



Hydroculture in Hawaii

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What is Hydroponics?

- Growing plants in a nutrient rich solution without the presence of soil.
- Is Hydroponics “Organic”?
- Can you use “Pesticides”?



Why Hydroponics?

- Water use efficiency
- Space availability
- Potential for increased production
- Cleanliness
- Nutrient use efficiency
- Aesthetics



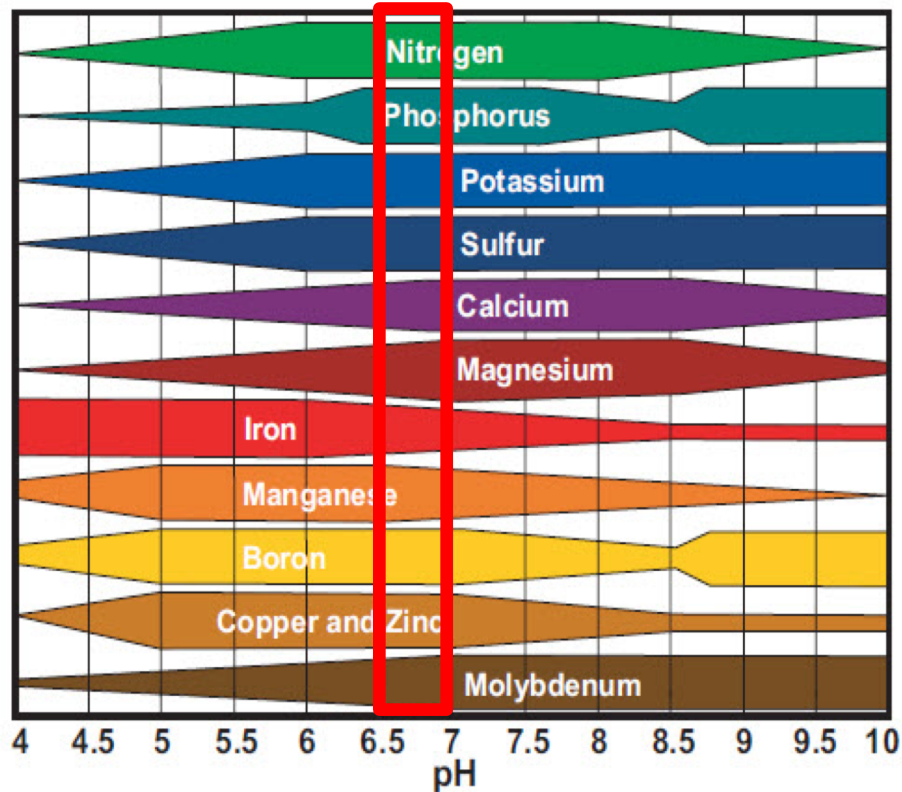
Plant Nutrients and pH

- Macronutrients

- Nitrogen
- Phosphorus
- Potassium
- Magnesium
- Calcium
- Sulfur

- Micronutrients

- Iron
- Manganese
- Copper
- Boron
- Molybdenum
- Zinc
- Chlorine





Fertilizer Sources

Local Companies (home gardener)

Mainland Companies (commercial)

- Hydro-gardens, Colorado
 - <http://hydro-gardens.com>
- American Hydroponics, California
 - <http://www.amhydro.com>

Blend your own

- Brewer Environmental Industries (BEI)
 - 300 Pakana St, Wailuku, HI 96793



Can I use Miracle-Gro?

Macronutrients

- Nitrogen
- Phosphorus
- Potassium
- **Magnesium**
- **Calcium**
- **Sulfur**

Micronutrients

- Boron
- Copper
- Iron
- Manganese
- Molybdenum
- Zinc
- **Chlorine**
- **Cobalt**





Organic Nutrients

- Compost Tea
- Bone Meal
- Seaweed Extract
- Fish Emulsion
- Natural Farming Sprays

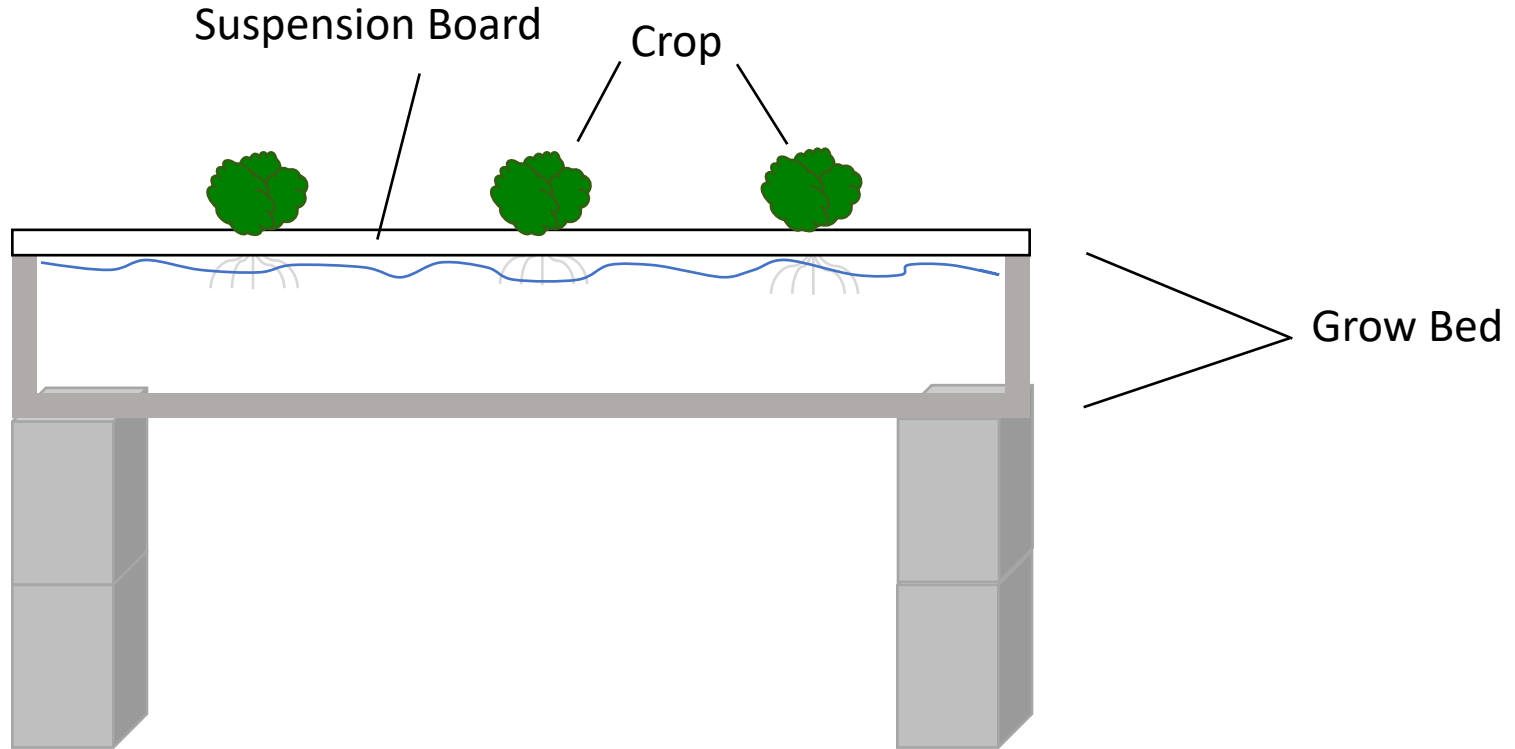


What Kind of Hydroponics?

- Circulating vs Non-circulating
- Fish Effluent vs Synthetic Fertilizer
- Organic vs Non-organic
- Simple vs Complicated
- Manual vs Automated
- Leafy Greens vs Fruiting crops



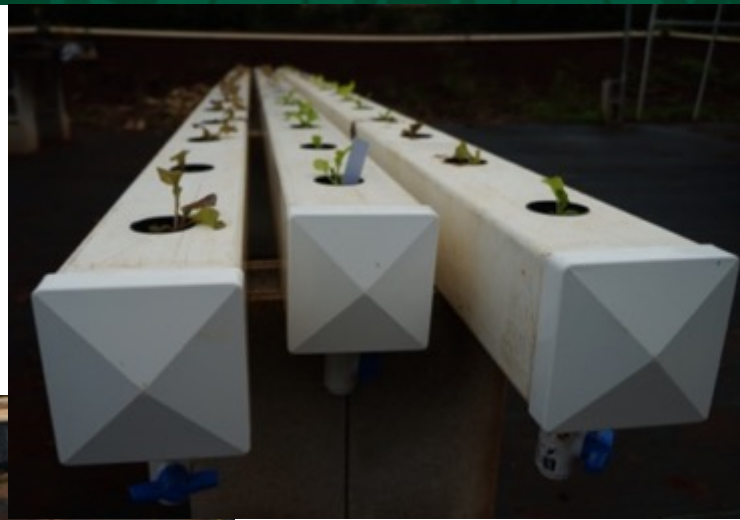
Suspended Non-circulating Hydroponics







50gal Drum



Fence Post



Food Grade System



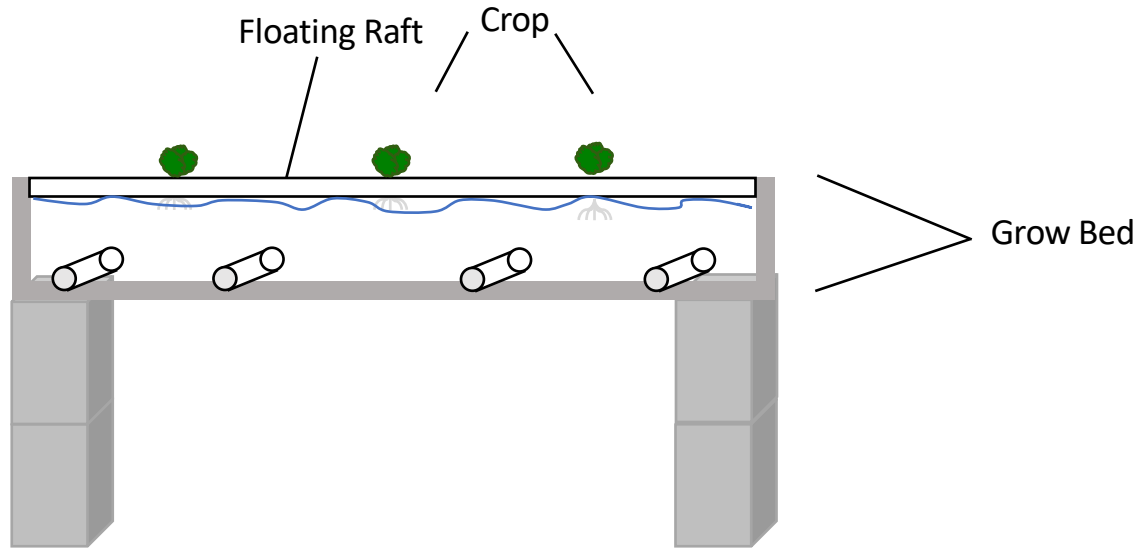


CNMI CES





Floating Raft Non-circulating Hydroponics





UH Manoa, Rooftop



SOFT
Student Hydroponic
Project



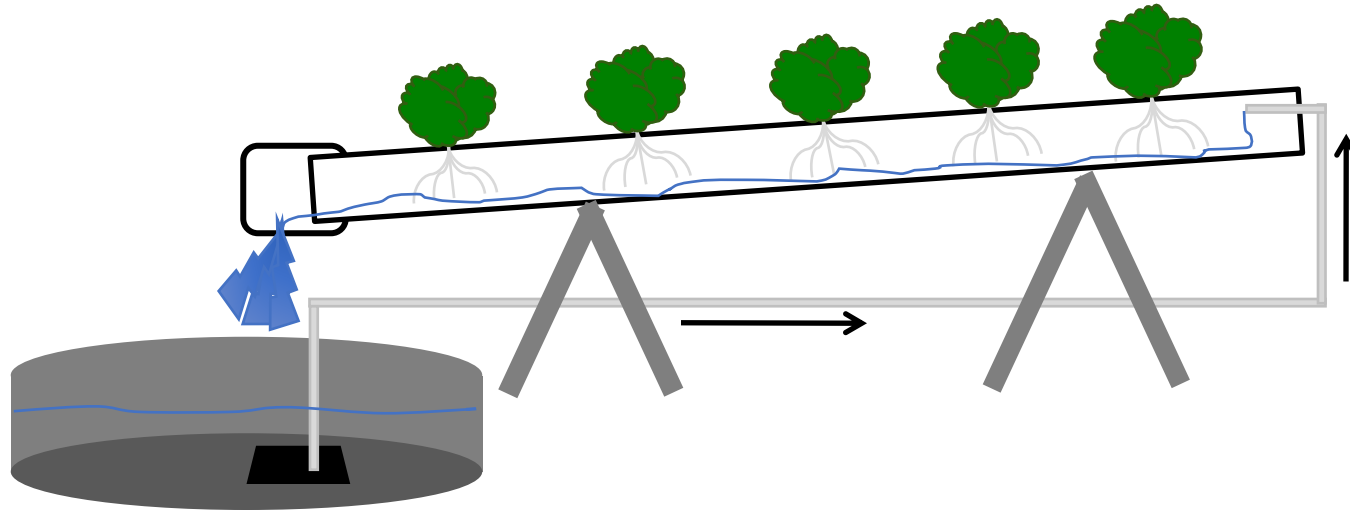
Poamoho Research Station



Kunia Country Farms, Oahu



Nutrient Film Technique (NFT)







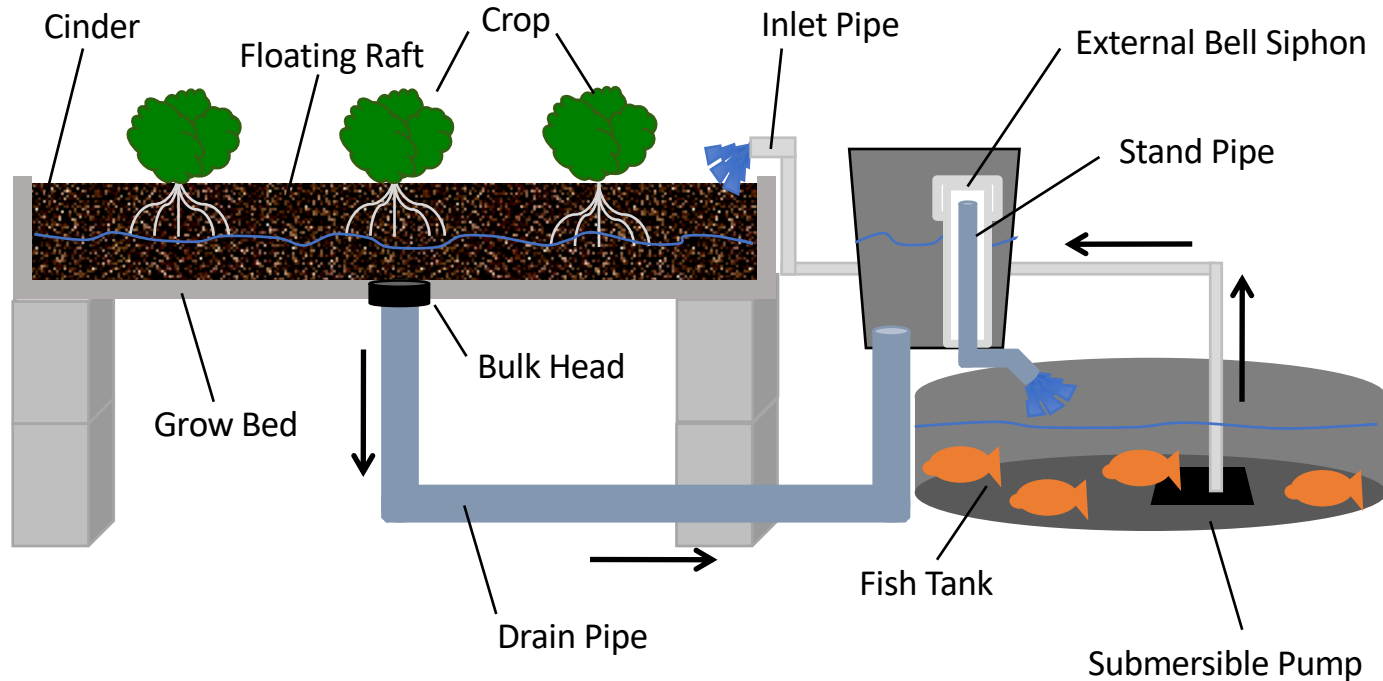


Mays Wonder Garden, Oahu





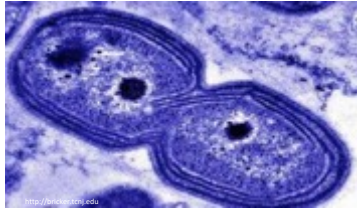
Gravel Bed Hydroponics (Aquaponics)





Aquaponic Nitrogen Cycle

Nitrosomonas



Ammonia -> Nitrite



Nitrobacter

Nitrite -> Nitrate



Nitrate
Removed

The
Aquaponic
Nitrogen
Cycle

Ammonia Produced



Feed



Clean Water







Waimanalo Research Station



Nitrogen

Calcium

Phosphorus

PURINA®
AQUAMAX® SPORT FISH 500
FEED FOR FISH
CAUTION: USE ONLY AS DIRECTED

GUARANTEED ANALYSIS

Crude Protein (Min)	41.00 %
Crude Fat (Min)	12.00 %
Crude Fiber (Max)	4.00 %
Ash (Max)	11.00 %
Calcium (Min)	2.25 %
Calcium (Max)	2.75 %
Phosphorus (P) (Min)	1.10 %
Sodium (Na) (Max)	0.60 %

INGREDIENTS
Fish Meal, Poultry By-Product Meal, Dehulled Soybean Meal, Ground Corn, Wheat Middlings, Spray Dried Porcine Blood Cells, Fish Oil, Animal Fat (preserved with mixed tocopherols), Calcium Carbonate, Lecithin, Yeast Culture, Pyridoxine Hydrochloride, Choline Chloride, Calcium Pantothenate, DL-Methionine, L-ascorbyl-2-polyphosphate, Menadione Sodium Bisulfite Complex (source of Vitamin K activity), Biotin, Thiamine Mononitrate, Vitamin D3 Supplement, Folic Acid, Riboflavin Supplement, Vitamin E Supplement, Niacin Supplement, Vitamin A Supplement, Zinc Sulfate, Vitamin B-12 Supplement, Manganese Sulfate, Ferrous Sulfate, Copper Sulfate, Ethylenediamine Dihydroiodide.

5D05-TFPC-W 1
DIRECTIONS
Feed to fish. See bag for species specific feeding instructions.
DO NOT FEED TO CATTLE OR OTHER RUMINANTS.
CAUTION
Store in a dry, well-ventilated area protected from rodents and insects. Do not feed moldy or insect-infested feed to animals as it may cause illness, performance loss or death.

0045303
PURINA® AQUAMAX® SPORT FISH 500



Biofiltration



Seedling Transplants





Seedling Media





Community Trays



COOPERATIVE EXTENSION

UNIVERSITY OF HAWAII AT MANOA
COLLEGE OF TROPICAL AGRICULTURE AND HUMAN RESOURCES

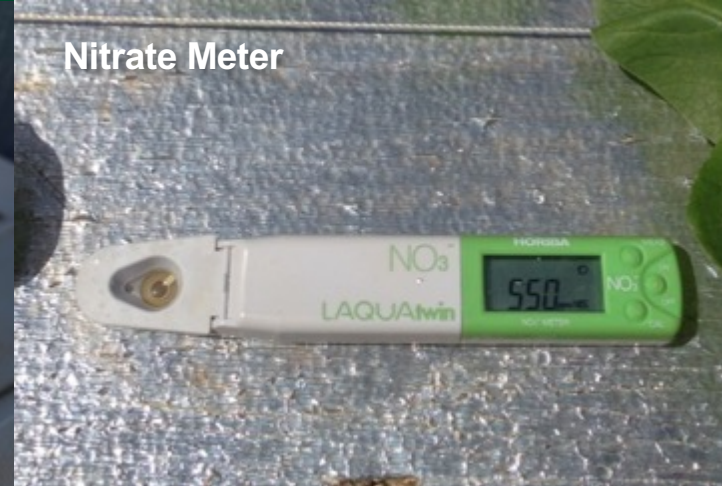




Nutrient Management Equipment



Nitrite, Nitrate & Ammonia Test



Nitrate Meter



DO Meter



pH & EC meter



Supplemental Lighting





Pest and Diseases





Challenges

- Initial Cost
- Technical skills needed
- Source of fertilizer/fish food
- Pest and Diseases
- Clogging
- Pumps break



Future of Hydroponics





Potential Crops For Hydroponics





Eggplant





Soybean



Cilantro





Green Onion



Basil





Asian Cabbages



Taro Leaf



Potatoes



Cucumber



Watercress



Strawberry



Kale



Lettuce

A photograph of a hydroponic lettuce growing system. Rows of white plastic channels are filled with water, and young lettuce plants are growing in the channels. The background shows a field and trees under a blue sky.

For More Information:
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