

# Some Things we have Learned About Aquaponics

Fourth Massachusetts Urban Agriculture Meeting  
12 March 2016

Salem State University  
NorthEastern Massachusetts Aquaculture Center  
Cat Cove Marine Laboratory  
Department of Biology



# The Team: 2015-2016

Joseph Buttner

James Carnazza

Anthony Dunn

Camron Adibi

Lynn Embrick

Hazel Heifer

Eliza Kessler

Makayla McCarthy

Alexandra Kluge

Mitchell Tepe

Anastasia Perullo

Joseph Incastasciato

Steve Parks

Frank Nastasi

Bram Kools

Amid Batanneh

Reia Bustolini

Mary McKee

Peggy Wiinikinean

# What is Aquaponics

Marriage of Hydroponics and Aquaculture, specifically  
Recirculating Aquaculture System (RAS)

Hydroponics grows crops in absence of soil

RAS grows fish in enclosed system

- Fish holding unit

- Solids removal

- Biological Filter

Combine 2: Waste of one provides nutrients for other  
Two crops instead of one  
May facilitate plant and fish production

**Hydroponics + RAS = Aquaponics**

# Value of Aquaponics

No contaminants

No weeding

Continuous growing season

Easy on back

Animal protein (80 : 20 rule)

# Learn about Systems by Visiting Systems



Spend Holiday and January in Hawaii

# Small Systems



# Modest-size Systems



# Large-scale Systems: Mari's Gardens



Fish holding tank



Grow beds

# Hawaiian Aquaponics Metrics

Years in Operation	1.5 – 8.0
Media	Volcanic Rock
Fish Cultured	Tilapia
Feed	40% protein
Plants Grown	Everything
Worms	“Red” and/or “Blue” Wigglers
Water Replacement	Minimal, some drained
Management	Variable
Ratio Plant Area Bed to Fish Tank Area	0.7 – 7.8 : 1
Ratio Plant Bed Volume to Fish Tank Volume	0.1 – 5.5 : 1
Water Exchanges per Hour	1.2 - 100
Fill to Drain Time	1.3 – 1.9

# Systems are Versatile and Forgiving

Focus on System Setup and Operation

Acquisition, Construction, Debugging, Monitoring/  
Management

Not: Production and Marketing

# North Shore Aquaponics



Fall 2014



Fall 2015

# Step 1: Permit to “Possess, Propagate, Maintain and Buy” Fish



Species: Pumpkinseed sunfish



Exclusion fence



Emergency generator and identification

## Broodstock in ponds, Gardner



## Step 2: Dependable Supply of Fingerlings



Trained fingerlings grown to market size in aquaponics system

Fingerlings from Gardner trained to ingest pelleted food at CCML

# Step 3: Greenhouse Construction



# Step 4: Solar Powered, DC Run



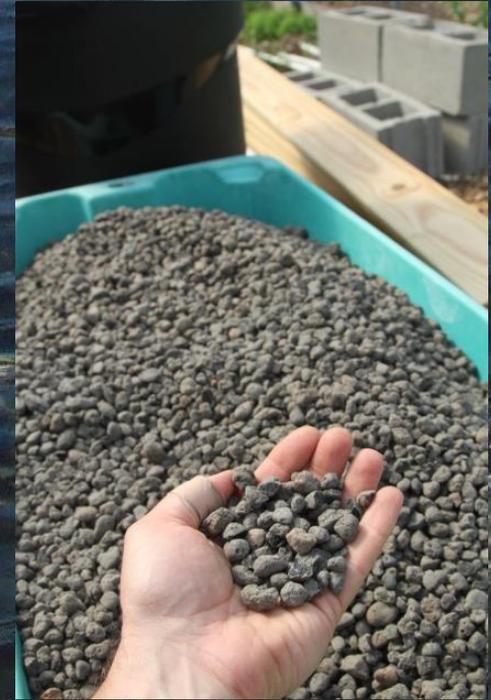
Maintained at 12.2 (SD 0.5 volts)

Below 12 volts = insufficient, primarily post Turkey Day

# Step 5: Aquaponics Setup



Construct and assemble system



Growbed media



System operational

# Step 6: Seed Plants, Stock Fish, Manage System



Plants sprout and grow



Ali and Joe monitor water quality

# Step 7: System Works



Luscious growth in December 2015



Last harvest, 5 January 2016

# They Survived Historic Cold, 16 February



Yea, Bubble Wrap and a Mild Winter

# Crew, 26 February 2016



Objectives: Production and Marketing