PHOTOSYNTHESIS & HYDROPONICS

LESSON & DEMONSTRATION

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| Lesson Title: PHOTOSYNTHESIS & Physical observation of plant growth through Hydroponics | Participating Schools and Grade Level (s):* Faleasao: 4-8
* Fitiuta: 4-8
* MHS: 10 & 12
 |
| Length of Lesson: 5 weeks | Prepared by: Toni Leano, Farmer | Date: Nov. 17 – Dec. 22, 2020 |
| Materials:  | * Pool noodle
* 30 gal totes and covers
* Measuring tape/ruler
* Drill and door knob drill bit
* Water
* Nutrients
* Bok choy seedlings (3-4 weeks old)
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| ASDOE Standards & Benchmarks by Grade Level: | Examples: 4.8.2: Explore how plants and animals obtain their food through their relationships within food webs in an ecosystem.* Explain that plants make their own food (photosynthesis) and animals, including humans, get food by eating plants and/or eating other animals.

5.7.1: Explore how plants and animals have certain structures and behaviors that enable them to respond to changes in the environment and meet their basic needs.* Develop examples of how plants and animals respond to internal needs

6.7.1: Describe the characteristic structures and functions that support life processes of * growth, respiration, and reproduction, and explain theses processes in terms of matter and energy transformations

7.7.2: Identify organisms’ needs for energy, and explain how their structures and functions align to meet these needs.* Describe plants as systems that use solar energy and water to extract carbon dioxide from the air (photosynthesis)

8.7.4 Describe cellular processes such as respiration, ingestion, digestion, excretion, and secretion * Describe the conversion of solar energy into chemical energy in plants (i.e., photosynthesis)

Grade 10: BIO1.7.3: Investigate chemical reactions and cell processes in organisms* Create presentations on photosynthesis and respiration
* Nutrients
* Plant life

Grade 12: CTE: 9-12.2.1: Explore & understand educational & career options in order to develop and implement personal, educational career goals; Analyze individual & educational career goals: Agricultural Opportunities* Farming
	+ Hydroponics
	+ Animals
	+ Plants
	+ STEM
		- Modern day farming practices and Cultural farming knowledge and practices come together
		- Data collection
		- Sustainability
		- Economic Growth
		- Employment opportunities in Manu’a
		- Social Growth and Development
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| LESSON PROCEDURES | Activity/Activities | Time |
| \*Students will collect data weekly using a data recording sheet.\*\*Teachers will email digital photo (s) of plants each week.\*\*\*All data will be completed and collected on week 5. | 1. PowerPoint Presentation and School Demonstrations
	1. Faleasao Elementary
	2. Manu’a High School
	3. Fitiuta Elementary
2. Week #2 visit to schools
	1. Plants follow up & progress
	2. Data Collection
	3. Discussions on Plant growth and observations
3. Week#3 visit to schools
	1. Plants follow up & progress
	2. Data Collection
	3. Discussions on Plant growth and observations
4. Week#4 visit to schools
	1. Plants follow up & progress
	2. Data Collection
	3. Discussions on Plant growth and observations
5. Week #5 visit to schools
	1. Harvest and Cooking demonstration
	2. Lesson Culmination
		1. Wrap Up:
			1. Understanding plant life and how it makes food (Photosynthesis)
			2. Sustainability in Manu’a and all over the world (How can Hydroponics be a sustainable method of farming?)
			3. Food Production: Growing our own food
			4. College Planning: Fields of study
			5. Career Planning: Career fields
 | 1 hour1 hour1 hour1 hour1 hour |
| Evaluation | * All participants will identify and define Photosynthesis
* Students will observe plant growth for 5 weeks and collect data based on plant development
* Students will describe plant changes through different stages of plant life
* Participants will be aware of Agricultural practices, Sustainability, Food Growth and Security Issues, as well as explore career and college careers towards economic development
 | 100% |
| Acknowledgements & Conclusion: | Acknowledgements to the island of Ta’u Manu’a. Thank you to all students, schools and community participants of this project. This research studies the ability to grow specialty crops in a remote location with few resources through water and resource management, and the use of controlled environment, pest, and disease control. All studies are based on the objectives that aim for developments in community sustainability, education, local and global economic and environmentally friendly impacts. Thank you, Western SARE Farmer Research program, for supporting and funding this project. It has been a great learning experience. |