Aquaponics

Growing Fish and Plants Together

Hydroponics

Growing Plants in Soil-less Media

COLORADO AQUAPONICS

Terms of Reference:

Aquaponics:

A system of aquaculture in which the waste produced by farmed fish or other aquatic animals supplies nutrients for plants grown hydroponically, which, in combination with bacteria, purify the water which is re circulated to the fish

Hydroponics:

Raising vegetables (and some fruit) in a water- based system with mineral nutrient solutions

More Terms of Reference:

Controlled Environment: A greenhouse with bio security

Organic: See the Organic Foods Production Act of 1990 (OFPA)

Production Management: the practice of coordinating, directing and overseeing the manufacture of goods in a factory or another type of production facility

Quality Manual: Documentation of policies and procedures assuring that you are producing the same product, the same way, every time according to recognized standards

I.P.M.: Integrated Pest Management

Controlled Environment: A greenhouse

Ceres High Efficiency Greenhouse

Climate Battery At The GrowHaus

Rimol High Tunnel

Aquaponics and Hydroponics:

What Are The Similarities For Commercial Operators?

Commercial Aquaponics and hydroponics BOTH require:
-A controlled environment (in your location, if you want to grow year- round)
- A systematic and analytical operations framework
- A knowledge of plant science, biology and chemistry
- Understanding of production management
-A “Quality Manual” with standard operating procedures (SOPs)
- Managerial skills, patience, and hard work
- Available low cost labor
- A viable marketing program to achieve premium prices
- Walk-in cooler (10’ X 10’ is about $7,000)

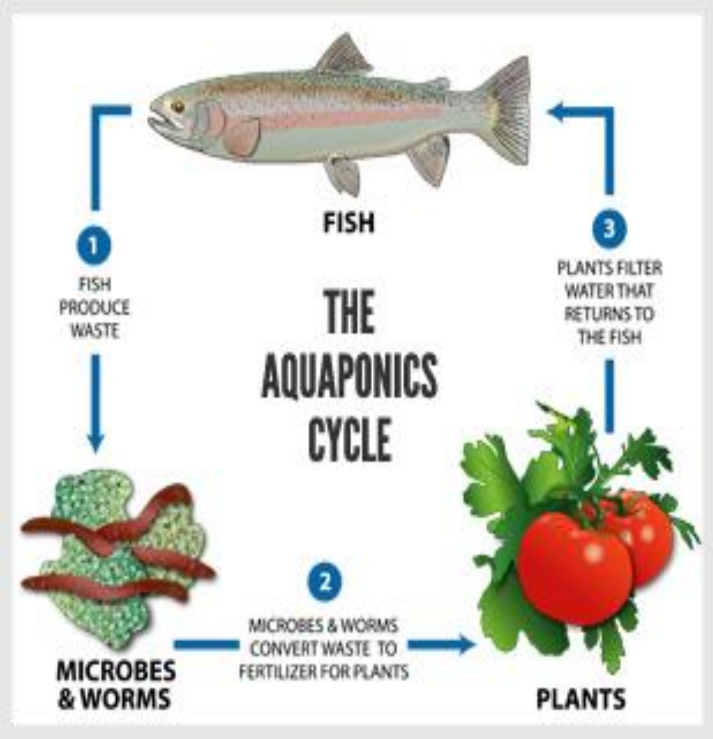
Aquaponics and Hydroponics:

What Are The Differences For Commercial Operators?

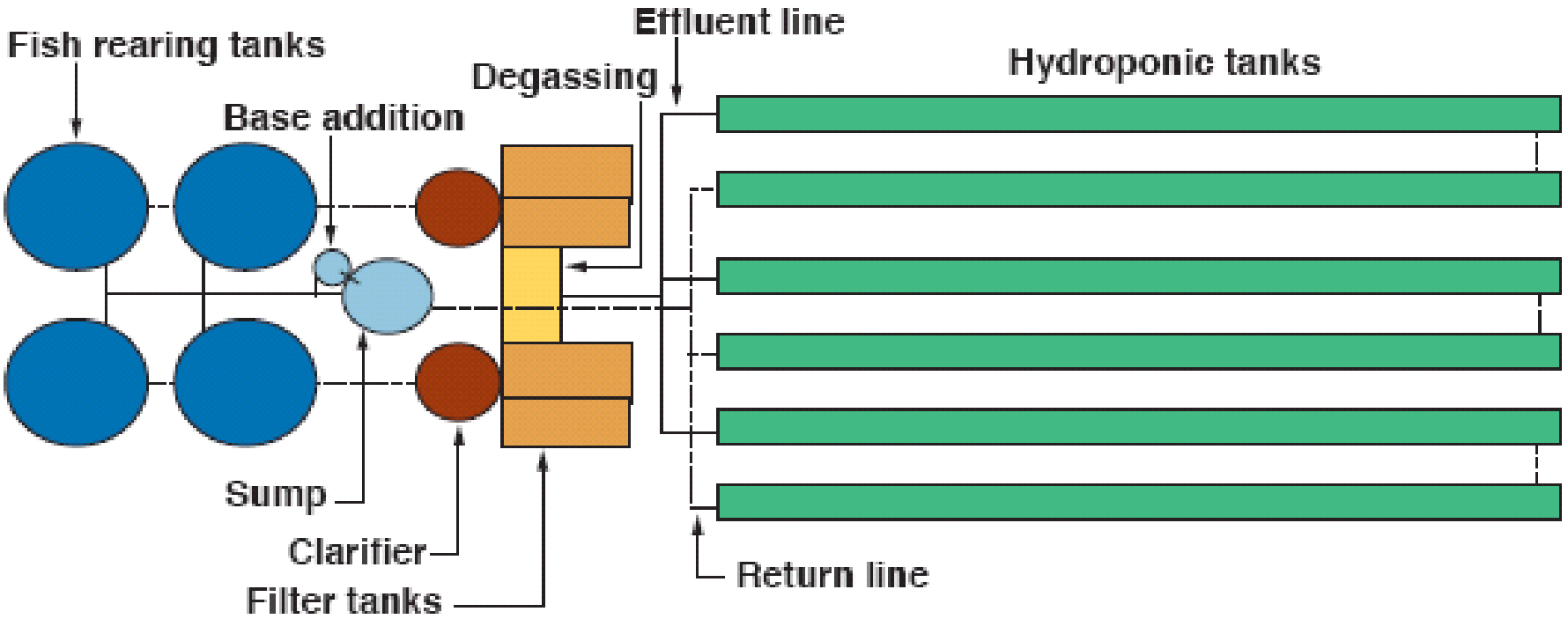
	Aquaponics	Hydroponics
Source of plant nutrients	fish	commercial
Source of fish nutrients	commercial	n/a
Number of species	3	1
Outputs	fish & vegetables	vegetables
System cost p.s.f.	(DWC) $10.00- 15.00	$1.50- 3.00
Prep areas for:	fish & vegetables	vegetables
Food Safety SOPs	Specific	Standard

How Aquaponics Works

1. Fish are raised in a tank
2. Water from the fish tank is pumped to where the plants grow
3. Bacteria convert ammonia and nitrite to nitrate (fertilizer)
4. Plants absorb the nutrient rich, oxygenated water
5. Filtered water is returned to the fish tank, clean



UVI Deep Water Culture Design



Raft Method

Method researched and developed at University of Virgin Islands www.uvi.edu

Media-Based Grow Beds

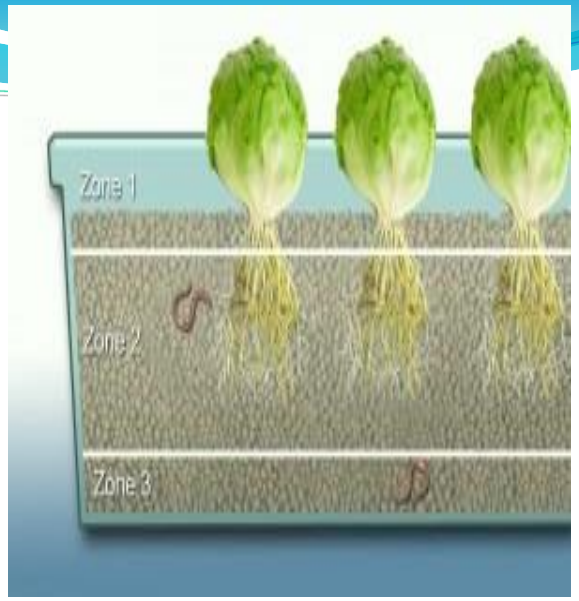


Image and copy credit: Murray Hallam
Practical Aquaponics www.aquaponics.net.au

- Also called flood and drain or ebb and flow
- Filled with gravel, hydroton, crushed shale
- Most common in home and education

Vertical Wall System

Ecolicious.com.au

Farm Philly – Greensgrow Project

Zip Grow Towers

Built by Nate Storey
www.brightagrotech.com

Wicking Beds

Grow root vegetables in wicking Beds. Water from bottom, don't soak. Using coir/potting soil mix

At Flourish Farm, we have DWC, Media, NFT, Wicking Beds

The Produce

Why do Plants like Aquaponics and Hydroponics?

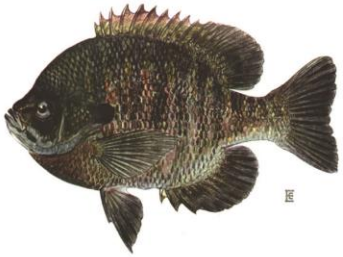
- Nutrients constantly provided
- Warm oxygenated water bathing the roots
- Don't have to search for water, food or oxygen
- Less effort needed in putting out roots
- All the energy goes into growing UP not DOWN
- No weed competition

THE FISH

SPECIES

TILAPIA
72°-90° F

BLUEGILL
65°-80° F



CATFISH
65°-75° F

FRESHWATER PRAWN
75°-85° F

PERCH
66°-72° F

BASS
60°-75° F

CARP
60°-70° F

CRAWDADS
65°-75°

GOLDFISH
62°-72° F

KOI
60°-78° F

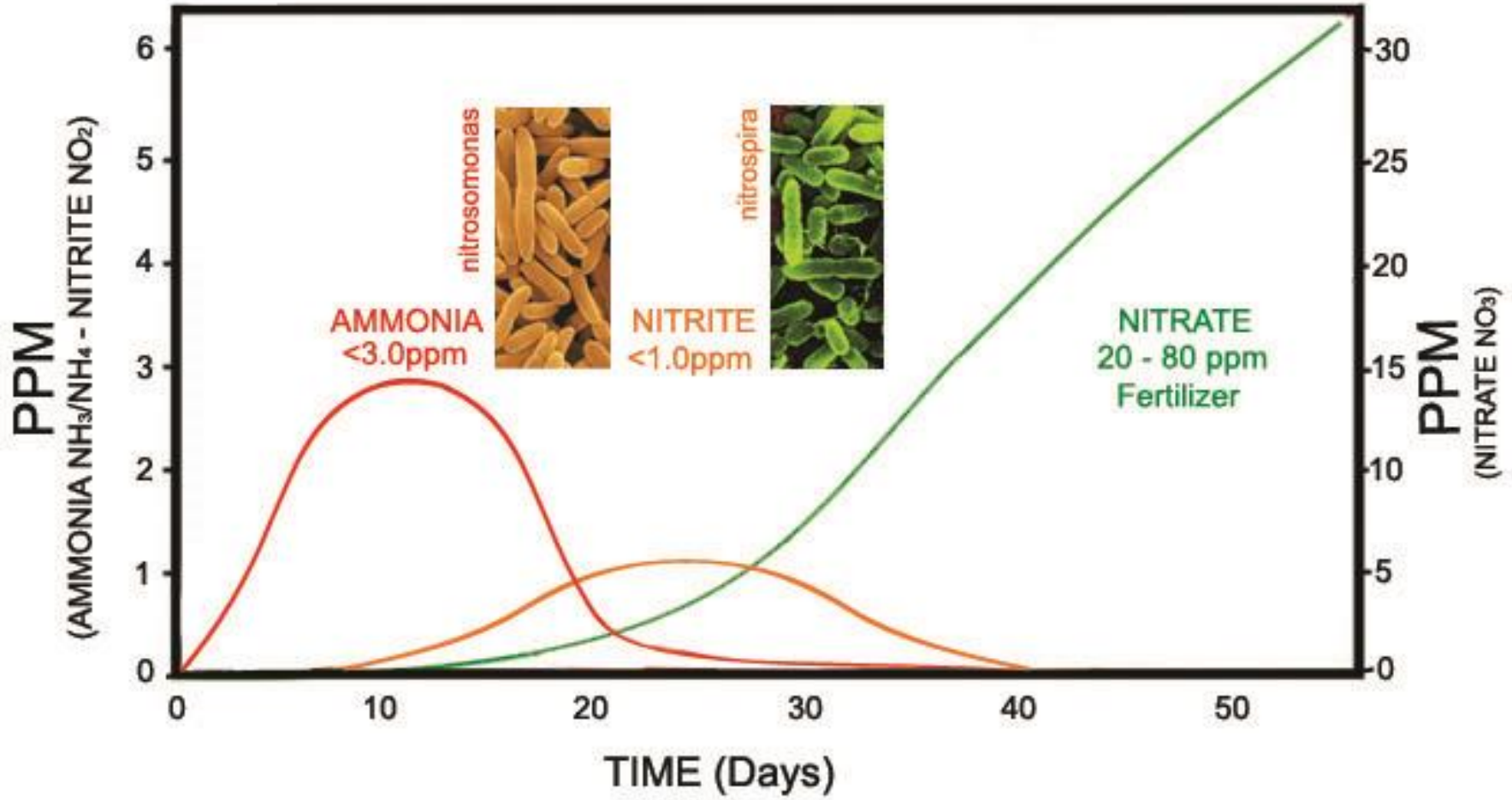
AQUARIUM FISH
varies

TROUT
50°-60° F

Why do Fish like Aquaponics?

- Fish don't need to be overcrowded. Appropriate stocking densities make for a balanced eco-system with fish and plants
- pH and water quality are managed by plants and beneficial bacteria working together as a natural biological filter for the fish waste
- Flood and drain process in grow beds provides additional oxygenation of water for fish
- Can help protect species and prevent diseases

The Bacteria



When cycling with fish perform 1/3 water change when ammonia or nitrite exceeds safe levels

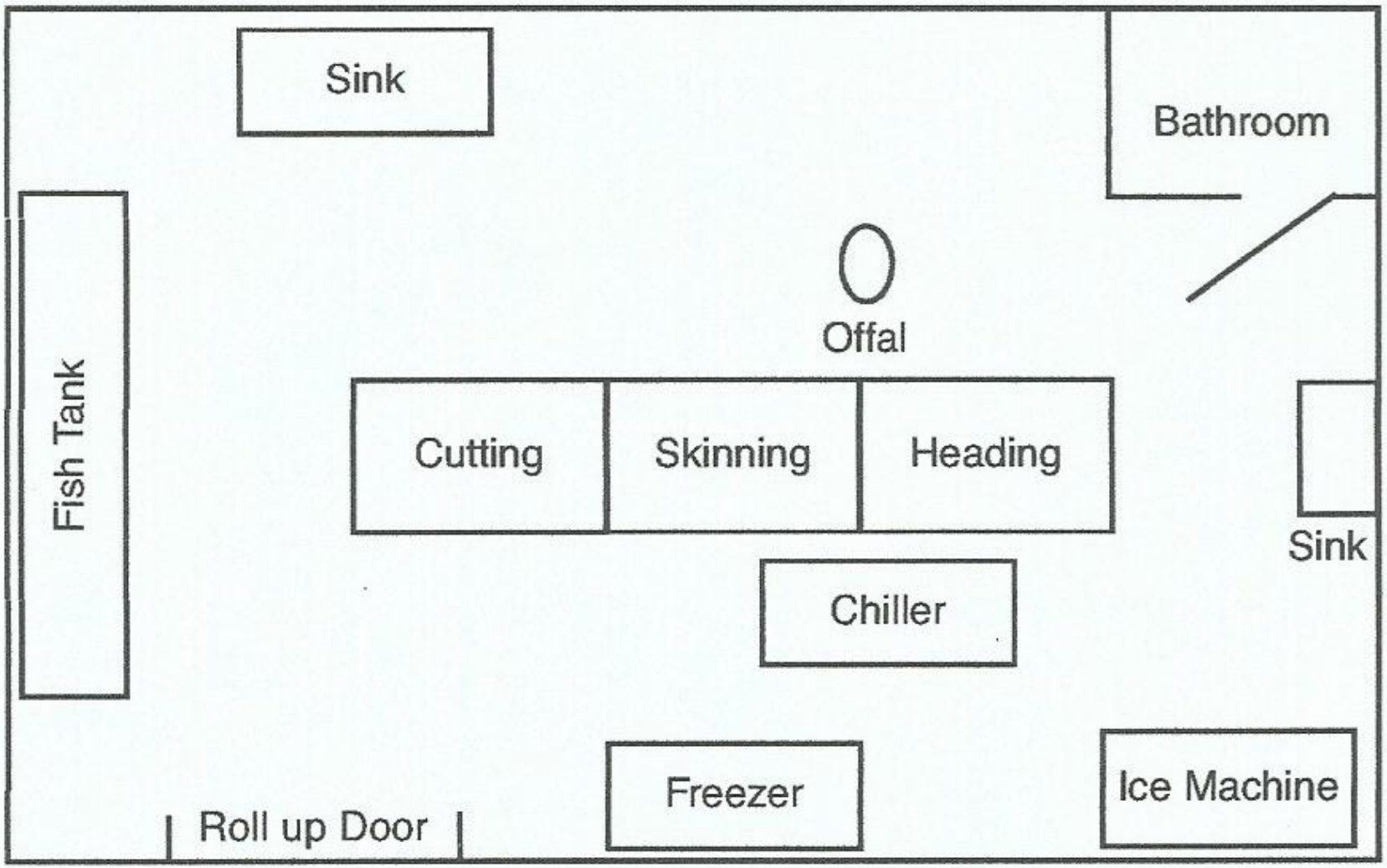


Figure 1. Example of a small, on-farm catfish processing facility.

How Hydroponics Works

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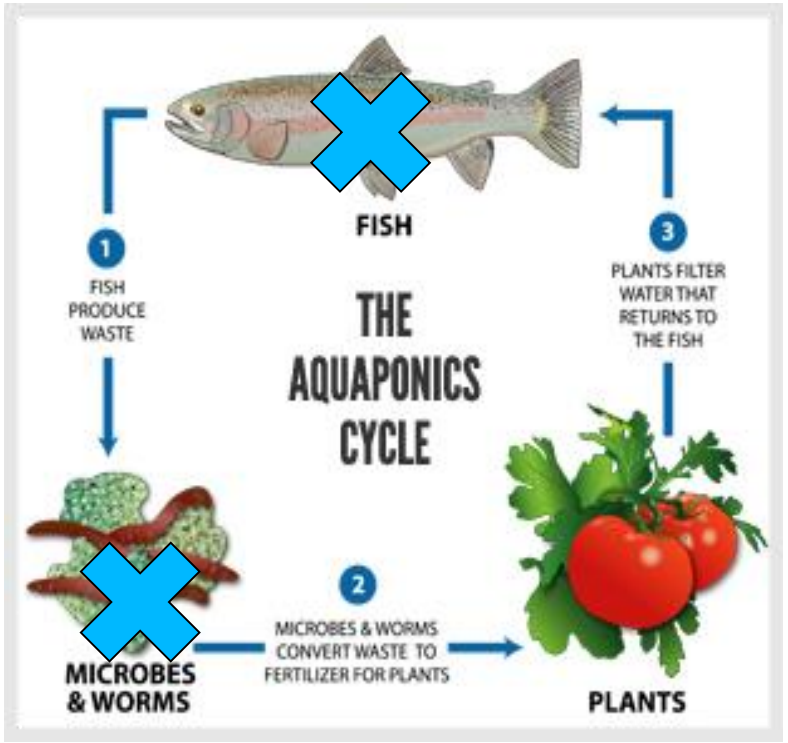
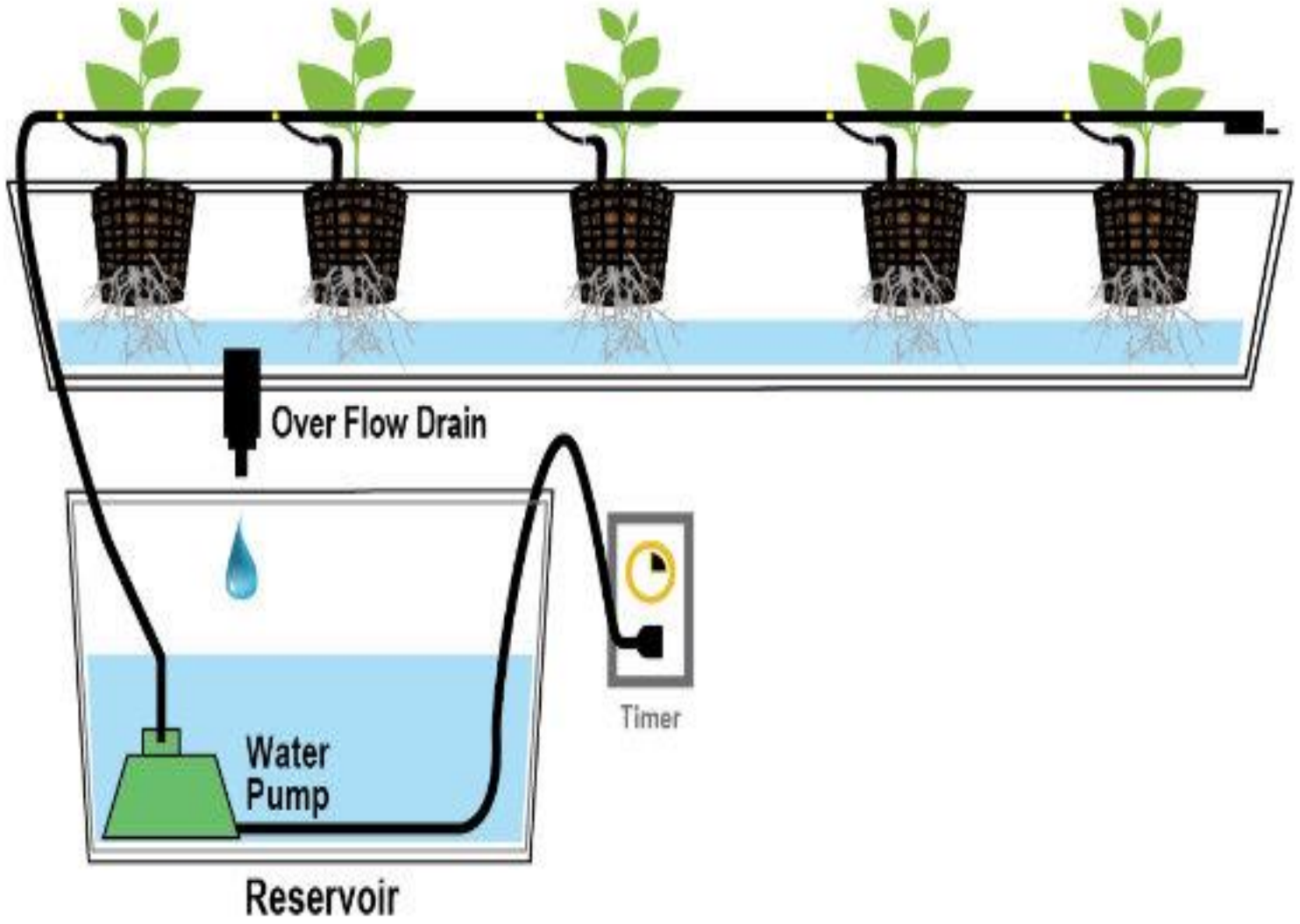
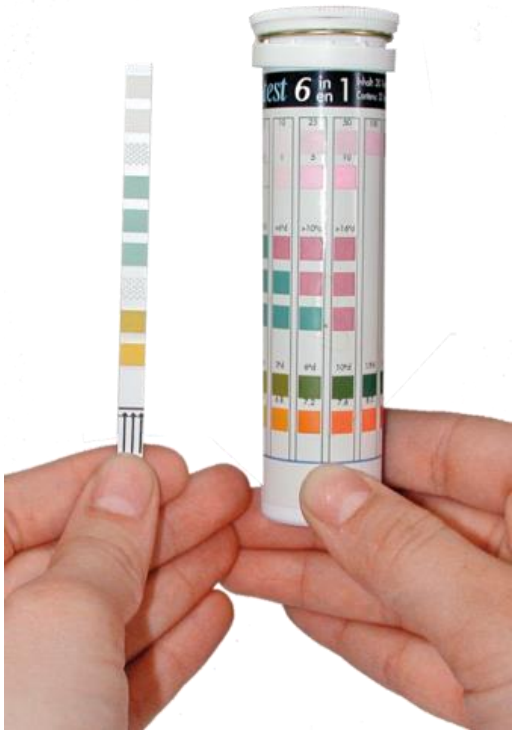


Fish are Happy! Plants are Happy!
We have two different food crops!


Over Flow Drain
Timer
Water
Pump
Reservoir

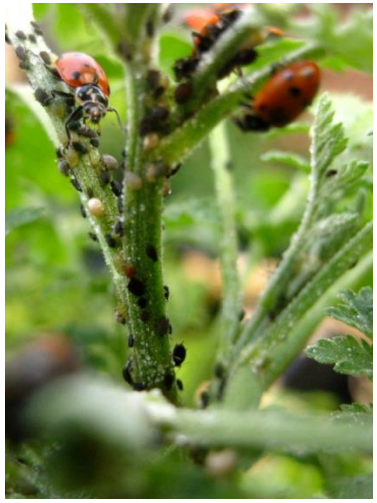

NGS

Water Testing



500Tons per year salmon RAS with hydro basil

Create, Innovate, Educate, Integrate, Connect, Evolve

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