



Seeding the Future: Locally grown Hydroponic Produce

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Produce available

This week

- Red Russian Kale
- Genovese Basil
- Thai Basil (limited)
- Oregano
- Parsley
- Sunset Lettuce
- Chinese Cabbage
- Sweet Peppers (limited)
- Cucumbers (limited)

Coming Soon

- Tomatoes
- Peppers
- Leeks

Growing our own food: Hyper-local!



The word hydroponics is derived from the Greek words “hydro” which means water and “ponos” which means work. Hydroponic is an easy process that helps plant grow by making use of water and essential mineral nutrients. Hydroponics is a branch of agriculture where you can cultivate plants without soil. This approach allows us to grow certain produce, particularly greens, locally, and faster than traditional agricultural approaches.

We grow our produce in vertical hydroponic systems at Boston College. Our growing process starts with heirloom seeds that are germinated then transplanted into a grow system. The grow systems use LED and Fluorescent grow lights in combination with nutrient solution (contains the same essential mineral elements found in soil) from American Hydroponics. Currently our produce does not meet the strict definition of being organic since we use a nonorganic nutrient solution. However, our hydroponically grown produce is pesticide free, consumes little energy in its production, and is extremely local.



Who we are

We are students enrolled in the Lynch School of Education College Bound program. We are high school students from Brighton High School, West Roxbury Academy,

and the Urban Science Academy in the West Roxbury Educational Complex. We are most first generation college youth with aspirations to change the world for the better.



Recipe 1: Chicken Lettuce Wrap

Summer is the best time of the year to cook with fresh ingredients. Lettuce wraps are excellent, if for no other reason you do not need a plate! This recipe makes about 4 servings

Ingredients

1 Tbsp oil
1 Tbsp ginger and garlic

1 lb ground chicken
0.25 cup lime juice
1 Tbsp fish sauce
2 tsp. light brown sugar
2 tsp chili pepper or chili garlic sauce
1/2 cup minced onion or leeks
1/2 cup fresh basil
1/4 cup fresh oregano
Parsley for garnish
Lettuce

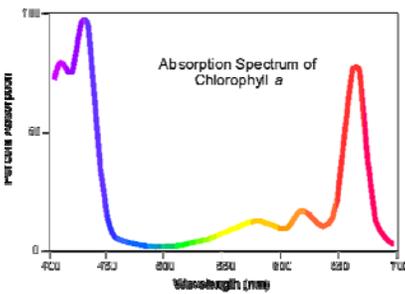
Directions

Heat onions and garlic in oil for about 1-2 minutes
Add chicken and cook till done—about 8-10 minutes
mix in lime juice, sugar, pepper and/or garlic sauce and cook for 3-4 minutes
Add basil and oregano
Serve on top of lettuce leaf

Source: Cuisine at Home, Issue 94, p. 9. August 2012



A vertical hydroponic system at Boston College



The Red and Blue LED lights are used as red and blue are the two most needed frequencies for photosynthesis.

What kind of lights are used?

LED grow lights were originally developed in the space station as a cheap and effective way to provide the needed light spectrum to grow plants. LED light-

ing can be adjusted for spectrum (see figure to the left); more red light for budding plants and more blue light for vegetative growth. LED bulbs will also last for years but have a steep drop off in intensity.

For large plants we use a combination of LED and fluorescent grow lights because LED lights typically do not provide a full spectrum their penetration depth is not good which means the lower leaves do not receive enough light.

What about the food for the plants?

All plants, whether they are grown in soil or with hydroponics require a balance of nitrogen, phosphorous and potassium (N-P-K) and trace elements to grow properly. These nutrients are available to plants in soil in small amounts, but over time they get depleted and need to be supplied separately to make up the deficit. In hydroponics, it is all the more important to ensure that plants get the right nutrients in the right amounts.

We have been measuring and determine the appropriate levels of nutrients to have in their reservoirs. We have also been conducting pH tests to ensure that the water is ideal for plant growth. If the pH is too high or low the plants cannot absorb nutrients.



We use a solid fertilizer that is derived from the essential elements that plants need to grow and produce by American Hydroponics.

▶▶▶ The what and why of hydroponics?



The excitement of the first harvesting of lettuce and kale from the hydroponic trays

Hydroponic is an easy process that helps plant growth fast by making use of water and essential mineral nutrients. Hydroponics is actually a branch of agriculture where you can cultivate plants without soil by using water and essential elements found in soil.

Both hydroponics and organic farming methods stay away from harmful chemical fertilizer and pesticides and seek to be environmentally friendly. It has been found that materials used in hydroponics actually offer a higher standard of purity than those often permitted for use in organic farming (Resh, 2011).

Hydroponics allows us to grow food year round, thus rather than transporting your tomato from California in February we can provide a locally grown, pesticide free, and delicious tomato in February!

What can grow in a hydroponic system?

Nearly any crop that can be grown outdoors can be grown in a hydroponic system. The systems that we built are vertical and can grow green leafy crops such as lettuce,

spinach, chard, kale, basil, and other herbs. However, the systems are also flexible and can be configured to grow peppers, tomatoes (see image to the right), beans, peas, and cucumbers.

We are currently experimenting to determine which system designs are best to grow which type of crop.



Where your food comes from?



Young tomatoes growing in an ebb and flow hydroponic system at Boston College

If you ask someone where his food comes from, most would probably say, "From the grocery store" or "From a restaurant." The reality is that your food comes from all over the world. Here in the northeast we import most of our food from other regions of the United States, particularly California.

Produce in the typical North American grocery stores travels an average of 1,500 miles. In the U.S., 47 percent of tomatoes are shipped from Florida and 68 percent of carrots are shipped from California. The next time you are in a store pick up the food you are buying and look at the label and see how long your food had to travel and the amount of Carbon Dioxide emitted during its transport.

Recipe 2: Lots of Basil?

Fresh Basil Pesto

Prep time: 10 minutes

INGREDIENTS

- 2 cups fresh basil leaves, packed
- 1/2 cup freshly grated Parmesan-Reggiano or Romano cheese
- 1/2 cup extra virgin olive oil
- 1/3 cup pine nuts or walnuts
- 3 medium sized garlic cloves, minced
- Salt and freshly ground black pepper to taste

DIRECTIONS

1. Combine the basil in with the pine nuts, pulse a few times in a food processor. (If you are using walnuts instead of pine nuts and they are not already chopped, pulse them a few times first, before adding the basil.) Add the garlic, pulse a few times more.
2. Slowly add the olive oil in a constant stream while the food processor is on. Stop to scrape down the sides of the food processor with a rubber spatula. Add the grated cheese and pulse again until blended. Add a pinch of salt and freshly ground black pepper to taste.

Serve with pasta, or over baked potatoes, or spread over toasted baguette slices.

Yield: Makes 1 cup

Source:
http://simplyrecipes.com/recipes/fresh_basil_pesto/

Partners and Sponsors

We would like to acknowledge Mr. Irving Backman (<http://iabackman.com/>) with a very generous donation of the equipment that made this project possible. Without his generosity the hydroponic farm program would have never happened. Some of the partners on this project are shown below. The lead partner is the STEM Garden Institute whose vision has made the project possible and all of the instructors and other staff members at Boston College.



**HYDROPONICS
ORGANICS
INDOOR GARDENS**



**STEM GARDEN
INSTITUTE**



**Urban
Ecology
Institute**



Did you know?



Examining a hydroponic tomato crop

The USDA expects consumer demand for locally grown food in the U.S. to be \$7 billion in 2012.

Agriculture uses 70 percent of the world's available freshwater for irrigation, rendering it unusable for drinking as a result of contamination with fertilizers, pesticides, herbicides, and silt. Hydroponics

can produce the same amount of food as traditional methods using 80-95% less water.

Together the world's 6.8 billion people use land equal in size to South America to grow food and raise livestock.

Civilization will have to cultivate another Brazil's worth of land—2.1 billion acres over the next 40 years to produce enough food for the world's rapidly growing population.