



2006 Wheat Chemical Use

Cooperating with the Montana Department of Agriculture
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The agricultural chemical use estimates in this report refer to on-farm use of commercial fertilizers and pesticides on targeted field crops for the 2006 crop year. Farm operators were enumerated late in the growing season after the farm

operator had indicated that planned applications were completed. The chemical use data were not summarized for geographical areas other than by those States published in this report.

Winter Wheat Fertilizer and Pesticide Use by State, 2006, Percent of Total Acres Treated and Total Applied, Program States

State	Planted Acreage	Percent of Acres Treated with Fertilizer and Total Applied								Percent of Acres Treated with Pesticides and Total Applied					
		Nitrogen		Phosphate		Potash		Sulfur		Herbicide		Insecticide		Fungicide	
		Thou	Pct	Mil Lbs	Pct	Mil Lbs	Pct	Mil Lbs	Pct	Mil Lbs	Pct	1,000 Lbs	Pct	1,000 Lbs	Pct
CO	2,150	54	36.8	36	13.5	1/		4	0.7	54	1,018	1/			
ID	750	93	80.9	66	13.7	16	2.2	63	9.6	84	349	1/		5	3
IL	930	93	82.1	76	49.8	76	68.4	3	0.5	46	62	1/		6	7
KS	9,800	88	493.0	66	197.5	8	29.0	5	5.3	53	2,600	1/			
MI	660	98	57.6	74	22.2	85	33.9	37	3.0	71	148	3	2/	23	17
MO	1,000	97	90.7	73	35.5	74	44.8	12	1.8	28	49	12	12	6	10
MT	1,950	87	96.8	84	46.2	31	9.9	12	2.0	92	2,315	1/		1/	
NE	1,800	75	73.3	57	34.0	4	1.4	13	1.9	56	399			4	8
OH	990	98	86.2	84	53.0	82	57.5	23	7.2	44	93	1/		1/	
OK	5,700	89	283.4	65	130.9	8	9.8	1/		20	495	7	138		
OR	760	95	46.2	12	2.8	10	1.4	48	4.9	87	366	1/		3	3
SD	1,450	82	78.7	57	28.1	15	4.7	12	1.1	74	749	1/		21	27
TX	5,550	44	152.1	29	47.3	8	20.8	11	5.3	22	1,299	4	92		
WA	1,850	99	140.8	36	12.0	10	3.5	71	18.0	94	1,077	1/		2	5
Total	35,340	80	1,798.6	57	686.5	17	288.5	14	66.4	49	11,019	3	315	2	86

1/ Insufficient reports to publish data. 2/ Total applied is less than 50 lbs.

Durum Wheat Fertilizer and Pesticide Use by State, 2006, Percent of Total Acres Treated and Total Applied, Program States

State	Planted Acreage	Percent of Acres Treated with Fertilizer and Total Applied								Percent of Acres Treated with Pesticides and Total Applied					
		Nitrogen		Phosphate		Potash		Sulfur		Herbicide		Insecticide		Fungicide	
		Thou	Pct	Mil Lbs	Pct	Mil Lbs	Pct	Mil Lbs	Pct	Mil Lbs	Pct	1,000 Lbs	Pct	1,000 Lbs	Pct
MT	400	93	20.6	82	7.3	8	0.3	4	0.1	89	250			1/	
ND	1,300	92	77.4	71	21.3	7	0.8	4	0.1	97	862	1/		1/	
Total	1,700	92	98.0	74	28.6	7	1.1	4	0.3	95	1,112	1/		5	6

1/ Insufficient reports to publish data.

Other Spring Wheat Fertilizer and Pesticide Use by State, 2006, Percent of Total Acres Treated and Total Applied, Program States

State	Planted Acreage	Percent of Acres Treated with Fertilizer and Total Applied								Percent of Acres Treated with Pesticides and Total Applied					
		Nitrogen		Phosphate		Potash		Sulfur		Herbicide		Insecticide		Fungicide	
		Thou	Pct	Mil Lbs	Pct	Mil Lbs	Pct	Mil Lbs	Pct	Mil Lbs	Pct	1,000 Lbs	Pct	1,000 Lbs	Pct
ID	490	96	60.7	56	9.5	25	3.5	59	8.5	95	272	8	9	12	6
MN	1,700	99	148.5	97	64.0	72	31.6	2	0.4	96	952	5	12	40	45
MT	2,950	86	129.5	81	57.7	21	9.0	10	2.5	91	2,172			1/	
ND	7,300	99	504.6	88	202.2	21	13.0	11	4.3	95	4,723			14	88
SD	1,850	90	119.4	80	55.6	22	11.9	10	3.5	84	943	1/		24	31
WA	430	100	43.6	60	4.7	9	1.6	89	6.4	96	261	11	19	12	5
Total	14,720	95	1,006.2	85	393.7	27	70.4	13	25.7	93	9,323	1	40	15	175

1/ Insufficient reports to publish data.

Survey and Estimation Procedures

Survey Procedures: Data for rice, soybeans, organic soybeans, durum wheat, other spring wheat, and winter wheat were collected on two 2006 surveys, the Agricultural Resource Management Survey (ARMS) and the Conservation Effects Assessment Project (CEAP).

Data collection for the ARMS and CEAP surveys occurred during the months of September through December 2006 and only those CEAP samples that matched the ARMS crops and states were included. Data collection and sampling procedures were similar for both the ARMS and CEAP surveys. ARMS screening samples were drawn from the NASS List Sampling Frame. This extensive sampling frame covers all types of farms and accounts for approximately 90 percent of all land in farms in the United States. All farms on the list had a possibility of being selected for the screening sample. Farms thought to have the crops of interest were more likely to be in the screening sample. Sampled farms were screened to determine if they grew the target crops in 2006. From this subpopulation of operations identified as producing a crop of interest, a subsample of farms was selected in such a way as to insure that each identified producer had an opportunity to be selected. In general, larger farms were more likely to be selected than smaller farms. Once a farm producing rice, soybeans, organic soybeans, durum wheat, other spring wheat, or winter wheat was selected, one field was randomly chosen from all the fields on the farm. The operator of the sampled field was personally interviewed to obtain information on chemical applications made to the selected field. The CEAP was a nationwide, area-based sample survey based on the Natural Resources Conservation Service (NRCS) National Resources Inventory (NRI) points. CEAP samples which reported a commodity of interest which matched the ARMS commodities were combined with the ARMS data for use in this publication.

Terms and Definitions

Active ingredient: The specific chemical which kills or controls the target pest(s). 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 salt and acid equivalent.

Application Rates: Refer to the average number of pounds of a fertilizer primary nutrient or pesticide active ingredient applied to an acre of land. Rate per application is the average number of pounds applied per acre in one application. Rate per crop year is the average number of pounds applied per acre counting multiple applications. Number of applications is the average number of times a treated acre received a specific primary nutrient or active ingredient.

Area applied: Represents the percentage of crop acres receiving one or more applications of a specific primary nutrient or active ingredient.

Avoidance: May be practiced when pest populations exist in a field or site but the impact of the pest on the crop can be avoided through some cultural practice. Examples of avoidance tactics include crop rotation such that the crop of choice is not a host for the pest, choosing cultivars with genetic resistance to pests, using trap crops, choosing cultivars with maturity dates that may allow harvest before pest populations develop, fertilization programs to promote rapid crop development, and simply not planting certain areas of fields where pest populations are likely to cause crop failure. Some tactics for prevention and avoidance strategies may overlap.

Beneficial Insects: Insects collected and introduced into locations because of their value in biologic control as prey on harmful insects and parasites.

Chemigation: Application of an agricultural chemical by injecting it into irrigation water. Common name: An officially

recognized name for an active ingredient. This report shows active ingredient by common name.

Crop year: Refers to the period immediately following harvest of the previous crop through harvest of the current crop.

Cultivar: A horticulturally or agriculturally derived variety of a plant, as distinguished from a natural variety.

Farm: Any establishment from which \$1,000 or more of agricultural products were sold or would normally be sold during the year. Government payments are included in sales. Places with all acreage enrolled in set aside or other government programs are considered to be a farm. **Fertilizer:** Refers to applications of the primary nutrients; nitrogen, phosphate, and potash. **Fungi:** A lower form of parasitic plant life which often reduces crop production and/or lowers the grade quality of its host.

Land in Farms: All land operated as part of a farming operation during the year. It includes crop and livestock acreage, wasteland, woodland, pasture, land in summer fallow, idle cropland, and land enrolled in the Conservation Reserve Program and other set-aside, conservation, or commodity acreage programs. It excludes public, industrial, and grazing association land, and nonagricultural land. It also excludes all land operated by establishments not qualifying as farms.

Mechanism of Action (MOA): The method/biological pathway the pesticide uses to kill the pest. **Monitoring:** Includes proper identification of pests through systematic sampling or counting or other forms of scouting. Also, weather monitoring to predict levels of pest populations or to determine the most effective time to make pesticide applications, and soil testing where appropriate.

Nematodes: Microscopic, worm-shaped parasitic animals. Damage to many crops can be severe.

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. The four classes of pesticides presented in this report and the pests targeted are: herbicides - weeds, insecticides - insects, fungicides - fungi, and other chemicals - other forms of life. Miticides and nematicides are included as insecticides while soil fumigants, growth regulators, defoliants, and desiccants are included as other chemicals.

Pheromone: A chemical substance produced by an insect which serves as a stimulus to other individuals of the same species for one or more behavioral responses.

Prevention: The practice of keeping a pest population from infesting a crop or field. It includes such tactics as using pest-free seeds or transplants, alternative tillage approaches such as no-till or strip-till systems, choosing cultivars with genetic resistance to insects or disease, irrigation scheduling to avoid situations conducive to disease development, cleaning tillage and harvesting equipment between fields or operations, using field sanitation procedures, and eliminating alternate hosts or sites for insect pests and disease organisms.

Suppression: Tactics include cultural practices such as narrow row spacings or optimized in-row plant populations, using cover crops or mulches, or using crops with allelopathic potential in the rotation. Physical suppression tactics may include cultivation or mowing for weed control, baited or pheromone traps for certain insects, and temperature management or exclusion devices for insect and disease management. Biological pesticides and controls, including mating disruption for insects, can be considered as alternatives to conventional pesticides. Determining pest thresholds and alternating pesticide active ingredients to avoid resistance buildup are suppression methods which minimize pesticide use.

Trade name: A trademark name given to a specific formulation of a pesticide product. A formulation contains a specific concentration of the active ingredient, carrier materials, and other ingredients such as emulsifiers and wetting agents.

Winter Wheat: Agricultural Chemical Applications, Montana, 2006 1/

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
Fertilizer	Percent	Number	Pounds per Acre		Mil Lbs
Nitrogen	87	1.6	36	57	96.8
Phosphate	84	1.0	28	28	46.2
Potash	31	1.0	16	16	9.9
Sulfur	12	1.0	8	8	2.0
Herbicide	Percent	Number	Pounds per Acre		1,000 Lbs
2,4-D, 2-EHE	54	1.5	0.321	0.467	491
2,4-D, dimeth. salt	10	1.1	0.254	0.285	53
2,4-D, isoprop. salt	17	2.4	0.050	0.121	39
Bromoxynil octanoate	11	1.0	0.214	0.214	47
Chlorsulfuron	5	1.0	0.006	0.006	1
Clodinafop-propargil	6	1.0	0.035	0.035	4
Dicamba	5	1.0	0.060	0.060	6
Dicamba, digly salt	8	1.0	0.097	0.097	16
Dicamba, dimet. salt	8	1.3	0.084	0.112	18
Dicamba, sodium salt	4	1.1	0.081	0.093	7
Glyphosate iso. salt	63	2.7	0.417	1.131	1,379
MCPA, 2-ethylhexyl	8	1.0	0.274	0.274	42
Metsulfuron-methyl	24	1.0	0.002	0.002	1
Sulfosulfuron	9	1.0	0.032	0.032	6
Thifensulfuron	19	1.0	0.006	0.006	2
Triasulfuron	8	1.2	0.010	0.012	2
Tribenuron-methyl	22	1.0	0.004	0.004	2

1/ Planted acreage for Montana in 2006 was 1.95 million acres.

Durum Wheat: Agricultural Chemical Applications, Montana, 2006 1/

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
Fertilizer	Percent	Number	Pounds per Acre		Mil Lbs
Nitrogen	93	1.5	38	56	20.6
Phosphate	82	1.0	22	22	7.3
Potash	8	1.0	10	10	0.3
Sulfur	4	1.0	8	8	0.1
Herbicide	Percent	Number	Pounds per Acre		1,000 Lbs
2,4-D, 2-EHE	30	1.1	0.292	0.314	37
2,4-D, dimeth. salt	20	1.1	0.235	0.253	20
2,4-D, isoprop. salt	10	1.2	0.042	0.049	2
Bromoxynil octanoate	9	1.2	0.221	0.264	10
Clodinafop-propargil	29	1.0	0.038	0.038	4
Dicamba	11	1.0	0.094	0.098	4
Dicamba, digly salt	9	1.1	0.071	0.079	3
Dicamba, dimet. salt	28	1.1	0.061	0.064	7
Fenoxaprop-p-ethyl	18	1.0	0.046	0.046	3
Fluroxypyr	5	1.0	0.105	0.105	2
Fluroxypyr 1-MHE	3	1.0	0.084	0.084	1
Glyphosate iso. salt	40	1.1	0.374	0.402	64
MCPA, 2-ethylhexyl	23	1.1	0.243	0.271	25
Thifensulfuron	8	1.1	0.009	0.011	2/
Tribenuron-methyl	13	1.1	0.005	0.005	2/
Trifluralin	11	1.0	0.333	0.333	15

1/ Planted acreage for Montana in 2006 was 400 thousand acres. 2/ Total applied is less than 500 lbs.

Other Spring Wheat: Agricultural Chemical Applications, Montana, 2006 1/

Agricultural Chemical	Area Applied	Applications	Rate per Application	Rate per Crop Year	Total Applied
Fertilizer	Percent	Number	Pounds per Acre		Mil Lbs
Nitrogen	86	1.5	35	51	129.5
Phosphate	81	1.0	24	24	57.7
Potash	21	1.0	15	15	9.0
Sulfur	10	1.0	9	9	2.5
Herbicide	Percent	Number	Pounds per Acre		1,000 Lbs
2,4-D, 2-EHE	47	1.1	0.310	0.351	488
2,4-D, dimeth. salt	13	1.1	0.280	0.309	123
2,4-D, isoprop. salt	8	2.0	0.061	0.122	28
Bromoxynil octanoate	16	1.0	0.225	0.225	109
Clodinafop-propargil	23	1.0	0.038	0.038	26
Dicamba	10	1.5	0.035	0.051	15
Dicamba, digly salt	17	1.0	0.083	0.083	42
Dicamba, dimet. salt	7	1.2	0.070	0.083	17
Dicamba, sodium salt	6	1.0	0.066	0.066	12
Fenoxaprop-p-ethyl	7	1.0	0.035	0.035	7
Fluroxypyr	7	1.0	0.053	0.053	11
Glyphosate iso. salt	43	1.7	0.430	0.738	945
MCPA, 2-ethylhexyl	13	1.0	0.247	0.247	94
MCPA, isooctyl ester	3	1.0	0.234	0.234	21
Metsulfuron-methyl	11	1.0	0.003	0.003	1
Pinoxaden	1	1.0	0.062	0.062	2
Thifensulfuron	12	1.0	0.011	0.011	4
Triasulfuron	8	1.0	0.017	0.017	4
Tribenuron-methyl	14	1.0	0.005	0.005	2

1/ Planted acreage for Montana in 2006 was 2.95 million acres.

Trade Names, Common Names, and Classes

The following is a list of common names of active ingredients with the associated class and trade name. The classes are herbicides (H), insecticides (I), fungicides (F). This list is provided as an aid in reviewing pesticide data. Pre-mixes are not listed. The list is not complete and NASS does not mean to imply use of any specific trade name.

Class	Common Name	Trade Name
H	24-D 2-EHE	2,4-D L.V. 4 Ester (3.84 lbs/ g), 2,4-D LV4 (3.80 lbs/ g), 2,4-D LV6, 2,4-D Lo-V Este Agsco 400 (EC), Agsco B-4, Barrage, Barrage HF, Double Up B+D, LV 400 2,4-D Weed Killer, Low Vol 4 Ester Weed Killer, Maestro D, Outlaw (aka Bushwhacker), Salvo, Starane+Salvo, Turret, WECO MAX, Weed Pro 6lb., Weedone LV4 Solventless
H	24-D dimeth. salt	2,4-D Amine, 2,4-D Amine 4, 2,4-D Amine 6, Banvel + 2,4-D, Brash, Formula 40, Hi-Dep, Range Star, Rifle-D, Saber, Savage, Weedar 64, Weedaxe, Weedmaster
H	24-D isoprop. salt	RT Master
H	Bromoxynil octanoate	Agsco B-4, Bison, Bison Advanced, Bromox/ MCPA 2-2, Bronate (4EC), Bronate (Bronate Pro #2), Bronate Advanced, Brox 2EC, Brox-M, Buctril 4EC, Connect 20 WSP, Double Up B+D, HBN Plus, Maestro D Maestro MA, Rhino, WECO MAX
H	Chlorsulfuron	Finesse, Glean FC (75DF)
H	Clodinafop-propargil	Discover, Discover NG
H	Dicamba	Banvel SGF (2EC), Oracle Dicamba Agricultural Herbicide, Outlaw (aka Bushwhacker)
H	Dicamba digly salt	Clarity
H	Dicamba dimet. salt	Banvel (4L), Banvel + 2,4-D, Brash, Diablo, Range Star, Rifle, Rifle-D, Sterling, Weedmaster
H	Dicamba sodium salt	Dicamba SG, Rave
H	Fenoxaprop-p-ethyl	Cheyenne FM (container #2), Puma 1EC (Bronate Pro #1), Tiller EC, Whip 360
H	Fluroxypyr	Starane EC
H	Fluroxypyr 1-MHE	CleanWave, Starane + Sword, Starane+Salvo, WideMatch, WideMatch M
H	Glyphosate iso. salt	Alecto 41S, Backdraft, Buccaneer, Buccaneer Plus, ClearOut 41 Plus, Cornerstone, Credit, Credit Duo, Credit Duo Extra, Durango, Extreme, Fallow Master, Genesis, Genesis Extra Broad Spectrum, Gly Star Plus, Gly-4 Plus, Glyphos X-TRA, Glyphomax, Glyphomax Plus, Glyphomax XRT, Glyphosate 4 (Turf & Ornamental), Glyphosate Original, Grandslam 4XS, Helosate Plus, Hi-Yield Killzall, Honcho, Honcho Plus, Imitator Plus, Mad Dog Glyphosate, Mirage (4EC), Mirage Plus, RT 3 Herbicide, RT Master, Rascal, Rascal Plus, Roundup Custom, Roundup D-Pak, Roundup Export, Roundup Original, Roundup Original II, Roundup Original Max, Roundup Pro (T & O), Roundup Ultra, Roundup Ultra Max, Roundup Weather Max, Silhouette Herbicide, StrikeOut Extra, Supersate, Wise Up Plus Glyphosate Herbicide
H	MCPA 2-ethylhexyl	Agsco MXL, Bison Advanced, Bromox/ MCPA 2-2, Bronate (4EC), Bronate (Bronate Pro #2), Bronate Advanced, Brox-M, Cheyenne FM (container #2), Curtail M (EC), Dagger HBN Plus, MCP 4 Ester, MCPE Phenoxy, Maestro MA, Rhino, See MCPA Ester, Solve MCPA Ester, Starane + Sword, Sword, WideMatch M, WildCard
H	MCPA isooctyl ester	Bison
H	Metsulfuron-methyl	Ally Extra, Ally XP (60DF), Finesse, Metsulfuron 60ED AG, Purestand DF, Valuron 60DF
H	Pinoxaden	Axial (For Wheat & Barley)
H	Sulfosulfuron	Maverick
H	Thifensulfuron	Affinity BroadSpec Herbicide, Affinity Tankmix, Ally Extra, Harmony Extra XP, Harmony GT XP, Synchrony STS, Synchrony XP
H	Triasulfuron	Amber, Rave
H	Tribenuron-methyl	Affinity BroadSpec Herbicide, Affinity Tankmix, Ally Extra, Canopy EX, Express XP (DF), Harmony Extra XP
H	Trifluralin	Buckle (G), Treflan 4L, Treflan 5 (EC), Treflan E.C., Treflan HFP, Treflan TR-10, Tri-4, Trifluralin 4EC, Trilin, Trilin 10G, Trust 4EC