The Extent of Adoption of Pest Management Techniques or Practices

This section presents recent results regarding the extent of adoption of pest management techniques by growers of field crops and selected fruits and vegetables.

The Data

Most of ERS empirical research on pest management is based on a series of surveys carried out by the National Agricultural Statistics Service (NASS) of the USDA.[9] Data for field crops are obtained from the 1996 ARMS (Agricultural Resource Management Study) consolidated survey. This survey combines the former Cropping Practices Survey (CPS) and the Farm Costs and Returns Survey (FCRS) to link information on resource use to production technologies and financial data, and to improve data collection efficiency. The data collected include production practices, chemical input use, resource use, and costs of production, as well as production and resource data for corn, soybeans, cotton, potatoes, and wheat.[10] Corn was selected as the 1996 target crop, so additional production practices and financial data were collected for corn. Corn growers were surveyed in 16 States, soybean growers in 12 States, cotton producers in 8 States, fall potato growers in 3 States and the Red River Valley, winter wheat farmers in 11 States, spring wheat in 3 States, and durum wheat in only 1 State (USDA, 1997d). (Table 4 provides details of participating States.)

Data for fruits and vegetables were collected beginning in 1990 under the Pesticide Data Program (PDP) and the Water Quality Program, which were initiated as a response to public concern over health and environmental effects associated with chemicals used in agriculture (Vandeman et al.). Data used to report the extent of adoption of pest management practices for selected fruits and vegetables were collected in the 1993 Fruit Chemical Use Survey and its Economic Follow-On (apples, grapes, and oranges), the 1994 Vegetable Chemical Use Survey and its Economic Follow-On (tomatoes and strawberries), and the 1995 Fruit Chemical Use Survey and its Economic Follow-On (peaches) (USDA, 1994b, 1995b, 1996) (table 5).

The Extent of Adoption for Field Crop Producers

Tables 6-13 include the survey responses of field crop producers to questions regarding the adoption practices that aim at controlling one or more pest classes. They also include responses to questions about adoption practices that, while not considered pest management practices per se, are known to affect pest development and, consequently, pesticide use, such as the use of no tillage. The same information is distributed by crop and region and presented in Appendix II.

Given the detailed and technical nature of many of the questions asked in the pest management section of the ARMS survey, one should use care when comparing the results presented in this report with those of other surveys, as the answers may vary with the precise content of the question. To make clear the exact terms used in the survey, we present the questions included in the pest management section of the corn survey (Appendix IV). Soybeans, cotton, potato, and wheat growers answered a similar but somewhat smaller set of questions.

Scouting

The 1996 ARMS survey asked about scouting for three different classes of pest: weeds, insects, and diseases. Scouting for weeds ranged from 72 per-

[9]These surveys were based on probability samples drawn from NASS sampling frames. Stratified random sampling techniques were used. The surveys were carried out through on-site interviews conducted by trained and experienced enumerators.

[10]The 1996 ARMS survey was carried out between June 1996 and April 1997.

Table 4—Survey coverage for major field crops, ARMS 1996

Survey for field crops covered nearly 182 million acres in 32 States

State	Corn	Soybeans	Cotton	Fall potatoes	Winter wheat[1]	Spring wheat	Durum wheat
				Planted acreage, 1,000 acres			
Arizona	--	--	315	--	--	--	--
Arkansas	--	3550	1000	--	--	--	--
California	--	--	1000	--	--	--	--
Colorado	--	--	--	--	2200	--	--
Delaware	--	--	--	--	78	--	--
Georgia	--	--	1350	--	--	--	--
Idaho	--	--	--	410	860	--	--
Illinois	11000	9900	--	--	--	--	--
Indiana	5600	5400	--	--	--	--	--
Iowa	12700	9500	--	--	--	--	--
Kansas	2500	--	--	--	8800	--	--
Kentucky	1300	--	--	--	--	--	--
Louisiana	--	1100	890	--	--	--	--
Maine	--	--	--	78	--	--	--
Michigan	2650	--	--	--	--	--	--
Minnesota	7500	5950	--	--	--	2550	--
Mississippi	--	1800	1120	--	--	--	--
Missouri	2750	4100	--	--	--	--	--
Montana	--	--	--	--	1980	4200	--
Nebraska	8500	3050	--	--	2100	--	--
North Carolina	1000	--	--	--	--	--	--
North Dakota	--	--	--	--	--	9600	3000
Ohio	2900	4500	--	--	--	--	--
Oklahoma	--	--	--	--	4900	--	--
Oregon	--	--	--	--	850	--	--
Pennsylvania	1450	--	--	--	--	--	--
Red River Valley[2]	--	--	--	146	--	--	--
South Carolina	400	--	--	--	--	--	--
South Dakota	4000	--	--	--	1580	--	--
Tennessee	--	1200	540	--	--	--	--
Texas	2100	--	5700	--	2900	--	--
Washington	--	--	--	163	2350	--	--
Wisconsin	3900	920	--	--	--	--	--
Total	70250	50970	11915	797	28598	16350	3000
U.S. planted acreage included, percent	88	79	81	63	72	82	83

[1] Harvested acreage.

[2] Red River Valley includes the counties of Clay, Clearwater, Kittson, Mahnomen, Marshall, Norman, Pennington, Polk, Red Lake, Roseau and Wilkin in Minnesota; and Cass, Grand Forks, Pembina, Richland, Steele, Traill, and Walsh in North Dakota.

-- = States not surveyed for the given crop.

Source: USDA, 1997d.

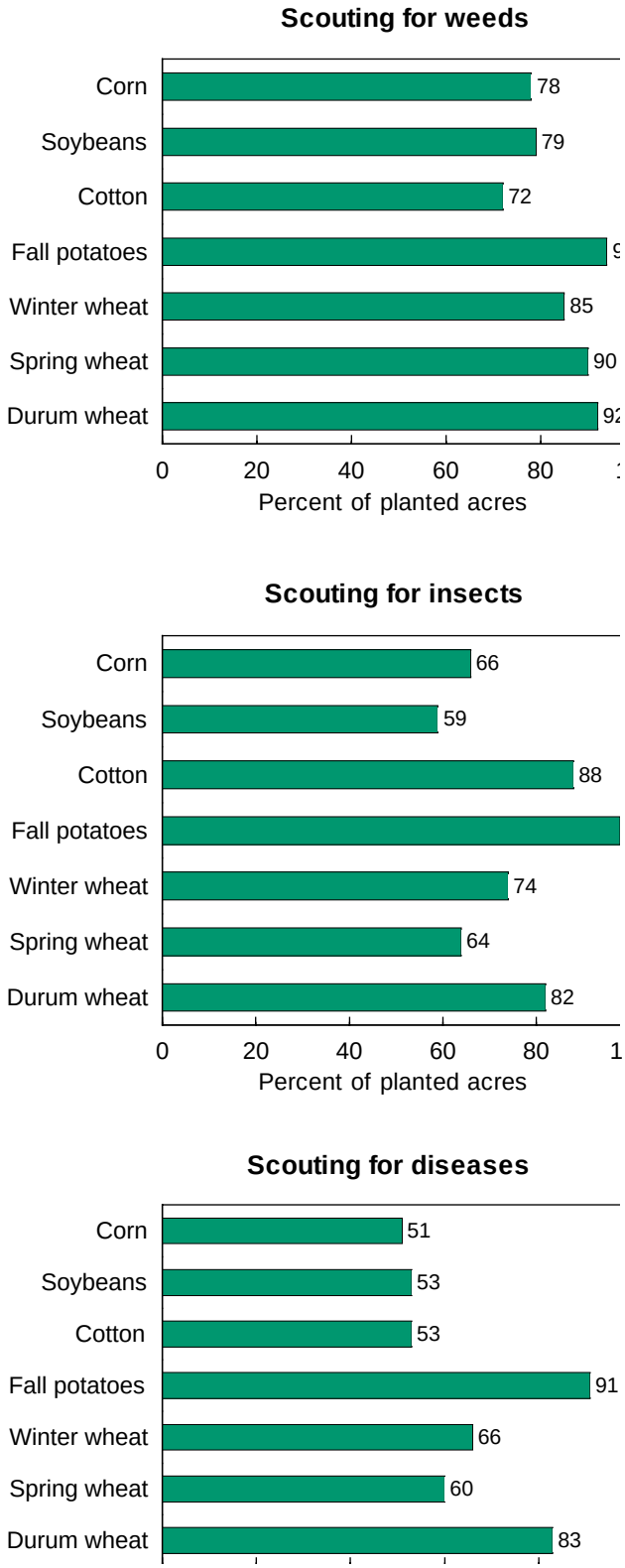
cent of the acreage for cotton to 94 percent of the acreage for fall potatoes (figure 1, table 6). Corn and soybean farmers reported scouting for weeds on 78 and 79 percent of their acreage respectively.[11] Calculating a weighted average of all major field crops, scouting for weeds reached 80 percent in 1996. The major source of scouting for weeds was the farm operator or family member on about 45 percent or more of the planted acres. However, 19 percent of the cotton acres were scouted for weeds by a crop consultant or commercial scout.

Scouting for insects ranged from 59 percent of soybean acreage to 98 percent of fall potatoes, with 66 and 88 percent of the corn and cotton acreage also scouted (figure 1, table 6). On average, scouting for insects reached 67 percent among all field crops in 1996. The primary source of scouting for insects was the farm operator or family member for all field crops except cotton, for which 51 percent of the planted acres were scouted by crop consultants or commercial scouts. Diseases were scouted on more than half of the planted acres for field crops. While the figures for scouting for insects and diseases appear to be low for some of the field crops, notably corn and soybeans, insect pests and disease are not problems for certain crops in many of the States (Appendix II). This situation is reflected in the low percentage of corn and soybean acreage treated with insecticides and the low fungicide use on corn, soybeans, and cotton (Appendix III).

The ARMS survey also incorporated scouting by pest class with pest recordkeeping, either written or electronic. This pairing of practices represents a higher level of monitoring activity than just scouting. Across all crops, a lower percentage of farmers scouted and kept records on weeds compared with those who just scouted for weeds (table 6). The

(Text continues on p. 17)

Figure 1
Scouting field crops for pests, ARMS 1996
More than 50 percent of field crops are scouted for pes



[11]The proportion of farmers using scouting reported here differs from that reported for the Fall Area Survey (USDA, 1998b). Scouting results were lower in the Fall Area Survey apparently because this survey used different wording in the scouting question, adding the phrase "using a systematic method" (USDA, 1998b, p. 30).

Table 5—Survey coverage for selected fruits and vegetables

Survey covered more than 70 percent of the acreage for the selected fruits and vegetables

State	Apples	Grapes	Peaches	Oranges	Tomatoes[1]	Strawberries
			Planted acreage			
California	33300	651300	72600	181700	36500	23300
Florida	--	--	--	489200	47900	5800
Georgia	--	--	21000	--	4000	--
Michigan	54500	11200	5500	--	2800	2100
New Jersey	--	--	10800	--	4800	500
New York	52500	32500	1600	--	2700	2600
North Carolina	10900	--	--	--	1700	2500
Oregon	8300	4600	--	--	--	6300
Pennsylvania	2200	11000	6800	--	--	--
South Carolina	--	--	23000	--	--	--
Texas	--	--	--	--	3500	--
Washington	147000	32700	2500	--	--	1400
Wisconsin	--	--	--	--	--	1300
Total	328500	743300	143800	670900	103900	46800
U.S. acreage included, percent	71	98	83	98	76	95

-- = States not surveyed for the given crop.

[1] Fresh market tomatoes.

Source: Apples, grapes, and oranges: 1993 Fruit Chemical Use Survey (USDA, 1994b); tomatoes and strawberries: 1994 Vegetable Chemical Use Survey (USDA, 1995b); peaches: 1995 Fruit Chemical Use Survey (USDA, 1996).

Table 6—Scouting and source of scouting, field crops 1996

While the activity of scouting for weeds is important for all field crops, scouting for insects is more important for cotton and fall potatoes

Item	Corn	Soybeans	Cotton	Fall potatoes	Winter wheat	Spring wheat	Durum wheat
				Percent of planted acres			
Scouting for weeds	78	79	72	94	85	90	92
Source of scouting:							
Operator, partner, family member	59	68	46	59	73	77	91
Employee	2	1	3	7	*	*	0
Chemical dealer	8	6	4	17	6	9	0
Consultant or commercial scout	8	3	19	12	5	4	1
Scouting for insects	66	59	88	98	74	64	82
Source of scouting:							
Operator/family member	49	51	24	56	62	56	81
Employee	2	1	3	7	*	*	0
Chemical dealer	7	3	10	19	5	3	0
Consultant or commercial scout	8	3	51	15	6	4	1
Scouting for diseases	51	53	53	91	66	60	83
Scouted and kept written/electronic records to track the activity of:							
Broadleaf weeds	19	19	28	26	17	23	9
Grass weeds	19	19	28	26	15	17	5
Insects	I	13	52	31	14	9	5

I See table 9 for corn insect pest management practices.

* Less than 0.5 percent. Source: NASS/ERS 1996 ARMS survey.

Figure 2

Herbicide application timing for field crops, ARMS 1996

Use of both pre- and postemergence herbicides is the most popular herbicide application timing for corn, soybeans, cotton, and fall potatoes

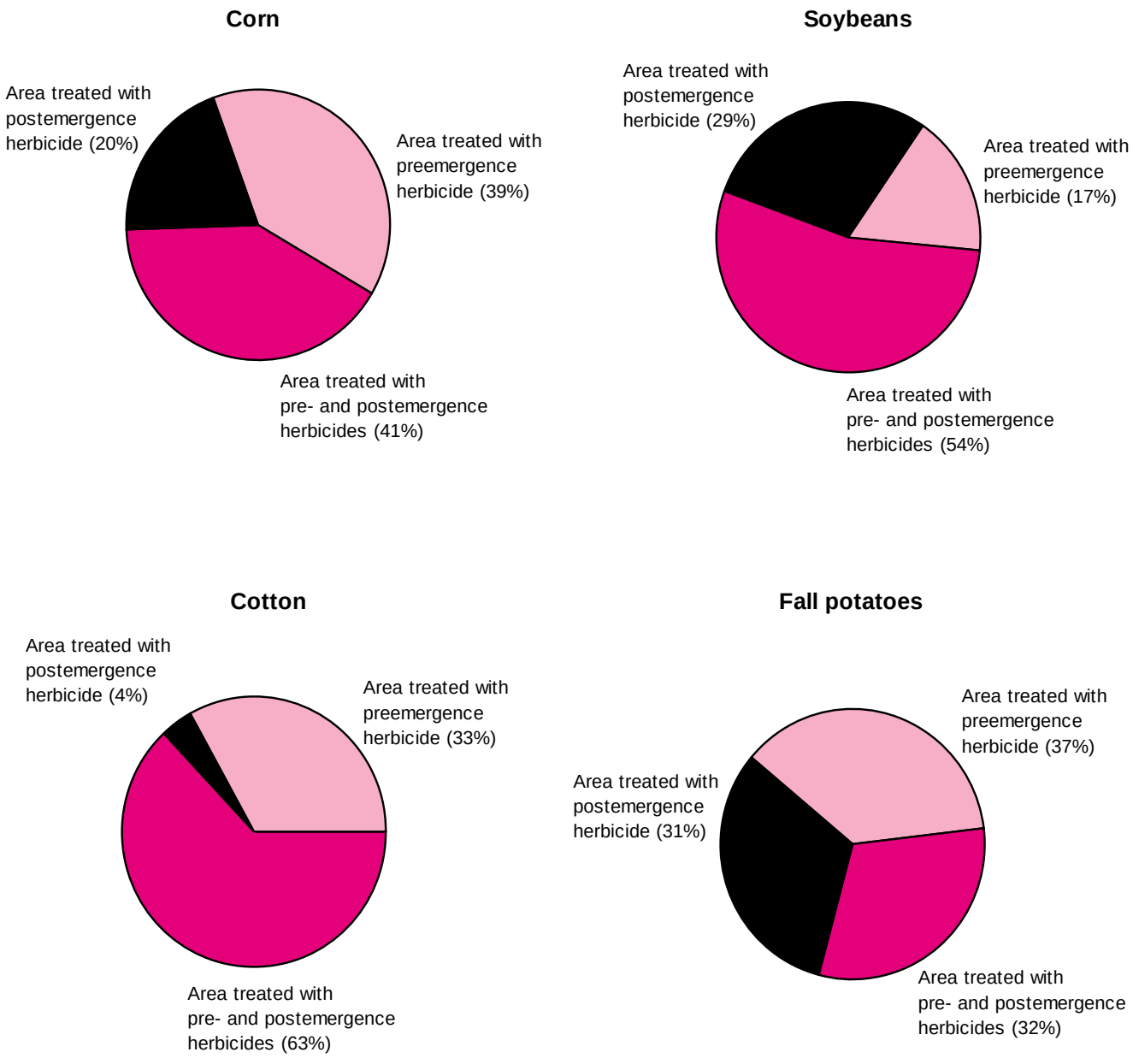


Figure 2

Herbicide application timing for field crops, ARMS 1996--Continued

Postemergence herbicide application is the most popular for wheat

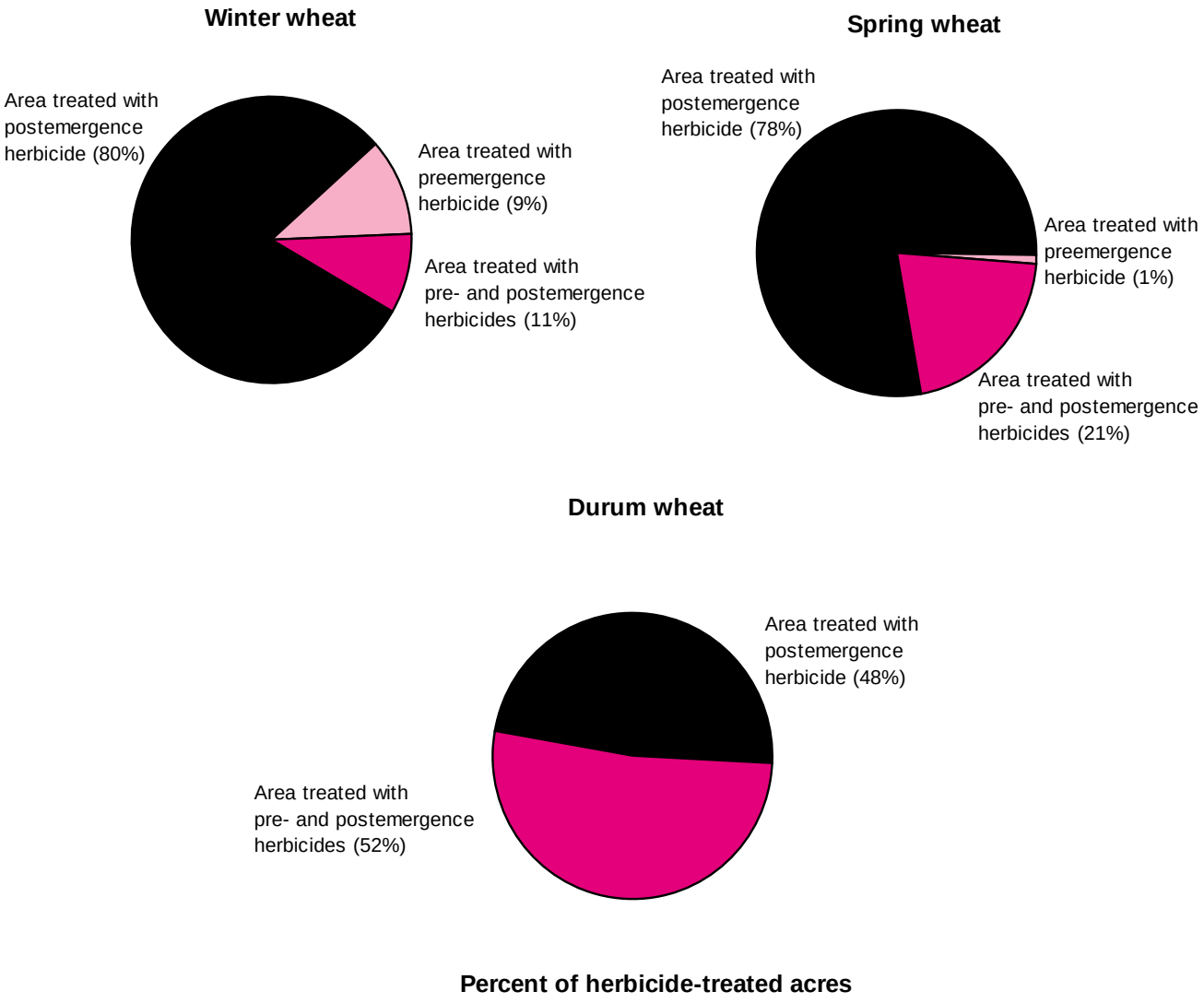


Table 7—Herbicide application timing, application decision criteria, and application methods, field crops, 1996

Among field crops, the application of preemergence herbicides versus postemergence herbicides or both is mixed. However, the majority of herbicides are applied using the broadcast method

Item	Corn	Soybeans	Cotton	Fall potatoes	Winter wheat	Spring wheat	Durum wheat
			Percent of herbicide-treated acres				
Preemergence only							
Area treated	39	17	33	37	9	1	*
Application decision criteria:							
Previous problem/routine	93	90	96	96	98	100	*
Field mapping	12	10	5	14	35	69	0
Computer decision model	1	*	*	1	0	0	0
Crop consultant recommendation	19	15	9	26	15	22	0
Postemergence only							
Area treated	20	29	4	31	80	78	48
Application decision criteria:							
Routine treatment	63	65	25	79	33	56	72
Type and density of weeds	52	64	80	43	77	63	87
Computer decision model	*	1	0	*	*	0	0
Crop consultant recommendation	24	14	6	37	21	12	9
Pre- and postemergence							
Area treated	41	54	63	32	11	21	52
Application decision criteria:							
Previous problem/routine	94	93	92	96	71	89	83
Field mapping	14	11	15	7	35	6	10
Routine treatment	64	63	60	82	71	53	72
Type and density of weeds	71	73	66	85	37	60	85
Computer decision model	1	1	*	1	0	0	0
Crop consultant recommendation	20	23	21	19	9	16	3
Application methods							
Broadcast[1]	85	88	45	46	86	84	55
In seed furrow[2]	1	*	2	20	*	2	3
In irrigation water	*	0	*	23	*	0	0
Banded[3]	9	5	38	*	1	0	0
Foliar or directed spray	6	7	15	11	14	14	42

[1] Broadcast includes ground with and without incorporation and aerial broadcast.

[2] Includes in seed furrow and chisel/injected or knifed in.

[3] Banded in or over row.

* Less than 0.5 percent.

Source: NASS/ERS 1996 ARMS survey.

same was true for scouting and recordkeeping for insects. In the case of cotton, however, growers on 52 percent of the acreage scouted and kept records. This is very close to the percentage of the cotton acreage scouted for insects by crop consultants or commercial scouts (51 percent of the planted acres).

Herbicide Application Timing, Decision Criteria, and Method of Application

As weeds are the most common pest problem for field crops (tables 1 and 2) and few alternatives to chemical treatments exist (Jordan), the 1996 ARMS survey collected detailed information on herbicide application timing, application decision criteria, and method of application. Herbicides can be applied before weeds emerge (preemergence), after weeds emerge (postemergence), or both pre- and postemergence. When only the acres that received herbicides were considered, the range of preemergence applications ran from 1 percent of spring wheat acreage to 39 percent of corn acreage. Postemergence applications of herbicides ran from 4 percent of cotton acres to 80 percent of winter wheat acres. For crops that received both pre- and postemergence applications of herbicides, the shares ranged from 11 percent for winter wheat to 63 percent for cotton (figure 2, table 7).

The survey data show that, except for wheat, most field crop acreage received preemergence herbicides. The application decision criteria used most often were based on weed problems in previous years. Other decision criteria for applying preemergence herbicides—such as field mapping, computer decision models, and recommendations from an independent crop consultant—were used less frequently, even though these techniques are considered more likely to result in lower herbicide applications. For example, the use of field mapping, a technique that pinpoints the location of weed problems in previous years and allows farmers to vary application rates accordingly, varied widely: where only preemergence herbicides were applied, the use of field mapping ranged from 5 percent of the acreage for cotton to 69 percent of the acreage for spring wheat (but only 1 percent of spring wheat herbicide-treated acres were treated with preemergence herbicides). Field mapping was also used on acres receiving both pre- and postemergence herbicides. Its use ranged from 6 percent for spring wheat acres to 35 percent for winter wheat.

When applying postemergence herbicides, farmers can treat weeds according to the species present and weed density level. Using the density of the weeds as a criterion for postemergence herbicide application has an advantage over routine treatment because it allows farmers to adjust application rates according to the size and density of the weeds. The density of weeds present was used as a decision criterion on 52 and 64 percent of the herbicide-treated acres for corn and soybeans, respectively.

Broadcast application was the most frequently used method of applying herbicides. For soybeans, 88 percent of the acres receiving herbicides received them via the broadcast method (table 7). For cotton, 45 percent of the acres receiving herbicides received them using the broadcast method, the lowest percentage of broadcast application for the surveyed crops. Banded application of herbicides, which uses less herbicide than the broadcast method, was used on far fewer acres—except for cotton—with 38 percent of the total acres receiving banded applications.

Other Pest Management Practices

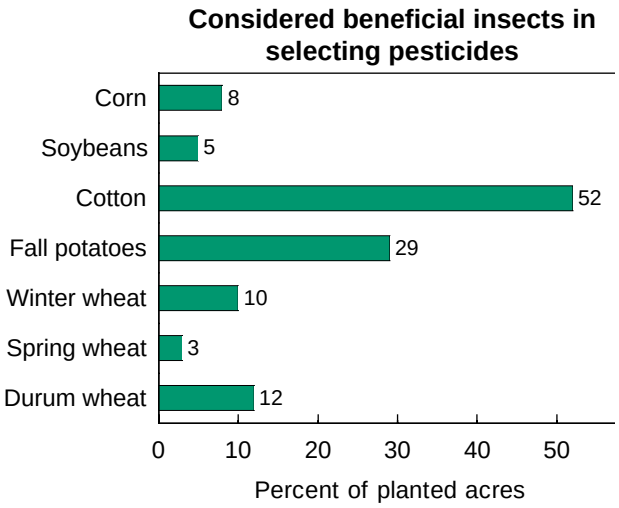
Biological techniques of pest management include natural enemy/predator insects, pheromones for control, and Bt. Across all of the surveyed field crops, the technique of considering beneficial insects when selecting pesticides was more broadly used than any of the other biological practices, particularly for cotton, with 52 percent of the planted acres, and fall potatoes, with 29 percent of the planted acres (figure 3, table 8). Cotton growers are also the major users of most other biological practices: they used pheromone lures to control pests on 7 percent of their planted acres, foliar Bt on 4 percent of their insecticide-treated acres, and Bt varieties on 15 percent of the planted acres. However, soybean farmers were the largest users of herbicide-

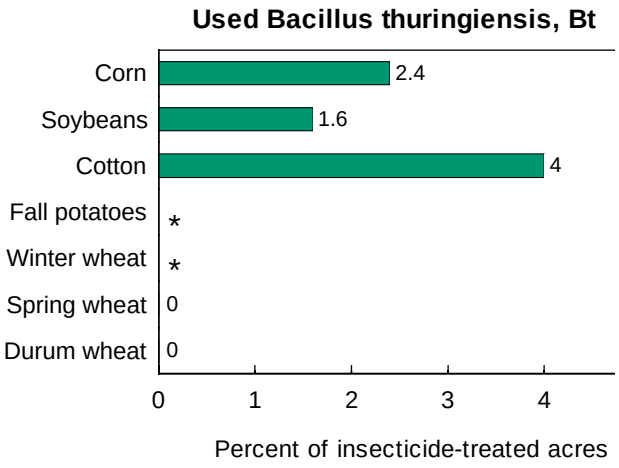
(Text continues on p. 24)

Figure 3

Biological pest management practice for field crops, ARMS 1996

Considering beneficial insects when selecting pesticides is the most widely used biological pest management practice





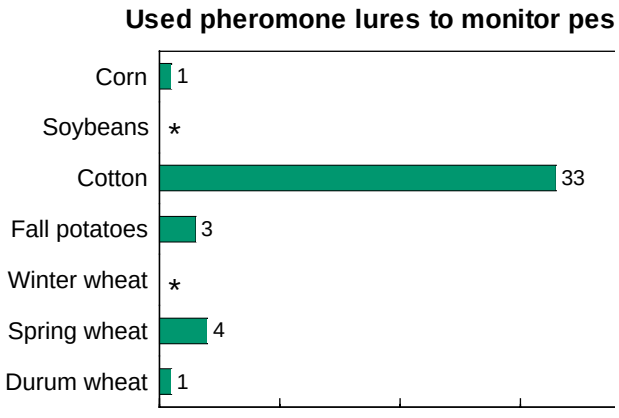
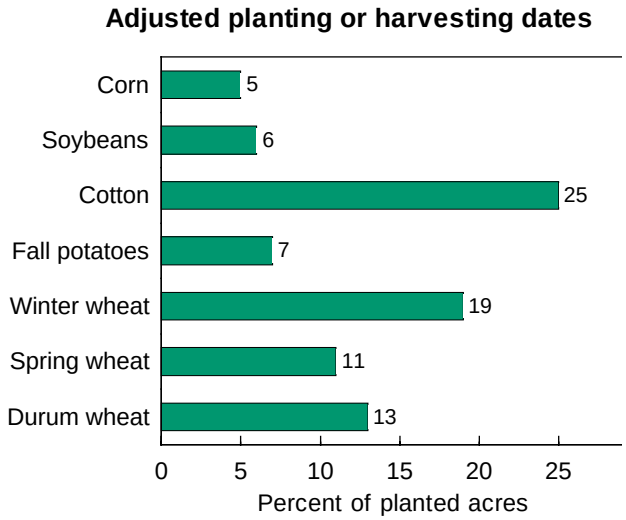
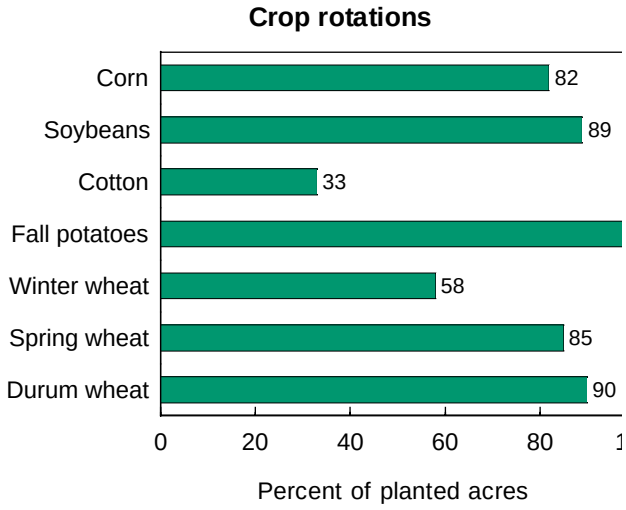


Figure 4

Cultural pest management practices, field crops, ARMS 1996

Crop rotations are used on more than a third of the planted acreage as a cultural pest management practice





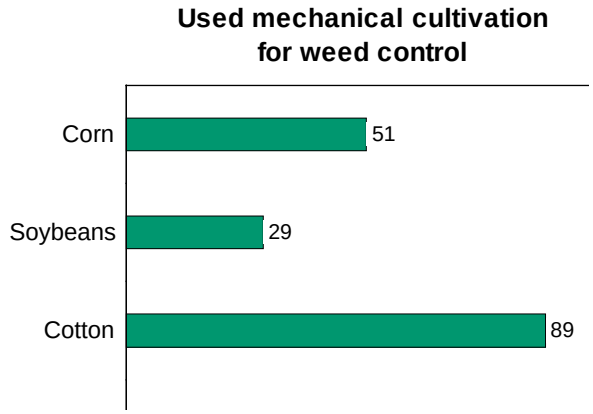


Table 8—Pest management practices, field crops, 1996

Cultural techniques are the leading pest management practice for field crops

Item	Corn	Soybeans	Cotton	Fall potatoes	Winter wheat	Spring wheat	Durum wheat
				Percent of planted acres			
Biological techniques							
Considered beneficial insects in selecting pesticides	8	5	52	29	10	4	12
Purchased and released beneficial insects	*	*	*	0	*	*	0
Used pheromone lures to control pests	na	*	7	2	*	1	0
Used Bacillus thuringiensis (Bt)[2]	2.4	1.6	4.1	*	*	0	0
Cultural techniques							
Adjusted planting or harvesting dates[3]	5	6	25	7	19	11	13
Used mechanical cultivation for weed control	51	29	89	86	na	na	na
Used a no till system	19	33	na	na	3	4	7
Crop rotations[4]							
Continuous[5]	18	11	67	2	42[11]	14	10
Rotation with other row crops[6]	54[8]	63[9]	15	2	2	2	0
Other[7]	28	26	18	96[10]	56[12]	83[13]	90[14]
Pesticide efficiency							
Alternated pesticides to control pest resistance	31	28	41	69	13	38	32
Monitoring							
Used pheromone lures to monitor pests[1]	1	*	33	3	*	4	1
Used soil biological testing to detect pests such as insects, diseases, or nematodes	2	3	9	46	2	0	0

[1] For corn, pheromone lures were used to monitor black cutworm.

[2] Percent of insecticide-treated acres for Bt.

[3] Adjust planting dates only for corn.

[4] Crop rotations include three years 1994, 1995, and 1996. Column crop heading indicates the crop planted in 1996.

[5] The same crop was planted in 1994, 1995, and 1996.

[6] A crop sequence, excluding continuous same crop, where only row crops (corn, soybeans, sorghum, cotton, and peanuts) were planted for three consecutive years.

[7] Other excludes continuous same crop and rotation with row crops and includes fallow or idle.

[8] 49 percent of corn-planted acres were in rotation with soybeans.

[9] 56 percent of soybean-planted acres were in rotation with corn.

[10] 26 percent of potato-planted acres were fallow in 1994 and 1995, and 70 percent were in rotation with other crops or fallow in 1994 or 1995.

[11] Continuous same crop for winter wheat were for two years 1995 and 1996, for winter wheat planted in fall 1994 and winter wheat planted in fall 1995.

[12] 40 percent of winter-wheat-planted acres were fallow in fall 1994 and had winter wheat planted in fall 1995.

[13] 23 percent of spring-wheat-planted acres were fallow in 1994 and had spring wheat in 1995, and 60 percent were in rotation with other crops or fallow in 1994 or 1995.

[14] 24 percent of durum-wheat-planted acres were fallow in 1994 and had durum wheat in 1995, and 66 percent were in rotation with other crops or fallow in 1994 or 1995.

na= not available or not applicable. * Less than 0.5 percent.

Source: NASS/ERS 1996 ARMS survey.

Table 9—Pest-resistant varieties used, field crops 1996

Bt cotton is the leading resistant variety used

Item	Corn	Soybeans	Cotton	Fall potatoes
	Percent of planted acres			
Herbicide-resistant hybrid/variety	3	7	id	na
Bt variety for insect resistance	1	na	15	1
Gray-leaf-spot-resistant variety	2	na	na	na
Potato-scab-resistant variety	na	na	na	1

na= not available or not applicable.
id= insufficient data for a statistically reliable estimate.
Source: NASS/ERS 1996 ARMS survey.

Table 10—Cultural management practices used by corn producers, 1996

Rotating crops is the leading cultural management practice used to control both weed and insect pests in corn

Item	To control		
	Weeds	Insects	Both
	Percent of planted acres		
Adjusted row spacing or plant density	5	*	2
Adjusted planting dates	1	1	2
Alternated pesticides to control pest resistance	15	2	12
Reduced pests from spreading by:			
Tilling/mowing field edges	13	2	17
Using water management practices	1	*	3
Cleaning harvest/tillage implements	12	1	11
Crop rotations[1]			
Continuous[2]	na	na	18
Rotation with other row crops[3]	na	na	54[5]
Other[4]	na	na	28

[1] Crop rotations include three years, 1994, 1995, and 1996, with corn planted in 1996.

[2] Corn planted in 1994, 1995, and 1996.

[3] A crop sequence, excluding continuous same crop, where only row crops (corn, soybeans, sorghum, cotton, and peanuts) were planted for three consecutive years.

[4] Other also includes fallow or idle.

[5] 49 percent were rotation with soybeans.

na= not available.
* Less than 0.5 percent.
Source: NASS/ERS 1996 ARMS survey.

Table 11—Monitoring and other pest management practices, corn, 1996

Scouting and keeping written records on insects are the most popular monitoring practices used for corn

Item	Corn
	Percent of planted acres
Monitoring	
Used soil biological testing to detect insects, diseases or nematodes	2
Scouted and kept written/electronic records on black cutworms	11
Scouted and kept written/electronic records on corn rootworms	14
Scouted and kept written/electronic records on European corn borers	18
Scouted and kept written/electronic records on spider mites	8
Scouted for adult corn rootworm beetles during 1995 season	14
Scouted for adult corn rootworm beetles during 1996 season	7
Used pheromone lures to monitor black cutworm	1
Used pre-plant grain traps to monitor wireworms	*
Submitted diseased plants to a lab for diagnosis	1
Other practices	
Considered beneficial insects in selecting and using pesticides	8
Removed weeds to prevent insect egg laying	10
Used seed treatments for seedling blight	12
Routinely used soil insecticide at planting to control corn rootworm	24
Weed resistance	
Weeds resistant to the triazine family of herbicides	11
Weeds resistant to ALS (sulphonylurea or imidazolinone families)	5
Biological practices	*Percent of insecticide-treated acres*
Purchased and released beneficial insects	*
Used Bacillus thuringiensis (Bt)	2.4

* Less than 0.5 percent.
Source: NASS/ERS 1996 ARMS survey.

Table 12 —Insecticide decision criteria for field crops, 1996

More than 50 percent of insecticide application decisions are based on the farmer's own determination of pest infestation levels

Insecticide decision criteria based on	Soybeans	Cotton	Fall potatoes	Winter wheat	Spring wheat	Durum wheat
			Percent of planted acres			
Scouting data and university or Extension guidelines for infestation thresholds	11	46	24	12	23	10
Standard practice or history of insect problems	30	22	55	20	29	23
Local information (other farmers, radio-TV, etc.) that the pest was or was not present	12	7	20	9	11	15
Operator's own determination of the pest infestation level	54	55	83	69	65	69

Source: NASS/ERS 1996 ARMS survey.

Table 13—Primary source of information for pest management, field crops, 1996

Farm supply or chemical dealers are the primary sources of information on pest management for major field crops except cotton

Item	Corn	Soybeans	Cotton	Fall potatoes	Winter wheat	Spring wheat	Durum wheat
				Percent of planted acres			
Extension advisors, commercial scouting service, and crop consultants	21	14	62	40	24	21	23
Farm supply/chemical dealer	69	74	22	54	42	52	58
Other growers and producer associations, newsletters or trade magazines	5	3	5	4	13	7	6
Media or other information sources (World Wide Web, DTN, etc.)	2	3	4	1	5	7	11
None	3	6	7	1	16	13	2

Source: NASS/ERS 1996 ARMS survey.

Table 14—Scouting for pests and source of scouting, selected fruits and vegetables, 1993-95

More than 70 percent of selected fruit and vegetable acres are scouted for pests

Item	Apples	Grapes	Peaches	Oranges	Tomatoes[1]	Strawberries
				Percent of planted acres		
Scouting for pests	84	68	71	90	92	98
Source of scouting						
Operator or employee	33	35	19	49	38	59
Chemical dealer	30	22	37	24	14	11
Professional service	16	10	15	12	38	26
Other	5	1	1	5	3	2
Decision strategies for pesticide applications						
Used pest thresholds	56	41	na	68	70	74
Routine or preventive schedule	41	25	na	16	25	19
Other or did not apply	3	34	na	11	5	7

na = not available.

[1] Fresh market tomatoes.

Source: Padgitt et al.

Table 15—Pest management practices, selected fruits and vegetables, 1993-95

Apple and tomato growers led the use of pest management practices among fruit and vegetable growers

Item	Apples	Grapes	Peaches	Oranges	Tomatoes[1]	Strawberries
			Percent of planted acres			
Biological						
Considered beneficial insects in selecting pesticides	80	31	41	61	64	59
Purchased/released beneficial insects	1	5	1	8	3	35
Used pheromone lures to monitor pests	69	12	32	16	15	5
Used pheromone lures to control pests	15	5	21	3	20	*
Planted resistant varieties or rootstock	10	12	44	13	37	37
Other						
Adjusted planting dates	na	na	na	na	11	15
Alternated pesticides to reduce pest resistance	75	36	67	61	73	72
Used soil and plant tissue testing	11	20	8	26	31	19

na= not available.
[1] Fresh market tomatoes.
* Less than 0.5 percent.
Source: Padgitt et al.

Table 16—Most often used source of information for pest control, selected fruits and vegetables, 1993-95

Extension advisors/professional scouters and chemical dealers are the two largest sources of pest control information used for selected fruits and vegetables

Item	Apples	Grapes	Peaches	Oranges	Tomatoes[1]	Strawberries
			Percent of planted acres			
Extension advisors and professional scouting service	42	38	55	37	57	52
Chemical dealer	49	43	34	54	37	41
Media or demonstration events	2	2	4	5	1	2
Other information sources	6	17	7	4	5	5

[1] Fresh market tomatoes.
Source: Padgitt et al.

tolerant varieties (table 9).[12]

Such cultural techniques as mechanical cultivation, adjusting planting/harvesting dates, no till, and crop rotations were used fairly extensively on all the field crops. For example, crop rotations were used on at least 82 percent of the planted acres for field crops except for cotton and winter wheat, where only 33 and 58 percent of the planted acres were in rotation, respectively (figure 4, table 8). Cotton growers used mechanical cultivation and adjusted planting or harvesting dates on 89 and 25 percent of the acres, respectively (table 8).

Controlling pest resistance by alternating pesticides, a technique used to increase pesticide efficiency, was used to a moderate degree by all growers and most extensively by fall potato and cotton growers, covering 69 and 41 percent of their planted acreage, respectively. This practice was used on 28 percent of the soybean-planted acres and 31 percent of corn-planted acres (table 8).

The survey also found 46 percent of the cotton-planted acres and 24 percent of the fall-potato-planted acres, both crops with major insect problems, received insecticide applications based on scouted data compared with university or extension infestation thresholds (table 12). On the other hand, soybeans and durum wheat, which have much less insect problems, used thresholds on only 10 percent of their acreages (table 12).

The farm supply or chemical dealer was the most important source of pest management information for most field crops, ranging from 42 percent for winter wheat acres to 74 percent for soybean acres (table 13). Cotton growers, however, used extension and crop consultants more often (62 percent) than farm supply or chemical dealers (22 percent). Crop consultants and extension advisors were also an important source of pest management information for potato producers.

The Extent of Adoption for Fruit and Vegetable Growers

Among growers of fruits and vegetables, scouting for pests ranged from 71 percent of the peach-planted acreage to 98 percent for strawberries, with an overall average of about 80 percent (table 14).[13] Farm operators or employees did most of the scouting, except for peaches and tomatoes. Chemical dealers were the main source of scouting for peaches, covering 37 percent of the planted acres. Professional scouting services reached 38 percent for tomatoes, matching the percentage of scouting carried out by the operator or employees. Pest thresholds were also extensively used, from 41 percent of the acres for grapes to 74 percent for strawberries.

Pheromones for both control and monitoring were more often used on fruit and vegetable acreage than on field crop acreages (table 15). Resistant varieties were also used at relatively high rates for tomatoes (37 percent), strawberries (37 percent), and peaches (44 percent). The most common pest management practice among growers of fruits and vegetables was alternating pesticides to reduce pest resistance. Its use ranged from 36 percent for grape acreage to 75 percent for apples. Growers considered beneficial insects in selecting pesticides on 80 percent of the apple-planted acres. Finally, the single most often used source of information for pest control was the chemical dealer for most selected fruits and vegetables; however, the combined use of professional scouting services and extension advisors often exceeded that of chemical dealers (table 16).

[12]The survey also included responses to a series of additional questions specific to corn (tables 8 and 9).

[13]In contrast to the ARMS survey, surveys for the selected fruits and vegetables considered all pests as a single group.