2020 VEGETABLE CHEMICAL USE SURVEY

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NATIONAL AGRICULTURAL STATISTICS SERVICE

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ENTERPRISE

VERSION	POID	SUBTRACT
01	__ __ __ __ __ __ __ __ __ __	__ __

CONTACT RECORD		
DATE	TIME	NOTES

INTRODUCTION:

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

We are collecting information on chemical use 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**. We encourage you to refer to your records during the interview.

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004

BEGINNING TIME [MILITARY]. . . . . __ __ __ __

☐ [*Name, address and partners verified and updated if necessary.*]

During the screening phase of the Vegetable Chemical Use Survey conducted in June and July, your operation was found to be growing or intending to grow vegetables this year. I now need to verify some of the information collected during the screening survey.

Verify operation name and operator on label and/or screener.

- *If no changes, go to Section **A**, page 4.*
- *If changed, continue to "Change in Operating Status".*

CHANGE IN OPERATING STATUS

[**ENUMERATOR NOTE:** *Skip this section if there is no change in operation name or operator.*]

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

☐ **NO** - [*Go to Enumerator Note below*.]

CODE

☐ **YES** - [*Enter code 1, complete name and address information below for new operator, and read Enumerator Note*.]. 023

Operation Name _____

Operator Name _____

Address _____

_____

Phone (_____) _____

[**ENUMERATOR NOTE:** *If the operation on the face page was in business part of the 2020 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.]

SCREENING

1. Did this operation have any of the target crops during the 2020 crop year?

   ☐ **YES** - [*Continue*.]

   ☐ **NO** - [*Write notes explaining situation then go to "Conclusion" on back page.*]

   Notes: _____

   _____

   _____

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 with questions 3 and 4.*]

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 ☐

4. Please identify the other person(s) in this partnership, then go to Section **A**.
   [*Verify partners' names and make necessary corrections if names have already been entered.*]

PARTNERS **POID**__ __ __ __ __ __ __ __ __ __	**PARTNERS** **POID**__ __ __ __ __ __ __ __ __ __
PARTNER NAME	PARTNER NAME
ADDRESS	ADDRESS
CITY STATE ZIP PHONE NUMBER	CITY STATE ZIP PHONE NUMBER
PARTNERS **POID**__ __ __ __ __ __ __ __ __ __	**PARTNERS** **POID**__ __ __ __ __ __ __ __ __ __
PARTNER NAME	PARTNER NAME
ADDRESS	ADDRESS
CITY STATE ZIP PHONE NUMBER	CITY STATE ZIP PHONE NUMBER

ACRES OPERATED

[**Enumerator Action:** *If acreage on the insert is verified as correct, enter code 1 in box 801, then skip to Section **B**. If acreage has changed, ask ALL questions*.]. 801

Now I would like to ask about the total acres operated under this land arrangement.

1. How many acres does this operation---

		ACRES
a.	Own?. . . . . +	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. [Calculate item 1a + 1b - 1c.] Then the total acres operated are:. . . . . = 900 .

   a. Does this include the farmstead, all cropland, woodland, pasture land, 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, including 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 vegetables? (***Include*** *both target and non-target vegetables planted on the operation.*). . . . . 803 . ___

TARGET CROPS & CODES

FLORIDA	
613	**BEANS, SNAP**
808	**CABBAGE**
766	**CORN, SWEET**
798	**CUCUMBERS**
736	**PEPPERS, BELL**
742	**SQUASH**
748	**STRAWBERRIES**
770	**TOMATOES**
752	**WATERMELONS**

GEORGIA	
613	**BEANS, SNAP**
808	**CABBAGE**
766	**CORN, SWEET**
798	**CUCUMBERS**
824	**ONIONS**
736	**PEPPERS, BELL**
742	**SQUASH**
752	**WATERMELONS**

ILLINOIS	
613	**BEANS, SNAP**
738	**PUMPKINS**

INDIANA	
738	**PUMPKINS**
752	**WATERMELONS**

MICHIGAN	
701	**ASPARAGUS**
613	**BEANS, SNAP**
798	**CUCUMBERS**
738	**PUMPKINS**
742	**SQUASH**

MINNESOTA	
766	**CORN, SWEET**
855	**PEAS, GREEN**

NEW JERSEY	
736	**PEPPERS, BELL**
742	**SQUASH**

NEW YORK	
613	**BEANS, SNAP**
808	**CABBAGE**
766	**CORN, SWEET**
824	**ONIONS**
738	**PUMPKINS**
742	**SQUASH**

NORTH CAROLINA	
798	**CUCUMBERS**
736	**PEPPERS, BELL**
738	**PUMPKINS**
742	**SQUASH**
752	**WATERMELONS**

OHIO	
736	**PEPPERS, BELL**
738	**PUMPKINS**

OREGON	
613	**BEANS, SNAP**
766	**CORN, SWEET**
824	**ONIONS**
855	**PEAS, GREEN**
742	**SQUASH**

PENNSYLVANIA	
613	**BEANS, SNAP**
738	**PUMPKINS**

SOUTH CAROLINA	
752	**WATERMELONS**

TEXAS	
808	**CABBAGE**
798	**CUCUMBERS**
824	**ONIONS**
738	**PUMPKINS**
752	**WATERMELONS**

WASHINGTON	
701	**ASPARAGUS**
632	**CARROTS**
766	**CORN, SWEET**
824	**ONIONS**
855	**PEAS, GREEN**

WISCONSIN	
613	**BEANS, SNAP**
808	**CABBAGE**
632	**CARROTS**
766	**CORN, SWEET**
798	**CUCUMBERS**
855	**PEAS, GREEN**

NOTES:

1. What **target vegetables** were on these [*Section **A**, item 2*] acres during the 2020 crop year? (***Exclude** new plantings of vegetables not intended for harvest in 2020.*)

[**ENUMERATOR NOTE:** *If no target acreage is present, write notes and skip to "Conclusion" on back page.*]

OFFICE USE LINES IN TABLE	TABLE 001	199

LINE	1 CROP	2 CROP CODE	3 How many acres were PLANTED for harvest in the 2020 crop year? (*Include* **2020** *acres which were planted in other years.*) ACRES	4 Were any commercial fertilizers applied to this crop? [YES = 1]	5 Were any herbicides, insecticides fungicides, etc. applied to this crop? [YES = 1]
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 acreage of TARGET CROPS for processing or fresh market.*
- *All 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.*
- *Acreage not harvested due to weather, economic or other reasons.*

Crops planted in the fall of 2017 if they were part of the 2020 crop.

- *Double Cropping*

EXCLUDE:

- ***ALL CROPS GROWN IN ANOTHER STATE.***
- *All crops grown in greenhouses, hothouses and **home gardens**.*
- *Plantings of crops not intended for harvest in 2020.*
- *New plantings and other plantings which are not yet bearing (asparagus & strawberries)*
- *All vegetables grown for commercial transplanting.*
- *All mushrooms, potatoes, dry beans, sweet potatoes.*
- *All vegetable acreage grown for seed only.*
- *All vegetable acres grown by institutional, experimental, research and university farms.*

NOTES: _____

[**ENUMERATOR ACTION:** *If pesticides were reported in Section B, column 5, continue. Otherwise, skip to Section E.*]

1. 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 2020 crop year to each of the **target VEGETABLE crops** you grew. **Let's start with the first application to your** [*crop*] **since the 2017 crop year harvest.**
[*Complete the table for all chemical applications to the target VEGETABLE crops. Use supplemental tables if necessary.*]
(***Include*** *herbicides, insecticides, nematicides, miticides, fungicides, chemical thinners, growth regulators, microbial agents, pheromones, rodenticides, and soil fumigants.* ***Exclude*** *seed treatments, foliar applications of nutrients, and applications made to VEGETABLE after harvest.*)

OFFICE USE LINES IN TABLE **TABLE 001** 399

LINE	CHEMICAL PRODUCT NAME	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.

CODES FOR COLUMN 8

1	POUNDS	14	PINTS	30	GRAMS	46	SPIRALS
12	GALLONS	15	OUNCES, LIQUID	40	KILOGRAMS	47	PACKETS
13	QUARTS	28	OUNCES, DRY	41	LITERS	50	OTHER (*Specify*_____)

LINE	6 **How much was applied per acre per application?**	**OR**	7 **What was the total amount applied per application?**	8 [*Enter unit code from above.*] **CODE**	9 **How many acres were treated with this product?** **ACRES**	10 **How many times was it applied?** **NUMBER**
01	65 . ___ ___		73 .	74	77 .	79
02	65 .		73 .	74	77 .	79
03	65 .		73 .	74	77 .	79
04	65 .		73 .	74	77 .	79
05	65 .		73 .	74	77 .	79
06	65 .		73 .	74	77 .	79
07	65 .		73 .	74	77 .	79
08	65 .		73 .	74	77 .	79
09	65 .		73 .	74	77 .	79
10	65 .		73 .	74	77 .	79
11	65 .		73 .	74	77 .	79
12	65 .		73 .	74	77 .	79
13	65 .		73 .	74	77 .	79
14	65 .		73 .	74	77 .	79
15	65 .		73 .	74	77 .	79

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

Line No.	**Pesticide Type** (*Herbicide, Insecticide, Fungicide, etc*.)	**Tradename and Formulation**	**Form Purchased** (*Liquid or Dry)*	**EPA Reg. No.**

CHEMICAL PRODUCT NAME	LINE	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.

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LINE	6 **How much was applied per acre per application?**	**OR**	7 **What was the total amount applied per application?**	8 [*Enter unit code from above.*] **CODE**	9 **How many acres were treated with this product?** **ACRES**	10 **How many times was it applied?** **NUMBER**
16	65 . ___ ___	73	. ___ ___	74 77	. ___	79
17	65 . ___ ___	73	. ___ ___	74 77	. ___	79
18	65 . ___ ___	73	. ___ ___	74 77	. ___	79
19	65 . ___ ___	73	. ___ ___	74 77	. ___	79
20	65 . ___ ___	73	. ___ ___	74 77	. ___	79
21	65 . ___ ___	73	. ___ ___	74 77	. ___	79
22	65 . ___ ___	73	. ___ ___	74 77	. ___	79
23	65 . ___ ___	73	. ___ ___	74 77	. ___	79
24	65 . ___ ___	73	. ___ ___	74 77	. ___	79
25	65 . ___ ___	73	. ___ ___	74 77	. ___	79
26	65 . ___ ___	73	. ___ ___	74 77	. ___	79
27	65 . ___ ___	73	. ___ ___	74 77	. ___	79
28	65 . ___ ___	73	. ___ ___	74 77	. ___	79
29	65 . ___ ___	73	. ___ ___	74 77	. ___	79
30	65 . ___ ___	73	. ___ ___	74 77	. ___	79
31	65 . ___ ___	73	. ___ ___	74 77	. ___	79
32	65 . ___ ___	73	. ___ ___	74 77	. ___	79
33	65 . ___ ___	73	. ___ ___	74 77	. ___	79

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

Line No.	**Pesticide Type** (*Herbicides, Insecticides, Fungicides, 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 vegetable acres** on this operation. (***Include*** *both target and non-target vegetable crops grown.*)
By pests, we mean insects, weeds, and diseases.

[Enumerator Action: ***Were PESTICIDE APPLICATIONS reported in Section B, column 5 on page 5*****?]**

☐ **YES** - [*Continue.*] ☐ **No** - [*Go to item 4.*]

		CODE
1. Was weather data used to assist in determining either the need or when to make pesticide applications?	**YES = 1**	600
2. Were any biological pesticides such as Bt (*Bacillus thuringiensis*), insect growth regulators (*Courier, intrepid, etc*.), neem or other natural/biological based products sprayed or applied to manage pests?	**YES = 1**	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**	602

4. In 2020, how were your vegetable acres primarily scouted for insects, weeds, diseases and/or beneficial organisms? 608

1 By deliberately going to the vegetable acres specifically for scouting activities. (*Enter code 1 and go to item 5.*)
2 By conducting general observations while performing routine tasks. (*Enter code 2 and go to item 7.*)
3 The vegetable acres were not scouted. (*Enter code 3 and go to item 10.*)

5. Was an established scouting process used (*systemic sampling, recording counts, insect traps, etc*.) on any vegetable acres?	**YES = 1**	609
6. Was scouting for pests done on these vegetable acres due to---		
a. a pest advisory warning?	**YES = 1**	610
b. a pest development model?	**YES = 1**	611

1 7. Were your vegetable acres scouted for –-- **YES = 1**		2 [*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 5 Processor 6 Other (*specify*: _____) **CODE**
a. weeds?	612	614
b. insects and mites?	615	617
c. disease?	618	620

E PEST MANAGEMENT PRACTICES E

		CODE
8. Were written or electronic records kept to track the activity or numbers of weeds, insects or diseases?	YES = 1	623
9. Was scouting data compared to published information on infestation thresholds to determine when to take measures to manage pests?	YES = 1	624
10. Was field mapping data used for making pest management decisions?	YES = 1	625
11. Were the services of a diagnostic laboratory used for pest identification or soil or plant tissue pest analysis?	YES = 1	626
12. Were crop residues plowed down or removed to manage pests?	YES = 1	627
13. Were crops rotated during the past three years for the purpose of managing pests?	YES = 1	628
14. Were ground covers, mulches, or other physical barriers maintained to manage pest problems?	YES = 1	629
15. Was a crop variety chosen because it had resistance to a specific pest?	YES = 1	630
16. Was no-till or minimum till used to manage pests?	YES = 1	631
17. Were planting locations planned to avoid infestation of pests?	YES = 1	632
18. Were planting or harvesting dates adjusted to manage pests?	YES = 1	633
19. Were row spacing or plant density adjusted to manage pests?	YES = 1	634
20. Was a trap crop grown to help manage insects?	YES = 1	635
21. Were any beneficial organisms (*insects, nematodes, fungi*) applied or released to manage pests?	YES = 1	636
22. Were floral lures, attractants, repellants, pheromone traps or other biological pest controls used on any vegetable acres?	YES = 1	637
23. Were any vegetable acres cultivated for weed control during the growing season?	YES = 1	640
24. Were field edges, lanes, ditches, roadways or fence lines chopped, mowed, plowed, or burned to manage pests on any vegetable acres?	YES = 1	642
25. Were equipment and implements cleaned after completing field work to reduce the spread of pests?	YES = 1	643
26. Were any vegetable acres irrigated for the 2020 crops?	YES = 1	644
a. [*If item 26 = YES, ask*---] Were water management practices (excluding chemigation) such as irrigation scheduling, controlled drainage, or treatment of retention water used to manage pests?	YES = 1	645

COMPLETION CODE for FERTILIZER APPLICATIONS	
1 Incomp/R 3 Valid Zero	200

COMPLETION CODE for PESTICIDE APPLICATIONS	
1 Incomp/R 3 Valid Zero	300

COMPLETION CODE for PEST MANAGEMENT PRACTICES	
1 Incomp/R	500

E-1 PEST MANAGEMENT PRACTICES E-1

Enumerator Note: For the remaining questions, primary target crop is defined as the largest target crop by acres planted for harvest in 2020, as reported in Section B, Question 1.

The primary target crop on this operation is:_____crop /_____crop code.

E-1 PEST MANAGEMENT PRACTICES E-1

1. Were any of the following pesticide spraying practices or activities used on this operation for [insert primary target crop] in 2020? Pesticides include insecticides, fungicides, herbicides, bactericides, nematicides, and plant growth regulators (PGR).

Pesticide Spraying Practice or Activity	1 Was this used in 2020? 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., altering spray pressure, ground speed, and/or boom height)	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, variable-rate 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:_____

2. Which of the following spraying practices resulted in a sprayer re-calibration for [insert primary target crop] in 2020? 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 ☐ None of the above

3. Excluding application of herbicides, which of the following methods of spraying did this operation use to apply insecticide/ fungicide/bactericides/nematicides/plant growth regulator for [insert primary target crop] in 2020? Check all that apply.

5405 ☐ Ground boom sprayer(s)

5406 ☐ Aerial application(s)

5407 ☐ Spot treatments (e.g., backpack sprayers)

5410 ☐ Chemigation (such as through drip irrigation or micro-sprinklers)

☐ Air blast / Air-assisted sprayer(s)
xxxx

Other, specify: 5400_____
5413
☐

☐

☐

4. Pre-emergence pesticide applications are pesticides that are applied both prior to planting and/or before the emergence of the vegetables for early-season pest management. Pesticides include insecticides, fungicides, herbicides, bactericides, nematicides, and plant growth regulators (PGR). Did this operation make any pre-emergence pesticide applications using air blast sprayer and/or ground boom sprayers for [insert primary target crop] in 2020?

0000 ☐ Yes, made pre-emergence pesticide applications using air blast / air-assisted sprayer(s) - Complete Column 1

0000 ☐ Yes, made pre-emergence pesticide applications using ground boom sprayers - Complete Column 2

0000 ☐ No, did not make pre-emergence pesticide applications - Go to item 5

	1 For Air blast / Air-assisted sprayer(s) systems	2 For Ground Boom systems
a. What pesticide type(s) were used in this [insert systems type] pre-emergence in 2020? Check all that apply.	5420 ☐ Insecticides 5421 ☐ Fungicides 5422 ☐ Herbicides 5423 ☐ Bactericides xxxx ☐ Nematicides 5424 Plant Growth Regulators (PGRs) 5425 Other: specify: 5426_____	5427 ☐ Insecticides 5428 ☐ Fungicides 5429 ☐ Herbicides 5430 ☐ Bactericides Xxxx ☐ Nematicides 5431 Plant Growth Regulators (PGRs) 5432 Other: specify: 5433_____
b. What is the typical spray volume, in Gallons per Acre (GPA), for pesticide applications pre-emergence in 2020? Select one item only.	5434 1 ☐ Less than 25 GPA 2 ☐ 25 to <50 GPA 3 ☐ 50 to <75 GPA 4 ☐ 75 to <100 GPA 5 ☐ 100 to <200 GPA 6 ☐ 200 or greater GPA 99 Don't Know	5435 1 ☐ Less than 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 or greater GPA 99 Don't Know
c. What is the typical operating pressure, in PSI, for pesticide applications pre-emergence in 2020? Select one item only.	5436 1 ☐ Less than 50 PSI 2 ☐ 50 to <75 PSI 3 ☐ 75 to <100 PSI 4 ☐ 100 to <150 PSI 5 ☐ 150 to <200 PSI 6 ☐ 200 or greater PSI 99 Don't Know	5437 1 ☐ Less than 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 PSI or greater 99 Don't know
d. What is the typical nozzle used when spraying pesticide applications pre-emergence in 2020? Select one item only.	1 ☐ Hollow Cone 2 ☐ Full Cone 3 ☐ Disc/Core Nozzle 4 ☐ Flat fan 5 ☐ Air-inclusion (AI) Air-induction 6 ☐ Other, specify: xxxx_____ 99 ☐ Don't Know	5438 1 ☐ Hollow Cone 2 ☐ Full Cone 3 ☐ Disc/Core Nozzle 4 ☐ Flat fan 5 ☐ Air-inclusion (AI)/Air-induction/Venturi 6 ☐ Other, specify: 5439_____ 99 Don't Know
e. What is the typical ground speed when spraying pesticide applications pre-emergence in 2020? Select one item only.	5440 1 ☐ Less than 1 mph 2 ☐ 1 to <2 mph 3 ☐ 2 to <3 mph 4 ☐ 3 to <4 mph 5 ☐ 4 to <5 mph 6 ☐ 5 mph or greater 99 Don't Know	5441 1 ☐ Less than 1 mph 2 ☐ 1 to <2 mph 3 ☐ 2 to <3 mph 4 ☐ 3 to <4 mph 5 ☐ 4 to <5 mph 6 ☐ 5 to <6 mph 7 ☐ 6 to <7 mph 8 ☐ 7 mph or greater 99 Don't know
f. What is the typical boom height above the ground when spraying pesticide applications pre-emergence in 2020? Select one item only.	1 ☐ <24 inches 2 ☐ 24 to <36 inches 3 ☐ 36 inches or greater 4 ☐ Don't know	5442 1 ☐ <24 inches 2 ☐ 24 to <36 inches 3 ☐ 36 inches or greater 99 ☐ Don't know

	1 For Air blast / Air-assisted sprayer(s) systems	2 For Ground Boom systems
g. What is the typical target droplet size spectrum for pesticide applications pre-emergence in 2020? Select one item only.	5443 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	5444 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
h. For which of the following reasons did this operation change the airspeed (in revolutions per minute, or RPM) pre-emergence in 2020? Check all that apply.	5445 ☐ Crop stage 5446 ☐ Change of product(s) 5447 ☐ Use of specialty Plant Growth Regulator (PGR) applications (e.g., for thinning or fruit finish) 5448 ☐ Moving between blocks 5449 ☐ Wind speed or wind direction 5450 ☐ Other, specify: 5451	
i. Which of the following practices were used pre-emergence in 2020? Check all that apply.	5452 ☐ Never 5453 ☐ Drift reducing adjuvant(s) 5454 ☐ Drift reducing nozzle(s) 5454 ☐ Shielded sprayers Xxxx ☐ Don't know	5453 ☐ Drift reducing adjuvant(s) 5454 ☐ Drift reducing nozzle(s) 5455 ☐ Shielded sprayers 0000 ☐ Don't know

5. Post-emergence pesticide applications are made to control pests that occur after emergence of the vegetables.

Pesticides include insecticides, fungicides, herbicides, bactericides, nematicides, and plant growth regulators (PGR). Did this operation make any post-emergence pesticide applications using air blast sprayers and/or ground boom sprayers for [insert primary target crop] in 2020?

5241 ☐ Yes, made post-emergence pesticide applications using air-assisted sprayer(s) - Complete Column 1

5240 ☐ Yes, made post-emergence pesticide applications using ground boom sprayers - Complete Column 2

5242 ☐ No, did not make post-emergence pesticide applications - Go to item 6

	For Air blast / systems 1 Air-assisted sprayer(s)	2 For Ground Boom systems
A. What pesticide type(s) were used in this [insert systems type] post-emergence in 2020? Check all that apply.	5420 ☐ Insecticides 5421 ☐ Fungicides 5422 ☐ Herbicides xxxx ☐ Bactericides ☐ Nematicides 5423 ☐ Plant Growth Regulators (PGRs) Other: 5424 specify: 5426_____	5427 ☐ Insecticides 5428 ☐ Fungicides ☐ <24 inches ☐ 24 to <36 inches ☐ 36 inches or greater ☐ Don't know xx 5432 specify: 5433_____
B. What is the typical spray volume, in Gallons per Acre (GPA), for pesticide applications post-emergence in 2020? Select one item only.	5425 5434 1 ☐ Less than 25 GPA 2 ☐ 25 to <50 GPA 3 ☐ 50 to <75 GPA 4 ☐ 75 to <100 GPA 5 ☐ 100 to <200 GPA 6 ☐ 200 or greater GPA 99 ☐ Don't Know	5435 1 ☐ Less than 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 or greater GPA 99 ☐ Don't Know
C. What is the typical operating pressure, in PSI, for pesticide applications post-emergence in 2020? Select one item only.	5436 1 ☐ Less than 50 PSI 2 ☐ 50 to <75 PSI 3 ☐ 75 to <100 PSI 4 ☐ 100 to <150 PSI 5 ☐ 150 to <200 PSI 6 ☐ 200 or greater PSI 99 ☐ Don't Know	5437 1 ☐ Less than 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 PSI or greater 99 ☐ Don't know
D. What is the typical nozzle used when spraying herbicide applications post-emergence in 2020? Select one item only.	1 ☐ Hollow Cone 2 ☐ Full Cone 3 ☐ Disc/Core Nozzle 4 ☐ Flat fan 5 ☐ Air-inclusion (AI)/Air-induction/Venture 6 ☐ Other, specify: xxxx_____ 99 ☐ Don't Know	5438 1 ☐ Hollow Cone 2 ☐ Full Cone 3 ☐ Disc/Core Nozzle 4 ☐ Flat fan 5 ☐ Air-inclusion (AI)/Air-induction/Venturi Other, specify: 5439_____ 99 ☐ Don't Know
E. What is the typical ground speed when spraying pesticide applications post emergence in 2020? Select one item only.	5440 1 ☐ Less than 1 mph 2 ☐ 1 to <2 mph 3 ☐ 2 to <3 mph 4 ☐ 3 to <4 mph 5 ☐ 4 to <5 mph 6 ☐ 5 mph or greater 99 ☐ Don't Know	5441 1 ☐ Less than 1 mph 2 ☐ 1 to <2 mph 3 ☐ 2 to <3 mph 4 ☐ 3 to <4 mph 5 ☐ 4 to <5 mph 6 ☐ 5 to <6 mph 7 ☐ 6 to <7 mph 8 ☐ 7 mph or greater 99 ☐ Don't know
F. What is the typical boom height above the ground or plant canopy when spraying herbicide applications post-emergence in 2020? Select one item only.	1 2 3 ☐ 4 ☐	5442 1 ☐ <24 inches 2 ☐ 24 to <36 inches 3 ☐ 36 inches or greater 99 ☐ Don't know

	1 For Air Blast / Air-assisted sprayer(s) systems	2 For Ground Boom systems
G. What is the typical target droplet size spectrum for pesticide applications post-emergence in 2020? Select one item only.	5443 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	5444 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
H. For which of the following reasons did this operation change the airspeed (in revolutions per minute, or RPM) post-emergence in 2020? Check all that apply.	5445 ☐ Crop stage 5446 ☐ Change of product(s) 5447 ☐ Use of specialty Plant Growth Regulator (PGR) applications (e.g., for thinning or fruit finish) Moving between blocks Wind speed or wind direction Other, specify: 5451 _____ 5448 ☐ 5449 ☐ Never 5450 ☐ 5452 ☐	
j. Which of the following practices were used post-emergence in 2020? Check all that apply.	5453 ☐ Drift reducing adjuvant(s) 5454 ☐ Drift reducing nozzle(s) 5455 ☐ Shielded sprayers xxxx ☐ Don't Know	5453 ☐ Drift reducing adjuvant(s) 5454 ☐ Drift reducing nozzle(s) 5455 ☐ Shielded sprayers 0000 ☐ Don't know

6.Now we are going to ask a few questions about spray equipment maintenance in 2020.

	1 For Air Blast / Air-assisted systems	2 For Ground Boom systems
a. How often did this operation clean the system(s) in 2020? Check all that apply. [If the never box is checked for Item 5464 in Column 1 or 5276 in Column 2, then skip item 25b and go to 25c; otherwise go to 24b.]	5457 ☐ Before the season 5458 ☐ After the season 5459 ☐ Depended on the product(s) 5460 ☐ When switching from USDA certified organic to conventional blocks 5461 ☐ Regularly scheduled cleaning 5432 ☐ Other: specify: 5463 _____ 5464 ☐ Never	5271 ☐ Before the season 5272 ☐ After the season 5273 ☐ Depended on the product(s) 5278 ☐ When switching from USDA certified organic to conventional blocks 5274 ☐ Regularly scheduled cleaning 5275 ☐ Other: specify: 5277 _____ 5276 ☐ Never
b. For each time that the system(s) was cleaned, how often was a tank cleaner used?	5473 1 ☐ Always (100%) 2 ☐ Often (51% or more) 3 ☐ Sometimes (50% or less) 4 ☐ Never (0%) 99 ☐ Don't know	5279 1 ☐ Always (100%) 2 ☐ Often (51% or more) 3 ☐ Sometimes (50% or less) 4 ☐ Never (0%) 99 ☐ Don't know
c. What were the most common reasons for replacing the nozzles on the sprayers in 2020? Check all that apply.	5481 ☐ Regularly scheduled calendar based replacement (i.e., annually, twice annually, monthly, etc.) 5482 ☐ Regularly scheduled replacement based on operating time (I.e., sprayer operating hours) 5483 ☐ Sporadic replacement based on area covered or general intuition (i.e., it feels like the right time to change nozzles) 5484 ☐ Calibration problems (i.e., too high or too low a flow rate) 5485 ☐ Observed nozzle damage (e.g., change in spray pattern or leaks) 5486 ☐ Availability of new nozzle technologies 5487 ☐ Expert and/or consultant recommendations (e.g., Cooperative Extension, crop consultants, etc.) 5488 Other, please specify: 5480 ☐ _____ 5489 ☐ None of the above	5491 ☐ Regularly scheduled calendar based replacement (i.e., annually, twice annually, monthly, etc.) 5492 ☐ Regularly scheduled replacement based on operating time (I.e., sprayer operating hours) 5493 ☐ Sporadic replacement based on area covered or general intuition (i.e., it feels like the right time to change nozzles) 5494 ☐ Calibration problems (i.e., too high or too low a flow rate) 5495 ☐ Observed nozzle damage (e.g., change in spray pattern or leaks) 5496 ☐ Availability of new nozzle technologies 5497 ☐ Expert and/or consultant recommendations (e.g., Cooperative Extension, crop consultants, etc.) 5498 Other, please specify: 5490 ☐ _____ 5499 ☐ None of the above

7.On what proportion of fields did this operation wind-breaking structures, such as hedge rows, that are at least one and a half times the height of the crop canopy in 2020?

5300 1 ☐ 0% 2 ☐ 1% to 25% 3 ☐ 26% to 50%

4 ☐ 51% to 75% 5 ☐ 76% to 100% 99 ☐ Don't know

E-1 PEST MANAGEMENT PRACTICES E-1

8.How often were the following sources of information used to inform pest management decisions in 2020?

Sources of Information	1 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, catalogues,newspapers, etc.....	5305
d. Commodity/trade groups.....	5307
e. Pesticide sales representatives and/or farm supply distributors.....	5309
f. Independent crop consultants paid for by the operation.....	5311
g. Crop consultants employed by pesticide companies or other distributors.....	xxxx
h. Other grower(s).....	5..3.1..3..
i. Commercial or other non-university decision tools.....	5315
j. Weather forecasting tools.....	5317
k. Other, Specify:5319	5320

9.[If 8b, 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 2020?

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)....	.....5..322
b. Field days/demonstration workshops.....	.....5..323
c. Farm visits and/or one-on-one consultation.....	.....5..324
d. Email lists.....	.....5..325
e. Newsletters and blogs.....	.....5.3. 26
f. Crop and/or Pest Protection Handbook.....	.....5.3.27
g. Other publications (e.g., fact sheets).....	.....5.3. 28
h. Decision tools.....	.....5.3. 29
i. Other, Specify:5330_____.....	5331

E-1 PEST MANAGEMENT PRACTICES E-1

10. How often were the following practices used during the season to manage herbicide, fungicide and insecticide resistance in 2020?

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 material, cleaning transplant trays, sanitizing process or wash water)		5336	
iii. For insect control (e.g., removing or incorporating unharvested vegetables 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
h. Rotating crops	0000	0000	0000

11. 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 2020? 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.

E-1 **PEST MANAGEMENT PRACTICES** **E-1**

10. How often were the following practices used during the season to manage herbicide, fungicide and insecticide

5356 ☐ Other communication tool(s), Specify: 5358_____

5357 ☐ Other, Specify:5359_____

12. How often were the following Best Management Practice (BMPs) used during the season in 2020?

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 crop 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:5536_____....	5537	5538

13.Which of the following auditing systems, if any, did this operation participate in during 2020? Check all that apply.

- 5361 ☐ GLOBAL G.A.P.
- 5362 ☐ State Quality Food (SQF) Program
- 5363 ☐ Other, Specify:5365_____
- 5364 ☐ The operation did not participate in an auditing system
- 5369 ☐ Don't know

CONCLUSION

SURVEY RESULTS

1. To receive the complete results of this survey on the release date, go to http://www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/

To have a brief summary emailed to you at a later date, please enter your email address. 1095

CODE

Would you rather have a brief summary mailed to you at a later date?. . . . . **YES = 1** | 9990

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

ENDING TIME [*MILITARY*]. 005

OFFICE USE TIME IN HOURS

006 . ___

RECORD USE

CODE

Did respondent use operation records to report pesticide data?. . . . . **YES = 1** | 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**	9911 Telephone: _____

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-Sp 3-Acct/Bkpr 4-Partner 9-Other	9902	2-PATI (tel) 3-PAPI (Face-to-Face)	9903	9998	9989 __ __ __ __ __ __ __ __ __ __

Eval.	Change
9900	9985