

# 2019 FRUIT CHEMICAL USE SURVEY

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ENTERPRISE

<b>VERSION</b> 01	<b>POID</b> _____	<b>SUBTRACT</b> _____
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**CONTACT RECORD**

DATE	TIME	NOTES

**INTRODUCTION:**

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

We are collecting information on chemical use and pest management practices and need your help to make the information as accurate as possible. The information you provide will be used for statistical purposes only. Your responses 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 provisions of Title V, Subtitle A, Public Law 107-347 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.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid OMB control number. The valid OMB control number is 0535-0218. The time required to complete this information collection is estimated to average 60 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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

H H M M
004
_____

BEGINNING TIME [MILITARY].....

Name, address, and partners verified and updated if necessary.

1. During 2019, were any crops, including new plantings, livestock or poultry on the total acres operated? EXCLUDE crops produced by a tenant if target operator is landlord only.
 
 Yes - [Go to item 1, page 2]     No - [Continue]
2. During 2019, did this operation sell any agricultural products or receive government agricultural payments? EXCLUDE crops produced by a tenant if target operator is landlord only.
 
 Yes - [Go to item 1, page 2]     No - [Continue]
3. During 2019, were any crops stored on the total acres operated? EXCLUDE crops produced by a tenant if target operator is landlord only.
 
 Yes - [Go to item 1, page 2]     No - [Continue]
4. During 2019, did this operation have any fruit acres which were operated by a management firm?
 
 Yes - [Go to item 1, page 2]     No - [Go to page 4]

## SCREENING

1. Did this operation have any of the target crops during the 2019 crop year? [See page 3 for target crops.]

Yes - Continue

No - Write notes explaining the situation then go to "Conclusion" on back page.

2. Are the day-to-day decisions for this operation (name on label) made by -- [Check one]

one individual? [Go to Section A]

a hired manager? [Go to Section A]

partners? [Continue]

3. How many individuals are involved in the day-to-day decisions of this operation? [Enter the number of partners, including the partner named on the label. Identify the other persons in this partnership below, then go to Section A. Partners jointly operate land and share in decision making. Do not include landlords and tenants as partners.....]

Number

--

Partners: POID _____	Partners: POID _____
PARTNER NAME	PARTNER NAME
ADDRESS	ADDRESS
CITY                      STATE      ZIP                      PHONE NUMBER	CITY                      STATE      ZIP                      PHONE NUMBER
Partners: POID _____	POID _____
PARTNER NAME	PARTNER NAME
ADDRESS	ADDRESS
CITY                      STATE      ZIP                      PHONE NUMBER	CITY                      STATE      ZIP                      PHONE NUMBER

**TARGET CROPS & CODES**

---

FLORIDA

320 Grapefruit  
335 Oranges, All  
748 Strawberries  
349 Tangerines/Tangelos

NEW YORK

301 Apples  
314 Cherries, Tart

SOUTH CAROLINA

340 Peaches

TEXAS

320 Grapefruit

GEORGIA

309 Blueberries  
340 Peaches

NORTH CAROLINA

309 Blueberries

WASHINGTON

301 Apples  
309 Blueberries  
312 Cherries, Sweet  
314 Cherries, Tart  
322 Grapes, Juice  
624 Grapes, Wine  
520 Pears  
345 Raspberries

OREGON

301 Apples  
309 Blueberries  
312 Cherries, Sweet  
520 Pears

MICHIGAN

301 Apples  
309 Blueberries  
314 Cherries, Tart  
340 Peaches

PENNSYLVANIA

301 Apples  
340 Peaches

NEW JERSEY

309 Blueberries  
340 Peaches

### CHANGE IN OPERATOR STATUS

[Enumerator Note: Skip this section if there is no change in operation name or operator.]

Code

1. Has there been a change in operation name or operator?.....

Yes=1  
No=3

023

[If item 1 = 1, complete name and address information below for new operator and continue.  
If item 1 = 3, go to Enumerator Note below.]

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Operation Name \_\_\_\_\_

Operator Name \_\_\_\_\_

Address \_\_\_\_\_  
\_\_\_\_\_

Phone (\_\_\_\_\_) \_\_\_\_\_

[Enumerator Note: If the operation on the face page was in business part of the 2019 crop year, complete this questionnaire for the part of the year during which the operation did business, unless the operation has been taken over by a new operator. If the operator has changed midyear, please conduct this interview start to finish with the new operator after reading "Valid Substitution" rules in section 4 of the Interviewer's Manual.]

2. Has the operation printed on this questionnaire been combined or merged with any other farming operations?

Yes - [Go to "Conclusion"]

No - [Continue]

A

## LAND OPERATED

A

## Acres Operated

1. How many acres does this operation--

a. own?.....

+

Acres
901
.____

b. rent or lease from others or use rent free? EXCLUDE land used on an animal unit month (AUM) basis.....

+

902
.____

c. rent to others?.....

-

905
.____

2. Then the total acres operated are: [item 1a + 1b - 1c].....

=

900
.____

a. Does this include the farmstead, all cropland, woodland, pastureland, wasteland, and government program land?

 Yes - [Continue] No - [Make corrections, then continue.]

The remaining questions in this survey refer to these [item 2] acres.

3. Of the total acres operated, how many acres are considered cropland? INCLUDE land in hay, summer fallow, cropland idle, cropland used for pasture and cropland in government programs.....

802
.____

4. Of the total acres operated, how many acres are in fruit? INCLUDE bearing and non-bearing acreage in trees, vineyards and bushes.....

803
.____

1. What target fruit crops were on these [Section A, item 4] acres during the 2019 crop year? EXCLUDE new plantings and other plantings which are not yet bearing.

Table 001	
Office Use Lines in Table	
Line 99	199

L I N E	1	2	3	4	5
	Crop	Crop Code	How many bearing acres of [crop] did this operation have? Acres	Were any commercial fertilizers applied to this crop? Yes = 1 No = 3	Were any herbicides, insecticides, fungicides, etc. applied to this crop? Yes = 1 No = 3
01			11 ▪__	12	13
02			11 ▪__	12	13
03			11 ▪__	12	13
04			11 ▪__	12	13
05			11 ▪__	12	13
06			11 ▪__	12	13
07			11 ▪__	12	13
08			11 ▪__	12	13
09			11 ▪__	12	13
10			11 ▪__	12	13
11			11 ▪__	12	13
12			11 ▪__	12	13
13			11 ▪__	12	13
14			11 ▪__	12	13
15			11 ▪__	12	13

- INCLUDE**
- Target Crops Only
  - All commercial bearing acreage equal to or greater than one tenth of an acre.
  - All bearing acreage of target crops for roadside stands, farmer's markets or U-pick sales.
  - Bearing acreage not harvested due to weather, economic or other reasons.
  - Crops planted in the fall of 2018 if they were part of the 2019 crop.
- EXCLUDE**
- All crops grown in another state.
  - Non-commercial orchard and vineyard acreage (home garden).
  - Non-target fruit.
  - New plantings and other plantings which are not yet bearing.
  - All target crops grown by institutional, experimental, research and university farms (abnormal farms).
  - Abandoned orchards and vineyards.

Notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

FERTILIZER APPLICATIONS

Enumerator Note--

If column 4 of the table in Section B is Yes for any crops, continue with item 1.  
 If column 4 of the table in Section B is No for all crops, go to Section D, page 9.

1. I need to record complete information on all commercial fertilizers applied to the bearing acres of target fruit grown during the 2019 crop year. INCLUDE all applications regardless of how they were applied such as irrigation water, foliar applications, etc. Record amount of an analysis of fertilizers applied or pounds of actual plant nutrients applied. Complete the table below and any necessary supplemental fertilizer tables. EXCLUDE micronutrients, lime, and gypsum.

Office Use

200
-----

Office Use Lines in Table	Table 001	299
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LINE	1	2	3	4	5	6	7	8	9	10
	Crop	Crop Code	NITROGEN	PHOSPHATE	POTASH	SULFUR	How much was applied per acre per application? [Leave this column blank if actual nutrients were reported.]	Unit Codes 1 Pounds 12 Gallons 13 Quarts 15 Liquid Oz. 28 Dry Oz. 19 Actual Nutrients	How many acres was this applied to? [Include bearing acres only]	How many times was it applied?
			N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	S			Acres	Number
01			31	32	33	34	36	37	40	41
02			31	32	33	34	36	37	40	41
03			31	32	33	34	36	37	40	41
04			31	32	33	34	36	37	40	41
05			31	32	33	34	36	37	40	41
06			31	32	33	34	36	37	40	41
07			31	32	33	34	36	37	40	41
08			31	32	33	34	36	37	40	41
09			31	32	33	34	36	37	40	41
10			31	32	33	34	36	37	40	41
11			31	32	33	34	36	37	40	41
12			31	32	33	34	36	37	40	41
13			31	32	33	34	36	37	40	41
14			31	32	33	34	36	37	40	41
15			31	32	33	34	36	37	40	41
16			31	23	33	34	36	37	40	41
17			31	32	33	34	36	37	40	41

## FERTILIZER APPLICATIONS

LINE	1	2	3	4	5	6	7	8	9	10
	Crop	Crop Code	NITROGEN N	PHOSPHATE P <sub>2</sub> O <sub>5</sub>	POTASH K <sub>2</sub> O	SULFUR S	How much was applied per acre per application? [Leave this column blank if actual nutrients were reported.]	Unit Codes 1 Pounds 12 Gallons 13 Quarts 15 Liquid Oz. 28 Dry Oz. 19 Actual Nutrients	How many acres was this applied to? [INCLUDE bearing acres only]	How many times was it applied?
18			31	32	33	34	36	37	40	41
19			31	32	33	34	36	37	40	41
20			31	32	33	34	36	37	40	41
21			31	32	33	34	36	37	40	41
22			31	32	33	34	36	37	40	41
23			31	32	33	34	36	37	40	41
24			31	32	33	34	36	37	40	41
25			31	32	33	34	36	37	40	41
26			31	32	33	34	36	37	40	41
27			31	32	33	34	36	37	40	41
28			31	32	33	34	36	37	40	41
29			31	32	33	34	36	37	40	41
30			31	32	33	34	36	37	40	41
31			31	32	33	34	36	37	40	41
32			31	32	33	34	36	37	40	41
33			31	23	33	34	36	37	40	41
34			31	32	33	34	36	37	40	41
35			31	32	33	34	36	37	40	41
36			31	32	33	34	36	37	40	41
37			31	32	33	34	36	37	40	41
38			31	32	33	34	36	37	40	41
39			31	32	33	34	36	37	40	41
40			31	32	33	34	36	37	40	41



Now I have some questions about pesticide and chemical applications to your bearing fruit acreage before harvest. Please consider all applications made to trees, vineyards or bushes which occurred after last season's harvest.

1. Since last year's (2018) harvest, did you use herbicides on any of your bearing fruit acreage?.....  Yes  No
2. Since last year's (2018) harvest, did you use insecticides, nematocides or miticide on any of your bearing fruit acreage?.....  Yes  No
3. Since last year's (2018) harvest, did you use any fungicides on any of your bearing fruit acreage?.....  Yes  No
4. Since last year's (2018) harvest, did you use any other chemicals such as chemical thinners, growth regulators, microbial agents, pheromones, rodenticides, etc. on any of your bearing fruit acreage?.....  Yes  No

[Enumerator Action: If all items 1 - 4 are No, go to Section E, page 14, otherwise continue.]

[Enumerator Action: If pesticides were reported in Section B, column 5, continue. Otherwise, go to Section E.]

5. Now I need to get complete information on all of the chemicals applied, including applications made by you and/or by custom applicators during the 2019 crop year to each of the target fruit crops you grew. Let's start with the first application to your crop since the 2018 crop year harvest.

INCLUDE the table for all chemical applications to the target fruit crops. Use supplemental tables if necessary.

INCLUDE herbicides, insecticides, nematocides, miticide fungicides, chemical thinners, growth regulators, microbial agents, pheromones, rodenticides, and soil fumigants.

EXCLUDE seed treatments, foliar applications of nutrients, and applications made to fruit after harvest.

Office Use Lines in Table	Table 001	399
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Chemical Product Name	L I N E	1  Crop	2  Crop Code	3  What products were applied to the [crop]? [Enter product code.]	4  Was this product bought in liquid or dry form? [Enter L or D.]	5  Was this part of a tank mix? [If tank mix, enter line number of first product in mix.]
	01			61		63
	02			61		63
	03			61		63
	04			61		63
	05			61		63
	06			61		63
	07			61		63
	08			61		63
	09			61		63
	10			61		63
	11			61		63
	12			61		63
	13			61		63
	14			61		63
	15			61		63

[For pesticides not listed in Respondent Booklet, specify--]

Line No.	Pesticide Type (Herbicide, Insecticide, fungicide, etc.)	Trade Name and Formulation	Form Purchased (Liquid or Dry)	EPA Reg. No.
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

PESTICIDE APPLICATIONS

Codes for Column 8

1 Pounds	30 Grams
12 Gallons	40 Kilograms
13 Quarts	41 Liters
14 Pints	46 Spirals
15 Ounces, Liquid	47 Packets
28 Ounces, Dry	50 Other (Specify: _____)

Office Use  
300

L I N E	6 OR 7		8	9	10	11
	How much was applied per acre per application?	What was the total amount applied per application?	[Enter unit code from above.]  Code	What percent of the rows were covered with an airblast application?  100 All Rows 50 Every Other Row --- Other Percent	How many acres were treated with this product? [Include bearing acres only.]  Bearing Acres	How many times was this product applied?  Number
01	65 . ____	73 . ____	74	75	77 . ____	79
02	65 . ____	73 . ____	74	75	77 . ____	79
03	65 . ____	73 . ____	74	75	77 . ____	79
04	65 . ____	73 . ____	74	75	77 . ____	79
05	65 . ____	73 . ____	74	75	77 . ____	79
06	65 . ____	73 . ____	74	75	77 . ____	79
07	65 . ____	73 . ____	74	75	77 . ____	79
08	65 . ____	73 . ____	74	75	77 . ____	79
09	65 . ____	73 . ____	74	75	77 . ____	79
10	65 . ____	73 . ____	74	75	77 . ____	79
11	65 . ____	73 . ____	74	75	77 . ____	79
12	65 . ____	73 . ____	74	75	77 . ____	79
13	65 . ____	73 . ____	74	75	77 . ____	79
14	65 . ____	73 . ____	74	75	77 . ____	79
15	65 . ____	73 . ____	74	75	77 . ____	79

[For pesticides not listed in Respondent Booklet, specify--]

Line No.	Pesticide Type (Herbicide, Insecticide, fungicide, etc.)	Trade Name and Formulation	Form Purchased (Liquid or Dry)	EPA Reg. No.
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

PESTICIDE APPLICATIONS

Chemical Product Name	L I N E	1  Crop	2  Crop Code	3  What products were applied to the [crop]? [Enter product code.]	4  Was this product bought in liquid or dry form? [Enter L or D.]	5  Was this part of a tank mix? [If tank mix, enter line number of first product in mix.]
	16			61		63
	17			61		63
	18			61		63
	19			61		63
	20			61		63
	21			61		63
	22			61		63
	23			61		63
	24			61		63
	25			61		63
	26			61		63
	27			61		63
	28			61		63
	29			61		63
	30			61		63
	31			61		63
	32			61		63
	33			61		63

[For pesticides not listed in Respondent Booklet, specify--]

Line No.	Pesticide Type (Herbicide, Insecticide, fungicide, etc.)	Trade Name and Formulation	Form Purchased (Liquid or Dry)	EPA Reg. No.
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

**PESTICIDE APPLICATIONS**

Codes for Column 8

1 Pounds	30 Grams
12 Gallons	40 Kilograms
13 Quarts	41 Liters
14 Pints	46 Spirals
15 Ounces, Liquid	47 Packets
28 Ounces, Dry	50 Other (Specify: _____)

L I N E	6 OR 7		8	9	10	11
	How much was applied per acre per application?	What was the total amount applied per application?	[Enter unit code from above.]  Code	What percent of the rows were covered with an airblast application?  100 All Rows 50 Every Other Row --- Other  Percent	How many acres were treated with this product? [Include bearing acres only.]  Bearing Acres	How many times was this product applied?  Number
16	65	73	74	75	77	79
17	65	73	74	75	77	79
18	65	73	74	75	77	79
19	65	73	74	75	77	79
20	65	73	74	75	77	79
21	65	73	74	75	77	79
22	65	73	74	75	77	79
23	65	73	74	75	77	79
24	65	73	74	75	77	79
25	65	73	74	75	77	79
26	65	73	74	75	77	79
27	65	73	74	75	77	79
28	65	73	74	75	77	79
29	65	73	74	75	77	79
30	65	73	74	75	77	79
31	65	73	74	75	77	79
32	65	73	74	75	77	79
33	65	73	74	75	77	79

[For pesticides not listed in Respondent Booklet, specify--]

Line No.	Pesticide Type (Herbicide, Insecticide, fungicide, etc.)	Trade Name and Formulation	Form Purchased (Liquid or Dry)	EPA Reg. No.

**E PEST MANAGEMENT PRACTICES E**

Now I have some questions about pest management practices you may have used on any of the total fruit acres on this operation. INCLUDE bearing and non-bearing acreage of both target and non-target fruit crops grown. By pests, we mean insects, weeds, and diseases.

[Enumerator Action: Were pesticide applications reported in Section B, column 5 on page 6?]

Yes - Continue     No - Go to item 4

- |   |               |             |
|---|---------------|-------------|
| 1. Was weather data used to assist in determining either the need or when to make pesticide applications?.....  | Yes=1<br>No=3 | Code<br>600 |
| 2. Were any biological pesticides such as Bt ( <i>Bacillus thuringiensis</i> ), insect growth regulators, such as Courier, intrepid, etc., neem or other natural/biological based products sprayed or applied to manage pests?..... | Yes=1<br>No=3 | Code<br>601 |
| 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<br>No=3 | Code<br>602 |

- |  |   |             |
|--|---|-------------|
| 4. In 2019, how were your fruit acres primarily scouted for insects, weeds, diseases and/or beneficial organisms?..... | 1 By deliberately going to the fruit acres specifically for scouting activities. Enter code 1 and go to item 5.<br><br>2 By conducting general observations while performing routine tasks. Enter code 2 and go to item 7.<br><br>3 The fruit acres were not scouted. Enter code 3 and go to item 10. | Code<br>608 |
|--|---|-------------|

- |   |               |             |
|---|---------------|-------------|
| 5. Was an established scouting process used such as systemic sampling, recording counts, insect traps, etc., on any fruit acres?..... | Yes=1<br>No=3 | Code<br>609 |
| 6. Was scouting for pests done on these fruit acres due to--  |               | Code        |
| a. a pest advisory warning?.....  | Yes=1<br>No=3 | Code<br>610 |
| b. a pest development model?.....   | Yes=1<br>No=3 | Code<br>611 |

7. Were your fruit acres scouted for --	Yes = 1 No = 3	[If column 1 is Yes, 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
a. weeds?.....	612	614
b. insects or mites?.....	615	617
c. disease?.....	618	620

		Code
8. Were written or electronic records kept to track the activity or numbers of weeds, insects or diseases?.....	Yes=1 No=3	623
9. Was scouting data compared to published information on infestation thresholds to determine when to take measures to manage pests?.....	Yes=1 No=3	624
10. Was field mapping data used for making pest management decisions?.....	Yes=1 No=3	625
11. Were the services of a diagnostic laboratory used for pest identification or soil or plant tissue pest analysis?.....	Yes=1 No=3	626
12. Were crop residues, including drops, rotting fruit and/or debris, removed to manage pests?.....	Yes=1 No=3	627
13. Were ground covers, mulches, or other physical barriers maintained to manage pest problems?.....	Yes=1 No=3	629
14. Were any beneficial organisms such as insects, nematodes, or fungi applied or released to manage pests?	Yes=1 No=3	636
15. Were floral lures, attractant repellants, pheromone traps or other biological pest controls used on any fruit acres?.....	Yes=1 No=3	637
16. Were any fruit acres cultivated for weed control during the growing season?.....	Yes=1 No=3	640
17. Were field edges, lanes, ditches, roadways or fence lines chopped, mowed, plowed, or burned to manage pests on any fruit acres?.....	Yes=1 No=3	642
18. Were equipment and implements cleaned after completing field work to reduce the spread of pests?.....	Yes=1 No=3	643
19. Were any fruit acres irrigated for the 2019 crop?.....	Yes=1 No=3	644
[If item 19 = Yes, ask--]		
a. Were water management practices, excluding chemigation, such as irrigation scheduling, controlled drainage, or treatment of retention water used to manage pests?.....	Yes=1 No=3	645

COMPLETION CODE for PEST MANAGEMENT PRACTICES	
1 Incomp/R	500

**E PEST MANAGEMENT PRACTICES E**

20. Were any of the following pesticide spraying practices or activities used on this operation in 2019? Pesticides include insecticides, fungicides, herbicides, bactericides, and plant growth regulators (PGR).

Pesticide Spraying Practice or Activity	1  Was this used in 2019?  1 Yes 3 No 99 Don't Know	2  Was it specifically used to keep pesticide application(s) on target (i.e., reduce pesticide drift)?  1 Yes 3 No 99 Don't Know	3  [Complete column for every Yes in Column 1.] Considering labor, training, capital expenditures, and other costs, how easy or difficult was it to implement this practice or activity?  1 Very Easy 2 Somewhat Easy 3 Somewhat Difficult 4 Very Difficult	4  [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 General time management issue/too busy 5 Unfamiliar with activity or practice 6 Other, specify:
a. Altering spray time(s) depending on weather conditions (e.g., wind speed, wind direction)	5170	5171	5172	5173 _____ 5174 _____ Specify: _____
b. Calibrate sprayer before the season	5190	5191	5192	5193 _____ 5194 _____ Specify: _____
c. Calibrate sprayer during the season	5195	5196	5197	5198 _____ 5199 _____ Specify: _____
d. Manually altering sprayer settings to improve the spray precision (e.g., turning off upper nozzles for smaller trees)	5200	5201	5202	5203 _____ 5204 _____ Specify: _____
e. Electronic eye/infra-red or other sensor-based technology (e.g., sonar)	5165	5166	5167	5168 _____ 5169 _____ Specify: _____
f. Other technologies to improve the spray precision (e.g., on/off nozzle spray technology, GPS technology)	5205	5206	5207	5208 _____ 5209 _____ Specify: _____
g. Pulse Width Modulation (PWM) (e.g., Aim Command, Raven's Hawk Eye, John Deere's Exact Apply)	5215	5216	5217	5218 _____ 5219 _____ Specify: _____
h. Other - Specify: 5225 _____	5220	5221	5222	5223 _____ 5224 _____ Specify: _____



**E PEST MANAGEMENT PRACTICES****E**

21. Which of the following spraying practices resulted in a sprayer re-calibration in 2019?

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: <sup>5268</sup> \_\_\_\_\_
- 5267  None of the above

22. Which of the following methods of spraying did this operation use to make insecticide/fungicide/bactericides/plant growth regulator applications, excluding herbicides, in 2019? Check all that apply.

- 5401  Conventional air blast sprayer(s)
- 5402  Tower air blast sprayer(s)
- 5403  Rotary atomizer air-assisted sprayer(s) (e.g. Proptec, Micron, or Curtex)
- 5404  Over-the-row/tunnel sprayer(s), wrap-around sprayers, or other canopy directed sprayer(s)
- 5405  Ground boom sprayer(s)
- 5406  Aerial application(s)
- 5407  Spot treatments (e.g., backpack sprayers)
- 5408  Trunk drench or vine drench (i.e., under the canopy)
- 5409  Ultra-low volume (ULV) ground applications (i.e. non-air assisted high pressure)
- 5410  Chemigation (such as through drip irrigation or micro-sprinklers)
- 5411  Multi-row sprayer
- 5412  Vertical boom (i.e. non-air assisted high pressure)
- 5413  Other, specify: <sup>5400</sup> \_\_\_\_\_

**E PEST MANAGEMENT PRACTICES**
**E**

23. Next we will discuss the use of air blast and ground boom tanks/systems on this operation in 2019.

	1	2
	For Air Blast tanks/systems	For Ground Boom tanks/systems
a. What pesticide type(s) were used in this [insert tanks/systems type] in 2019? Check all that apply.	5420 <input type="checkbox"/> Insecticides 5421 <input type="checkbox"/> Fungicides 5422 <input type="checkbox"/> Herbicides 5423 <input type="checkbox"/> Bactericides 5424 <input type="checkbox"/> Plant Growth Regulators (PGRs) 5425 <input type="checkbox"/> Other: specify: <sup>5426</sup> _____	5427 <input type="checkbox"/> Insecticides 5428 <input type="checkbox"/> Fungicides 5429 <input type="checkbox"/> Herbicides 5430 <input type="checkbox"/> Bactericides 5431 <input type="checkbox"/> Plant Growth Regulators (PGRs) 5432 <input type="checkbox"/> Other: specify: <sup>5433</sup> _____
b. What is the typical spray volume, in Gallons per Acre (GPA), for pesticide applications in 2019? Select one item only.	5434 1 <input type="checkbox"/> Less than 25 GPA 2 <input type="checkbox"/> 25 to <50 GPA 3 <input type="checkbox"/> 50 to <75 GPA 4 <input type="checkbox"/> 75 to <100 GPA 5 <input type="checkbox"/> 100 to <200 GPA 6 <input type="checkbox"/> 200 or greater GPA 99 <input type="checkbox"/> Don't Know	5435 1 <input type="checkbox"/> Less than 5 GPA 2 <input type="checkbox"/> 5 to <7.5 GPA 3 <input type="checkbox"/> 7.5 to <10 GPA 4 <input type="checkbox"/> 10 to <15 GPA 5 <input type="checkbox"/> 15 to <20 GPA 6 <input type="checkbox"/> 20 to <25 GPA 7 <input type="checkbox"/> 25 or greater GPA 99 <input type="checkbox"/> Don't Know
c. What is the typical operating pressure, in PSI, for pesticide applications in 2019? Select one item only.	5436 1 <input type="checkbox"/> Less than 50 PSI 2 <input type="checkbox"/> 50 to <75 PSI 3 <input type="checkbox"/> 75 to <100 PSI 4 <input type="checkbox"/> 100 to <150 PSI 5 <input type="checkbox"/> 150 to <200 PSI 6 <input type="checkbox"/> 200 or greater PSI 99 <input type="checkbox"/> Don't Know	5437 1 <input type="checkbox"/> Less than 10 PSI 2 <input type="checkbox"/> 10 to <20 PSI 3 <input type="checkbox"/> 20 to <30 PSI 4 <input type="checkbox"/> 30 to <40 PSI 5 <input type="checkbox"/> 40 to <50 PSI 6 <input type="checkbox"/> 50 to <60 PSI 7 <input type="checkbox"/> 60 to <70 PSI 8 <input type="checkbox"/> 70 to <80 PSI 9 <input type="checkbox"/> 80 to <90 PSI 10 <input type="checkbox"/> 90 PSI or greater 99 <input type="checkbox"/> Don't know
d. What is the typical nozzle used when spraying herbicide applications in 2019? Select one item only.		5438 1 <input type="checkbox"/> Hollow Cone 2 <input type="checkbox"/> Full Cone 3 <input type="checkbox"/> Disc/Core Nozzle 4 <input type="checkbox"/> Flat fan 5 <input type="checkbox"/> Air-inclusion (AI)/Air-induction/Venturi 6 <input type="checkbox"/> Other, specify: <sup>5439</sup> _____ 99 <input type="checkbox"/> Don't Know
e. What is the typical ground speed when spraying pesticide applications in 2019? Select one item only.	5440 1 <input type="checkbox"/> Less than 1 mph 2 <input type="checkbox"/> 1 to <2 mph 3 <input type="checkbox"/> 2 to <3 mph 4 <input type="checkbox"/> 3 to <4 mph 5 <input type="checkbox"/> 4 to <5 mph 6 <input type="checkbox"/> 5 mph or greater 99 <input type="checkbox"/> Don't Know	5441 1 <input type="checkbox"/> Less than 1 mph 2 <input type="checkbox"/> 1 to <2 mph 3 <input type="checkbox"/> 2 to <3 mph 4 <input type="checkbox"/> 3 to <4 mph 5 <input type="checkbox"/> 4 to <5 mph 6 <input type="checkbox"/> 5 to <6 mph 7 <input type="checkbox"/> 6 to <7 mph 8 <input type="checkbox"/> 7 mph or greater 99 <input type="checkbox"/> Don't know
f. What is the typical boom height above the ground or plant canopy when spraying herbicide applications in 2019? Select one item only.		5442 1 <input type="checkbox"/> <24 inches 2 <input type="checkbox"/> 24 to <36 inches 3 <input type="checkbox"/> 36 inches or greater 99 <input type="checkbox"/> Don't know

## E PEST MANAGEMENT PRACTICES

E

	1 For Air Blast tanks/systems	2 For Ground Boom tanks/systems
g. What is the typical target droplet size spectrum for pesticide applications in 2019? Select one item only.	5443 1 <input type="checkbox"/> Less than 106 microns (Extremely Fine or Very Fine) 2 <input type="checkbox"/> 106-235 microns (Fine) 3 <input type="checkbox"/> 236-340 microns (Medium) 4 <input type="checkbox"/> 341-403 microns (Coarse) 5 <input type="checkbox"/> 404-502 microns (Very Coarse) 6 <input type="checkbox"/> 503-665 microns (Extremely Coarse) 7 <input type="checkbox"/> Greater than 665 microns (Ultra Coarse) 99 <input type="checkbox"/> Don't Know	5444 1 <input type="checkbox"/> Less than 106 microns (Extremely Fine or Very Fine) 2 <input type="checkbox"/> 106-235 microns (Fine) 3 <input type="checkbox"/> 236-340 microns (Medium) 4 <input type="checkbox"/> 341-403 microns (Coarse) 5 <input type="checkbox"/> 404-502 microns (Very Coarse) 6 <input type="checkbox"/> 503-665 microns (Extremely Coarse) 7 <input type="checkbox"/> Greater than 665 microns (Ultra Coarse) 99 <input type="checkbox"/> Don't Know
h. For which of the following reasons did this operation change the airspeed (in revolutions per minute, or RPM) in 2019? Check all that apply.	5445 <input type="checkbox"/> Crop stage 5446 <input type="checkbox"/> Change of product(s) 5447 <input type="checkbox"/> Use of specialty Plant Growth Regulator (PGR) applications (e.g., for thinning or fruit finish) 5448 <input type="checkbox"/> Moving between blocks 5449 <input type="checkbox"/> Wind speed or wind direction 5450 <input type="checkbox"/> Other, specify: <sup>5451</sup> _____ 5452 <input type="checkbox"/> Never	
i. Which of the following practices were used in 2019? Check all that apply.		5453 <input type="checkbox"/> Drift reducing adjuvant(s) 5454 <input type="checkbox"/> Drift reducing nozzle(s) 5455 <input type="checkbox"/> Shielded sprayers
j. Is the majority of spray material from this operation's air blast sprayer(s) directed: Select one item only.	5456 1 <input type="checkbox"/> Upward? 2 <input type="checkbox"/> Horizontally? 3 <input type="checkbox"/> Downward? 4 <input type="checkbox"/> Both horizontal and upward? 5 <input type="checkbox"/> Both horizontal and downward? 99 <input type="checkbox"/> Don't know	

**E PEST MANAGEMENT PRACTICES**

24. Now we are going to ask a few questions about spray equipment maintenance in 2019.

	1	2
	For Air Blast tanks/systems	For Ground Boom tanks/systems
<p>a. How often did this operation clean the tanks/systems in 2019? Check all that apply.</p> <p>[If the never box is checked for Item 5464 in Column 1 or 5276 in Column 2, then skip item 24b and go to 24c; otherwise go to 24b.]</p>	<p>5457 <input type="checkbox"/> Before the season</p> <p>5458 <input type="checkbox"/> After the season</p> <p>5459 <input type="checkbox"/> Depended on the product(s)</p> <p>5460 <input type="checkbox"/> When switching from USDA certified organic to conventional blocks</p> <p>5461 <input type="checkbox"/> Regularly scheduled cleaning</p> <p>5432 <input type="checkbox"/> Other: specify: 5463 _____</p> <p>5464 <input type="checkbox"/> Never</p>	<p>5271 <input type="checkbox"/> Before the season</p> <p>5272 <input type="checkbox"/> After the season</p> <p>5273 <input type="checkbox"/> Depended on the product(s)</p> <p>5278 <input type="checkbox"/> When switching from USDA certified organic to conventional blocks</p> <p>5274 <input type="checkbox"/> Regularly scheduled cleaning</p> <p>5275 <input type="checkbox"/> Other: specify: 5277 _____</p> <p>5276 <input type="checkbox"/> Never</p>
<p>b. For each time that the tank/system was cleaned, how often was a tank cleaner used?</p>	<p>5473</p> <p>1 <input type="checkbox"/> Always (100%)</p> <p>2 <input type="checkbox"/> Often (51% or more)</p> <p>3 <input type="checkbox"/> Sometimes (50% or less)</p> <p>4 <input type="checkbox"/> Never (0%)</p> <p>99 <input type="checkbox"/> Don't know</p>	<p>5279</p> <p>1 <input type="checkbox"/> Always (100%)</p> <p>2 <input type="checkbox"/> Often (51% or more)</p> <p>3 <input type="checkbox"/> Sometimes (50% or less)</p> <p>4 <input type="checkbox"/> Never (0%)</p> <p>99 <input type="checkbox"/> Don't know</p>
<p>c. What were the most common reasons for replacing the nozzles on the sprayers in 2019? Check all that apply.</p>	<p>5481 <input type="checkbox"/> Regularly scheduled calendar based replacement (i.e., annually, twice annually, monthly, etc.)</p> <p>5482 <input type="checkbox"/> Regularly scheduled replacement based on operating time (i.e., sprayer operating hours)</p> <p>5483 <input type="checkbox"/> Sporadic replacement based on area covered or general intuition (i.e., it feels like the right time to change nozzles)</p> <p>5484 <input type="checkbox"/> Calibration problems (i.e., too high or too low a flow rate)</p> <p>5485 <input type="checkbox"/> Observed nozzle damage (e.g., change in spray pattern or leaks)</p> <p>5486 <input type="checkbox"/> Availability of new nozzle technologies</p> <p>5487 <input type="checkbox"/> Expert and/or consultant recommendations (e.g., Cooperative Extension, crop consultants, etc.)</p> <p>5488 <input type="checkbox"/> Other, please specify: 5480 _____</p> <p>5489 <input type="checkbox"/> None of the above</p>	<p>5491 <input type="checkbox"/> Regularly scheduled calendar based replacement (i.e., annually, twice annually, monthly, etc.)</p> <p>5492 <input type="checkbox"/> Regularly scheduled replacement based on operating time (i.e., sprayer operating hours)</p> <p>5493 <input type="checkbox"/> Sporadic replacement based on area covered or general intuition (i.e., it feels like the right time to change nozzles)</p> <p>5494 <input type="checkbox"/> Calibration problems (i.e., too high or too low a flow rate)</p> <p>5495 <input type="checkbox"/> Observed nozzle damage (e.g., change in spray pattern or leaks)</p> <p>5496 <input type="checkbox"/> Availability of new nozzle technologies</p> <p>5497 <input type="checkbox"/> Expert and/or consultant recommendations (e.g., Cooperative Extension, crop consultants, etc.)</p> <p>5498 <input type="checkbox"/> Other, please specify: 5490 _____</p> <p>5499 <input type="checkbox"/> None of the above</p>

25. On what proportion of fields did this operation use hedge rows or other wind-breaking structures that are at least one and a half times the height of the crop canopy for drift reduction in 2019?

5300 1  0%

2  1% to 25%

3  26% to 50%

4  51% to 75%

5  76% to 100%

99  Don't know

**E PEST MANAGEMENT PRACTICES**

**E**

26. How often were the following sources of information used to inform pest management decisions in 2019?

Sources of Information	<p style="text-align: center;">1</p> <p style="text-align: center;">How often was this source of information 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;">Which of these sources was this operation's primary source of pest management decisions? Select one.</p> <p>1 Primary 2 Not primary</p> <p style="text-align: center;">Code</p>
a. Pesticide product labels.....	5301	5302
b. University and/or Agricultural Cooperative Extension resources/recommendations.....	5303	5304
c. Non-university literature, such as magazines or newspapers..	5305	5306
d. Grower/trade groups.....	5307	5308
e. Pesticide sales representatives and/or farm supply distributors.....	5309	5310
f. Crop consultants paid for by the operation.....	5311	5312
g. Other grower(s).....	5313	5314
h. Non-university decision tools.....	5315	5316
i. Weather forecasting tools.....	5317	5318
j. Other, Specify: <sup>5319</sup> _____.....	5320	5321

27. [If 26b, column 1 equals 1, 2, 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 2019?

University and/or Agricultural Cooperative Extension Services	<p style="text-align: center;">How often was this source of information 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>
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: <sup>5330</sup> _____.....	5331

**E PEST MANAGEMENT PRACTICES**

E

28. How often were the following practices used during the season to manage herbicide, fungicide and insecticide resistance in 2019?

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	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	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
a. Scouting.....	5510	5511	5512
b. Field mapping weeds and/or keeping records of field history and pesticide use to assist pesticide decisions.....	5332	5333	5334
c. Field Management/Sanitation Practices.....			
i. For weed control (e.g., managing weeds in field borders, tillage, preventing field-to-field and within field movement of weed seed).....	5335		
ii. For disease control (e.g., removing or incorporating unharvested fruit and/or other field litter).....		5336	
iii. For insect control (e.g., removing or incorporating unharvested fruit and/or other field litter).....			5337
d. Planting disease-resistant cultivars and/or rootstock.....		5338	
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 (i.e., tank mix or pre-mix product).....	5347	5348	5349

29. 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 2019? 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 beekeeper growers, pesticide applicators, and landowners)
- 5355  Driftwatch - Driftwatch is a voluntary communication tool that enables crop producers, beekeeper and pesticide applicators to work together to protect crops and apiaries through the use of mapping programs.
- 5356  Other communication tool(s), Specify: <sup>5358</sup> \_\_\_\_\_
- 5357  Other, Specify: <sup>5359</sup> \_\_\_\_\_

**E PEST MANAGEMENT PRACTICES****E**

30. How often were the following Best Management Practice (BMPs) used during the season in 2019?

Best Management Practices	1 How often was this practice used?  1 Always (100%) 2 Often (51% or more) 3 Sometimes (50% or less) 4 Never (0%) 99 Don't know	2 [Only answer if column 1 = 1, 2, or 3] Was this practice specifically used to prevent exposure to bees?  1 Always (100%) 2 Often (51% or more) 3 Sometimes (50% or less) 4 Never (0%) 99 Don't know
a. Avoid bloom time applications.....	5520	5521
b. Make applications when temperatures are below 50°F	5522	5523
c. Maintain buffer between known beehive locations.....	5524	5525
d. Select pesticides that have the lowest residual toxicity to bees.....	5526	5527
e. Use alternative application methods of an active ingredient to prevent bee exposure (e.g., non-foliar applications when bees are foraging).....	5528	5529
f. Avoid applications when dew is forecast.....	5530	5531
g. Manage blooming plants on the orchard floor before applying pesticides that are acutely toxic to bees (e.g., mowing).....	5532	5533
h. Make application(s) at nighttime or no more than two hours prior to sunset.....	5534	5535
i. Other, Specify: <sup>5536</sup> _____	5537	5538

31. Which of the following auditing systems, if any, did this operation participate in during 2019? Check all that apply.

5361  GLOBAL G.A.P.5362  State Quality Food (SQF) Program5363  Other, Specify:<sup>5365</sup> \_\_\_\_\_5364  The operation did not participate in an auditing system5369  Don't know

### CONCLUSION

1. To receive the complete results of this survey on the release date, go to  
[https://www.nass.usda.gov/Surveys/Guide\\_to\\_NASS\\_Surveys/](https://www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/)

To have a summary emailed to you at a later date, please enter your email address.

1095
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[Thank the respondent, then review this questionnaire.]

Ending time [Military].....	<table style="margin: auto; border-collapse: collapse;"> <tr> <td style="text-align: center; font-size: small;">H H M M</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">0005</td> </tr> <tr> <td style="text-align: center; font-size: x-small;">Office Use Time in Hours</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">006</td> </tr> </table>	H H M M	0005	Office Use Time in Hours	006
H H M M					
0005					
Office Use Time in Hours					
006					

**Record Use**

Did respondent use operation records to report pesticide data?

	Code
Yes=1 No=3	064

**Supplement Use**

[Record the total number of supplements used to complete this interview.]

	Number
Fertilizer Supplements.....	067
Pesticide Supplements.....	068

Reported by: _____	9910 M M D D Y Y	Telephone: (____) _____
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OFFICE USE										
R. Unit	Ptr 1 Str	Ptr 2 Str	Ptr 3 Str	Ptr 4 Str	OPS	SSO 1	ADJ	Optional Use		
9921	9922	9923	9927	9928	923	9907	922	9906	9916	
Response		Respondent		Mode		Enum.	POID			
1-Comp 2-R 3-Inac 4-Office Hold		9901 1-Op/Mgr 2-Spouse 3-Acct/Bkpr 4-Partner 9-Other		9902 2-PATI (tel) 3-PAPI (Face-to-Face)		9903 9998		9989		
								Eval.		Change
								9900		9985