



Introduction:

Thank you for helping out by taking this survey. The purpose of the survey is to measure the effects of spotted wing drosophila (SWD) on fruit crop production. Results will be used to develop national research and extension projects to minimize future impacts of SWD. These may include:

- Development of new management tactics and programs
- Supporting new or expanded pesticide registrations for SWD
- Development of educational material on SWD for growers, extension agents, and others

Participation in the survey is voluntary. The survey does not collect personally identifying information. Data may be summarized by state, crop, farm size, or farm type, but individual survey responses are confidential and will never be shared. Summaries of aggregated survey data will be publicly available on our project website, and will also be available by request.

Funding for this project, *Sustainable Spotted Wing Drosophila Management for US Fruit Crops*, was provided by the National Institute of Food and Agriculture, U.S. Department of Agriculture Specialty Crops Research Initiative under Agreement No. 2016-51181-24252.

The survey should be completed by the person (age 18 or older) who is responsible for making pest management decisions for this growing operation.

If you have questions about the survey, please contact Hannah Burrack <u>at hjburrac@ncsu.edu</u>, or Jean-Jacques Dubois at <u>jbdubois@ncsu.edu</u>

If you have read the above information, are responsible for making pest management decisions for the operation, are age 18 or older, and you agree to take the survey, please check here. \Box

INSTRUCTIONS FOR COMPLETING THE SURVEY

- > Please answer all questions unless directed to skip based on previous answers.
- > Select one response for each question unless directed to "Select all that apply."
- ➤ If you don't know the answer or the question is not applicable to your situation, please check DK/NA (Don't Know/Not Applicable/Prefer Not to Answer).
- > Instructions for each question are listed in [brackets in bold font.].



IMPACT OF SWD AND ECONOMICS	

- **1.a.** For the crops listed below, answer A and B:
 - **A.** Please indicate the crops you have grown in the last 10 years.
 - **B.** For each crop selected in A, indicate the number of acres of this crop grown in 2016. Please enter whole numbers or fractions to 2 decimal places (e.g., 1, 1.25, 2, 3, .66, etc.)

[Select each crop grown in the past 10 years. For each crop selected, indicate the number of acres grown in 2016.]

acres grown in 2	010.]			
	Crop	A.	В.	
	Стор	Grown in Past 10 Years?	Number of Acres Grown in 2016	DK/NA
Blueberries	a. High Bush	🗖		
	b. Rabbiteye			
	c. Wild			
Raspberries	d. Fall Fruiting			
	e. Other Varieties	.		
Blackberries	f. Floricane Fruiting			
	g. Primocane Fruiting			
Strawberries	h. Spring Fruiting/June Bearing			
	i. Day Neutral/Ever Bearing			
Cherries	j. Sweet			
	k. Tart/Sour			
None of the Above				
	If you grew any of th	e crops listed abo	ove, skip to Q2 on t	he next page.
	If you selec	ted "None of the	Above," continue t	o Q1b below.
1b. During the last ten y	years, did you grow any other crop	os on which SWE) was found?	
	Yes [Continue to Q2, ne	xt page]		
	No			
		Don't I	Know	

If "No" or "Don't Know" to Q1b, that concludes the survey.

The remainder of the survey is targeted toward berry growers or growers who have found SWD on other crops.

Thank you very much for your participation! There is no need to return this survey.

IMPACT OF SWD AND ECONOMICS_____

2. For eac	h crop grown in the last 10 years, please	answ	er the	followi	ng questions:							
A.	In 2016, has SWD been found on this of	crop ir	ı your	operati	on? If "Yes" 2016, sel			f "No, skip t	o next croj	p. (If you d	idn't grow a specific crop	in
В.	When was the first year SWD was foun	nd on	this cr	op?	Record	Year or	r check DK/	NA. Contir	nue to C.			
C.	At what stage was SWD first found on	this c	rop du	iring 20					DK/NA. (Continue to	next crop. Record other	•
						n which	SWD was f	ound		C.		
	A.				В.			C+.	ago of which		First Found	
Crop	In 2016, SWD Has Been Found o	n		DK/	First Year	DK/				II SWD was	First Found	
		Yes	No	NA	Found	NA	Bloom	Fruit Set (green fruit)	Fruit Coloring	Harvest	Other [Specify]	DK/ NA
Blueberries	a. High Bush											
	b. Rabbiteye											
	c. Wild											
Raspberries	d. Fall Fruiting											
	e. Other Varieties											
Blackberries	f. Floricane Fruiting											
	g. Primocane Fruiting											
Strawberries	h. Spring Fruiting/June Bearing											
	i. Day Neutral/Ever Bearing											
Cherries	j. Sweet											
	k. Tart/Sour											
Other Crops on which			_								·	
SWD has been found			_									
[Specify]												

IMPACT OF SWD AND ECONOMICS _____

- **3.** For each crop grown in 2016, please answer the following questions:
 - A. What percentage of your product/fruit was not harvested due to SWD? [Record the percentage for 2016.]
 - B. What percentage of your product/fruit was rejected after harvest because of SWD presence? [Record the percentage for 2016. If "None" enter 0.]
 - C. What percentage of your product/fruit was rejected after harvest because it exceeded maximum pesticide residue levels? [Record the percentage for 2016. If "None" enter 0.]

	Сгор	A. Percent not harv Due to SWI		B. Percent Rejected Harvest Due to		C. Percent Rejecte to Pesticide Lo	
		%	DK/NA	%	DK/NA	%	DK/NA
Blueberries	a. High Bushb. Rabbiteye						<u> </u>
	c. Wild						
Raspberries	d. Fall Fruitinge. Other Varieties			·			
	e. Other varieties						
Blackberries	f. Floricane Fruiting						
	g. Primocane Fruiting						
Strawberries	h. Spring Fruiting/June Bearing.						
	i. Day Neutral/Ever Bearing						
Cherries	j. Sweet						
	k. Tart/Sour						
Other Crops on							
which SWD has been found							
[Specify]							















IMPACT OF SWD AND ECONOMICS

4.			O in the last 10 years resulted in increase we had losses due to SWD?	d, decreased, o	r unchanged ir	nsecticide use,	
	[Select o	ne response for eac	h crop grown.]	Chan	ge in Level of I	Insecticide Use	
		_		Decreased	Unchanged	Increased	DK/NA
		Blueberries	a. High Bush				
			b. Rabbiteye				
			c. Wild				
		Raspberries	d. Fall Fruiting				
			e. Other Varieties				
		Blackberries	f. Floricane Fruiting				
			g. Primocane Fruiting				
		Strawberries	h. Spring Fruiting/June Bearing				
			i. Day Neutral/Ever Bearing				
					<u> </u>		
		Cherries	j. Sweet				
			k. Tart/Sour				
		Other Crops on					
		which SWD has been found					
		[Specify]					

If ALL varieties "Stayed the Same," skip to Q6.

If ANY variety "Increased" or "Decreased," continue to Q5.

















Impa	CT	OF	SWD	AND	ECO	ONC	MICS
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5.	If insecticide u	use has increas e	ed or decreased	, please answe	er the following	questions

For each crop grown in 2016, regardless of whether or not you had crop loss due to SWD:

- A. How many sprays per season did you apply in years before SWD appeared, and in 2016? [If Before SWD and 2016 are "0" skip to the next crop.]
- B. Did the cost of insecticides increase, decrease, or stay the same?
- C. What was the dollar amount of the change? [Round to nearest dollar. If no change, record \$0.]

[For each cro	p selected in A, answer B and C.]	Α.	Number	of Sprays		B. Change in Cost per Acre				C. Total Cost of Change	
	Crop	Before SWD	DK/NA	In 2016	DK/NA	Increase	Decrease	No Change	DK/NA	Dollar Amount	DK/NA
Blueberries	a. High Bush									\$	
	b. Rabbiteye									\$	
	c. Wild									\$	
Raspberries	d. Fall Fruiting									\$	
	e. Other Varieties									\$	
Blackberries	f. Floricane Fruiting									\$	
	g. Primocane Fruiting									\$	
Strawberries	h. Spring Fruiting/June Bearing									\$	
	i. Day Neutral/Ever Bearing									\$	
Cherries	j. Sweet									\$	
	k. Tart/Sour									\$	
Other Crops on which										\$	
SWD has										\$	
been found [Specify]										\$	
v -										\$	

7.	Please indicate the percent change in cost. [Enter number. See instructions below	ow.]
		%
	Don't Know	

RECORDING PERCENT CHANGE:

If your cost doubled, enter '100%'; if it tripled, enter '200%.' For example:

- If I had 50 and now I have 100, that's a 100% increase.
- If I had 50 and now I have 150, that's a 200% increase.
- If I had 50 and now I have 200, that's a 300% increase, etc."

	your bearing acreage due at least in part to SWD? you eliminated completely and "0%" if you have SWD.]	Percent Reduction	DK/N
Blueberries	High Bush	%	
	Rabbiteye	%	
	Wild	%	
Raspberries	Fall Fruiting	%	
	Other Varieties	%	
Blackberries	Floricane Fruiting	%	
	Primocane Fruiting	%	
Strawberries	Spring Fruiting/June Bearing	%	
	Day Neutral/Ever Bearing	%	
Cherries	Sweet	%	
	Tart/Sour	%	
Other Crops on which SWD has been found		%	
[Specify]		%	
		%	
		%	

9.	Have you exper		ed any other impacts due to SWD?	
- •			Yes [Continue to Q10]	
			No [Skip to Q11]	
			Don't Know / Not Applicable [Skip to Q11]	
			Don't Know/ Not Appacable [5Klp to Q11]	
10.	Please describe	othe	r impacts of SWD that you have experienced.	
İ				
İ				
İ				
Ì				
Dnad	ericee/Decrici	me i	USAGE (2016 SEASON)	
11.	Which of the for [Select all that		wing did you use to manage SWD in 2016, whether or not SWD was a proble. ly.]	m?
	Insecticides	a.	Insecticides applied pre-harvest	
		b.	Insecticides applied during harvest	
		c.	Insecticides applied post-harvest	
	Other	d.	Mass trapping to kill adults	
	Methods	e.	Exclusion netting	
		f.	Monitoring adults with traps	
		g.	Increased harvest frequency	
		h.	Post-harvest sorting	
		i.	Post-harvest cold storage	
		j.	Sanitation	
		Oti	her [Specify up to two]	
			1)	
			2)	
		1.		
_		k.		U
			Don't Know / Not Applicable [Skip to Q19]	

If you used insecticides (selected a, b, or c in Q11), continue to Q12

If you did not use insecticides (d - j) or Other, skip to Q19.

	CTICES/PESTICIDE USAGE (2016 SEASON)						
12.	If you used insecticides during the 2016 season:						
	To what extent did you follow a pre-set, calendar-based spraying schedule for SWD?						
	100% Preset, Calendar-Based						
	Mostly Preset, Calendar-Based						
	About Half and Half						
	Mostly Separate Decision Each Time						
	100% Separate Decision Each Time						
	Don't Know / Not Applicable						
	If you used less than 100% preset calendar-based spray, continue t	o Q13.					
	If you used 100% preset calendar-based spray, skip t	o Q16.					
13.	If you used less than 100% calendar-based decisions, was this because:						
	I only use insecticides when needed [Skip to Q15]						
	I wanted to schedule treatments but I was not able to [Continue to Q14]						
	I was concerned about risks of calendar treatments [Skip to Q15]						
	Don't Know / Not Applicable [Skip to Q16]						
14.	If you used less than 100% preset calendar-based spray:						
	Why were you not able to schedule treatments?						
	[Select three factors from the list and/or from "Other Factors." Skip to Q16]						
	a. It could not be fit in the schedule						
	b. Rainfall disrupted the timing of my sprays						
	c. Concerns about pesticide residues for export						
	d. It was too close to the Pre Harvest Interval						
	e. Cost of Insecticide						
	Other Factor(s) in the Top Three [Specify]						
	f						
	g						
	h 🗅						
	Don't Know / Not Applicable						

Skip to Q16.

I KAC	TICES/PESTICIDE USAGE (2	010 SEASON)						
15.	What risks were you concer	ned about? [Select all that apply.]						
		a. Concerns about pesticide residues for export						
	b. Concerns about insect resistance							
	c. Cost of Insecticide							
	d. Personal concern for customer exposure							
		e. Personal concern for operator exposure						
		Other [Specify]	_					
		Don't Know / Not Applicable						
16.	When did you start applying in	nsecticide to control SWD?						
	, ,,,							
		Fruit Set (green fruit)						

		B 1 11111 1 1						
		D 07.0 . 17.1						
	Reports from Extension Office							
	Information from Neighbors							
		Other [Specify]	_					
		Don't Know / Not Applicable						
	1. 1. 0							
17.		ly insecticide to control SWD?						
		sistently.						
		we skipped some weeks when weather or harvesting interferes						
	Bi-weekly, b	out we skipped some sprays when weather or harvesting interferes						
	No set sched	ule. Completely dependent on weather						
	When I had	time and it didn't interfere with picking						
	Other Specif	y]						
		Don't Know / Not Applicable						
18.	Which of the following insection	ide application methods did you use for SWD? [Select all that apply.]						
10.								
		a. Plane.						
		b. Drone						
		c. Ground application						
		d. Backpack sprayers						
		e. Overhead irrigation						
		Other [Specify]						
		Don't Know / Not Applicable						

19.	Please indicate the monitoring methods you used for SWD in 2016. [Select all that apply.]	
19.	Flease indicate the monitoring methods you used for SWD in 2010. [Select an that apply.]	
	a. Traps	
	b. Salt or Sugar Test	
	c. Fruit Sampling /Smash fruit to count larva	
	d. Crop Consultant	
	e. Extension Agent Reports	
	f. Did not monitor for SWD	
	Other [Specify]	
	g	
	h	
	Don't Know / Not Applicable	
	If you monitored to SWD (options a-e above): Skip t	o O21
	If you did not monitor for SWD (option f above): Continue t	
	If you did not monitor for 5 112 (option 1 asove), contained	- Q
20.	Why didn't you monitor? [Select all that apply.]	
	a. Too expensive	
	b. Managed preventively	
	c. Too difficult to ID flies/larvae	
	Other [Specify]	_
		_
	Don't Know / Not Applicable	
21.	Which post-harvest practices did you use in 2016? [Select all that apply.]	
	a. Fruit was taken directly to packing house or distributor	
	b. Fruit was sorted while picking	
	c. Fruit was sorted after picking by hand	
	d. Fruit was sorted after picking by machine	
	e. Fruit was stored in cold storage	
	f. Fruit was picked by consumers (You-Pick)	
	Other [Specify]	_
		_
	Don't Know / Not Applicable	

PRACTICES/PESTICIDE USAGE (2016 SEASON)						
22.	In the 2016 growing season, what did you do with infested fruit? [Select all that apply. If you found no infested fruit, select Not Applicable.]					
		a.	Discard on site/throw on ground			
		b.	Discard away from crop field			
		c.	Solarize (cook in black trash bag left in the sun)			
		d.	Feed to animals on my farm or another farm			
		e.	Process for juice or other product			
		Othe	er [Specify]			
			Don't Know / Not Applicable			

USE AND KNOWLEDGE OF SWD CONTROL PRACTICES __ 23. [To the best of your knowledge, please indicate whether you believe each statement to be true or false.] In your region: True **False** DK/NA SWD are only active in the warmer growing months/growing season... b. SWD are active year-round SWD are more active in areas of high humidity/moisture..... c. d. SWD are less active in areas of high humidity/moisture..... e. SWD can infest only ripe fruit..... f. SWD can infest fruit once it starts to ripen SWD overwinter as adults g. SWD overwinter as immatures (eggs, larvae, and/or pupae) h. i. SWD populations are local within a state or region j. SWD populations move throughout North America..... k. SWD do not use hosts outside of crop fields..... l. SWD use a narrow range of hosts that are similar to the crop hosts (e.g. wild blackberry) SWD use a broad range of hosts that may or may not be similar to crop hosts

USE AND KNOWLEDGE OF SWD CONTROL PRACTICES

24.	[To the best of your knowledge, please indicate whether you believe each statement to be true or false for SWD.]								
			True	False	DK/NA				
	a.	Insecticides currently used work the same throughout North America							
	b.	Insecticides have different efficacy depending on crop							
	c.	Insecticides have different efficacy depending on application technology (e.g. aerial vs. ground-based sprays)							
	d.	Insecticides have differences in longevity depending on climatic region							
	e.	Insecticides that deter egg laying but do not outright kill adult SWD are not as effective as those that kill on contact							
FARM	FARM INFORMATION								
25.	Where is/are your farm(s) located? [Record State(s). If outside US mainland, record location.								
	US State(s)								
	Other Location(s								
	Prefer Not to Answer								
26.	How is yo	our fruit sold? [Select all that apply.]							
		a. Wholesale, Export							
		b. Wholesale, Domestic							
		c. Direct market (e.g. You-Pick, Farmers Market, Farm	Stand).						
		Other [Specify]							
		Prefer Not to An.	swer						
27.	What best	describes your farm? [Select all that apply.]							
		a. Conventionalb. Organic		_	_				
	b. Organic □ c. Transitional □								
		d. No spray							
		e. Some conventional, some organic)				
		Other [Specify]	swer						

FARM	M INFORMAT	TION					
28.	Is your fruit	used for:	[Select all th	at apply.]			
			a. Fresh r	narket			
			b. Frozen	products			
			c. Proces	sed products			
			Other [Specif	cify]			
				Prefer Not to Answer			
29.				pest management decisions for your farm? [Select one ibe in Other.]			
		Owner					
		Farm ma	nager				
	A staff member who is dedicated primarily to pest management decision-making						
	Independent consultant						
		Chemical	al dealer representative				
		Other [S]	pecify]				
				Prefer Not to Answer			
30.	How do you	u prefer to 11	to receive inf with "1" as th	ormation about pest management? [Rank the following in the top preferred method.]	n order of		
				Source	Rank		
			a.	Text messaging			
			b.	University or Extension website			
			c.	Industry website.			
			d.	Other internet source			
			e.	Social media (Facebook, Twitter, etc.)			
			f.	Ag Chemical Guide for my state			
			g.	Email			
			h.	Production guides/pest bulletins			
			i.	In-person meetings with Extension agent			
			j.	Chemical dealer			
			k.	Crop consultant			
			Oti	her [Specify]			
				Prefer Not to Answer	П		

FARM	M INFORMAT	ΠΟΝ	
31.	to 6 in order	ing to apply insecticide, what sources of information do you use? [Rank the following or of how important they are in your decision with "1' as the most important source. Setant sources of information.]	
		Source R	ank
		a. Advice from Extension agent or specialist	
		b. Advice from chemical dealer	
		c. My state's Ag Chemical Manual.	
		d. Other growers	
		e. Advice from independent consultant	
		f. Internet	
		Other Sources [Specify]	
		Prefer Not to Answer]
32.		oics do you most need information? [Rank the following in order of importance from 1 to ost important topic. Specify other important topics.]	7 with
		Source R	ank
		a. SWD biology	
		b. Forecasting SWD risk	
		c. Resistance to insecticides	
		d. Scouting	
		e. Insecticide efficacy	
		f. Non-chemical SWD management	
		Other Topics [Specify]	
		Prefer Not to Answer	
33.		u prefer to receive training from extension about pest management/? [Rank the follow portance from 1 to 6 with "1" as the most important topic. Specify other needed training.]	ving in
		Source R	ank
		a. Publications	
		b. Website	
		c. Webinar	
		d. Field Days	
		e. Extension meetings	
		f. Mobile App	
		Other Needed Training [Specify]	
		Prefer Not to Answer]

GM CONTROL METHODS

It is possible that technologies could genetically modify the SWD to eliminate it locally. This technology would only be used once a permit from USDA was obtained, certifying the technology did not pose a significant risk to human health or the environment. For this technology to be effective, it would have to be deployed 'areawide', meaning all farms and SWD-susceptible crops within a defined area would be affected by a release.

34.	To what extent would you support research and development of such technologies?						
				Fully			
				Somewhat	П		
				Not at all	_		
				[Continue to Q35]			
				Prefer Not to Answer			
35.	If you do	not	support the	ese GM technologies, please indicate why. [Select all that apply.]			
		a.	This sou	nds too expensive			
		b.	The bene	fits are too uncertain.			
		c.	There are	e more effective approaches available			
		d.	There are	e cheaper approaches available.			
		e.		erned that I would get a lower price for my fruit if such technologies d to prevent SWD infestations			
		f.		erned that using these technologies would pose too much risk to onment.			
		g.		personally against them, but my customers or the public in general			
		h.		te the 'areawide' impact of this technology and/or I don't want to lose f how SWD is managed on my farm.			
		О	ther [Speci	fy]	_		
		_			_		
		_			_		
		-			_		
		-			_		
				Prefer Not to Answer			

INTEGRATED PEST MANAGEMENT										
36.	Please indicate your level of a	greement with t	he following	statements:						
		Level of Agreement								
		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Know/ Not Applicable			
a.	IPM takes too much effort.				٥					
b.	The advantages of IPM outweigh the disadvantages.									
c.	Extension recommendations are trustworthy.									
37.	Please rate your level of know	ledge and intere	est in IPM:							
	,	<u>v</u>		Rating			Don't			
		Well Below Average	Below Average	Average	Above Average	Well Above Average	Know/ Not Applicable			
a.	Compared to other growers, my knowledge of IPM is									
b.	Compared to other growers, my interest in IPM is									
BAG	BACKGROUND INFORMATION									
38.	What is your age?	[Enter age in	n years. Rou	ınd to the ne	arest year.]					
				Prefer N	lot to Answer					
39.	What is your current primary	occupation?								
37.	what is your current primary	occupation.	a.	Grower						
				Other [Specif						
					lot to Answer					
40.	40. How many years have you spent in your current primary occupation? [Enter number of years. Round to the nearest year. If less than 1 year, please enter "0"]									
				Prefer N	lot to Answer					
41.	What is your gender?									
	A man and a man Boundary		Fema	le			🗖			
			Male.				🗖			
			<u> </u>	Prefer i	not to Answer					

BACKGROUND INFORMATION Are you of Hispanic, Latino, or Spanish origin? Yes No...... 🗖 Prefer not to Answer With which race do you most identify?) African American/Black...... American Indian/Alaskan Native Asian/Pacific Islander Caucasian/White..... Other [Specify] Prefer not to Answer 44. What educational level have you completed? Less than High School High School Graduate/GED □ Some College Associate's Degree College Graduate Graduate School or Higher Prefer not to Answer

That concludes the survey. Thanks for your participation!

Please return the survey before March 30 by fax (919-515-3642) OR mail to:

Center for Urban Affairs & Community Services (SWD Survey)

NC State University

Campus Box 7401

Raleigh, NC 27695-7401

Please do not include your name on the survey or on the envelope.