



## HOSPITAL HYDROPONICS; OUTER SPACE TO SALINAS?

(from *Growing Edge* magazine)

Standing in the corner of the cafeteria at Salinas Valley Memorial Healthcare (SVMC) in Salinas, California, is a miniature hydroponic unit--barely larger than a refrigerator--and it's literally from out of this world. The intensity of the fluorescent light inside is automatically measured,

adjusted, and digitally displayed. Digital meters also show the precise temperature, humidity, pH, electrical conductivity (EC), and carbon dioxide (CO<sub>2</sub>) levels inside the growth chambers. All of the aspects of the unit's environment are constantly monitored in minute detail.

[For the rest of this article, read the July/August 2003 issue of *Growing Edge* magazine! Call Foothill Hydroponics to purchase your copy today.]



The BPS being transferred into ISS U.S. Lab Destiny. Astronauts: Left to Right - Dan Bursch (Expedition 4), Jerry Ross (STS-110), and Lee Morin (STS-110).

## DRY FOG?

How can fog be dry? Natural fog is water in the form of vapor dispersed in the air. A very special type of fog can be created by use of ultrasonic sound waves. These frequencies are far above the range of human hearing. The ultrasonic piezoelectric transducer agitates the surface of the water / air interface so violently that the water breaks up into microscopic droplets. These droplets are far smaller than any normal drops of water. They range in size from 1 to 10 micrometers (microns).

This "dry" fog will condense on cooler surfaces to form normal drops. This dry fog can also be used as a carrier for insecticides, fungicides and fertilizer nutrients. The



USDA is currently conducting research into greenhouse whitefly control using dry fog application of pesticide.

Some researchers are using the technology for propagation of cuttings without any rooting media. This application shows promise but needs more research. We are now stocking the single transducer low water level dry fogger which atomizes 80 ml per hour and needs about 2" of water to operate.

The High Output 5 transducer model atomizes 400 ml per hour. The High Output model comes with a Hydroponic buoy which allows it to float in our Hydromax reservoirs and stay at the correct level automatically in 3 or 4 inches of water. The High Output model comes with a fan-cooled remote power supply with 30 ft., low-voltage cord. We do not recommend constant operation.

The Greenair HCT-1 aeroponic timer will cycle the fogger on for 1 minute and off for 4 minutes. The piezo crystals normally last 2000 to 3000 hours and should be cleaned with a soft swab once or twice a week. They can be easily changed to a new crystal for \$6.95.

## HYDROPONIC CRABGRASS?

No the crabgrass is not hydroponic. Foothill supplied Hydrofarm Radiant Reflectors with 1000 watt Agrosun Metal Halide bulbs for growing crabgrass. The crabgrass was used as part of a commercial for an herbicide to control crabgrass. The production company on the project was Space Program, based in Universal City, California.



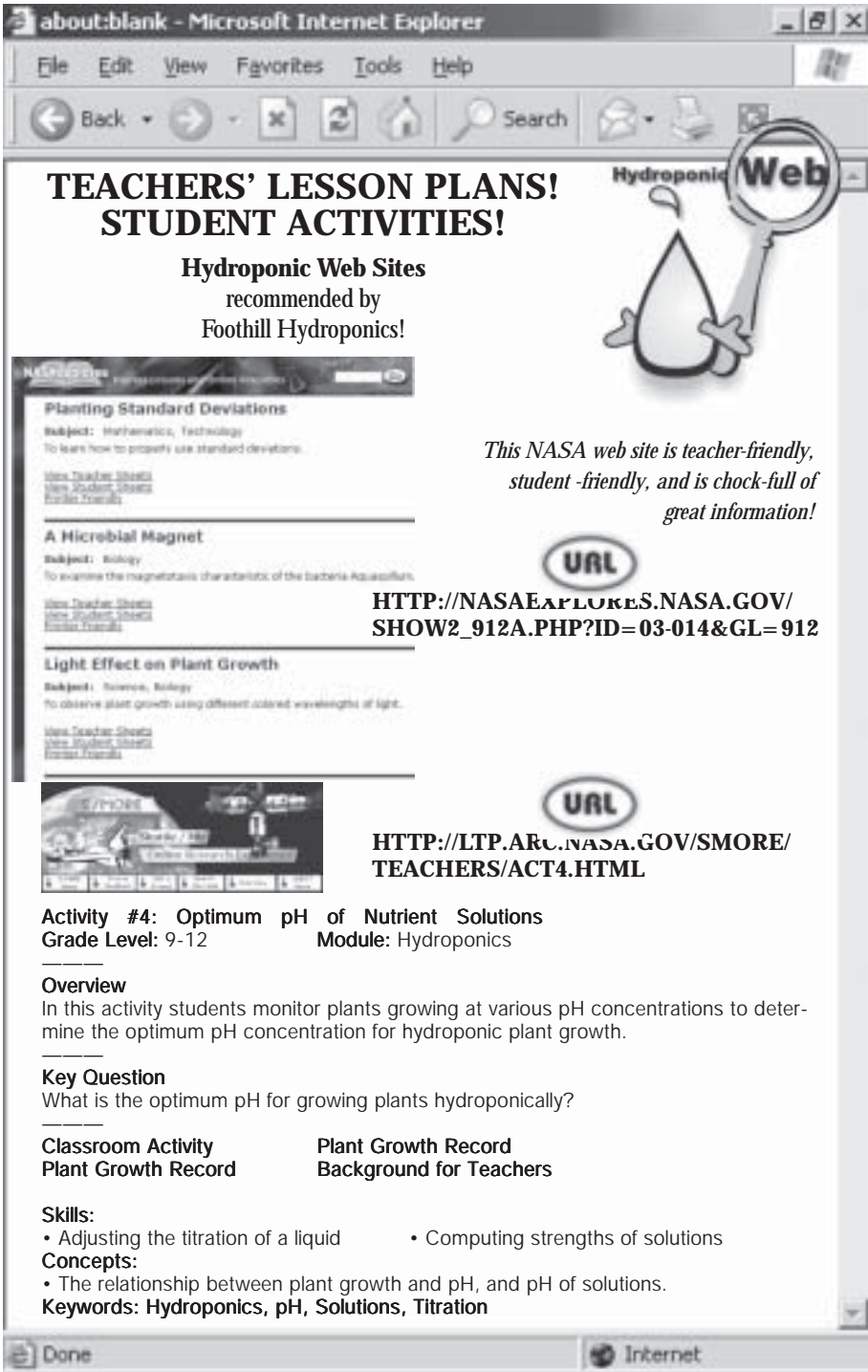
## SCHOOL NEWS

Fullerton High School purchased a Hydromax 2000 top irrigation kit and other supplies for their ongoing Hydroponics education projects.

Dana Middle School purchased propagation supplies and Xtra-Edge liquid hydroponic nutrients. They use 48" full spectrum tubes, as well as Agrosun spot lamps for the larger plants.

California Foundation for Agriculture in the Classroom has listed Foothill Hydroponics as provider of Hydroponic supplies in the 2003 Teacher Resource Guide. This publication is an excellent source of information on available resources for teachers because many of the resources are free! The Guide itself is also free.

Wards Natural Science ordered 3 of the Hydromax Jr. Mini-NFT / Ebb & Flow systems.



# TEACHERS' LESSON PLANS! STUDENT ACTIVITIES!

**Hydroponic Web Sites**  
recommended by  
Foothill Hydroponics!



*This NASA web site is teacher-friendly,  
student-friendly, and is chock-full of  
great information!*

## Planting Standard Deviations

**Subject:** Mathematics, Technology  
To learn how to properly use standard deviations.

[View Teacher Sheets](#)  
[View Student Sheets](#)  
[Printed Friendly](#)

## A Microbial Magnet

**Subject:** Biology  
To examine the magnetotaxis characteristics of the bacteria Aquaspirillum.

[View Teacher Sheets](#)  
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## Light Effect on Plant Growth

**Subject:** Science, Biology  
To observe plant growth using different colored wavelengths of light.

[View Teacher Sheets](#)  
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SHOW2\\_912A.PHP?ID=03-014&GL=912](http://NASAEXPLORES.NASA.GOV/SHOW2_912A.PHP?ID=03-014&GL=912)**



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TEACHERS/ACT4.HTML](http://LTP.ARC.NASA.GOV/SMORE/TEACHERS/ACT4.HTML)**



**Activity #4: Optimum pH of Nutrient Solutions**  
**Grade Level:** 9-12      **Module:** Hydroponics

### Overview

In this activity students monitor plants growing at various pH concentrations to determine the optimum pH concentration for hydroponic plant growth.

### Key Question

What is the optimum pH for growing plants hydroponically?

**Classroom Activity**  
**Plant Growth Record**

**Plant Growth Record**  
**Background for Teachers**

### Skills:

- Adjusting the titration of a liquid
- Computing strengths of solutions

### Concepts:

- The relationship between plant growth and pH, and pH of solutions.

**Keywords:** Hydroponics, pH, Solutions, Titration

# Carol's Corner

by Carol Spoelstra

## MORE GREENHOUSE STORIES

About three weeks after starting my greenhouse, I was ready to sit down and rethink the entire process as I tried everything in the starter tray. Every plant was burned beyond recognition, even here in Santa Maria (Central Coast). I quickly decided that I should have asked more questions before building a GLASS house!

With some help from my husband, I covered one section of the roof with shade cloth, but I do believe that I could cover the entire top with about 65% density.

My next starter tray was ready and waiting, with each little seed sprouting. I was trying two different kinds of rockwool. I call this the first of my daily experiments. Every day I checked the roots of those little plants, waiting and waiting for them to grow long enough so I could put them in my mister buckets.

For those of you who have not tried the misting bucket systems, they are just great. I can use them for three small plants or one larger plant. I can use them to get my little plants growing faster (oh, I did not say that), then transfer them to the Hydromax or the Tomato Pot.

I think I must have started every vegetable in that first tray, but by the second tray I was more selective and thoughtful about which vegetables would go where.

With a very large tomato plant in the tomato pot, I really needed Julio from

Foothill to instruct me how deep to plant it, but I thought, "Well, I can do this." Today, my tomato plant is everywhere and the ties are having a hard time holding it because it needed to be planted deeper, and the ties needed to be installed when the plant was small. So, you see, I am spending my time experimenting with systems and with ideas for all of you, as I play with all kinds of fun things. Just wait until you see the next issue!

For those of you who are THINKING about getting started, lets discuss Seed Germination.

As you remember from your classes, you CAN take a plant that has been started in soil and rinse off all the soil and organic material, and put that plant into your hydroponic system. HOWEVER, remember that you could be introducing pests and disease from the nursery where the plants were propagated. Just ask me, I can tell you.

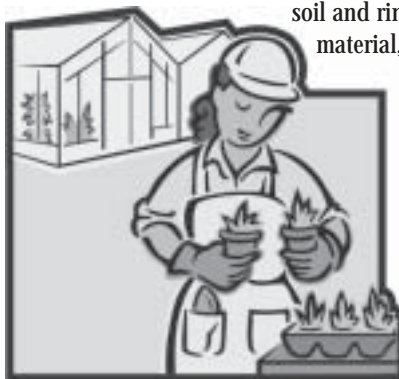
I thought my little tomato plants were not growing fast enough so I purchased some young plants. Two or three weeks later, I pulled them out of the tomato pots and disinfected the pots, but not before I had problems.

So by starting from seed you have control. Foothill Hydroponics has some great hydroponically-developed seeds, and I suggest that you try those. They are listed in the new catalog (#132), and they are a winner.

Remember: A seed needs moisture and warm temperatures to germinate.

Direct seeding works well in perlite, rockwool or any other medium that is fine enough not to loose the seed in. It is IMPORTANT to thoroughly moisten your growing medium prior to seeding.

To use ROCKWOOL, soak the cube in water or nutrient solution and drop the seed



into the hole in the center of the rockwool cube.

When SEEDING the growing medium of perlite you MUST keep it moist. You can use water at first for germination, right up to the point that the seed coat cracks open and the radical root is exposed. At that point you have a seedling rather than a seed, which NOW needs WATER, NUTRIENTS, LIGHT AND WARMTH.

Controlling the temperature is very important for good seed germination. For this reason you see lots of people use the seed propagation table, or similar device, to maintain the ideal temperature throughout the germination process.

You need to over-seed by 25%, at least, and as soon as the plants are up you need to pinch off the weak plants (don't pull up the weak plant) so that no roots are disturbed.

NEXT ISSUE: NUTRIENTS TO USE PER PLANT/HOW TO LOOK FOR DISORDERS



There is NEW TECHNOLOGY in compact fluorescent bulbs with built-in high-efficiency electronic ballast. This is especially important in that both of the new bulbs are medium-base sockets, and they screw into ANY STANDARD HOUSEHOLD lamp!

20 watt - 1200 lumen -5000 k

55-watt - 3500 lumen -5000 k

Best of all, they are inexpensive (see page 73 of the new Foothill Hydroponics catalog #132).

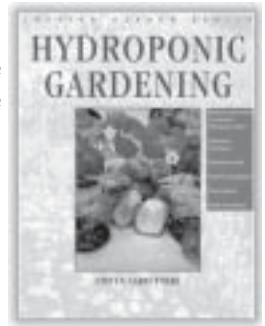
Also new in Foothill Catalog #132 is information about celery! Everyone at Foothill Hydroponics knows that the first place I head for is the garden to see if Julio has grown some new celery. There is NOTHING that tastes or smells as good as celery grown hydroponically. When I have a class, and I am searching for "something

new" to show teachers, I always take celery, and 98% of the time teachers cannot guess what the plant is! Growing in my greenhouse right now: CELERY!

## WANT A BASIC "HOW-TO" HYDROPONICS BOOK?

When I am asked by anyone for a "good book" on basics, I always recommend "Hydroponic Gardening," by Steven Carruthers. This is not a new book, but it's a good book for learning the basics. It begins at the beginning, and I should tape it to my greenhouse door!

It starts with nutrient, and while we always have the wonderful XTRA EDGE, the book leads you on to other media and techniques. The author not only explains how to use various media, he also shows you how with photos of how it should look.



This book will help you select or build a single system, or multiple systems to suit your ideas, and then it helps you through the process of understanding seed germination, temperature, water, oxygen, light, plant spacing and plant support. It even helps with disorders, pests and diseases.

If you are seeking a good basic hydroponics book, call Dennis and ask for "Hydroponic Gardening," by Steven Carruthers (\$19.95).

Of course, Foothill has lots of other good hydroponics books such as:

"Hydroponic Home Food Production"

"Secrets of High Yield Plant Growth"

"Gardening Indoors with Rockwool"

AND MANY OTHERS . . . Call to order!