Grade Level: 4

Title: What's Going On with the Strawberries (November - March)

Purpose:

The purpose of this lesson is to teach students how changes in an organism's environment can either be beneficial or harmful.

Subject Area(s) Addressed:

Science, Social Studies, Math, ELA

Common Core/Essential Standards:

Math

4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.

Science

4.L.1.1 Give examples of changes in an organism’s environment that are beneficial to it and some that are harmful.

Social Studies

4.G.1.3 Exemplify the interactions of various peoples, places and cultures in terms of adaptation and modification of the environment.
4.E.1.2 Understand how scarcity and choice in a market economy impacts business decisions.

ELA

4.RIT.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

Vocabulary:

beneficial
economic
environmental
herbicides
monitor
pesticides
vegetation

Materials Needed:

internet access
journals
chart paper
sticky notes
markers

Teaching Strategy:

Part 1: Insects

How do insects impact strawberry plants?

Show students pictures of ladybugs, garden spiders and earthworms. Ask students what these three have in common. Responses will vary. Then, explain to students that from November to March, farmers monitor their strawberry plants for pests and weeds. Have students brainstorm a list of other creatures that might be seen in a garden. Some common responses may include beetles, bugs, ants, and grasshoppers. Have students classify the creatures from the pictures as well as their list as helpful or harmful to strawberry plants. Next, have students determine if their prediction is correct by conducting research. Students will further research insects that are harmful to strawberry plants. Remind students to be aware of insects such as butterflies, who are harmless to the strawberry plant. However, the caterpillar from which the butterfly morphs may cause damage to the leaves or fruit. Also, inform students not to generalize a group of insects, such as beetles. Some beetles are harmful to the plants, while the ladybug is helpful. It eats the aphids from the leaves. Have students create an informative flyer (i.e. Microsoft Publisher) showing helpful and harmful creatures and how they help or harm the strawberry plant.

Part 2: Weeds

How do farmers control weeds?

Which method do you consider best? Why?

Another issue that strawberry farmers face is unwanted vegetation (weeds). In a previous lesson, *What's with the Water*, students learned that some farmers deliberately plant rye grass between the strawberry rows to prevent erosion. However, weeds are not welcome in the strawberry field. Some farmers use chemical herbicides to control weeds as well as pesticides to control pests on the strawberry farm. (A pest can be anything that destroys the crop. Clarify that a pest can also include larger animals, such as squirrels, rabbits, and deer.) Have students research the environmental impacts (runoff, destruction of good insects, etc.) and the economic affects (product cost, loss of plants, labor, etc.) of using chemicals to control pests and weeds. In small groups, have students present their findings. Each group should be prepared to contribute to a class chart listing the pros and cons of pesticides and herbicides. Use sticky notes to insure each group participates. Allow students to discuss their findings. This activity could extend into a debate on the use of chemicals versus natural alternatives.

Part 3: Diseases

What are some diseases that affect strawberry plants?

What are their effects?

How do farmers treat for or prevent diseases?

Strawberry plants are susceptible to diseases such as gray mold. These diseases can be detrimental to a strawberry crop. Students should research common diseases that affect strawberries in their area and what farmers do to prevent and control these diseases. Have students choose one disease and

create a multi-flow map (See resource included in Background Information) showing its causes and effects. Remind students to consider the economic impact of diseased plants. Have students collect images of healthy strawberry plants and those affected by the disease they research. Students will work in groups to create a digital poster (i.e., Glogster) explaining the causes and effects of the disease and will report their findings to the class.

Extension Activity:

Compare and contrast organic and non-organic farming practices. (If time permits and the curriculum allows, this would be an excellent activity for students to debate.)

Background Information:

During the months of September and October, strawberry farmers prepare their fields and plant their crops.After planting, during the winter months, the plants may appear dormant, though they are still green and developing roots and initiating the buds that will be next spring's flowers. During this time, strawberry farmers monitor the temperature to know when and if to apply protective coverings or irrigate (with overhead irrigation) for frost protection. If it is dry they may need to water the plants through the drip irrigation. They also monitor their plants for pests and diseases. If a disease or pest is becoming a problem, they may use control measures, such as a fungicide or pesticide. The most important insect/arthropod pest of strawberries is twospotted spider mites. They are especially interesting because one control measure involves use of predatory mites that eat the twospotted spider mites. See www.ncstrawberry.com/docs/Mite%20ID%20and%20Management.pdf

Deer are a major problem, especially in fall and winter, when they eat the foliage. Strawberry plants continue to grow all winter, making them a tasty meal for deer when not many other food plants are available. Deer also punch holes in the plastic and damage irrigation as they roam the fields. Many growers use electric fencing to keep deer out of their fields.

Major strawberry diseases in our region are botrytis, anthracnose, phytophthora, and angular leaf spot.

The following website outlines the steps to build a school strawberry garden. It also contains a timeline that details what students should be doing during the year to take care of their garden. This can be related to what is happening on the strawberry farm at the same time. http://cals.ncsu.edu/hort_sci/extension/documents/TeachFromTheGardenStrawberries.pdf

Students may follow the what farmers are doing at the blog "We Grow Strawberries" http://wegrowstrawberries.blogspot.com/?zx=2632293249196b50.

To learn more about strawberry production in North Carolina see http://strawberries.ces.ncsu.edu/strawberries-production-schedule/ and http://www.ncstrawberry.com/docs/NCStrawberryInfoforSchools.htm

The following website from the University of Illinois Extension provides good information about strawberries (though not all of it applicable to this region). http://urbanext.illinois.edu/strawberries/growing.cfm

The Field Guide for Identification of Pest Insects, Diseases, and Beneficial Organisms in Minnesota Strawberry Fields contains links at the bottom of the page to research beneficial insects such as the ladybeetle. Even though it is from Minnesota, many of the pests, diseases and beneficial insects are relevant. www.mda.state.mn.us/en/plants/pestmanagement/ipm/strawberry-guide.aspx

Cornell's Berry Diagnostic Tool is great for pest/disease detective work: http://www.fruit.cornell.edu/berrytool/

Following is a sample of the information that can be found on the **Crop Profile for Strawberries in North Carolina 2003.** "Gray mold is a serious disease in all strawberry production areas and is one of the primary diseases of concern in most years. The disease is a problem not only in the field, but also during storage, transit, and market of strawberries, due to onset of severe rot as the fruits begin to ripen. Other parts infected by the fungus include leaves, crown, petals, flower stalks, and fruit caps. Disease is most severe during bloom and harvest in seasons with lengthy periods of cloud and rain." This website also provides specific information about the pesticides, herbicides and other non-chemical options to reduce and control insect and weed infestation. http://www.ipmcenters.org/cropprofiles/docs/NCstrawberries.pdf

Thinking Maps Resource

http://www.eisd.net/domain/599

Assessment:

Part 1: Flyer

Part 2: Class chart and participation in discussion

Part 3: Multi-flow map and digital poster

This project was supported by the North Carolina Department of Agriculture and Consumer Services Specialty Crop Block Grant Program.