



# Agricultural Chemical Usage - Vegetables Methodology and Quality Measures

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## Vegetable Chemical Usage Survey Methodology

**Scope and Purpose:** The National Agricultural Statistics Service (NASS) Vegetable Chemical Use program collects entire farm level chemical use data from growers of select vegetables in program States. The fruit and vegetable chemical surveys have been conducted in alternating years since 1990 with data collected on fruits in odd numbered years and vegetables in even numbered years. The States involved and the commodities surveyed are selected based on NASS acres planted and evaluated each cycle to ensure maximum coverage. NASS aims to cover at a minimum 80 percent of acres planted. Farm level data are combined during summary and, pending compliance with disclosure rules, published at State and National levels. Data are published for 24 crops in 19 States. Carrots, Cucumbers, Snap Beans, Sweet Corn, and Tomatoes are published by both fresh market and processing dispositions.

**Survey Timeline:** Data collection begins on October 1 and lasts until mid January of the following year to ensure completion of the crop year. NASS Field Offices (FOs) along with NASS Headquarters (HQ) spend the next several months reviewing reported data for reasonableness and conduct producer follow-ups, as necessary. The estimates are released to the NASS Quick Stats system during the last week in July.

**Sample Size, Sampling Frames, and Methods:** The sample for the Vegetable Chemical Use Survey (VCUS) is selected from the NASS List Sampling Frame. List incompleteness is addressed through the estimators. The sample design for VCUS is Multivariate Probability Proportional to Size (MPPS). In MPPS, the maximum of the probabilities of selection over all of the target crops that an operation grows is used in combination with the desired sample sizes for each crop to draw the sample. The larger the operation's maximum probability is, the larger the operation's chance of being selected for the sample.

VCUS is a two-phase sample design. In Phase 1, the screening phase, list frame control data are used to determine the probabilities of selection. The operations selected in Phase 1 are interviewed in the Integrated Screening Survey to determine if they are growing any of the crops of interest and the number of acres planted. In Phase 2, the results from the Integrated Screening Survey are used to select the final sample for the survey. Both the Phase 1 and Phase 2 sample selections use MPPS designs.

In Phase 2, operations with multiple operating arrangements are sub-sampled. Only the sub-sampled operations are contacted for data collection.

The sample size for the VCUS is approximately 4,500.

**Data Collection and Editing:** All federal data collections require approval by the Office of Management and Budget (OMB). NASS must document the public need for the data, show the design applies sound statistical practice, ensure the data do not already exist elsewhere, and show that the public is not excessively burdened. The vegetable chemical use questionnaires must display an active OMB number that gives NASS the authority to conduct the survey, a statement of the purpose of the survey and the use of the data being collected, a response burden statement that gives an estimate of the time required to complete the form, a confidentiality statement that the respondent's information will be protected from disclosure, and a statement that response to the survey is voluntary and not required by law.

Using these questionnaires, chemical data are collected only by personal visit from an enumerator. Letters are mailed out to producers prior to field contact informing them of the importance of cooperation and that contact will be made in the coming weeks. Once contact is made by the field enumerator, an appointment will be set up to collect data when the farm operator indicates no further chemical applications are remaining. The field enumerator returns the questionnaires to the NASS field office for editing and data entry. Questionnaire responses are captured and edited for consistency using automated systems, and a report of questionnaires with errors is generated. NASS field office statisticians will correct the errors on the report or comment to their validity if the data are deemed to be correct. Records with errors can pass to summary only with field statistician comments and HQ acceptance.

**Analysis Tools:** Chemical use data are processed through an interactive data analysis tool which displays data for all reports by product or commodity. This application tool provides various scatter plots, graphs, tables, charts, and listing tools that allow the analyst to compare an individual record to other similar records within their state or at a national level. Outliers and unusual data relationships are investigated by FO and HQ statisticians to determine if they are correct. Suspect data found to be in error are corrected, while data found to be correct are kept.

**Nonsampling Errors:** Nonsampling errors are present in any survey process. These errors include reporting, recording, editing, and imputation errors. Steps are taken to minimize the impact of these errors, such as comprehensive interviewer training, validation and verification of processing systems, detailed computer edits, and the analysis tool. Re-contact with respondents is conducted on an as needed basis.

**Nonresponse Adjustment:** Response to the VCUS is voluntary. Some producers refuse to participate in the survey, others cannot be located during the data collection period, and some submit incomplete reports. These nonrespondents must be accounted for if accurate estimates of total chemical usage are to be made. For this survey, item level nonresponse is accounted for by imputing data where there are missing values. Imputed rates of application for chemicals are calculated through an automated imputation system that calculates an unweighted mean for an imputation group based on commodity, state, and product. When a group lacks sufficient responses, groups are collapsed by state to preserve as much homogeneity as possible.

**Calibration:** Calibration is a weighting technique used in survey sampling to adjust the survey weights for sampled elements so that the weighted sum of a set of benchmark variables equals a pre-determined set of values for the population. The input to the calibration algorithm is the weights generated from the sampling procedures. Sampling weights are calculated based on numerous factors so that the sample allocation can be representative of the entire population of farms at the state level for the target vegetable crops in that state. Due to survey nonresponse and the possibility of disproportionate responses across different target vegetable crops, weights are adjusted through a calibration algorithm. Calibration adjusts the sampling weights so that the expanded data will match planted acreage totals from the January Crop Production report. This ensures that the chemical data collected will accurately represent the chemical usage for all target vegetable crops for the entire target population.

**Estimators:** The VCUS utilizes direct expansions for all survey indications. Direct expansions are calculated by summing the reported or imputed chemical data values multiplied by the calibrated weights. Variance estimates are computed for all expansions.

**Outliers:** NASS conducts a review of outliers found in the chemical use data by reviewing application rates for all records for the same product and commodity combinations. The FO and HQ statisticians work together to get the data as accurate as possible. The FO statistician reviews outliers within their state, and the HQ statistician examines outliers across all states for the published categories. A determination is made as to whether an adjustment to the application data is required. Most outliers trace back to unique situations that do not exist in the target population as much as the survey weight would indicate.

**Estimation:** HQ statisticians execute a summary that generates state level and national level indications. Field Offices are responsible for performing a detailed review of their survey results and providing comments that justify their survey results. HQ statisticians conduct a final review of survey results from all states. Any irregularities revealed by the summary must be investigated and, if necessary, resolved. After final review, national level summary results are adopted as official national estimates except in cases where strong justification supports deviating from survey totals.

There are three main types of data that NASS estimates for these surveys - fertilizer application, pesticide application, and Integrated Pesticide Management (IPM) data. For the application data, NASS collects information about the commercial fertilizers and pesticides applied during the crop year. For fertilizer, these applications are collected as either actual pounds or percent analysis of Nitrogen (N), Phosphate (P), Potash (K), and Sulfur (S). For pesticides, these applications are collected at the product level, generally per application. These product level data are converted to pounds of active ingredient, summarized, and published. If the data are deemed too unreliable (if there are too few reports), they are suppressed from publication, along with any needed complementary suppression.

For both fertilizer and pesticide application data, NASS estimates Area Applied (percent acres treated), Number of Applications, Rate per Application (pounds of active ingredient per acre), Rate per Crop Year (number of applications multiplied by rate per application), and Total Amount Applied.

The standard deviation for each active ingredient is calculated to determine data distribution for each crop. Chemical distribution rates are given by active ingredient for the Percent of Acres Treated, Number of Applications, Rate per Application, and Rate per Crop Year. Rate Distribution tables include the median, the 10<sup>th</sup> and 90<sup>th</sup> percentiles, the mean, and the coefficient of variation (CV) for an active ingredient when at least 30 farm operators report applying it on the specified crop.

The IPM data are generally a series of yes/no questions pertaining to specific pest management practices. IPM data are collected for the entire operation. From these data, NASS releases the percent of operations using the practice as well as the percent of acreage. The percent of acreage assumes that, if the operation uses the practice on one acre, it is used on all acres. This also means that the IPM data are not crop specific; they are distributed across all vegetable acres.

## Quality Metrics for Agricultural Chemical Usage

**Purpose and Definitions:** Under the guidance of the Statistical Policy Office of the Office of Management and Budget (OMB), the United States Department of Agriculture’s National Agricultural Statistics Service (NASS) provides data users with quality metrics for its published data series. The metrics tables below describe the performance data for the survey contributing to the publication. The accuracy of data products may be evaluated through sampling and non-sampling error. The measurement of error due to sampling in the current period is evaluated by the coefficient of variation for each estimated item. Non-sampling error is evaluated by response rates and the percent of the estimate from respondents.

**Sample Size** is the number of observations selected from the population that are used to be representative of the entire population.

**Response rates** measure the proportion of the sample that is represented by the responding units in the survey.

**Coefficient of Variation** provides a measure of the size for the standard error relative to the point estimate and is used to measure the precision of the results of a survey estimator.

### Vegetable Chemical Distribution, Sample Size, and Response Rates – United States: 2010

State	Sample size		Response rate	
	2010		2010	
Arizona .....		38		81.6
California .....		662		64.4
Colorado .....		40		87.5
Florida .....		262		63.7
Georgia .....		159		73.0
Illinois .....		139		82.7
Michigan .....		386		78.2
Minnesota .....		284		87.7
New Jersey .....		168		79.2
New York .....		284		75.0
North Carolina .....		208		90.4
Ohio .....		234		81.6
Oregon .....		176		84.1
Pennsylvania .....		215		85.1
South Carolina .....		98		92.9
Tennessee .....		74		79.7
Texas .....		234		79.5
Washington .....		233		75.1
Wisconsin .....		299		88.3
United States .....		4,193		78.0

### Asparagus: Agricultural Chemical Distribution Table – Program States: 2010

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Herbicides</b>				
Diuron .....	20	11	15	15
Glyphosate iso. salt .....	18	10	8	10
Metribuzin .....	33	4	20	19
<b>Insecticides</b>				
Carbaryl .....	31	22	27	44
Chlorpyrifos .....	29	10	7	8
<b>Fungicides</b>				
Chlorothalonil .....	32	14	10	11

### Peppers, Bell: Agricultural Chemical Distribution Table – Program States: 2010

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Insecticides</b>				
Acephate .....	156	107	12	109
Chlorantraniliprole .....	123	102	27	127
Lambda-cyhalothrin .....	121	58	14	71
<b>Fungicides</b>				
Azoxystrobin .....	110	54	18	59
Chlorothalonil .....	54	49	56	73
Copper hydroxide .....	61	62	27	75
Mancozeb .....	50	55	44	76
Maneb .....	18	45	14	37

### Cabbage, Fresh: Agricultural Chemical Distribution Table – Program States: 2010

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Herbicides</b>				
Oxyfluorfen .....	49	5	43	42
Trifluralin .....	68	1	21	21
<b>Insecticides</b>				
Lambda-cyhalothrin .....	57	47	10	42
<b>Fungicides</b>				
Chlorothalonil .....	27	22	11	14

### Carrots, Processing: Agricultural Chemical Distribution Table – Program States: 2010

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Herbicides</b>				
Linuron .....	135	20	69	70

**Cucumbers, Fresh: Agricultural Chemical Distribution Table – Program States: 2010**

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Herbicides</b>				
Clomazone .....	45	6	44	47
Ethalfuralin .....	40	(Z)	21	21
<b>Insecticides</b>				
Carbaryl .....	47	12	14	11
Endosulfan .....	111	60	12	58
Esfenvalerate .....	108	64	11	64
<b>Fungicides</b>				
Azoxystrobin .....	49	64	8	65
Chlorothalonil .....	24	33	17	25
Copper hydroxide .....	81	43	36	65
Cymoxanil .....	77	51	2	52
Famoxadone .....	77	52	2	52
Mancozeb .....	26	57	21	60
Propamocarb hydrochloride .....	46	18	15	23

(Z) Less than half of the unit shown.

**Cucumbers, Pickles: Agricultural Chemical Distribution Table – Program States: 2010**

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Herbicides</b>				
Clomazone .....	24	(Z)	30	30
Ethalfuralin .....	23	11	19	28
<b>Fungicides</b>				
Chlorothalonil .....	11	12	10	6
Cymoxanil .....	15	10	7	15
Famoxadone .....	15	10	7	15
Mancozeb .....	19	12	6	14
Propamocarb hydrochloride .....	9	5	7	8

(Z) Less than half of the unit shown.

**Peas, Green, Processing: Agricultural Chemical Distribution Table – Program States: 2010**

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Herbicides</b>				
Bentazon .....	17	7	5	11
Imazethapyr .....	17	1	2	3
Imazethapyr ammonium salt .....	26	4	7	10
MCPB .....	15	2	5	6
Pendimethalin .....	8	2	4	4
<b>Insecticides</b>				
Bifenthrin .....	29	9	6	14

**Lettuce Head: Agricultural Chemical Distribution Table – Program States: 2010**

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Herbicides</b>				
Pronamide .....	50	5	37	40
<b>Insecticides</b>				
Chlorantraniliprole .....	81	16	45	35
Imidacloprid .....	28	15	39	28
Lambda-cyhalothrin .....	25	38	4	35
Methomyl .....	91	39	30	9
Permethrin .....	58	67	21	49
Spinetoram-J .....	31	34	15	48
Spinetoram-L .....	31	34	15	48
Spirotetramat .....	129	21	10	29
Zeta-cypermethrin .....	50	35	26	27
<b>Fungicides</b>				
Dimethomorph .....	179	22	8	29
Mandipropamide Technical .....	51	13	3	13
Maneb .....	21	20	22	13

**Lettuce Other: Agricultural Chemical Distribution Table – Program States: 2010**

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Herbicides</b>				
Bensulide .....	61	17	26	21
<b>Insecticides</b>				
Imidacloprid .....	48	30	75	76
Lambda-cyhalothrin .....	52	58	5	56
Methomyl .....	119	28	24	8
Permethrin .....	56	52	18	69
Spinetoram-J .....	44	42	10	37
Spinetoram-L .....	44	42	10	37
Spirotetramat .....	65	19	2	18
Zeta-cypermethrin .....	45	11	5	15
<b>Fungicides</b>				
Dimethomorph .....	51	7	1	6
Fenamidone .....	70	43	5	42
Mandipropamide Technical .....	41	26	2	25
Maneb .....	42	38	12	42

## Onions: Agricultural Chemical Distribution Table – Program States: 2010

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Herbicides</b>				
Bromoxynil .....	38	9	35	33
Bromoxynil heptanoate .....	35	8	10	12
Bromoxynil octanoate .....	24	28	26	9
Clethodim .....	34	10	6	14
Dimethenamide-P .....	32	7	11	14
Fluazifop-P-butyl .....	38	12	9	17
Oxyfluorfen .....	18	22	23	12
Pendimethalin .....	17	13	8	8
<b>Insecticides</b>				
Chlorpyrifos .....	15	16	9	10
Diazinon .....	42	11	19	22
Lambda-cyhalothrin .....	51	15	7	13
Methomyl .....	30	14	9	22
Oxamyl .....	33	17	4	17
Spinetoram-J .....	17	6	17	15
Spinetoram-L .....	17	6	17	15
<b>Fungicides</b>				
Boscalid .....	29	6	49	48
Chlorothalonil .....	20	14	8	14
Copper hydroxide .....	14	18	23	16
Iprodione .....	29	24	5	25
Mancozeb .....	12	11	16	13
Mefenoxam .....	35	16	35	37
Pyraclostrobin .....	29	5	32	30

## Pumpkins: Agricultural Chemical Distribution Table – Program States: 2010

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Herbicides</b>				
Clomazone .....	26	1	6	6
Ethalfuralin .....	27	1	13	13
Glyphosate iso. salt .....	67	14	16	18
Halosulfuron .....	33	2	8	8
S-Metolachlor .....	19	1	16	16
<b>Insecticides</b>				
Carbaryl .....	31	21	10	27
Endosulfan .....	38	28	14	35
Esfenvalerate .....	64	52	6	56
Imidacloprid .....	54	24	91	73
Lambda-cyhalothrin .....	65	41	14	32
Permethrin .....	57	32	31	58
<b>Fungicides</b>				
Azoxystrobin .....	33	8	6	9
Boscalid .....	38	28	27	40
Chlorothalonil .....	31	10	6	13
Copper hydroxide .....	37	16	17	27
Cyazofamid .....	58	35	2	36
Cymoxanil .....	53	14	6	10
Famoxadone .....	54	14	6	9
Mancozeb .....	67	9	20	27
Myclobutanil .....	46	10	12	16
Propamocarb hydrochloride .....	75	13	5	17
Pyraclostrobin .....	31	25	31	50
Quinoline .....	38	26	5	30
Triflumizole .....	58	13	6	14



**Beans, Snap, Fresh: Agricultural Chemical Distribution Table – Program States: 2010**

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
Herbicides				
S-Metolachlor .....	50	(Z)	35	35
Insecticides				
Acephate .....	65	55	40	21
Esfenvalerate .....	89	15	13	28
Fungicides				
Chlorothalonil .....	58	33	26	35

(Z) Less than half of the unit shown.

**Beans, Snap, Processing: Agricultural Chemical Distribution Table – Program States: 2010**

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
Herbicides				
Bentazon .....	12	2	7	8
EPTC .....	15	2	2	3
Fomesafen .....	19	2	9	7
Halosulfuron .....	50	2	4	5
Imazamox .....	29	(Z)	6	6
Imazethapyr ammonium salt .....	80	2	2	3
Pendimethalin .....	48	2	8	9
S-Metolachlor .....	18	5	17	22
Sethoxydim .....	25	3	17	17
Trifluralin .....	19	3	6	4
Insecticides				
Acephate .....	36	5	4	6
Bifenthrin .....	17	10	5	14
Esfenvalerate .....	16	3	8	9
Fungicides				
Boscalid .....	27	1	9	9
Copper hydroxide .....	31	5	5	7
Iprodione .....	6	3	3	3
Thiophanate-methyl .....	13	13	4	11

(Z) Less than half of the unit shown.

### Squash: Agricultural Chemical Distribution Table – Program States: 2010

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Herbicides</b>				
Clomazone .....	47	2	37	38
Ethalfuralin .....	29	1	18	18
Halosulfuron .....	85	25	13	35
<b>Insecticides</b>				
Bifenthrin .....	92	67	15	77
Carbaryl .....	81	36	27	46
Endosulfan .....	115	72	25	51
Esfenvalerate .....	57	51	13	53
Imidacloprid .....	103	83	71	39
Lambda-cyhalothrin .....	98	56	60	37
Permethrin .....	63	36	14	43
<b>Fungicides</b>				
Azoxystrobin .....	98	25	7	27
Chlorothalonil .....	28	33	26	55
Copper hydroxide .....	51	26	27	44
Cymoxanil .....	80	95	3	95
Famoxadone .....	80	96	3	96
Mancozeb .....	81	44	36	69
Myclobutanil .....	83	43	38	31
Propamocarb hydrochloride .....	81	22	16	33
Pyraclostrobin .....	71	118	126	35

### Strawberries: Agricultural Chemical Distribution Table – Program States: 2010

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Insecticides</b>				
Abamectin .....	27	42	25	46
Acetamiprid .....	43	44	8	41
Bifenazate .....	21	9	5	11
Bifenthrin .....	20	32	30	33
Malathion .....	28	38	32	43
Naled .....	23	23	15	14
Spinetoram-J .....	58	16	75	64
Spinetoram-L .....	58	16	5	16
<b>Fungicides</b>				
Boscalid .....	23	9	5	10
Captan .....	13	21	12	21
Cyprodinil .....	23	35	7	39
Fenhexamid .....	20	38	20	22
Fludioxonil .....	23	35	7	39
Myclobutanil .....	21	24	9	31
Pyraclostrobin .....	19	15	65	55
Pyrimethanil .....	31	23	27	48
Sulfur .....	24	19	26	40
Thiophanate-methyl .....	39	44	44	13
Thiram .....	23	22	10	22
<b>Other Chemicals</b>				
Chloropicrin .....	22	10	8	13

**Sweet Corn, Fresh: Agricultural Chemical Distribution Table – Program States: 2010**

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Herbicides</b>				
Alachlor .....	54	0	17	17
Atrazine .....	28	5	7	8
Bentazon .....	34	5	9	10
Glyphosate iso. salt .....	73	37	19	50
Mesotrione .....	25	23	20	25
Pendimethalin .....	64	22	21	19
S-Metolachlor .....	32	5	13	15
Topramezone .....	79	(Z)	16	16
<b>Insecticides</b>				
Bifenthrin .....	59	39	27	48
Carbaryl .....	17	6	7	8
Chlorpyrifos .....	33	24	24	30
Cyfluthrin .....	32	53	40	25
Esfenvalerate .....	66	35	13	37
Lambda-cyhalothrin .....	25	38	5	37
Methomyl .....	9	35	10	39
Permethrin .....	25	16	21	23
Thiodicarb .....	13	36	9	29
Zeta-cypermethrin .....	43	90	44	58
<b>Fungicides</b>				
Propiconazole .....	49	38	13	33

(Z) Less than half of the unit shown.

**Sweet Corn, Processing: Agricultural Chemical Distribution Table – Program States: 2010**

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Herbicides</b>				
Acetochlor .....	33	3	7	8
Atrazine .....	5	5	4	8
Dimethenamid-P .....	38	1	4	5
Mesotrione .....	37	2	19	19
S-Metolachlor .....	13	3	6	6
Tembotrione .....	17	1	2	2
Topramezone .....	27	3	3	5
<b>Insecticides</b>				
Bifenthrin .....	6	6	2	5
Lambda-cyhalothrin .....	17	18	10	17
<b>Fungicides</b>				
Azoxystrobin .....	19	7	5	9
Propiconazole .....	22	3	3	5
Tebuconazole .....	22	7	2	8

### Tomatoes, Fresh: Agricultural Chemical Distribution Table – Program States: 2010

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Herbicides</b>				
Metribuzin .....	31	14	23	29
Paraquat .....	40	24	24	19
S-Metolachlor .....	29	3	10	12
<b>Insecticides</b>				
Bifenthrin .....	57	55	41	85
Carbaryl .....	96	51	61	64
Chlorantranilprole .....	22	26	94	110
Dimethoate .....	37	45	9	52
Endosulfan .....	29	37	23	29
Esfenvalerate .....	28	45	14	56
Imidacloprid .....	25	12	13	11
Lambda-cyhalothrin .....	69	22	18	20
Methomyl .....	32	25	17	24
Spinetoram-J .....	31	43	8	49
Spinetoram-L .....	31	43	8	49
<b>Fungicides</b>				
Azoxystrobin .....	23	41	9	44
Chlorothalonil .....	15	23	16	14
Copper hydroxide .....	11	32	19	27
Cymoxanil .....	35	27	20	26
Famoxadone .....	35	28	18	23
Mancozeb .....	14	26	15	25
Pyraclostrobin .....	41	23	39	38

### Tomatoes, Processing: Agricultural Chemical Distribution Table – Program States: 2010

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Herbicides</b>				
Glyphosate iso. salt .....	41	19	2	20
Rimsulfuron .....	78	61	11	71
S-Metolachlor .....	39	28	4	28
Trifluralin .....	36	27	8	21
<b>Insecticides</b>				
Dimethoate .....	38	70	3	71
<b>Fungicides</b>				
Chlorothalonil .....	44	35	2	34
Copper hydroxide .....	24	41	38	29
Myclobutanil .....	20	53	(Z)	53
Sulfur .....	35	22	9	27

(Z) Less than half of the unit shown.

**Watermelons: Agricultural Chemical Distribution Table – Program States: 2010**

Active ingredient	Percent of acres treated	Number of applications	Rate per application	Rate per crop year
	(CV percent)	(CV percent)	(CV percent)	(CV percent)
<b>Herbicides</b>				
Ethalfuralin .....	24	9	19	11
Glyphosate iso. salt .....	38	29	25	30
<b>Insecticides</b>				
Esfenvalerate .....	75	42	12	51
<b>Fungicides</b>				
Azoxystrobin .....	34	51	12	51
Boscalid .....	31	18	10	23
Chlorothalonil .....	10	6	5	9
Copper hydroxide .....	31	35	16	48
Mancozeb .....	12	16	16	12
Pyraclostrobin .....	26	14	36	34
Tebuconazole .....	22	35	36	33

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