Plant-A-Plant Seed Germination Laboratory Guide
(common for all Plant-a-Plant experiments)

Task

Germinate maize seeds to be used in Plant-a-Plant experiments. Determine average seed weight (to be used in plant-a-plant experiment calulations).

Materials and Tools

Determine the number of plants that will be necessary for the Plant-a-Plant experiments that you will conduct (be sure to account for the type of experiments and the number of replications). Since not every seed will germinate, we recommend starting 30% more seeds than you will need.

- ❑ Maize seeds
- ❑ Laboratory scale (accuracy of 0.01 gram)
- ❑ Non-transparent trays or dishes with flat bottom for seed germination
- ❑ Gardening perlite or sand (carefully wash with water)
- ❑ Tap water
- ❑ *Seed Germination Laboratory Data Sheet*

Procedure

1) Seed Germination

a) Choose an appropriate place for seed germination. It should be warm, but not in direct sunlight. Ideal temperature for germination is about 27 °C.

b) Place a 1-2 cm thick layer of gardening perlite or washed sand on the bottom of the nontransparent tray.

c) Saturate perlite or sand with tap water. The level of water should not be greater than the thickness of the perlite or sand layer.

d) Place maize seeds about 2 cm apart in the prepared tray or dish (see Figure 1, A). Press the seed gently into the growing medium.

e) Use another tray or dish of the same size to cover the seeds. This will increase the humidity for better germination.

f) Carefully observe the development of the seed sprouts. Make a note of the day that you observe the first sprout, and the days at which 50% and 75% of the seeds have germinated. Check the amount of water, and add more if the perlite/sand begins to dry.

g) After 7 to 9 days the sprouts should be about 2-3 cm long, and the seeds are now ready to be used in your experiments (see Figure 1, B).

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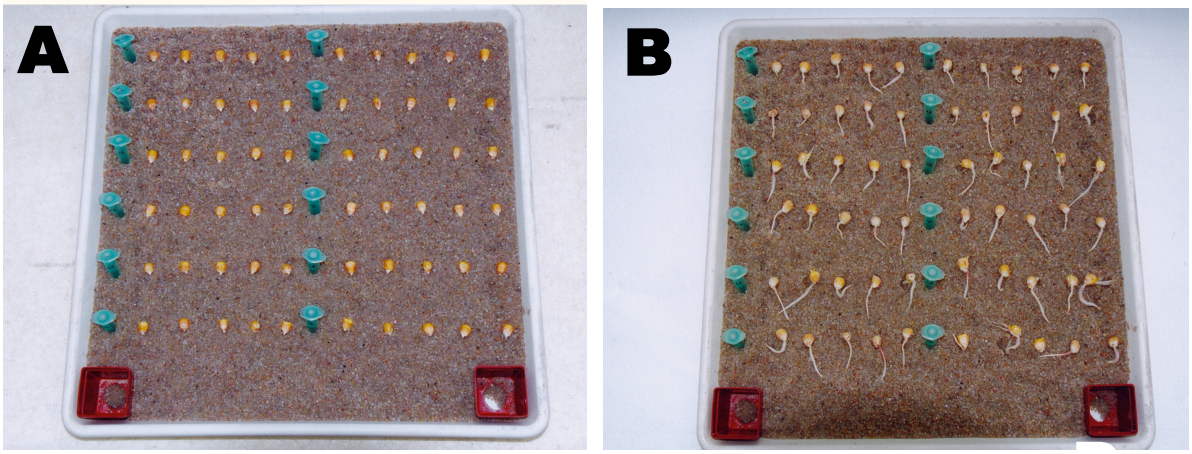

Figure 1: Germination of maize seeds for Plant-a-Plant experiments
A) Maize grains prepared for germination placed on sand saturated with water.
B) After 7 days, the root is long enough, maize is ready to plant.

2) Determine Average Seed Weight

*The average seed **fresh weight** will be needed to make some calculations at the end of your experiments. Make these calculations while you wait for seeds to germinate and prepare for upcoming experiments.*

a) Count out 200 maize seeds and weigh them together. Record the weight on the *Seed Germination Laboratory Data Sheet* (Table 2).

b) Calculate the average weight of a maize seed.

Extension(s)

Natural Variation and Graphing

- Why did you find a seed average instead of using the weight of only one seed?
    - Although maize seeds appear to be almost the same, there can be differences that are indistinguishable to the eye. Some seeds could be heavier, because they contain more reserve compounds (e.g. starch). Differences in available reserve resources will affect the timing of germination as well as a seed's ability to grow at all. Because it would be difficult to weigh each seed in our experiment, we have already calculated the average weight, and in this section, we will look more closely at the variation in weight in a small subset of our seeds.
- Determine Variation in Seed Weight
    - Choose 20 seeds.
    - Weigh each of the 20 seeds and record the weights in Table 3.
    - Count the number of seeds with the same weight as the average, then the number of heavier seeds and the number of lighter seeds. Record these observations on the *Laboratory Data Sheet* (Table 4).

- Circle the maximum and minimum seed weights in Table 3 (this with help define the scale of your graph.

- Graph Variation in Seed Weight

  - You can use either the empty graph in the data sheet or you can create your own. We will use graphs throughout the Plant-a-Plant experiments to help in the visualization of data. In this graph, data will be represented in two dimensions, defined by 2 axes; the horizontal axis or x-axis, will represent the seed number; the vertical axis or y-axis, will represent the seed weight.

  - Determine an appropriate scale for the Y-axis, based on the range of seed weights in your dataset.

  - Read the data for each of your seeds, and place a point on the graph to represent this observation. You many choose to represent your data as a bar graph or a scatter plot.

Graphs – EXAMPLE

Seed number	Weight (g)
Seed 1	0.344
Seed 2	0.309
Seed 3	0.301
Seed 4	0.305
Seed 5	0.340

Table: Can you find the minimum and maximum weights at a glance?

Graph: Is it easier to identify the lightest and heaviest seeds in the graph or the data table?