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Pest Management Practices 1999 Summary

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USDA



1999 Pest Management Practices

Overview: The pest management practices in this report are based on data compiled from a survey conducted in the Fall of 1999. 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. However, not all possible questions regarding specific management practices in each category were asked. A copy of the actual questions used to collect these data is shown on pages 34-35.

The data are published in two tables for each crop: percent of acres receiving the specific pest management practice and percent of farms using the specific pest management practice. These percentages are published at the U.S. and regional level. For barley, corn, soybeans, wheat, fruits and nuts, vegetables, and all other crops and cropland pasture, the percentages refer only to farms and planted acres. For alfalfa hay and other hay, the percentages refer only to farms and harvested acres. A single asterisk in the table means there were too few reports to publish the percentage while a double asterisk means the percentage is less than one percent. A blank indicates there were no reports of the practice being used. An NA, not applicable, indicates no questions were asked for that particular practice that year.

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

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

Did you use practices such as tilling, mowing, burning, or chopping of field edges, lanes, ditches, roadways or fence lines to manage 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 crop varieties that were genetically modified to be resistant to insects (Bt, etc.)?

Did you adjust planting or harvesting dates to control pests?

Did you rotate crops for the purpose of controlling pests?

Did you use any crop varieties that were genetically modified to be resistant to plant pathogens or nematodes causing plant diseases?

Did you choose planting locations to avoid cross infestation of insects or disease?

Did you grow a trap crop to help control insects?

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:

Was this crop 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 soilborne pests or pathogens?

Did you use pheromones to monitor the presence of pests by trapping?

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, could 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 crop varieties that were genetically modified to be resistant to specific herbicides (Roundup Ready, Liberty Link, Poast-Protected corn, STS soybean, IT corn)?

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 beneficial organisms (insects, nematodes or fungi) 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 maintain ground covers, mulches or physical barriers to reduce pest problems?

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

Did you alternate pesticides to keep pests from becoming resistant to pesticides (use pesticides with different mechanisms of action)?

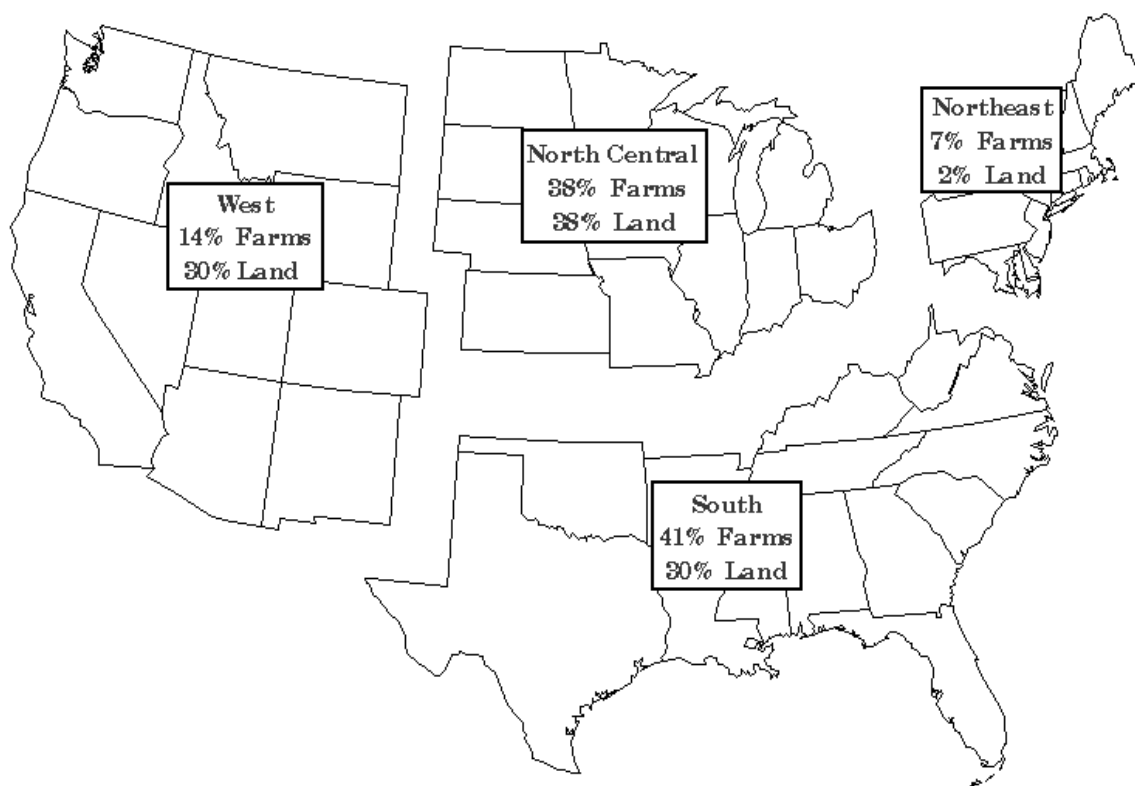
Did you use pheromones to control pests by disrupting mating?

Questions asked during the 1999 survey but not asked during the 1998 survey were:

Did you choose planting locations to avoid cross infestation of insects or disease?

Did you grow a trap crop to help control pests?

Distribution of Farms and Land in Farms by Region, 1999



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.

Highlights

Barley: The leading pest management practice for barley was rotating crops to control pests. Fifty-nine percent of the farms used this practice on 67 percent of the acres across the United States. Pest management practices used on over 40 percent of the barley acres include tillage practices to manage pests, cleaning implements after fieldwork, rotating crops to control pests, scouting for pests to make decisions, and using alternate pesticides.

Corn: Rotating crops to control pests was used on 77 percent of the corn acres and was the leading pest management practice for corn. It was also the most widely used practice in terms of number of farms, at 67 percent. Scouting for pests was reported on 55 percent of the corn acres. Use of alternate pesticides and using tillage practices to manage pests were also common, each being reported on nearly half of the corn acres.

Cotton: Scouting for pests was used by 71 percent of the cotton farms on 78 percent of the cotton acres. Prevention practices, such as using tillage practices to manage pests, removing or plowing down crop residue, and cleaning implements after fieldwork were used on more than half of the cotton farms and acres. Other practices used on 50 percent or more of the acres include 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 soybean pests, which was done on 76 percent of the soybean acres and on 73 percent of the soybean farms. Other practices used on 40 percent or more of the acres included tillage to manage pests, clean implements after fieldwork, scouting for pests, and using crop varieties genetically modified to be herbicide resistant.

All Wheat: The leading pest management practice used on wheat was rotating crops to control pests, which was used by 48 percent of the wheat farms on 56 percent of the wheat acres. 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: Scouting for pests was the most widely used pest management practice on alfalfa acreage at 29 percent. Rotating crops to control pests was used on 28 percent of the alfalfa acreage and 27 percent of the farms while tillage was used to control pests on 22 percent of the acres.

Other Hay: Thirteen percent of the hay acres, other than alfalfa, used tillage practices to manage pests. Cleaning implements after fieldwork was used on 7 percent of the farms and scouting for pests was used on 6 percent of the farms.

Fruits and Nuts: Scouting for pests in fruits and nuts, the most widely used pest management practice, was used by 72 percent of the fruit and nut farms on 92 percent of the acres. Tillage methods to manage pests and use of alternate pesticides were each used on 73 percent of the fruit and nut acres. More than 35 percent of the farms cleaned implements after field work, kept records to track pests, and monitored the weather as pest management practices.

Vegetables: Eighty-one percent of vegetable acres were scouted for pests, making it the most common pest management practice for vegetable crops. Rotating crops was reported on 77 percent of the acres, while using tillage to manage pests and use of alternate pesticides were used on more than 60 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 on 48 percent of the acres. Using tillage to manage pests, cleaning implements after fieldwork, and scouting for pests, were each used on more than 40 percent of the acres.

**Planted and Harvested Acres for Selected Crops,
by State and Region, 1999 Crop Year**

State and Region	Area Planted					Area Harvested	
	Barley ¹	Corn	Cotton	Soybeans	All Wheat ¹	Alfalfa Hay	Other Hay
	<i>1,000 Acres</i>	<i>1,000 Acres</i>	<i>1,000 Acres</i>	<i>1,000 Acres</i>	<i>1,000 Acres</i>	<i>1,000 Acres</i>	<i>1,000 Acres</i>
CT		38				11	50
DE	30	169		205	75	7	8
ME		33				12	150
MD	55	470		490	215	60	150
MA		26				17	90
NH		15				7	55
NJ	6	110		105	42	30	100
NY		1,150		130	130	550	950
PA	75	1,500		370	195	700	1,200
RI		3				1	7
VT		106				45	200
Northeast	166	3,620		1,300	657	1,440	2,960
IL		10,800		10,600	1,050	500	350
IN		5,800		5,600	550	400	300
IA		12,100		10,800	40	1,300	400
KS	16	3,150	33	2,850	10,000	850	1,850
MI	23	2,200		1,950	610	950	350
MN	200	7,100		7,000	2,045	1,600	850
MO		2,650	380	5,400	980	450	3,200
NE	5	8,600		4,300	2,000	1,400	1,800
ND	1,350	820		1,350	9,410	1,450	1,450
OH		3,450		4,600	1,050	600	700
SD	80	3,600		4,100	3,105	2,400	1,600
WI	80	3,600		1,350	133	2,100	500
North Central	1,754	63,870	413	59,900	30,973	13,000	13,350

See footnotes at end of table.

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**Planted and Harvested Acres for Selected Crops,
by State and Region, 1999 Crop Year (continued)**

State and Region	Area Planted					Area Harvested	
	Barley ¹	Corn	Cotton	Soybeans	All Wheat ¹	Alfalfa Hay	Other Hay
	<i>1,000 Acres</i>	<i>1,000 Acres</i>	<i>1,000 Acres</i>	<i>1,000 Acres</i>	<i>1,000 Acres</i>	<i>1,000 Acres</i>	<i>1,000 Acres</i>
AL ²		220	565	240	140		800
AR		105	970	3,450	970	20	1,220
FL ²		90	107	20	16		260
GA ²		350	1,470	220	300		600
KY	9	1,320		1,200	650	250	2,150
LA ²		340	615	1,020	110		380
MS ²		340	1,200	1,950	180		850
NC	24	750	880	1,400	650	20	690
OK	4	430	240	480	6,400	360	2,200
SC ²	3	300	330	480	225		300
TN		630	570	1,250	500	30	1,850
TX	15	1,950	6,183	400	6,200	130	5,400
VA	80	500	110	470	280	120	1,150
WV		60			11	50	530
South	135	7,385	12,240	12,580	16,632	980	18,380
AZ	63	50	275		86	200	40
CA	170	550	850		590	1,030	540
CO	95	1,230			2,653	900	620
ID	710	165			1,420	1,150	280
MT	1,300	65			5,560	1,650	950
NV	5				17	255	225
NM		150	77		445	290	90
OR	145	45			870	420	680
UT	90	61			176	540	160
WA	500	155			2,525	470	270
WY	90	85			210	660	630
West	3,168	2,556	1,202		14,552	7,565	4,485
US ³	5,223	77,431	14,855	73,780	62,814	23,985	39,175

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, 1999 Crop Year**

State and Region	Number of Farms	Land in Farms
		<i>1,000 Acres</i>
CT	4,000	370
DE	2,600	580
ME	6,900	1,270
MD	12,400	2,100
MA	6,100	570
NH	3,100	420
NJ	9,600	830
NY	39,000	7,800
PA	59,000	7,700
RI	700	60
VT	6,700	1,340
Northeast	150,100	23,040
IL	79,000	27,700
IN	65,000	15,500
IA	96,000	33,000
KS	65,000	47,500
MI	53,000	10,400
MN	81,000	28,800
MO	110,000	30,100
NE	55,000	46,400
ND	30,500	39,400
OH	80,000	14,900
SD	32,500	44,000
WI	78,000	16,300
North Central	825,000	354,000

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**Number of Farms and Land in Farms,
by State and Region, 1999 Crop Year (continued)**

State and Region	Number of Farms	Land in Farms
		<i>1,000 Acres</i>
AL	48,000	9,200
AR	48,500	14,650
FL	45,000	10,400
GA	50,000	11,200
KY	91,000	13,600
LA	30,000	8,150
MS	43,000	11,400
NC	58,000	9,300
OK	84,000	34,000
SC	25,000	4,850
TN	91,000	11,900
TX	227,000	130,500
VA	50,000	8,600
WV	20,500	3,600
South	911,000	281,350
AZ	7,700	27,500
CA	89,000	27,800
AZ	29,000	31,800
ID	24,500	11,900
MT	28,000	57,000
NV	3,000	6,800
NM	15,500	44,700
OR	40,500	17,200
UT	15,500	11,600
WA	40,000	15,700
WY	9,200	34,600
West	301,900	286,600
US ¹	2,188,000	944,990

¹ Alaska and Hawaii were not included in the survey.

**Pest Management Practices,
Percent of Acres Receiving Practice,
Barley, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>
Prevention Practices:						
Tillage/etc. to manage pests	65	40	12	46	43	43
Remove or plow down crop residue	49	27	11	34	32	31
Clean implements after fieldwork	18	45	12	57	49	49
Water management practices	*	**		11	14	7
Avoidance Practices:						
Crop varieties genetically modified to resist insects	*			**	*	**
Adjust planting/harvesting dates	5	13	*	32	22	23
Rotate crops to control pests	54	75	21	68	71	67
Crop varieties genetically modified to be pathogen/nematode resistant			**	**	**	**
Alternate planting locations	*	41	*	16	NA	24
Grow trap crop to control insects				**	NA	**
Monitoring Practices:						
Scouted for pests	35	53	7	71	47	60
Records kept to track pests	39	20	*	28	18	25
Field mapping of weed problems	6	24	*	25	21	22
Soil analysis to detect pests	17	*	*	9	9	6
Pheromones to monitor pests			*	**	*	**
Weather monitoring	15	21	4	20	16	19
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant	*		**	**	**	**
Scouting used to make decisions	10	17	*	18	9	16
Biological pesticides	**	**	**	**	**	**
Beneficial organisms	*	*	*	**	1	1
Physical barriers	*	18	8	11	17	13
Adjust planting methods	*	*	*	6	11	6
Alternate pesticides	15	45	10	49	44	44
Pheromones to disrupt mating				**		**

* Insufficient reports to publish data.

** Less than 1 percent

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Farms Utilizing Practice,
Barley, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>
Prevention Practices:						
Tillage/etc. to manage pests	37	27	24	45	34	35
Remove or plow down crop residue	24	19	24	31	25	25
Clean implements after fieldwork	27	29	14	43	39	32
Water management practices	*	**		13	12	6
Avoidance Practices:						
Crop varieties genetically modified to resist insects	**			*	*	*
Adjust planting/harvesting dates	3	10	*	23	13	14
Rotate crops to control pests	78	67	32	53	63	59
Crop varieties genetically modified to be pathogen/nematode resistant			*	**	**	*
Alternate planting locations	**	16	*	12	NA	12
Grow trap crop to control insects				**	NA	**
Monitoring Practices:						
Scouted for pests	33	36	19	53	32	40
Records kept to track pests	15	11	*	14	9	12
Field mapping of weed problems	9	16	*	15	12	14
Soil analysis to detect pests	7	**	*	6	5	4
Pheromones to monitor pests			*	**	*	**
Weather monitoring	8	11	16	13	9	12
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant	*		*	**	**	**
Scouting used to make decisions	9	8	*	11	7	8
Biological pesticides	*	**	*	**	**	2
Beneficial organisms	**	**	*	1	**	2
Physical barriers	*	9	12	14	10	11
Adjust planting methods	**	*	*	5	6	4
Alternate pesticides	11	26	19	38	30	28
Pheromones to disrupt mating				**		**

* Insufficient reports to publish data.

** Less than 1 percent

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Acres Receiving Practice,
Corn, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>
Prevention Practices:						
Tillage/etc. to manage pests	39	44	53	50	48	45
Remove or plow down crop residue	36	17	45	34	25	22
Clean implements after fieldwork	41	34	50	34	37	36
Water management practices	8	9	11	29	13	10
Avoidance Practices:						
Crop varieties genetically modified to resist insects	11	19	8	7	13	17
Adjust planting/harvesting dates	10	9	21	13	8	11
Rotate crops to control pests	67	80	60	61	77	77
Crop varieties genetically modified to be pathogen/nematode resistant	**	**	**	1	**	**
Alternate planting locations	15	13	20	13	NA	14
Grow trap crop to control insects	**	3	**	**	NA	3
Monitoring Practices:						
Scouted for pests	52	57	44	62	52	55
Records kept to track pests	20	23	19	39	23	23
Field mapping of weed problems	16	18	11	20	16	17
Soil analysis to detect pests	12	15	19	25	14	16
Pheromones to monitor pests	**	2	1	3	1	2
Weather monitoring	24	15	17	31	10	16
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant	3	6	19	8	7	8
Scouting used to make decisions	17	18	20	23	19	19
Biological pesticides	5	5	3	7	4	5
Beneficial organisms	*	1	3	2	**	2
Physical barriers	16	13	12	26	14	13
Adjust planting methods	5	8	13	9	8	8
Alternate pesticides	46	44	33	50	49	44
Pheromones to disrupt mating	**	**		*	**	**

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Farms Utilizing Practice,
Corn, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>
Prevention Practices:						
Tillage/etc. to manage pests	44	37	39	50	37	38
Remove or plow down crop residue	28	16	37	23	22	20
Clean implements after fieldwork	41	27	38	27	28	29
Water management practices	4	6	8	18	9	6
Avoidance Practices:						
Crop varieties genetically modified to resist insects	21	30	5	7	20	25
Adjust planting/harvesting dates	7	6	12	9	6	7
Rotate crops to control pests	59	73	44	56	67	67
Crop varieties genetically modified to be pathogen/nematode resistant	**	**	**	2	**	**
Alternate planting locations	9	9	10	9	NA	9
Grow trap crop to control insects	**	2	**	**	NA	2
Monitoring Practices:						
Scouted for pests	36	45	27	48	37	42
Records kept to track pests	10	13	7	22	11	12
Field mapping of weed problems	9	10	4	11	9	10
Soil analysis to detect pests	6	8	8	14	8	8
Pheromones to monitor pests	**	**	**	**	**	**
Weather monitoring	16	9	9	17	7	10
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant	9	12	19	16	11	13
Scouting used to make decisions	7	10	7	13	9	10
Biological pesticides	3	3	1	3	2	3
Beneficial organisms	**	**	1	**	**	**
Physical barriers	12	9	9	13	10	9
Adjust planting methods	4	5	6	4	6	5
Alternate pesticides	34	34	17	36	36	32
Pheromones to disrupt mating	**	**		**	**	**

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Acres Receiving Practice,
Cotton, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>
Prevention Practices:						
Tillage/etc. to manage pests	*	85	67	81	61	69
Remove or plow down crop residue	*	70	53	79	57	55
Clean implements after fieldwork	*	44	61	60	59	61
Water management practices	*		15	40	19	16
Avoidance Practices:						
Crop varieties genetically modified to resist insects			26	26	17	26
Adjust planting/harvesting dates		**	20	27	25	21
Rotate crops to control pests	*	42	38	74	48	40
Crop varieties genetically modified to be pathogen/nematode resistant			1		3	1
Alternate planting locations		*	12	19	NA	12
Grow trap crop to control insects			6	*	NA	6
Monitoring Practices:						
Scouted for pests	*	44	77	100	72	78
Records kept to track pests	*	*	58	83	53	59
Field mapping of weed problems	*	*	14	50	12	17
Soil analysis to detect pests		*	18	20	25	18
Pheromones to monitor pests		18	65	37	53	63
Weather monitoring		*	22	38	15	22
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant		11	33	17	24	32
Scouting used to make decisions	*	*	48	71	41	48
Biological pesticides		**	16	*	14	15
Beneficial organisms			5	*	5	5
Physical barriers		*	9	*	14	9
Adjust planting methods			8	18	12	9
Alternate pesticides	*	*	42	79	57	44
Pheromones to disrupt mating		**	17	*	14	16

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Farms Utilizing Practice,
Cotton, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>
Prevention Practices:						
Tillage/etc. to manage pests	*	89	61	65	56	62
Remove or plow down crop residue	*	56	52	68	58	53
Clean implements after fieldwork	*	54	55	61	53	55
Water management practices	*		11	36	14	13
Avoidance Practices:						
Crop varieties genetically modified to resist insects			32	16	22	30
Adjust planting/harvesting dates		*	17	33	21	18
Rotate crops to control pests	*	51	44	33	52	44
Crop varieties genetically modified to be pathogen/nematode resistant			1		3	1
Alternate planting locations		*	14	13	NA	13
Grow trap crop to control insects			6	*	NA	6
Monitoring Practices:						
Scouted for pests	*	28	71	93	65	71
Records kept to track pests	*	*	44	72	46	45
Field mapping of weed problems	*	**	11	11	8	11
Soil analysis to detect pests		*	17	15	24	16
Pheromones to monitor pests		8	62	18	54	58
Weather monitoring		*	23	17	14	22
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant		29	44	40	34	44
Scouting used to make decisions	*	**	37	41	36	37
Biological pesticides		**	13	*	10	13
Beneficial organisms			5	*	4	6
Physical barriers		*	9	*	12	9
Adjust planting methods			7	13	11	7
Alternate pesticides	*	*	39	44	52	39
Pheromones to disrupt mating		**	17	*	20	16

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Acres Receiving Practice,
Soybeans, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>
Prevention Practices:						
Tillage/etc. to manage pests	43	46	58	*	48	48
Remove or plow down crop residue	18	16	40	*	23	20
Clean implements after fieldwork	40	37	52	*	39	40
Water management practices	5	7	11	*	11	8
Avoidance Practices:						
Crop varieties genetically modified to resist insects	**	**	3		1	**
Adjust planting/harvesting dates	7	8	13		7	9
Rotate crops to control pests	70	82	54	*	78	76
Crop varieties genetically modified to be pathogen/nematode resistant	2	2	2		3	2
Alternate planting locations	18	13	14		NA	14
Grow trap crop to control insects		**	**		NA	**
Monitoring Practices:						
Scouted for pests	49	56	39	*	50	53
Records kept to track pests	18	18	12	*	18	17
Field mapping of weed problems	15	17	11	**	14	16
Soil analysis to detect pests	21	18	11		15	17
Pheromones to monitor pests	**	**	**		1	**
Weather monitoring	22	14	18		10	15
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant	53	49	45	*	34	48
Scouting used to make decisions	27	14	21	*	16	16
Biological pesticides	*	**	**		1	**
Beneficial organisms	3	1	2		1	1
Physical barriers	17	13	9	*	13	12
Adjust planting methods	9	16	16		15	16
Alternate pesticides	53	41	29	*	46	39
Pheromones to disrupt mating	**	**			**	**

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Farms Utilizing Practice,
Soybeans, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>
Prevention Practices:						
Tillage/etc. to manage pests	46	40	49	*	42	41
Remove or plow down crop residue	15	14	34	*	20	16
Clean implements after fieldwork	39	30	47	*	31	33
Water management practices	3	6	8	*	8	6
Avoidance Practices:						
Crop varieties genetically modified to resist insects	**	**	6		*	1
Adjust planting/harvesting dates	5	5	10		5	6
Rotate crops to control pests	62	76	50	*	76	73
Crop varieties genetically modified to be pathogen/nematode resistant	5	2	3		3	2
Alternate planting locations	9	9	10		NA	9
Grow trap crop to control insects		**	**		NA	**
Monitoring Practices:						
Scouted for pests	42	48	33	*	42	46
Records kept to track pests	14	12	7	*	12	12
Field mapping of weed problems	11	11	7	*	10	10
Soil analysis to detect pests	11	11	7		10	10
Pheromones to monitor pests	**	**	**		**	**
Weather monitoring	12	9	13		8	9
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant	61	61	56	*	48	61
Scouting used to make decisions	14	9	10	*	11	10
Biological pesticides	*	**	**		1	**
Beneficial organisms	3	**	2		**	**
Physical barriers	12	10	7	*	11	9
Adjust planting methods	8	12	11		12	12
Alternate pesticides	47	34	23	*	38	33
Pheromones to disrupt mating	**	**			**	**

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Acres Receiving Practice,
All Wheat, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>
Prevention Practices:						
Tillage/etc. to manage pests	44	44	40	44	43	43
Remove or plow down crop residue	34	27	32	32	30	30
Clean implements after fieldwork	44	49	40	60	49	49
Water management practices	*	5	6	9	10	6
Avoidance Practices:						
Crop varieties genetically modified to resist insects	**	**	**	1	**	**
Adjust planting/harvesting dates	17	24	10	34	23	23
Rotate crops to control pests	77	69	30	60	58	56
Crop varieties genetically modified to be pathogen/nematode resistant		**	**	**	**	**
Alternate planting locations	19	22	8	17	NA	17
Grow trap crop to control insects		**	**	**	NA	**
Monitoring Practices:						
Scouted for pests	52	49	21	66	41	46
Records kept to track pests	29	17	7	24	15	16
Field mapping of weed problems	16	14	3	23	12	13
Soil analysis to detect pests	17	5	6	12	7	7
Pheromones to monitor pests		**	**	**	**	**
Weather monitoring	21	16	8	21	11	15
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant	*	**	1	**	1	**
Scouting used to make decisions	24	15	9	18	12	14
Biological pesticides	*	1	**	**	**	1
Beneficial organisms	*	**	**	2	1	**
Physical barriers	13	17	5	19	14	14
Adjust planting methods	5	7	4	11	9	7
Alternate pesticides	49	34	15	41	33	31
Pheromones to disrupt mating			**	**	*	**

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Farms Utilizing Practice,
All Wheat, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>
Prevention Practices:						
Tillage/etc. to manage pests	52	40	28	42	35	36
Remove or plow down crop residue	30	20	24	28	25	23
Clean implements after fieldwork	47	34	29	44	33	33
Water management practices	*	4	3	8	8	4
Avoidance Practices:						
Crop varieties genetically modified to resist insects	**	**	**	**	**	**
Adjust planting/harvesting dates	7	24	6	20	18	16
Rotate crops to control pests	66	67	22	51	53	48
Crop varieties genetically modified to be pathogen/nematode resistant		**	**	1	**	**
Alternate planting locations	10	12	7	12	NA	10
Grow trap crop to control insects		**	**	**	NA	**
Monitoring Practices:						
Scouted for pests	33	40	13	55	29	31
Records kept to track pests	16	11	3	17	9	9
Field mapping of weed problems	10	7	2	16	6	6
Soil analysis to detect pests	9	4	3	10	5	4
Pheromones to monitor pests		**	**	**	**	**
Weather monitoring	12	10	5	16	6	9
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant	*	**	7	*	1	3
Scouting used to make decisions	8	10	4	15	7	8
Biological pesticides	**	**	**	**	**	**
Beneficial organisms	*	**	**	**	**	**
Physical barriers	7	11	4	17	10	9
Adjust planting methods	2	5	2	6	5	4
Alternate pesticides	33	23	7	35	22	18
Pheromones to disrupt mating			**	**	*	**

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Acres Receiving Practice,
Alfalfa Hay, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>
Prevention Practices:						
Tillage/etc. to manage pests	30	16	20	33	23	22
Remove or plow down crop residue	8	5	11	10	8	7
Clean implements after fieldwork	33	10	22	24	17	16
Water management practices	4	3	3	15	8	6
Avoidance Practices:						
Crop varieties genetically modified to resist insects	**	**	6	**	1	**
Adjust planting/harvesting dates	7	7	7	12	8	8
Rotate crops to control pests	48	30	7	19	33	28
Crop varieties genetically modified to be pathogen/nematode resistant	**	**	*	**	1	**
Alternate planting locations	3	3	9	4	NA	4
Grow trap crop to control insects		**		**	NA	**
Monitoring Practices:						
Scouted for pests	34	24	30	37	26	29
Records kept to track pests	11	9	8	13	9	10
Field mapping of weed problems	5	6	**	8	5	7
Soil analysis to detect pests	4	4	1	7	5	5
Pheromones to monitor pests	**	**	**	2	1	**
Weather monitoring	9	8	5	9	5	8
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant	**	**	*	**	**	**
Scouting used to make decisions	10	10	4	9	9	10
Biological pesticides	*	**	**	2	1	1
Beneficial organisms	*	**	**	3	2	1
Physical barriers	4	3	**	7	6	4
Adjust planting methods	**	1	**	2	2	2
Alternate pesticides	19	8	11	19	13	12
Pheromones to disrupt mating				**	*	**

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Farms Utilizing Practice,
Alfalfa Hay, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>
Prevention Practices:						
Tillage/etc. to manage pests	37	18	18	31	21	22
Remove or plow down crop residue	7	4	8	7	6	5
Clean implements after fieldwork	34	9	17	21	13	14
Water management practices	3	2	4	11	5	4
Avoidance Practices:						
Crop varieties genetically modified to resist insects	**	**	3	**	1	**
Adjust planting/harvesting dates	5	5	6	9	6	5
Rotate crops to control pests	47	28	6	16	30	27
Crop varieties genetically modified to be pathogen/nematode resistant	**	**	*	1	1	**
Alternate planting locations	5	2	5	2	NA	3
Grow trap crop to control insects		**		**	NA	**
Monitoring Practices:						
Scouted for pests	26	23	18	26	20	23
Records kept to track pests	8	5	3	7	4	6
Field mapping of weed problems	4	3	**	5	4	4
Soil analysis to detect pests	2	2	2	4	3	3
Pheromones to monitor pests	**	**	**	**	**	**
Weather monitoring	8	5	3	6	3	5
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant	**	**	*	**	**	**
Scouting used to make decisions	7	5	2	5	6	5
Biological pesticides	*	**	**	2	1	**
Beneficial organisms	**	**	**	2	1	**
Physical barriers	4	3	**	3	4	3
Adjust planting methods	**	1	**	**	1	1
Alternate pesticides	16	5	5	11	8	7
Pheromones to disrupt mating				**	*	**

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Acres Receiving Practice,
Other Hay, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>
Prevention Practices:						
Tillage/etc. to manage pests	12	10	13	27	13	13
Remove or plow down crop residue	3	**	3	6	3	2
Clean implements after fieldwork	11	5	9	11	7	8
Water management practices	**	**	2	7	1	2
Avoidance Practices:						
Crop varieties genetically modified to resist insects			**		**	**
Adjust planting/harvesting dates	2	**	**	3	1	1
Rotate crops to control pests	10	6	2	5	6	4
Crop varieties genetically modified to be pathogen/nematode resistant	**				*	**
Alternate planting locations	**	**	**	**	NA	**
Grow trap crop to control insects		**	**	**	NA	**
Monitoring Practices:						
Scouted for pests	4	7	8	18	6	8
Records kept to track pests	1	1	1	6	1	2
Field mapping of weed problems	1	**	**	4	1	**
Soil analysis to detect pests	2	**	1	2	1	1
Pheromones to monitor pests	**	**	**	**	*	**
Weather monitoring	1	**	1	5	1	1
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant	**	**	**	**	**	**
Scouting used to make decisions	**	**	**	3	1	**
Biological pesticides		**	**	**	**	**
Beneficial organisms		**	**	5	**	**
Physical barriers	2	1	1	3	3	1
Adjust planting methods	**	**	**	**	1	**
Alternate pesticides	1	1	2	10	1	2
Pheromones to disrupt mating				**		**

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Farms Utilizing Practice,
Other Hay, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>
Prevention Practices:						
Tillage/etc. to manage pests	14	11	9	20	12	11
Remove or plow down crop residue	4	1	2	5	3	2
Clean implements after fieldwork	11	5	8	10	6	7
Water management practices	1	**	1	3	2	1
Avoidance Practices:						
Crop varieties genetically modified to resist insects			**		**	**
Adjust planting/harvesting dates	3	1	**	3	1	**
Rotate crops to control pests	11	7	1	4	6	4
Crop varieties genetically modified to be pathogen/nematode resistant	**				*	**
Alternate planting locations	2	**	**	**	NA	**
Grow trap crop to control insects		**	**	**	NA	**
Monitoring Practices:						
Scouted for pests	5	8	3	19	6	6
Records kept to track pests	2	**	**	3	1	**
Field mapping of weed problems	2	**	**	3	1	**
Soil analysis to detect pests	2	**	**	2	1	**
Pheromones to monitor pests	**	**	**	**	*	**
Weather monitoring	2	**	**	3	1	**
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant	**	**	**	*	**	**
Scouting used to make decisions	**	**	**	4	1	**
Biological pesticides		**	**	**	**	**
Beneficial organisms		**	**	1	**	**
Physical barriers	2	1	1	1	3	1
Adjust planting methods	**	**	**	**	1	**
Alternate pesticides	2	1	**	7	1	2
Pheromones to disrupt mating				**		**

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Acres Receiving Practice,
Fruits and Nuts, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>
Prevention Practices:						
Tillage/etc. to manage pests	90	68	68	74	79	73
Remove or plow down crop residue	13	*	24	36	39	30
Clean implements after fieldwork	46	26	52	40	34	44
Water management practices	3	*	34	55	39	44
Avoidance Practices:						
Crop varieties genetically modified to resist insects	**			**	2	**
Adjust planting/harvesting dates	*	*	**	9	4	6
Rotate crops to control pests	6	*	1	3	3	4
Crop varieties genetically modified to be pathogen/nematode resistant	*			**	4	**
Alternate planting locations	24	*	23	5	NA	12
Grow trap crop to control insects	*		*	8	NA	6
Monitoring Practices:						
Scouted for pests	90	99	83	96	82	92
Records kept to track pests	19	67	55	75	62	65
Field mapping of weed problems	13	*	23	23	15	22
Soil analysis to detect pests	16	37	51	43	41	43
Pheromones to monitor pests	3	49	*	47	27	34
Weather monitoring	66	56	44	56	40	53
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant				**	1	**
Scouting used to make decisions	23	61	39	53	42	47
Biological pesticides	3	*	*	30	17	21
Beneficial organisms	20	*	23	19	14	21
Physical barriers	41	80	21	40	39	36
Adjust planting methods	**	*	*	6	11	8
Alternate pesticides	76	96	61	78	72	73
Pheromones to disrupt mating	*	41	*	16	7	15

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Farms Utilizing Practice,
Fruits and Nuts, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>
Prevention Practices:						
Tillage/etc. to manage pests	83	80	50	68	69	64
Remove or plow down crop residue	12	*	9	31	35	20
Clean implements after fieldwork	51	24	30	42	25	37
Water management practices	2	*	11	30	19	20
Avoidance Practices:						
Crop varieties genetically modified to resist insects	*			**	1	**
Adjust planting/harvesting dates	*	*	*	5	4	4
Rotate crops to control pests	8	*	2	3	5	3
Crop varieties genetically modified to be pathogen/nematode resistant	*			**	4	1
Alternate planting locations	15	*	3	4	NA	5
Grow trap crop to control insects	*		**	2	NA	2
Monitoring Practices:						
Scouted for pests	81	92	47	84	68	72
Records kept to track pests	19	44	16	51	35	36
Field mapping of weed problems	9	*	**	14	4	9
Soil analysis to detect pests	10	10	16	25	16	19
Pheromones to monitor pests	4	21	**	30	16	17
Weather monitoring	59	41	14	47	22	36
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant				**	1	**
Scouting used to make decisions	17	29	9	36	22	24
Biological pesticides	3	*	**	16	10	8
Beneficial organisms	11	*	2	18	8	11
Physical barriers	34	41	8	42	26	29
Adjust planting methods	*	*	*	3	5	4
Alternate pesticides	65	68	34	62	49	53
Pheromones to disrupt mating	*	10	**	10	4	6

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Acres Receiving Practice,
Vegetables, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>
Prevention Practices:						
Tillage/etc. to manage pests	79	31	57	70	74	61
Remove or plow down crop residue	62	27	44	72	57	56
Clean implements after fieldwork	51	38	53	51	48	49
Water management practices	47	24	34	47	47	40
Avoidance Practices:						
Crop varieties genetically modified to resist insects	**	*	**	*	3	4
Adjust planting/harvesting dates	35	19	13	37	23	28
Rotate crops to control pests	86	84	62	79	78	77
Crop varieties genetically modified to be pathogen/nematode resistant			**	10	5	5
Alternate planting locations	33	31	27	34	NA	32
Grow trap crop to control insects	**	*	4	*	NA	2
Monitoring Practices:						
Scouted for pests	91	77	73	85	80	81
Records kept to track pests	58	60	30	68	54	56
Field mapping of weed problems	25	23	10	33	24	25
Soil analysis to detect pests	44	17	34	40	38	35
Pheromones to monitor pests	10	19	3	8	16	9
Weather monitoring	51	29	32	41	34	38
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant	*			**	2	**
Scouting used to make decisions	65	33	33	37	37	40
Biological pesticides	19	8	18	11	19	13
Beneficial organisms	14	**	14	15	9	12
Physical barriers	44	15	19	13	34	19
Adjust planting methods	10	18	16	16	26	16
Alternate pesticides	76	51	56	60	72	60
Pheromones to disrupt mating	*	*	*	*	2	2

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Farms Utilizing Practice,
Vegetables, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>
Prevention Practices:						
Tillage/etc. to manage pests	49	18	37	71	54	39
Remove or plow down crop residue	43	22	31	49	48	34
Clean implements after fieldwork	31	15	35	37	30	28
Water management practices	13	6	16	32	22	15
Avoidance Practices:						
Crop varieties genetically modified to resist insects	**	*	**	**	3	10
Adjust planting/harvesting dates	28	6	12	37	15	18
Rotate crops to control pests	67	83	40	57	64	62
Crop varieties genetically modified to be pathogen/nematode resistant			*	1	5	**
Alternate planting locations	21	39	12	36	NA	27
Grow trap crop to control insects	*	*	3	*	NA	5
Monitoring Practices:						
Scouted for pests	47	58	36	71	52	52
Records kept to track pests	21	17	7	39	23	19
Field mapping of weed problems	4	4	6	9	13	6
Soil analysis to detect pests	9	4	14	29	12	13
Pheromones to monitor pests	2	4	2	11	4	4
Weather monitoring	31	7	18	16	14	16
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant	*			*	2	2
Scouting used to make decisions	25	17	11	12	17	15
Biological pesticides	12	32	5	8	11	16
Beneficial organisms	1	*	3	18	4	5
Physical barriers	27	17	8	27	33	18
Adjust planting methods	19	3	8	11	17	9
Alternate pesticides	40	22	32	29	41	30
Pheromones to disrupt mating	**	**	*	*	2	2

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Acres Receiving Practice,
All Other Crops and Cropland Pasture, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>	<i>Percent of Acres</i>
Prevention Practices:						
Tillage/etc. to manage pests	33	39	46	40	45	43
Remove or plow down crop residue	23	23	38	24	31	31
Clean implements after fieldwork	33	42	44	33	41	42
Water management practices	12	7	20	14	15	15
Avoidance Practices:						
Crop varieties genetically modified to resist insects	**	**	**	**	1	**
Adjust planting/harvesting dates	3	15	12	11	12	12
Rotate crops to control pests	40	67	40	42	51	48
Crop varieties genetically modified to be pathogen/nematode resistant			2	**	1	**
Alternate planting locations	11	24	11	13	NA	15
Grow trap crop to control insects		**	**	1	NA	**
Monitoring Practices:						
Scouted for pests	38	51	38	47	43	43
Records kept to track pests	21	21	15	26	17	18
Field mapping of weed problems	9	12	8	17	10	11
Soil analysis to detect pests	9	8	13	18	12	12
Pheromones to monitor pests	*	**	1	2	2	1
Weather monitoring	20	17	17	19	14	18
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant	**	2	**	**	1	1
Scouting used to make decisions	19	21	20	18	19	20
Biological pesticides	10	4	1	4	2	2
Beneficial organisms	*	1	2	6	2	2
Physical barriers	25	18	8	11	12	12
Adjust planting methods	8	12	6	7	9	8
Alternate pesticides	25	37	25	38	34	30
Pheromones to disrupt mating		**	**	**	**	**

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

**Pest Management Practices,
Percent of Farms Utilizing Practice,
All Other Crops and Cropland Pasture, 1999**

Practice	Region				United States	
	North-east	North Central	South	West	1998	1999
	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>	<i>Percent of Farms</i>
Prevention Practices:						
Tillage/etc. to manage pests	31	26	36	33	33	33
Remove or plow down crop residue	13	12	33	14	21	24
Clean implements after fieldwork	32	20	35	21	23	30
Water management practices	14	8	7	10	9	8
Avoidance Practices:						
Crop varieties genetically modified to resist insects	*	**	**	2	1	2
Adjust planting/harvesting dates	1	8	8	8	6	7
Rotate crops to control pests	27	39	25	26	36	29
Crop varieties genetically modified to be pathogen/nematode resistant			3	1	1	2
Alternate planting locations	3	10	9	9	NA	9
Grow trap crop to control insects		**	**	1	NA	**
Monitoring Practices:						
Scouted for pests	30	30	24	34	26	27
Records kept to track pests	7	9	5	15	7	7
Field mapping of weed problems	1	4	3	9	4	4
Soil analysis to detect pests	2	3	6	10	6	5
Pheromones to monitor pests	**	**	**	3	1	**
Weather monitoring	10	7	8	12	6	8
Suppression Practices:						
Crop varieties genetically modified to be herbicide resistant	*	1	4	3	1	3
Scouting used to make decisions	8	7	6	8	7	6
Biological pesticides	13	**	2	3	2	2
Beneficial organisms	*	**	1	5	1	2
Physical barriers	24	10	9	8	10	10
Adjust planting methods	4	6	6	5	8	6
Alternate pesticides	23	16	15	21	18	16
Pheromones to disrupt mating		**	**	2	**	**

* Insufficient reports to publish data.

** Less than 1 percent.

NA Not applicable, question not asked that year.

Survey Procedures: The estimates in this report are based on the Fall Agricultural Survey conducted in December 1999. This probability survey used an area frame design with a sample of 6,930 segments or parcels of land. Each segment averages approximately one square mile in size. 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 are 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- Valid Zero 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				
2. [List all crops grown during the 1999 crop year.]	401	402	403	404	405
Crop					
3. [Enter crop code for each crop.]	441	441	441	441	441
Crop Code					

Now I have some questions about pest management practices you may have used on this operation for any crops grown during 1999. **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 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
4b.	insects (Bt., etc.)?	444	444	444	444
4c.	plant pathogens or nematodes causing plant diseases	445	445	445	445
5.	Was this crop scouted for pests (weeds, insects or disease) using a systematic method?	446	446	446	446
6.	Were electronic or written records kept to track the activity or numbers of different pests?	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
8.	Did you use field mapping of previous weed problems to assist you in making weed management decisions?	449	449	449	449
9.	Did you use soil analysis to detect the presence of soilborne pests or pathogens?	450	450	450	450
10.	Did you use beneficial organisms (insects, nematodes or fungi) to control pests?	453	453	453	453

SECTION K - PEST MANAGEMENT PRACTICES (continued)

		COLUMN NUMBER				
		401	402	403	404	405
Crop						
		If YES, enter Code=1 for each crop				
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 (Bacillus Thuringiensis), insect growth regulators, neem or other natural products to control pests?	452	452	452	452	452
14.	Did you use water management practices, such as controlled drainage or irrigation scheduling, excluding chemigation, to control pests?	458	458	458	458	458
15.	Did you remove or plow down crop residues to control pests?	456	456	456	456	456
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 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
18.	Did you adjust planting or harvesting dates to control pests?	460	460	460	460	460
19.	Did you choose planting locations to avoid cross infestation of insects or disease?	464	464	464	464	464
20.	Did you rotate crops for the purpose of controlling pests?	462	462	462	462	462
21.	Did you use weather monitoring to predict the need for pesticide application?	480	480	480	480	480
22.	Did you alternate pesticides to keep pests from becoming resistant to pesticides (use pesticides with different mechanisms of action)?	461	461	461	461	461
23.	Did you adjust row spacing, plant density or row direction to control pests?	459	459	459	459	459
24.	Did you maintain ground covers, mulches or physical barriers to reduce pest problems?	454	454	454	454	454
25.	Did you grow a trap crop to help control insects?	463	463	463	463	463
26.	[Column completion 1- Incomplete code] 3- Valid Zero	442	442	442	442	442

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Report Features

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

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