Aquaponics

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What is Aquaponics?

- Melds aquaculture with hydroponics
- Modern aquaponics: ~25 years
Advantages of Aquaponics

- Miserly water use - the water is used very efficiently to grow two crops - fish & plants
- Zero environmental impact - no nutrient-rich waste-water discharge, the fish food is used to its maximum potential (to grow fish & plants)
- Two crops from the one input - the fish feed entering the system supports the growth of both fish and plants
- Small footprint/high density - because of their compact nature, facilities may be located very close to the end users (restaurants, green grocers, food manufacturers, public) in a variety of locations (country, city).
- No herbicides or pesticides can be used - healthier
The Aquaponic Cycle

Fish produce wastes

Bacteria converts wastes to fertilizer for fish

Plants filter water that is returned to the fish
Fish Care 101

• Do not forget the fish
• Water quality is key
• Fish should be:
  – Actively swimming
  – No lesions or red spots
  – Eating regularly
• If not – check water quality first!

• Important Water quality parameters:
  • pH
  • Alkalinity
  • Temp
  • Dissolved oxygen
Plant Care 101

• Water, but not too much
• Oxygen but moist
• Nutrients balanced
  - nitrogen
  - phosphorus
  - calcium

• Important to:
  – Test pH every week
  – Buffer with potassium and calcium buffers to desired pH
What if my fish get sick?

- Most diseases are a result of poor water quality
- Check water quality
- Do water change if necessary
- DO NOT ADD SALT!
- Quarantine fish if disease is not water quality related
What if my plants get sick?

• Soil borne diseases will not be a problem
• non-chemical methods
  – biological control
    • Resistant cultivars
    • predators
    • antagonistic organisms
    • barriers, traps
  - manipulation of the environment
Current Trends

• Commercial scale - few but not proven profitable
• Mainly home aquaponic systems
Types of Systems

• **Simple Flood and Drain**
• Simple method
• Grow bed above fish tank
• Pump water to grow bed – water drains back into fish tank
CHIFT PIST
Constant Height In Fish Tank - Pump In Sump Tank

- Water flows into grow bed
- Drains into sump
- Water pumped from sump to fish tank
Grow Bed

• Should be slightly larger than width of fish tank
• 1:1 ratio with fish tank
  – 10 gallon fish tank: 10 gallons growbed capacity
• Should be between 3”-8” deep
Grow Bed

• Grow medium-
  – Porous, inert material to hold plant roots and maintain moisture
  – Ex: perlite, expanded clay pebbles, peat moss, pea gravel, coconut coir
Cycling your system

- Temperature dependent
- 3-4 weeks
- Pure ammonia
- Fish
How many fish do I add to my system?

• In an aquarium-based system, a good rule of thumb is to stock the tank at 1lb of fish for every 5-10 gallons of water.

• In larger systems with proper filtration, commercial growers usually stock the tank to a maximum of 1/2 lb of fish/gallon of water.
How many plants can I have with a certain number of fish?

The number of plants you can grow is directly related to:

- The number of fish
- The size of the fish
- The amount of fish food added daily
- 10-gallon of water, you can support 2 sq. feet of plants
Resources

- SRAC
  - https://srac.tamu.edu/
- Backyard Aquaponics
  - http://www.backyardaquaponics.com/
- Aquaponics journal
  - http://aquaponicsjournal.com/