

Activity: Creating a Plastic Tote Hydroponic Garden

Brief Description:

To educate students about the hydroponic system where they will be able to compare and contrast the various aspects to traditional gardening.

Materials Needed:

- Container with removable lid (Dark colored containers are recommended to eliminate algae growth. A clear container will work; just spray-paint the outside of the container black before starting. The size may vary depending on your needs, but it should have minimal depth. Dimensions of container in pictures are 23 ½ inches x 16 7/8 inches x 5 7/8 inches which holds 27 liters of liquid.)
- Liquid fertilizer (9-4-9 which is designed for fruits and vegetables)
- Small syringe to measure fertilizer amounts
- Drill, hole saw, or tin snips to cut holes in the lid
- Seedlings (Recommend “vine” plants such as cucumbers, watermelon or cantaloupe.)
- A protected area with six to eight hours of direct sunlight. Protection from the elements is very important for this project because your plants will not have the support of the soil. Rain storms and wind can very easily damage these plants. Pay attention to the temperature requirements of the selected plants and make sure that you will be able to keep them at the recommended temperature for growth.

Approximate budget for this project is \$35.

Project:

1. Identify the area for the hydroponic garden. Have students monitor and record the amount of sunlight for this area. Varying amounts of sunlight will aide in plant selection. If your area has four hours or less of sunlight, then focus on succulent plants. The best place would be a table indoors next to a window. This will eliminate the worry of strong rain storms damaging the plant since it will not have the support of the soil as well as any loss due to frost. If you do not have a window, placement under an awning can also work. The system can be moved from place to place but this is not recommended due to the weight of the container as well as sloshing of water and possible damage to the root system of plant.
2. Obtain materials. When searching for your container, remember that you want a larger surface area with minimal depth.



3. Select your plants. Vine plants are ideal for outdoor areas because they require the least amount of support. Tomatoes, bell pepper and okra are also good choices, but they will need support for vertical growth.
4. If you select seedlings, you will need to wash off all dirt before placing them in your container. If time allows, have students grow their own seedlings. Students would be able to monitor and record the growth process from seed to seedling. You can start this process with seeds and a clay pot.
5. Next, you will need to cut holes (using a drill, small hole saw, or tin snips) in the lid to allow the plants to “sit” on top of the lid while their root systems are submerged in the water/fertilizer mixture that you will be adding to the container. Holes for the plants should be cut two inches apart. If you cut the holes bigger than the plants need, then you can add Styrofoam into the hole to aid in support. As long as the roots are submerged in water and the

stem and leaves are above water, they will be fine. Another option is to buy net cups and place them in the holes to keep the plants out of the water. You will need to buy growing media which will cost more. You will also need to cut a single hole that will be used to add your water/fertilizer mixture without disturbing the plants.

6. Place the seedlings in their respective holes and begin filling with water. Leave one inch of space from water level to lid to keep water from spilling. You can even drill a small drainage hole one inch down so that you cannot overfill.
7. Measure surface area of the lid and container (Area = Length x Width). Read fertilizer packaging to find recommended dosage amounts. Add the recommended amount of fertilizer to the water already in the container. For example, if the fertilizer bottle selected reads “one bottle (16 ounces) will feed 400 ft²” and the area of the container is about 2.75 ft², we should use 0.11 ounces per week or 3.25 ml. (1 ounces = 29.573 ml).
8. Continue fertilizing your hydroponic garden until desired plant production is reached. Fruits and vegetables will produce in approximately eight-12 weeks. Students should see growth within the first week.

