Hydroponics to Engage Students Afterschool

Hello!

My name is Alexus Hansen

- Currently the Hydroponic Specialist and Operations Manager at the Greenery for Beyond School Bells
- I received a Bachelor of Science in Biological Sciences from UNL
- My passions are a love of plants, sustainability, and cultivating community
- Education, education, education

“The best way to predict the future is to create it.”
-Peter Drucker

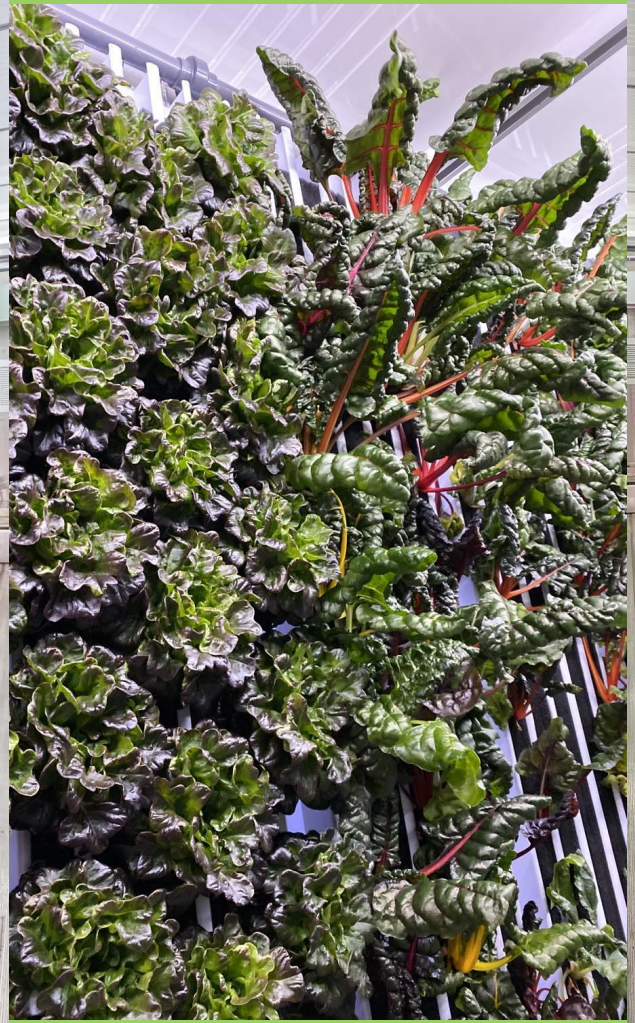
The Greenery at SCC

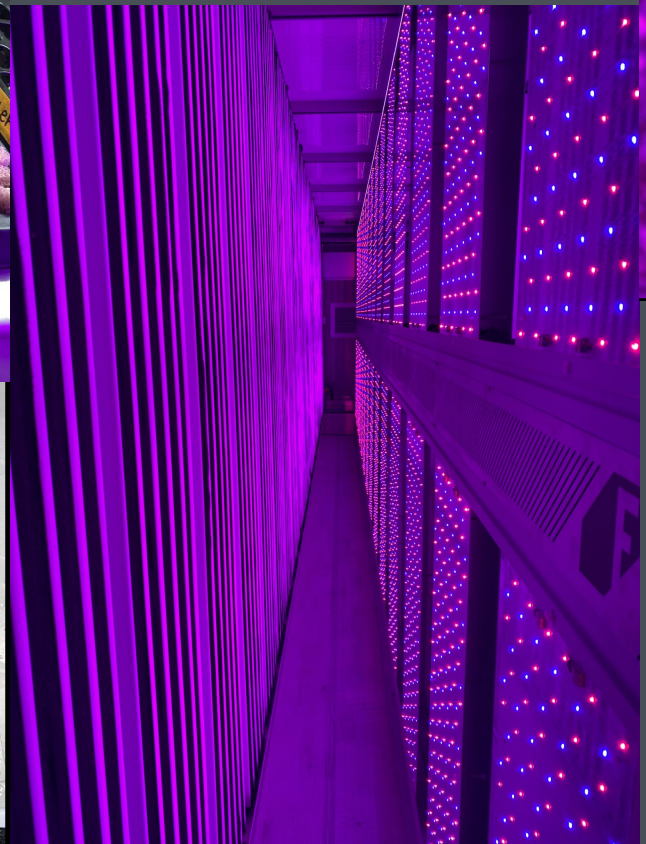
The Greenery is a shipping container turned hydroponic farm created by Freight Farms that utilizes:

- Sustainability
  - Low resource, water, and land use
- Innovation
  - The high tech lights and automated farm computer have expanded urban agriculture
- A climate controlled, two part grow space

1. The Nursery Station
- Ebb and Flow trough system
- LED light panels
- High plant capacity

2. The Cultivation Area
- Vertical grow walls
- Drip emitters
- LED light panels
- Integrated water management system

STEM in Hydroponics

Older Students: Chemistry, Biology, Physics, Math, Engineering, Plant Science, Agriculture

- pH scale
- Electrical conductivity of water
- Chemical reactions
- Pigments/photosynthesis
- Dilutions
- Nutrition from plants
- Different types of hydroponics
- Optimal growing conditions
- Pest and disease prevention
- Plant diagnostics
- Problem solving
- Nutrients in plants (NPK)
- Sustainability
- Plant physiology

Younger Students: Basic Plant Science, Biology, & Nutrition

- Seed germination
- Energy from light
- Chlorophyll
- Basic plant anatomy
- Basic plant life cycle
- Sustainability
- Plants are nutritious food (for the mind and body), the more color the better!

Hydroponic Farming Fits into BSB's E-CAP

Environmental Conservation Action Program: Grow ELO

- E-CAP creates a K-12+ continuum of environmental education at BSB
- Grow ELO foundation in what all students should engage in – planting seeds, being outside, eating fresh foods, exploring
- As students get older, their engagement in ECAP opportunities, such as *ForkFarms* will grow.
- Freight Farm model

What we have done so far!

On-Farm Education Experiences:

- Freight Farm Fellows
  - College students
- High School Internships
  - Paid hydroponic farming experience
  - Incorporated STEM lessons
  - Students created & presented projects
- High School Research Projects
  - LPS Science Focus Program students
- Independence Academy Involvement
- Farm tours

Off-Farm Education Experiences:

- Hydroponics in cup activity at LPS Science Fair
- LPS Garden Gatherings
- College and career connections

Food Distributions:

- Cafeterias
- Family engagement events
- Student-food programs
- Food bank / community kitchens

Hydroponics Extensions:

- Partnerships with
  - Nebraska Environmental Trust
  - Grow NE: Nat Geo slingshot
  - NDE Farm to School
  - Farm Bureau Foundation
- Collaboration with student groups
  - CTSOs (FFA, etc)
  - High School Focus Programs (FEWSS)

Why it Matters

- Starting education early in STEM and teaching about climate change, environmental stewardship, and alternate agricultural practices can make a huge difference as students get older
    - Instills value on the planet
    - Teaches out of the box thinking to better respond to future challenges
    - Provides useful life and career skills
    - Gives them a good background to begin careers in science, agriculture, sustainability, environmental science, hydroponics, etc→ all of which will help create a society with ideals and knowledge aligned with protecting the planet and our natural resources
- Educating students on these types of topics also empowers them to take a stand on climate change and to be active in their communities and local food systems

I believe it takes a **combined approach** to have local **food security**, specifically that innovations like the Greenery are necessary to provide food while current **crop land is regenerated and sustainable agriculture practices are implemented.**

How it can apply to your programs

- DIY Hydroponics or Hydroponic Grow Towers
  - Can be adapted to meet the needs of specific programming
  - Apply STEM, Nutrition, Culinary lessons
- Integrated Curriculum Options
  - Learn, Grow, Eat & GO!- Junior Master Gardener
  - Nebraska Agriculture in the Classroom- Nebraska Farm Bureau Foundation
  - Student created and led lessons
    - Hannah's Hydroponics Lesson Plan
- Engagement of students in their local food system
  - Production
  - Distribution

Lettuce Grow

Fork Farms

Student Leadership Opportunities

- Older students leading younger students
  - Prepares younger students for future opportunities
  - Solidifies topics for older students
  - Encourages and teaches leadership
- Some ways to engage
  - Grow towers maintained by older students who show and educate younger students on a variety of STEM topics
  - Implementing student written and led curriculums/lessons
  - Connecting older students with local career pathways (health, food systems, science)

Activities connecting to learning opportunities

1. Panels
    - Panel components
    - Transplanting

2. Seed Trays & Plugs
- Plant stage comparison
- Seeding

3. Hydroponic Maintenance
    - Freight Farm vs Grow Tower
    - Maintenance work

Discussion Questions

1. How can hydroponics help engage more students?
2. How can hydroponic farming encourage creativity and innovation in afterschool programming?
3. What new ways can hydroponics build agriculture partnerships?
4. How can we effectively introduce students to the larger food system?

You can find more information at:
Beyondschoolbells.org

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