

LOCATION OF WORK	WRITTEN BY:	APPROVED BY:	DATE	LAST REVISION
School: All schools Subject: STEM	David Gamble Lorie Carriere	Principal or S&H Committee	April 5, 2023	new

### PERSONAL PROTECTION EQUIPMENT (PPE)



Safety glasses or face shield must be worn at all times when refilling or testing chemicals



Wear disposable nitrile gloves when mixing pH + Base, pH-Acid, Tower Tonic A, and Tower Tonic B, in order to protect your hands.

### HAZARDS PRESENT

- Electric shock
- Chemical burns
- Bulbs are hot - contact may cause burns. Contact with combustible items may cause fire.

### ADDITIONAL REQUIREMENTS

- Equipment Orientation

### SAFE WORK PROCEDURE

**DO NOT** use this machine unless a teacher has instructed you in its safe use and operation and has given permission.

#### PRE-OPERATIONAL SAFETY CHECKS:

- The Tower Garden® is an aeroponic growing system. Do not stand on the Tower Garden® and take care to keep children from playing on the Tower Garden®.
- When draining the Tower Garden®, do not allow the drainpipe to drain over an electrical outlet or extension cord. Do not overfill the Tower Garden®, which would allow water to run out of the electrical cord opening in the reservoir.
- Wear protective gloves when mixing pH + Base, pH-Acid, Tower Tonic A, and Tower Tonic B, in order to protect your hands. Disposable nitrile gloves can be used while working with the acid and base solutions.
- Use a large stirring paddle or spoon to mix the nutrients and pH adjusting chemicals in the reservoir. **DO NOT USE YOUR HANDS.** The solution may be alkaline or acidic and may cause skin irritation.
- Read and follow all safety instructions on the pH and Tower Tonic labels.
- Ensure the tower is placed close to an electrical outlet. Extension cords/power bars are not allowed.
- Place a pan or utility mat underneath the unit to protect the flooring.
- Ensure the tower is level. It must be level to work properly.

#### PROCEDURE:

1. Start your seeds using the seed starter tray provided. After 1-3 weeks you will have healthy seedlings ready for transplanting into your tower garden.

2. Your Tower Garden® will hold approximately 20 gallons when filled to within 3 inches of the top lid. Use a hose to fill the reservoir with cool water. Do not overfill the reservoir. NEVER use softened water, heavily chlorinated water, or very hard water, as it may damage your plants. NOTE: Chlorine in water can be eliminated by filling a bucket with water and leaving it out in full sun for 48 hours.

**Hazard:** overfilling the reservoir can cause the cord to come into contact with water causing electrical shock.

3. Don all personal protective equipment required (safety glasses/gloves). Add the correct amount of Tower Tonic to the reservoir. See Important Safety Information before adding Tower Tonic. Follow the instructions listed on the fertilizer labels. A Tower Garden® with all new plants requires a half strength of Tower Tonic (200 ml each of Tower Tonic A and Tower Tonic B).

**Hazard:** the acid solution is 6% phosphoric acid and the base solution is 6% potassium Hydroxide. Both are corrosive and will cause burns to the skin, eyes, nose and throat. Ensure you are wearing your safety glasses and nitrile gloves when handling the product.

4. Use a utensil to stir the nutrients thoroughly.

**Hazard:** Do not use your hands. The solution may be slightly acidic or alkaline and can cause Chemical irritation/burns to the skin.

5. Use the pH tester kit to test the pH of the solution. The optimal pH is 5.0 to 7.0. If an adjustment is necessary, use a small amount (one to two tablespoons) of the pH buffering solution (included) to either raise (pH + Base) or lower (pH-Acid) the pH of the nutrient solution.

**Hazard:** Follow all safety instructions on the pH bottles. Avoid contact with the skin. The solution may be slightly acidic or alkaline and can cause chemical irritation/burns to the skin.

Retest the solution for the correct pH. If further adjustment is necessary, continue to add a small amount of the pH buffering solution and retest the pH level until the correct range is obtained.

6. Plug in the pump and check to see that water is coming out of the top of the Tower Garden® before putting the lid on the shower cap. Your Tower Garden® comes with an adjustable flow rate dial on the pump. This dial is useful, as the flow rate out of the shower cap is affected by altitude. Turning the dial counterclockwise opens the flow rate to maximum, and turning the dial clockwise reduces the flow rate to minimum. Be sure to set your flow rate so that the nutrient solution does not touch the shower cap lid. If it does, you may have potential leakage around the shower cap area.

7. A timer is included with your Tower Garden®. The Tower Garden® functions better if the watering is on a cycle, rather than a continuous flow. We recommend 15 minutes on and 15 minutes off. Cooler seasons throughout the year may allow for longer durations without water. To set the timer, follow the instructions found on the back of the timer.

8. Place the access port lid on the reservoir lid.

9. Place one seedling cube inside each net pot on the tower garden, gently pressing the seedling cube in until it touches the base of the net pot. If the cube is not touching the base of the net pot the seedlings will not get watered.

10. Set light timer for 12-hour intervals (after seedlings have been transplanted into the tower.).

**Hazard:** Bulbs become extremely hot when left on for long periods of time and may be considered a fire hazard and may cause burns when in contact with skin. Lights cannot be set to operate over night when no one is present.

### **MAINTAINING YOUR TOWER GARDEN:**

1. Check the water level regularly. Keep enough solution in your reservoir so that the submersible pump stays completely submerged. A full reservoir should last 2-3 weeks.
2. Check the pH weekly and after refilling the reservoir, follow the instructions to adjust your pH levels. Yellowing leaves are an indication that your pH may have drifted out of the recommended range.
3. Keep the shower cap holes clean and free from debris. You can use a toothpick to clean the holes.
4. Keep roots away from the pump. You can trim the roots that may be dangling in the reservoir.
5. Clean the pump filter monthly.
  - Unplug the pump, pull the pump up through the access port and remove the pump cover. Clean with water to remove debris.
  - Another technique is to turn off the pump and firmly place a garden hose at the top of the center stem in your shower cap. This will blow old root debris out of the filter into the bottom of the tank.
  - Be sure to clean out the debris from the tank bottom or it will clog your pump.
6. Keep cool water (85 degrees or less) in the Tower Garden®. You can help keep the water cool by utilizing the Tower Garden® dolly or placing a mat underneath the reservoir.
7. Drain the refilling tower and clean the unit at the end of each growing season.
  - Unplug the pump.
  - Insert the drainpipe on the tip of the shower cap nozzle.
  - Make sure the drainpipe is facing away from any electrical plugs and pointing into a container or large pail that will hold 20 gallons.
  - Plug in the pump and empty the reservoir.
  - Discard any plant material and clean the net pots with warm soapy water.
  - Clean the tower and dry out the reservoir before closing for the summer or when all the vegetables have been used.

### **REGULATORY REQUIREMENTS**

- WS&H Act W210, Section 4, 5, 7, 7.1
- MB. Regulations 217/2006,
  - o Part 2, Section 2.1 Safe Work Procedures
  - o Part 6, Section 6.1 PPE
  - o Part 16, Sections 16.1 – 16.18, Machine & Tool Safety
  - o Part 8.0 Musculoskeletal Injuries
  - o Part 35.0 WHMIS
  - o Part 36.0 Chemical Biological Substances
- Operators Instruction Manual
- SDS for pH solutions

