



# The University of Houston's Campus Garden: A Collaborative Informal Science Education Initiative

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## ABSTRACT

A campus garden provides an excellent opportunity for informal science education and community outreach. Participation by students in The University of Houston's Campus Garden has opened the door to discussions on traditional breeding, hybridization, and genetic engineering of crops. Conversations occur regularly about pest management, plant diseases, and nutrient and light requirements. The first pilot garden at the University of Houston began as part of the University's "Go Green" initiatives. The project was initially conceived by the University's Services Department and evolved over the last two years to involve campus Facilities, Dining Services, the Horticulture Society, Urban Harvest, and interested students. Urban Harvest is a community-based organization which helps local groups and schools develop community gardens for food production, habitats, and general enjoyment. At present, the Horticulture Society sows seeds and raises seedlings in the campus greenhouse for planting in the garden in the spring. The garden itself was designed by Urban Harvest. Funding and oversight are provided by the Services Department. Campus facilities constructed the garden and laid the irrigation system. The garden is planted and maintained by interested students, staff, and faculty. A future goal of the Campus Garden participants is to produce tomatoes, basil, and cilantro for use in "Shasta's Salsa" (Shasta is the school mascot) which will be created in the campus dining hall and served on campus. This collaborative effort has brought together individuals across the campus from a number of disciplines. The garden brings plant science out of the realm of the biology department and makes it accessible to the general public.



**Figure 1. The Community Garden and Horticulture Society Greenhouse.** Planting the community garden in Fall 2009 (left). The Environmental Club, the Horticulture Society, the Metropolitan Volunteer Program, U of H's executive chef, Plant Operations, and the Services Department assisted. Peppers, herbs and tomatoes were planted. The herbs and tomatoes survived until heavy frosts in December. Peppers were moved to the greenhouse and were replanted in the Charter School garden and the Community Garden in the spring. Seedlings for the garden spring planting are started in the greenhouse in February.

## GREENHOUSE GARDENING

### Advantages:

- 1) Year round growing possible
- 2) Start seedlings for an outdoor garden early
- 3) Protect plants in winter for replanting in spring
- 4) Propagate plants
- 5) Experiment with new varieties/breeding
- 6) Some temperature and humidity control
- 7) No weeding beds

### Suggestions:

- 1) Pots can be obtained for free from local aboretums or recycling centers. Disinfect in a 10% bleach solution before use.
- 2) Watering by hand is adequate but sprinkler systems can be built with PVC pipe by the students. Our system cost ~\$150.00 and was assembled in two afternoon worksessions.
- 3) Screens over the windows are a must for Southern regions in the summer. We purchase it by the roll from the local hardware store or a greenhouse supplier.
- 4) Fans help keep air circulating and the temperatures down.
- 5) A heater is needed for winter months when temperatures drop below freezing.
- 6) Funds can be raised for needed equipment and supplies through plant sales on campus.

### Disadvantages:

- 1) Limited space
- 2) Extreme summer heat (+113°F)



**Figure 2. U of H Greenhouse.** A variety of plants can be cultivated in the greenhouse environment (left). Screens on the glass cut the summer high and a sprinkler system can be installed for the summer months when fewer students are available to maintain the plants.

## PLANNING AN OUTDOOR GARDEN

### Getting Started

1. Locate a suitable plot.
  - A. Decide how large a size you need.
  - B. Decide how large a plot you can manage with your available personnel.
  - C. Check the drainage of the area (see Figure 1).
  - D. Check the shade/sunlight at various times of the day.
  - E. Get permission from the Campus Facilities Planning Committee (be sure a parking garage is not going to be occupying your space two years from now).
2. Plan out beds, walkways, and irrigation.
3. Determine a planting, harvest, maintenance schedule (refer to gardening books specific for your region).
4. Build raised beds (helps with irrigation and weed control and provides an organized appearance... something campus facilities committees will be looking for). Cinder blocks are inexpensive and durable ([http://www.urbanharvest.org/advice/basics/raised\\_beds.html](http://www.urbanharvest.org/advice/basics/raised_beds.html)).
5. Condition the soil: add loam and/or fresh garden mix soil, add compost or fertilizer, adjust pH.
6. Label your plants with plastic stakes so you don't forget what you have. This is particularly helpful if you plant several varieties of the same crop.

### Costs

1. **B locks or timber for raised bed.**

**Example:** For a 40 ft x 4 ft x 8 inch bed:  
146 blocks (8 inch) x \$1.10 per block = ~\$160.60
2. **Soil.**  $[(\text{Length (ft)} \times \text{Width (ft)} \times \text{Depth (inches)})/324] =$  cubic yards soil needed
 

**Example:** 40 ft x 4 ft x 8 inches = 3.95 cubic yards soil; Multiply by 5% to account for settling of the soil, so 3.95 x 0.05 = 0.2 cubic feet extra needed; Order 4.15 cubic feet of soil at approximately \$43.00 per cubic foot, so approximate cost will be \$178.45.
3. **Mulch.** Multiple the amount of soil needed (see above) by 0.375
 

**Example:** 4.15 cubic feet x 0.375 = 1.56 cubic feet mulch  
Cost: 1.56 cubic feet x \$32.50/cubic foot = \$50.70
4. **Path materials (optional).** Crushed granite or mulch
5. **Irrigation system.**

Simple: hoses (\$15-\$50 depending on length and quality); nozzle (\$8-10)  
Drip irrigation system (\$150-600 depending on size and complexity of system)
6. **Gardening tools.**

Spades, gloves, rakes, hoes, pruning shears, stakes, cages, trellises
7. **Pest control and fertilizer.**

Buy pest control items as needed; low cost "homemade" solutions are often available  
Fertilizer: If you do your own composting you won't have to budget for fertilizers.
8. **Seeds, seedlings, or young plants.**

Once you have an established garden, seeds can be harvested for future years to reduce future costs.

### Maintenance

1. Check watering needs. Water in the morning (5-6 am) to reduce water stress on the plants and decrease opportunities for mold problems.
2. Mulching with hay, composted wood (not bark), or composted leaves helps reduce weeds and helps the garden retain water.
3. Keep an eye out for nutrient deficiencies and pests and treat accordingly.
4. Stake up plants or use a trellis or fence for support.
5. WEED!!!!
6. Prune plants and remove dead flower heads as recommended on the seed packaging or garden reference book.
7. Rotating the crops helps keep the garden productive. Alfalfa will add nitrogen back to the soil. Alfalfa can be hoed under for compost or harvested and donated to local animal shelters and wildlife rescue organizations for food for small animals. Rotating the crops (planting different foods in the bed each year entirely, not just in different sections of the same garden) helps reduce pests. See [http://www.urbanharvest.org/advice/basics/crop\\_rotation.html](http://www.urbanharvest.org/advice/basics/crop_rotation.html) for suggestions on plot rotation schemes.

## COMPOSTING: VERMICULTURE

### Small-Scale in the Greenhouse:

#### Bin Options:

- Commercially available bins (see Figure 3)
- Homemade with Rubbermaid bins:  
<http://www.instructables.com/id/Multi-Layer-Vermiculture-Bin/>

#### What can be composted:

- Cardboard and newspaper provide fiber
- Fruits and vegetables
- Limited citrus, spicy peppers, and starches
- Coffee grounds and tea bags

#### What should not be composted:

- Cheese, meat, oils

#### Worms:

- Red wigglers are highly recommended and can be ordered online.
- Make sure the tub is not going to fill with rain water.

#### Worm Tea and Castings:

- Worm tea can be harvested from the spigot of the unit or from the bottom bin of a homemade unit.
- Tea can be made by soaking worm castings and water. Shake vigorously.
- Tea can be used undiluted in a garden and diluted 1:5 with water for pots.
- Castings can be mixed into potting soil or garden soil to provide a rich source of nutrients.



**Figure 3. Worm Factory.** Available from online suppliers



**Figure 4. University of Houston students teaching about plants and composting at the U of H Charter School.** The University of Houston's Community Learning Agricultural Sustainability Program worked with the U of H Charter School to develop a garden and teach students about the plant life cycle and composting.

## OUTREACH OPPORTUNITIES

- Help elementary schools and community groups establish their own gardens.
- Donate seedlings to school and community gardens.
- Donate plants for classrooms for lessons.
- Establish vermiculture bins for classrooms.
- Establish hydroponic systems for classrooms.
- Develop curriculum modules to accompany materials.
- Present lessons on plants, composting, and agricultural sustainability in schools.
- Donate produce to the local food bank or charity organization.

## ACKNOWLEDGEMENTS

The campus garden is funded by the University of Houston Services Department. Advising, garden planning, and design are provided by Urban Harvest. The Horticulture Society at the University of Houston is responsible for the Science Building Greenhouse and provides seedlings for the garden and University of Houston Charter School. Thanks to Yosef Kerzner for overseeing the greenhouse maintenance, Kavan Yen for starting vermiculture in the greenhouse, Emily Messa and Maria Honey for organizing the Community Garden initiative, Leah Wolfthal for overseeing the garden, and the many students involved in the projects presented here.

Reference: <http://www.urbanharvest.org/index.html>;  
retrieved October 28, 2010