

FOOD FOR THOUGHT

April 2014

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Notes from New Hampshire

After a long winter, hints of spring are finally in the air! Farmers are busy with the birth of new livestock and preparing for planting their fields.

NH Ag in the Classroom is busy as well! Both Deb and Debbi have been hard at work with our Ag Literacy Program. To date, we have reached roughly 3,000 elementary students throughout the state by volunteers flocking to the classrooms armed with the book "Down on the Farm: Chickens" by Hannah Ray. Some enterprising helpers have also brought eggs, chickens, videos and supporting activities. Once again, the program has been well received and the group effort continues to bring agricultural literacy to area

Hydroponics

Developing methods to grow plants without soil is becoming increasingly important. Typically, plants rely on soil as the source of their nutrients. Unfortunately, this is not always the best case scenario. Many climates around the world are too harsh, too dry, too cold or too rocky for a successful growing season in the ground. Space is another issue. According to the World Health Organization, the population of urban areas in developing countries is expected to double by the year 2050. This is an additional 2 billion people in these areas alone. How are we going to feed and clothe all of these people with less land available for agricultural purposes? Hydroponics, or growing plants without soil, will definitely have a hand in bridging this gap.

Hydroponics is not a modern century innovation. In fact, the Hanging Gardens of Babylon and the floating gardens of the Aztecs in Mexico reflect the basic principles of hydroponic gardening. The early concepts have developed through the years as the need called for advancement. During World War II, troops stationed on Pacific islands were provided with fresh produce grown in local hydroponic systems. NASA continues research in this area as they consider the possibility of sustaining human life on another planet.

You have most likely heard a variety of terms related to growing plants without soil. Let's look at a few definitions from dictionary.com to help us distinguish between the methods.

hydroponics - the cultivation of plants in liquid nutrient solutions rather than soil

aeroponics - a method of growing plants without soil by suspending them above sprays that constantly moisten the roots with water and nutrients

aquaculture - the cultivation of aquatic animals and plants, especially fish, shellfish and seaweed, in a natural or controlled marine or freshwater environment

aquaponics - a food production system that combines conventional aquaculture with hydroponics in a symbiotic environment

Currently, hydroponics is the most common of type soilless planting. Nutrients are delivered to the plant quickly and easily in a solution form so the plant can expend more energy on growing larger and healthier. Plants grown in this fashion use far less water because it is recirculated and stays in the system. Excess nutrients in the controlled system do not pollute the environment. Produce is easy to harvest and has a higher nutritional value for humans. The healthier plants grow larger producing higher yields. There are a few drawbacks to this approach. The initial cost to set up a hydroponic system is much higher than growing in dirt. Another hazard is that you must have a plan to maintain your power supply for systems relying on a

youth. Our sincere thanks to all of the volunteers!

Deb and Debbi have been spending time in classrooms as well. Deb has been traveling around Grafton County taking part in the Ag Literacy program and Debbi presented several workshops on where our food comes from at the Southwick Elementary School Wellness Fair.

Coming up, the Debs will be attending the Eastern Regional Ag in the Classroom conference in Camp Hill, PA and the National Ag in the Classroom conference in Hershey, PA. We are in the planning stages of several School-to-Farm events. Merrimack County School-To-Farm will be held at Carter Hill Orchard on May 22nd and May 23rd. UNH School-to-Farm will be June 3rd thru 5th. More information to come on those.

That's it for now. Enjoy the newsletter!

Related Resources

[empty glue bottle and shoelace hydroponic project](#)

[home or classroom hydroponic plans](#)

[more basic hydroponic system plans](#)

[home aquaponic systems](#)

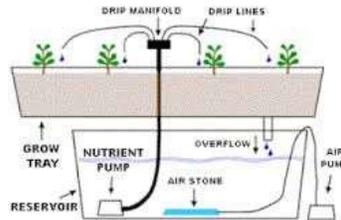
[plans for a desktop aquaponic system](#)

[a few videos about building different systems](#)

[aeroponics information](#)

pump. Without circulation of the nutrient solution, plants can die pretty quickly.

Hydroponics has caught the attention of home gardeners, hobbyists, farmers and commercial growers. Systems have been designed for tabletop use all the way up to enormous vertical farms housed in old factories and warehouses. FarmedHere recently opened the nation's largest vertical farm in a 90,000 square foot facility near Chicago. Plants are grown in beds stacked up to six high and are fed by mineral rich water from tanks of tilapia, an edible freshwater fish.



Although there is quite a variety in systems, they all have the same basic requirements:

- 1) container to hold the root system such as a plastic tote, a bucket or something larger
- 2) support medium for the plants such as gravel, peat or vermiculite
- 3) reservoir to hold the nutrient solution
- 4) Submersible pump to deliver the nutrient solution to the plants (unless the system relies on wicking or capillary action)
- 5) Delivery system to each plant
- 6) Timer to control the lights and the pump
- 7) Lighting - natural or artificial

Verti-grow has developed a vertical system with rotating pots for commercial use. They report that it uses 80% less water, less fertilizer and fewer pesticides than other methods with 5 to 8 times greater plant density compared to an equivalent field crop. Also, without soil,

herbicides are not necessary.



Whatever type of system is used, hydroponics is a great way to explore gardening and cultivating produce year-round in most any climate. Whether you chose a plastic tote from the department store or a larger, more complex system, the results are bound to be rewarding.

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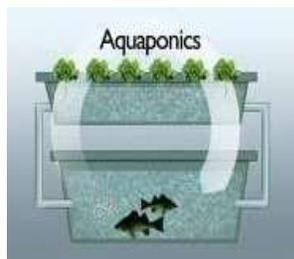
Aeroponics and Aquaculture

Aeroponics differs from hydroponics in that the plant roots do not have any contact with any type of growing medium. The plants are suspended and the roots periodically misted with the nutrient solution. With this method, the roots receive more oxygen and it is easier to use a variety of nutrient solutions, plus it uses less water than hydroponics. However, the delivery system can be more complicated and a bit more expensive than hydroponics.



There are two distinct parts to an aquaponics system - the part that grows the fish and the part that grows the plants. According to the Aquaponics Association, "aquaponics is a synergistic growing technique in which fish and plants are grown together in the same systems. The fish waste feeds the growing plants using organic hydroponic techniques. The plants, in turn, clean and filter the water that returns to the fish environment." A third component, bacteria, is essential to make this relationship work. Wikipedia sums it up well by saying "nitrification, the aerobic conversion of ammonia into nitrates, is one of the most important functions in an aquaponics system as it reduces the toxicity of the water for fish, and allows the resulting nitrate compounds to be removed by the plants for nourishment".

Both aeroponics and aquaponics are promising components of our future food production systems offering ways to capitalize



on areas where soil based plants are not suitable.

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