**Garden Genetics**

**Grade Level:** 8th

**Season:** Fall

**Larger IGS Unit:** Seeds

**Essential Question:** Where do seeds come from? How do our food choices affect the world around us?

**Objective:** Students will understand the process of selective breeding. Students will identify desirable traits in different varieties of crops and explore their role as plant breeders.

**Materials:**
Several different tomato varieties (eg. Green Zebra, Amish Paste, Peach, Black Cherry, Matt’s Wild, Cherokee Purple, Ruth’s Perfect)
Mason jars
Strainers
Paper towels
*Tomato Seed Saving step-by-step* handout

**Introduction:**
“Raise your hand if you are a plant breeder.” Ask students what they envision when they think of a plant breeder.
Discuss the role of a plant breeder with students:
- Identifies traits
- Selects desirable traits
- Breeds varieties containing desirable traits

Explain that every time you make a food choice, you become an active part of the selection process. Your food choices dictate the breeding of crops worldwide through creating demand for specific traits.

Define traits: *a distinguishing characteristic or attribute*

Ask students to give examples of traits. Then ask for examples of traits they would expect to identify in a tomato: *color, size, shape, taste, texture/skin, maturity, growing behavior, disease resistance.*

~ Today, we are going to explore the process of plant breeding.

**Activity:**
Part One: Identifying Traits
(Tomatoes are numbered, and presented whole, for students to see their appearance.)

- First, students work with a partner to write down the *physical* traits of each tomato.
- Next, partners are able to touch and smell the tomato. They write down more traits they are able to identify.

(Now offer pieces of each tomato to the students, one at a time. This process may take time.)

- Next, students taste each tomato, and continue to write down the traits they are identifying.
- Ask students to share a few of their traits, and write them on the board.
- Finally, students are given information on each tomato, including hardiness, growing behavior, germination rate, seed production, etc.

Discussion: As a class, discuss why there is such diversity in the tomato varieties. What are the different purposes? How could you distinguish between different purposes (juicing vs. stewing vs. slicing)? How do these tomatoes compare?

Part Two: Selecting Desirable Traits

- Ask students, “What do you think the original wild tomato looked like? How did people selectively breed to achieve such diversity in tomatoes?”
- Guide students through the history of the domestication of the tomato.
- Review the Punnett Square, and demonstrate using the Punnett Square to understand the offspring of cross-breeding two tomato varieties.
- In partners/groups, students discuss the traits they would want in their ideal tomato, based on the list of traits in given tomatoes.
- Next, students choose two of the tomato varieties that contain some of these desirable traits and complete a Punnett Square.
- Students share their results with the class.

- Now, as plant breeders, you are going to select tomatoes to grow in the school garden this year. (Explain that in order for us to complete the cross-breeding demonstrated in the Punnett Squares, students would have to continue this project for several years!)
- In groups, students discuss: “What variety would they like to grow this year? Why?” Each group shares their response.
- Based on the class’s choices, set aside the varieties that students would like to grow, and prepare for seed saving.
Part Three: Seed-Saving

- Guide students through wet-processing. Give students a step-by-step hand-out
- In groups, students scoop out seeds and place them in labeled mason jars.
- 1-3 days later, students strain seeds and rinse in strainer.
- Next, students dry seeds
- Finally, students package and label their seeds.
- Students mark on calendar when seeds should be started in the greenhouse!
- As a group, discuss the importance of plant breeding, and the consolidation of seed companies. For homework, students write a response to the questions: “What does it mean to be a plant breeder? Why do you think this is an important role to take on?”

Wrap up/ Assessment:

- Part One: List of tomato traits
- Part Two: Punnett Square worksheet
- Part Three: Response paper

Extensions:

- Tomato seed starting (Spring)
- Spring Plant Sale

Notes/Resources:

- Seed to Seed: Seed Saving and Growing Techniques for Vegetable Gardeners, by Suzanne Ashworth