**Could Mark Watney have actually grown potatoes in 10-cm deep soil?**

**“It’ll be a lot of work, but I’m going to need to cover the entire floor to a depth of 10 centimeters.”**

*Educational Opportunities*

A. Learn about assembling an experiment and maintaining a record of observations.

B. Learn about the vegetative propagation of a new plant from a "seed potato".

C. Explore the importance of adequate soil volume to supply the resources (water and nutrients) needed by plants for growth.

*Materials and Experimental Environment*

* Seed potatoes or an ‘organic’ potato not treated with sprout suppressant.
* Soil: Either collected soil (sandy loam) or obtain potting soil
* Two-liter plastic beverage containers
* Saucers (e.g. aluminum pie plates) on which to place containers to catch drained water
* Metric rulers
* Sunny location to place pots

*Procedures* (The material in the box below can be put on the blackboard for students to copy into her/his notebook.)

1. Each laboratory group (2-4 students) obtain\* one potting container for each of the depth treatments

\*These containers might be prepared by teacher so children do not have to use "sharps".

a. Containers need to be cleaned and carefully cut to allow soil depth of up to 20 cm or more.

 b. Drill or poke small holes (~ 3-4 mm diameter) in bottom of containers to allow drainage

2. Students carefully cut potato tubers so that there is at least one "eye" in each piece.

3. Partially fill and gently pack the containers with soil. For the 10-cm treatment this depth would be 5 cm and for the 20-cm this would be 15 cm. Put in one or two potato seed pieces on the soil positioned so the “eyes” are on the top side. Complete filling the container to cover potato pieces with soil to the desired depth. Gently pack soil.

4. Incrementally add 25 mL amounts of water until the containers just start dripping.

5. Place on drainage saucers in sunny location.

6. Students will initially make observations for emergence of the initial plant shoots. Once emerged, students will measure and record height of shoots and add water to dripping.

7. At 7-10 intervals, record status of plants and add water to dripping.

8. The exercise can be terminated when the tallest potato plant was about 40-50 cm.

OBJECTIVE: Test growth of potatoes when grown in containers of different depths

PROCEDURES:

1. Organize containers that hold differing depths of soil.

2. Obtain two "seed" potatoes for each container.

3. Plant "seed" potato with sprout ‘eyes’ facing upwards in soil of each depth treatment.

4. Water pots to dripping.

4. Observe for emergence of plant shoots.

5. At 7-10 day intervals, record status of plants including length of shoots. Add water to dripping.

*Results* (To be recorded in notebook in tables similar to those given below.)

The key results from this exercise will be the length of the shoots. In addition, to recording results in tables we found many students like to add drawings and/or narratives about the plants. These notes should also be encouraged as part of the notebook.

The students were asked to write her/his conclusions in the notebook. A graph can be suggested showing for each of the depth treatments of shoot length vs. dates. Differences in the slope of this graph could give insight about the influence of soil depth on growth rate.

**10-cm Soil Depth**

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| --- | --- | --- | --- | --- |
| **DATE** | **Water added** | **Shoot Length** | **Leaf Observations** | **Root Observations** |
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**20-cm Soil Depth**

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| --- | --- | --- | --- | --- |
| **DATE** | **Water added** | **Shoot Length** | **Leaf Observations** | **Root Observations** |
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