



# SOS: Save Our Seeds!

*Total time ~50 minutes*

## Overview

Students will learn ...

- The difference between GM, hybrid, and heirloom seeds.
- How and why humans intervene in seed production and preservation.
- How to save their own seeds.

## Objectives:

After this lesson students will be able to:

- **Define and distinguish** GM, hybrid, and heirloom seeds.
- **Understand** the context and historical importance of seed saving.
- **Save their own seeds!**

## Vocabulary:

- **neonicotinoid**
- **seed saving**
- **hybrid seeds**
- **heirloom seeds**
  - **heirloom**
- **genetically modified (GM) seeds**
- **yield**

## Introduction (~4 min.)

A. Ask students: What seeds do we eat?

- a. Potential answers: sunflower seeds, pumpkin seeds, poppy seeds, sesame seeds, seeds in fruits and “vegetables” (i.e. tomatoes or cucumber), beans and peas, quinoa, corn kernels

B. Ask students: If we want to grow plants, where do we get seeds?

- a. Answer 1 - Buying seeds: In modern times, we have the luxury of being able to buy almost any kind of seed we want from nurseries, grocery stores, and online.

## Materials:

- Powerpoint and copies of Handout: “S.O.S.: Save Our Seeds!”
- 1 small manila envelope per student
- Paper plates or newspaper to dry out seeds

## Preparation:

- Print Handout
- Purchase envelopes and prepare snack ahead of time if needed

## On The Board:

- Vocabulary
- Seed Saving Instructions

## Suggested Snack:

- Tangelos  
OR
- Pluot slices  
OR
- Heirloom tomatoes w/ salt

- i. \*\*tell students to make sure that any seeds they buy are neonicotinoid free (see handout for a list of brands)
  - 1. Seeds are often treated with an insecticide known as **neonicotinoid**. This gets incorporated into the plant pollen and kills bees, which is bad since we need bees for pollination.
- b. Answer 2 - Saving seeds from the garden: Thousands of years ago, farmers couldn't just go to the nursery and buy a packet of new seeds when they ran out. Instead, they let their plants grow to full maturity until blossoms formed. Once the flowers were fertilized with pollen, seeds formed and farmers harvested them. Because of this, it was crucial to keep their crops alive so that they would have seed to plant year after year.
  - i. This is process known as **seed saving**
  - ii. \*\*If anyone answers "saving seeds from vegetables," emphasize that we're going to talk about how to save seeds from home grown vegetables, because saving seeds from store-bought vegetables only works if they're heirloom (which they often aren't)

### Activity 1: Heirloom Seeds (~3 min.)

- C. **Heirloom seeds** have been saved for many generations and are naturally well adapted to specific conditions
  - a. They are often chosen for their high quality flavor and cultural relevance.
  - b. Like a *family heirloom* (jewelry, furniture, etc. that gets passed down) in their value, age, and importance
    - i. Ask students: Has anything ever been passed down from from your grandparents or parents?
  - c. Examples:
    - i. Hopi turquoise corn
      - 1. Ask if anyone's ever had blue tortilla chips
    - ii. Ask if anyone has seen the different looking heirloom tomatoes at the farmers market or in the garden
- D. More examples:
  - a. Beet chioggia
  - b. Watermelon radishes
  - c. Yellow pear tomato
  - d. Purple green beans
- E. Ask students if they've ever tried an heirloom fruit or vegetable and to describe what it looked and tasted like.
  - a. If there is no response (or they're not sure if they've had one), ask:

- i. Does your family grow tomatoes? When you get home check what type they are—there’s a good chance they’re heirloom!
- F. Explain that there are actually seed “libraries” that preserve valuable heirloom seeds! If these did not exist, many such varieties would likely go extinct.
  - a. How it works: First, you become a member. Then you can browse their seed collection and “check out” some of the seeds you want. You plant the seeds and when your plant grows, you can save the seeds (which we’ll learn how to do later), then return those new seeds to the library. The seeds you return will produce plants just like the ones you grew since they’re heirloom seeds.
  - b. A nearby seed library is the Seed Library of Los Angeles at the Learning Garden (SLOLA) next to Venice High School
    - i. **\*\*Possible field trip idea**

## Activity 2: Hybrid Seeds (~5 min.)

- A. **Hybrid** seeds form when humans cross two *different varieties* of the *same species*.
- B. Examples:
  - a. Plumcots and pluots
    - i. cross between a plum and an apricot
  - b. Broccolini
    - i. cross between broccoli and Chinese kale or gai-lan
  - c. Tangelos
    - i. cross between a tangerine and a pomelo or a grapefruit
  - d. Romanesco Cauliflower
    - i. cross between broccoli and cauliflower
- C. The goal is to get a baby plant that has the best qualities of its two parents.
  - a. This is done by plant breeders using *controlled* pollination.
    - i. Tell students to recall their Seed Cycle lesson and ask: How does pollination occur? What happens?
      - 1. Answer: Pollen (from the same or a different plant) fertilizes the ovary inside a flower. Seeds will develop after this.
    - ii. Farmers control pollination by physically moving pollen from a specific plant (Parent 1) to another (Parent 2).
      - 1. Ask the class: What might be a good quality in a parent plant?
        - a. Answer: high **yields**, disease resistance, tasty fruit, bigger fruit, etc.
    - iii. Optional/Extra Credit: Tell students to recall their Mendelian genetics lesson: Would a hybrid be a heterozygote or a homozygote?
      - 1. Answer: heterozygote

### Activity 3: Genetically Modified Seeds (~6 min)

- A. **genetically modified (GM) seeds** are *engineered by humans* to have DNA from two *different species* (not just vegetable to vegetable)
- a. Some of the most common genetically modified crops are corn, soy, alfalfa, canola, sugar beets, yellow squash, zucchini, and papaya
  - b. Like hybrids, the goal is to get a new combination of desirable traits.
  - c. A way to remember “GM” is: G → genes + M → manmade/manipulation
  - d. Examples:
    - i. Ex: Genes from a type of bacteria (Parent Species 1) that is NOT killed by chemicals has been added to corn DNA (Parent Species 2). This is done in a lab. The resulting GM corn looks like corn but has the bacteria’s resistance to chemicals (herbicides) that would normally kill any plant. That way, farmers can kill weeds with the herbicide without killing their crops.
      1. A lot of non-organic supermarket corn is this kind
    - ii. Ex: Scientists have incorporated scorpion venom genes into cabbage plants so that caterpillars that try to eat it will die. However, the genes were modified to be harmless to humans.
      1. A built-in pesticide of sorts
      2. Not available to consumers
    - iii. Ex: Altered DNA from a common virus has been put into bananas so that people who eat them will be immune to that disease (like a vaccine)
      1. Designed as a cheaper vaccination option for developing countries.
      2. Not available to consumers
- B. Pros:
- a. Higher yields
  - b. In some cases, it can reduce the need for chemical inputs (e.g. pesticides, herbicides, or synthetic fertilizers)
  - c. There are currently no known adverse effects from eating GMO crops
- C. Cons:
- a. The long-term health consequences of eating GMO crops are will not be known for many years
  - b. GM seeds can “infect” non-GM varieties with their modified genes, reducing biodiversity
  - c. Farmers using GM seeds might outcompete the farmers who produce heirloom varieties that have important cultural meaning

- D. Tell students to get with their elbow partners and come up with ways that hybrid, heirloom, and GM seeds are each different from each other.

#### Activity 4: Review Questions (~5 min.)

- A. Read aloud the following questions then have students get in pairs to answer them on their handouts. Review the answers as a class:
- a. 1) The Aztecs grew food, but couldn't buy seeds from stores like we do now. What kind of seeds do you think they used and why?
    - i. Heirloom, because they had to save their seeds.
  - b. 2) If you wanted a plant that could completely resist bugs which kind of seed would it have to be?
    - i. Genetically modified (GM)
  - c. 3) Your parents just gave you a seed saved from your great-great-great-grandparents' garden. What type of seed would this be?
    - i. Heirloom

#### Activity 4: How to Save Seeds (~4 min.)

- B. Explain that we only want to save seeds from *heirloom* plants because the new plants will resemble their parent plants.
- a. This is not the case for hybrids, which get new combinations of genes each generation.
  - b. Genetically modified seeds are often engineered to not reproduce or to produce infertile plants, so we don't want to try saving seeds from those.
    - i. The people who make genetically modified seeds do this so people will have to buy them more often
  - c. Ask students to get with their elbow partners and guess whether you can tell the difference between the 3 types of seeds just by looking at them (not the packet)?
    - i. No, you can't!

#### Garden Activity! (~12 min.)

- A. Go on a "seed scavenger hunt"! Tell students to find a vegetable that has gone to seed and explain how they identified it.
- a. Possible answer: it is very tall and flowers and/or seed pods have formed
- B. Set up three stations: one for fruiting crops, one for leafy greens or root crops, and one for beans and peas
- a. Demonstrate how to gather seeds from the plant (see below), then bring the seeds to the classroom to dry out on newspaper or a paper plate for a few days. Distribute to students to take home in small manila envelopes.
    - i. Fruiting crops (ex: tomatoes, apples, squash, cucumber...):
      1. Pick the fruit and pick out the seeds. Allow them to dry a few days, as above.

- ii. Root or leafy vegetables and herbs:
  - 1. When the plant is fully mature, a tall shoot will grow and flowers will form, followed by small seed pods. Once brown and dry, pick and break open the pod and collect the seeds inside.
- iii. Beans and peas:
  - 1. Let the pods dry up on the plant then pop out the bean or peas (the seeds)
  - b. Allow the seeds to dry at room temperature until completely hard. Saved seeds should be kept in a cool, very dry spot away from the sun.
- C. Make sure to demonstrate with heirloom, not hybrid, crops.
- D. If anyone asks, seeds need to be completely dried because unless you plan to plant them right away, they will easily get moldy if there is any moisture and won't be able to grow.

### **Snack (~5 min.)**

- A. Serve heirloom tomatoes with salt and pepper OR tangelo segments OR pluot slices



## **SOS: Save Our Seeds!**

Name:

Teacher:

Date:

- **neonicotinoid:**
- **seed saving:**
- **hybrid:**
- **heirloom:**
- **transgenic / genetically modified (GM) seeds:**

### **Small Group Discussion:**

- 1) The Aztecs grew food, but couldn't buy seeds from stores like we do now. What kind of seeds do you think they used and why?

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- 2) If you wanted a plant that could completely resist bugs which kind of seed would it have to be?

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3) Your parents just gave you a seed saved from your great-great-great-grandparents' garden. What type of seed would this be?

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**Trustworthy seed brands:**

Adaptive Seed  
All Good Things Organic Seeds  
Annie's Heirloom Seeds  
Baker Creek  
Blue River Hybrids  
Botanical Interests  
Burpee  
Denali Seed Company  
Fedco  
Goodwin Creek Gardens  
Grow Organic  
Gurney's Seed Nursery Co  
Harris Seeds  
High Mowing Seeds  
Horizon Herbs  
Hudson Valley Seed Library  
Johnny's Selected Seeds  
Maine Potato Lady  
Native Seeds  
Northeast Seeds  
Peaceful Valley  
Pinetree Seeds  
Renee's Garden  
Seed Savers  
Southern Exposure

Sustainable Seed Company  
Territorial Seed

**EXTRA NOTES:**

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