

Title: Investigating Citrus Greening on Florida Citrus.

Gary Carlson
Haines City High School

Abstract:

This unit will have the students investigating Citrus greening. They first will learn about the citrus industry and the local impact of citrus in Polk County. They will take on roles to help understand how integrated citrus is in our community and present to the class. They will use the internet to research the topic to see the relevance. A scientist will be a guest speaker to inform the students on current research on Citrus Greening. The students will create questions before to ask the scientist in class. Then the students will investigate DNA and learn how PCR amplifies it for DNA gel electrophoresis. The students will learn techniques used in real laboratories and be exposed to potential careers in Biotechnology. The end of the year will wrap-up with Viral Quest, which will reinforce the skills learned throughout the year and leave the students thinking of possible careers in science.

Rational:

It is important to show students the connections from biology and real world applications. This unit is designed to introduce students to current research and how it is impacting Florida. As the unit unfolds the students will learn new techniques used in research labs today and how they could pursue a career.

Description of teaching unit or module(s), including expected outcomes

Module 1: Citrus Greening Outbreak in Florida (9/8/2011 – 9/15/2011)

Before the lesson:

The first unit of the years is basic science methods that will be a great introduction into this unit. The students will review the scientific method, which is taught every year. We will also go over how to research effectively. The students will have to take a pretest to use as base line of prior knowledge on citrus. Then there will be a brief introduction to Citrus Greening that will tie into the jigsaw activity.

Activity: Jigsaw

The jigsaw will introduce citrus to the students. First the students will group into their roles; Farmers, industry, consumers, researchers. Next, the students will break out into their communities to discuss the different views. Then each group will make a poster focused on one group of people.

Assessment:

The poster will be presented to the class and that will be the evidence of knowledge gained.

Activity: Citrus Greening Research

Each student will be given a webquest.

- ⤴ What is Citrus greening, what causes it, who does it affect, how is it diagnosed?
- ⤴ What sites were visited.
- ⤴ Create three questions for the guest speaker

Assessment:

Each student will turn their webquest with three questions for the guest speaker.

Discussion:

This will be the time to review with the class on how reliable the references are from their webquest. What are

good resources that are fact based from the other site on the internet?

Presentation: Guest Speaker

I am planning to work with the University of Florida (UF) Citrus Research and Education Center to get a scientist to come speak to my students. I have already e-mailed Dr. William Castle about having him speak on the topic. I will model how scientists work together with each other and the community. This is where my students will get a chance to ask their questions that they created on the webquest.

Activity: Post Card Summary

Each student will be given a 5x7 index card and they will write at least five sentences summarizing the Guest Speaker lecture. This will be focused toward an absent student.

Assessment: Post-test

The post-test will measure increased knowledge about Citrus Greening.

***Activity: Grafting (*I plan doing this activity during our plant unit*)**

The students will be introduced to grafting and will show how it may make the organism more resistant. The student will graft tomato plants to help understand the concept. This activity will show that this procedure works across many different species.

Module 2: Investigating the DNA of infected Citrus. (1/3/2012 1/17/2012)

This unit will start after the cells unit. The will have a basic understanding of cells and organelles. There will be another pretest and then DNA will then be introduced.

Activity: Have your DNA and eat it too.

This activity is from learn.genetics (<http://gslc.genetics.utah.edu>). The students will make their own molecule of DNA model. The students will understand the base pairing, hydrogen bonding, and over look of the molecule.

Discussion: DNA and PCR

The students will be introduced to PCR. Homework will be the PCR simulation on learn.genetics. PCR Virtual Lab (<http://learn.genetics.utah.edu/content/labs/pcr/>).

Activity: PCR Dash

This activity will be provided by CPET. This is a hands on and visual way to understand the concept.

Assessment: Post Card Summary

Each student will be given a 5x7 index card and they will write at least five sentences summarizing PCR. This will be focused toward an absent student.

Activity: DNA Sequencing

The students will learn about DNA Sequencing and use the BLAST to identify a species.

Activity: Pipette Activity

The students will understand what micropipettes are and the correct way to use one. This will be a locker provided by CPET.

Activity: DNA Gel Electrophoresis

The students will be exposed to a new technique in gel electrophoresis. The fast gels do not need any liquids

and are easy to use. This is new technology that the students need to understand. This will be a locker provided by CPET.

I plan to tell the students that we are going to help out our local citrus research center. The samples will be from our local groves and we need to know if they are infected with citrus greening.

Activity: Citrus Microarray simulation

This activity will show the students that citrus can get many different viruses. This simulation will be provided by CPET.

Assessment: Post-Test

This should show learning gains from the students.

Module 3: Viral Quest (5/14/2012 – 5/25/2012)

The students will I plan on using the two week instructions provided. The lessons will have to be modified to a block schedule, but that should not be difficult. There will be pretest and post test provided. The students will be engaged in the story provided.

Literature cited

Gabriel, D. 2011 June 14. Plants and Pathogens. ICORE 2011. University of Florida Center for Pre-collegiate Education and Training Summer Institute.

Lawrence, C. June 2011. Simulations and Web media. ICORE 2011. University of Florida Center for Pre-collegiate Education and Training Summer Institute.

Sadler, T. 2011. Viral Quest. University of Florida College of Education.

Budget and budget justification

Bio-Rad - Restriction Digestion and Analysis of Lambda DNA Kit	\$252.50
Micropipettes tips	\$35.00
Tomato seeds	\$15.00
E-Gel® 0.8% General Purpose Agarose 18-Pak http://products.invitrogen.com/ivgn/product/G501808	\$174.00
Total	\$476.50

SCIENCE LESSON PLAN

TITLE: Why is my orange, green?

KEY QUESTION(S): What can I learn from research about my question? (SC.912.N.1.1d, SC.912.N.1.1c, SC.912.N.1.1), What influence does the scientific method have on the practice of science?

SCIENCE SUBJECT: Biology Honors

GRADE AND ABILITY LEVEL: 10th Biology Honors

SCIENCE CONCEPTS: Scientific Method; Research

OVERALL TIME ESTIMATE: 1- 90min block

LEARNING STYLES: Kinesthetic.

VOCABULARY: Vectors

LESSON SUMMARY: The students will be in the media center using the internet to research Citrus Greening. Each student will be completing a web quest and summarizing what they learned.

STUDENT LEARNING OBJECTIVES WITH STANDARDS:

The student will be able to...

1. Explain what citrus greening is. **LA.910.2.2.3**
2. Who Citrus Greening is affecting.
3. Current research on Citrus Greening. (SC.912.N.1.1d, SC.912.N.1.1c, SC.912.N.1.1)

MATERIALS: Location: media center

ESSENTIAL: Each student will be using a computer with internet access.

SUPPLEMENTAL: Each student will have a web quest work sheet that they will need to complete.

BACKGROUND INFORMATION: Citrus Greening is a virus the attacks citrus. It is still a problem all over this country and is currently being researched to stop the spread of this disease.

ADVANCE PREPARATION: This is an introduction to Citrus Greening. The only thing you ready need is access to computers.

PROCEDURE AND DISCUSSION QUESTIONS WITH TIME ESTIMATES:

1. Bell work: (10 min) – list the steps of the Scientific Method and give an example of using it.
 - At this time take attendance
2. Introduction (15 min) – I will introduce research on topics and let the students know what I am expecting.
 - Go to the media center and have students log on to the computers
3. Online Research (35 min) – Pass out the Web Quest to each student and let them know they only have 35 min. online.
4. Wrap up (30 min) – Each student will write a paragraph (5 sentence minimum) for each question. Each student must also create three questions to ask a scientist. Have the students turn in there work.

ASSESSMENT SUGGESTIONS: Describe specific assessments for EACH objective:

For objective 1: Each student will respond in writing one paragraph for each question in the web quest.

For objective 2: Each student will respond in writing one paragraph for each question in the web quest.

For objective 3: Each student will create three questions that they still have on Citrus Greening. There will be a scientist coming to speak to us and that will be the time to address the questions.

EXTENSIONS:

ACTIVITIES: I am planning on having a scientist come speak to my class. I also plan on doing a jigsaw on different views of Citrus Greening.

RESOURCES/REFERENCES:

Citrus Greening: Questions and Answers. The U.S. Department of Agriculture (USDA). March 2007.
www.cdfa.ca.gov/phpps/acp/docs/usda/faq_citrus_greening.pdf 9/5/2011.

The Online Teacher Resource. Web Quest Generator, 2010. http://www.teach-nology.com/web_tools/web_quest/ 9/5/2011.

Name: _____

Subject: Biology

Teacher Name: Mr. Carlson

Date: _____

Citrus Greening



Introduction: You are helping our community by investigating Citrus Greening.

Task: Your task is to understand what Citrus Greening is. Who it affects and what is being done to correct the problem.

Process: Do not spend too much time searching through all the websites. Choose a few websites and read them thoroughly. Choose your sources wisely.

Resources: www.google.com
www.cdfa.ca.gov/phpps/acp/docs/usda/faq_citrus_greening.pdf

Evaluation: After your research is complete, write a paragraph answering each question. What is Citrus Greening? Who does it affect? What is being done?

*a paragraph is at least 5 sentences.

Conclusion: I understand that one day at the media center cannot answer all the questions about Citrus Greening. You need to create three questions to ask a scientist that you still have about Citrus Greening. We will have a scientist coming in to help us answer your questions on Citrus Greening.