

AGRICULTURAL RESOURCE MANAGEMENT SURVEY

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U.S. Department of Agriculture
 National Operations Division
 9700 Page Avenue, Suite 400
 St. Louis, MO 63132-1547
 Phone: 1-888-424-7828
 Fax: 855-415-3687
 Email: nass@usda.gov

COTTON PRODUCTION PRACTICES REPORT FOR 2021

VERSION 79	ID _____	TRACT 01	SUBTRACT _____	C-TYPE 106
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CONTACT RECORD

DATE	TIME	NOTES

INTRODUCTION:

[Introduce yourself, and ask for the operator. Rephrase in your own words.]

The information you provide will be used for statistical purposes only. Your response will be kept confidential and any person who willfully discloses ANY identifiable information about you or your operation is subject to a jail term, a fine, or both. This survey is conducted in accordance with the Confidential Information Protection and Statistical Efficiency Act of 2018, Title III of Pub. L. No. 115-435, codified in 44 U.S.C. Ch. 35 and other applicable Federal laws. For more information on how we protect your information please visit: <https://www.nass.usda.gov/confidentiality>. Response is voluntary.

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[We encourage you to refer to your farm records during the interview.]

BEGINNING TIME H H M M
 [MILITARY] 0004

SCREENING BOX
0006

Check if verified POID _____

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

check if
cell phone

Phone: (____) _____

Check if verified POID _____

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

check if
cell phone

Phone: (____) _____

Check if verified POID _____

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

check if
cell phone

Phone: (____) _____

Check if verified POID _____

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

check if
cell phone

Phone: (____) _____

Total Planted Acres

1. How many total acres of cotton did this operation plant for the 2021 crop year?.....

0050

[If no acres were planted, review Screening Survey Information Form, make notes, then go to back page.]

I will follow a simple procedure to make a random selection from the cotton fields planted for the 2021 crop.

Total Number Of Fields Planted

2. What is the total number of cotton fields that were planted on this operation? [If only one field, enter "1" and go to item 4.].....

0020

3. [Now, I need to identify a cotton field to be used for this survey.] The cotton field pre-selected for this interview is the:

- 1 Northern most field
- 2 Southern most field
- 3 Eastern most field
- 4 Western most field
- 5 Northeastern most field
- 6 Southeastern most field
- 7 Northwestern most field
- 8 Southwestern most field

Field description:

APPLY "RANDOM NUMBER" LABEL HERE

Office Use
OY Field Substituted

0022

4. The field selected is _____ (field name/number/description).
During this interview, the cotton questions will be about this selected cotton field.
[Be sure the operator can identify the selected field.]

Acres

5. How many acres of cotton were planted in this field for the 2021 crop?.....

1301

C NUTRIENT or FERTILIZER APPLICATIONS--SELECTED FIELD

C

1. Were commercial nutrients or fertilizers applied to the selected field for the 2021 cotton crop? INCLUDE those from operators, landlords, and contractors.....	Yes=1 No=3	Code 0202	Office Use Edit Table 0200
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[If commercial nutrient or fertilizer applied, continue, else go to Section D.]

2. How many commercial nutrient or fertilizer applications were made to the selected field for the 2021 crop? INCLUDE applications made by airplanes and custom applicators.....	Number 0203
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3. [Now I need to record information for each application.]

CHECKLIST		Office Use Lines in Table	Table 001	0299
INCLUDE	EXCLUDE			
<input type="checkbox"/> Custom applied nutrients or fertilizers	<input type="checkbox"/> Micronutrients			
<input type="checkbox"/> Nutrients or fertilizers applied in the fall of 2020 and those applied earlier if the selected field was fallow in 2020.	<input type="checkbox"/> Unprocessed manure			
<input type="checkbox"/> Commercially prepared manure or compost	<input type="checkbox"/> Nutrients or fertilizers applied to previous crops in the selected field			
	<input type="checkbox"/> Lime and gypsum/landplaster			

Application Codes for Column 6	
1 Broadcast, ground without incorporation	5 In irrigation water
2 Broadcast, ground with incorporation	6 Chisel/injected or knifed in
3 Broadcast, by aircraft	7 Banded in or over row
4 In seed furrow	8 Foliar or directed spray

LINE	2 Materials Used [Enter percentage analysis or actual pounds of plant nutrients applied per acre.] [Show Common Nutrients or Fertilizers in Respondent Booklet]				3 What quantity was applied per acre? [Leave this column blank if actual nutrients were reported]	4 [Enter material code] 1 Pounds 12 Gallons 13 Quarts 19 Pounds of actual nutrients	5 When was this applied? 1 In the fall before seeding 2 In the spring before seeding 3 At seeding 4 After seeding	6 How was this applied? [Refer to code list above]	7 How many acres in the selected field were treated in this application? Acres
	N Nitrogen	P ₂ O ₅ Phosphate	K ₂ O Potash	S Sulfur					
	31	32	33	34					
01	31	32	33	34	36	37	38	39	40
02	31	32	33	34	36	37	38	39	40
03	31	32	33	34	36	37	38	39	40
04	31	32	33	34	36	37	38	39	40
05	31	32	33	34	36	37	38	39	40
06	31	32	33	34	36	37	38	39	40
07	31	32	33	34	36	37	38	39	40
08	31	32	33	34	36	37	38	39	40
09	31	32	33	34	36	37	38	39	40
10	31	32	33	34	36	37	38	39	40

Now I have some questions about all the biocontrols or pesticides used on the selected field for the 2021 cotton crop, including both custom applications and applications made by this operation.

		Code	Office Use Edit Table
1. Were any herbicides, insecticides, fungicides or other biocontrols or pesticides used on this cotton field for the 2021 crop?.....	Yes=1 No=3	0302	0300

[Probe for applications made in the fall of 2020 and those made earlier if the selected field was fallow.]

If no biocontrols or pesticides applied, go to Section E.

INCLUDE defoliant, fungicides, herbicides, insecticides, and other pesticides INCLUDE biological and botanical pesticides.	EXCLUDE adjuvants, nutrients or fertilizers reported earlier and seed treatments.	Office Use Line in Table	Table 001	0399
-------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------	-----------------------------	--------------	------

Chemical Product Name	L I N E	2	3	4	5	6 OR 7		8
		What products were applied to the selected field? [Show product codes from Respondent Booklet.]	Was this product bought in liquid or dry form? [Enter L or D]	If this was part of a tank mix, enter line number of first product in mix.	When was this applied? 1 Before planting 3 At planting 4 After planting 5 Defoliation prior to harvest	How much was applied per acre per application?	What was the total amount applied per application in the selected field?	[Enter unit code] 1 Pounds 12 Gallons 13 Quarts 14 Pints 15 Liquid Ounces 28 Dry Ounces 30 Grams
	01	61	62	63	64	65	73	74
	02	61	62	63	64	65	73	74
	03	61	62	63	64	65	73	74
	04	61	62	63	64	65	73	74
	05	61	62	63	64	65	73	74
	06	61	62	63	64	65	73	74
	07	61	62	63	64	65	73	74
	08	61	62	63	64	65	73	74
	09	61	62	63	64	65	73	74
	10	61	62	63	64	65	73	74
	11	61	62	63	64	65	73	74
	12	61	62	63	64	65	73	74
	13	61	62	63	64	65	73	74
	14	61	62	63	64	65	73	74

2. For biocontrols or pesticides not listed in Respondent Booklet, specify--

Line	Pesticide Type (Herbicide, Insecticide, Fungicide, etc.)	EPA No. or Trade Name and Formulation	Form Purchased (Liquid or Dry)	Where Purchased (Ask only if EPA No. cannot be reported)
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Applications Codes for Column 9

- | | |
|-------------------------------------------|----------------------------------|
| 1 Broadcast, ground without incorporation | 6 Chiseled/injected or knifed in |
| 2 Broadcast, ground with incorporation | 7 Banded in or over row |
| 3 Broadcast, by aircraft | 8 Foliar or directed spray |
| 4 In seed furrow | 9 Spot treatments |
| 5 In irrigation water | |

L I N E	9	10	11	12
	How was this product applied? [Enter code from above.]	How many acres in the selected field were treated with this product? Acres	How many times was it applied? Number	Were these applications made by-- 1 Operator, partner, or family member? 2 Custom applicator? 3 Employee/Other?
01	76	77 .__	79	80
02	76	77 .__	79	80
03	76	77 .__	79	80
04	76	77 .__	79	80
05	76	77 .__	79	80
06	76	77 .__	79	80
07	76	77 .__	79	80
08	76	77 .__	79	80
09	76	77 .__	79	80
10	76	77 .__	79	80
11	76	77 .__	79	80
12	76	77 .__	79	80
13	76	77 .__	79	80
14	76	77 .__	79	80

E

PEST MANAGEMENT PRACTICES - SELECTED FIELD

E

[Now I have some questions about your pest management decisions and practices used on the selected field for the 2021 cotton crop. By pests, we mean weeds, insects, and diseases.]

[Enumerator Action: Were pesticide applications reported in Section D?]

Yes - Continue No - Go to item 4

- | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------|
| 1. Were weather data used to assist in determining either the need or when to make pesticide applications?..... | Yes=1
No=3 | Code
0800 |
| 2. Were any biological pesticides such as Bt (<i>Bacillus thuringiensis</i>), insect growth regulators, neem or other natural/biological based products sprayed or applied to manage pests in the selected field?..... | Yes=1
No=3 | Code
0801 |
| 3. Were pesticides with different mechanisms of action rotated or tank mixed for the primary purpose of keeping pests from becoming resistant to pesticides?..... | Yes=1
No=3 | 0802 |
| 4. Were records kept for the selected field to track the activity or numbers of weeds, insects, or diseases?..... | Yes=1
No=3 | 0823 |
| 5. Did you use published information on infestation thresholds to determine when to take measures to manage pests in the selected field?..... | Yes=1
No=3 | 1824 |
| 6. In 2021, how was the selected field primarily scouted for insects, weeds, diseases, and/or beneficial organisms?..... | | Code
0808 |
| 1 By deliberately going to the field specifically for scouting activities [Enter code 1 and go to item 7.]
2 By conducting general observations while performing routine tasks [Enter code 2 and go to item 8.]
3 The selected field was not scouted. [Enter code 3 and go to item 10.] | | |
| 7. Was an established scouting process such as systematic sampling, recording counts, etc. used or were insect traps used in the selected field?..... | Yes=1
No=3 | 0809 |
| 8. Was scouting for pests done in the selected field due to-- | | |
| a. a pest advisory warning?..... | Yes=1
No=3 | 0810 |
| b. a pest development model?..... | Yes=1
No=3 | 0811 |

1	2	3	4
9. Was this cotton field scouted for--	Yes=1 No=3	[If column 2 = 1, ask--] What was the infestation level for [column 1]? 1 Higher than normal 2 Normal 3 Lower than normal Code	[If column 2 = 1, ask--] Who did the majority of the scouting for [column 1]? 1 Operator, partner or family member 2 An employee 3 Farm supply or chemical dealer 4 Independent crop consultant or commercial scout Code
a. weeds?.....	0812	0813	0814
b. insects or mites?.....	0815	0816	0817
c. diseases?.....	0818	0819	0820

	Code
10. Did you use field mapping of previous weed problems to assist you in making weed management decisions?.....	Yes=1 0825 No=3
11. Did you do any of the following other types of pest management for the specific purpose of managing or reducing the spread of pests in the selected field?	Code
a. Use the services of a diagnostic laboratory for pest identification or soil plant tissue pest analysis for the selected field?.....	Yes=1 0841 No=3
b. Plow down crop residue using conventional tillage?.....	Yes=1 0842 No=3
c. Remove/burn down crop residue?.....	Yes=1 0843 No=3
d. Rotate crops in the selected field during the past three years?.....	Yes=1 0844 No=3
e. Maintain ground covers, mulches, or other physical barriers?.....	Yes=1 0845 No=3
f. Choose crop variety because of specific resistance to a certain pest?.....	Yes=1 0846 No=3
g. Use no-till or minimum till?.....	Yes=1 0847 No=3
h. Plan planting locations to avoid cross infestation of pests?.....	Yes=1 0848 No=3
i. Adjust planting or harvesting dates?.....	Yes=1 0849 No=3
j. Chop, spray, mow, plow, or burn field edges, lanes, ditches, roadways, or fence lines?.....	Yes=1 0850 No=3
k. Clean equipment and field implements after completing field work to reduce the spread of pests?.....	Yes=1 0851 No=3
l. Adjust row spacing, plant density, or row directions?.....	Yes=1 0852 No=3
m. Have the seed treated for insect or disease control after you purchased the seed for the selected field?.....	Yes=1 0854 No=3
n. Maintain a beneficial insect or vertebrate habitat?.....	Yes=1 0855 No=3
o. Maintain buffer strips or border rows to isolate cotton from non-organic crops or land, or did you take a buffer harvest?.....	Yes=1 0856 No=3
p. Use a flamer to kill weeds?.....	Yes=1 0857 No=3
q. Plant earlier or later to avoid weeds?.....	Yes=1 0865 No=3
12. Were any beneficial organisms, such as insects, nematodes, or fungi, applied or released in the selected field to manage pests?.....	Code Yes=1 0853 No=3
13. Were floral lures, attractants, repellants, pheromone traps, or other biological pest controls used on the selected field?.....	Yes=1 0858 No=3
14. Was a trap crop, excluding fallow, grown to help manage insects in the selected field?.....	Yes=1 0863 No=3
15. Was the selected field left fallow in 2020 to help manage insects on the selected field?.....	Yes=1 0864 No=3
16. Were water management practices such as irrigation scheduling, controlled drainage, or treatment of retention water used on the selected field to manage pests or toxin-producing fungi and bacteria?.....	Code Yes=1 0861 No=3

Completion Code for Pest Management Data	
1 Incomplete/Refusal	0500

1	2	3	4
1. In 2021, do you believe this cotton field was infested with--	1 Yes 3 No 99 Don't know	[If column 2 = 1, ask--] Was the infestation/population level higher than the economic threshold for treatment? 1 Much lower (between 0.5 and 0 times the threshold) 2 Lower (between 1 and 0.5 times the threshold) 3 Higher (between 1 and 1.5 times the threshold) 4 Much higher (over 1.5 times the threshold) 99 Don't know Code	[If column 2 = 1, ask--] How many pesticide applications did you make to treat this pest? Number of Applications
Insects or Mites?			
a. Plant Bugs?.....	2260	2261	2262
b. Stink Bugs?.....	2263	2264	2265
c. Aphids?.....	2266	2267	2268
d. Whiteflies?.....	2269	2270	2271
e. Cotton Bollworms/Corn Earworms?.....	2272	2273	2274
f. Thrips?.....	2275	2276	2277

Yes = 1
No = 3

2. Did you plant genetically modified (GM) or genetically engineered (GE) seeds during the 2021 crop year?.....

2300

[If item 2 = 1, continue, otherwise, go to item 4.]

3. Did the cotton planted on the selected field have any of the following genetically modified (GM) or genetically engineered (GE) traits in 2021?

Yes = 1
No = 3

a. Insect resistance (Bt).....

2302

b. Herbicide Tolerance (HT) to glyphosate (e.g. Roundup Ready®).....

2306

c. Herbicide Tolerance (HT) to 2,4-D (e.g. Enlist®).....

2308

d. Herbicide Tolerance (HT) to dicamba (e.g. Extend®).....

2310

e. Herbicide Tolerance (HT) to glufosinate (e.g. Liberty Link®).....

2312

Code

4. Have herbicide tolerant seeds been planted on the selected field any time since 2015?..... Yes=1 No=3

2021

[If item 4 = 1 continue, otherwise go to item 5.]

If column 2 = 1, ask questions in columns 3 - 6

1 For herbicide tolerant seeds that are tolerant of--	2 Have you noticed a decline in the effectiveness of [Column 1] in controlling weeds in the selected field? Yes=1 No=3	3 What was the first year you noticed a decline in the effectiveness of [Column 1] in controlling weeds in the selected field? Year	After noticing the decline in the effectiveness of [Column 1] in controlling weeds on the selected field, did you --		
			4 Increase the use of [Column 1]? Yes=1 No=3	5 Change tillage practices? Yes=1 No=3	6 Started using an alternate herbicide? Yes=1 No=3
a. Glyphosate (e.g. Roundup®).....	2022	2023	2024	2025	2026
b. Glufosinate (e.g. Liberty®).....	2027	2028	2029	2030	2031
c. Dicamba (e.g. Xtend®, Xtendimax®, Engenia®).....	2032	2033	2034	2035	2036
d. 2,4-D (e.g. Enlist®).....	2037	2038	2039	2040	2041

Unit Codes

- 1 Pounds
- 2 CWT
- 3 Tons
- 4 Bushels

Units per Acre

5. If the selected field were not treated with herbicides, tillage, or cultivation, how much yield loss per acre would you expect from weeds?.....

0869	0870
------	------

6. Did you observe "stem or leaf curving, leaf blisters, cupping, browning" or other symptoms associated with dicamba or 2,4-D drift/volatility on the selected field in 2021?..... Yes=1 No=3

Code

1974

[If item 6 =1, continue, otherwise go to item 7.]

a. In your opinion, were these symptoms due to volatility (when pesticides evaporate and move off-target without damaging the plants they pass above) or drift (when pesticides move off-target near ground level, damaging every plant they contact)?.... Volatility=1 Drift=2 Don't know=99

Code

1980

b. Did you report the injury to state or local officials?..... Yes=1 No=3

1981

[If item 6b = 1, continue, otherwise go to item 7.]

c. Was the injury investigated by state or local officials?..... Yes=1 No=3

Code

1982

7. As far as you are aware, did farmers in neighboring fields observe "stem or leaf curving, leaf blisters, cupping, browning" or other symptoms associated with dicamba or 2,4-D drift/volatility in 2021?..... Yes=1 No=3

Code

1976

8. For the selected field, were any of the following pesticide spraying practices or activities used in 2021? Pesticides include insecticides, fungicides, herbicides and plant growth regulators (PGR).

[Enumerator Note: Column 4: Choose items 1 - 5 and/or 6 for a write-in response.]

Pesticide Spraying Practice or Activity	<p style="text-align: center;">1</p> <p style="text-align: center;">Was this used in 2021?</p> <p>1 Yes 3 No 99 Don't know</p> <p style="text-align: center;">Code</p>	<p style="text-align: center;">2</p> <p>[Complete column for every "Yes" in Column 1.] Was it specifically used to keep pesticide application(s) on target (e.g. reduce pesticide drift)?</p> <p>1 Yes 3 No 99 Don't know</p> <p style="text-align: center;">Code</p>	<p style="text-align: center;">3</p> <p>[Complete column for every "No" in Column 1.] Why was this practice or activity not used? List all that apply.</p> <p>1 Cost of labor/training 2 Cost of associated equipment/products 3 Incompatible with current production practices (e.g. topography, equipment limitations) 4 Lack of time/too busy 5 Unfamiliar with activity or practice 6 Other, specify:</p> <p style="text-align: center;">Code</p>
a. Altering spray time(s) depending on weather conditions (e.g. wind speed, wind direction, temperature)	5170	5171	5173 _____ 5174 Specify: _____
b. Drift reducing adjuvant(s)	5175	5176	5178 _____ 5179 Specify: _____
c. Drift reducing nozzle(s)	5180	5181	5183 _____ 5184 Specify: _____
d. Increased gallons per acre (GPA) spray solution	5185	5186	5188 _____ 5189 Specify: _____
e. Calibrate sprayer before the season	5190	5191	5193 _____ 5194 Specify: _____
f. Calibrate sprayer during the season	5195	5196	5198 _____ 5199 Specify: _____
g. Manually altering sprayer settings to improve the spray precision (e.g. altering spray pressure, ground speed, and/or boom height)	5200	5201	5203 _____ 5204 Specify: _____

(Continued) Pesticide Spraying Practice or Activity	1 Was this used in 2021? 1 Yes 3 No 99 Don't Know Code	2 [Complete column for every "Yes" in Column 1.] Was it specifically used to keep pesticide application(s) on target (e.g. reduce pesticide drift)? 1 Yes 3 No 99 Don't Know Code	3 [Complete column for every "No" in Column 1.] Why was this practice or activity not used? List all that apply. 1 Cost of labor/training 2 Cost of associated equipment/products 3 Incompatible with current production practices (e.g. topography, equipment limitations) 4 Lack of time/too busy 5 Unfamiliar with activity or practice 6 Other, specify: Code
h. Adopting the use of technologies to improve the spray precision (e.g. on/off nozzle spray technology, GPS boom section controls, automatic boom height stabilization, and/or infrared technology)	5205	5206	5208 _____ 5209 Specify: _____
i. Shielded sprayers	5210	5211	5213 _____ 5214 Specify: _____
j. Pulse Width Modulation (PWM) (e.g. Aim Command, Raven's Hawk Eye, John Deere's Exact Apply)	5215	5216	5218 _____ 5219 Specify: _____
k. Other - Specify: 5225 _____	5220	5221	5223 _____ 5224 Specify: _____

9. Post-emergence herbicide applications are made to control weeds that occur after emergence of the cotton. For the selected field, did this operation make any post-emergence herbicide applications using aerial sprayers and/or ground boom sprayers in 2021?

5241 Yes, made post-emergence herbicide applications using ground boom sprayers - Complete table below

5240 Yes, made post-emergence herbicide applications using aerial sprayers - Go to item 10

5242 No, did not make post-emergence herbicide applications - Go to item 10

	Post-emergence Herbicide Applications Using Ground Boom Sprayers		Code
a. What was the typical spray volume (gallons per acre-GPA) for post-emergence herbicide applications?	1 <5 GPA 2 5 to <7.5 GPA 3 7.5 to <10 GPA 4 10 to <15 GPA	5 15 to <20 GPA 6 20 to <25 GPA 7 25 GPA or greater 99 Don't know	5243
b. What is the typical operating pressure for post-emergence herbicide application (PSI)?	1 <10 PSI 2 10 to <20 PSI 3 20 to <30 PSI 4 30 to <40 PSI 5 40 to <50 PSI 6 50 to <60 PSI	7 60 to <70 PSI 8 70 to <80 PSI 9 80 to <90 PSI 10 90 to <100 PSI 11 100 PSI or greater 99 Don't know	5244
c. What nozzles were typically used most often for any post-emergence herbicide applications? (Select one)	1 Hollow Cone 2 Full Cone 3 Disc/Core Nozzle 4 Flat (e.g., flat fan)	5 Air-inclusion (AI), Air-induction, Venturi 6 Other: specify: 5246 _____ 99 Don't know	5245
d. At what ground speed was this ground boom sprayer(s) typically driven during post-emergence herbicide applications?	1 <5 MPH 2 5 to <10 MPH 3 10 to <15 MPH	4 15 to <20 MPH 5 20 MPH or greater 99 Don't know	5247
e. At what boom height above ground or crop canopy did this operation typically spray during post-emergence herbicide applications?	1 <12 inches 2 12 to <24 inches 3 24 to <36 inches	4 36 inches or greater 99 Don't know	5248
f. What is the target droplet size spectrum for post-emergence herbicide applications?	1 Less than 106 microns - extremely fine or very fine 2 106-235 microns - fine 3 236-340 microns - medium 4 341-403 microns - coarse	5 404-502 microns - very coarse 6 503-665 microns - extremely coarse 7 Greater than 665 microns - ultra coarse 99 Don't know	5249

10. Post-emergence insecticide and/or fungicide applications are made to control pests that occur after emergence of the cotton. For the selected field, did this operation make any post-emergence insecticide and/or fungicide applications using aerial sprayers and/or ground boom sprayers in 2021?

5251 Yes, made post-emergence insecticide/fungicide applications using ground boom sprayers - Complete table below

5250 Yes, made post-emergence insecticide/fungicide applications using aerial sprayers - Go to item 11

5252 No, did not make post-emergence insecticide/fungicide applications - Go to item 11

	Post-emergence Insecticide/Fungicide Applications Using Ground Boom Sprayers		Code
a. What was the typical spray volume (gallons per acre-GPA) for post-emergence insecticide/fungicide applications?	1 <5 GPA 2 5 to <7.5 GPA 3 7.5 to <10 GPA 4 10 to <15 GPA	5 15 to <20 GPA 6 20 to <25 GPA 7 25 GPA or greater 99 Don't know	5253
b. What is the typical operating pressure for post-emergence insecticide/fungicide application (PSI)?	1 <10 PSI 2 10 to <20 PSI 3 20 to <30 PSI 4 30 to <40 PSI 5 40 to <50 PSI 6 50 to <60 PSI	7 60 to <70 PSI 8 70 to <80 PSI 9 80 to <90 PSI 10 90 to <100 PSI 11 100 PSI or greater 99 Don't know	5254
c. What nozzles were typically used most often for any post-emergence insecticide/fungicide applications? (Select one)	1 Hollow Cone 2 Full Cone 3 Disc/Core Nozzle 4 Flat (e.g., flat fan)	5 Air-inclusion (AI), Air-induction, Venturi 6 Other: specify: 5256 _____ 99 Don't know	5255
d. At what ground speed was this ground boom sprayer(s) typically driven during post-emergence insecticide/fungicide applications?	1 <5 MPH 2 5 to <10 MPH 3 10 to <15 MPH	4 15 to <20 MPH 5 20 MPH or greater 99 Don't know	5257
e. At what boom height above ground or crop canopy did this operation typically spray during post-emergence insecticide/fungicide applications?	1 <12 inches 2 12 to <24 inches 3 24 to <36 inches	4 36 inches or greater 99 Don't know	5258
f. What is the target droplet size spectrum for post-emergence insecticide/fungicide applications?	1 Less than 106 microns - extremely fine or very fine 2 106-235 microns - fine 3 236-340 microns - medium 4 341-403 microns - coarse	5 404-502 microns - very coarse 6 503-665 microns - extremely coarse 7 Greater than 665 microns - ultra coarse 99 Don't know	5259

11. For the selected field, which of the following spraying practices resulted in a sprayer re-calibration in 2021? Check all that apply.

5261 Computer calibration alert system

5262 Change in product being applied

5263 Observed change in spray pattern (e.g., from worn nozzles)

5264 Scheduled calibration (e.g., daily, monthly, annually)

5265 When moving to a different block or crop

5266 Other, specify: ⁵²⁶⁸ _____

5267 Don't know

12. For the selected field, when did this operation clean the ground boom sprayer tank system in 2021?
Check all that apply.

- 5271 Before the season
- 5272 After the season
- 5273 Depended on the product(s)
- 5274 Regularly scheduled cleaning
- 5275 Other, specify: ⁵²⁷⁷ _____
- 5276 Never

[Enumerator Note: If response to item 12 = Never (IC 5276), go to item 13, otherwise continue to item 12a and 12b.

a. For each time that the ground boom sprayer was cleaned, how often was a tank cleaner used?.....

1 Always (100%)
2 Often (51% or more)
3 Sometimes (50% or less)
4 Never (0%)
99 Don't know

Code
5279

b. Did this operation use separate spray rigs for herbicide applications?

1 Yes 3 No 99 Don't know.....

Code
5280

13. For the selected field, what material were a majority of the nozzles made of that were used across all pesticide applications made in 2021? Select one.

- 5281 1 Plastic, such as Polypropylene (i.e. Poly or PP) or other types
- 2 Aluminum, brass, or other soft metal(s)
- 3 Stainless steel including hardened stainless steel
- 4 Other, specify: ⁵²⁸² _____
- 5 Don't know

14. For the selected field, what were the most common reasons for replacing the nozzles on the sprayers in 2021? Check all that apply.

- 5291 Regularly scheduled calendar-based replacement (e.g. annually, twice annually, monthly, etc.)
- 5292 Regularly scheduled replacement based on operating time (e.g. sprayer operating hours)
- 5293 Sporadic replacement based on area covered or general intuition (e.g. it feels like the right time to change nozzles)
- 5294 Calibration problems (e.g. too high or too low a flow rate)
- 5295 Observed nozzle damage (e.g. change in spray pattern or leaks)
- 5296 Availability of new nozzle technologies
- 5297 Expert and/or consultant recommendations (e.g. Cooperative Extension, crop consultants, etc.)
- 5298 Other, specify: ⁵²⁹⁰ _____
- 5299 Don't know

15. For the selected field, on what proportion did this operation use hedgerows or other wind-breaking structures that are at least one and a half times the height of the crop canopy for drift reduction in 2021?.....

1 0%
2 1% - 25%
3 26% - 50%
4 51% - 75%
5 76% - 100%
99 Don't know

Code
5300

16. How often were the following sources of information used to inform pest management decisions in 2021?

Sources of Information	How often was this source of information used? 1 Always (100%) 2 Often (51% or more) 3 Sometimes (50% or less) 4 Never (0%) 99 Don't know Code
a. Pesticide product labels.....	5301
b. University and/or Agricultural Cooperative Extension resources/recommendations.....	5303
c. Non-university literature, such as trade magazines, catalogs, newspapers, etc.....	5305
d. Grower/trade group.....	5307
e. Pesticide sales representatives and/or farm supply distributors.....	5309
f. Crop consultants paid for by the operation.....	5311
g. Other grower(s).....	5313
h. Non-university decision tools.....	5315
i. Weather forecasting tools.....	5317
j. Other, Specify: ⁵⁵³⁶	5320

17. [If 16b = 1, 2, or 3, ask--] Which of the following types of services offered by the University and/or Agricultural Cooperative Extension were most often used as sources of pest management decisions in 2021?

University and/or Agricultural Cooperative Extension Services	How often was this source of information used? 1 Always (100%) 2 Often (51% or more) 3 Sometimes (50% or less) 4 Never (0%) 99 Don't know Code
a. Formal presentations (e.g. annual meetings, educational trainings).....	5322
b. Field days/demonstration workshops.....	5323
c. Farm visits and/or one-on-one consultation.....	5324
d. Email lists.....	5325
e. Newsletters.....	5326
f. Crop and/or Pest Protection Handbook.....	5327
g. Other publications (e.g. fact sheets).....	5328
h. Decision tools.....	5329
i. Other, Specify: ⁵³³⁰	5331

18. For the selected field, how often were the following practices used during the season to manage herbicide, fungicide, and insecticide resistance in 2021?

Practice to Manage Resistance for Herbicide, Fungicide, and Insecticide	Only complete if operation uses herbicides How often was each practice used on this operation to manage herbicide resistance? 1 Always (100%) 2 Often (51% or more) 3 Sometimes (50% or less) 4 Never (0%) 99 Don't know Code	Only complete if operation uses fungicides How often was each practice used on this operation to manage fungicide resistance? 1 Always (100%) 2 Often (51% or more) 3 Sometimes (50% or less) 4 Never (0%) 99 Don't know Code	Only complete if operation uses insecticides How often was each practice used on this operation to manage insecticide resistance? 1 Always (100%) 2 Often (51% or more) 3 Sometimes (50% or less) 4 Never (0%) 99 Don't know Code
a. Field mapping weeds and/or keeping records of field history and pesticide use to assist pesticide decisions.....	5332	5333	5334
b. Field Management/Sanitation Practices.....			
i. For weed control (e.g. crop rotation, tillage, planting cover crops, managing field borders, preventing field-to-field and within field movement of weed seed).....	5335		
ii. For disease control (e.g. removing or incorporating field residue to reduce potential disease infestations, managing field borders).....		5336	
iii. For insect control (e.g. removing or incorporating field residue to reduce potential insect infestations, managing field borders).....			5337
c. Planting insect-resistant (e.g. aphids) and/or disease-resistant varieties of cotton.....		5338	5339
d. Pre-harvest and/or post-harvest control of weeds and/or disease to reduce the return of weed seeds and/or seed-borne diseases.....	5340	5341	
e. Use of pest diagnostic tools (e.g. Integrated Pest Management (IPM) treatment thresholds; predictive weather models (e.g. degree day models); pest forecasting systems, and/or assistance from diagnostic networks).....		5342	5343
f. Pesticide Mode of Action (MOA) rotation...	5344	5345	5346
g. Pesticide Mode of Action (MOA) combination (e.g. tank mix or pre-mix product).....	5347	5348	5349

19. How often were the following Best Management Practice(s) (BMPs) used by this operation during the season in 2021?

Best Management Practices	<p style="text-align: center;">1</p> <p style="text-align: center;">How often was this practice used?</p> <p>1 Always (100%) 2 Often (51% or more) 3 Sometimes (50% or less) 4 Never (0%) 99 Don't know</p> <p style="text-align: center;">Code</p>	<p style="text-align: center;">2</p> <p style="text-align: center;">[Only answer if column 1 = 1, 2, or 3] Was this practice specifically used to prevent exposure to bees and/or other pollinators?</p> <p>1 Always (100%) 2 Often (51% or more) 3 Sometimes (50% or less) 4 Never (0%) 99 Don't know</p> <p style="text-align: center;">Code</p>
a. Avoid applications after the crop has started blooming	5520	5521
b. Maintain buffer between known beehive locations.....	5524	5525
c. Select pesticides that have the lowest residual toxicity to bees.....	5526	5527
d. Use alternative application methods of an active ingredient to prevent bee exposure (e.g., non-foliar applications when bees are foraging).....	5528	5529
e. Avoid applications when dew is forecast.....	5530	5531
f. Manage blooming plants in the field before applying pesticides that are acutely toxic to bees (e.g., mowing).....	5532	5533
g. Make application(s) at nighttime or no more than two hours prior to sunset.....	5534	5535
h. Other, Specify: ⁵⁵³⁶ _____	5537	5538

20. In an effort to reduce off-target impacts to plants, pollinators, and/or beneficial insects, did this operation communicate with or consult any of the following sources in 2021? Check all that apply.

- 5351 Neighboring crop producers
- 5352 Nearby beekeepers
- 5353 A local expert, such as an Agricultural Cooperative Extension agent
- 5354 State managed pollinator protection plans, or MP3s - MP3s are state-developed efforts that intend to reduce pesticide exposure through timely communication and coordination among beekeepers, growers, pesticide applicators, and landowners.
- 5355 FieldWatch® - FieldWatch® is a voluntary communication tool that enables crop producers, beekeepers, and pesticide applicators to work together to protect crops and apiaries through the use of mapping programs.
- 5356 Other communication tool(s), Specify: ⁵³⁵⁸ _____
- 5357 Other, Specify: ⁵³⁵⁹ _____

Code

21. Did this operation participate in programs or activities that may have provided habitat to pollinators in 2021?.....

Yes=1
No=3

5540

[If item 21 = 1 continue, otherwise go to item 22.]

	1	2	3
Programs and Practices	Was this practice or program used in 2021?	[Only answer if column 1 = "Yes"] Was this practice specifically used to provide habitat or forage to pollinators?	[Complete column for every "No" in Column 1] Why was this practice or activity not used? Check all that apply
	1 Yes 3 No 99 Don't Know Code	1 Always (100%) 2 Often (51% or more) 3 Sometimes (50% or less) 4 Never (0%) 99 Don't know Code	1 Cost 2 Program incentive payment too low 3 Incompatible with current production practices (e.g. topography, equipment limitations) 4 Program not available in my location 5 Lack of time/too busy 6 Unfamiliar with activity or practice 7 Lack of technical support 8 Lack of interest 9 Other Code
a. Plant pollinator habitat or forage.....	5541	5542	5543
b. Plant cover crops.....	5544	5545	5546
c. Leave marginal land uncultivated and unmanaged.....	5547	5548	5549
d. Add hedgerows, windbreaks, or buffer strips along the field border.....	5550	5551	5552
e. Add hedgerows, windbreaks, or buffer strips within the field.....	5553	5554	5555
f. Participate in the Environmental Quality Incentives Program (EQIP).....	5556	5557	5558
g. Participate in the Conservation Stewardship Program (CSP).....	5559	5560	5561
h. Participate in the Conservation Reserve Program (CRP).....	5562	5563	5564
i. Other, specify ^{xxxx} _____	5566	5567	5568

22. For this operation, describe your interactions with honey producers/beekeepers in 2021? Check all that apply.

- 5570 I am aware of beekeepers utilizing my fields for forage or operating near my fields.
- 5571 I communicate with beekeepers utilizing my fields for forage or operating near my fields.
- 5572 I allow beekeepers to keep hives on or near my fields.
- 5573 I assist beekeepers in finding an isolated location for their hives.
- 5574 I do not mind if beekeepers utilize my fields for forage or operate near my fields.
- 5575 I passively discourage beekeepers from using my fields for forage by posting notices or verbal communication.
- 5576 I actively discourage beekeepers from using my fields for forage.
- 5577 I do not have interactions with beekeepers.
- 5578 Don't know.

23. Are the spraying practices for other fields in this operation similar to the spraying practices for this selected field?

- 5360 Yes
- 3 No - Please explain the difference.⁵³⁶⁶ _____
- 99 Don't know

CONCLUSION

1. To receive the complete results of this survey on the release date, go to nass.usda.gov/results
 To have a brief summary emailed to you at a later date, please enter your email address.

1095

[Enumerator Note: Thank the respondent, then review this questionnaire.]

H H M M

2. Ending time [Military].....

0005
_ _ _ _

RECORD USE

3. [Did respondent use farm/ranch records to report--]

- a. [fertilizer data?].....
- b. [pesticide data?].....

	Code
Yes=1	0011
No=3	
Yes=1	0012
No=3	

SUPPLEMENTS USED

4. [Record the total number of each type of questionnaire supplement used to complete this interview.....

	Number
Fertilizer Supplements	0041
Pesticide Supplements	0042

Operation Email: (if different from above)

Operation Phone:

9937	9936	check if cell phone <input type="checkbox"/>
	() - _____	

Respondent Name:

Respondent Phone (if different from above)

9912	9911	check if cell phone <input type="checkbox"/>	9910	MM	DD	YY
	() - _____		Date: _ _ _ _			

This completes the survey. Thank you for your help.

OFFICE USE									
R. Unit	Ptr 1 Str	Ptr 2 Str	Ptr 3 Str	Ptr 4 Str	OPS	SSO 1	Optional Use		
9921	9922	9923	9927	9928	923	9907	9906	9908	9916
Response		Respondent		Mode		Enum.	POID		
1-Comp 2-R 3-Inac 4-Office Hold 5-R - Est 6-Inac - Est 7-Off Hold - Est	9901	1-Op/Mgr 2-Sp 3-Acct/Bkpr 4-Partner 9-Other	9902	1-PASI (Mail) 2-PATI (tel) 3-PAPI (Face-to-Face) 4-CATI 5-Web 6-E-mail 7-Fax 8-CAPI 19-Other	9903	9998	9989		
						Eval.	ADJ	Change	
						9900	922	9985	