Instructions for Potting the Plants

Fill up two of the included planters with soil. Remove and dispose of any large clumps that remain, leaving only the fine soil. Add ½ cup of water to each planter and mix. Add water until soil is saturated. Place one type of seed in each planter on top of the soil, at least ⅜ of an inch apart. Insert planting markers into each planter to identify the two varieties of seeds. Gently apply additional water on all seeds until the soil is thoroughly wet (be careful not to wash away seeds). Place the dome lids on the planters for at least one week. Lids may then be removed if desired. Be sure to put both planters in a bright, sunny area.

Individual and Group Experiments

Either every student can do every experiment, or students can break into groups of three and observe the other group lessons.

1. **How do greenhouses work?**
   Fill two of the empty planters with water. Place them next to each other in the sun (either on a windowsill or outside). Cover the first planter with an included lid, and make sure it's closed tightly. Leave the second planter open. Leave the planters in the sun for about an hour. Then, remove the lid from the first planter and feel the water in both planters. Which planter has warmer water? Why? How would having a lid on the planter affect the greenhouse?

2. **Do plants sprout at different rates?**
   Plant the Mustard and Pink Polka Dot seeds in the planters according to the above directions. Make sure to water the seeds, and place the planters in a sunny area. Observe the seeds for the next week or two. Which seeds sprout faster, the Mustard seeds or the Pink Polka Dot seeds? Why do some seeds sprout faster than others?

3. **Does humidity have an affect on how quickly seeds sprout?**
   Plant the Mustard and Pink Polka Dot seeds in the planters according to the above directions. Place a lid on the first planter. Put it on a sunny windowsill. Put the second planter on the windowsill beside the first, but do not put a lid on this one. Observe the planters for the next week. Does one planter sprout faster than the other? Is there any condensation in the first planter? Does humidity make the seeds sprout faster?

The following experiments are to be done when both plants have reached maturity.

4. **Are all leaves the same?**
   After both plants have sprouted and started maturing observe the structures of the Mustard Plant leaves and the Pink Polka Dot Plant leaves. How are they different? How are they alike? What is the basic function of leaves on a plant?

5. **How do plants react to minimal sunlight?**
   Place the potted plants in an area of the classroom that is a few feet or more from a window. Observe the plants over the course of several days, noting whether they are straight or bent. If bent, in what direction are they curved? Turn the plants around (so that the bend is facing in the opposite direction) and observe what occurs over a period of two or three days. Do the spots on the Pink Polka Dot Plant change? What color are they now?

6. **What are circadian movements?**
   You will need a potted planter with just the Mustard Plant in it. Place the planter in a completely dark area for one day. Check on the flowering plant in the morning and at night. Does the flower still open and close as it would in light?

7. **How do plants react to being in the dark?**
   Place one potted planter on a sunny windowsill. Place another potted planter in a closet or somewhere completely dark and without windows. Leave the plants in these areas for two days. After the second day, take the plants out of the closet. Compare these plants to the ones that have been on the windowsill. Are there any differences? How to plants react to being in darkness versus light?

8. **Do plants react to touch?**
   Rub the end of a pencil against one leaf of both plants. Then, gently shake the plants and observe what happens next. Did the leaves of either of the plants fold together? How did the plants react to being gently shaken?

9. **How do plants respond temperature changes?**
   Put one of each type of plant in a warm area for about an hour (make sure both dome lids are off). Touch a leaf on each plant to see how it reacts. Move the plants to a very cold place (such as a refrigerator) for about 15 minutes. Touch the leaves of both plants again, and observe. Place the plants back in the warm area

for about 15 minutes, touch again, and observe. How did the cooler temperatures affect the plant's response to touch? How did they react after being returned to a warmer temperature?

10. How do plants breathe?
Water the plants in the dome. Put the lids on top of the planters and make sure both are tightly shut. Tape over the holes in the lid. Set the plants near a sunny window where they will get good light. After one day, check the plants. There should be drops of water inside the domes. Where do you think this water came from?

11. How do terrariums affect the growth rate of plants?
Make sure both planters are completely sealed with the included lids. Poke holes in one of the lids (five or six small holes). Leave the second planter completely enclosed with no holes. Place both on a sunny windowsill. Over the next week, observe the plant growth and water retention. Does the terrarium with the completely enclosed lid with no holes need more water, or does the one with holes need more water? Why?

12. Do water retention polymers affect the growth of plants?
Place ½ ounce of the included water retention polymers in one potted planter, water liberally to activate the polymer, and put on a windowsill. Do not include any water retention polymers in the second potted planter. Place the second planter by the first on the windowsill after it's been watered. Observe both sets of plants over a period of days. Which planter is growing faster? Does the planter with the water retention polymers have more moisture? Is the other one dry? Which one needs to be watered more?

13. How does fertilizer affect plant growth?
(Fertilizer is not included.) Add a small amount of fertilizer to the first planter. Water and set on a sunny windowsill. Water the second planter and set it beside the first one, with no fertilizer. (Make sure to leave lids off of both.) Observe the plants' growth over a week's time. Which one grows faster, the one with fertilizer or the one without? What is the purpose of fertilizer?

14. Do these two plants have the same root structure?
Carefully dig up the plants from the planter. Look at the root structure of both the Mustard Plant and the Pink Polka Dot Plant. Can you identify the type of root structure of these two plants? Why are they different? Why are roots important to plants?

Discussion Questions

What is photosynthesis? How do plants manufacture food? What are the two main components a plant needs to manufacture food?

Do we need plants to live? Do plants give off oxygen? What do we give plants and what do they give us that are necessary for survival?

Notes

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