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Pest Management Practices 1998 Summary

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1998 Pest Management Practices

Overview: The pest management practices in this report are based on data compiled from a survey conducted in the Fall of 1998. All results refer to responses from sampled producers concerning specific practices. The producers were asked how many acres of a specific commodity they had, and what pesticide management practices they used. The producers were asked a series of questions to which they responded yes or no. Pests were defined as weeds, insects, and diseases. If the respondent used a specific practice on a crop, it was assumed that the practice was used on all of the acres of that crop. For example, if a producer had 500 acres of wheat, and used field mapping of previous weed problems to assist in making weed management decisions, it was assumed that all 500 acres were mapped.

For this report, each question has been categorized into one of four pest management categories: prevention, avoidance, monitoring, and suppression. See pages 32-33 for a copy of the actual questions used to collect these data. Not all possible questions regarding management practices in each category were asked.

The data are published in two tables for each crop: percent of acres receiving the specific pest management practice and percent of farms utilizing the specific pest management practice. These percentages are published at the U.S. and regional level. For a specific crop, the percentages refer only to the farms and acres on which that crop is grown. If the percentage is less than one percent or there were too few reports to publish the percentage, an asterisk or double asterisk was used in the table. A blank indicates there were no reports of the practice being used.

Prevention is the practice of keeping a pest population from infesting a crop or field. It includes such tactics as using pest-free seeds and transplants, preventing weeds from reproducing, 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.

The following questions were categorized as prevention practices:

Did you use practices such as tilling, mowing, burning, or chopping of field lanes or roadways to manage pests?

Did you remove or plow down crop residues to control pests?

Did you clean tillage or harvesting implements after completing fieldwork for the purpose of reducing the spread of weeds, diseases, or other pests?

Did you use water management practices, such as controlled drainage or irrigation scheduling, excluding chemigation, to control pests?

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.

The following questions were categorized as avoidance practices:

Did you use any seed varieties with Bt (Bacillus Thuringiensis) genes for insect resistance?

Did you adjust planting or harvesting dates to control pests?

Do you rotate crops for the purpose of controlling pests?

Did you use seed varieties that were genetically modified to be resistant to plant pathogens or nematodes which cause plant diseases?

Monitoring includes proper identification of pests through surveys or scouting programs, including trapping, weather monitoring, and soil testing where appropriate.

The following questions were categorized as monitoring practices:

Were any of the crops on this operation scouted for pests (weeds, insects, or disease) using a systematic method?

Were electronic or written records kept to track the activity or numbers of different pests?

Did you use field mapping of previous weed problems to assist you in making weed management decisions?

Did you use soil analysis to detect the presence of pests, such as insects, disease, or nematodes?

Did you use pheromones to monitor the presence of pests?

Did you use weather monitoring to predict the need for pesticide applications?

Suppression tactics include cultural practices such as narrow row spacings or optimized in-row plant populations, alternative tillage approaches such as no-till or strip-till systems, 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 controls, including mating disruption for insects, should be considered as alternatives to conventional pesticides, especially where long-term control of an especially troublesome pest species can be obtained. Chemical pesticides are important and some use will remain necessary. However, pesticides should be applied as a last resort in suppression systems.

The following questions were categorized as suppression practices:

Did you use any seed varieties that were genetically modified to be resistant to specific herbicides?

Did you use scouting data and compare it to university or extension guidelines for infestation thresholds to determine when to take measures to control pests?

Did you use topically applied biological pesticides such as Bt (Bacillus Thuringiensis), insect growth regulators, neem or other natural products to control pests?

Did you use beneficial organisms (insects, nematodes, or fungi) to control pests?

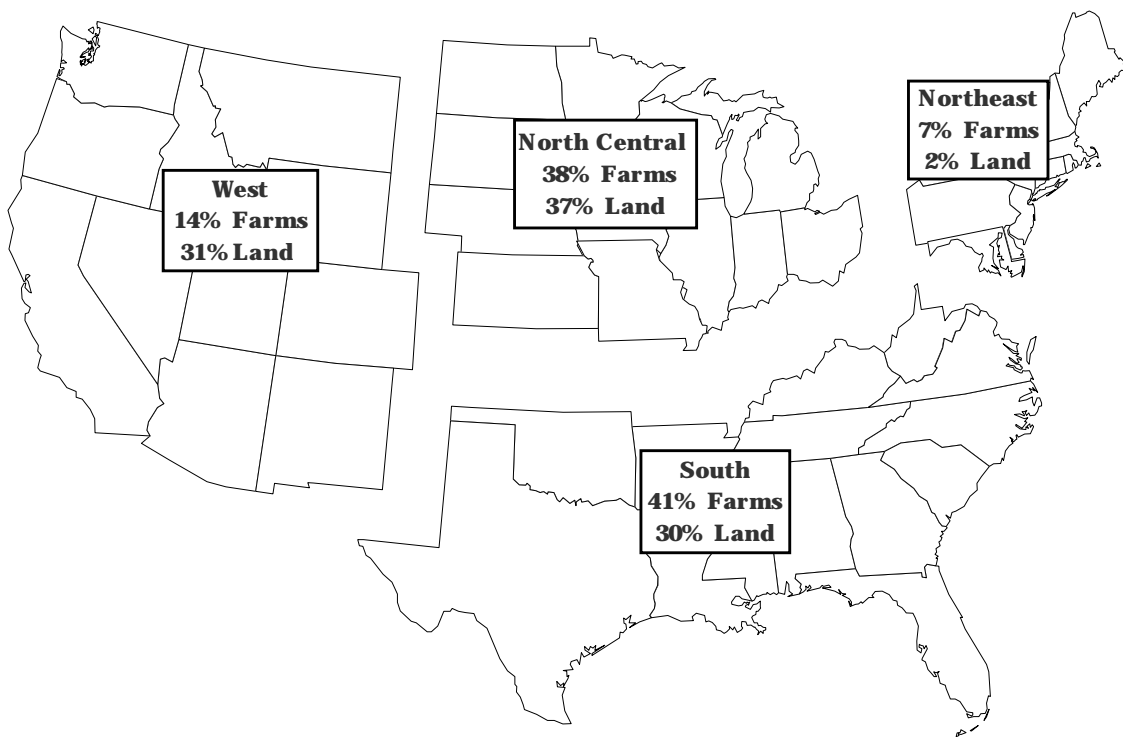
Did you maintain ground covers, mulches, or physical barriers to reduce pest problems?

Did you adjust row spacing, plant density, or row direction to control pests?

Do you alternate pesticides to keep pests from becoming resistant to pesticides?

Did you use pheromones to control pests by disrupting mating?

Distribution of Farms and Land in Farms by Region, 1998



Regions:

Northeast CT, DE, ME, MD, MA, NH, NJ, NY, PA, RI, VT

North Central IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, SD, WI

South AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX, VA, WV

West AZ, CA, CO, ID, MT, NV, NM, OR, UT, WA, WY

Alaska and Hawaii were not included in the survey.

The following questions were asked during the 1998 survey but were not asked during the 1997 survey:

Did you use seed varieties that were genetically modified to be resistant to plant pathogens or nematodes which cause plant diseases?

Did you use weather monitoring to predict the need for pesticide applications?

Did you use pheromones to control pests by disrupting mating?

Highlights

Barley: The leading pest management practice for barley was rotating crops to control pests. Sixty-three percent of the farms used this practice on 71 percent of the acres across the United States. The following pest management practices were used on over 40 percent of the barley acres across the nation: using tillage practices to manage pests, cleaning implements after fieldwork, rotating crops to control pest, scouting, and alternating the use of pesticides.

Corn: Rotating crops to control pests was the leading pest management practice, used on 77 percent of the nation's corn acres. It was also the most widely used practice in terms of number of farms, at 67 percent. Scouting for pests was reported on 52 percent of the corn acres. Alternating pesticides and using tillage practices to manage pests were also common, each being reported on nearly half of the corn acres.

Cotton: Almost three-fourths of the U.S. cotton acres were scouted for pests, on 65 percent of the nation's cotton farms. Prevention practices, such as using tillage practices to manage pests, removing or plowing down the crop residue, and cleaning implements after fieldwork were also widely used practices, being used on more than half of the cotton acres. The use of other practices which were reported on 50 percent or more of the acres were alternating pesticides, using records to keep track of pests, and using pheromones to monitor pests.

Soybeans: The most common pest management practice was rotating crops to control pests, which was done on 78 percent of the U.S. soybean acres and on 76 percent of the soybean farms. Other practices used on 40 percent or more of the acres were: using tillage to manage pests, scouting for pests, using seed varieties that were genetically modified to be resistant to specific herbicides, and alternating pesticides.

All Wheat: The leading pest management practice used on wheat was rotating crops to control pests, which was used on 58 percent of the acres and by 53 percent of the farms. Cleaning implements after fieldwork was the second most widely used practice, with 49 percent of the acres and 33 percent of the farms. Using tillage to manage pests and scouting for pests were each reported on 40 percent or more of the acres.

Alfalfa Hay: Rotating crops to control pests was the most widely used pest management practice on the U.S. alfalfa acreage, at 33 percent. Scouting for pests and using tillage to control pests were used on 26 percent and 23 percent of the acres, respectively.

Other Hay: Twelve percent of the U.S. producers of hay other than alfalfa utilized tillage practices to manage pests. Five percent or more of the hay producers used the following practices on their farms: cleaning implements after fieldwork, rotate crops to control pests, and scouting for pests.

Fruits and Nuts: The most widely used pest management practice was scouting for pests, which occurred on 82 percent of the U.S. fruit and nut acres. Using tillage to manage pests was the second most common practice, used on 79 percent of the acres. Alternating pesticides and keeping records to track pest problems were used on 72 and 62 percent of the acres, respectively.

Vegetables: Eighty percent of the U.S. vegetable acres were scouted for pests, making it the most common pest management practice for vegetable crops. Rotating crops was reported on 78 percent of the acres, while using tillage to manage pests was used on 74 percent of the acres.

All other Crops and Cropland Pasture: This group includes crops that were not specifically targeted during the survey such as sorghum, oats, rice, peanuts, etc. The most widely used pest management practice was rotating crops to control pests, at 52 percent of the acres. Using tillage to manage pests, scouting for pests, and cleaning implements after fieldwork were each utilized on more than 40 percent of the acres.

Genetically modified crop varieties: The practices showing the most change from the 1997 crop year to the 1998 crop year were the use of crop varieties that were genetically modified to be resistant to insects or to specific herbicides.

For corn, there was an increase from 5 percent of the acres in 1997 to 20 percent of the acres in 1998 that were planted to varieties that were modified through genetic engineering or conventional breeding to be resistant to insects. For cotton, there was an increase of 9 percentage points, from 13 percent of the acres in 1997 to 22 percent in 1998.

The use of crop varieties resistant to specific herbicides on corn increased from 2 percent in 1997 to 11 percent of the acres in 1998. The use of these varieties for cotton and soybeans showed a greater increase. For cotton, the change was an increase from 5 percent in 1997 to 34 percent in 1998. The proportion of soybean varieties used 10 percent in 1997 and 48 percent in 1998.

Planted and Harvested Acres for Selected Crops,
by State and Region, 1998 Crop Year

State and Region	Area Planted					Area Harvested	
	Barley 1/	Corn	Cotton	Soybeans	All Wheat 1/	Alfalfa Hay	Other Hay
	1,000 Acres						
CT		35				8	55
DE	34	169		220	75	8	8
ME		36				13	145
MD	60	470		470	225	55	145
MA		25				18	85
NH		15				8	48
NJ	6	120		115	48	30	90
NY		1,130		100	140	600	800
PA	80	1,550		400	195	700	1,150
RI		3				2	8
VT		112				45	200
Northeast:	180	3,665		1,305	683	1,487	2,734
IL		10,600		10,700	1,250	600	350
IN		5,800		5,700	700	400	350
IA		12,500		10,500	40	1,250	320
KS	8	3,000	17	2,550	10,700	1,000	1,900
MI	30	2,300		1,900	600	850	400
MN	440	7,300		6,900	2,015	1,550	850
MO		2,650	370	5,100	1,350	450	3,200
NE	10	8,800		3,800	1,900	1,400	1,800
ND	2,000	970		1,550	9,770	1,400	1,200
OH		3,550		4,400	1,200	550	780
SD	115	3,900		3,450	3,475	2,400	1,600
WI	80	3,700		1,150	148	1,900	500
North Central:	2,683	65,070	387	57,700	33,148	13,750	13,250

See footnotes at end of table.

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Planted and Harvested Acres for Selected Crops,
by State and Region, 1998 Crop Year (continued)

State and Region	Area Planted					Area Harvested	
	Barley 1/	Corn	Cotton	Soybeans	All Wheat 1/	Alfalfa Hay	Other Hay
	1,000 Acres						
AL 2/		300	495	340	120		750
AR		235	920	3,550	980	25	1,150
FL 2/		160	89	35	15		230
GA 2/		500	1,370	300	290		650
KY	8	1,300		1,220	750	250	2,100
LA 2/		700	535	1,200	100		330
MS 2/		550	950	2,050	160		790
NC	25	860	710	1,475	730	20	650
OK	7	270	160	470	6,600	350	1,900
SC 2/	4	350	290	540	265		320
TN		700	450	1,250	570	35	1,750
TX	10	2,400	5,755	440	6,100	140	3,900
VA	90	500	92	500	280	120	1,140
WV		60			11	50	530
South:	144	8,885	11,816	13,370	16,971	990	16,190
AZ	58	50	265.9		153	200	40
CA	170	620	850		680	1,020	550
CO	90	1,180			2,812	810	600
ID	780	145			1,350	1,130	300
MT	1,350	60			5,650	1,700	800
NV	5				16	260	225
NM		140	73.6		415	270	90
OR	150	55			910	400	570
UT	95	62			179	545	165
WA	530	160			2,670	480	270
WY	105	95			234	600	590
West:	3,333	2,567	1,189.5		15,069	7,415	4,200
US 3/	6,340	80,187	13,392.5	72,375	65,871	23,642	36,374

1/ Includes area planted in preceding fall.

2/ Alfalfa and alfalfa mixtures are included in all other hay.

3/ Alaska and Hawaii were not included in the survey.

Number of Farms and Land in Farms
by State and Region, 1998 Crop Year

State and Region	Number of Farms	Land in Farms
		1,000 Acres
CT	4,100	380
DE	2,700	580
ME	6,900	1,280
MD	12,500	2,100
MA	6,000	570
NH	3,100	420
NJ	9,600	830
NY	38,000	7,800
PA	60,000	7,700
RI	750	65
VT	6,700	1,340
Northeast:	150,350	23,065
IL	79,000	27,800
IN	66,000	15,600
IA	97,000	33,000
KS	65,000	47,500
MI	52,000	10,400
MN	80,000	28,900
MO	110,000	30,100
NE	55,000	46,400
ND	31,000	39,500
OH	80,000	14,900
SD	32,500	44,000
WI	78,000	16,400
North Central:	825,500	354,500

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Number of Farms and Land in Farms,
by State and Region, 1998 Crop Year (continued)

State and Region	Number of Farms	Land in Farms
		1,000 Acres
AL	49,000	9,500
AR	49,000	14,750
FL	45,000	10,600
GA	50,000	11,300
KY	90,000	13,900
LA	30,000	8,200
MS	42,000	11,600
NC	58,000	9,400
OK	83,000	34,000
SC	25,000	4,900
TN	91,000	11,900
TX	226,000	131,500
VA	49,000	8,800
WV	21,000	3,700
South:	908,500	284,050
AZ	7,900	28,300
CA	89,000	28,500
CO	29,500	32,200
ID	24,500	12,000
MT	27,500	57,500
NV	3,000	6,900
NM	16,000	45,300
OR	39,500	17,200
UT	15,000	11,600
WA	40,000	15,700
WY	9,200	34,600
West:	301,100	289,800
US 1/	2,185,450	951,415

1/ Alaska and Hawaii were not included in the survey.

Pest Management Practices,
Percent of Acres Receiving Practice,
Barley, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Acres --						
Prevention Practices:						
Tillage/etc. to manage pests	43	36	19	50	34	43
Remove or plow down crop residue	29	30	19	35	24	32
Clean implements after fieldwork	29	47	30	53	38	49
Water management practices	19	19	*	11	6	14
Avoidance Practices:						
Seed varieties with BT genes			*	*	*	*
Adjust planting/harvesting dates	6	21	5	25	13	22
Rotate crops to control pests	75	84	61	62	59	71
Genetically modified pathogen/ nematode resistant				1	NA	**
Monitoring Practices:						
Scouted for pests	33	50	13	48	35	47
Records kept to track pests	5	18	*	20	11	18
Field mapping of weed problems	6	18	5	25	21	21
Soil analysis to detect pests	15	6	3	12	4	9
Pheromones to monitor pests		*		*	1	*
Weather monitoring	6	15	*	19	NA	16
Suppression Practices:						
Seed varieties herbicide resistant	*			**	1	**
Scouting used to make decisions	5	8	9	10	13	9
Biological pesticides	*			1		**
Beneficial organisms			*	1	1	1
Physical barriers	12	11	*	24	14	17
Adjust planting methods	2	9	*	13	3	11
Alternate pesticides	19	50	11	43	41	44
Pheromones to disrupt mating					NA	

* Insufficient reports to publish data.

** Less than 1 percent.

Pest Management Practices,
Percent of Farms Utilizing Practice,
Barley, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Farms --						
Prevention Practices:						
Tillage/etc. to manage pests	34	35	16	38	33	34
Remove or plow down crop residue	21	27	11	28	24	25
Clean implements after fieldwork	35	45	23	39	29	39
Water management practices	12	14	*	12	6	12
Avoidance Practices:						
Seed varieties with BT genes			*	*	*	*
Adjust planting/harvesting dates	12	12	4	17	9	13
Rotate crops to control pests	53	79	59	52	58	63
Genetically modified pathogen/ nematode resistant				**	NA	**
Monitoring Practices:						
Scouted for pests	23	40	11	33	25	32
Records kept to track pests	13	12	*	8	7	9
Field mapping of weed problems	15	14	2	13	13	12
Soil analysis to detect pests	13	4	2	5	4	5
Pheromones to monitor pests		*		*	1	*
Weather monitoring	6	13	*	9	NA	9
Suppression Practices:						
Seed varieties herbicide resistant	*			1	1	**
Scouting used to make decisions	7	9	4	6	9	7
Biological pesticides	*			**		**
Beneficial organisms			*	1	1	**
Physical barriers	9	10	*	13	10	10
Adjust planting methods	3	7	*	6	5	6
Alternate pesticides	14	39	3	33	29	30
Pheromones to disrupt mating					NA	

* Insufficient reports to publish data.

** Less than 1 percent.

Pest Management Practices,
Percent of Acres Receiving Practice,
Corn, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Acres --						
Prevention Practices:						
Tillage/etc. to manage pests	37	47	53	57	40	48
Remove or plow down crop residue	36	21	45	39	20	25
Clean implements after fieldwork	34	37	41	37	34	37
Water management practices	14	12	14	31	10	13
Avoidance Practices:						
Seed varieties with BT genes	10	24	8	7	5	20
Adjust planting/harvesting dates	12	7	18	10	8	8
Rotate crops to control pests	68	80	61	55	69	77
Genetically modified pathogen/ nematode resistant	*	*	**	*	NA	**
Monitoring Practices:						
Scouted for pests	47	54	41	59	47	52
Records kept to track pests	18	23	17	39	19	23
Field mapping of weed problems	20	17	10	24	15	16
Soil analysis to detect pests	19	13	16	27	11	14
Pheromones to monitor pests	*	1	1	1	1	1
Weather monitoring	11	10	15	17	NA	10
Suppression Practices:						
Seed varieties herbicide resistant	8	11	11	10	2	11
Scouting used to make decisions	18	19	16	27	18	19
Biological pesticides	4	4	2	3	4	4
Beneficial organisms	*	**	1	3	**	**
Physical barriers	15	13	14	26	11	14
Adjust planting methods	11	7	12	6	7	8
Alternate pesticides	48	51	41	46	43	49
Pheromones to disrupt mating	*	**	*		NA	**

* Insufficient reports to publish data.

** Less than 1 percent.

Pest Management Practices,
Percent of Farms Utilizing Practice,
Corn, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Farms --						
Prevention Practices:						
Tillage/etc. to manage pests	31	37	37	39	31	37
Remove or plow down crop residue	27	19	32	31	20	22
Clean implements after fieldwork	25	28	28	27	24	28
Water management practices	8	8	8	17	7	9
Avoidance Practices:						
Seed varieties with BT genes	6	15	8	5	11	13
Adjust planting/harvesting dates	5	5	11	6	6	6
Rotate crops to control pests	52	75	45	43	57	67
Genetically modified pathogen/ nematode resistant	*	*	**	*	NA	**
Monitoring Practices:						
Scouted for pests	33	40	28	41	31	37
Records kept to track pests	7	12	7	19	9	11
Field mapping of weed problems	11	10	4	13	7	9
Soil analysis to detect pests	11	7	9	17	6	8
Pheromones to monitor pests	*	**	1	1	**	**
Weather monitoring	5	7	10	9	NA	7
Suppression Practices:						
Seed varieties herbicide resistant	7	6	8	5	4	7
Scouting used to make decisions	8	10	7	10	9	9
Biological pesticides	1	2	1	3	2	2
Beneficial organisms	*	**	1	2	**	**
Physical barriers	11	9	11	11	8	10
Adjust planting methods	6	6	9	7	5	6
Alternate pesticides	31	39	25	29	30	36
Pheromones to disrupt mating	*	**	*		NA	**

* Insufficient reports to publish data.

** Less than 1 percent.

Pest Management Practices,
Percent of Acres Receiving Practice,
Cotton, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Acres --						
Prevention Practices:						
Tillage/etc. to manage pests	13	61	70	62	61	
Remove or plow down crop residue	62	54	78	63	57	
Clean implements after fieldwork	60	62	39	52	59	
Water management practices		16	47	14	19	
Avoidance Practices:						
Seed varieties with BT genes	*	22	36	13	22	
Adjust planting/harvesting dates	*	24	35	24	25	
Rotate crops to control pests	17	47	59	48	48	
Genetically modified pathogen/ nematode resistant		3	*	NA	3	
Monitoring Practices:						
Scouted for pests	23	70	98	73	72	
Records kept to track pests	12	51	87	50	53	
Field mapping of weed problems	*	9	42	14	12	
Soil analysis to detect pests		25	32	26	25	
Pheromones to monitor pests	28	56	31	36	53	
Weather monitoring	*	14	31	NA	15	
Suppression Practices:						
Seed varieties herbicide resistant	*	37	*	5	34	
Scouting used to make decisions	*	39	69	45	41	
Biological pesticides	*	13	19	12	14	
Beneficial organisms		4	*	2	5	
Physical barriers		15	*	10	14	
Adjust planting methods	*	11	24	10	12	
Alternate pesticides	11	56	82	58	57	
Pheromones to disrupt mating		15	6	NA	14	

* Insufficient reports to publish data.

Pest Management Practices,
Percent of Farms Utilizing Practice,
Cotton, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
	-- Percent of Farms --					
Prevention Practices:						
Tillage/etc. to manage pests	24	55	81	56	56	
Remove or plow down crop residue	44	58	76	58	58	
Clean implements after fieldwork	48	54	48	49	53	
Water management practices		13	30	11	14	
Avoidance Practices:						
Seed varieties with BT genes	*	16	30	17	17	
Adjust planting/harvesting dates	*	20	43	24	21	
Rotate crops to control pests	11	53	57	46	52	
Genetically modified pathogen/ nematode resistant		2	*	NA	2	
Monitoring Practices:						
Scouted for pests	37	64	97	67	65	
Records kept to track pests	28	45	78	40	46	
Field mapping of weed problems	*	7	20	10	8	
Soil analysis to detect pests		25	31	18	24	
Pheromones to monitor pests	17	57	27	32	54	
Weather monitoring	*	15	14	NA	14	
Suppression Practices:						
Seed varieties herbicide resistant	*	27	*	13	24	
Scouting used to make decisions	*	36	57	38	36	
Biological pesticides	*	10	18	10	10	
Beneficial organisms		4	*	2	4	
Physical barriers		13	*	10	12	
Adjust planting methods	*	11	13	8	11	
Alternate pesticides	9	52	74	47	52	
Pheromones to disrupt mating		22	5	NA	20	

* Insufficient reports to publish data.

Pest Management Practices,
Percent of Acres Receiving Practice,
Soybeans, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Acres --						
Prevention Practices:						
Tillage/etc. to manage pests	63	46	53	*	41	48
Remove or plow down crop residue	33	18	44		18	23
Clean implements after fieldwork	51	37	46		35	39
Water management practices	30	10	13		8	11
Avoidance Practices:						
Seed varieties with BT genes	*	**	2		**	1
Adjust planting/harvesting dates	14	5	13		7	7
Rotate crops to control pests	81	83	58	*	69	78
Genetically modified pathogen/ nematode resistant	3	3	3		NA	3
Monitoring Practices:						
Scouted for pests	57	53	39	*	45	50
Records kept to track pests	31	20	12		15	18
Field mapping of weed problems	22	15	9		14	14
Soil analysis to detect pests	39	15	16		11	15
Pheromones to monitor pests	*	1	**		1	1
Weather monitoring	18	9	12		NA	10
Suppression Practices:						
Seed varieties herbicide resistant	54	48	49	*	10	48
Scouting used to make decisions	32	15	21	*	16	16
Biological pesticides	*	1	1		**	1
Beneficial organisms	*	**	2		**	1
Physical barriers	29	12	14		9	13
Adjust planting methods	31	14	20		13	15
Alternate pesticides	59	46	43	*	40	46
Pheromones to disrupt mating	*	**	1		NA	**

* Insufficient reports to publish data.

** Less than 1 percent.

Pest Management Practices,
Percent of Farms Utilizing Practice,
Soybeans, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Farms --						
Prevention Practices:						
Tillage/etc. to manage pests	41	40	49	*	35	42
Remove or plow down crop residue	33	16	38		15	20
Clean implements after fieldwork	32	30	38		28	31
Water management practices	11	7	8		6	8
Avoidance Practices:						
Seed varieties with BT genes	*	1	2		**	1
Adjust planting/harvesting dates	8	4	10		4	5
Rotate crops to control pests	71	80	55	*	64	76
Genetically modified pathogen/ nematode resistant	2	3	3		NA	3
Monitoring Practices:						
Scouted for pests	39	44	32	*	38	42
Records kept to track pests	13	13	7		10	12
Field mapping of weed problems	9	11	6		9	10
Soil analysis to detect pests	18	10	10		7	10
Pheromones to monitor pests	*	**	1		**	**
Weather monitoring	7	7	9		NA	8
Suppression Practices:						
Seed varieties herbicide resistant	55	33	37	*	17	34
Scouting used to make decisions	17	10	11	*	10	11
Biological pesticides	*	1	1		**	1
Beneficial organisms	*	**	1		**	**
Physical barriers	19	10	13		7	11
Adjust planting methods	11	12	15		9	12
Alternate pesticides	39	38	33	*	32	38
Pheromones to disrupt mating	*	**	**		NA	**

* Insufficient reports to publish data.

** Less than 1 percent.

Pest Management Practices,
Percent of Acres Receiving Practice,
All Wheat, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Acres --						
Prevention Practices:						
Tillage/etc. to manage pests	60	43	38	49	37	43
Remove or plow down crop residue	39	27	34	35	27	30
Clean implements after fieldwork	41	48	43	55	43	49
Water management practices	19	11	7	11	6	10
Avoidance Practices:						
Seed varieties with BT genes		**	*	1	**	**
Adjust planting/harvesting dates	22	26	10	29	20	23
Rotate crops to control pests	73	67	39	54	53	58
Genetically modified pathogen/ nematode resistant		*	*	1	NA	**
Monitoring Practices:						
Scouted for pests	52	43	22	56	35	41
Records kept to track pests	27	16	7	19	11	15
Field mapping of weed problems	20	11	4	21	13	12
Soil analysis to detect pests	22	6	7	9	6	7
Pheromones to monitor pests	*	*	**	**	1	**
Weather monitoring	18	12	5	14	NA	11
Suppression Practices:						
Seed varieties herbicide resistant	5	1	1	**	1	1
Scouting used to make decisions	28	12	9	15	13	12
Biological pesticides	*	*	1	**	**	**
Beneficial organisms	*	*	**	2	1	1
Physical barriers	20	12	10	20	12	14
Adjust planting methods	15	9	6	12	6	9
Alternate pesticides	44	34	18	42	30	33
Pheromones to disrupt mating	*	*	*		NA	*

* Insufficient reports to publish data.

** Less than 1 percent.

Pest Management Practices,
Percent of Farms Utilizing Practice,
All Wheat, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Farms --						
Prevention Practices:						
Tillage/etc. to manage pests	47	36	28	43	31	35
Remove or plow down crop residue	36	22	23	35	22	25
Clean implements after fieldwork	35	35	25	42	32	33
Water management practices	10	9	4	11	5	8
Avoidance Practices:						
Seed varieties with BT genes		**	*	1	**	**
Adjust planting/harvesting dates	12	25	4	18	14	18
Rotate crops to control pests	68	65	28	49	51	53
Genetically modified pathogen/ nematode resistant		*	*	2	NA	**
Monitoring Practices:						
Scouted for pests	36	33	15	42	27	29
Records kept to track pests	9	10	3	14	7	9
Field mapping of weed problems	7	7	2	13	7	6
Soil analysis to detect pests	7	4	4	6	5	5
Pheromones to monitor pests	*	*	**	**	**	**
Weather monitoring	8	7	2	9	NA	6
Suppression Practices:						
Seed varieties herbicide resistant	4	**	1	1	1	1
Scouting used to make decisions	14	7	6	10	7	7
Biological pesticides	*	*	**	**	**	**
Beneficial organisms	*	*	**	1	**	**
Physical barriers	20	10	5	16	9	10
Adjust planting methods	5	6	3	7	5	5
Alternate pesticides	30	24	11	31	21	22
Pheromones to disrupt mating	*	*	*		NA	*

* Insufficient reports to publish data.

** Less than 1 percent.

Pest Management Practices,
Percent of Acres Receiving Practice,
Alfalfa Hay, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Acres --						
Prevention Practices:						
Tillage/etc. to manage pests	31	17	35	33	21	23
Remove or plow down crop residue	15	4	7	13	10	8
Clean implements after fieldwork	32	12	22	24	17	17
Water management practices	8	5	9	15	8	8
Avoidance Practices:						
Seed varieties with BT genes	*	1	2	2	**	1
Adjust planting/harvesting dates	15	6	6	11	8	8
Rotate crops to control pests	46	36	17	25	32	33
Genetically modified pathogen/ nematode resistant	*	*		2	NA	1
Monitoring Practices:						
Scouted for pests	39	21	32	30	24	26
Records kept to track pests	11	7	7	14	9	9
Field mapping of weed problems	10	5	8	4	8	5
Soil analysis to detect pests	11	4	10	5	4	5
Pheromones to monitor pests	*	*	*	2	**	1
Weather monitoring	5	4	10	7	NA	5
Suppression Practices:						
Seed varieties herbicide resistant	*	**	*	*	1	**
Scouting used to make decisions	16	8	9	11	9	9
Biological pesticides	*	*	*	1	1	1
Beneficial organisms	*	*	*	4	1	2
Physical barriers	11	4	7	8	5	6
Adjust planting methods	1	1	4	4	2	2
Alternate pesticides	24	8	18	19	13	13
Pheromones to disrupt mating		*		*	NA	*

* Insufficient reports to publish data.

** Less than 1 percent.

Pest Management Practices,
Percent of Farms Utilizing Practice,
Alfalfa Hay, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Farms --						
Prevention Practices:						
Tillage/etc. to manage pests	26	19	20	25	18	21
Remove or plow down crop residue	10	4	4	8	6	6
Clean implements after fieldwork	28	9	10	16	13	13
Water management practices	5	3	5	10	4	5
Avoidance Practices:						
Seed varieties with BT genes	*	**	6	1	**	1
Adjust planting/harvesting dates	11	4	3	9	4	6
Rotate crops to control pests	41	33	15	16	28	30
Genetically modified pathogen/ nematode resistant	*	*		1	NA	1
Monitoring Practices:						
Scouted for pests	32	19	17	22	17	20
Records kept to track pests	5	4	1	6	4	4
Field mapping of weed problems	7	3	3	3	3	4
Soil analysis to detect pests	10	2	4	3	3	3
Pheromones to monitor pests	*	*	*	1	**	**
Weather monitoring	5	3	3	3	NA	3
Suppression Practices:						
Seed varieties herbicide resistant	*	**	*	*	2	**
Scouting used to make decisions	12	5	3	6	5	6
Biological pesticides	*	*	*	1	**	1
Beneficial organisms	*	*	*	2	**	1
Physical barriers	9	2	6	5	5	4
Adjust planting methods	1	1	2	2	1	1
Alternate pesticides	17	6	6	11	7	8
Pheromones to disrupt mating		*		*	NA	*

* Insufficient reports to publish data.

** Less than 1 percent.

Pest Management Practices,
Percent of Acres Receiving Practice,
Other Hay, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Acres --						
Prevention Practices:						
Tillage/etc. to manage pests	13	9	14	24	10	13
Remove or plow down crop residue	2	1	4	11	3	3
Clean implements after fieldwork	14	4	7	12	8	7
Water management practices	1	1	1	7	2	1
Avoidance Practices:						
Seed varieties with BT genes	*	*	*		*	**
Adjust planting/harvesting dates	1	1	1	2	3	1
Rotate crops to control pests	14	7	2	6	7	6
Genetically modified pathogen/ nematode resistant			*	*	NA	*
Monitoring Practices:						
Scouted for pests	3	4	7	15	7	6
Records kept to track pests	1	1	1	7	1	1
Field mapping of weed problems	1	1	1	1	1	1
Soil analysis to detect pests	4	1	1	**	1	1
Pheromones to monitor pests		*	*	*	**	*
Weather monitoring	**	**	1	1	NA	1
Suppression Practices:						
Seed varieties herbicide resistant	*	*	1	*	**	**
Scouting used to make decisions	1	1	1	1	1	1
Biological pesticides		*	*	*	**	**
Beneficial organisms		*	*	**	**	**
Physical barriers	5	2	4	1	2	3
Adjust planting methods	*	**	1	**	**	1
Alternate pesticides	3	1	1	2	3	1
Pheromones to disrupt mating					NA	

* Insufficient reports to publish data.
** Less than 1 percent.

Pest Management Practices,
Percent of Farms Utilizing Practice,
Other Hay, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Farms --						
Prevention Practices:						
Tillage/etc. to manage pests	15	11	11	25	10	12
Remove or plow down crop residue	3	2	3	10	2	3
Clean implements after fieldwork	14	6	4	13	6	6
Water management practices	2	2	1	4	1	2
Avoidance Practices:						
Seed varieties with BT genes	*	*	*		*	**
Adjust planting/harvesting dates	1	1	1	2	1	1
Rotate crops to control pests	15	9	2	5	6	6
Genetically modified pathogen/ nematode resistant			*	*	NA	*
Monitoring Practices:						
Scouted for pests	8	5	5	16	5	6
Records kept to track pests	1	1	**	2	1	1
Field mapping of weed problems	2	1	**	1	1	1
Soil analysis to detect pests	4	1	1	**	1	1
Pheromones to monitor pests		*	*	*	**	*
Weather monitoring	1	1	1	2	NA	1
Suppression Practices:						
Seed varieties herbicide resistant	*	*	**	*	**	**
Scouting used to make decisions	1	1	1	4	1	1
Biological pesticides		*	*	*	**	**
Beneficial organisms		*	*	**	**	**
Physical barriers	4	2	4	4	1	3
Adjust planting methods	*	1	1	**	**	1
Alternate pesticides	2	2	1	3	2	1
Pheromones to disrupt mating					NA	

* Insufficient reports to publish data.
** Less than 1 percent.

Pest Management Practices,
Percent of Acres Receiving Practice,
Fruits and Nuts, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Acres --						
Prevention Practices:						
Tillage/etc. to manage pests	92	80	89	74	74	79
Remove or plow down crop residue	30	18	29	44	47	39
Clean implements after fieldwork	28	16	43	33	42	34
Water management practices	*	*	47	39	39	39
Avoidance Practices:						
Seed varieties with BT genes		*	3	2	*	2
Adjust planting/harvesting dates	*	*	*	6	17	4
Rotate crops to control pests	24	*	1	2	13	3
Genetically modified pathogen/ nematode resistant			2	1	NA	1
Monitoring Practices:						
Scouted for pests	93	79	85	81	80	82
Records kept to track pests	63	68	61	62	60	62
Field mapping of weed problems	*	*	20	14	17	15
Soil analysis to detect pests	23	*	63	36	46	41
Pheromones to monitor pests	19	45	11	32	35	27
Weather monitoring	25	64	50	36	NA	40
Suppression Practices:						
Seed varieties herbicide resistant			4	2	1	2
Scouting used to make decisions	57	52	48	39	40	42
Biological pesticides	*	*	21	16	14	17
Beneficial organisms	*		19	13	14	14
Physical barriers	29	50	34	40	33	39
Adjust planting methods	*	*	4	14	16	11
Alternate pesticides	93	88	65	72	68	72
Pheromones to disrupt mating	*	*	*	9	NA	7

* Insufficient reports to publish data.

** Less than 1 percent.

Pest Management Practices,
Percent of Farms Utilizing Practice,
Fruits and Nuts, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Farms --						
Prevention Practices:						
Tillage/etc. to manage pests	68	73	64	70	58	69
Remove or plow down crop residue	20	37	14	46	22	35
Clean implements after fieldwork	14	11	20	30	23	25
Water management practices	*	*	24	19	15	19
Avoidance Practices:						
Seed varieties with BT genes		*	2	1	*	1
Adjust planting/harvesting dates	*	*	*	6	6	4
Rotate crops to control pests	12	*	2	2	6	5
Genetically modified pathogen/ nematode resistant			3	5	NA	4
Monitoring Practices:						
Scouted for pests	77	64	53	74	59	68
Records kept to track pests	39	26	24	41	27	35
Field mapping of weed problems	*	*	3	4	9	4
Soil analysis to detect pests	3	*	24	17	16	16
Pheromones to monitor pests	7	7	2	24	14	16
Weather monitoring	22	19	20	23	NA	22
Suppression Practices:						
Seed varieties herbicide resistant			1	**	2	1
Scouting used to make decisions	21	18	11	27	22	22
Biological pesticides	*	*	6	12	7	10
Beneficial organisms	*		7	10	8	8
Physical barriers	25	42	14	30	16	26
Adjust planting methods	*	*	3	4	7	5
Alternate pesticides	59	43	40	52	39	49
Pheromones to disrupt mating	*	*	*	6	NA	4

* Insufficient reports to publish data.

** Less than 1 percent.

Pest Management Practices,
Percent of Acres Receiving Practice,
Vegetables, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Acres --						
Prevention Practices:						
Tillage/etc. to manage pests	82	59	76	81	59	74
Remove or plow down crop residue	71	34	51	70	53	57
Clean implements after fieldwork	62	30	49	55	51	48
Water management practices	48	38	42	56	38	47
Avoidance Practices:						
Seed varieties with BT genes	2	*	4	4	**	5
Adjust planting/harvesting dates	23	14	12	33	19	23
Rotate crops to control pests	92	67	75	83	74	78
Genetically modified pathogen/ nematode resistant	*	*	9	9	NA	4
Monitoring Practices:						
Scouted for pests	78	75	75	86	81	80
Records kept to track pests	49	41	45	67	46	54
Field mapping of weed problems	14	25	4	36	22	24
Soil analysis to detect pests	35	19	38	52	40	38
Pheromones to monitor pests	10	26	*	19	6	16
Weather monitoring	17	23	37	43	NA	34
Suppression Practices:						
Seed varieties herbicide resistant	*		*	*	1	1
Scouting used to make decisions	44	27	23	49	37	37
Biological pesticides	14	8	18	28	8	19
Beneficial organisms	*	*	*	12	6	9
Physical barriers	67	41	28	24	21	34
Adjust planting methods	46	22	14	29	17	26
Alternate pesticides	71	66	85	71	68	72
Pheromones to disrupt mating	*	*	*	*	NA	2

* Insufficient reports to publish data.

** Less than 1 percent.

Pest Management Practices,
Percent of Farms Utilizing Practice,
Vegetables, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Farms --						
Prevention Practices:						
Tillage/etc. to manage pests	51	54	43	72	50	54
Remove or plow down crop residue	44	42	48	62	37	48
Clean implements after fieldwork	29	20	30	49	27	30
Water management practices	15	21	13	43	26	22
Avoidance Practices:						
Seed varieties with BT genes	**	*	4	4	1	3
Adjust planting/harvesting dates	16	8	20	20	7	15
Rotate crops to control pests	61	73	49	71	43	64
Genetically modified pathogen/ nematode resistant	*	*	1	12	NA	5
Monitoring Practices:						
Scouted for pests	53	56	31	69	58	52
Records kept to track pests	18	29	10	38	17	23
Field mapping of weed problems	9	21	1	20	8	13
Soil analysis to detect pests	10	3	16	24	13	12
Pheromones to monitor pests	2	7	*	6	1	4
Weather monitoring	8	12	15	24	NA	14
Suppression Practices:						
Seed varieties herbicide resistant	*		*	*	3	2
Scouting used to make decisions	11	14	15	30	17	17
Biological pesticides	12	5	8	28	3	11
Beneficial organisms	*	*	*	14	5	4
Physical barriers	41	39	17	36	28	33
Adjust planting methods	23	21	10	14	12	17
Alternate pesticides	41	41	40	43	41	41
Pheromones to disrupt mating	*	*	*	*	NA	2

* Insufficient reports to publish data.

** Less than 1 percent.

Pest Management Practices,
Percent of Acres Receiving Practice,
All Other Crops and Cropland Pasture, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
-- Percent of Acres --						
Prevention Practices:						
Tillage/etc. to manage pests	50	37	50	50	37	45
Remove or plow down crop residue	33	23	38	37	24	31
Clean implements after fieldwork	47	40	41	39	36	41
Water management practices	20	11	16	25	14	15
Avoidance Practices:						
Seed varieties with BT genes	*	**	2	**	**	1
Adjust planting/harvesting dates	5	15	9	13	12	12
Rotate crops to control pests	60	62	42	44	49	52
Genetically modified pathogen/ nematode resistant	*	*	2	2	NA	1
Monitoring Practices:						
Scouted for pests	52	42	40	51	40	43
Records kept to track pests	26	15	16	23	16	17
Field mapping of weed problems	8	10	6	17	13	10
Soil analysis to detect pests	27	7	14	16	10	12
Pheromones to monitor pests	*	1	1	9	2	2
Weather monitoring	24	13	12	19	NA	14
Suppression Practices:						
Seed varieties herbicide resistant	3	1	2	*	3	2
Scouting used to make decisions	33	17	21	19	17	19
Biological pesticides	*	*	3	2	1	2
Beneficial organisms	*	*	2	7	1	2
Physical barriers	15	10	13	14	11	12
Adjust planting methods	24	12	6	7	7	9
Alternate pesticides	50	33	31	42	31	34
Pheromones to disrupt mating	*	*	**	**	NA	**

* Insufficient reports to publish data.

** Less than 1 percent.

Pest Management Practices,
Percent of Farms Utilizing Practice,
All Other Crops and Cropland Pasture, 1998

Practice	Region				United States	
	North- East	North Central	South	West	1997	1998
	-- Percent of Farms --					
Prevention Practices:						
Tillage/etc. to manage pests	42	26	34	44	27	33
Remove or plow down crop residue	20	15	26	23	15	21
Clean implements after fieldwork	19	21	23	27	20	23
Water management practices	5	8	8	15	8	9
Avoidance Practices:						
Seed varieties with BT genes	*	**	1	**	**	1
Adjust planting/harvesting dates	3	8	6	6	6	6
Rotate crops to control pests	34	47	27	27	32	36
Genetically modified pathogen/ nematode resistant	*	*	2	1	NA	1
Monitoring Practices:						
Scouted for pests	29	24	25	33	25	26
Records kept to track pests	9	8	4	14	7	7
Field mapping of weed problems	5	5	3	6	4	4
Soil analysis to detect pests	7	3	8	10	4	6
Pheromones to monitor pests	*	**	1	1	1	1
Weather monitoring	6	5	5	10	NA	6
Suppression Practices:						
Seed varieties herbicide resistant	3	1	2	1	3	1
Scouting used to make decisions	12	7	6	6	7	7
Biological pesticides	*	*	2	3	1	2
Beneficial organisms	*	*	1	1	1	1
Physical barriers	17	6	11	17	9	10
Adjust planting methods	8	6	10	6	5	8
Alternate pesticides	21	17	18	22	18	18
Pheromones to disrupt mating	*	*	**	**	NA	**

* Insufficient reports to publish data.

** Less than 1 percent.

Survey Procedures: The estimates in this report are based on the Fall Agriculture Survey conducted in December, 1998. This survey is based on a probability area frame with a sample of 6,840 segments or parcels of land which average approximately 1 square mile. Enumerators conducting the area survey contact all farmers having operations within the sampled segments and collect a variety of information, including pest management practices for their entire operation. Estimates are then calculated, using the selection probability of each segment.

Estimation Procedures: For each crop/pest management practice combination, two ratios were calculated: percent of farms and percent of acres covered by that practice. If a farm operator used a given practice on a specific crop, all acres planted to that crop were considered to have been "treated" with the given pest management practice.

These data will not be revised even if there are subsequent revisions to acreage for a given crop.

Reliability: The probability nature of the survey provides estimates that are statistically representative of pest management practices on the targeted crops. Reliability of survey results is affected by sampling variability and non-sampling errors. The sampling variability, expressed as a percentage of the estimate, is referred to as the coefficient of variation (cv).

Sampling variability of the estimates differs considerably by crop/pest management practice combination. Some practices are seldom used on certain crops. In general, the more common the pest management practice, the smaller the sampling variability. For commonly used pest management practices, cv's will range from 1-15 percent at the U.S. level and 5-40 percent at the Regional level.

Non-sampling errors occur during a survey process, and unlike sampling variability, are difficult to measure. They may be caused by interviewers failing to follow instructions, poorly worded questions, non-response, problematic survey procedures, or data handling mistakes between collection and publication. In this survey, all survey procedures and analyses were carried out in a consistent and orderly manner to minimize the occurrence of these types of errors.

Terms and Definitions

Agricultural chemicals: Active ingredients in fertilizers and pesticides.

Allelopathic: The release of chemical compounds from a plant that will inhibit the growth of another plant, such as weeds.

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.

Crop year: The period immediately following harvest for the previous crop through harvest of the current crop.

Cultivars: 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 operating.

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 or commodity acreage programs. It excludes public, industrial, and grazing association land and nonagricultural land. It excludes all land operated by establishments not qualifying as farms.

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), includes 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.

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.

SECTION K - PEST MANAGEMENT PRACTICES

1. [**ENUMERATOR ACTION.**]
 [Were any *crops planted or harvested, hay cut, or cropland pasture reported on total acres operated?*]
 YES - [Continue.] **NO** - [Enter 3 in Code Box 463, and go to Section L.]

	000
Completion Code for Section K Only	1 - Incomplete 3 - ValidZero
	463
	COLUMNS IN TABLE
	440

CROP CODES FOR ITEM 3		
191 - Corn	190 - Barley	142 - All Vegetables
26 - Soybeans	1 - Alfalfa Hay	312 - All Fruits & Nuts
8 - Cotton	11 - Other Hay	401 - All Other crops & Cropland Pasture
34 - Wheat	225 - Wild Hay	

		COLUMN NUMBER				
		401	402	403	404	405
2.	[List all crops grown during the 1998 crop year.] Crop					
	Crop Code	441	441	441	441	441
3.	[Enter crop code for each crop.]					

Now I have some questions about pest management practices you may have used on this operation for any crops grown during 1998. **By pests, we mean weeds, insects and diseases.** Were any of the following practices used on your operation by you or anyone else?

4.	Did you use any crop varieties that were genetically modified (either genetic engineering or conventional breeding) to be resistant to	If YES, how many acres:				
	4a. specific herbicides (Roundup-Ready, Liberty-Link, Poast-Protected corn, STS soybean, IT-corn)?	443	443	443	443	443
	4b. insects (Bt., etc)?	444	444	444	444	444
	4c. plant pathogens or nematodes causing plant diseases	445	445	445	445	445
5.	Were any of the crops on this operation scouted for pests (weeds, insects or disease) using a systematic method? . . .	If YES, enter Code= 1 for each crop				
		446	446	446	446	446
6.	Were electronic or written records kept to track the activity or numbers of different pests?	447	447	447	447	447
7.	Did you use scouting data and compare it to university or extension guidelines for infestation thresholds to determine when to take measures to control pests?	448	448	448	448	448
8.	Did you use field mapping of previous weed problems to assist you in making weed management decisions?	449	449	449	449	449
9.	Did you use soil analysis to detect the presence of pests, such as insects, disease, or nematodes?	450	450	450	450	450

SECTION K - PEST MANAGEMENT PRACTICES (continued)

	COLUMN NUMBER				
	401	402	403	404	405
Crop					
	If YES, enter Code= 1 for each crop				
10. Did you use weather monitoring to predict the need for pesticide application?	480	480	480	480	480
11. Did you use pheromones to monitor pests by trapping?	481	481	481	481	481
12. Did you use pheromones to control pests by disrupting mating?	482	482	482	482	482
13. Did you use topically applied biological pesticides such as Bt (<i>Bacillus Thuringiensis</i>), insect growth regulators, neem or other natural products to control pests?	452	452	452	452	452
14. Did you use beneficial organisms (insects, nematodes or fungi) to control pests?	453	453	453	453	453
15. Did you maintain ground covers, mulches or physical barriers to reduce pest problems?	454	454	454	454	454
16. Did you use practices such as tilling, mowing, burning, or chopping of field edges, lanes, ditches, roadways or fence lines to manage pests?	455	455	455	455	455
17. Did you remove or plow down crop residues to control pests?	456	456	456	456	456
18. Did you clean tillage or harvesting implements after completing field work for the purpose of reducing the spread of weeds, diseases or other pests?	457	457	457	457	457
19. Did you use water management practices, such as controlled drainage or irrigation scheduling, excluding chemigation, to control pests?	458	458	458	458	458
20. Did you adjust row spacing, plant density or row direction to control pests?	459	459	459	459	459
21. Did you adjust planting or harvesting dates to control pests?	460	460	460	460	460
22. Do you alternate pesticides to keep pests from becoming resistant to pesticides (use pesticides with different mechanisms of action)?	461	461	461	461	461
23. Do you rotate crops for the purpose of controlling pests?	462	462	462	462	462

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