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## **HYDROPONIC VEGETABLE GARDENING**

### **Marcy Stanton, Master Gardener**

You can experience the ease and success of growing hydroponic vegetables indoors and outdoors. The thrill and taste of harvesting lettuce and Swiss chard in the middle of winter is indescribable. After your first several indoor harvests you will be looking for ways to increase your production and perhaps adding new varieties of veggies such as cukes and spinach.

The same methods for hydroponic gardening regarding containers, growing media, seed starting and nutrients described for outdoors can be used for indoor growing. The big differences for indoor hydroponic gardening are:

- 1.) Having a suitable place in your home or office to set up your hydroponic garden.
- 2.) Setting up lighting, timers, and as an option, an aquarium pump to aerate your hydroponic nutrient solutions.

### **Setup and Operation of Your Indoor Hydroponic Garden**

**Container:** The container we use for the hydroponic class is a Styrofoam box used for transporting fish. You can usually get them free where fish is sold. However, they will need a lot of airing out! You can also use any container with a lid that can be cut to accommodate a net pot or other container that will hold growing media. Some examples are plastic storage containers and buckets with lids. If the container is translucent or porous, line it with black plastic to prevent algae growth or leakage. The holes in the Styrofoam lids were cut with a 1 5/8 inch diameter hole saw bit to accommodate the net pots I use. If you use different pots or containers, size and cut the hole accordingly. To make it easy to add water and nutrients, cut one extra hole for pouring solutions into the tank.

**Growing Media:** Fill the net pots with dampened potting mix or other media Such as vermiculite, perlite, sand or wool rock. The purpose of the media is to support the seeds and plants as they begin to grow.

**Starting Seeds:** Place 2-4 seeds on top of the growing media in each net pot you want to start. Make sure the potting mix stays moist at all times. If the hydroponic nutrient container is filled enough, the potting mix will stay wet.

**Nutrients and Water:** Lettuce, Swiss chard, and other leafy plants do well with basic water-soluble nutrients that you find at your local gardening store. Add 15-15-15 or 15-20-15 fertilizer in the amount based on the directions given on the container. You do not have to add the fertilizer until the seeds have germinated and started their first true leaves. As the plants grow, monitor the water level to ensure there is sufficient water and a layer of air between the bottom of the lid and the surface of the water/nutrient solution. Roots need air too!

**Site:** Choose an area to set up your indoor hydroponic garden away from direct sunlight, not in the way of your everyday activities, and with an overall temperature of 55-70 F. Lettuce and Swiss chard are cool weather crops and prefer the lower temperature range, do not require high light levels and love fluorescent lights. Basements are useful as they are out of the way and fall within the temperature preference. Select an area where you will tolerate small water spills without creating a disaster. A bench or table space of 2ft. X 4ft. with access to at least 3 sides will do fine. Make sure you have access to electricity and a water source.

**Lighting:** A simple 2-bulb 4-foot fluorescent fixture with standard **COOL WHITE** bulbs is adequate for most leafy vegetables. Do not buy any of the fancy fluorescent grow bulbs; you are wasting your money on these expensive bulbs. When we set up a fluorescent light system to grow vegetables, what we are paying for is the intensity of light called lumens. For plants the more lumens the better. Advances in fluorescent fixtures and bulbs now give us significantly more lumens per watt of electricity used than ever before. These highly efficient fixtures and bulbs are called T8 fluorescent and are available at all home improvement centers at a very low cost. These new fluorescent **COOL WHITE** bulbs produce 2850 lumens per bulb. This is more than adequate to keep lettuce, Swiss chard and spinach very happy.

**What You Will Need:** A 4ft. T8 fluorescent fixture that will accommodate 2 bulbs, two T8 fluorescent bulbs, a 2ft. x 4ft. space with an overhead means to suspend the fluorescent fixture and adjust to different heights above your plants, and a 3 prong grounded, mechanical timer available at home improvement centers.

**Lighting set up:** You must be able to adjust the height of the lights so that they are always 3-4 inches above your plants as they grow. Lightweight chain with links is very effective. Program your light timer to be on 14-16 hours per day.

**Aerating Your Nutrient Solution:** Aeration is an option, but aerating the hydroponic nutrient solution will make indoor plants grow noticeably faster. Some literature on hydroponics suggests that plants with aerated nutrient solutions will grow up to 50% faster.

**What You Will Need:** An aquarium air pump, an air stone, and a timer. A large air pump will aerate several nutrient tanks from one pump. A pump rated for 20 "60 gallon fish tanks and will put out up to 2800ccs per minute of air. This pump does a good job of aerating 4 nutrient tanks. (A 2ft. X 4ft. space will accommodate 4 styrofoam nutrient tanks). To give a soft aeration of the nutrient tank, attach an air stone, a porous stone that disperses the air stream from the air pump into small air bubbles, to the end of the tubing in the tank. If you set up multiple nutrient tanks, buy an aquarium air distribution manifold to route air to all your nutrient tanks with some aquarium air tubing. Finally, get a 3 prong mechanical timer with the capability to program 3 cycles. All the aeration items are available at a discount pet supply store or a discount department store with an aquarium department. The timer is available at most home improvement centers. **Aeration pump and timer set up:** Place the aeration pump near the nutrient tanks. If possible, locate the air pump above the nutrient tank(s). If the aeration pump is mounted below the nutrient level in the tanks. install the check valve (supplied with the air pump) per the instructions. The check valve prevents nutrient solution from siphoning back through the air pump when it is off (causing a mess and electrical hazard). Program your air pump to come on 3 times a day and run for 1 hour per cycle, i.e., 9am, 12noon, and 3pm for 1 hour each cycle.

### **Estimated Cost Summary for Equipment for Indoor Hydroponic Gardening**

T8 fluorescent fixture with 2- T8 bulbs	\$17.00
Air Pump, hose, Manifold, & air stones	25.00
Mechanical timers capable of 3 programs	20.00
Estimated total –	\$62.00

**Important considerations:** If you choose to grow plants using more than one nutrient tank under the same set of lights, choose plants that will grow to approximately the same height. Set up each nutrient tank within a week or so of each other so the height difference is minimal. If you mix short and tall plants, grow them in separate tanks and adjust tank levels by using blocks under the tanks to maintain appropriate plant distance from the lights.

Now set back and watch your plants grow!! Be sure to add nutrient solution as needed. The time to maturity of the lettuce, Swiss chard and cukes grown inside is very close to the culture of the vegetable plant variety grown outside. The plants really don't know whether they are inside or outside!

Happy Growing!

Some hydroponic equipment and material suppliers:

1. Worm's Way [www.wormsway.com](http://www.wormsway.com) 1-800-274-9676  
Sells hydroponic systems, equipment and supplies (nutrients, pesticides, etc.) for the hobby grower.
2. Crop King [www.cropking.com](http://www.cropking.com) 1-330-769-2002  
Sells hydroponic systems, equipment and supplies (nutrients, pesticides, etc.) for the hobby and commercial grower. Request the hobby catalogue.
3. Johnny's Selected Seeds, 955 Benton Ave., Winslow, ME 04901, 207-861-3901  
[www.johnnyseeds.com](http://www.johnnyseeds.com)
4. An interesting web site, which gives the history of hydroponics by Gary V. Deutschmann, Sr., is: [www.archimedes.galilei.com/raiar/histhydr.html](http://www.archimedes.galilei.com/raiar/histhydr.html)
5. *Basic Hydroponics for the do-it-yourselfer*, A Cultural Handbook by M. Edward Muckle Growers Press Inc., P.O. Box 189, Princeton, British Columbia, Canada VOX 1 WO, phone/fax 604-295-7755

Got questions? UNH Cooperative Extension's Family, Home & Garden Education Center Info Line offers practical help finding answers for your lawn and garden questions. Call toll free at 1-877-398-4769, M-F, 9:00 a.m.-2:00 p.m., or e-mail us at [answers@unh.edu](mailto:answers@unh.edu)