

Activity: Plant Genetic Engineering Simulation

Objective: Provide students with a hands-on, step-by-step, learning exercise for understanding the general process of genetic engineering of plants.

Grade level: 5th-12th, with slight modifications to fit each level

Format: This is an in-class activity that will take a minimum of 3 class periods. There are stopping points within the activity so as to accommodate a multi-day exercise. When I did this activity, however, I did it in one day (three consecutive periods). The concept of genetic engineering should be introduced and discussed prior to this activity.

Materials:

- 50-100 1.5 mL microfuge tubes (available from biological suppliers like Carolina Biologicals)
- Disposable pipettes, one per student ()
- Petri dishes (25 mm), three per student ()
- Tissue culture plates (petri dishes containing plant tissue culture media or water agar with or without rooting hormone) (one per student)
- Plants (I used the following, but you may want to use some other species):
 - Philodendron
 - Potato
 - Lettuce
- Tweezers (for each individual or group of student(s))
- Scissors and/or hole-punches
- 3 250mL-500mL bottles (for the various transformation solutions)
- Small beads, 4 colors (available at craft stores) lots of them
- 26 gauge wire (available at craft stores)
- Thread (available at craft or sewing stores)
- Rubber gloves (optional but the students love it!)
- Sterile water
- Sterilizing solution: very dilute bleach (10 mL bleach + 990 mL water)

Description:

This activity is designed to simulate what scientists actually have to do to genetically engineer a plant using the original method developed in the 1980 s (*Agrobacterium*-mediated transformation). If you are unfamiliar with genetic engineering, you may wish to review the basics in a molecular biology textbook (i.e. Alberts et.al [The Molecular Biology of the Cell](#)), reputable website, or contact me I'm happy to explain.

In this simulation, the students represent the scientific community and you represent a biological supply company. From the plants and the organisms that you have, the students/scientists can choose what plant to engineer and with what gene. To describe this