



# recipe for change

## Grow to Your Room Eco-Gardens Workshop Facilitator Notes

**Objective:** Students will each build their own sub-irrigated planter out of a used pop bottle to take home. They will plant seeds in their planters and learn how to care for living things as they grow.



**Recipe Category:** Plants & Gardening



**Cooking Time:** At least 2 hours



**Level of Difficulty:** Beyond 3:30 After School Programming – Grade 7/8



### Recipe Ingredients:

#### Pop Bottle Planters

- Empty pop bottles (one per student)
- Zip ties (one per student)
- 4"x4" squares of window screen (one per student)
- Coir or potting mix (enough for  $\frac{3}{4}$  litre of hydrated coir or soil per student)
- Worm castings (enough for  $\frac{1}{2}$  litre per student)
- 2 five-gallon buckets (one for hydrating coir and one for mixing)
- Measuring cups (750 mL for coir/soil and 500 mL for castings)
- Worms – for demonstration purposes
- Bush bean seeds (two per student)

- Instructions for care (one sheet per student)
- Other kinds of sub irrigated planter pictures (attached)
- Masking tape
- Utility knives (one per facilitator)
- Markers
- Scissors

#### Plant Survival Bean Bag Game

- Bean bags (eight each of yellow, blue and red)
- Blind folds (three)

#### Bean Dissection

- Paper towels
- Green beans (enough for 3 or 4 per student)

## Introduction: (10 minutes)

- Introduce yourselves and tell the students what they will be doing in the workshop.
- Today we're going to be exploring the three major needs of plants: **water, nutrients and sunlight**

## Water Discussion: (5 minutes)

*Why do plants need water?* They use it for many things...

- Plants cannot absorb nutrients from the soil unless they are first dissolved in water.
- Plants are also made up mostly of water. Have the students guess what percentage of the weight of a human body is made up of water ... about 60%. Now guess what percent of a plant is made up of water ... as much as 95%!
- During photosynthesis, a plant uses energy from the **sun** to turn **water** and **carbon dioxide** (another important need) into a type of sugar called **glucose** and **oxygen**.



## Sub-Irrigated Planter Explanation: (5 minutes)

Using the pre-assembled planter, explain to the group how it works.

- The **growing mix** in the neck of the bottle that sits in the water acts as a wick, and through capillary action transports water to the rest of the soil.
- The **window screening** prevents the mix from falling into the water reservoir.
- The **flaps** cut into the bottom section allow the reservoir to be filled and also allow for ventilation.

Explain the benefits of sub-irrigation versus top watering:

1. The plant can take up water as it needs it.
2. Fewer nutrients are lost because they are not washed away in water poured from above.

Pass around some photos of other types of sub-irrigated planters and give a brief explanation of each.

Have a volunteer add water to the coir and let it expand while you move on to the next activity.

### **Planter Assembly: (30 minutes)**

1. Have the students come up one at a time with their pop bottle to the two facilitators, each of whom should have a utility knife. Make a small **cut along the ridge near the top** of the bottle so that the student can start cutting the top off with scissors. Make **three evenly spaced ½” cuts** along the ridge at the bottom of the bottle, and then cut up about ½” from each end of these cuts to create small flaps.
2. Each student should then **cut the top off of their bottle** with scissors.
3. Turn the top section upside down, and place it inside the other part of the bottle. Using a marker, **trace a line** on the top section to mark the portion that sticks out.
4. Using scissors, make **small vertical cuts** from the edge to the line, every ½” around the entire top.
5. Give each student a square of window screening and a zip tie and have them **fasten the screening over the mouth** of the bottle with the zip tie. This will prevent the growing mixture from falling down into the water reservoir.
6. Students will now take the top section of the bottle (still turned upside down) and **push it inside the bottom section** until the mouth of the bottle touches the bottom.

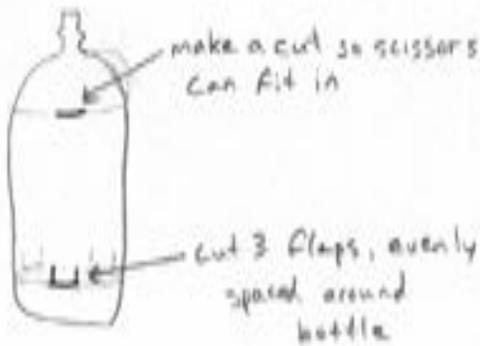
### **Making the Growing Mix & Checking out Worms:**

Highlight the three major needs of a plant again: **Water, Nutrients and Sunlight**

- The planters are designed to make sure the plant gets all the water it needs. *Where do plants get their nutrients from?* Soil contains many types of nutrients, including nitrogen. Animal waste contains a lot of nitrogen ... that’s why farmers put cow manure on their fields.
- Make up your own nutrient-rich soil using the coir/potting mix and worm manure.
- Show the students the worms and explain how they eat food scraps and turn them into rich castings. We use Red Wigglers for vermicomposting for many reasons:
  - They can eat as much as half of their body weight in a single day.
  - They remain fairly shallow in the soil, making them perfect pets for classroom-sized worm bins (e.g. Rubbermaid containers)

- Some other interesting worm facts to know:
  - Worms don't have ears, they "hear" through vibrations.
  - Worms need to keep their skin nice and moist to allow breathing, they don't have lungs like us.
  - Worms don't have eyes.
  - Worms have no teeth, only gizzards.
  - Worms have five hearts.
  - A worm torn in two does not equal two worms.
  - Worms prefer cool, moist, dark environments.
  
- Ask the students to take turns adding a scoop of worm castings and a scoop of coir/potting mix to a bucket and then mixing it up with their hands. When the mixture is ready, have them take turns filling the top section of their planter, making sure not to pack it down too hard.

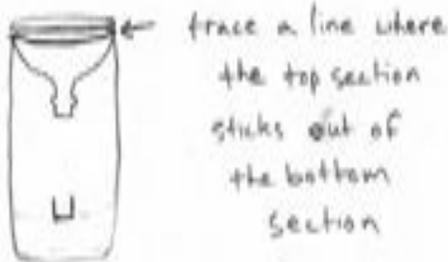
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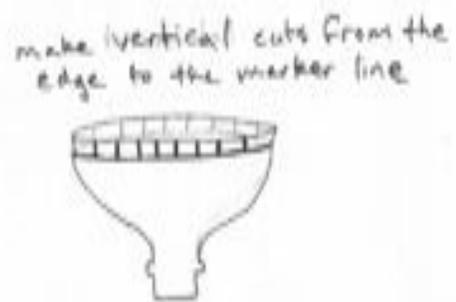
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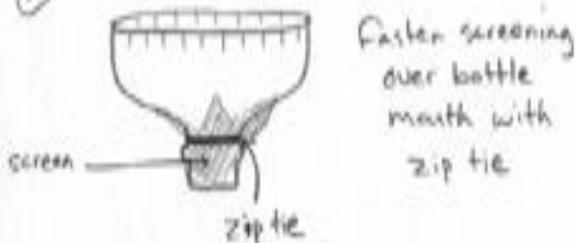
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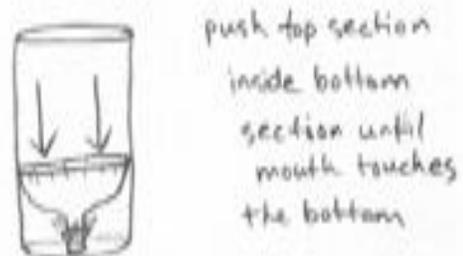
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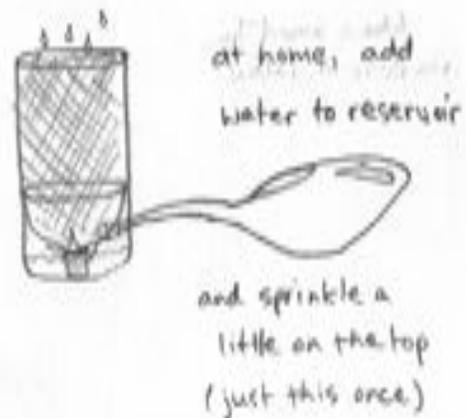
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## **Planting and Care:**

- 1.** Give each student **two bean seeds** and have them plant them in their new planter. To avoid spillage during the trip home, make sure they do not add water to the planter yet.
- 2.** Pass out the **instruction sheets** and have the students tape them to the outside of their planters so they do not lose them. Give each student a piece of masking tape to label their planter with their name. Go through the instructions step by step, making sure the students understand that they need to add water to the reservoir but also to the growing mix when they get home so that the seed can start to germinate.
- 3.** Go over the three major needs again. We've covered water and nutrients, now we need to make sure the plants get **sunlight**. Discuss the way the sun moves through the sky. Ask the students which direction the sun comes up in the morning and where it sets. Explain that the sun doesn't move directly above us, but rather **shines from the south**. A window on the north side of a house will not get any direct sunlight. Make sure they understand how to determine a good location for their planter. If there is extra time, ask each student if they have an idea about where in their house they can keep their planter.

## **Clean Up:**

Encourage the students to clean up any soil or pop bottle labels.

## **Plant Survival Bean Bag Game:**

Ask the students to recount the three main things plants need to survive:

- 1.** water
- 2.** sunlight
- 3.** nutrients

There are three different colours of bean bags:

- 1.** blue to represent water
- 2.** yellow to represent sunlight
- 3.** red to represent nutrients in the soil

- Choose two or three students for special roles and then split the rest of the group up into **teams of four to six students**.
- The game starts with each team in its own corner and all of the bean bags in a pile in the middle of the gym.
- The students that you have chosen should put on blindfolds and stand by the pile of bean bags. They represent things that can **block the required elements for growth**, such as shade, drought, and poor soil.
- **The goal is for each team** to collect 3 bean bags of each colour and place them on the floor in their corner.
- Bean bags can only be moved by **tossing them from person to person** (no walking or running when you have a bean bag) and they have to be **touched by at least 3 different people** before they reach the corner.
- If a **bean bag is dropped**, it has to be carried back to the centre.
- As students try to grab the bean bags from the middle, the blindfolded students try to block them by tagging them. **If a student is tagged**, they have to run back to their home base before they can start playing again.

**To make the game more complex**, you can try adding these requirements:

- Nutrients can only be collected once a team has enough water in its base to absorb each nutrient (one water per nutrient);
- Teams can steal elements by intercepting them in the air.

### **Optional Game:**

- The facilitators stand against one wall and have the students stand in **the middle of the gym**.
- Assign each of the other three **walls to be water, sunlight and nutrients**.
- **Call out clues** from the list below, one at a time.
- After the clue is read, the students have to **run to the wall that represents the correct answer**.
- The **last student** to reach the wall is eliminated from the game.

1. Your body is made mostly out of me. (WATER)
2. I am the source of the energy that makes photosynthesis happen. (SUNLIGHT)
3. Nutrients cannot be absorbed by a plant's roots without me. (WATER)
4. The best place to find me in a house is near a south-facing window. (SUNLIGHT)
5. Worm poop is a good place to find me. (NUTRIENTS)
6. I account for up to 90% of the weight of a plant. (WATER)
7. There are many types of me, but nitrogen is one of the most important. (NUTRIENTS)
8. Florescent lights can do my job, but they aren't as good at it as I am. (SUNLIGHT)
9. Plants turn carbon dioxide and me into sugar and oxygen. (WATER)
10. You can find me in the soil. (WATER or NUTRIENTS)

### **Bean Dissection Activity:**

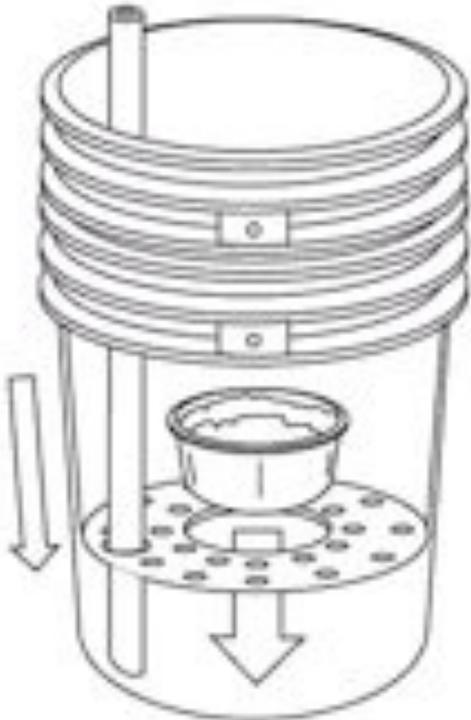
- Give each student 3 or 4 green beans and a paper towel.
- Have them guess how many seeds are in each bean, writing their guesses on the paper towel.
- Now dissect the beans and count the seeds.
- Have the students talk about the similarities between the seeds they have pulled out of the green beans and the seeds they planted in their bottle planters.
- If you have extra time, get the students to guess how many seeds there are in total.
- After the all numbers have been tallied, give the student with the closest guess a prize (more green beans, left over apples, a healthy snack.)

### **Wrap Up:**

Bring the students back together and ask if they have any questions about the workshop. Ask them what they have learned and what they liked and did not like. Write down any good quotes. Make sure they understand the instructions for taking care of their plants. Tell them that you will be back again in a couple of months.

# Other Types of Sub-Irrigated Planters

## 5-gallon bucket SIP

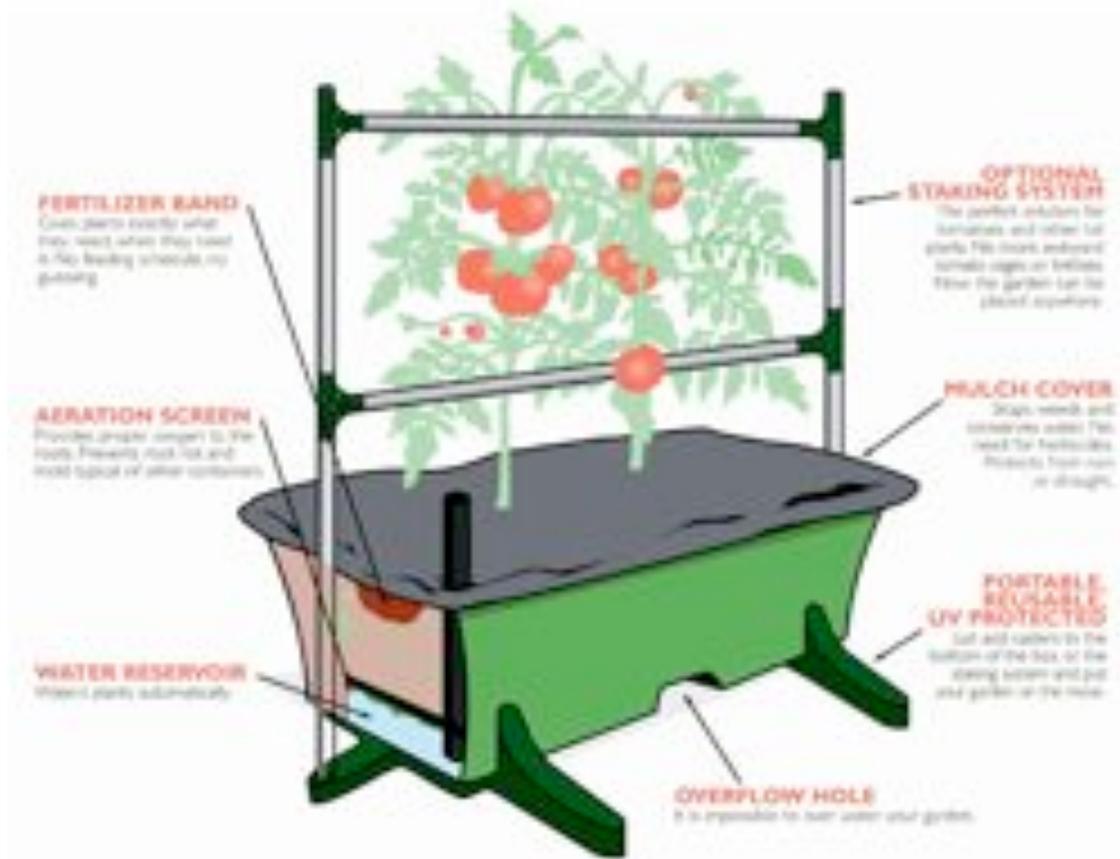


Source: <http://www.tacticalintelligence.net>

## SIP from FoodShare’s Gateway Garden



## Earthbox



Source: <http://www.greenhousecatalog.com>

## Biotop



Source: <http://biotopcanada.com/>

## **Taking Care of Your Sub-Irrigated Bottle Planter**

1. When you get home, add water to the water reservoir by pouring it through one of the flaps in the bottom part of the bottle.
2. Add some water to the soil at the top of the planter to help the seed to start to grow. You will not need to water the top part again, as water from the reservoir will soak up through the soil in the neck of the bottle and keep the rest of the soil damp.
3. Find a window in your house that has sun shining through it for at least part of the day (a window on the south side of your house is best), and place your planter on the windowsill or on a table or shelf beside the window.
4. Wait until the water in the reservoir has run out before adding more.



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