



Reduction of Tomato Disease

COUNTY EDUCATOR: Jeffrey Mizer, Snyder County

PROGRAM

Reduction Bacterial Canker of Tomato Program

The extension educational program, designed to reduce the intensity of a tomato disease, was conducted in six counties over a period of 10 years. The agent employed multiple delivery methods including farm visits, meetings, USDA and university guides, fact sheets, pamphlets, Penn State books, and newspaper columns. Horticultural agents in the other counties helped to advertise the program.

PROGRAM OBJECTIVES

Impact Objectives

As a result of Extension's educational effort, tomato growers will:

- report a decline in the intensity of the disease over the last three years
- select and use recommended varieties of tomatoes
- use recommended growing systems
- use recommended management practices

Delivery Method Objectives

As a result of extension's educational effort, tomato growers will:

- indicate that they have found Extension books, guides, fact sheets, meetings and visits "very valuable"
- own copies of two specific extension publications
- find Extension sources of information as valuable or more valuable than other sources of information on this topic

EVALUATION STRATEGY

Design: The evaluation had three purposes. The first purpose of the evaluation was to assess whether extension met the objectives. The second purpose was to evaluate whether more work is needed to reduce tomato bacterial canker. And the third purpose was to find out what topics extension should focus on in the coming years, if tomato canker were no longer a problem.

The agent designed an on-farm interview for tomato growers on farms where baseline data existed from scientific tests that confirmed the presence of the disease on the farm. This sampling technique was not random, and therefore, the results could not be generalized to all growers in the area. This sampling technique, called purposive sampling, insured however, that before-after data would be available for each farm. Having before-after data provides Extension *with a basis for claiming credit* that it played a role in the changes that occurred on those farms.

The evaluation of this program offers many advantages but also a disadvantage or two. The advantages help both the agent and the grower.

- An on-farm interview to collect evaluation data allows an agent to get the data they need. In this study, all growers participated in the interview. If a mail survey had been used, the agent believes the participation rate would have been low.
- An on-farm interview to collect evaluation data reinforces that the Extension agent is interested in the problems of the growers in the county. The evaluation interview can be considered a public relations tool.
- An on-farm interview to collect evaluation data demonstrates that Extension is doing something important. When such a systematic study occurs, the growers feel like they are part of something, contributing to science and Penn State. Under these circumstances they are willing to spend time to help the industry. Evidence of this contribution was demonstrated by the fact that all growers consented to have the data compared to their original baseline data collected years ago.
- An on-farm interview to collect evaluation data allows personal contact with a grower with whom the agent wants to continue a strong relationship.
- An on-farm interview to collect evaluation data allows the agent an opportunity to observe tomato plots and other parts of the farm for potential needs of the grower.
- The on-farm interview also has advantages for the grower that would not be present in a mail survey. The on-farm interview affords the grower an opportunity to ask questions after the interview about the tomato disease.
- An on-farm interview to collect evaluation data gives the grower an opportunity to explain some of the barriers they encountered in adopting the recommended practices, something not likely to happen in a mail survey since it would require a lot of writing by the grower.

Two disadvantages of this evaluation method for the agent are the time it took to be on the farms and the number of interviews that were possible compared to the potential response of a mail survey. However, the agent believed that advantages outweighed the disadvantages for the long-term benefit of the Extension program.

Solicitation: The agent sent a personal letter a month before the visit to the farm. A copy of the letter can be obtained from the agent by e-mail.

Measures: The specific evaluation questions in the interview below, carry out the purposes of the evaluation and measure the degree to which the impact objectives and delivery methods objectives were achieved. In addition, the evaluation questions measured the degree to which the growers believe extension should focus on other topics in the upcoming years.

Sampling Design: A purposive sample of tomato growers was selected for the interview. All the growers had been visited at one time or another, had the disease confirmed on their farms, and had filled out earlier surveys on disease intensity and growing practices.

DATA COLLECTION METHOD: ON-FARM INTERVIEW

[Interviewer: Introduce yourself and ask the vegetable grower if it is a convenient time for you to interview him or her for about 15 minutes].

For over a decade now, Bacterial Canker of Tomato has been a troublesome disease in central Pennsylvania. We would like to find out how widespread the problem is at this time, the sources of information that may have helped you manage the problem on your farm, and information that would help us plan future educational programs for you and other producers like yourself. Thank you for spending this time to help us improve our extension efforts.

Part 1	Did you grow tomatoes in	2000	NO	YES
		2001	NO	YES
		2002	NO	YES

[Interviewer: For each of the last 3 years the producer has grown tomatoes, ask the following questions].

EXTENDED IMPACT QUESTIONS 1. How would you describe the disease level on your farm in each of the last 3 years. I am interested in knowing the level of both plant injury and also fruit spotting. For each growing season, starting with 2002, please tell me how you would describe first, the plant injury, and then, the fruit spotting. The descriptions are: *none, light, moderate, severe, unsure* and *did not grow*.

For this growing season, 2002, would you say the **plant injury** is: (circle number)

- NONE1
- LIGHT2
- MODERATE3
- SEVERE4
- UNSURE5
- DID NOT GROW6

For this growing season, 2002, would you say the **fruit spotting** is: (circle number)

- NONE1
- LIGHT2
- MODERATE3
- SEVERE4
- UNSURE5
- DID NOT GROW6

For last growing season, 2001, would you say the plant injury was: (circle number)

- NONE1
- LIGHT2
- MODERATE3
- SEVERE4
- UNSURE5
- DID NOT GROW6

For last growing season, 2001, would you say the fruit spotting was: (circle number)

- NONE1
- LIGHT2
- MODERATE3
- SEVERE4
- UNSURE5
- DID NOT GROW6

Let's go back another year.

For the growing season, 2000, would you say the plant injury was: (circle number)

- NONE1
- LIGHT2
- MODERATE3
- SEVERE4
- UNSURE5
- DID NOT GROW6

Let's go back another year.

For the growing season, 2000, would you say the fruit spotting was: (circle number)

- NONE1
- LIGHT2
- MODERATE3
- SEVERE4
- UNSURE5
- DID NOT GROW6

Part 2

MANAGEMENT PRACTICES

1. During each of the last three growing seasons—2002, 2001, and 2000— tell me which of the following growing systems you have used? [Interviewer: read the entire list, then go back and say, "For the year 2002, what system did you use?" and read through the complete list again until they identify the system. Then circle the answer and go to the next year].

<u>Growing System</u>	<u>2002</u>	<u>2001</u>	<u>2000</u>
BASKETWEAVE TRELLIS NO SUCKERING	B-N	B-N	B-N
BASKETWEAVE TRELLIS SUCKERING	B-S	B-S	B-S
CAGES-NO SUCKERING	C-N	C-N	C-N
CAGES-SUCKERING	C-S	C-S	C-S
STAKES (ONE PER PLANT) SUCKERING	S-S	S-S	S-S
GROUND BED NO SUCKERING	G-N	G-N	G-N
OTHER (PLEASE DESCRIBE)	O	O	O
DID NOT GROW TOMATOES THIS SEASON	N	N	N

BEFORE -AFTER QUESTION

2. In each of the last 3 years, can you recall what varieties you have grown? Just name the leading three. [Interviewer: 2.a. name each year and record up to 3 varieties. Then go to part 2b].

↓

YEAR	VARIETY (IF KNOWN)
2. a. 2002.....	a. _____
	b. _____
	c. _____

↓

2.b. Can you recall the seed company from which you purchased the seed? [Interviewer: name the year and then read off the name of each variety named in question 1.a.; record each seed company named].

BEFORE -AFTER QUESTION

YEAR	SEED COMPANY (IF KNOWN)
2002.....	a. _____
	b. _____
	c. _____

BEFORE -AFTER QUESTION

YEAR	VARIETY (IF KNOWN)	SEED COMPANY (IF KNOWN)
2001	a. _____	a. _____
	b. _____	b. _____
	c. _____	c. _____
2000	a. _____	a. _____
	b. _____	b. _____
	c. _____	c. _____

3. Now I am going to read a list of growing practices that can be used with bacterial canker. Tell me if you have used the growing practice the last year you grew tomatoes, even if it was before 2000?

QUESTION ON
MANAGEMENT
PRACTICE
CHANGE

a. change to less problematic varieties (or at least seem to be less of a Problem)	YES	NO	
b. request seed company to treat seed for bacterial canker	YES	NO	
c. treat seed yourself with bleach (sodium hypochlorite) solution	YES	NO	
d. treat seed yourself with acetic acid solution	YES	NO	
e. treat seed yourself with hot water	YES	NO	
f. disinfect greenhouse and flats	YES	NO	
g. disinfect irrigation lines	YES	NO	
h. use streptomycin on transplants	YES	NO	
i. spray Actigard after transplanting	YES	NO	
j. spray copper compounds after transplanting	YES	NO	
k. rotate crops—tomatoes only every 4 or more years	YES	NO	
l. purchase only certified transplants	YES	NO	
m. use new stakes each year	YES	NO	NA
n. disinfect stakes with chlorine bleach	YES	NO	NA
o. disinfect cages with fire	YES	NO	NA
p. disinfect cages with chlorine bleach	YES	NO	NA
q. work in fields only when plants are dry	YES	NO	
r. refrain from suckering tomatoes	YES	NO	
s. replace all plastic mulch and drip tape each year	YES	NO	NA
t. quit growing tomatoes due to bacterial canker problems	YES	NO	
u. Other (please list) _____	YES	NO	
v. Other (please list) _____ _____	YES	NO	

Now, let's talk about where you might have gotten information about bacteria canker.

4. Now I am going to read a list of growing practices that can be used with bacterial canker. Tell me if you have used the growing practice the last year you grew tomatoes, even if it was before 2000?

SOURCES OF INFORMATION

4.a. Since you first had to deal with bacterial canker, tell me how valuable each of the following sources has been to you for learning how to deal with the disease. Tell me if each has been "not valuable," "somewhat valuable," or "very valuable."

"Identifying Diseases of Vegetables" picture book by Alan MacNab	NOT VALUABLE1
	SOMEWHAT VALUABLE2
	VERY VALUABLE.....3
Penn State Commercial Vegetable Production Guide	NOT VALUABLE1
	SOMEWHAT VALUABLE2
	VERY VALUABLE.....3
Fact sheets from Cooperative Extension	NOT VALUABLE1
	SOMEWHAT VALUABLE2
	VERY VALUABLE.....3
Extension meetings	NOT VALUABLE1
	SOMEWHAT VALUABLE2
	VERY VALUABLE.....3
Visits from county agents/ university specialists	NOT VALUABLE1
	SOMEWHAT VALUABLE2
	VERY VALUABLE.....3
Chemical company representatives, dealers	NOT VALUABLE1
	SOMEWHAT VALUABLE2
	VERY VALUABLE.....3
Other growers	NOT VALUABLE1
	SOMEWHAT VALUABLE2
	VERY VALUABLE.....3
Other not mentioned (please list): _____	NOT VALUABLE1
	SOMEWHAT VALUABLE2
	VERY VALUABLE.....3

SOURCES OF INFORMATION

4.b. Do you happen to own a copy of "Identifying Diseases of Vegetables" picture book by Alan Macnab?

YES.....1
NO.....2
NOT SURE.....3

4.c. Do you happen to own a copy of the 2002 Commercial Vegetable Production Recommendations?

YES.....1
NO.....2
NOT SURE.....3

Part 3 Program Planning

1. Now I am going to read to you five areas in which extension agents do educational programs. For each area I would like to know in what ways, if any, Penn State Cooperative Extension can provide educational experiences that will help you farm more safely and profitably in the area of Pest Management:

NEEDS ASSESSMENT QUESTION

- a. In what ways, if any, can Penn State Cooperative Extension provide educational experiences that will help you farm more safely and profitably in the area of Labor (employees) Management.
- b. In what ways, if any, can Penn State Cooperative Extension provide educational experiences that will help you farm more safely and profitably in the area of Planning Farm Succession.
- c. In what ways, if any, can Penn State Cooperative Extension provide educational experiences that will help you farm more safely and profitably in the area of Production Practices.
- d. In what ways, if any, can Penn State Cooperative Extension provide educational experiences that will help you farm more safely and profitably in the area of Processing and Marketing Farm Products.
- e. In what ways, if any, can Penn State Cooperative Extension provide educational experiences that will help you farm more safely and profitably in the area of Processing and Marketing Farm Products?
- f. Can you think of any other areas in which Penn State Cooperative Extension can provide educational experiences that will help you farm more safely and profitably?

- 1. YES
- 2. NO

For this new area _____, in what ways, if any, can Penn State Cooperative Extension provide educational experiences that will help you farm more safely and profitably?

2. What days/ nights of the week are you able to attend meetings?

PROGRAM
DELIVERY
QUESTIONS

MONDAY.....1
TUESDAY.....2
WEDNESDAY.....3
THURSDAY.....4
FRIDAY.....5
NOT LIKELY TO ATTEND.....6

3. What time of day are you most likely to attend meetings?

DOESN'T MATTER.....1
MORNING.....2
AFTERNOON.....3
EVENING.....4
NOT LIKELY TO ATTEND.....5

DEMOGRAPHIC
QUESTIONS

4. Do you have a private pesticide license?

YES 1
NO 2

This questionnaire is being conducted to determine if there has been any overall change in disease occurrence or growing practices in our region since 1988. Would you be willing to provide your name and address so that we can compare the current bacterial canker situation with the first time you and others first reported bacterial canker? If so, please sign this survey and write your address below. The individual data will be kept strictly confidential; only Dr. Alan MacNab, vegetable pathologist, and Jeff Mizer, county agent, will see individual data. The data will be used only in summary form. No names will be used.

Signature _____ Address _____

City _____ State _____ Zip _____

USE OF THE DATA

In conducting this evaluation, the agent provided himself with hard data that demonstrated achievement of both the impact objectives and the delivery method objectives. The agent also provided hard data to demonstrate the need for more research, thus producing a well rounded study:

IMPACT OBJECTIVES

- growers who have made many important and productive changes and growers Who were too passive, and had not made many changes.

IMPACT OBJECTIVES

- practice changes that were readily adopted and those that need to be emphasized more in future educational efforts.

DELIVERY METHOD OBJECTIVES

- use and ownership of Penn State and other publications.

FUTURE RESEARCH

- some areas within the tomato bacterial canker disease that need further applied research to determine why we are Getting certain observations.

For further information about the evaluation, please contact Jeff Mizer (jwm5@psu.edu). This Web site is copyrighted by the Pennsylvania State University. The information may be used for educational purposes but not sold for profit.