Aquaponics

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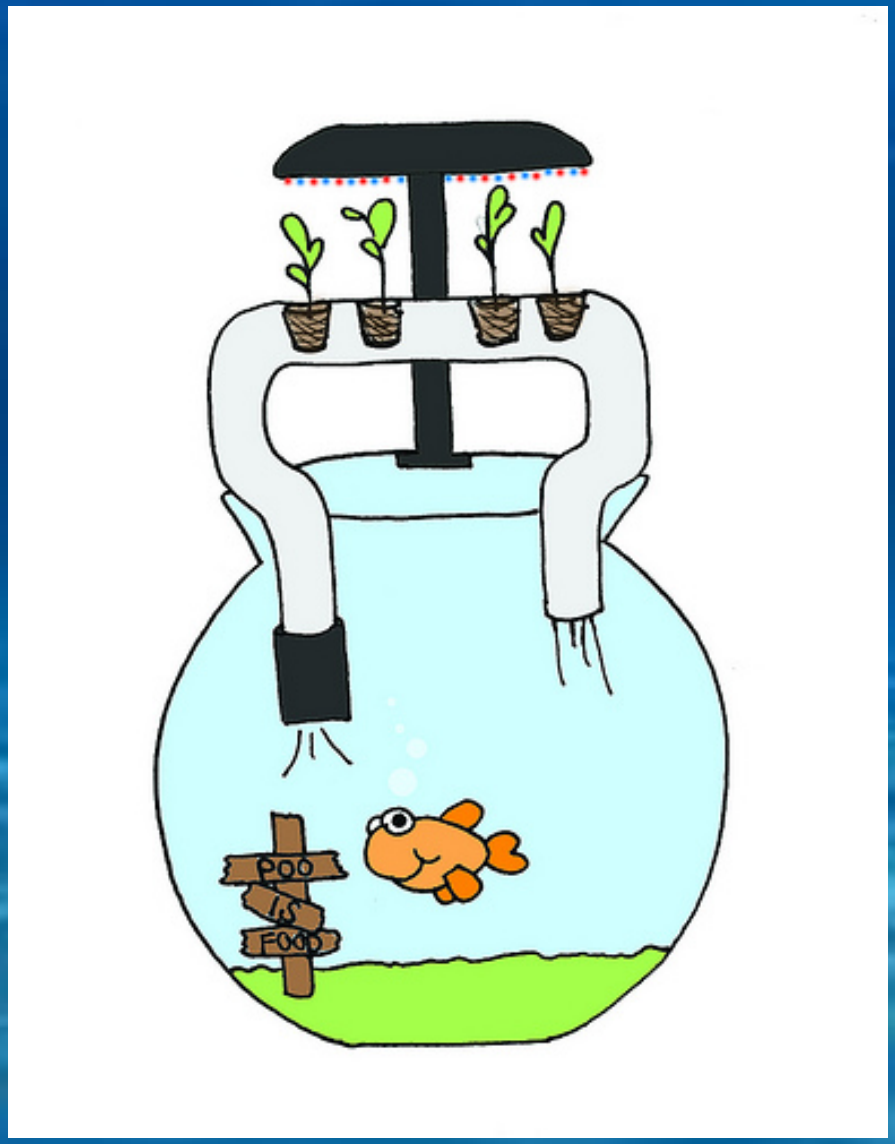
What is Aquaponics?

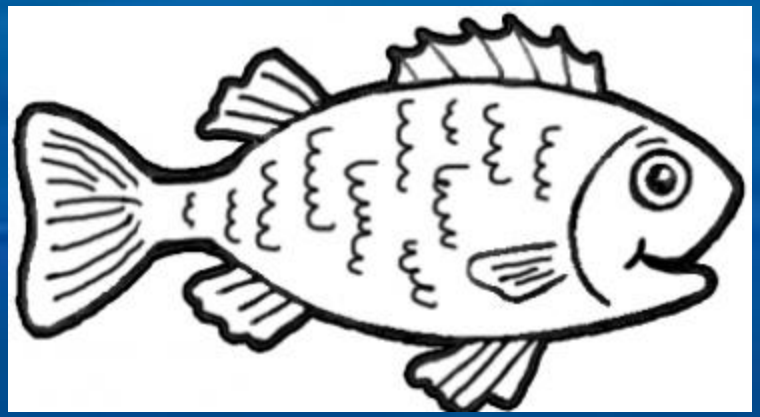
- Melds aquaculture with hydroponics
- Modern aquaponics: ~25 years



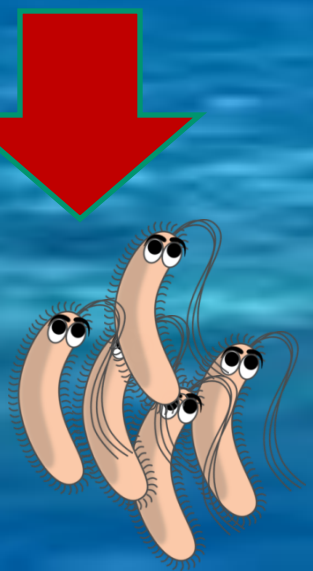
Advantages of Aquaponics

- 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

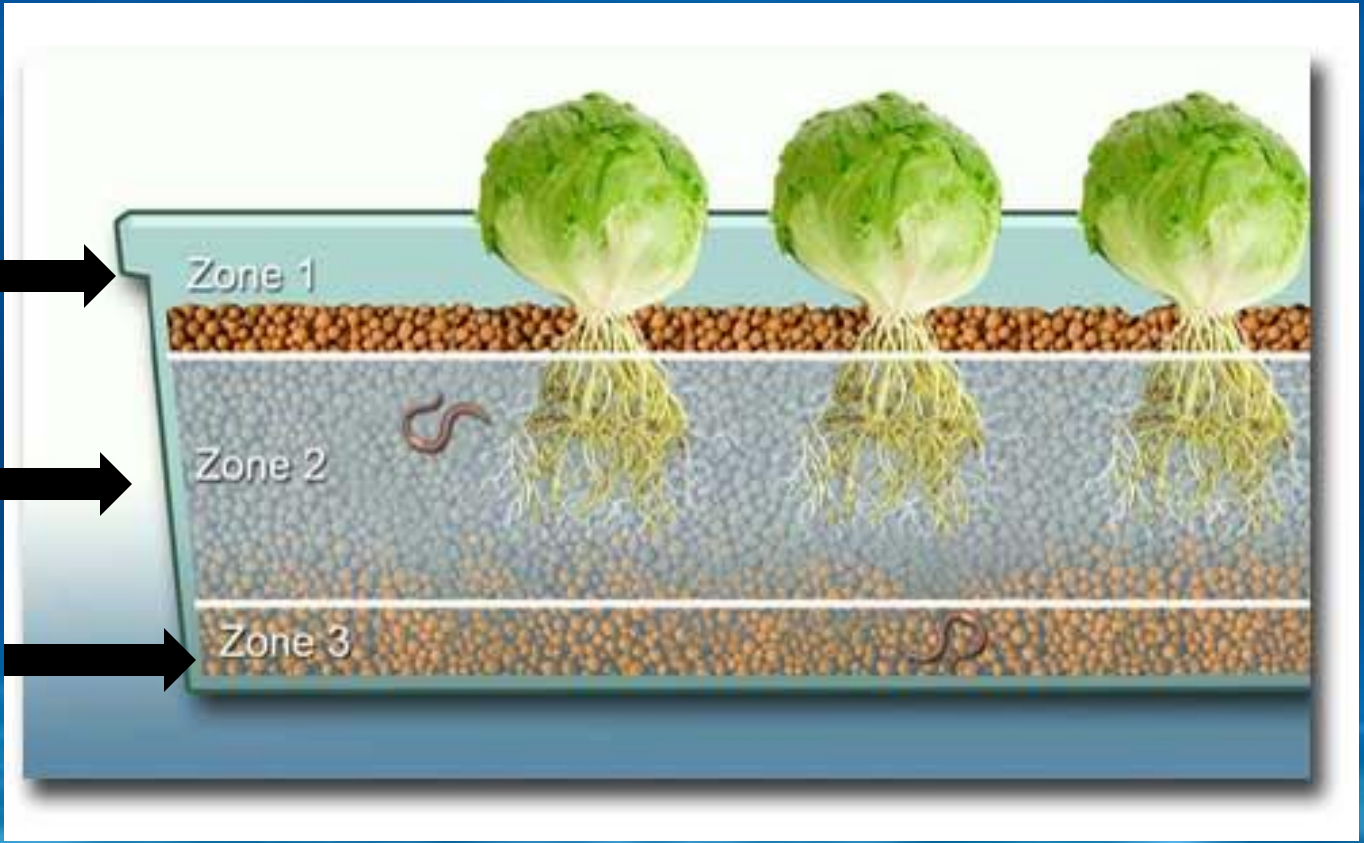
Current Trends

- Commercial scale- few but not proven profitable
- Mainly home aquaponic systems

Dry zone

Root zone

Solids collection zone



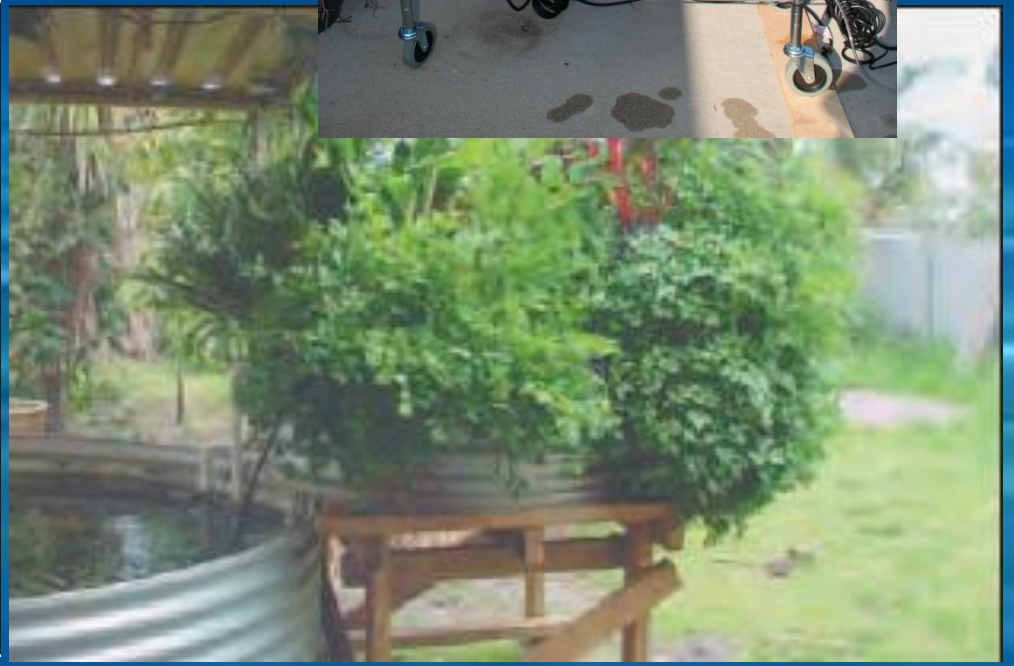
Types of Systems

- **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 SumpTank

- 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

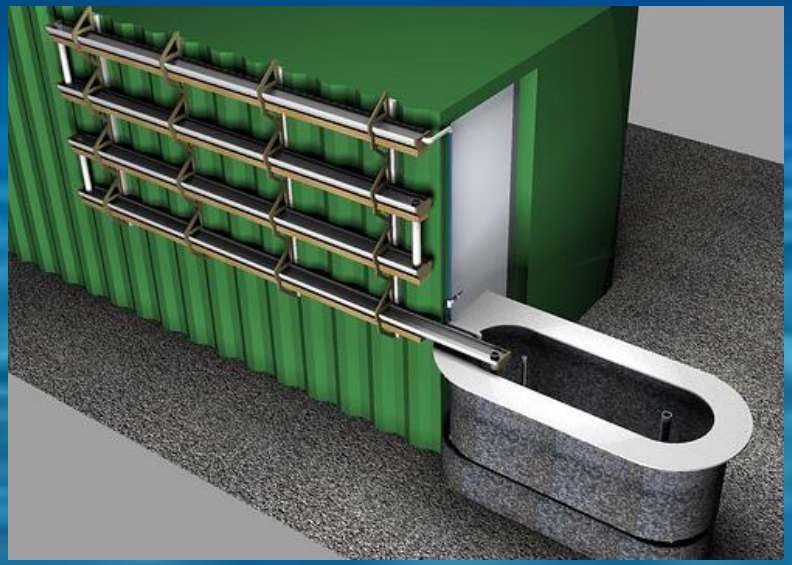
Grow Bed

- 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


1.8"
1.6"



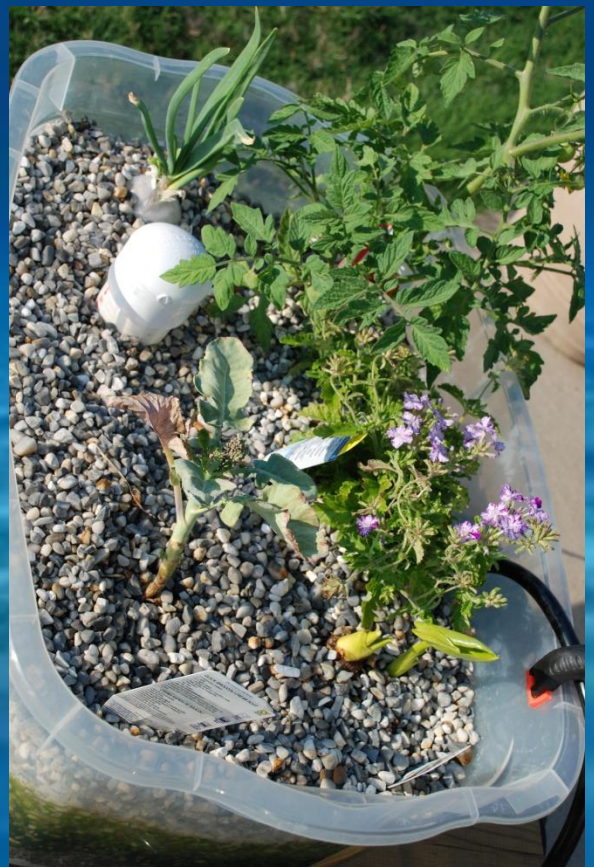
How many fish do I add to my system?

- 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?

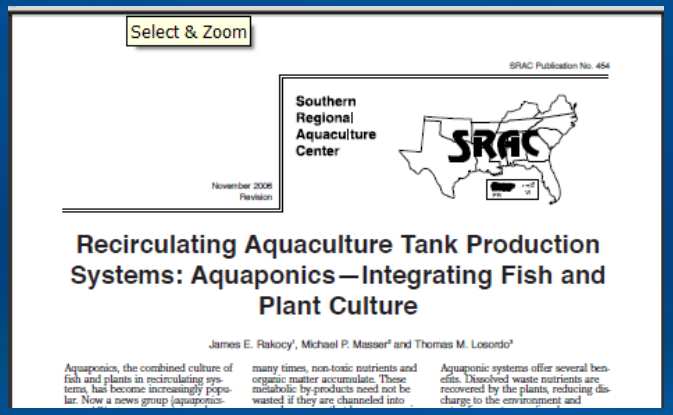
The number of plants you can grow is directly related to:

- 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/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Recirculating Aquaculture Tank Production Systems: Aquaponics—Integrating Fish and Plant Culture

James E. Rakocy[1], Michael P. Masser[2] and Thomas M. Losordo[3]

Aquaponics, the combined culture of fish and plants in recirculating systems, has become increasingly popular. Now a news group [aquaponics-

many times, non-toxic nutrients and organic matter accumulate. These metabolic by-products need not be wasted if they are channeled into

Aquaponic systems offer several benefits. Dissolved waste nutrients are recovered by the plants, reducing discharge to the environment and