

The Science Experiment in Detail

Objective

To compare the germination rate of tomato seeds after seed exposure to the following environmental conditions:

- Exposure to conditions in the Earth's environment only (the "control" group).
- A group of Tomatosphere™ seeds have been sent to the International Space Station and returned to Earth.

Preparation

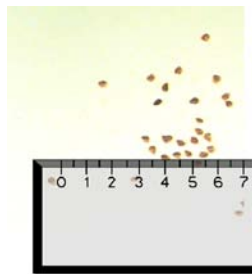
- 1 Create a plan (who, where, when, what)
- 2 Choose a location
- 3 Prepare seeds
- 4 Plant seeds
- 5 Monitor germination (keep a daily log)

Acquire your tomato seeds

By registering for Tomatosphere, you will have received your 2 packages of seeds for each class registered. One package is the control group and the second contains the seeds that have spent time in space at the International Space Station. Make sure that you know the origin (which package!) each seed has come from!!!! Although you will not know the origin of each set of seeds, it is SO important to keep the two sets properly labeled.

[Tomato seeds](#) are relatively small, about 2-3 mm (1/10th of an inch) in length. They are light enough to be blown away in drafts from open doors and windows.

All seeds should be germinated simultaneously under identical conditions in order to control as many variables as possible.



Tomato seeds are very small

Acquire the planting medium

Decide how and where you will germinate the tomato seeds. Peat pellets/pods are strongly recommended. You can find start up supplies online at [Stokes Seeds](#), a Tomatosphere™ partner. Once on the Stokes Seeds home page, you'll see a box indicating "[Tomatosphere](#)".

Note: peat pellets can generally be purchased in one of two forms - in packages or in trays. In both cases the peat pellets are dehydrated and compressed. They will expand significantly when they absorb water.

The packaged kind can be set out in the bottom of an empty margarine container or in a shallow pie plate. Loosely covering the container with clear plastic wrap reduces evaporation.

If you make your own tray, its sides should be high enough to allow for the height of the pellets when they are fully expanded.



Peat pots

Develop a plan (space, time and procedure)

Space: This experiment involves the measurement of the germination properties of the tomato seeds you received from Tomatosphere™. The peat pellets (about 60 per class) will require a fair amount of counter space. Try to find a location to ensure, as much as possible, that all seeds are germinated under identical conditions. You will need labeled containers for all the peat pellets.



Organizing the Experiment

HINT: 12-15 labeled margarine containers will hold about 4-5 peat pellets each works well if you are using individual pellets. If you are using trays they typically contain 10 pellets each, so 3 trays for each group would work fine as well.

Time: Plan to have four (4), more or less, uninterrupted weeks in which to perform this experiment so that (except for weekends) observations can be taken, and recorded daily. It is also best to set up a schedule to identify students and times to make observations.

It is best to plant on a Wednesday or Thursday in order to see the first germination the following week.

Procedure: Due to the important scientific nature of this experiment it is essential that you develop a plan to keep track of which seeds are which. Develop a method to accurately and clearly identify each group of seeds.



Prepare your Germination Center

Label all containers clearly prior to planting. Multiple forms of labeling can be helpful. For example, in addition to labeling the containers, gluing a container to a sheet of colored paper, a specific color assigned to each of the two groups of seeds is helpful.

Set up the germination center before you actually plant any seeds. Is there enough space? Are the conditions of temperature, light, and humidity likely to remain relatively uniform and undisturbed for all of the seeds during the experiment?

Germinating seeds do not require sunlight. They do however require moisture, a moderate temperature (not too warm), and oxygen.

Do not place your seeds in direct sunlight as they may become overheated. A broad windowsill where the temperature is about 70°F throughout the day is ideal.

Caution: Some schools turn down the heat at night as an energy conservation measure. Under these conditions it can become very cold near windows unless curtains are provided. An alternative is to set up some form of barrier between the window and the seeds; this can be set up each afternoon before leaving. Heavy duty cardboard works well.

Plant the seeds

Soak the peat pellets for about 20 minutes in water at room temperature (or until they are fully saturated).

HINT: It is important to plant all seeds on the same day. However, to minimize the chances of accidentally mixing up seed-groups, plant only one seed group at a time into their appropriately labeled containers. **Plant only one seed per peat pellet/pod.** Tomato seeds are very small. Each seed should be pressed gently into the depression in the center of the peat pellet, to a depth equal to the length of the tomato seed itself. Place the pellet in its labeled container. (Hint: label the containers in such a way that there is no opportunity for their labels to be removed, accidentally or otherwise!)



Planting the seeds

Observe and record

Detailed and carefully recorded observations are essential to completing a successful Tomatosphere™ experiment.

Observations should be recorded daily (or every second day if this is what the schedule permits).

Make copies of the Tomatosphere™ Data Collection Sheet provided (or design your own).

Monitor the germination conditions.

- 1 Seeds must be kept moist, but not wet. Water gently using a fine spray from above, or by adding a small amount of water in the peat tray to keep the peat pellets uniformly moist.
- 2 Germinating seeds prefer a moderately warm uniform temperature. Large changes in temperature inhibit seed germination.
- 3 Ensure that all seeds are germinated under identical conditions.
- 4 Avoid direct sunlight



TOMATOSPHERE™

Tomatosphere™ Data Collection Sheet

Data for the Group Marked _____ (from the seed package)

DATE	DAY NUMBER	GERMINATED TODAY (new)	TOTAL NUMBER GERMINATED	COMMENTS – changes in conditions, visual aspects,
	1			
	2			
	3			
	4			
	5			
	6			
	7			