

Investigation Three – The Living Corn Necklace

Standard V

Students will understand that traits are passed from the parent organisms to their offspring, and that sometimes the offspring may possess variations of these traits that may help or hinder survival in a given environment.

Objective 1

Using supporting evidence, show that traits are transferred from a parent organism to its offspring.

Intended Learning Outcomes

1. Use science process and thinking skills
2. Manifest scientific attitudes and interests.
3. Understand science concepts and principles.
4. Communicate effectively using science language and reasoning.

Standard V

Objective 1

Background Information

Each human (except for an identical twin) has a unique set of traits that enables us to immediately identify them as an individual. However, have you ever tried to distinguish one bean plant from another bean plant? Or one corn plant from another corn plant? Plants grown as crops have been selected to minimize trait variation so that farmers can get the best yield from each field. In this activity, students germinate two types of corn seeds: Dent corn and Indian corn. As a result of their observations, students will see that all seedlings of the Dent corn variety (which has been bred for mass production) are very similar, while more differences can be observed among the Indian corn seedlings (which have not been selected as often).

Pre-Assessment/Invitation to Learn

1. Tell the students that they are now going to investigate the amount of variation present in crop plants.
2. Provide each group of students with a picture of a field of crop plants, such as corn, beans, etc. Ask each group to make a chart of the similarities and differences they can see between plants in the pictures. Discuss with them how the amount of variation they observe compares with the amount of variation they observed in apples. As a class, brainstorm reasons why farmers might not want variation among plants they grow to produce crops.
3. Give each group of students a dried ear of Dent corn or Indian corn. Ask each group to make a chart of similarities and differences between the kernels on an ear (each kernel is an individual offspring of the plant that produced the ear). As a class, discuss their observations. Also compare the traits of the two corn varieties.
Teaching Tip: If you do not have ears of corn available, have students compare all of the Dent corn seeds and all of the Indian corn seeds they will germinate.
4. Tell the students they will now have the opportunity to continue their Investigation by observing corn seeds as they grow into plants.

Materials

Per group

- Ear of Dent corn or Indian corn
- Pictures of fields of crop plants such as beans, corn, etc.

Instructional Procedure

Materials

- 2 cotton balls for each student
- 1 small plastic jewelry bag for each student
- 1 Dent corn seed for each student
- 1 Indian corn seed for each student
- 1 necklace length of yarn for each student
- Several permanent markers for each group
- 1 cup of water for each group
- 1 hand lens for each student pair
- 1 metric ruler for each student or pair
- Photographs of mature Dent corn and Indian corn plants

1. Provide each student with a Dent corn and an Indian corn seed. Ask each group to begin his/her corn journal by drawing a picture of each seed and writing several sentences to describe it.
2. Divide students into groups and provide them with materials for each student to make a “Living Necklace” (plastic jewelry bag, cotton balls, and yarn), permanent marker(s) and a cup of water. Direct students to make their “Living Necklaces” as follows:
 - a. Use the permanent marker to label one side of the jewelry bag “1” and one side “2”. Write name or group name on top.
 - b. Dip a cotton ball in water so that it is thoroughly wet.
 - c. Put the Dent corn seed on one side of the ball and place it in the jewelry bag so that the seed faces the side labeled “1”.
 - d. Wet the second cotton ball. Put the Indian corn seed on it and place it in the jewelry bag so that it faces the side labeled “2”.
 - e. Seal the jewelry bag.
 - f. String the yarn through the hole in the jewelry bag. Tie a knot in the end of the string to form a necklace.
 - g. The bags can be hung from tacks in a bulletin board and taken down each day for student observations. Add water if the cotton balls become dry.
3. Each day have students record in their journals the changes they observe including information about observable traits such as: number of days from “planting” until the root and the shoot can be seen; root and shoot lengths and color; and number of leaves and roots.
 - a. Use hand lenses to observe the roots and shoots as they emerge and grow.
 - b. Use rulers to measure the length of roots and leaves as they emerge and grow.
4. Have students make charts and graphs of their daily data for measurable traits (leaf and root length).
 - a. As a class, make charts and graphs for all of the traits for each type of corn seed.
 - b. Compare and contrast the amount of variation present among the offspring of each type of parent plant (Dent corn and Indian corn).
5. Compare the traits of the corn seedlings to those of mature corn plants (using photographs).
6. Compare the amount of variation seen in the corn seedlings to the amount of variation seen in other organisms.

Teaching Tip: The corn seeds will sprout in 3-6 days. Planting them on a Friday and making the first observation on Monday is a quick way to speed up this activity.

Curriculum Extensions

Language Arts –

- Assign students to compare similarities and differences in traits among plants of a species growing in the wild, and among plants of another cultivated species. (Standard VII, Objective 6)
- Incorporate stories and other material from Native American history from the 5th grade social studies curriculum. *In the Three Sisters Garden: Native American Stories and Seasonal Activities for the Curious Child*, by JoAnne Dennee, et. al., is a great reference book for legends and historical information concerning the importance of maize (Food Works, 1995. ISBN: 0787221759. \$28.95). (Standard VII, Objective 2, 3)

Science –

- Grow Wisconsin Fast Plants™, either for a week to observe germination and early growth (as with the corn seeds), or for a full life cycle of approximately 40 days. Seeds can be purchased from Carolina Science and Math, <http://www.carolina.com>. Seeds with several variations, such as “F” Non-purple stem, yellow-green leaf” (online catalog number WW-15-8888), will show a high degree of variation, although variation can be observed with any of the varieties. The following resources provide information about growing Fast Plants™ and numerous teaching activities. (ILOs 1, 3, 6)
- *Spiraling Through Life with Fast Plants: An inquiry-rich manual* by Robin Greenler, et. al. Kendall/Hunt Publishing Company. 2001. ISBN 0-7872-6920-7; available from Carolina Science and Math for \$23.05 (online catalog #WW-15-8951-A). Very highly recommended.
- The Wisconsin Fast Plants web site – <http://www.fastplants.org>
- Carolina Science and Math – <http://www.carolina.com/fastplants/default.asp>
- Growing the Brassica butterfly, which lives on Fast Plants™, at the same time enables students to also observe the life cycle of an insect that undergoes metamorphosis from an egg to a caterpillar to a chrysalis and emergence as an adult butterfly, all in 26 days. Brassica butterfly eggs are available from Carolina Science and Math for \$9.95 (online catalog #WW-14-4100). (ILOs 1, 3, 6)

Assessment Suggestion

- Check the students’ journals for completeness of their investigations.
- Check the students’ charts and graphs for accuracy
- Discuss their findings by asking direct questions about their experiment.

Reference to Assessment Section:

	Multiple Choice	Constructive Response	Performance Test
Unit Test	1, 2, 5	1, 2	Raising Seeds

Resources

“[Living Necklace Kits](#)” with enough materials (seeds, cotton, yarn, and jewelry bags) for 75 students are available for \$6. Dent corn and Indian corn seeds are free. Ears of Dent and Indian corn are also available for the cost of shipping. Contact Utah Agriculture in the Classroom, 2315 Hold Main Hill, Logan, UT 84322-2315. Phone 435-797-1657 or order online at <http://www.agclassroom.org/ut>