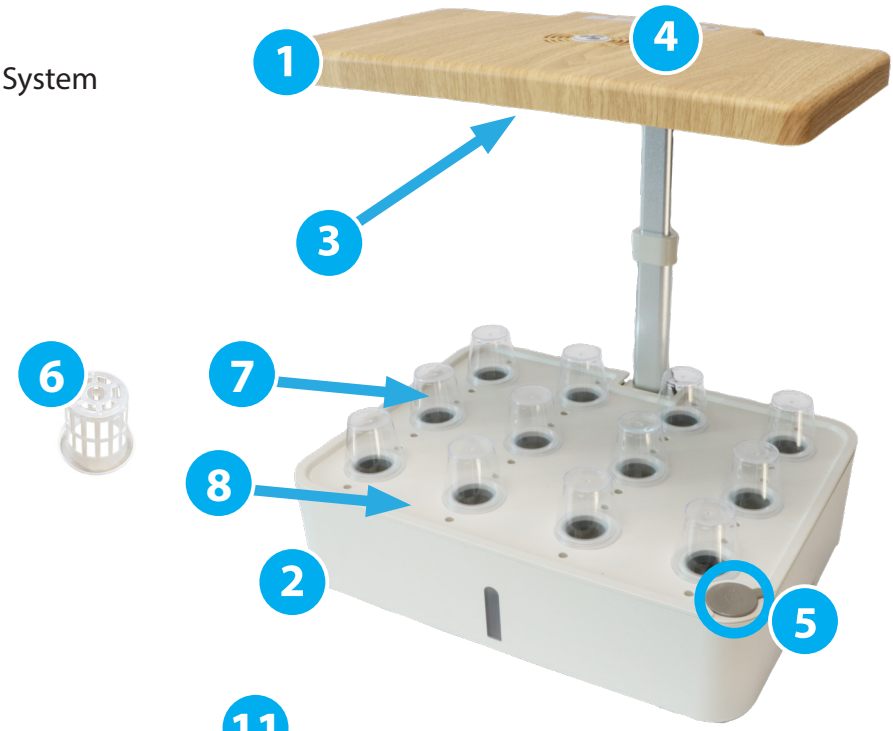
Plant Mini Educational Hydroponics System
User Guide

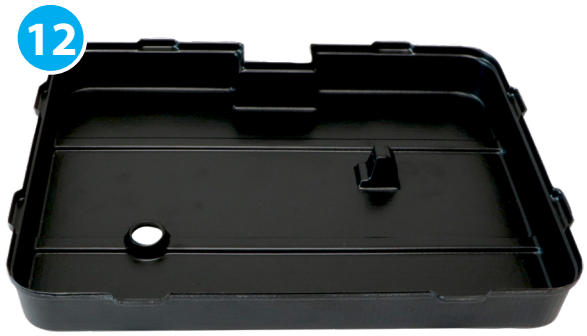
The Plant Mini Educational Hydroponics Systems allow students to take individual or small-group responsibility for growing a variety of plants while addressing key plant science, STEM, and sustainability efforts. This system allows growth through deep water culture, ebb and flow, or microgreen methods.

Plant Mini includes:

1. Plant Mini Educational Hydroponics System
2. Water tank
3. Lights
4. Fan
5. Water and nutrient access hole
6. Reusable grow cups
7. Mini germination domes
8. Grow cup cover
9. Grow plugs
10. Grow mat
11. Starter seeds*
    *Brands may vary
12. Ebb and flow tray
13. Microgreen tray

- Access to online curriculum
- 1-year limited warranty





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Introduction to Educational Hydroponics Systems

Each system comes with curricula and slide presentations to teach students more about what hydroponics is. The curriculum addresses growing produce as well as accessory kit materials and a user guide to begin growing right away. Use them to engage more students in agriculture programs, incorporate STEM concepts into your curriculum, and teach relevant, in-demand skills that modern agriculture careers require.

Assembly Instructions

Unboxing

1. Unwrap the unit from the packaging and set out the base, post, top, and power cord. Remove the tape from the pump.

2. Set the top with the lights facing up and slide the post into the notch until it clicks into place.

3. Turn the post and top over and slide the post into the base of the unit so that it clicks into place.

4. Turn the knob on the post to the left to loosen it, extend the post, and turn the knob to the right to tighten it in the desired position.

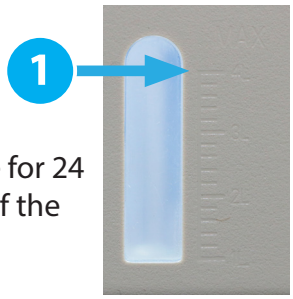
5. Press the pump cord into the notch on the base, then plug it into the top. Plug the power cable into the top, then plug the other end into an electrical wall outlet when ready to use.

Pump Power

Accessory Kit

A starter kit is included to start planting right away. This is a sample of the products that can be sourced after initial usage from many different retail and online stores. Included are a pack of starter seeds, grow plugs, and a grow mat.

Water



1. Fill the tank to the max mark with four liters of water.
2. Add the nutrients (see **Step 3** on pg 6 and 9 for more details) and let the water circulate for 24 hours. This will allow the water to reach room temperature and will leach chlorine out of the water.
3. Turn the system on.
4. Add water regularly to prevent water levels from dropping too low, letting water sit for 24 hours prior to adding to the tank as noted above.

Prepare the Mini Hydroponics System

It is important that the following steps are completed in order when first opening the hydroponics system:

1. Make sure the hydroponics system is on a level surface and plugged in.
2. Prepare the hydroponics system at least 2-3 days before planting seeds.
3. Add water and nutrients to the tank, and let the water circulate for 24 hours before adding plants.
4. Place the desired tray on top of the water tank then place the grow cup lid if using ebb and flow or deep water culture methods.

Nutrient Recommendations

Nutrients need to be purchased prior to growing plants. There are many different nutrient types that can be purchased. Recommended options are detailed below:

- General Hydroponics Floraduo A & B Fertilizer – 1 quart MFG recommendations:

Type of Growth	Floraduo A	Floraduo B
Mild Grow Blend	2 tsp/gallon of water	1 tsp/gallon of water
Strong Grow Blend	3 tsp/gallon of water	1 tsp/gallon of water
Transitional Grow Blend	2 tsp/gallon of water	2 tsp/gallon of water
Mild Bloom Blend	1 tsp/gallon of water	2 tsp/gallon of water
Strong Bloom Blend	1 tsp/gallon of water	3 tsp/gallon of water

- General Hydroponics Flora Bloom Fertilizer – 1 Quart MFG recommendations:
  - Maintain pH at 5.5 - 6.5
  - Measure accurately

Type of Growth	FloraGro	FloraMicro	FloraBloom
Seedlings/cuttings	¼ tsp/gallon of water	¼ tsp/gallon of water	¼ tsp/gallon of water
Mild Growth	1 tsp/gallon of water	1 tsp/gallon of water	1 tsp/gallon of water
Aggressive Growth	3 tsp/gallon of water	3 tsp/gallon of water	3 tsp/gallon of water
Transition to Bloom	2 tsp/gallon of water	2 tsp/gallon of water	2 tsp/gallon of water
Blooming/Ripening	1 tsp/gallon of water	1 tsp/gallon of water	1 tsp/gallon of water

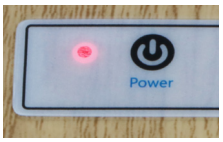
Seed Sources

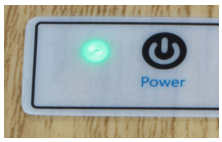
Below is a sampling of seed companies that offer online ordering and direct shipping of seeds. Larger retailers like amazon.com, homedepot.com, walmart.com, and other chain stores are also available. Local, regional, or national seed suppliers are also resources for seeds.

- Johnny's Selected Seeds Winslow, ME www.johnnyseeds.com
- Seed Savers Exchange Decorah, IA www.seedsavers.org
- Baker Creek Heirloom Seeds Mansfield, MO www.rareseeds.com
- Burpee Seeds and Plants Warminster, PA www.burpee.com
- Territorial Seed Company Cottage Grove, OR www.territorialseed.com
- Seeds of Change Rancho Dominguez, CA www.seedsofchange.com
- Ferry-Morse Seed Company Fulton, KY www.ferrymorse.com
- Southern Exposure Seed Exchange Mineral, VA www.southernexposure.com
- High Mowing Organic Seeds Wolcott, VT www.highmowingseeds.com
- Fedco Seeds Waterville, ME www.fedcoseeds.com
- Nichols Garden Nursery Albany, OR www.nicholsgardennursery.com
- Botanical Interests Broomfield, CO www.botanicalinterests.com
- Renee's Garden Seeds Felton, CA www.reneesgarden.com
- Peaceful Valley Farm & Garden Supply Grass Valley, CA www.groworganic.com

Standard Settings

Power

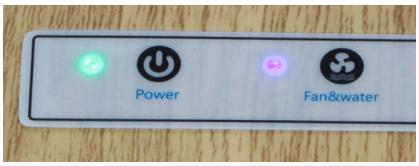




- Press the power button on the top of the unit. The red light means the power is off and the green light means the power is on.
- The unit will automatically turn on the pump and fans, along with the lights for either the vegetables or the flowers and fruits. See below for more specifics on these items.

Water Pump and Fans

The water pumps circulate the water so that vital nutrients can move to the plant roots. The fans help strengthen and reduce injury and disease to the plants. They always run at a consistent speed.



- One button on the top panel turns the water pump and fans on.
- They run on a 60-minute schedule that begins when the switch is turned on.
- The water pump and fans follow this schedule of approximately 30 minutes on, 30 minutes off.

Lights

The LED light array mimics sunlight (including the red-and-blue light spectrum) to help the plants grow.

- The lights run on a 24-hour schedule that begins when they are turned on for approximately 16 hours on, 8 hours off.
- There is a bloom light for flowering plants and a vegetable light for leafy greens and other non-flowering vegetables. Select the button on the top for the appropriate setting depending on what is being grown.

Guide to Growing Microgreens

Step 1: Prep and Growth Understanding

Prepare the microgreen tray

1. Remove any trays currently installed.
2. Place the microgreen tray on top so that the notch in the tray lines up with the post at the back of the hydroponic system.

Planning and timing

Plan on what plants to grow based on the goals of the program. Some recommendations are arugula, kale, mesclun mix, swiss chard, and other microgreen salad mixes.

Planting and Harvesting Cheat Sheet			
Plant	**Direct Light Needed**	**Germination**	**Days to Maturation**
Arugula	Yes	5-7	45-60
Kale	Yes	3-10	55-80
Mesclun mix	Yes	7-14	40-60
Swiss Chard	Yes	7-10	55-65

Quick tips

1. Microgreens are baby plants and don't always need nutrients to grow.
2. Plan on harvesting in 2-3 weeks unless you want the plant to flower.
3. Be aware of root hairs; they can look like mold, but they are actually the roots.
4. Use quality seeds; if any mold is on the seeds it will continue to grow.
5. Do not overseed; this can cause root rot.
6. The temperature for best growth should be between 68-72 degrees F with humidity at 35-50% as the microgreens are dense.
7. Control fruit fly aphids and other insects to protect your plants.

Step 2: Germination and Grow Mats

1. Cut the grow mat down to size with the cut diagram provided on the downloads page.
2. Soak the grow mat for 15 minutes in clean water, then drain and place it on the tray, or place it on the tray and mist it with a spray bottle.
3. Sprinkle seeds onto the mat.

Step 3: Nutrients

Mix nutrients into the water reservoir at least 24 hours before adding plants to the hydroponics system. Water should be checked for pH and for EC (Electrical Conductivity). EC measures the potential for electrical current to be transported by water. It is measured in Seimens (S) and allows nutrients to move to plants more easily.

Test these two variables by using meters that can be purchased online or at a hydroponics store. These are the general recommended levels for the EC and pH when testing the water:

pH

- LOW pH: If the pH is below the level needed by the plant, it is time to add new water into the system. Please reread the **Water** section (pg 3) before adding any new water.
- HIGH pH: If the pH is above the level needed by the plant, add nutrients to raise the acidic levels of the water. Nutrients are acidic, so it is a good solution to bring the water back down within the recommended range. If EC is also high, the tank should be drained and filled with fresh water and nutrients.

EC

- LOW EC: If the EC is low, the plants have consumed the nutrients in the water and more nutrients should be added to the tank.
- HIGH EC: If the EC is high, too many nutrients were added and more water needs to be added to the tank.

For all nutrients, the manufacturing company is the best reference for pH recommendation and the amount of the nutrients to use. Check pH and EC together.

Step 4: Checking Levels

Once all plants are in the hydroponic grow cups, it is necessary monitor the growth of the plants and check the levels of the water and nutrients. Water levels will begin to decrease as water evaporates. As the plants grow, they will consume increasing amounts of water and nutrients.

There are some recommendations to follow:

Type of Growth	Growth Description	Level Check Timing
Early Growth	Plant is just placed into the hydroponics system	1-2 times per week
Late Growth	Plants are growing but not quite to harvest	2-3 times per week
Harvest	Plants are ready to harvest or will be within a week's time	3-4 times per week

It is important to check on the plants periodically to ensure that they are growing as expected. Monitoring and checking on the plants in a systematic format (record-keeping or journaling) will help to keep optimal growth.

The following is a recommended schedule per tank being used:

Water Levels

- 2 times a week with under half of the plant spots being used
- 3 times a week with over half of the plant spots being used

EC and pH Balance

- 2 times a week with under half plant spots being used
- 4 times a week with over half plant spots being used

Step 5: Harvesting

1. Turn off the power and unplug from the power source prior to harvesting.
2. Mist the greens with fresh water before harvest.
3. Use a clean, sharp scissors or knife for cutting. Ready a container to receive the cut greens. Make sure your hands and all utensils are clean.
4. Harvest the microgreens (search online for tips and tricks for your plant) and shake the plant to remove any seed hulls after its cut. Handle the plant carefully to avoid bruising the remaining leaves.
5. Wash the harvested greens with fresh water and then remove any excess water with a salad spinner or paper towels.
6. Store the harvested greens with a few paper towels to absorb excess moisture and replace the paper towels every few days to keep the greens crisp.

Step 6: Cleaning Prior to the Next Planting

Once the crop is harvested, clean up the hydroponics unit to start another planting.

1. Turn off the power and unplug the cord from the wall outlet and hydroponic system.
2. Remove the grow mat and dispose of it.
3. Take the system to a sink, remove the microgreen tray, and dump the water out of the tray and water tank.
4. Clean the tank(s) and tray covers with warm soapy water from a bucket. Do not pour soap/bleach directly into the reservoir. Bleach can be used to clean the hydroponics system, but it is advisable to use less than a ¼ capful of bleach for every 1-2 gallons of water. If bleach is used, wait an additional 24 hours before filling the tank with water.
5. Rinse thoroughly to remove the soap and bleach (if used).
6. Remove all visible green algae that may have accumulated from the previous harvest.
7. Remove the pump by pulling the tab and lifting the pump. Clean any roots that may be in the intake screen and then reinstall the pump.
8. Use a dry cloth or let it air dry before adding new water.
9. Once clean and dry, new water can be added. The recommendation is to let water sit/circulate for 24 hours before adding any plant life to the hydroponics system.

Guide to Growing with Deep Water Culture or Ebb and Flow

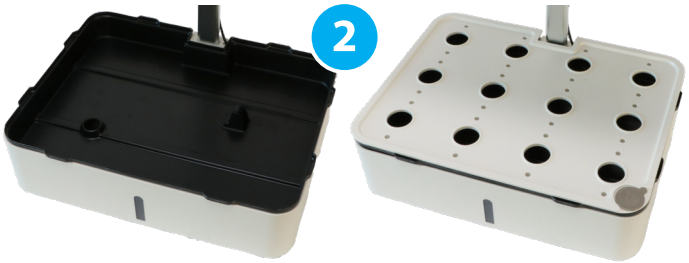
There are many ways to grow plants using hydroponics systems and many different variables to consider. This is a recommendation of an 8-step process to prepare and use the hydroponics system for deep water culture and ebb and flow methods. Read through all 8 steps prior to starting the growing process.

Step 1: Prep and Growth Understanding

Prepare the system for deep water culture

1. Remove any trays currently installed.
2. Place the grow cup cover on top so that the notch in the cover lines up with the post at the back of the hydroponic system.

OR



Prepare the system for ebb and flow

1. Remove any trays currently installed.
2. Place the ebb and flow tray on, followed by the grow cup cover, so that the notches in the tray and cover line up with the post at the back of the hydroponic system.

Planning and timing

Plan on what plants to grow based on the goals of the program. Some recommendations are cabbage, cucumber, green beans, kale, leaks, lettuce, radishes, swiss chard, and tomatoes.

Be aware of the average germination times for plants. Below is a list of average timelines for growth of popular plants.

Planting and Harvesting Cheat Sheet			
Plant	**Direct Light Needed**	**Germination**	**Days to Maturation**
Cabbages	Yes	4-10	65-85
Cucumbers		6-10	55-65
Green Beans		7-14	80-100
Kale	Yes	3-10	55-80
Leeks	Yes	7-12	80-90
Lettuce	Yes	4-10	35-65
Radishes	Yes	3-10	50-60
Swiss Chard	Yes	7-10	55-65
Tomatoes		6-14	55-90

Step 2: Germination and Grow Plugs

Grow plugs make it easy to germinate and grow plants in your hydroponics unit.

1. Match the number of grow plugs with the number of seeds being planted.
2. Place the grow plugs into the germination cups, one piece per cup.
3. Put one seed into the small divot of each grow plug. For lettuce, 2-3 seeds can be planted in each location if desired.
4. Place a mini germination dome on top of each.
5. Remove the dome after plant emergence and 0.5-1" of growth.

Reusing grow plugs

1. Grow plugs can often be reused if cared for properly.
2. Carefully remove the plant and roots from the grow plugs.
3. Rinse the grow plugs in a sink.
4. Grow plugs do not need to be fully dried out before they are reused.

Step 3: Nutrients

Mix nutrients into the water reservoir at least 24 hours before adding plants to the hydroponics system. Water should be checked for pH and for EC (Electrical Conductivity). EC measures the potential for electrical current to be transported by water. It is measured in Seimens (S) and allows nutrients to move to plants more easily.

Test these two variables by using meters that can be purchased online or at a hydroponics store. These are the general recommended levels for the EC and pH when testing the water:

pH

- LOW pH: If the pH is below the level needed by the plant, it is time to add new water into the system. Please reread the **Water** section (pg 3) before adding any new water.
- HIGH pH: If the pH is above the level needed by the plant, add nutrients to raise the acidic levels of the water. Nutrients are acidic, so it is a good solution to bring the water back down within the recommended range. If EC is also high, the tank should be drained and filled with fresh water and nutrients.

EC

- LOW EC: If the EC is low, the plants have consumed the nutrients in the water and more nutrients should be added to the tank.
- HIGH EC: If the EC is high, too many nutrients were added and more water needs to be added to the tank.

Below is a reference chart to help with a more exact recommendation for many different types of hydroponic plants. For all nutrients, the manufacturing company is the best reference for pH recommendation and the amount of the nutrients to use. Check pH and EC together.

EC and pH Values for Different Hydroponic Crops		
Plant	**pH Range**	**EC (uS)**
Cabbages	6.5-7.5	2500-3000
Cucumbers	6.0-7.0	1700-2500
Green Beans	5.5-6.0	2000-4000
Kale	6.0-7.5	800-1800
Leeks	6.0-6.8	1400-1800
Lettuce	6.0-6.5	800-1200
Radishes	6.0-7.0	1600-2200
Swiss Chard	6.2-6.8	1800-2300
Tomatoes	5.5-6.5	2000-5000

Step 4: Checking Levels

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There are some recommendations to follow:

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The following is a recommended schedule per tank being used:

Water Levels

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EC and pH Balance

- 2 times a week with under half plant spots being used
- 4 times a week with over half plant spots being used

Step 5: Harvesting

When it is time to harvest, start to remove the plants from the water and the baskets they have been growing in. Start by taking plants from the front and work backwards. It is best to have a tray, bowl, or holder of the plant material being harvested. Having a trash can or compost bin to put the waste of the plant in is also good for easy cleanup.

Harvesting tips

- Start with the front plants and move back on each shelf.
- Take the grow cups out, then clip the base of the leaves/plant (edible portion) with a knife or scissors, or tear off by hand.
- Once the plants are harvested, pull the roots out of the grow plugs and dispose of them following local guidelines or clean the grow plugs for reuse if desired.

Step 6: Cleaning Prior to the Next Planting

Once the crop is harvested, clean up the hydroponics unit to start another planting.

1. Turn off the power and unplug the cord from the wall outlet and the hydroponics system.
2. Clean up the grow plugs for reuse (optional) or purchase new grow plugs.
3. Take the system to a sink, remove the cover and the ebb and flow tray if used, then dump the water out of the tray and water tank.
4. Clean the tank(s) and tray covers with warm soapy water from a bucket. Do not pour soap/bleach directly into the reservoir. Bleach can be used to clean the hydroponics system, but it is advisable to use less than a ¼ capful of bleach for every 1-2 gallons of water. If bleach is used, wait an additional 24 hours before filling the tank with water.
5. Rinse thoroughly to remove the soap and bleach (if used).
6. Remove all visible green algae that may have accumulated from the previous harvest.
7. Remove the pump by pulling the tab and lifting the pump. Clean any roots that may be in the intake screen and then reinstall the pump.
8. Use a cloth to dry or let it air dry before adding new water.
9. Once clean and dry, new water can be added. The recommendation is to let water sit/circulate for 24 hours before adding any plant life to the hydroponics system.

Need More Help?

Additional Help and Information

Online Product Support

We're here to help! Our online product support features video tutorials, downloadable documents, frequently asked questions and product notices, all of which make it easy for you to get support for products, software and more, day or night. Find our online product support area here: ***https://www.realityworks.com/knowledge-base/***

Online Store

Supplies, accessories, select simulators, curriculum and more are available for purchase from our website 24 hours a day!

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