



ABRC: TRAINED Kit

Plant Curiosity Advanced:

Student Handout – Lab Procedure & Assignments

PROCEDURE 1 – Plant parent seeds

Materials

Arabidopsis seeds	Potting soil	Fertilizer
8 plastic pots per group	1 solid tray per group	1 tray with holes per group
Cheesecloth or paper towels	1 weighing boat per group	1 disposable Pasteur pipette per group
Labeling tape and marker	Plastic wrap	Watering can
Gloves		

1. Cut 8 pieces of cheesecloth or paper towel to fit the bottom of a pot. Place one piece in the bottom of each pot. This will stop soil from escaping during watering.
2. Place potting soil in a container and moisten with water. The moisture level of the soil should resemble a wet sponge. Add fertilizer according to package directions and mix thoroughly. Wear gloves when handling fertilizer and fertilized soil.
3. Fill each pot loosely with soil. Do not compress the soil as you fill the pots.
4. Stack one tray with drainage holes inside a solid tray. This stacked pair of trays will simply be called a tray moving forward.
5. Your group will plant one tray containing eight pots. Using labeling tape and a permanent marker, label each tray with your group number and the date (see examples below).

Group 1 - Date

6. Label eight pots with your group number and the seed type (see example below).

Group 1
CS4004 Mix

7. Fill a weighing dish with water. Sprinkle a portion of the seeds into the water. Mix the seeds in the water by pipetting up and down slowly using a disposable Pasteur pipette. This will help to separate the seeds and make it easier to capture them individually.

8. Use the pipette to draw up individual seeds and place them on the surface of the soil. Plant nine seeds, evenly spaced, in each pot (Figure 1). Do not cover the seeds with soil.
9. Once planting is complete, place the pots in the tray. Wrap the tray tightly with plastic wrap to maintain moisture levels during germination.
10. Optional – Place the tray inside a cold room or refrigerator at 4°C for 2-3 days. This process, known as stratification, mimics winter conditions and promotes uniform germination of the seeds. Skip this step if you do not have access to adequate refrigeration space.
11. Place the trays under fluorescent lights.
12. Remove the plastic wrap once you see seedlings emerge from the soil (approximately 7 days after planting).
13. Once the plastic wrap has been removed, you will begin watering the plants regularly. Water when the pots feel light and the soil appears dry (1-3 times/week). Do not water directly into the pots. Add water to the tray to a depth of ½ inch and allow pots to soak. After 15 minutes, dump out any water that was not absorbed. Be careful not to overwater the pots or allow the soil to dry out.

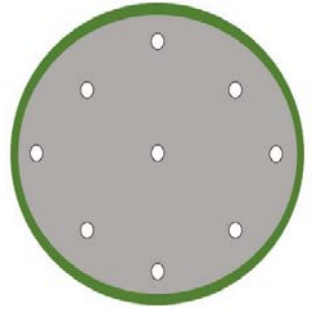


Figure 1. Placement of 9 seeds on soil surface

ASSIGNMENT 1 – Observe growth and record phenotypes

Complete the following tasks in your lab notebook:

1. Define key terms related to plant growth and anatomy:
Rosette, inflorescence, silique, stratification, trichome, germination, bolting, and senescence.
2. Observe the plants closely. Look for differences between the plants. Make detailed drawings of the different plants you find. These different plants are called 'strains'.
3. Describe the development and life cycle of each of the strains of Arabidopsis described in #2. For each strain, include notes about when the plant flowers, when siliques form and when senescence begins. Also include details about plant development such as the number of leaves present in the rosette and the height of the inflorescences.
4. Describe the unique traits for each of the six strains using drawings and notes. Note when each trait was first visible (*e.g.*, in rosette stage or after flowering).
5. Make predictions about how each of the unique traits identified in #4 may increase or decrease a plant's likelihood to survive and be healthy.

PROCEDURE 2 – Collect offspring seeds

Materials

6 Eppendorf tubes per group

Labeling tape and marker

Scissors

1. Allow the plants to dry out for two weeks until the color of the siliques changes from green to yellow-brown.
2. Label a 2 mL Eppendorf tube for each of the six strains of Arabidopsis identified. Each label should include your group number, date, and strain name (see example below).

Group 1, date
Ler-0

3. Use scissors to carefully remove 2 siliques from each type of plant and place them in the appropriately labeled Eppendorf tube.
4. Gently tap the tube on a table several times to release the seeds.
5. At this point, the parent plants can be discarded.
6. Allow the seeds to dry in the Eppendorf tubes for two weeks. This process will reduce the internal moisture content of the seeds leading to higher germination rates.

ASSIGNMENT 2 – Make a prediction

Complete the following tasks in your lab notebook:

1. Define key terms related to reproduction:
Pollination, self-pollination, cross-pollination, and fertilization.
2. Arabidopsis is self-pollinating. Make a prediction about how the plants grown from each strain of seed might look.

PROCEDURE 3 – Plant offspring seeds

Materials

Gloves	6 strains of Arabidopsis seeds	Mixed Arabidopsis seeds
Potting soil	Fertilizer	7 plastic pots per group
1 solid tray per group	1 tray with holes per group	Cheesecloth or paper towels
7 weighing boats per group	Labeling tape and marker	Plastic wrap
7 disposable Pasteur pipettes per group	Watering can	

1. Following the steps for planting outlined in Procedure 1, each group should plant one pot each of the six strains of Arabidopsis seeds collected in Procedure 2, as well as one pot of the parent seeds originally planted in Procedure 1
2. Follow steps 10-14 in Procedure 1 for plant care.

ASSIGNMENT 3 – Compare results

Complete the following tasks in your lab notebook:

1. Write down observations about the plants growing in each of the six pots representing the offspring generation.
2. Compare the appearance of the offspring plants with those of the parent generation.
3. Do all of the offspring resemble their parent plant? Why or why not?
4. Talk to your classmates, do their results match yours? How do you explain differing results?