and of imported food, chemical characteristics and toxicity of the pesticide, and production volume/pesticide usage patterns.



Analytical Methods

To analyze the large numbers of samples whose pesticide treatment history is usually unknown, FDA uses analytical methods capable of simultaneously determining a number of pesticide residues. These multiresidue methods (MRMs) can determine about half of the approximately 400 pesticides with EPA tolerances, and many others that have no tolerances. The most commonly used MRMs can also detect many metabolites, impurities, and alteration products of pesticides (2).

Single residue methods (SRMs) or selective MRMs are used to determine some pesticide residues in foods (2). An SRM usually determines one pesticide; a selective MRM measures a relatively small number of chemically related pesticides. This type of methods is usually more resource-intensive per residue. Therefore, SRMs are much less cost effective than MRMs.

The lower limit of residue measurement in FDA's determination of a specific pesticide is usually well below tolerance levels, which generally range from 0.1 to 50 parts per million (ppm). Residues present at 0.01 ppm and above are usually measurable; however, for individual pesticides, this limit may range from 0.005 to 1 ppm. In this report, the term "trace" is used to indicate residues detected, but at levels below the limit of quantitation (LOQ).

FDA/State Cooperation

FDA field offices interact with their counterparts in many states to increase FDA's effectiveness in pesticide residue monitoring. Memoranda of Understanding or more formal Partnership Agreements have been established between FDA and various state agencies. These agreements provide for more efficient monitoring by broadening coverage and eliminating duplication of effort, thereby maximizing federal and state resources allocated for pesticide activities. These arrangements vary from data sharing, joint planning, and state collection of samples for FDA examination, to FDA/State division of collection, analytical, and enforcement follow-up responsibilities for individual commodities or products of particular origin (*i.e.,* imported *vs.* domestic products).

Animal Feeds

In addition to monitoring foods for human consumption, FDA also samples and analyzes domestic and imported feeds for pesticide residues. FDA's Center for Veterinary Medicine (CVM) directs this portion of the Agency's monitoring via its Feed Contaminants Compliance Program. Although animal feeds containing violative pesticide residues may present a potential hazard to a number of different categories of animals (*e.g.,* laboratory animals, pets, wildlife, etc.), CVM's monitoring focuses on feeds for livestock and poultry, animals that ultimately become, or produce, foods for human consumption.

International Activities

FDA participates in several international agreements in an effort to minimize incidents of violative residues and remove trade barriers. A standing request for information from foreign governments on pesticides used on their food exported to the U.S. exists, a provision of the Pesticide Monitoring Improvements Act.

Under the auspices of the North American Free Trade Agreement (NAFTA), the U.S., Mexico, and Canada have established a NAFTA Technical Working Group on Pesticides (TWG). The NAFTA Pesticide TWG now serves as the focal point for all pesticide issues that arise among the three NAFTA countries. The TWG reports directly to the NAFTA Sanitary and Phytosanitary Committee.

One of the major goals of the TWG is to ensure that pesticide registrations and tolerances/maximum residue limits in the three countries are harmonized to the extent practical, while strengthening protection of public health and the environment. A number of projects has been undertaken by the TWG to identify differing residue limits in the NAFTA countries and to determine what steps might be taken to harmonize the limits. While this process is difficult, the TWG envisions eventual movement toward a "North America" pesticide registration and tolerance system so that citizens of all three countries can be assured of the safety and legality of foods produced in any one of the NAFTA countries. FDA's activities on the TWG complement its ongoing trilateral cooperation with its counterparts in Mexico and Canada.

Beyond the North American agreements, FDA continues to collaborate with New Zealand to implement a "residue compliance assurance program." New Zealand, historically having excellent compliance with U.S. pesticide tolerances, is implementing a plan whereby their government would provide assurances that selected commodities exported to the U.S. would be in full compliance with U.S. tolerances.




Incidence/Level Monitoring

FDA's pesticide program includes incidence/level monitoring to complement regulatory monitoring. This approach increases FDA's knowledge about particular pesticide/commodity combinations. This information is acquired by analyses of randomly selected samples to determine the presence and levels of selected pesticides. In 1999, FDA issued two special assignments, to determine incidences and levels of certain pesticides in wheat entering the U.S. from Canada, and to determine incidences and levels of forchlorfenuron, a growth regulator, on grapes entering the U.S. from Mexico.

Total Diet Study

The Total Diet Study is the other major element of FDA's pesticide residue monitoring program (3). In its previous annual pesticide reports, FDA provided Total Diet Study findings for 1987-1998 (4a, 4b). More detailed information, including estimated dietary intakes of pesticide residues covering June 1984-April 1986 (5) and July 1986-April 1991 (6), has been published. In September 1991, FDA implemented revisions to the Total Diet Study that were formulated in 1990 (7). These revisions primarily consisted of collection and analysis of an updated and expanded number of food items, addition of six age/sex groups (for a total of 14), and revised analytical coverage. Details of that revision are published (8, 9).

In conducting the Total Diet Study, FDA personnel purchase foods from supermarkets or grocery stores four times per year, once from each of four geographic regions of the country. The 261 foods that comprise each of the 4 market baskets represent over 3,500 different foods reported in USDA food consumption surveys; for example, apple pie represents all fruit pies and fruit pastries. Each market basket is a composite of like foods purchased in three cities in a given region. The foods are prepared table-ready and then analyzed for pesticide residues (as well as radionuclides, industrial chemicals, toxic elements, trace and macro elements, and folic acid). The levels of pesticides found are used in conjunction with USDA food consumption data to estimate the dietary intakes of the pesticide residues.

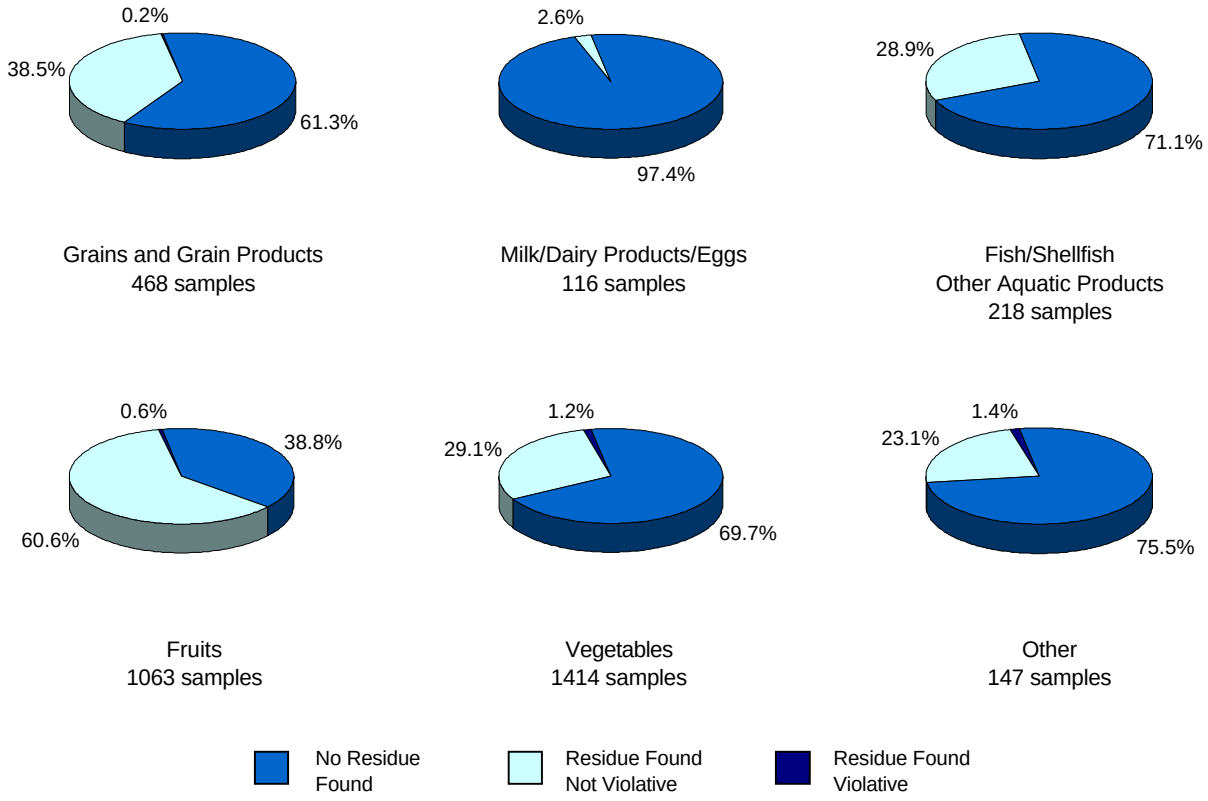
Results and Discussion

Regulatory Monitoring

Under regulatory monitoring, 9,438 samples were analyzed. Of these 3,426 were domestic and 6,012 were imports.

Figure 1 shows the percentage of the 3,426 domestic samples by commodity group with no residues found, nonviolative residues found, and violative residues found. (A violative residue is defined in this report as a residue which exceeds a tolerance or a residue at a level of regulatory significance for which no tolerance has been established in the sampled food.)

Figure 1. Summary of Results of Domestic Samples by Commodity

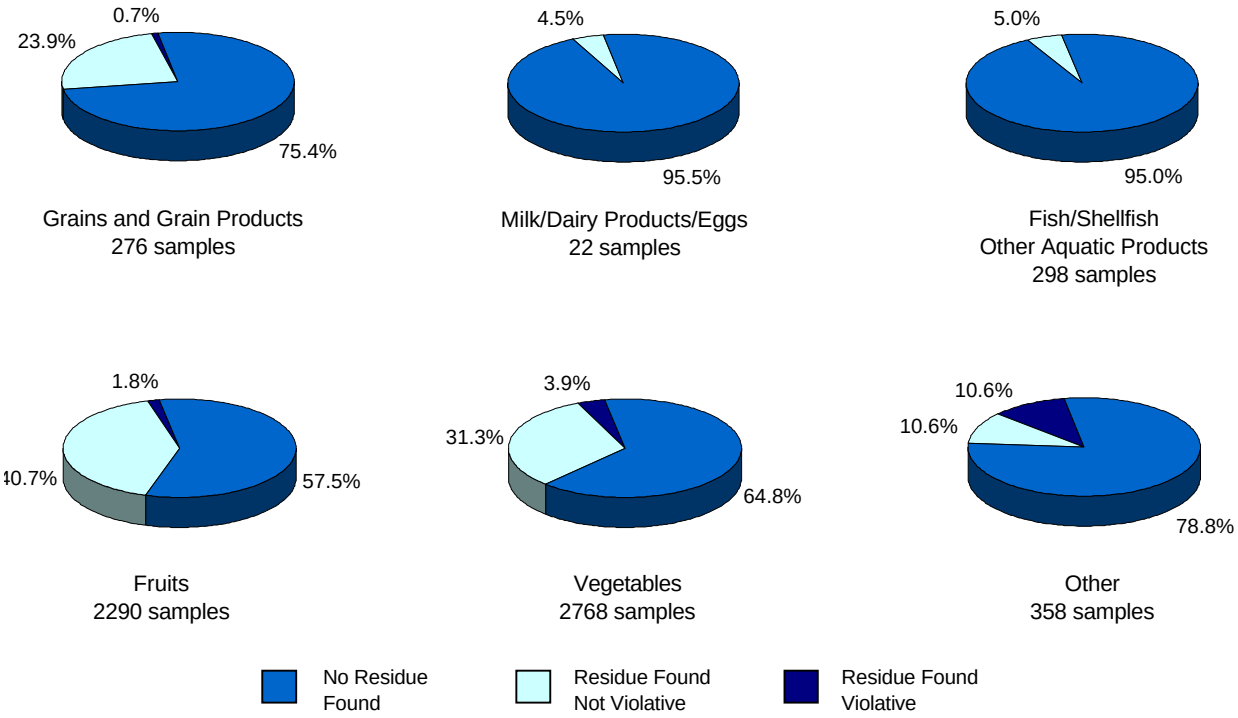


As in earlier years, fruits and vegetables accounted for the largest proportion of the commodities analyzed in 1999; those two commodity groups comprised 72.3% of the total number of domestic samples. In 1999, no violative residues were found in 99.2% of all domestic samples (99.1% in 1996, 98.8% in 1997, 99.2 % in 1998.).

Appendix A contains more detailed data on domestic monitoring findings by commodity, including the total number of samples analyzed, the percent samples with no residues found, and the percent violative samples. Of the 3,426 domestic samples, 60.2% had no detectable residues and 0.8% had violative residues. In the largest commodity groups, fruits and vegetables, 38.8% and 69.7% of the samples, respectively, had no residues detected. 0.6% of the fruit samples and 1.2% of the vegetable samples contained violative residues (Figure 1). In the grains and grain products group, 61.3% of the samples had no residues detected, and 0.2% had violative residues. In the fish/shellfish/other aquatic products group, 71.1% had no detectable residues, and no violative residues were found. In the milk/dairy products/eggs group, 97.4% of the samples had no residues detected, and no violative residues were found. 38 samples of baby foods or formula were analyzed (see category Other). This total included 20 vegetable, 4 cereal, and 14 fruit juice samples. None of the samples had violative residues.

Findings by commodity group for the 6,012 import samples are shown in Figure 2. Fruits and vegetables accounted for 84.1% of these samples. Overall, no violative residues were found in 96.9% of the import samples (97.4% in 1996, 98.4% in 1997, 97.0% in 1998).

Figure 2. Summary of Results of Import Samples by Commodity



Appendix B contains detailed data on the import samples. Of the 6,012 samples analyzed, 65.0% had no residues detected, and 3.1% had violative residues. Fruits and vegetables had 57.5% and 64.8%, respectively, with no residues detected. The fruit group and the vegetable group had 1.8% and 3.9%, respectively, with violative residues. No residues were found in 95.5% of the milk/dairy products/eggs group and in 95.0% of the fish/shellfish group, and no violative residues were found in either of those groups. In the grains and grain products group, 75.4% had no detectable residues, and 0.7% had violative residues.

Pesticide monitoring data collected under FDA's regulatory monitoring approach in 1999 are available to the public as a computer database. This database summarizes FDA 1999 regulatory monitoring coverage and findings by country/commodity/pesticide combination. The database also includes the monitoring data by individual sample from which the summary information was compiled. Information on how to obtain this database as well as those for 1992–1998 is provided at the end of this report.

Geographic Coverage

Domestic. 3,426 domestic samples were collected in 1999 from 47 states (no samples were collected from Rhode Island, New Hampshire, or Oklahoma) and from Puerto Rico. The largest numbers of samples were collected from those states that are the largest producers of fruits and vegetables. Table 1 lists numbers of domestic samples from each location, in order of descending numbers of samples.

Table 1. Domestic Samples Collected and Analyzed, by State[a], in 1999

Washington	747	Michigan	68	Alabama	25	Delaware	9
California	403	Missouri	68	North Dakota	24	New Mexico	9
Florida	338	Ohio	60	South Carolina	24	West Virginia	9
Louisiana	162	Texas	60	Iowa	21	Hawaii	8
Minnesota	145	Arizona	54	Kansas	19	Utah	8
Illinois	138	Indiana	53	Nebraska	17	Arkansas	3
New York	118	New Jersey	46	Wyoming	15	Nevada	3
Montana	118	Maryland	34	Georgia	14	Vermont	2
Wisconsin	113	Kentucky	33	North Carolina	12	Connecticut	1
Oregon	112	South Dakota	33	Colorado	11	Maine	1
Idaho	101	Pennsylvania	30	Massachusetts	11	Mississippi	1
Virginia	73	Tennessee	29	Alaska	10		

[a]Other domestic samples: Puerto Rico, 33 samples.

Import. 6,012 samples representing food shipments from 92 countries were collected. (The origin of some additional samples was unspecified.) Table 2 lists numbers of samples collected from each country. Mexico, as usual, was the source of the largest number of samples, reflecting the volume and diversity of commodities imported from that country, especially during the winter months.

Table 2. Foreign Countries and Number of Samples Collected and Analyzed in 1999

Mexico	2463	Pakistan	46
Chile	540	Korea, Rep. of (South)	45
China, Peoples Rep.	248	Philippines	44
Canada	220	US misc. Pacific Is.	43
Netherlands (Holland)	191	Brazil	41
Thailand	169	Lebanon	39
Guatemala	155	South Africa	33
Ecuador	139	Egypt	31
India	129	Greece	31
Costa Rica	113	Poland	27
Spain (inc. Canary Is.)	101	Jamaica	25
Peru	98	Unspecified	25
Dominican Republic	90	Germany, Federal Rep.	22
Italy	76	Honduras	22
Viet-Nam, Rep. of	66	France	21
Taiwan, Republic of	61	Indonesia	21
Israel	60	Panama	20
Belgium	59	United Kingdom	20
New Zealand	57	Japan	17
Turkey	57	Denmark	13
Colombia	55	Morocco	12
Australia	53	Nicaragua	12
Argentina	52	Hong Kong	11

Ten or fewer samples collected from the following:

Austria
Bangladesh
Belize
Bhutan
Bolivia
Bulgaria
Croatia
Cyprus
El Salvador
Estonia
Ethiopia
Fiji
Finland
Ghana
Grenada
Haiti
Hungary
Ireland
Ivory Coast
Jordan
Kenya
Macedonia
Malaysia
Mauritius
Moldova (Moldavia)
Mozambique
Nigeria
Norway
Papua New Guinea
Portugal (inc. Azores)
Russia
Saudi Arabia
Singapore
Slovenia
St. Lucia
St. Pierre & Miquelo
St. Vincent
Sweden
Switzerland
Tonga
Trinidad & Tobago
United Arab Emirates
Uruguay
Venezuela
Western Samoa
Zambia

Domestic/Import Violation Rate Comparison

In 1999, 3,426 domestic and 6,012 import samples were collected and analyzed. Pesticide residues were detected in 39.8% of the domestic samples and in 35.0% of the import samples. Only 0.8% of the domestic samples and only 3.1% of the import samples were violative. Among grains and grain products, the violation rate was 0.2% domestic *vs.* 0.7% import. No violations were found in the milk/dairy products/eggs group or the fish/shellfish/other aquatic products group among either domestic or import samples. Of domestic fruits, 0.6% were violative; of import fruits, the violation rate was 1.8%. Of vegetables, 1.2% of domestic samples and 3.9% of import samples were violative. In the category "Other" the rates for domestic and import samples were, respectively, 1.4% and 10.6%. Except for this last category, the overall rate of violations is approximately one domestic violation for three import violations. Of the violative samples, eight of the domestic ones and 19 of the import ones contained pesticide residues at levels which exceeded the tolerance for the given chemical in the given commodity. The remainder of the violative samples contained pesticide residues which were not registered in the U.S. for use in the commodities in which they were found; 18 domestic samples and 169 import samples fell in this category.

Pesticide Coverage

Table 3 lists the 366 pesticides that were detectable by the methods used; each of the 90 pesticides that were actually found is indicated by an asterisk.

FDA conducts ongoing research to expand the pesticide coverage of its monitoring program. This research includes testing the behavior of new or previously untested pesticides through existing analytical methods, and development of new methods to cover pesticides that cannot be determined by methods currently used by FDA. The research encompasses both U.S.-registered pesticides and foreign-use pesticides that are not registered in the U.S. The list of pesticides detectable for 1999 (Table 3) reflects the addition of a number of pesticides whose recovery through the analytical methods used was demonstrated as a result of ongoing research.

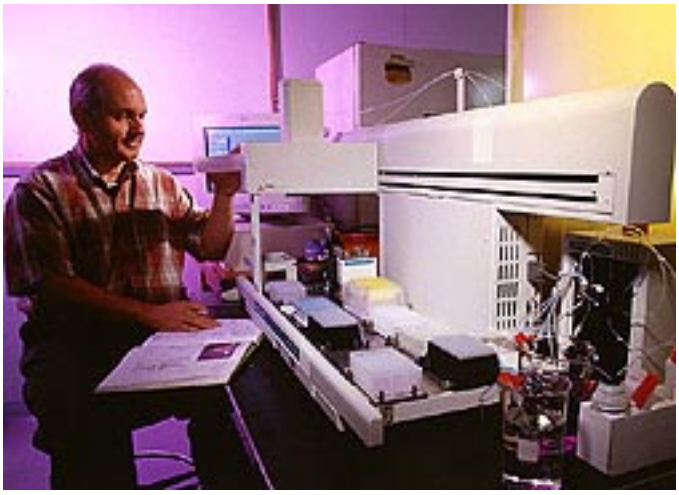


Table 3. Pesticides Detectable and Found (*) by Methods Used in 1999 Regulatory Monitoring[a,b]

2,4-dichloro-6-nitro benzenamine
4(phenylamino)phenol*
acephate*
acetochlor
acrinathrin
alachlor
aldicarb*
aldrin
allethrin
allidochlor
alpha-cypermethrin
ametryn
aminocarb
amitraz
anilazine
Aramite
atrazine*
azinphos-ethyl
azinphos-methyl*
bendiocarb
benfluralin
benodanil
benomyl/carbendazim[c]
benoxacor
bensulide
benzoylprop-ethyl
6-benzyladenine
BHC*
bifenox
bifenthrin*
binapacryl
biphenyl*
bitertanol
bromacil
bromophos
bromophos-ethyl
bromopropylate
bromoxynil
bromuconazole
bufencarb
Bulan
bupirimate
butachlor
butralin
butylate
cadusafos
captafol
captan*
carbaryl*
carbofuran
carbophenothion
carbosulfan
carboxin
carfentrazone ethyl ester
chlorbenside
chlorbromuron
chlorbufam
chlordane*
chlordecone
chlordimeform*
chlorethoxyfos
chlorfenapyr
chlorfenvinphos
chlorflurecol methyl ester
chlorimuron ethyl ester
chlornitrofen
chlorobenzilate
3-chloro-5-methyl-4-nitro-1H-pyrazole
chloroneb
chloropicrin
chloropropylate
chlorothalonil*
chloroxuron
chlorpropham*
chlorpyrifos*
chlorpyrifos-methyl*
chlorthiophos
clomazone
coumaphos
crotoxyphos
crufomate
cyanazine
cyanofenphos
cyanophos
cycloate
cycluron
cyfluthrin
cymoxanil
cypermethrin*
cyprazine
cyproconazole
cyprodinil
DCPA*
DDT*
deltamethrin
deltamethrin, trans
demeton*
desmetryn
dialifor
di-allate
N,N-diallyl-dichloro= acetamide
diazinon*
dichlobenil
dichlofenthion
dichlofluanid*
dichlone
4-(dichloroacetyl)-1-oxa-4-azapiro[4.5]decane
2,6-dichlorobenzamide
dichlorvos*
diclobutrazol
diclofop-methyl
dicloran*
dicofol*
dicrotophos
dieldrin*
diethatyl-ethyl
Dilan
dimethachlor
dimethametryn
dimethipin
dimethoate*
dinitramine
dinobuton
dinocap
dioxabenzofos
dioxacarb
dioxathion
diphenamid
diphenylamine*
dipropetryn
disulfoton*
diuron
edifenphos
endosulfan*
endrin*
EPN
esfenvalerate*
etaconazole
ethalfluralin
ethephon
ethiofencarb
ethion*
ethofumesate
ethoprop
ethoxyquin*
ethylenebisdithio= carbamates*[d]
etridiazole
etrimfos*
famphur
fenamiphos
fenarimol
fenbuconazole
fenfuram
fenitrothion
fenoxaprop ethyl ester
fenoxycarb
fenpropathrin*
fenpropimorph
fenson
fensulfothion
fenthion
fenvalerate*
fipronil
flamprop-M-isopropyl
flamprop-methyl

[a] The list of pesticides detectable is expressed in terms of the parent pesticide. However, monitoring coverage and findings may have included metabolites, impurities, and alteration products.
[b] Some of these pesticides are no longer manufactured or registered for use in the United States.
[c] The analytical methodology determines carbendazim, which may result from use of benomyl or carbendazim.
[d] Such as maneb.

Table 3 (continued)

fluazifop butyl ester
fluchloralin
flucythrinate
fludioxinil
flusilazole
fluvalinate*
folpet*
fonofos
formothion
fosthiazate
fuberidazole
furilazole
Gardona
heptachlor*
heptenophos
hexachlorobenzene*
hexaconazole
hexazinone
hexythiazox
imazalil*
imazamethabenz methyl ester
iprobenfos
iprodione*
iprodione metabolite isomer*
isazofos
isocarbamid
isofenphos
isoprocarb
isopropalin
isoprothiolane
isoxaben
isoxaflutole
lactofen
lambda-cyhalothrin
lenacil
leptophos
lindane*
linuron*
malathion*
mecarbam*
mephosfolan
merphos
metalaxyl*
metaldehyde*
metasystox thiol
metazachlor
methabenzthiazuron
methamidophos*
methidathion*
methiocarb*
methomyl*
methoprotryne
methoxychlor*
2-methoxy-5,6-trichloropyridine
methyl chloride*
metobromuron
metolachlor
metolcarb
metribuzin
mevinphos*
MGK 264
mirex
molinate
monocrotophos*
monolinuron
monuron
myclobutanil*
naled*
napropamide
naptalam*
neburon
nitralin
nitrapyrin
nitrofen
nitrofluorfen
nitrothal-isopropyl
norea
norflurazon
nuarimol
octhilinone
ofurace
omethoate*
ovex
oxadiazon
oxadixyl
oxamyl*
oxydemeton-methyl
oxyfluorfen
oxythioquinox
paclobutrazol
paraquat
parathion*
parathion-methyl*
pebulate
penconazole
pendimethalin
pentachlorobenzene*
pentachlorobenzonitrile
pentachlorophenyl methyl ether*
permethrin*
Perthane
phenmedipham*
phenothrin
phenthoate
phenylphenol, ortho-*
phorate*
phosalone*
phosmet*
phosphamidon*
phoxim oxygen analog
piperonyl butoxide
piperophos
pirimicarb
pirimiphos-ethyl
pirimiphos-methyl*
pretilachlor
probenazole
prochloraz
procyazine
procymidone*
prodiamine
profenofos
profluralin
Prolan
promecarb
prometryn
pronamide
propachlor
propanil
propargite*
propazine
propetamphos
propham
propiconazole
propoxur*
prothiofos
prothoate
pyracarbolid
pyrazon
pyrazophos*
pyrethrins
pyridaphenthion
pyrimethanil
pyriproxyfen
quinalphos*
quintozene*
quizalofop ethyl ester
ronnel
S-bioallethrin
schradan
secbumeton
simazine*
simetryn
Strobane
sulfallate
sulfotep*
Sulphenone
sulprofos
TCMTB
tebuconazole
tebupirimfos
tecnazene
tefluthrin
TEPP
terbacil
terbufos
terbumeton
terbuthylazine
terbutryn
tetradifon
tetraiodoethylene
tetrasul
thiabendazole*
thiazopyr
thiodicarb
thiometon
thionazin
thiophanate-methyl
THPI*
tolylfluanid
toxaphene
tralomethrin
traloxydim
triadimefon*
triadimenol*
tri-allate
triazamate
triazophos
tribufos*
trichlorfon
tricyclazole
tridiphane
trietazine
triflumizole
trifluralin*
triflusulfuron methyl ester
trimethacarb
vamidothion sulfone
vernolate
vinclozolin*
XMC

Animal Feeds

In 1999, 463 domestic and 61 import feed samples were collected and analyzed for residues. Of the 463 domestic samples, 274 (59.2%) contained no detectable pesticide residues, and 7 (1.5%) contained residues which exceeded regulatory guidance (Table 4). Of the 61 import samples, 33 (54.1%) contained no detectable pesticide residues, and 10 (16.4%) contained residues which exceeded regulatory guidance.

The following 5 residues in domestic samples were considered to have exceeded regulatory guidance because there is no tolerance or action level established for the pesticide-commodity combination: 0.028 ppm of chlorpyrifos-methyl on a sample of hominy (feed) from Texas (collected by the Dallas district); 0.047 ppm of chlorpyrifos-methyl on a soybean meal sample from Iowa (collected by the Kansas City district); 0.422 ppm of chlorpyrifos-methyl on a chopped corn sample from Colorado (collected by the Denver district); 0.036 ppm of captafol on a barley sample from Maryland (collected by the Philadelphia district); 0.039 ppm vinclozolin on a canola meal sample from South Dakota (collected by the Minneapolis district).

Two domestic samples had residues that exceeded an EPA tolerance or a FDA requested maximum level. A sample of soybean meal from Kansas and collected by the Kansas City district contained 0.254 ppm of diazinon. This residue exceeded the 0.1 ppm tolerance for diazinon on soybeans in 40 CFR 180.153. The Dallas district collected a sample of bite size dry dog food that contained 125 ppm of ethoxyquin. In 1997, the FDA requested that the maximum level of ethoxyquin in complete dog foods be voluntarily lowered from 150 ppm to 75 ppm.

Ten import samples from Canada (9 canola fines, 1 canola meal) contained 18 pesticide residues that exceeded regulatory guidance. These 10 samples were collected by the Seattle district and contained residues of chlorpyrifos (n=10; range of 0.020-0.090 ppm), malathion (n=7; range of 0.016-1.45 ppm), and vinclozolin (n=1; 0.024 ppm). No tolerance has been established for chlorpyrifos, malathion, or vinclozolin on canola by the EPA.

In the 189 domestic samples of feed in which one or more pesticides were detected, there were 307 residues (233 quantifiable and 74 trace). Malathion, chlorpyrifos-methyl, chlorpyrifos, and diazinon were the most frequently found and accounted for 76.5% of all residues detected (Table 5).

Table 4. Summary of 1999 Domestic Feed Samples

Type of Feed	Total # Samples	Without residues #	Without residues %	Exceeding Guidance #	Exceeding Guidance %
Whole/Ground Grains	173	121	69.9	2	1.2
Plant By-products	117	66	56.4	4	3.4
Mixed Feed Rations	99	39	39.4	1	1.0
Animal By-products	49	32	65.3	0	0.0
Supplements	13	8	61.5	0	0.0
Hay & Hay Products	12	8	66.7	0	0.0
Total	**463**	**274**	**59.2**	**7**	**1.5**

Table 5. Residues Found in Domestic Feeds in 1999

Pesticide	# of Samples with Trace Amount[a]	# of Samples with Quantifiable Levels	Range[b] (ppm)	Median[b] (ppm)
malathion	21	102	0.005 - 6.830	0.111
chlorpyrifos-methyl	22	43	0.013 - 0.422	0.081
chlorpyrifos	10	15	0.018 - 1.400	0.070
diazinon	3	19	0.012 - 0.254	0.041
methoxychlor (p,p' + o,p')	6	6	0.002 - 0.049	0.028
ethion	2	7	0.011 - 0.511	0.053
iprodione + metabolite	0	6	0.500 - 4.500	0.900
carbaryl	3	1	2.500	N/A
tribufos (DEF)	1	3	0.038 - 0.095	0.055
imazalil	0	4	0.150 - 0.900	0.150
lindane	0	4	0.012 - 0.037	0.020
dieldrin	1	2	0.024 - 0.030	0.027
ethoxyquin[c]	0	3	3.500 - 432.0	125.0
permethrin	0	3	0.043 - 0.900	0.200
all others[d]	5	15	0.034 - 7.500	0.120

[a] Residue found is below that normally quantifiable, but its presence and identity are known.

[b] In samples containing quantifiable levels.

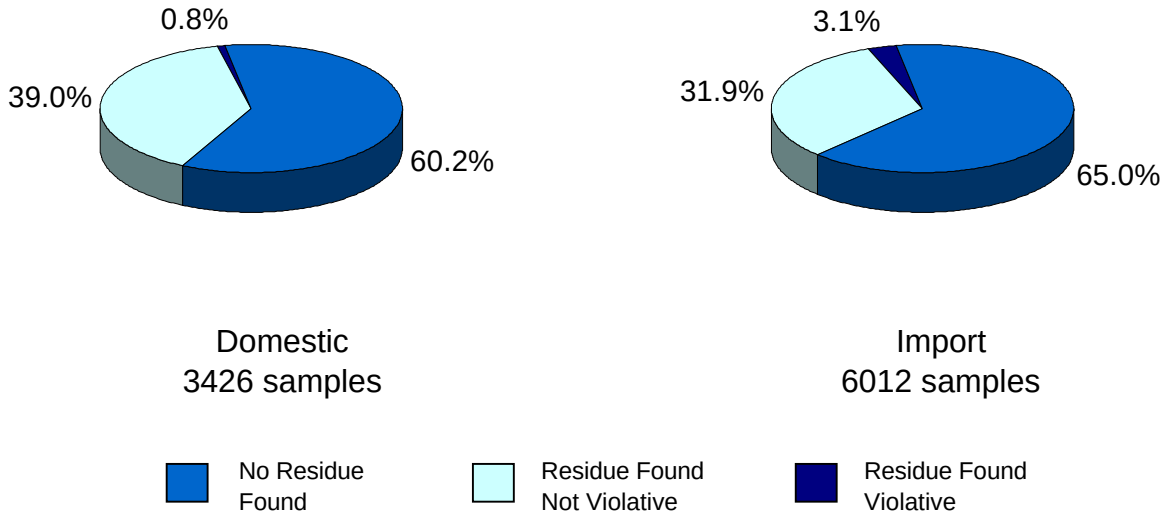
[c] Ethoxyquin is approved as a pesticide (plant regulator) at levels up to 3 ppm in 40 CFR 180.178. Ethoxyquin is also a feed additive (anti-oxidant) that is approved at levels up to 150 ppm in a finished article (21 CFR 573.380). The 432.0 ppm value was present in a fish meal sample.

[d] n=2 for azinphos-methyl, captan, parathion or its methyl homolog, phosmet, and piperonyl butoxide; n=1 for captafol, chlordane (cis + trans), DCPA, dimethoate, endosulfan (I + II), nonachlor (trans), pirimiphos-methyl, polychlorinated biphenyl, thiabendazole, and vinclozolin.

Summary: Regulatory Monitoring

No residues were found in 60.2% of domestic and in 65.0% of import samples (Figure 3) analyzed under FDA's regulatory monitoring approach in 1999. Only 0.8% of domestic and 3.1% of import samples had residue levels that were violative. The findings for 1999 demonstrate that pesticide residue levels in foods are generally well below EPA tolerances, corroborating results presented in earlier reports (4a, 4b). Animal feed samples (463 domestic, 61 import) were analyzed. 59.2% of the domestic samples and 54.1% of the import samples contained no residues.

Figure 3. Summary of Results of Domestic vs. Import Samples



Incidence/Level Monitoring

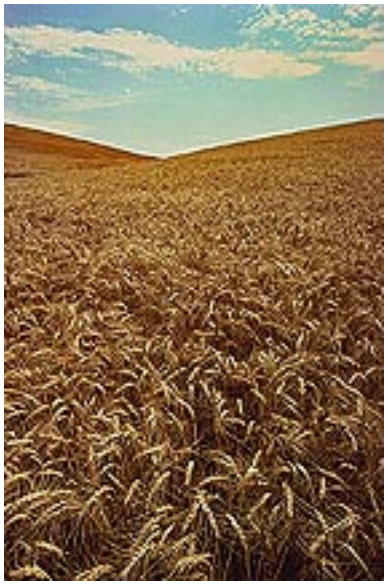
Special Surveys

Wheat. In 1999, FDA issued a special assignment to determine incidences and levels of certain pesticides in wheat entering the U.S. from Canada. Specifically, a total of 30 samples of whole grain wheat entering the U.S. from Canada was analyzed for 17 pesticide chemicals, including seven chlorophenoxy acids, which are registered for use on wheat in the U.S. and/or in Canada.

Samples of whole grain wheat were collected by the Minneapolis and Detroit Districts, since they were responsible for the ports where most of wheat from Canada enters the U. S. All 30 samples were sent to the Pacific Regional Laboratory Northwest for the determination of ten pesticides (10). Each sample composite was sent to the Kansas City District laboratory to determine the presence of the chlorophenoxy acids (11). Residues were found in only one wheat sample, 0.002 ppm of dicamba and 0.012 ppm of 2,4-D. These residue levels are well below the U.S. tolerances, which are 2.0 ppm and 0.5 ppm respectively.

Grapes. In 1999, FDA issued a special assignment to determine incidences and levels of forchlorfenuron, a growth regulator, on grapes entering the U.S. from Mexico. FDA had received information that grapes from Mexico might have been treated with forchlorfenuron to improve the growth of berries. Forchlorfenuron is not registered for use in the U.S. Specifically, a total of 52 samples of grapes entering the U.S. from Mexico was analyzed for forchlorfenuron (12).

Samples of fresh table grapes (29 Superior, 18 Flame, 1 Ruby, 1 Red Globe, 3 Thompson) were collected and analyzed for forchlorfenuron by the Los Angeles District, since it was responsible for the ports where nearly all grapes from Mexico enter the U.S. No forchlorfenuron was detected in these samples. The limit of quantitation is 0.003 ppm.



Summary: Incidence/Level Monitoring

Results of the survey of wheat and grapes show that, as in FDA's regulatory monitoring, the levels of most pesticide residues found in these two commodities are generally well below U.S. tolerances, and no violative residues were found.

Total Diet Study

The Total Diet Study (TDS) is distinct from regulatory monitoring in that it determines pesticide residues in foods prepared for consumption (3). To measure the low levels of residues found in the TDS foods, the analytical methods used are modified to permit measurement at levels 5-10 times lower than those normally used in regulatory monitoring. In general, residues present at or above 1 part per billion can be measured. Of the nearly 200 chemicals that can be determined for the analytical methods used, 104 individual residues were found in the foods analyzed in the four market baskets reported here (Market Baskets 98-3, 98-4, 99-1, and 99-2). Among these were 55 pesticides, including 11 which represent more than one related compound counted as a "total", 18 volatile organic compounds for which 70 TDS foods per basket are now being examined, and 10 other organic compounds.

Table 6 lists the 20 most frequently found residues (those found in >2% of the samples), the total number of findings, and the percent occurrence in the four market baskets analyzed in 1999 (1040 food items). The five most frequently observed chemicals, DDT, chlorpyrifos-methyl, malathion, endosulfan, and dieldrin, are the same as those observed for the past several years. The levels of these residues, as well as the others listed in Table 6, are well below regulatory limits.

Information obtained through the TDS is used to estimate dietary intakes of pesticides; these intakes are then compared with established standards. Dietary intakes based on TDS samples collected through mid-1991 have been published previously. (5, 6) Dietary intake estimates based on samples collected since mid-1991 are expected to be published separately in the coming year; a notice will be posted on the TDS website when the paper is scheduled for publication.

For several years, FDA has collected and analyzed a number of baby foods in addition to those covered under TDS. This adjunct to the TDS included 20 different food items in the four baskets represented here (7 fruit juices, 5 fruits, 4 fruit desserts, and 4 grain products). Table 7 lists the15 pesticide residues found in four collections of these foods (78 samples total) in 1999, the percentage occurrence, and ranges of levels found.

Table 6. Frequency of Occurrence of Pesticide Residues Found in Total Diet Study Foods in 1999[a]

Pesticide[b]	Total No. of Findings	Occurrence, %
DDT	225	22
chlorpyrifos-methyl	188	18
malathion	175	17
endosulfan	151	15
dieldrin	145	14
chlorpyrifos	93	9
chlorpropham	70	7
permethrin	54	5
iprodione	48	5
chlordane	36	3
heptachlor	36	3
lindane	33	3
thiabendazole[c]	33	3
BHC, alpha+beta+delta	32	3
hexachlorobenzene	32	3
carbaryl[d]	31	3
methamidophos	29	3
methoxychlor	29	3
dicloran	28	3
dimethoate	24	2

[a] Based on 4 market baskets analyzed in 1999 consisting of 260 items each (1040 total). Only those found in >2% of the samples are shown.

[b] Isomers, metabolites, and related compounds are included with the "parent" pesticide from which they arise.

[c] Reflects overall incidence; however, only 67 selected foods per market basket (*i.e.,* 268 items total) were analyzed for the benzimidazole fungicides thiabendazole and benomyl.

[d] Reflects overall incidence; however, only 96 selected foods per market basket (*i.e.,* 384 items total) were analyzed for N- methylcarbamates.

Table 7. Frequency of Occurrence of Pesticide Residues Found in Selected Baby Foods in 1999[a]

Pesticide[b]	Total No. of Findings	Occurrence, %	Range, ppm
endosulfan	20	26	0.0001-0.0069
iprodione	16	21	0.0006-0.057
chlorpyrifos	11	14	0.0003-0.006
carbaryl[c]	10	13	0.004-0.013
permethrin	10	13	0.0006-0.060
chlorpyrifos-methyl	9	12	0.0008-0.018
malathion	9	12	0.002-0.01
thiabendazole[d]	9	12	0.018-0.324
dimethoate	5	6	0.0008-0.004
ethylenethiourea[e]	3	4	0.004-0.008
propiconazole	2	3	0.023-0.035
benomyl[d]	1	1	0.037
esfenvalerate	1	1	0.008
fenarimol	1	1	0.001
fenvalerate	1	1	0.005

[a] Based on 4 market baskets consisting of 78 total items.
[b] Isomers, metabolites, and related compounds are included with the "parent" pesticide from which they arise.
[c] Reflects overall incidence; however, only 13-14 selected foods per market basket (*i.e.,* 54 items total) were analyzed for N- methylcarbamates.
[d] Reflects overall incidence; however, only 13-14 selected foods per market basket (*i.e.,* 54 items total) were analyzed for the benzimidazole fungicides (thiabendazole and benomyl).
[e] Reflects overall incidence; however, only 11-12 selected foods per market basket (*i.e.,* 46 items total) were analyzed for ethylenethiourea.

Summary: Total Diet Study

In 1999, the types of pesticide residues found and their frequency of occurrence in TDS were generally consistent with those given in previous FDA reports (4a, 4b). The pesticide residue levels found were well below regulatory standards. An adjunct survey of baby foods in 1991-1999 also provided evidence of only small amounts of pesticide residues in those foods.

Summary

A total of 9,438 samples of domestically produced food and imported food from 92 countries was analyzed for pesticide residues in 1999. FDA collected and analyzed animal feed samples (463 domestic, 61 import) for pesticides. 59.2% of the domestic samples and 54.1% of the import samples contained no residues. Total Diet Study findings for 1999 were generally similar to those found in earlier periods; details of findings will be published separately.

This report was compiled through the efforts of the following FDA personnel: Center for Food Safety and Applied Nutrition, Washington, DC: Office of Plant and Dairy Foods and Beverages: Bernadette M. McMahon (retired), Mark S. Wirtz, Carolyn M. Makovi, and Marion Clower, Jr., Division of Pesticides and Industrial Chemicals; Young H. Lee, Division of Programs and Enforcement Policy; S. Kathleen Egan, Division of Risk Assessment; Office of Management Systems: Sharon A. Macuci, Division of Information Resources Management; Center for Veterinary Medicine, Rockville, MD: Randall Lovell; Kansas City District, Lenexa, KS: Sheila K. Egan, David F. Graham, and Mark E. Parmon.

The database containing the data from which this report was derived is also available from FDA's World Wide Web site, at http://www.cfsan.fda.gov. The 1996 through 1998 reports and databases are available at the same site. FDA pesticide monitoring data collected under the regulatory monitoring approach in 1992, 1993, 1994, and 1995 are available for purchase on personal computer diskettes from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161 (telephone 1-800-553-6847); or from NTIS's website at http://www.ntis.gov. Order numbers are: 1992, PB94-500899; 1993, PB94-501681; 1994, PB95-503132; and 1995, PB96-503156.

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Appendix A. Analysis of Domestic Samples by Commodity Group in 1999

Commodity Group	Total Samples	Samples without Residues, %	Samples Violative[a], %	# over tolerance	# no tolerance
A. Grains and Grain Products					
Corn & corn products	41	70.7	2.4		1
Oats & oat products	16	100.0	0.0		
Rice & rice products	55	69.1	0.0		
Soybeans & soybean products	33	81.8	0.0		
Wheat & wheat products	234	47.4	0.0		
Other grains & grain products	43	62.8	0.0		
Breakfast cereals	33	87.9	0.0		
Bakery products, crackers, etc.	7	57.1	0.0		
Pasta and noodles	6	100.0	0.0		
Total	**468**	**61.3**	**0.2**		
B. Milk/Dairy Products/Eggs					
Cheese & cheese products	16	100.0	0.0		
Eggs	25	92.0	0.0		
Milk/cream & milk products	75	98.7	0.0		
Total	**116**	**97.4**	**0.0**		
C. Fish/Shellfish/Other Aquatic Products					
Fish and Fish Products	156	63.5	0.0		
Shellfish & Crustaceans	61	90.2	0.0		
Other Aquatic Animals & Products	1	100.0	0.0		
Total	**218**	**71.1**	**0.0**		
D. Fruits					
Blackberries	4	25.0	75.0	2[b]	1
Blueberries	32	59.4	0.0		
Cranberries	11	54.5	0.0		
Grapes, raisins	24	50.0	0.0		
Raspberries	27	11.1	3.7		1
Strawberries	85	22.4	2.4	2[b]	
Other berries	6	83.3	0.0		
Grapefruit	24	16.7	0.0		
Lemons	9	22.2	0.0		
Limes	1	0.0	0.0		
Oranges	133	33.8	0.0		
Other citrus fruit	8	75.0	0.0		
Apples	194	37.6	0.0		
Pears	28	28.6	0.0		
Apricots	19	5.3	0.0		
Avocadoes	2	100.0	0.0		

[a] Includes samples with residues over tolerance or action level and samples with residues with no tolerance.

[b] Residue in one or more samples exceeded an action level rather than a tolerance.

Appendix A. (continued)

Commodity Group	Total Samples	Samples without Residues, %	Samples Violative[a], %	# over tolerance	# no tolerance
Cherries	78	15.4	0.0		
Nectarines	17	11.8	0.0		
Peaches	132	21.2	0.0		
Plums	7	42.9	0.0		
Bananas, plantains	5	60.0	0.0		
Mangoes	1	100.0	0.0		
Papaya	4	100.0	0.0		
Pineapple	1	0.0	0.0		
Other sub-tropical fruit	1	100.0	0.0		
Cantaloupe	41	70.7	0.0		
Honeydew	7	71.4	0.0		
Watermelon	31	90.3	0.0		
Other melons	3	100.0	0.0		
Apple juice	92	73.9	0.0		
Citrus juice	12	91.7	0.0		
Other fruit juices	11	45.5	0.0		
Fruit jams/jellies/pastes/toppings	13	23.1	0.0		
Total	**1,063**	**38.8**	**0.6**		
E. Vegetables					
Corn	100	100.0	0.0		
Peas (green/snow/sugar/sweet)	72	84.7	0.0		
String beans (green/snap/pole/long)	104	70.2	1.9	1	1
Other beans & peas & products	71	88.7	0.0		
Cucumbers	61	57.4	0.0		
Eggplant	17	94.1	0.0		
Okra	9	77.8	22.2		2
Peppers, hot	9	88.9	0.0		
Peppers, sweet	38	76.3	2.6		1
Squash/pumpkins	67	65.7	3.0	1[b]	1
Tomatoes	147	34.7	0.7		1
Other fruiting vegetables	2	50.0	0.0		
Artichokes	1	100.0	0.0		
Asparagus	44	97.7	0.0		
Broccoli	25	88.0	0.0		
Cabbage	61	90.2	1.6		1
Cauliflower	30	93.3	0.0		
Celery	18	11.1	0.0		
Collards	15	86.7	0.0		

[a] Includes samples with residues over tolerance or action level and samples with residues with no tolerance.
[b] Residue in one or more samples exceeded an action level rather than a tolerance.

Appendix A. (continued)

Commodity Group	Total Samples	Samples without Residues, %	Samples Violative[a], %	# over tolerance	# no tolerance
Endive	3	100.0	0.0		
Kale	3	66.7	33.3		1
Lettuce, head	47	53.2	0.0		
Lettuce, leaf	35	42.9	0.0		
Mustard greens	7	57.1	14.3		1
Spinach	37	43.2	0.0		
Other leaf & stem vegetables	26	92.3	0.0		
Mushrooms and Truffles	9	77.8	0.0		
Carrots	105	54.3	2.9		3
Onions/leeks/scallions/shallots	36	88.9	0.0		
Potatoes	116	57.8	2.6	1[b]	2
Radishes	6	66.7	0.0		
Red beets	6	100.0	0.0		
Sweet potatoes	27	74.1	0.0		
Turnips	4	75.0	0.0		
Other root & tuber vegetables	13	92.3	0.0		
Vegetables, dried or paste	16	93.8	0.0		
Other vegetables/vegetable products	27	81.5	0.0		
Total	**1,414**	**69.7**	**1.2**		
F. Other					
Peanuts & peanut products	15	93.3	0.0		
Other nuts & nut products	1	100.0	0.0		
Vegetable oil, crude	3	100.0	0.0		
Vegetable oil, refined	3	66.7	33.3	1[b]	
Beverages & water	1	100.0	0.0		
Coffee/tea/wine	33	33.3	0.0		
Honey & other sweeteners	48	85.4	0.0		
Baby foods/formula	38	89.5	0.0		
Other food products, incl. prepared foods	4	100.0	0.0		
Nonfood items	1	0.0	100.0		1
Total	**147**	**75.5**	**1.4**		
Total A-F	**3,426**	**60.2**	**0.8**		

[a] Includes samples with residues over tolerance or action level and samples with residues with no tolerance.
[b] Residue in one or more samples exceeded an action level rather than a tolerance.

Appendix B. Analysis of Import Samples by Commodity Group in 1999

Commodity Group	Total Samples	Samples without Residues, %	Samples Violative[a], %	# over tolerance	# no tolerance
A. Grains and Grain Products					
Corn & corn products	6	66.7	0.0		
Oats & oat products	2	100.0	0.0		
Rice & rice products	99	92.9	1.0		1
Soybeans & soybean products	1	100.0	0.0		
Wheat & wheat products	42	50.0	0.0		
Other grains & grain products	15	86.7	0.0		
Breakfast cereals	12	75.0	8.3		1
Bakery products, crackers, etc.	19	73.7	0.0		
Pasta and noodles	80	65.0	0.0		
Total	**276**	**75.4**	**0.7**		
B. Milk/Dairy Products/Eggs					
Cheese & cheese products	9	88.9	0.0		
Eggs	5	100.0	0.0		
Milk/cream & milk products	8	100.0	0.0		
Total	**22**	**95.5**	**0.0**		
C. Fish/Shellfish/Other Aquatic Products					
Fish and Fish Products	278	96.4	0.0		
Shellfish & Crustaceans	19	73.7	0.0		
Other Aquatic Animals & Products	1	100.0	0.0		
Total	**298**	**95.0**	**0.0**		
D. Fruits					
Blackberries	50	62.0	2.0		1
Blueberries	22	40.9	0.0		
Cranberries	3	100.0	0.0		
Grapes, raisins	293	34.8	1.0	1	2
Raspberries	61	50.8	0.0		
Strawberries	82	30.5	3.7		3
Other berries	12	50.0	8.3		1
Clementines	11	27.3	0.0		
Grapefruit	6	100.0	0.0		
Lemons	8	37.5	0.0		
Limes	12	91.7	0.0		
Oranges	84	42.9	2.4		2
Other citrus fruit	6	83.3	0.0		
Apples	115	34.8	0.0		
Pears	76	30.3	0.0		
Other pome fruit	5	60.0	0.0		

[a] Includes samples with residues over tolerance or action level and samples with residues with no tolerance.
[b] Residue in one or more samples exceeded an action level rather than a tolerance.

Appendix B (continued)

Commodity Group	Total Samples	Samples without Residues, %	Samples Violative[a], %	# over tolerance	# no tolerance
Apricots	4	75.0	0.0		
Avocadoes	64	93.8	0.0		
Cherries	5	40.0	0.0		
Dates	15	60.0	0.0		
Nectarines	12	33.3	0.0		
Olives	39	84.6	0.0		
Peaches	27	40.7	0.0		
Plums	21	38.1	0.0		
Other pit fruit	4	100.0	0.0		
Bananas, plantains	233	43.8	0.0		
Guavas	1	0.0	0.0		
Kiwi fruit	59	72.9	8.5		5
Mangoes	96	92.7	0.0		
Papaya	107	66.4	10.3		11
Pineapple	72	77.8	1.4		1
Other sub-tropical fruit	96	83.3	6.2	2	4
Bitter melon	14	92.9	0.0		
Cantaloupe	91	33.0	0.0		
Honeydew	82	25.6	0.0		
Watermelon	33	63.6	3.0		1
Other melons	11	100.0	0.0		
Other fruits	11	72.7	0.0		
Apple juice	39	92.3	0.0		
Citrus juice	18	100.0	0.0		
Other fruit juices	102	88.2	0.0		
Fruit jams/jellies/pastes/toppings	188	84.0	3.2		6
Total	**2,290**	**57.5**	**1.8**		
E. Vegetables					
Corn	37	94.6	0.0		
Mung beans and bean sprouts	9	100.0	0.0		
Peas (green/snow/sugar/sweet)	84	57.1	14.3		12
String beans (green/snap/pole/long)	97	49.5	11.3	1	10
Other beans & peas & products	105	75.2	3.8	1	3
Cucumbers	119	37.8	0.8	1	
Eggplant	37	54.0	5.4		2
Okra	28	92.9	0.0		
Peppers, hot	342	38.0	4.4	7	8

[a] Includes samples with residues over tolerance or action level and samples with residues with no tolerance.
[b] Residue in one or more samples exceeded an action level rather than a tolerance.

Appendix B (continued)

Commodity Group	Total Samples	Samples without Residues, %	Samples Violative[a], %	# over tolerance	# no tolerance
Peppers, sweet	196	59.2	2.5		5
Squash/pumpkins	199	47.2	4.5		9
Tomatoes	243	59.7	1.6	2	2
Other fruiting vegetables	60	75.0	3.3		2
Artichokes	24	87.5	0.0		
Asparagus	91	94.5	2.2		2
Bamboo shoots	20	100.0	0.0		
Bok choy & Chinese cabbage	21	42.9	14.3		3
Broccoli	63	71.4	3.2	1	1
Cabbage	26	69.2	3.9		1
Cauliflower	23	100.0	0.0		
Celery	21	42.9	4.8		1
Endive	29	100.0	0.0		
Kale	19	47.4	10.5		2
Lettuce, head	28	50.0	0.0		
Lettuce, leaf	47	63.8	4.3		2
Mustard greens	6	66.7	33.3		2
Radicchio	14	92.9	0.0		
Spinach	40	42.5	10.0	1	3
Other leaf & stem vegetables	111	71.2	4.5	1	4
Mushrooms and Truffles	58	84.5	1.7		1
Carrots	36	83.3	0.0		
Cassava	23	100.0	0.0		
Onions/leeks/scallions/shallots	123	90.2	2.4		3
Potatoes	38	94.7	0.0		
Radishes	19	73.7	0.0		
Red beets	9	33.3	0.0		
Sweet potatoes	34	94.1	0.0		
Turnips	2	0.0	50.0		1
Water chestnuts	23	91.3	4.3		1
Other root & tuber vegetables	57	93.0	5.3		3
Vegetables with sauce	15	66.7	0.0		
Vegetables, dried or paste	134	75.4	6.0	1[b]	7
Other vegetables/vegetable products	58	79.3	3.5		2
Total	**2,768**	**64.8**	**3.9**		
F. Other					
Cashews	47	80.8	0.0		
Coconut & coconut products	13	100.0	0.0		
Peanuts & peanut products	34	94.1	0.0		
Other nuts & nut products	15	100.0	0.0		

[a] Includes samples with residues over tolerance or action level and samples with residues with no tolerance.
[b] Residue in one or more samples exceeded an action level rather than a tolerance.

Appendix B (continued)

Commodity Group	Total Samples	Samples without Residues, %	Samples Violative[a], %	# over tolerance	# no tolerance
Edible seeds	26	73.1	7.7		2
Vegetable oil, crude	9	100.0	0.0		
Vegetable oil, refined	7	100.0	0.0		
Spices & condiments & flavors	47	70.2	10.6		5
Beverages & water	3	66.7	0.0		
Beverage bases	26	96.2	0.0		
Coffee/tea/wine	8	75.0	0.0		
Cocoa beans & chocolate products	6	100.0	0.0		
Honey & other sweeteners	41	97.6	0.0		
Baby foods/formula	1	100.0	0.0		
Other food products, incl. prepared foods	15	86.7	0.0		
Nonfood items	60	38.3	51.7		31
Total	**358**	**78.8**	**10.6**		
Total A-F	**6,012**	**65.0**	**3.1**		

[a] Includes samples with residues over tolerance or action level and samples with residues with no tolerance.
[b] Residue in one or more samples exceeded an action level rather than a tolerance.