



Threats and Challenges

Science, Mathematics and Language Arts

Brief Description:

In the other citrus lessons, the students have learned how to grow, harvest, process, pack and promote Florida citrus in their roles as growers in a cooperative. They will now face developments thrown at them by Mother Nature, namely threats from pests and diseases such as citrus canker and the Mediterranean fruit fly.

Objectives: Students will be able to:

1. Solve real-world citrus problems.
2. Design a research project to seek a solution to a real-world problem in the citrus industry.

Life Skills:

1. Gathering and Analyzing Information
2. Problem Solving

Time:

30 minutes, plus time for research

Materials:

- Computers with Internet access
- Reference materials
- News articles
- Copies of *Citrus Canker* and *Mediterranean Fruit Fly*

Preparation:

- Make copies of *Citrus Canker* and *Mediterranean Fruit Fly*.
- Arrange for use of computers with Internet access.

Vocabulary:

- citrus canker
- Contagious
- Mediterranean fruit fly
- Quarantine
- Virulent
- Maladies
- Eradicated
- Eradicated

Background:

Agriculture is a risky business. Growers never know whether they will have a good season or not. Will prices rise or fall? How will the weather be this year? Will there be floods, hail, tornadoes, hurricanes, freezes or picture perfect weather?

On top of these risks come diseases and insects that can devastate a crop, herd or farm economy. Two of the biggest menaces to Florida citrus are citrus canker and the Mediterranean fruit fly. These two maladies have been in the news frequently. Both maladies were brought into Florida from outside the U.S. Both are capable of wiping out the state's citrus industry, Florida's largest and best-known crop. It is important for Florida's citizens to understand their potential danger to Florida's second largest industry. Detailed information about each is in the student handouts.

The students will learn how critical it is to their livelihood for the Florida Department of Agriculture and Consumer Services and the U.S. Department of Agriculture to control these maladies should their groves become infected or infested.

Introduction:

1. Ask the students if they have heard of either Mediterranean fruit fly or citrus canker.
2. If so, discuss what they have heard or read.
3. If not, indicate what you have heard through the mass media.
4. As a class, speculate what would happen if an insect or disease were to wipe out Florida's citrus industry.



Citrus Canker

Activity One:

1. Hand out copies of *The Mediterranean Fruit Fly* and *Citrus Canker*, one per student.
2. Instruct students to get with the co-op group they formed during *From Grove to You*, if you have not done this lesson yet put the class into groups of 4 students. Divide the groups in half. Have half of the groups pretend that their groves have been hit with a Med Fly infestation and the other half will be hit with a canker infection.
3. Quiz students on the particulars of Med Fly and Canker. What does canker look like? How does Canker affect citrus trees and fruit? What does a Med Fly look like? How does Med Fly affect citrus fruit? To how many other fruits, vegetables and plants is the Med Fly attracted?
4. Now have students figure out the economic impacts these maladies cause.

Citrus Canker

Answers: 670 boxes will not be harvestable (335/acre for 2 acres=670). At \$3.00 a box the owner would have made **\$2,010** from these boxes. The owner will harvest **3,112** boxes (389 for 8 acres= 3,112.) At \$3.00/ box owner will make **\$9,336**. The additional cost of BMP's is **\$1,440** (180/acre for 8 acres=\$1,440).

Mediterranean Fruit Fly

Answers: The quarantine will last until November 15, three life cycles after the last fly is found. Students in the quarantine area can either wait until after November 15 to harvest their fruit or ground treat their fruit before picking it at a cost of \$5 an acre. That's an extra \$20,000 they must pay to treat a 4,000-acre grove. They also must get tarp trailers in which the fruit is transported and get special approvals for moving it. If Med Fly isn't eradicated and if Japan banned Florida grapefruit, grapefruit growers wouldn't get paid because Japan is their primary market.

Mediterranean
Fruit Fly



Activity Two:

1. Ask the students to imagine that they are scientists working to solve these two citrus pest problems. They may choose to be either an entomologist and research the Med fly, or plant pathologist and research the Citrus Canker.
2. Indicate that they need to propose a hypothesis to either control, prevent or eradicate these pests and design a research project to test their hypothesis.

Make sure their experiments include:

- Formulating A Hypothesis
- Researching The Topic
- Experimental Design
- Control and Experimental Groups
- Testing Hypothesis
- Recording Data/Observations
- Coming To A Conclusion Concerning the Hypothesis



Evaluation Options:

1. Assess the thoroughness of the students' research projects.
2. Have the students write a report on their project that includes quotes from current news articles written on one of these two problems.

Variations or Alternatives:

1. Have the students contact researchers working on these topics at the University of Florida in Gainesville.
2. Bring an Extension specialist, citrus grower or scientist to class to speak about these two citrus problems.

