Hydroponics

Extension Grand Challenge: Food - Food Production

STATE CONTACT: Mark Becker (mbbecker@illinois.edu)

BRIEF DESCRIPTION: An introduction to the process of growing plants without the use of soil developed by the 4-H program at the University of Tennessee. This signature program comes with a teacher's guide, student activity handbook, and a collection of slide decks to accompany each of the 8 activities designed to be a primer into the science and basic processes behind the management of a functional soilless growing system. A hydroponics system is not required to conduct these activities.

TARGET AUDIENCE: Students in high school in settings such as 4-H clubs, 4-H Federations, in-school and after-school programs and other positive youth development settings.

KEY OBJECTIVES

- Learn about plant science basics and plant care skills.
- Create opportunities for understanding the application of STEM skills in the context of Agriculture & Food Systems.
- Introduce skills and concepts required for the proper management of hydroponic soilless growing systems.
- Practice teamwork and collaboration skills in the context of plant care and gardening.
- Strengthen their understanding of where their food comes from through hands-on learning.

TOOLKIT

Supported Curricular Resources – See Preview Below

- **Hydroponics: Soilless Growing Systems - Shop 4-H Link to Curriculum**
- **Teacher Guide Presentation Slides –** Contact Mark Becker to receive a copy of the presentation slides to accompany the 8 activities.

CROSS-EXTENSION, CAMPUS, AND COMMUNITY COLLABORATORS

- Horticulture, Small Farms/Local Foods Educators and SNAP-Ed Educators
- Community and civic organizations
- In-School and After-School programs
- Local farmers and food producers
- Local greenhouses

REGISTRATION

Please register at the signature program intent to participate form distributed from the State 4-H Office.

FUNDING SUPPORT

The primary funding source made available through the State 4-H Office is to support the purchase of the curricular and material resources needed to achieve your programing goals. Groups should coordinate program expenses with their Unit Extension Office. Collaborations with local donors are also recommended where possible.

Additional funding to support programmatic costs is also available from the Food Advocacy Grants which are available several times a year through the State 4-H Office. See the following link for more information: Gardening, Agriculture and Food Access Page

Illinois 4-H Signature Program Overview

EVALUATION TOOL

Youth Participants: A Qualtrics based evaluation tool will be shared with you after registering through the Signature Programs process.

If you need a paper copy, please contact Mark Becker: mbbecker@illinois.edu

Illinois Extension
UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

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Plant System Standards

Code	Standard	Activity
AG-PL-1	Develop and implement a crop management plan for a given production goal that accounts for environmental factors.	1-8
AG-PL-2	Apply the principles of classification, plant anatomy and plant physiology to plant production and management.	2-8
AG-PL-3	Propagate, culture and harvest plants and plant products based on current industry standards.	2-8

Source: Common Career Technical Core. (2014). Retrieved from https://cte.careertech.org/sites/default/files/CCTC_Standards_Formatted_2014.pdf

Science Standards

Code	Standard	Activity
HS-LS1-5	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	1
HS-LS2-5	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	1
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.	2
HS-ESS3-2	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.	2
HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.	2
HS-LS2-7	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	3
HS-ETS1-1	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.	3
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.	3
HS-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.	3
HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	4
HS-PS1-5	Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.	5
HS-PS1-6	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.	6
HS-PS1-3	Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.	7
HS-PS1-2	Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.	8

Source: Next Generation Science Standards. (2018). Retrieved from nextgenscience.org