

## Agricultural Chemical Usage

The 2006 Vegetable Chemical Usage Report includes farm use of pesticides for 23 targeted vegetable crops in 19 major States. The crops surveyed in Michigan were asparagus, snap beans for processing, carrots for fresh market and processing, sweet corn for fresh market, cucumbers for fresh market and processing, pumpkins, and squash. Chemical use information for fruit is collected in odd numbered years, while vegetable information is collected in even numbered years. Information in this report is provided from a survey funded by the USDA Pesticide Data Program. The purpose of the Pesticide Data Program is to provide reliable pesticide use statistics and to enhance the quality of information on pesticide residues in food. Multiple agencies within the USDA administer this program. This data series addresses the increased public interest in

agricultural chemical use and provides the means for government agencies to respond effectively to food safety and water quality issues.

The entire series of chemical usage statistics since 1990 for Michigan and the U.S. can be found on the NASS website at [www.nass.usda.gov](http://www.nass.usda.gov). The common name and trade name for the active ingredients in the tables can be found on page 347 of the Agricultural Chemical Usage – Vegetables publication which was released on July 25, 2007 or on page 116 of the Agricultural Chemical Usage – Field Crops publication which was released on May 16, 2007.

### Asparagus: Agricultural chemical applications, 2006<sup>1</sup>

Agricultural chemical	Area applied Percent	Applications Number	Rate per application Pounds per acre	Rate per crop year Pounds per acre	Total applied 1,000 lbs
<b>Herbicides</b>					
2,4-D, dimeth. salt	8	1.2	0.97	1.169	1.2
Diuron	89	1.5	1.263	1.87	20.2
Fluazifop-P-butyl	5	1	0.272	0.272	0.2
Glyphosate iso. salt	89	1.6	0.798	1.254	13.6
Metribuzin	72	1.3	0.419	0.543	4.8
Paraquat	13	1.2	0.588	0.688	1.1
Sulfentrazone	36	1.1	0.194	0.217	0.9
Terbacil	3	1	0.359	0.359	0.1
<b>Insecticides</b>					
Carbaryl	88	3.3	0.618	2.041	21.9
Permethrin	59	2.8	0.105	0.291	2.1
<b>Fungicides</b>					
Chlorothalonil	77	2.7	1.49	3.974	37.5
Mancozeb	38	2.2	1.36	2.985	13.7
Tebuconazole	16	1.3	0.11	0.143	0.3

<sup>1</sup> Planted acres in 2006 were 12,200 acres.

### Snap Beans, Processing: Agricultural chemical applications, 2006<sup>1</sup>

Agricultural chemical	Area applied Percent	Applications Number	Rate per application Pounds per acre	Rate per crop year Pounds per acre	Total applied 1,000 lbs
<b>Herbicides</b>					
Bentazon	58	1	0.515	0.515	5.7
EPTC	27	1	2.283	2.283	11.7
Fomesafen	43	1	0.175	0.177	1.4
Glyphosate iso. salt	13	1	0.747	0.77	2
S-Metolachlor	39	1	0.859	0.859	6.3
Trifluralin	37	1	0.579	0.579	4.1
<b>Insecticides</b>					
Acephate	54	1.9	0.598	1.108	11.4
Carbaryl	16	3.2	0.919	2.916	8.7
Lambda-cyhalothrin	8	1.6	0.019	0.031	( <sup>2</sup> )

<sup>1</sup> Planted acres in 2006 were 19,000 acres.

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

**Carrots, Fresh: Agricultural chemical applications, 2006<sup>1</sup>**

Agricultural chemical	Area applied	Applications	Rate per application	Rate per crop year	Total applied
	Percent	Number	Pounds per acre	Pounds per acre	1,000 lbs
Herbicides					
Clethodim	45	1.5	0.12	0.184	0.2
Linuron	83	2.4	0.567	1.335	3.2

<sup>1</sup> Planted acres in 2006 were 2,900 acres.

**Carrots, Processing: Agricultural chemical applications, 2006<sup>1</sup>**

Agricultural chemical	Area applied	Applications	Rate per application	Rate per crop year	Total applied
	Percent	Number	Pounds per acre	Pounds per acre	1,000 lbs
Fungicides					
Chlorothalonil	100	3.4	1.327	4.491	8.1

<sup>1</sup> Planted acres in 2006 were 1,800 acres.

**Sweet Corn, Fresh: Agricultural chemical applications, 2006<sup>1</sup>**

Agricultural chemical	Area applied	Applications	Rate per application	Rate per crop year	Total applied
	Percent	Number	Pounds per acre	Pounds per acre	1,000 lbs
Herbicides					
2,4-D, dimeth. salt	2	1	0.545	0.545	0.1
Alachlor	15	1.1	2.082	2.193	2.9
Atrazine	73	1.1	1.259	1.336	8.8
Bentazon	9	1.3	0.491	0.632	0.5
Glyphosate iso. salt	1	1	1.102	1.102	0.1
Mesotrione	8	1	0.133	0.133	0.1
Pendimethalin	12	1	1.096	1.096	1.2
S-Metolachlor	54	1	1.412	1.415	6.9
Insecticides					
Carbaryl	3	3.4	1.104	3.735	1
Chlorpyrifos	18	1	0.229	0.229	0.4
Cyfluthrin	9	1.6	0.027	0.043	( <sup>2</sup> )
Esfenvalerate	27	3.2	0.038	0.12	0.3
Lambda-cyhalothrin	44	2.7	0.026	0.07	0.3
Methomyl	32	2.3	0.44	1.017	2.9
Permethrin	3	1.9	0.166	0.316	0.1
Thiodicarb	13	2.3	0.651	1.505	1.8
Zeta-cypermethrin	6	1.6	0.021	0.033	( <sup>2</sup> )
Fungicides					
Chlorothalonil	1	2.3	2.121	4.955	0.6
Propiconazole	6	1.3	0.077	0.102	0.1

<sup>1</sup> Planted acres in 2006 were 9,000 acres.

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

### Cucumbers, Fresh: Agricultural chemical applications, 2006<sup>1</sup>

Agricultural chemical	Area applied Percent	Applications Number	Rate per application Pounds per acre	Rate per crop year Pounds per acre	Total applied 1,000 lbs
Herbicides					
Clomazone	23	1	0.818	0.818	1.1
Ethalfluralin	57	1	0.858	0.858	2.7
Glyphosate iso. salt	2	1	1.106	1.106	0.1
S-Metolachlor	24	1	1.576	1.576	2.1
Trifluralin	( <sup>2</sup> )	1	0.608	0.608	( <sup>3</sup> )
Insecticides					
Carbaryl	1	1.1	0.97	1.038	( <sup>3</sup> )
Endosulfan	14	1.2	0.559	0.658	0.5
Esfenvalerate	33	3.2	0.037	0.119	0.2
Methomyl	18	2.4	0.643	1.525	1.5
Pyrethrins	( <sup>2</sup> )	2	0.032	0.062	( <sup>3</sup> )
Fungicides					
Azoxystrobin	3	1.1	0.191	0.202	( <sup>3</sup> )
Chlorothalonil	73	5.4	2.102	11.382	46.4
Copper hydroxide	73	5.2	0.583	3.005	12.3
Cymoxanil	72	2.5	0.125	0.311	1.3
Famoxadone	72	2.5	0.125	0.31	1.3
Mancozeb	13	5.2	2.213	11.409	8.4
Myclobutanil	18	1.9	0.098	0.182	0.2
Propamocarb hydroch.	73	3.9	0.771	2.989	12.3

<sup>1</sup> Planted acres in 2006 were 5,600 acres.

<sup>2</sup> Area applied was less than 0.5 percent.

<sup>3</sup> Total applied was less than 50 lbs.

### Cucumbers, Pickles: Agricultural chemical applications, 2006<sup>1</sup>

Agricultural chemical	Area applied Percent	Applications Number	Rate per application Pounds per acre	Rate per crop year Pounds per acre	Total applied 1,000 lbs
Herbicides					
Clomazone	61	1.1	0.119	0.128	2.7
Ethalfluralin	78	1.1	0.558	0.591	15.7
Halosulfuron	38	1	0.034	0.034	0.4
Sethoxydim	5	1	0.653	0.653	1
Insecticides					
Esfenvalerate	18	1.1	0.037	0.04	0.2
Fungicides					
Chlorothalonil	71	2.1	1.086	2.286	54.9
Copper hydroxide	3	2.6	0.589	1.536	1.4
Cymoxanil	67	1.8	0.106	0.188	4.3
Famoxadone	67	1.8	0.106	0.188	4.3
Mancozeb	65	2.3	1.54	3.529	78.6
Propamocarb hydroch.	78	2	0.72	1.464	39

<sup>1</sup> Planted acres in 2006 were 34,000 acres.

### Pumpkins: Agricultural chemical applications, 2006<sup>1</sup>

Agricultural chemical	Area applied	Applications	Rate per application	Rate per crop year	Total applied
	Percent	Number	Pounds per acre	Pounds per acre	1,000 lbs
<b>Herbicides</b>					
Clomazone	45	1	0.343	0.345	1
Ethalfluralin	48	1	0.773	0.773	2.3
Glyphosate iso. salt	15	1.1	0.87	0.927	0.9
<b>Insecticides</b>					
Bifenthrin	4	2	0.067	0.134	( <sup>2</sup> )
Carbaryl	18	1.8	0.831	1.517	1.7
Endosulfan	17	2.2	0.718	1.563	1.7
Esfenvalerate	19	2.9	0.035	0.102	0.1
Lambda-cyhalothrin	6	3.1	0.023	0.071	( <sup>2</sup> )
<b>Fungicides</b>					
Azoxystrobin	8	2.2	0.112	0.246	0.1
Chlorothalonil	50	3.3	1.714	5.742	17.9
Copper hydroxide	38	3.1	0.855	2.65	6.2
Cymoxanil	15	1.7	0.125	0.218	0.2
Famoxadone	15	1.7	0.125	0.218	0.2
Mancozeb	7	1.9	1.272	2.42	1.1
Mefenoxam	2	2.3	0.163	0.375	( <sup>2</sup> )
Propamocarb hydroch.	19	3	0.999	2.965	3.5
Thiophanate-methyl	11	2	0.308	0.629	0.4

<sup>1</sup> Planted acres in 2006 were 6,200 acres.

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

### Squash: Agricultural chemical applications, 2006<sup>1</sup>

Agricultural chemical	Area applied	Applications	Rate per application	Rate per crop year	Total applied
	Percent	Number	Pounds per acre	Pounds per acre	1,000 lbs
<b>Herbicides</b>					
Clomazone	37	1	0.328	0.336	1.1
Ethalfluralin	62	1	0.791	0.791	4.3
Glyphosate iso. salt	5	1	0.881	0.918	0.4
Halosulfuron	17	1	0.026	0.026	( <sup>2</sup> )
S-Metolachlor	8	1	1.639	1.639	1.2
<b>Insecticides</b>					
Carbaryl	31	1.9	0.764	1.415	3.8
Endosulfan	9	2.1	0.619	1.308	1
Esfenvalerate	28	2.9	0.035	0.102	0.2
Imidacloprid	2	1.5	0.124	0.189	( <sup>2</sup> )
Lambda-cyhalothrin	( <sup>3</sup> )	1.1	0.02	0.022	( <sup>2</sup> )
Permethrin	19	2.3	0.152	0.348	0.6
Pyrethrins	( <sup>3</sup> )	1.3	0.022	0.029	( <sup>2</sup> )
<b>Fungicides</b>					
Azoxystrobin	1	1.2	0.184	0.223	( <sup>2</sup> )
Basic copper sulfate	7	4.1	0.332	1.349	0.9
Chlorothalonil	71	3.1	1.519	4.647	28.6
Copper hydroxide	39	4.4	0.409	1.799	6.1
Cymoxanil	25	2	0.124	0.25	0.6
Famoxadone	25	2	0.124	0.249	0.5
Mancozeb	6	2.4	1.61	3.783	1.9
Maneb	7	2.9	1.037	2.979	1.8
Myclobutanil	11	1.7	0.091	0.151	0.1
Propamocarb hydroch.	19	4.3	0.753	3.213	5.4
Pyraclostrobin	14	1.1	0.139	0.147	0.2
Thiophanate-methyl	8	2.1	0.294	0.612	0.4

<sup>1</sup> Planted acres in 2006 were 8,700 acres.

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

<sup>3</sup> Area applied was less than 0.5 percent.

### Fertilizer applications: Soybeans, 2006<sup>1</sup>

Fertilizer	Symbol	Area applied	Applications	Rate per application	Rate per crop year	Total applied
		Percent	Number	Pounds per acre	Pounds per acre	Million pounds
Nitrogen	N	28	1.2	9	11	5.9
Phosphate	P <sub>2</sub> O <sub>5</sub>	28	1.2	30	35	19.5
Potash	K <sub>2</sub> O	56	1.2	75	87	96.7
Sulfur	S	3	1.0	3	3	0.2

<sup>1</sup> Planted acres in 2006 were 2.0 million acres.

### Agricultural chemical applications: Soybeans, 2006<sup>1</sup>

Agricultural chemical	Area applied	Applications	Rate per application	Rate per crop year	Total applied
	Percent	Number	Pounds per acre	Pounds per acre	1,000 pounds
Herbicides					
Glyphosate	6	1.3	0.716	0.898	107
Glyphosate iso. salt	91	1.4	0.846	1.169	2,128
Imazethapyr	2	1.0	0.059	0.059	3
Pendimethalin	3	1.0	0.871	0.871	57

<sup>1</sup> Planted acres in 2006 were 2.0 million acres.

### Fertilizer applications: Winter wheat, 2006<sup>1</sup>

Fertilizer	Symbol	Area applied	Applications	Rate per application	Rate per crop year	Total applied
		Percent	Number	Pounds per acre	Pounds per acre	Million pounds
Nitrogen	N	98	2.0	46	89	57.6
Phosphate	P <sub>2</sub> O <sub>5</sub>	74	1.0	44	46	22.2
Potash	K <sub>2</sub> O	85	1.0	59	61	33.9
Sulfur	S	37	1.3	10	12	3.0

<sup>1</sup> Planted acres in 2006 were 660,000 acres.

### Agricultural chemical applications: Winter wheat, 2006<sup>1</sup>

Agricultural chemical	Area applied	Applications	Rate per application	Rate per crop year	Total applied
	Percent	Number	Pounds per acre	Pounds per acre	1,000 pounds
Herbicides					
2,4-D, 2-EHE	23	1.0	0.438	0.438	67
2,4-D, dimeth. salt	11	1.0	0.585	0.585	41
Prosulfuron	2	1.0	0.016	0.016	( <sup>2</sup> )
Thifensulfuron	29	1.0	0.017	0.017	3
Tribenuron-methyl	29	1.0	0.006	0.006	1
Fungicides					
Azoxystrobin	3	1.0	0.043	0.043	1
Propiconazole	10	1.0	0.078	0.078	5
Pyraclostrobin	8	1.0	0.082	0.082	4
Tebuconazole	9	1.0	0.106	0.106	6

<sup>1</sup> Planted acres in 2006 were 660,000 acres.

<sup>2</sup> Total applied is less than 500 lbs.

**Commercial fertilizer consumption: 2002-2006<sup>1</sup>**

Item	Year ending June 30				
	2002	2003	2004	2005	2006
	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>
Primary plant nutrients					
Total N	240,680	238,296	264,850	253,433	232,710
N in multi-nutrients	55,048	60,449	60,405	57,559	58,308
Total P <sub>2</sub> O <sub>5</sub>	84,734	85,485	94,352	82,885	85,746
P <sub>2</sub> O <sub>5</sub> in multi-nutrients	82,377	83,193	92,225	81,187	83,841
Total K <sub>2</sub> O	189,200	189,463	210,479	189,432	163,523
K <sub>2</sub> O in multi-nutrients	41,924	45,298	46,989	41,926	36,883
Total plant nutrients	514,615	513,243	569,680	525,751	481,979
Average analysis	43.1	40.1	41.1	37.7	41.3
Total nutrients in multi-nutrients	179,349	188,940	199,620	180,673	179,031
Selected single-nutrient materials					
Ammonium nitrate	5,405	7,856	6,619	7,501	5,168
Anhydrous ammonia	52,766	39,235	43,551	50,071	33,759
Nitrogen solutions	284,355	285,787	323,712	301,868	279,293
Urea	107,305	107,854	132,493	108,090	107,941
Ammonium sulfate	23,569	25,294	30,376	36,660	30,254
Concentrated superphosphate	4,984	4,515	4,139	3,716	4,189
Potassium chloride	236,720	231,668	259,011	234,700	203,398
Multiple-nutrient fertilizers					
N-P-K	334,670	265,924	294,691	227,081	245,713
N-P	129,900	133,062	142,136	134,719	143,185
N-K	27,096	34,853	33,024	44,437	56,456
P-K	3,831	2,828	3,129	2,926	2,536
Leading multiple-nutrient grades					
10-34-0	44,303	46,717	50,860	37,026	47,687
18-46-0	36,672	37,149	35,938	38,902	39,534
11-52-0	24,636	25,865	34,428	35,776	35,295
28-3-3	7,761	7,654	7,357	6,951	12,504
19-19-19	13,989	12,709	16,547	13,756	11,670
4-10-10	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	7,347
Fertilizer consumption by classes					
Dry bulk single-nutrient	392,966	443,887	472,774	430,495	380,147
Dry bagged single-nutrient	23,385	40,127	35,943	19,815	18,688
Fluid single-nutrient	339,295	343,115	373,002	362,722	319,143
Dry bulk multiple-nutrient	223,668	231,005	248,576	202,878	214,164
Dry bagged multiple-nutrient	187,396	132,037	150,598	137,291	145,636
Fluid multiple-nutrient	84,433	73,625	73,805	68,993	88,090
Organics, secondary and micronutrients	31,883	84,679	60,845	58,519	148,112
Total	1,283,026	1,348,475	1,415,544	1,280,715	1,313,980

<sup>1</sup> Source: The Association of American Plant Food Control Officials