

Aquaponics A Quick Introduction?

Veteran Farm Tour-IN Beginning Farmer Program

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Interest in Aquaponics

- ▶ Local Healthy Food Source
- ▶ Real Estate Issues
- ▶ Sustainable Food Production Systems
- ▶ Cool, Interesting, New, Different, Sexy?



Aquaponics

Hydroponics + Aquaculture

- ▶ Hydroponics
 - ▶ “Method of Growing Plants with Mineral Nutrient Solutions in Water without Soil”
- ▶ Recirculating Aquaculture System (Indoor)
 - ▶ Controlling/Optimizing the Environment for Production of Aquatic Animals through Water Filtration and Re-Use.



Aquaponics

Symbiotic Relationship

▶ Hydroponics

- ▶ Nutrients Provided by Fish Waste
- ▶ Cash Flow Stream

▶ Aquaculture

- ▶ Removal of Waste Products from Fishes Environment
- ▶ Green Labeling



Hydroponics

- ▶ Mineral Nutrients
 - ▶ Water Born - C,H,O
 - ▶ Macro - N, P, K, Ca, Mg, and S
 - ▶ Micro - B, Cl, Cu, Fe, Mn, Na, Zn, Mo, Ni (Si, Co)

Aquaculture

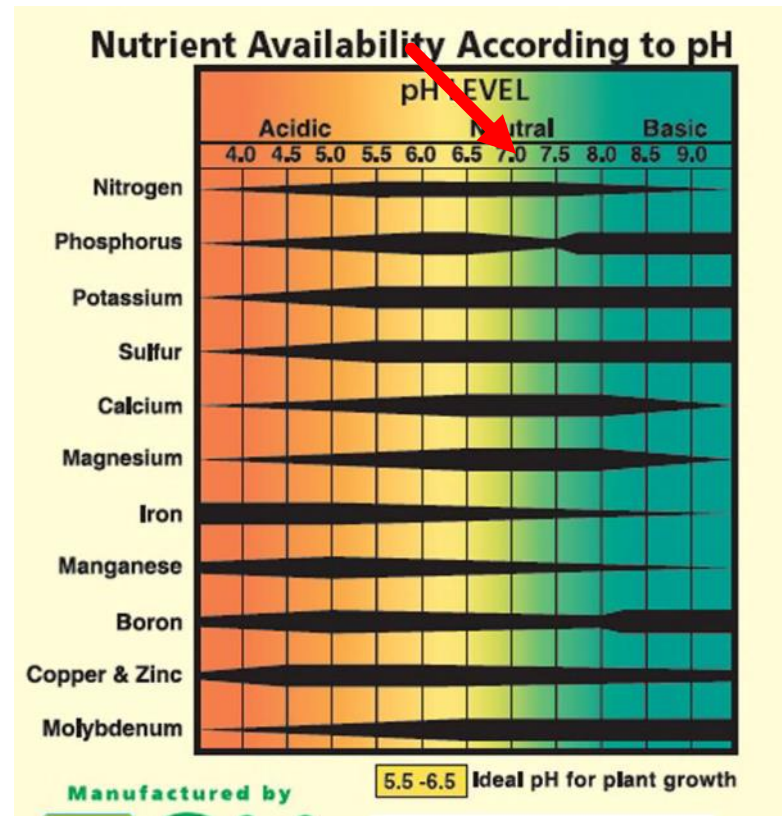
- ▶ WQ Parameters
 - ▶ Oxygen
 - ▶ Ammonia
 - ▶ Nitrite
 - ▶ pH
 - ▶ Alkalinity
 - ▶ CO₂



Aquaponic Water Quality

“Meeting In The Middle”

- ▶ Fish
 - ▶ High Alkalinity, pH
 - ▶ Ammonia Toxicity
- ▶ Plants
 - ▶ Low pH



Buildings

- ▶ Greenhouse
- ▶ Large Building (Warehouse, Factory, Barn)
- ▶ Both
- ▶ Three Season

- ▶ Source Water



Lighting

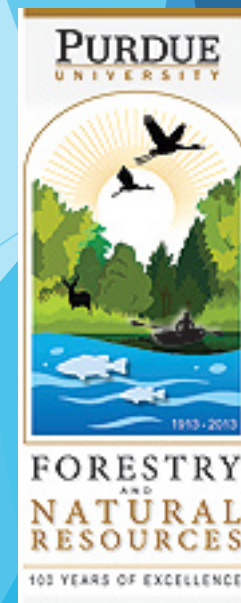
- ▶ Building
- ▶ Energy Use
- ▶ Capital Cost
- ▶ Algae



Plant Varieties



- ▶ Temperature
- ▶ Nitrogen
 - ▶ Vegetative
 - ▶ Flowering/Fruits
- ▶ Market



Fish Species

- ▶ Coolwater
 - ▶ YP, Trout
- ▶ Warmwater
 - ▶ Tilapia, LMB
- ▶ Other
 - ▶ Ornamentals, Bait



Balanced Aquaponics Systems

- ▶ Plant to Fish Ratio = 5-7:1 Area
 - ▶ Staggered Cropping
 - ▶ Batch Cropping
 - ▶ Intercropping
- ▶ Maintain Biomass



Blended Systems

- ▶ Plant to Fish Ratio Reduced
 - ▶ Focus on Fish
- ▶ Excess Fish Waste Treated or Discharged
 - ▶ Plants Secondary Income



Plant Growing Areas

- ▶ Raft/Raceway
- ▶ Nutrient Film Technology (NFT)
- ▶ Ebb and Flow
- ▶ Maintaining O₂ at Root Zone

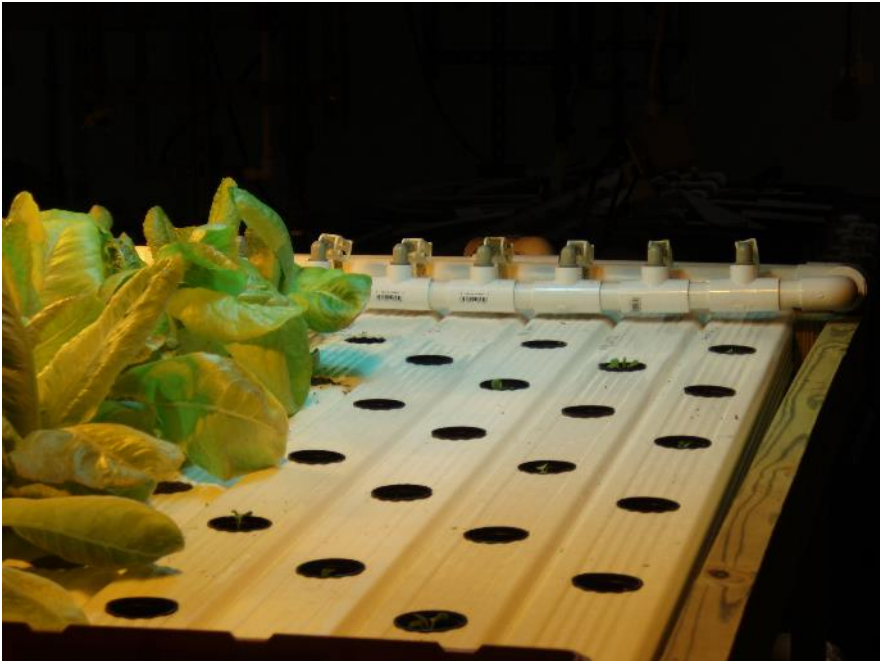
- ▶ Food Grade Materials



Raft/Raceway



NFT



Ebb and Flow



Fish Feeds

- ▶ Varying Nutrient Levels per Species
- ▶ Protein
 - ▶ 40% to Fish, 60% to Waste
- ▶ Vitamin/Mineral Premix Fortified
 - ▶ Generally Not Enough for Plants
 - ▶ Praire AquaTech



Solids Removal



Mineralization

- ▶ Release of Mineral Nutrients
 - ▶ Anaerobic Decomposition
- ▶ Supplementation of Minerals
 - ▶ Ca, Fe, K, Mg



WQ Measurement

- ▶ Mineral Nutrients
 - ▶ Too Expensive (Scale)
- ▶ Electrical Conductivity
 - ▶ Major ions NO_3 , PO_4 , SO_4 , K, Ca, and Mg
- ▶ pH
 - ▶ Availability of Nutrients



Pest Control

- ▶ Nothing Detrimental to Fish Health, Quality
- ▶ Integrated Pest Management (IPM)
 - ▶ Biological Control
 - ▶ Physical Barriers
 - ▶ Traps
 - ▶ Manipulate Environment
- ▶ Organic Certification ???????????
 - ▶ Third Party, Vegetables only



Information Sources

On-Line

Southern Regional
Aquaculture Center Pub. 454

<http://community.theaquaponicsource.com/>

<http://www.aquaponicsassociation.org/>

Trainings

- ▶ University of Virgin Islands
- ▶ Pentair Aquatic Eco. (FL)
- ▶ Lucky Clays Farm (NC)
- ▶ UW Stevens Point (WI)
 - ▶ Nelson and Pade
- ▶ Others



Getting Started Technical Aspects

- ▶ UVI System as Base
 - ▶ Scale Up or Down
- ▶ Agro-tourism
 - ▶ Additional Revenue versus Biosecurity
- ▶ Need Expertise
 - ▶ Aquaculture + Horticulture



Getting Started Marketing and Economics

- ▶ Market Surveys
 - ▶ Plants and Fish
 - ▶ Willingness of Consumers to Pay
- ▶ Future Costs of Land, Energy, Water



Getting Started Food Safety

- ▶ Vegetables
 - ▶ Food Safety Modernization Act (FSMA)
 - ▶ Good Agricultural Practices GAP
 - ▶ <http://vimeo.com/118113557>
- ▶ Fish
 - ▶ Processing IN Dept. of Health or FDA
 - ▶ Live - Regulations



Questions?

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