



United States  
Department of  
Agriculture

National  
Agricultural  
Statistics  
Service



# Agricultural Chemical Usage 2002 Restricted Use Summary

October 2003

Ag Ch 1 (03)

# USDA





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## 2002 Agricultural Chemical Use Estimates for Restricted Use Pesticides

**Overview:** As determined by the U.S. Environmental Protection Agency (EPA), a restricted use pesticide is a pesticide which is available for purchase and use only by certified pesticide applicators or persons under their direct supervision, and only for the uses covered by the applicator's certification. This group of pesticides is not available for use by the general public because of the very high toxicities or due to the environmental hazards associated with the materials. However, an active ingredient may be restricted for one crop but not for another. This report shows only those active ingredients which are restricted for each specific crop, based on the "Restricted Use Product (RUP) Report, June 2003" published by the EPA. The agricultural chemical use estimates in this report are based on data compiled from the Agricultural Resource Management Study and the Vegetable Chemical Use Survey. All field crop and vegetable crop data refer to on-farm use of restricted use pesticides for the 2002 crop year. Data were collected late in the growing season or after the farm operator had indicated that planned applications were completed. Trained enumerators personally interviewed farm operators or managers to obtain information on chemical applications made on sampled farm operations.

## Highlights

**Field Crops:** Field crop data on restricted use pesticides were compiled from the Agricultural Resource Management Study (ARMS) and from the Objective Yield Survey for selected Program States, with the main portion of data collection being conducted during the months of October-December of 2002. Targeted crops in the 2002 ARMS included corn, soybeans, durum wheat, other spring wheat, and winter wheat. The Program States accounted for 65 to 97 percent of the U.S. acreage for these selected crops.

Atrazine was again the most widely used restricted use herbicide applied to program field crops, with 62 percent of the field corn acres treated. Acetochlor was used on 25 percent of the corn acres. A total of ten distinct active ingredients found in restricted use insecticides were reported as applied to corn and soybeans. Tefluthrin and Carbofuran, with 6 and 4 percent of the acres treated, respectively, were the primary restricted use insecticides used on corn. Lambda-cyhalothrin was the primary active ingredient reported in the restricted insecticides class for soybeans.

Picloram was applied to 2 percent of the acreage and the only restricted use active ingredient reported for Other Spring Wheat.

**Vegetable Crops:** Growers in 18 Program States were surveyed to obtain chemical use data on 28 selected vegetable crops in 2002. The data on restricted use applications cover the period immediately following harvest of the 2001 crop through harvest of the 2002 crop.

Only a few restricted use herbicides were applied to vegetable crops in 2002. Atrazine was applied to 65 percent of the processing sweet corn acreage and to 56 percent of the fresh sweet corn acreage. Pronamide was used on 51 percent of the other lettuce acreage and on 43 percent of the head lettuce acreage. Paraquat was applied to 29 percent of the fresh cucumbers acres and to 15 and 12 percent of the strawberry and asparagus acreage, respectively.

Several restricted use insecticides were used extensively on vegetable crops in the Program States. Permethrin was applied to 69 and 68 percent of the other lettuce and head lettuce acres, respectively. It was also applied to 40 percent of the celery and 34 percent of the fresh spinach acreage. Methomyl was used on 63 percent of the fresh sweet corn acreage, as well as in 42 percent of the strawberry acres, 38 percent of the head lettuce, 35 percent of the other lettuce acres and 25 percent of the bulb onion acres in the Program States. Oxamyl was used on 30 and 24 percent of the bell peppers and the celery acreage, respectively. Lambda-cyhalothrin was used on 60 percent of the fresh sweet corn and 51 percent of the sweet corn acres planted for processing, while 50 percent of the other lettuce, 49 percent of the bulb onions and 32 percent of the head lettuce acreage was also reported as treated with this restricted active ingredient.

Other restricted use insecticides applied to 20 percent or more of planted acres were esfenvalerate on fresh cucumbers, carrots for processing, fresh snap beans, and fresh tomatoes; oxydemeton-methyl on broccoli, cauliflower, and head lettuce; and disulfoton on asparagus.

Methyl bromide, a soil fumigant, was used on 58 percent of the strawberry acreage, 44 percent of the fresh tomato acres and 37 percent of the bell pepper acreage. Chloropicrin was used on 64 percent of the strawberry acreage, 48 percent of the fresh tomato acres and 42 percent of the bell pepper acreage.

**Corn: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Appli-cations	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Acetamide	2	1.0	0.39	0.39	488
Acetochlor	25	1.0	1.73	1.74	22,556
Alachlor	1	1.0	2.16	2.16	1,281
Atrazine	62	1.0	1.04	1.12	35,762
Cyanazine	*	1.0	0.81	0.81	132
Paraquat	*	1.0	0.59	0.59	136
<b>Insecticides:</b>					
Carbofuran	*	1.0	0.93	0.93	176
Cyfluthrin	4	1.0	0.01	0.01	11
Fipronil	3	1.0	0.11	0.11	157
Lambda-cyhalothrin	2	1.0	0.02	0.02	17
Methyl parathion	*	1.0	0.53	0.53	99
Permethrin	2	1.0	0.10	0.10	83
Tefluthrin	6	1.0	0.11	0.11	334
Terbufos	1	1.0	1.08	1.08	812

\* Area applied is less than one percent.

<sup>1</sup> Planted acres in 2002 for the 7 program states were 51.4 million acres. States included are IL, IN, IA, MN, NE, OH, and WI.

**Soybeans: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Appli-cations	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Alachlor	1	1.0	1.25	1.27	802
Imazaquin	1	1.0	0.08	0.08	82
Paraquat	2	1.1	0.41	0.48	612
<b>Insecticides:</b>					
Diflubenzuron	*	1.0	0.04	0.04	5
Esfenvalerate	*	1.1	0.03	0.03	11
Lambda-cyhalothrin	2	1.0	0.02	0.02	31
Methyl parathion	1	1.3	0.59	0.78	382
Permethrin	1	1.0	0.07	0.08	54

\* Area applied is less than one percent.

<sup>1</sup> Planted acres in 2002 for the 20 program states were 71.7 million acres. States included are AR, IL, IN, IA, KS, KY, LA, MD, MI, MN, MS, MO, NE, NC, ND, OH, SD, TN, VA, and WI.

**Wheat, Other Spring: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Picloram	2	1.0	0.01	0.01	3

<sup>1</sup> Planted acres in 2002 for the program states were 12.7 million acres. States included are MN, MT, and ND.

**Wheat, Winter: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Picloram	*	1.0	0.02	0.02	1
<b>Insecticides:</b>					
Chlorpyrifos	3	1.0	0.42	0.43	289
Lambda-cyhalothrin	1	1.1	0.02	0.02	3

\* Area applied is less than one percent.

<sup>1</sup> Harvested acres in 2002 for the 10 program states were 22.2 million acres. States included are CO, IL, KS, MO, MT, NE, OH, OK, TX, and WA.

**Asparagus: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Appli-cations	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Paraquat	12	1.1	0.55	0.64	5.6
<b>Insecticides:</b>					
Disulfoton	46	1.3	0.99	1.32	43.3
Permethrin	19	2.0	0.09	0.18	2.4

<sup>1</sup> Planted acres in 2002 for the 3 program states were 70,500 acres. States included are CA, MI, and WA.

**Snap Beans, Fresh: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Paraquat	*	1.3	0.43	0.58	( <sup>2</sup> )
<b>Insecticides:</b>					
Esfenvalerate	20	1.1	0.03	0.03	0.6
Methomyl	18	3.1	0.30	0.92	13.6
Permethrin	*	1.3	0.14	0.18	( <sup>2</sup> )
<b>Other:</b>					
Chloropicrin	*	1.0	14.30	14.30	4.9

\* Area applied is less than one percent.

<sup>1</sup> Planted acres in 2002 for the 5 program states were 81,800 acres. States included are FL, GA, NY, NC, and TN.

<sup>2</sup> Total applied is less than 50 pounds.

**Snap Beans, Processing: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Insecticides:</b>					
Disulfoton	3	1.0	0.88	0.88	4.6
Esfenvalerate	11	1.0	0.03	0.03	0.6
Ethoprop	6	1.0	2.11	2.18	19.3
<b>Fungicides:</b>					
Benomyl	13	1.0	0.75	0.79	16.6

<sup>1</sup> Planted acres in 2002 for the 5 program states were 159,300 acres. States included are IL, MI, NY, OR, and WI.

**Broccoli: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Appli-cations	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Insecticides:</b>					
Cypermethrin	5	1.0	0.08	0.08	0.5
Enamectin benzoate	5	1.0	0.01	0.01	0.1
Esfenvalerate	16	1.1	0.04	0.04	0.8
Lambda-cyhalothrin	11	1.0	0.03	0.03	0.3
Methomyl	4	1.0	0.78	0.78	3.3
Oxydemeton-methyl	68	1.2	0.49	0.63	49.4
Permethrin	14	1.0	0.09	0.10	1.6

<sup>1</sup> Planted acres in 2002 for the California were 115,000 acres.

**Cabbage, Fresh: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Appli-cations	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Paraquat	*	1.7	0.63	1.10	0.2
<b>Insecticides:</b>					
Azinphos-methyl	4	1.1	0.51	0.56	1.6
Cypermethrin	4	1.8	0.08	0.14	0.4
Disulfoton	3	1.6	1.77	2.90	6.0
Emamectin benzoate	15	1.3	0.01	0.01	0.1
Esfenvalerate	18	2.4	0.03	0.08	1.0
Lambda-cyhalothrin	26	2.1	0.02	0.05	0.9
Methamidophos	1	1.2	0.81	0.97	0.8
Methomyl	14	1.7	0.50	0.87	8.2
Oxydemeton-methyl	10	1.3	0.61	0.81	5.8
Permethrin	19	2.0	0.11	0.23	3.0
<b>Other:</b>					
Chloropicrin	*	1.0	42.39	42.39	6.8
Methyl bromide	*	1.0	51.76	51.76	7.2

\* Area applied is less than one percent.

<sup>1</sup> Planted acres in 2002 for the 9 program states were 69,200 acres. States included are CA, FL, GA, NY, NC, OH, PA, TX, and WI.

**Carrots, Fresh Mkt.: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Insecticides:</b>					
Esfenvalerate	7	1.8	0.04	0.07	0.4
<b>Other:</b>					
Dichloropropene	3	1.0	79.42	84.21	230.6

<sup>1</sup> Planted acres in 2002 for 3 program states were 84,700 acres. States included are CA, MI, and TX.

**Carrots, Processing: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Insecticides:</b>					
Esfenvalerate	40	4.9	0.03	0.16	0.9
<b>Other:</b>					
Dichloropropene	29	1.0	85.92	88.94	355.7

<sup>1</sup> Planted acres in 2002 for the 4 program states were 13,700 acres. States included are CA, TX, WA, and WI.

**Cauliflower: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Insecticides:</b>					
Emamectin benzoate	27	1.0	0.01	0.01	0.1
Esfenvalerate	11	1.2	0.04	0.04	0.2
Lambda-cyhalothrin	29	1.7	0.03	0.04	0.5
Oxydemeton-methyl	38	1.4	0.49	0.72	10.0
Permethrin	14	1.1	0.10	0.12	0.6

<sup>1</sup> Planted acres in 2002 for California were 37,000 acres.

**Celery: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Insecticides:</b>					
Emamectin benzoate	5	1.0	0.01	0.01	( <sup>2</sup> )
Methomyl	18	1.1	0.83	0.98	4.4
Oxamyl	24	1.2	0.65	0.81	5.0
Permethrin	40	2.0	0.17	0.35	3.6
Pyrethrins	5	1.1	0.01	0.01	( <sup>2</sup> )

<sup>1</sup> Planted acres in 2002 for California were 25,500 acres.

<sup>2</sup> Total applied is less than 50 lbs.

**Corn, Sweet, Fresh: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Alachlor	9	1.0	1.77	1.85	30.0
Atrazine	56	1.1	1.01	1.11	111.8
Cyanazine	4	1.0	1.08	1.09	8.5
<b>Insecticides:</b>					
Cyfluthrin	12	5.1	0.03	0.14	3.1
Esfenvalerate	19	4.4	0.04	0.18	6.0
Lambda-cyhalothrin	60	4.0	0.03	0.11	11.3
Methomyl	63	5.0	0.33	1.68	186.4
Methyl parathion	6	2.0	0.55	1.10	11.3
Oxydemeton-methyl	11	1.0	0.45	0.46	9.3
Permethrin	11	3.2	0.12	0.38	7.4
Phorate	11	1.0	1.01	1.01	19.4
Tefluthrin	2	1.0	0.15	0.15	0.6
Terbufos	10	1.0	0.87	0.87	15.9
<b>Other:</b>					
Butylate	9	1.0	6.64	6.64	108.6

<sup>1</sup> Planted acres in 2002 for the 9 program states were 177,700 acres. States included are CA, FL, GA, MI, NJ, NY, NC, OH, and WI.

**Corn, Sweet, Processing: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Appli-cations	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Alachlor	12	1.0	1.96	2.01	93.1
Atrazine	65	1.0	0.74	0.78	196.4
Cyanazine	2	1.1	0.94	1.08	6.7
Paraquat	4	1.0	0.35	0.37	5.1
<b>Insecticides:</b>					
Esfenvalerate	1	1.5	0.03	0.05	0.2
Ethoprop	1	1.0	1.10	1.14	5.4
Lambda-cyhalothrin	51	3.0	0.02	0.07	14.2
Permethrin	5	1.3	0.14	0.18	3.7
Tefluthrin	1	1.0	0.10	0.10	0.5

<sup>1</sup> Planted acres in 2002 for the 5 program states were 388,400 acres. States included are MN, NY, OR, WA, and WI.

**Cucumbers, Fresh: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Paraquat	29	1.4	0.55	0.80	9.8
<b>Insecticides:</b>					
Esfenvalerate	23	2.0	0.02	0.05	0.5
Methomyl	4	2.7	0.43	1.17	1.9
Oxamyl	2	1.8	0.45	0.81	0.8
Permethrin	4	1.0	0.08	0.08	0.1
<b>Other:</b>					
Chloropicrin	13	1.0	62.58	62.58	336.8
Dichloropropene	10	1.0	54.72	57.60	236.5
Methyl bromide	12	1.0	137.53	137.53	689.1

<sup>1</sup> Planted acres in 2002 for the 4 program states were 42,300 acres. States included are FL, GA, MI, and NC.

**Cucumbers, Processing: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Insecticides:</b>					
Carbofuran	6	1.0	0.94	0.94	4.7
Esfenvalerate	10	1.4	0.03	0.04	0.3
Methomyl	2	3.0	0.37	1.14	2.3
Permethrin	6	3.0	0.08	0.24	1.3
<b>Other:</b>					
Dichloropropene	1	1.0	50.90	50.90	32.5

<sup>1</sup> Planted acres in 2002 for the 6 program states were 84,200 acres. States included are FL, MI, NC, OH, TX, and WI.

**Lettuce, Head: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Appli-cations	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Paraquat	*	1.0	0.70	0.70	0.4
Pronamide	43	1.1	0.65	0.73	57.1
<b>Insecticides:</b>					
Cypermethrin	14	1.0	0.08	0.08	2.1
Emamectin benzoate	16	1.6	0.01	0.02	0.5
Esfenvalerate	19	1.1	0.04	0.05	1.7
Lambda-cyhalothrin	32	1.8	0.03	0.05	2.9
Methomyl	38	1.3	0.70	0.92	63.8
Oxydemeton-methyl	31	1.2	0.49	0.63	35.4
Permethrin	68	1.7	0.16	0.28	34.8
Pyrethrins	1	1.0	0.01	0.01	( <sup>2</sup> )
Rotenone	1	1.0	0.01	0.01	( <sup>2</sup> )

\* Area applied is less than one percent.

<sup>1</sup> Planted acres in 2002 for the 2 program states were 181,300 acres. States included are AZ and CA.

<sup>2</sup> Total applied is less than 50 lbs.

**Lettuce, Other: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Appli- cations	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Pronamide	51	1.2	0.80	1.00	55.7
<b>Insecticides:</b>					
Lambda-cyhalothrin	50	1.6	0.03	0.04	2.4
Methomyl	35	1.1	0.70	0.82	31.4
Permethrin	69	1.5	0.14	0.22	17.0
Pyrethrins	3	1.0	0.01	0.01	( <sup>2</sup> )
Rotenone	2	1.0	0.01	0.01	( <sup>2</sup> )
Tralomethrin	5	1.0	0.02	0.02	0.1

<sup>1</sup> Planted acres in 2002 for the 2 program states were 109,600 acres. States included are AZ and CA.

<sup>2</sup> Total applied is less than 50 lbs.

**Melons, Cantaloupe: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Paraquat	1	1.0	0.30	0.33	0.2
<b>Insecticides:</b>					
Azinphos-methyl		2.6	0.48	1.29	0.1
Esfenvalerate	5	1.1	0.03	0.04	0.2
Methomyl	3	1.4	0.29	0.41	0.9
Oxamyl	4	1.8	0.29	0.51	1.5
Permethrin	5	1.3	0.10	0.13	0.6
<b>Other:</b>					
Dichloropropene	11	1.0	81.17	81.17	708.7

<sup>1</sup> Planted acres in 2002 for the 4 program states were 82,100 acres. States included are AZ, CA, PA, and TX.

**Melons, Watermelon: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Paraquat	2	1.1	0.51	0.56	1.5
<b>Insecticides:</b>					
Esfenvalerate	15	1.6	0.03	0.05	1.0
Fenamiphos	1	1.0	2.51	2.51	2.2
Methomyl	5	1.5	0.36	0.56	3.7
Oxamyl	2	1.0	0.58	0.58	1.1
Permethrin	9	3.5	0.12	0.42	4.5
<b>Other:</b>					
Chloropicrin	3	1.0	54.01	55.13	178.0
Dichloropropene	6	1.0	80.69	82.13	574.9
Methyl bromide	3	1.0	104.14	106.17	365.2

<sup>1</sup> Planted acres in 2002 for the 6 program states were 125,100 acres. States included are AZ, FL, GA, NC, SC, and TX.

**Dry Bulb Onions: Agricultural Chemical Applications,  
Restricted Use Pesticides  
States Surveyed, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Paraquat	4	1.1	0.54	0.61	3.4
<b>Insecticides:</b>					
Azinphos-methyl	8	1.5	0.68	1.02	10.3
Cypermethrin	5	1.9	0.09	0.17	1.0
Lambda-cyhalothrin	49	2.8	0.03	0.07	4.7
Methomyl	25	2.1	0.52	1.14	35.7
Methyl parathion	12	2.2	0.45	0.98	15.2
Oxamyl	9	1.8	0.88	1.60	17.5
Permethrin	8	1.8	0.16	0.29	2.8
<b>Other:</b>					
Chloropicrin	3	1.0	36.74	36.87	162.9
Dichloropropene	6	1.0	174.47	174.83	1,239.9

<sup>1</sup> Planted acres in 2002 for the 6 program states were 126,500 acres. States included are CA, GA, NY, OR, TX, and WA.

**Peas, Green, Processing: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Insecticides:</b>					
Esfenvalerate	8	1.0	0.03	0.03	0.5

<sup>1</sup> Planted acres in 2002 for the 5 program states were 201,800 acres. States included are MN, NY, OR, WA, and WI.

**Peppers, Bell: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Appli-cations	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Paraquat	4	1.1	0.72	0.83	1.4
<b>Insecticides:</b>					
Cyfluthrin	17	2.7	0.03	0.09	0.8
Esfenvalerate	7	1.9	0.04	0.07	0.2
Methomyl	26	2.9	0.51	1.50	18.6
Oxamyl	30	2.8	0.52	1.50	21.3
Permethrin	7	3.3	0.18	0.59	1.9
<b>Other:</b>					
Chloropicrin	42	1.0	98.99	100.94	2,051.5
Dichloropropene	4	1.2	105.61	130.88	255.0
Methyl bromide	37	1.0	139.21	139.21	2,469.9

<sup>1</sup> Planted acres in 2002 for the 4 program states were 48,000 acres. States included are CA, FL, NC, and OH.

**Pumpkins: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Appli-cations	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Insecticides:</b>					
Azinphos-methyl	*	1.9	0.40	0.79	0.1
Carbofuran	3	1.0	0.57	0.57	0.4
Esfenvalerate	9	2.6	0.03	0.09	0.2
Lambda-cyhalothrin	4	1.9	0.33	0.66	0.7
Methomyl	1	1.6	0.48	0.80	0.2
Oxydemeton-methyl	1	1.0	0.58	0.58	0.2
Permethrin	10	2.2	0.12	0.26	0.7

\* Area applied is less than one percent.

<sup>1</sup> Planted acres in 2002 for the 4 program states were 28,400 acres. States included are CA, IL, MI, and NY.

**Spinach, Fresh: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Insecticides:</b>					
Methomyl	6	1.1	0.51	0.58	0.9
Permethrin	34	2.1	0.15	0.32	2.9
Pyrethrins	3	1.0	0.01	0.01	( <sup>2</sup> )
Rotenone	3	1.0	0.01	0.01	( <sup>2</sup> )

<sup>1</sup> Planted acres in 2002 for the 2 program states were 26,800 acres. States included are CA and TX.

<sup>2</sup> Total applied is less than 50 lbs.

**Squash: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Paraquat	5	1.1	0.48	0.56	1.3
<b>Insecticides:</b>					
Carbofuran	3	1.0	0.58	0.58	0.7
Esfenvalerate	11	2.5	0.04	0.10	0.5
Lambda-cyhalothrin	1	1.6	0.03	0.04	
Methomyl	9	2.5	0.51	1.30	5.2
Oxamyl	1	1.7	0.66	1.18	0.4
Permethrin	8	1.8	0.13	0.24	0.8
<b>Other:</b>					
Chloropicrin	2	1.0	77.82	79.92	67.3
Dichloropropene	3	1.0	71.46	71.56	110.9
Methyl bromide	1	1.0	113.35	113.35	48.5

<sup>1</sup> Planted acres in 2002 for the 6 program states were 44,400 acres. States included are CA, FL, GA, MI, NJ, and NC.

**Strawberries: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Appli-cations	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Paraquat	15	1.3	0.38	0.53	3.0
Simazine	6	1.0	0.96	0.96	2.3
<b>Insecticides:</b>					
Azinphos-methyl	2	1.0	0.51	0.52	0.5
Diazinon	10	1.9	0.64	1.22	4.8
Methomyl	42	2.5	0.70	1.80	29.1
Oxydemeton-methyl	2	1.5	0.32	0.49	0.4
Pyrethrins	3	1.7	0.01	0.02	( <sup>2</sup> )
Rotenone	2	1.1	0.01	0.01	( <sup>2</sup> )
<b>Other:</b>					
Chloropicrin	64	1.2	124.14	156.55	3,896.5
Dichloropropene	6	1.1	164.70	184.02	428.3
Methyl bromide	58	1.1	159.58	189.33	4,263.4

<sup>1</sup> Planted acres in 2002 for the 3 program states were 38,900 acres. States included are CA, FL, and OR.

<sup>2</sup> Total applied is less than 50 lbs.

**Tomatoes, Fresh: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Paraquat	16	1.1	0.41	0.49	7.8
<b>Insecticides:</b>					
Azinphos-methyl	1	1.7	0.54	0.94	0.5
Cyfluthrin	19	4.4	0.03	0.13	2.4
Esfenvalerate	33	4.6	0.04	0.16	5.2
Lambda-cyhalothrin	25	4.1	0.03	0.14	3.3
Methamidophos	10	2.3	0.85	2.02	19.3
Methomyl	13	1.7	0.65	1.15	15.0
Oxamyl	7	2.8	0.67	1.90	12.9
Permethrin	16	6.4	0.10	0.65	10.4
<b>Other:</b>					
Chloropicrin	48	1.0	90.34	90.34	4,196.7
Methyl bromide	44	1.0	132.31	132.31	5,620.6

<sup>1</sup> Planted acres in 2002 the 5 program states were 97,300 acres. States included are CA, FL, GA, OH, and TN.

**Tomatoes, Processing: Agricultural Chemical Applications,  
Restricted Use Pesticides  
Program States, 2002 <sup>1</sup>**

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
	<i>Percent</i>	<i>Number</i>	<i>Pounds per Acre</i>	<i>Pounds per Acre</i>	<i>1,000 lbs</i>
<b>Herbicides:</b>					
Paraquat	2	1.0	0.29	0.31	1.9
<b>Insecticides:</b>					
Cyfluthrin	2	1.0	0.04	0.04	0.3
Esfenvalerate	5	1.2	0.04	0.06	0.8
Lambda-cyhalothrin	16	1.1	0.03	0.03	1.5
Methamidophos	4	1.1	0.99	1.11	13.7
Methomyl	5	1.2	0.51	0.62	9.0
Oxamyl	2	1.4	0.71	0.99	4.4
Permethrin	1	1.0	0.19	0.19	0.8

<sup>1</sup> Planted acres in 2002 for California were 296,000 acres.

**Estimation Procedures:** The chemical applications data, reported by product name or trade name, are reviewed within state and across states for reasonableness and consistency. This review compares reported data with manufacturer's recommendations and with data from other farm operators using the same product. Following this review, product information are converted to an active ingredient level. The chemical usage estimates in this publication consist of survey estimates of those active ingredients.

Estimates of the total amount of active ingredient applied are based on the acreage estimates published in the annual NASS report "**Crop Production - 2002 Summary**" [Cr Pr 2-1(03)] for corn, soybeans, durum, other spring, and winter wheat. Estimates of the total amount of active ingredient applied for vegetables are based on the acreage estimates published in the annual NASS report "Vegetables - 2002 Summary" [Vg 1-2(03)] released on January 29, 2003. The estimates for total amount applied will not be revised even if there are subsequent revisions to acreage for a given crop.

Detailed data within a table may not multiply across or add down due to independent rounding of the published values.

## Terms and Definitions

**Active ingredient:** The active ingredient is the specific chemical which kills or controls the target pests. Usage data are reported by pesticide product and are converted to an amount of active ingredient. A single method of conversion has been chosen for active ingredients having more than one way of being converted. For example in this report, copper compounds are expressed in their metallic copper equivalent, and others such as 2,4-D and glyphosate are expressed in their acid equivalent.

**Agricultural chemicals:** The phrase agricultural chemicals refers to the active ingredients in pesticides.

**Application Rates:** The application rates refer to the average number of pounds of a pesticide active ingredient applied to an acre of land. Rate per acre is the average number of pounds applied in one application. Rate per crop year is the average number of pounds applied counting multiple applications. Number of applications is the average number of times a treated acre receives a specific agricultural chemical. For dairy cattle rate per application is the average number of grams applied in one application. Rate per year is the average number of grams applied counting multiple applications.

**Area applied:** The area that represents the percentage of crop acres receiving one or more applications of a specific agricultural chemical. This report does not contain acre treatments. However, acre treatments can be calculated by multiplying the acres planted by the percent of area applied and the average number of applications.

**Common name:** The common name is an officially recognized name for an active ingredient. This report shows active ingredient by common name.

**Crop year:** A crop year refers to the period immediately following harvest for the previous crop through harvest of the current crop.

**Pesticides:** As defined by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), pesticides include any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any pest, and any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.

### Trade Name, Common Name, and Pesticide Class

The following is a list of the common name, associated class and trade name of active ingredients in this publication. The classes are Herbicides (H), Insecticides (I), Fungicides (F), and Other chemicals (O). This list is provided as an aid in reviewing pesticide data. Pre-mixes are not cataloged. The list is not complete for all pesticides used on field crops, vegetable crops or sheep, and NASS does not mean to imply the use of any specific trade name.

Class	Common Name	Trade Name
H	acetamide	Axiom
H	acetochlor	Harness, Topnotch
H	alachlor	Lasso
H	atrazine	AAtrex
I	azinphos-methyl	Guthion
I	benomyl	Benlate
H	butylate	Genate, Sutan
I	carbofuran	Furadan
O	chloropicrin	several
I	chlorpyrifos	Lorsban, Dursban
H	cyanazine	Bladex
I	cyfluthrin	Baythroid
I	cypermethrin	Ammo, Cymbush
I	diazinon	several
O	dichloropropene	Telone
I	diflubenzuron	Dimilin
I	disulfoton	Di-Syston
F	emamectin benzoate	Denim, Proclaim
I	esfenvalerate	Asana
I	fenamiphos	Nemacur
I	fipronil	Regent
H	imazaquin	Scepter
I	lambda-cyhalothrin	Karate, Warrior

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**Trade Name, Common Name, and Pesticide Class (cont.)**

Class	Common Name	Trade Name
I	methamidophos	Monitor
I	methomyl	Lannate
O	methyl bromide	several
I	methyl parathion	several
I	oxamyl	Vydate
I	oxydemeton-methyl	Metasystox-RH,
O	paraquat	Gramoxone, Cyclone, Starfire
I	permethrin	Ambush, Pounce
I	phorate	Thimet
H	picloram	Tordon
H	pronamide	Kerb
I	pyrethrins	several
I	rotenone	Rotenone
H	simazine	Princep
I	tefluthrin	Force
I	terbufos	Counter
I	tralomethrin	Scout

## Report Features

**Released October 1, 2003, by the National Agricultural Statistics Service (NASS), Agricultural Statistics Board, U.S. Department of Agriculture. For information on "Agricultural Chemical Usage" call (202) 720-6146, office hours 7:30 a.m. to 4:00 p.m. ET.**

The next "Agricultural Chemical Usage" report will be released March 10, 2004. This report will cover agricultural chemical use for postharvest applications on corn and soybeans in off farm grain storage facilities.

The next "Agricultural Chemical Usage" report for restricted use pesticides will be released on October 6, 2004. This report will cover the use of restricted agricultural chemicals for 2003 on field and fruits crops for major states.

Listed below are persons within the National Agricultural Statistics Service to contact for additional information.

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