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Will they grow?

Abstract: This lesson will give the students a chance to form a hypothesis, perform an experiment, and then collect results and come up with a solution. The students will plant seeds and see how they will grow in a specific temperature.

Grade Level: 3rd grade

State Core:

Science Benchmark

Light is produced by the sun and observed on Earth. Living organisms use heat and light from the sun. Heat is also produced from motion when one thing rubs against another. Things that give off heat often give off light. While operating, mechanical and electrical machines produce heat and/or light.

Standard V:

Students will understand that the sun is the main source of heat and light for things living on Earth. They will also understand that the motion of rubbing objects together may produce heat.

Objective 1: Provide evidence showing that the sun is the source of heat and light for Earth.

Instructional Time: 2 weeks

Materials:

- Seeds (potato, peas, corn, tomato, cotton)
- Dirt
- Greenhouse or fish tank that can be made into a terrarium
- Water
- Journals
- Heat Lamp
- Spray Bottle

Terminology:

- Green House: A structure, primarily of glass, in which temperature and humidity can be controlled for the cultivation or protection of plants
- Terrarium: A small enclosure or closed container in which selected living plants and sometimes small land animals are kept and observed
- Degrees: A unit division of a temperature scale.

Intended Learning Outcomes:

- Use science process and thinking skills
- Manifest scientific attitudes and interests
- Understand science concepts and principles

- Communicate Effectively Using Science Language and Reasoning

Background Information:

Light is very important when growing crops. Heat is also another very important factor when growing vegetables and other important foods. The amount of light that a crop has during one day is very important for plant productivity. The growing season for crops is rather short, but if the farmers have heat and lots of light year round, then their growing season will increase by a few months. Sometimes heat can work against the farmers; too much heat could fry the crops and result in a bad year. Also, water is another very important part. Often times water is not necessary, but it usually is. If there is a drought somewhere this could also result in a low production of crops. Corn has been found to be one of the vegetables that grow rather well in hot, humid weather. This experiment will give the students a chance to create their own humid environments and see what will grow and what won't.

Invitation to Learn:

All of the supplies will be presented to the students. Give students some green peas to look at and taste. The student will then be instructed to design their dream greenhouse. Instruct them how they would make it the warmest, most humid environment. Their dream greenhouse will be drawn on a piece of computer paper. Also, ask them how would their crops grow inside of their greenhouse?

Prior Knowledge Assessment:

Ask the students what they know about crops and how they grow. Students will also be questioned about different environments and how they think crops would grow there.

Procedures:

- Bring out all of the supplies and talk to the students about each one.
- Next, discuss important terminology that we will be using and students will look in their science books for definitions. This terminology and definitions will be recorded in the student's science journals.
- The students will then make a prediction in their journals about which seed they think will grow the fastest.
- As a class they will create a terrarium using the fish tank, heat lamp, spray bottle, dirt, and water.
- The students will then all be given a few seeds. A few students at a time they will go up and plant their seeds in our terrarium and mark which seed they planted so that when they begin to grow we will know what it is.
- Set up a time that the plants need to be watered; try for the same time everyday. The students will watch and observe the plants.
- Each day the students will record their findings and observations in their science journals.
- After two weeks we will review what we talked about and see which crop actually did grow the fastest.
- Discuss predictions and conclusions

Adaptations:

- Each student could create their own terrariums to take home and then bring back in two weeks. The students could also leave the terrariums somewhere in the classroom
- Put the students into pairs and have each pair create a terrarium that they can observe together and record the information in one of their journals.

Assessment:

Use the student's journals and their observations for assessment. Evaluate their predictions and what they recorded. Also, observe for student participation. If a student participates and is involved, then their participation points will be great! The predictions will be evaluated based on if the students did it. There is no right or wrong answer for a prediction, so as long as they have one written down it is right.

Used Websites:

<http://www.uaf.edu/snras/pass/research.html>

<http://web.ask.com>

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Cold Environments

Abstract: A summary of this lesson is to figure out if the cold environment affects the cultural crops in Alaska in comparison to a hotter environment. There are two lesson plans, one dealing with the colder environment, and one dealing with the hotter environment. This lesson will give the students a chance to hypothesize, predict, conduct an experiment, and then see what the results are. It is a challenging, fun experiment for everyone to enjoy!

Grade Level: 3rd grade

Utah State Core Curriculum Standards : Standard V, **Objective :** Students will understand that the sun is the main source of heat and light for things living on the Earth. We will also compare temperatures in sunny and cold places. **Benchmark :** Light is produced by the sun and observed on Earth. Living organisms use heat and light from the sun. Heat is also produced from motion when one thing rubs against another. Things that give off heat often give off light. While operating, mechanical and electrical machines produce heat and/or light.

Instructional Time: two weeks

Materials:

- Journals (students record their own observations)
- Freezer
- Pot
- Lights
- Water
- Soil
- Different seeds:
 - corn, tomatoes, potatoes, peas, cotton and any other plants that seems necessary

Terminology:

- Horticultural: the science or art of cultivating fruits, vegetables, flowers, or ornamental plants.
- Agricultural crops: the science, art and business of cultivating soil and producing crops.
- Plant Hardiness: plants may be capable of surviving unstable or unfavorable conditions.

- Crop: plant grown for use; any group of plants grown by people for food or other use, especially on a large scale in farming or horticulture
- Cultural Crops: a group of plants grown by people for food or other use that is relating to a particular culture or civilization

Intended Learning Outcome: The Intended Learning Outcome will describe the skills and attitudes students should have and learn as a result of this science instruction. This is an essential part of the Science Core Curriculum and it will provide teachers with a standard for evaluation of student learning in science. Instruction should include significant science experiences that lead to student understanding using the ILOs. To use the science process and learning skills. The ILO of this lesson is to provide students with information concerning how heat and light is the main source for all living things.

Background Information: Light has a lot to do with the growth of agricultural crops. Obviously, light fluctuates from sunrise to sunset, so the amount and quality of light is very vital for a plants production. Also, there are cool seasoned vegetables that can be produced, but they have to be produced in the summer time, since winter destroys the crops. The costs are definitely challenging for the local growers but modifications have to be made. Potatoes actually adapt the best in cool weather conditions, so this is one reason why the lesson involves testing potatoes. There are also tomato, cotton, corn and pea plants that can be tested to see which plant is going to grow the fastest. Cool weather makes plants more susceptible to damage. It is important to know why cool weather is better than warm, or vice versa. It is also known that cool season vegetables can be produced in large quantity during Alaska’s summer, but the production costs are altering and it is complicated for the local growers. The purpose of this particular lesson is to study cool season vegetables to see if the cold weather affects the production of crops and then to provide information on the varied production methods that can be used to produce profitable crops in the northern latitudes. Students should have journals and provide a journal entry for each day of this process. This will provide information of understanding along with ways for the students to record their own questions, observations, hypothesis, etc. This is going to be their tracking device on the experiment.

Invitation to Learn: The instructor will say to the students, “have you ever wondered about the affects weather has on growing cultural crops? Farmers face this issue all the time, but without

farmers, how would we get the crops produced so we can eat them? Is it necessary to have farmers and does it matter what crops grow in what climate? We are going to do an experiment to see if climate affects the growth of agricultural crops.”

Prior Knowledge Assessment: The instructor will ask questions to assess prior knowledge of this subject matter. For example, students will discuss what they know about seeds and how they grow. Then discuss whether the students have ever helped their parent’s plant seeds in their garden at home and if they have, what were the procedures they used to plant these seeds? Students will then discuss if they know anything about different types of weather and have them predict what factors affect the growth of seeds, or plants. This assessment will drive instruction because once the instructor gets some background knowledge from the students he/she will know what needs to be taught.

Procedures:

1. The first step in performing this lesson is to have the students hypothesize about what they think will be the best conditions for the growth of a crop.
2. Then introduce the term horticultural and explain that this means the science or art of cultivating fruits, vegetables, flowers, or ornamental plants. We are going to be cultivating vegetables and watching the growth conditions of them and that is why this term is important to know. This experiment will take a couple of weeks, so be prepared.
3. After the students make a prediction of whether or not hot or cold temperatures will affect the growth of an agricultural crop, the experiment begins.
4. Then you need to explain that an agricultural crop is the science, art and business of cultivating soil and producing crops. We are going to be physically producing a crop.
5. The students can choose the seed that they wish to test, whether it is a corn, tomato, pea, cotton, or a potato seed.
6. Clarify that a crop is a cultivated or agricultural plant that produces a grain, fruit, vegetable, etc.
7. They will get a pot and put soil into this pot along with the seed of their choice.
8. After they plant the seed into the pot, they will add water to the pot along with heat lamps, or some sort of consistent light. This experiment is to test to see if the cold reacts to the growth of the plant; this plant will need to be set up in a cold environment.

9. If it is winter, then outside would work, and if it is spring time, then a freezer or fridge would work just as well. However, a light needs to be placed inside this cold environment for growth to even try and happen. If you are doing this project in a mini refrigerator then you need a light with a clamp. You will need to clamp the light in the refrigerator and have the chord come out through the cracks. This will provide light for the plants to try and grow.
10. Then you need to introduce that a plant is going to have hardiness. This means that it may be capable of surviving unstable or unfavorable conditions.
11. The plants need to be slightly watered everyday to see if growth can occur in a cold environment.
12. After the two weeks have passed, a result and conclusion on the different weather types can be made. Was it easier for the plant to grow in a cold environment, or a hot one? This is the question the students will need to answer.
13. This relates to agriculture because you are testing the way agricultural plants grow and what climate is more sustainable for growth. The horticulture is the science of actually producing cultivating fruits, vegetables, flowers, etc. In this case we are trying to produce vegetables.
14. Students should be observing during the two weeks the progress of the crop they choose. They need to record their hypothesis, predictions, and observations during this process.

Adaptations and Modifications for special Learning Needs: If students are having trouble understanding how to conduct the experiment, they may work in groups, or have family help with this experiment at home. This experiment could also be broken down into small steps. Cue cards with the steps could help.

Assessment: The student's journals along with their observations and predictions could be assessed to indicate what students have learned. The criteria that will be made for this lesson is to make sure that the students were capable of setting up this experiment with the correct terms. The teacher needs to look for a hypothesis, materials, procedure, and conclusion statement.

Resources:

<http://www.uaf.edu/snras/pass/research.html>

<http://pwa.ars.usda.gov/pendleton/cpcrc/recfdtxt.htm>