Selovita & iseedUSA

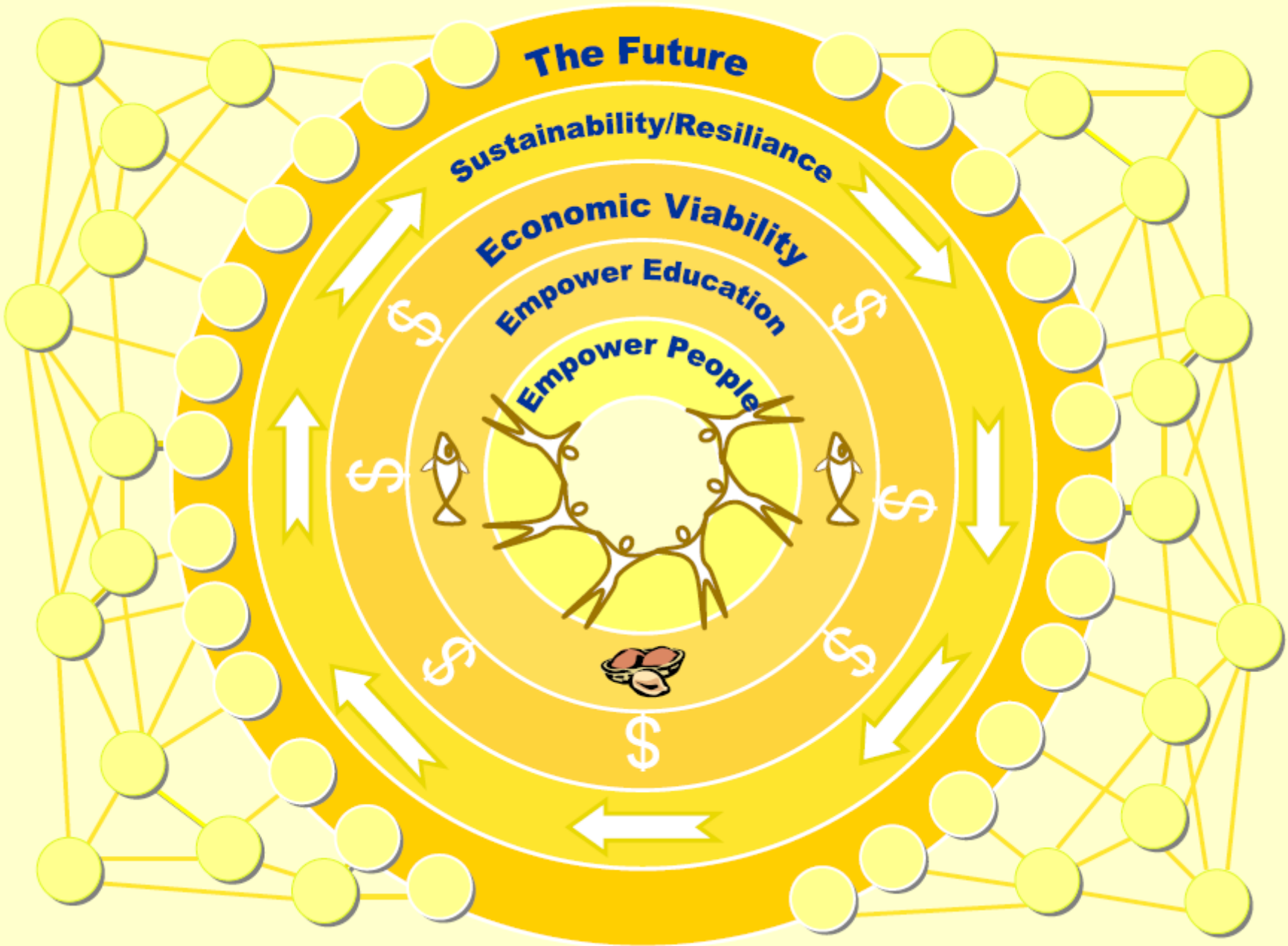
Sustainable Food Security

Christian Colarusso

&

Aaron Morris

iSEEDUSA Delivers the RESULTS



Fort Myers, Florida, USA

Engineered to Scale

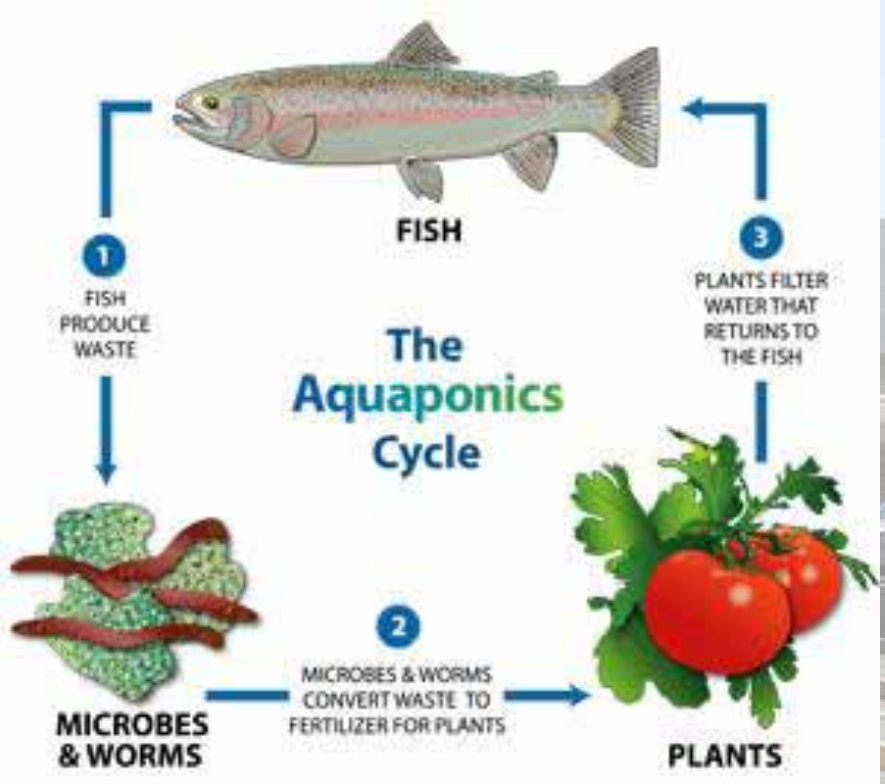
- Designed to be applied in various scales.
- Engineered for consistent results
- Design Duplication

Food Security?

- Population
- Ecosystems
- Declining Fishers
- Limited Resources

Aquaponics = Aquaculture + Hydroponics

- Integration of Farming Techniques
- Combines advances in technology
- Innovative Agriculture
- Hydroponics
- Aquaculture



Aquaponics

- It’s the best!
- Water consumption
- Power Requirements
- Delivery of Nutrient
- Chemicals & Fertilizers
- Simple & dependable
- Sustainable!

Javi 15: Hati Prototype, Fort Myers, FL

Conservation of Energy *(Digestion/Respiration)*

AIR

+

+

FOOD

Poop
(Solids)

Nitrogen

MECHANICAL ENERGY

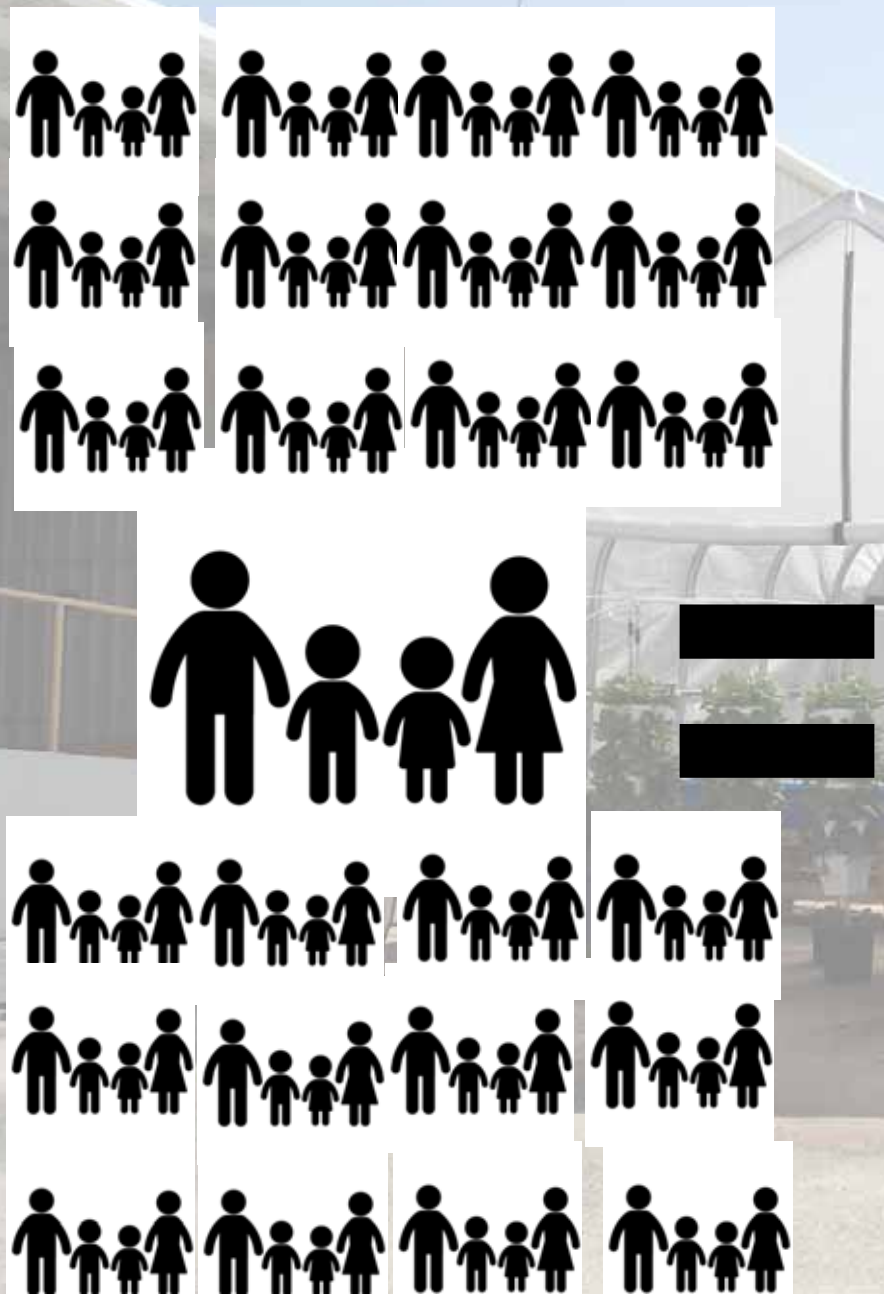
The 1st Step… Is the Seed.

Vertical Farming

VS.

Javi 15's Hydroponic yields: September 2013

Hydroponic Stacks

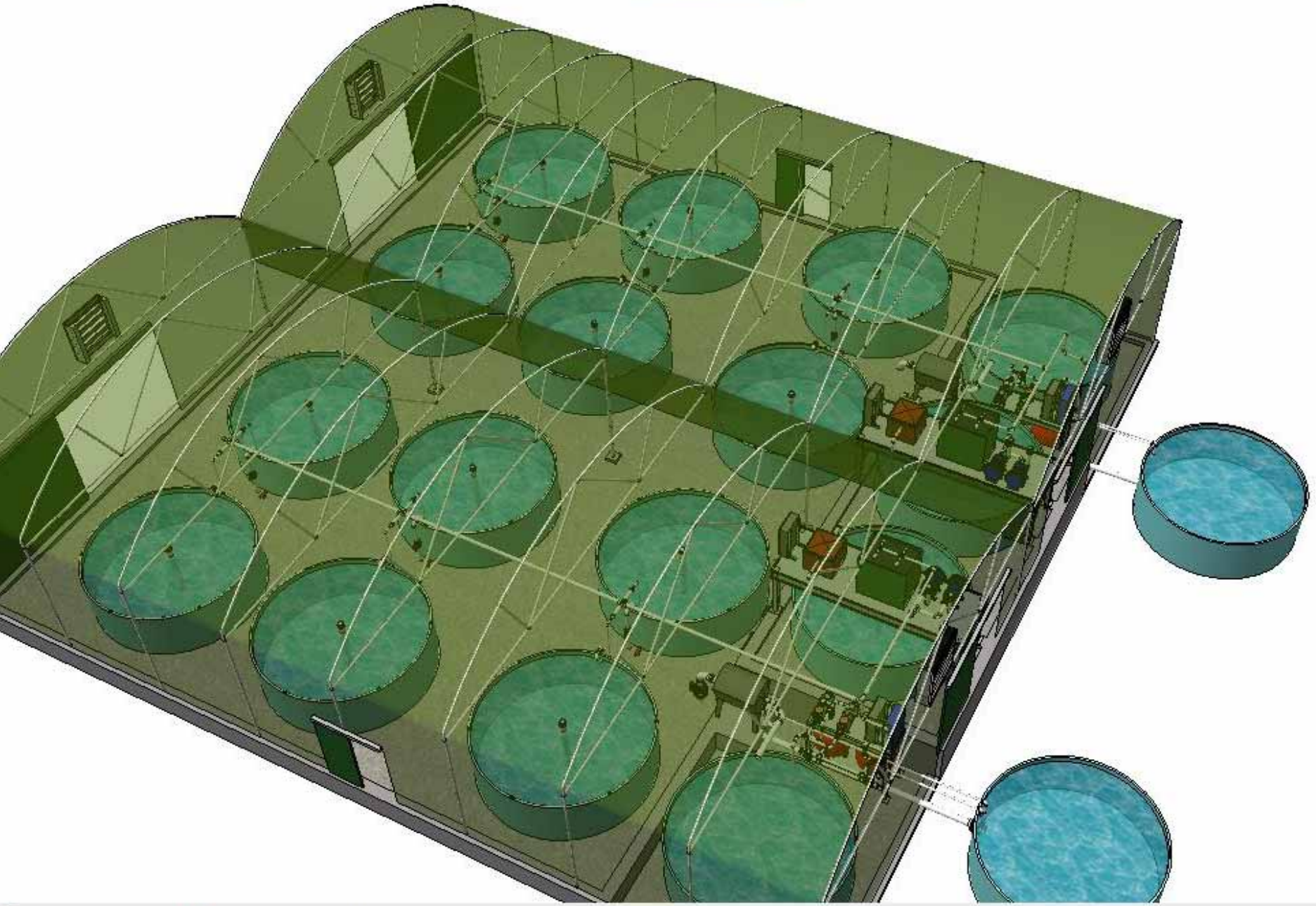


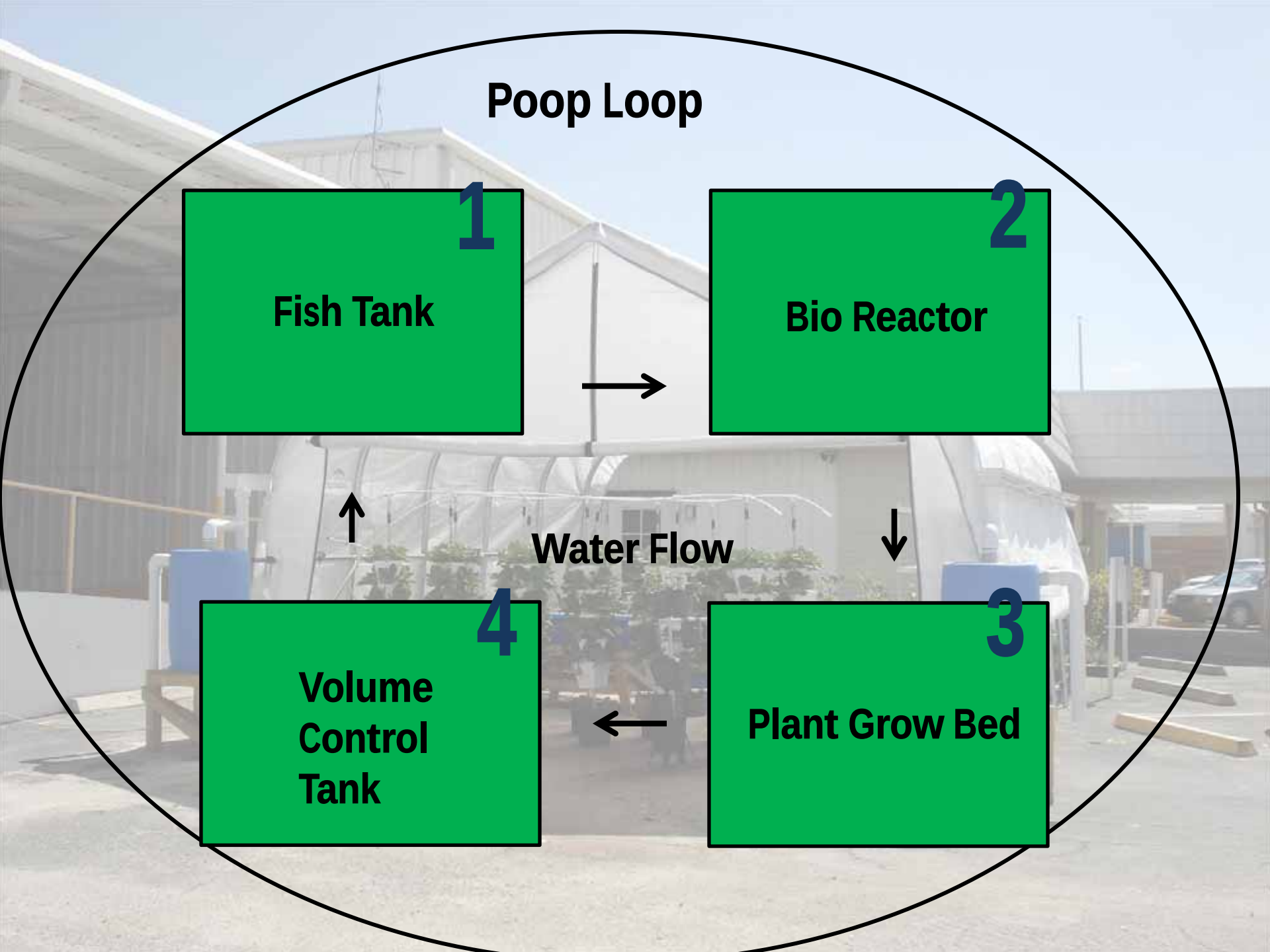
Iseedusa's Hydroponic Field, Fort Myers Campus

The Little Engines

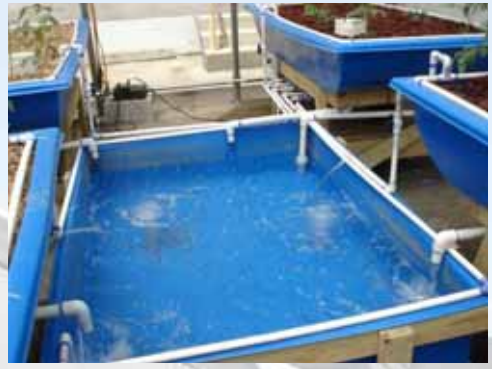
Inside the Fish House

Tilapia Fry at 6 weeks




Poop Loop
1
Fish Tank
2
Bio Reactor
Water Flow
4
Volume
Control
Tank
3
Plant Grow Bed

Javi 15 - Kennesaw



Javi Oasis 10 Components

Four Functioning Components

1. Fish Quarters

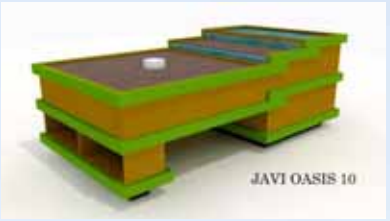
2. Bio-Reactor

3. Grow Bed

4. Volumetric Compensator

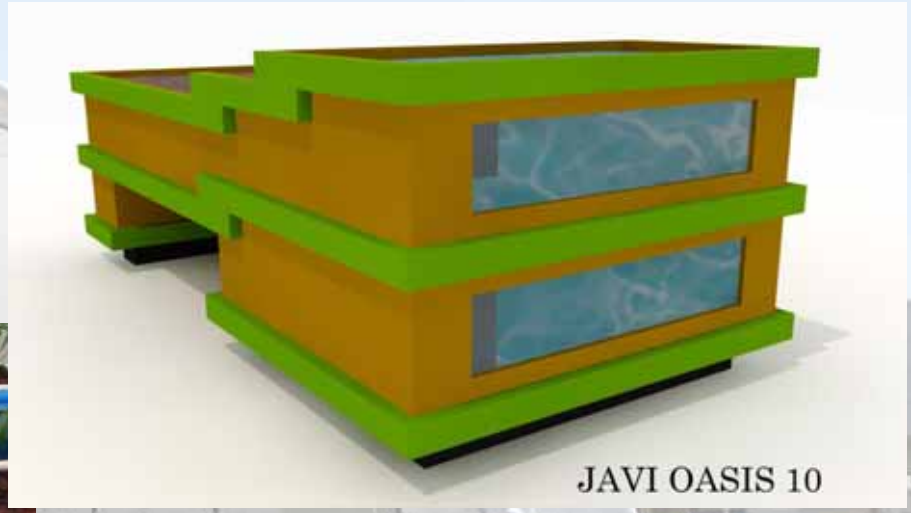
Javi Oasis 10 Aquaculture

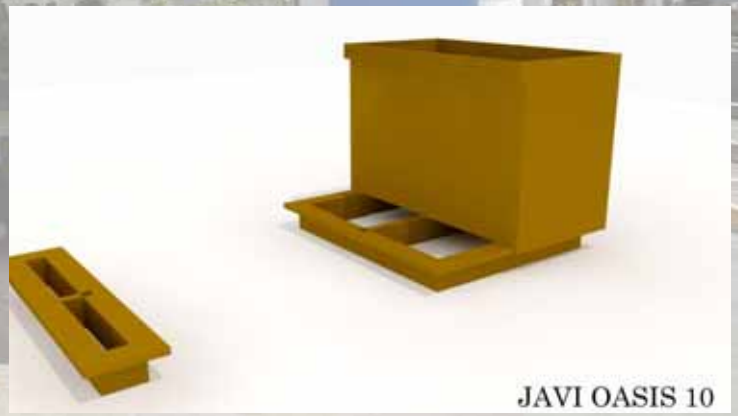
1



Fish Requirements

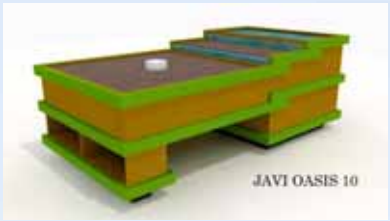
a. Oxygen
b. Food
c. Water Circulation
d. Temperature Control
e. Protection
f. Algae Growth Prevention





Javi Oasis 10 *Fish Tank to Bio Reactor*

1



How to convert Fish Poop to Plant Food.

Enriched Organic Matter

Nitrogen

Javi Oasis 10 Bio-Reactor

2

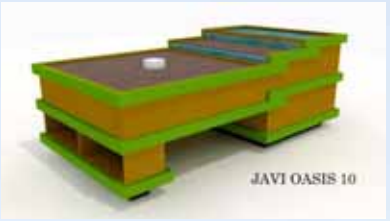


Table 1. Chemical composition of rainbow trout feces fed three commercial feeds. Data measured on a dry-weight basis. Values are means ± SD where means in each row with different letters are significantly different (P<0.05).

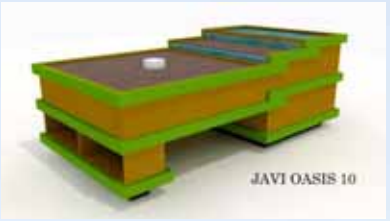
Element	Feces 1		Feces 2		Feces 3		Average	
	mean	± SD	mean	± SD	mean	± SD	mean	± SD
Elements measured as percent								
N	3.62 [b]	±0.28	5.20 [a]	±0.04	3.08 [b]	±0.01	**3.97**	±1.10
P	2.51 [b]	±0.13	3.86 [a]	±0.13	2.25 [b]	±0.07	**2.87**	±0.86
K	<0.30 [a]	±0.00	<0.30 [a]	±0.00	<0.30 [a]	±0.00	**<0.30**	±0.00
Ca	5.42 [a]	±0.35	6.36 [a]	±2.64	4.91 [a]	±0.05	**5.56**	±0.73
Mg	0.44 [a]	±0.01	0.50 [a]	±0.03	0.39 [b]	±0.00	**0.44**	±0.05
Inorganic C	0.47 [b]	±0.08	0.79 [a]	±0.01	0.49 [b]	±0.05	**0.58**	±0.18
Organic C	42.92 [a]	±0.18	33.76 [b]	±0.06	45.88 [a]	±1.27	**40.85**	±6.32
Total C	43.38 [a]	±0.26	34.55 [b]	±0.07	46.37 [a]	±1.23	**41.43**	±6.14
Elements measured as $mg.kg^{-1}$								
As	<1.0 [a]	±0.00	<1.0 [a]	±0.00	<1.0 [a]	±0.00	**<1.0**	±0.00
Cd	<1.0 [a]	±0.00	<1.0 [a]	±0.00	<1.0 [a]	±0.00	**<1.0**	±0.00
Co	<1.5 [a]	±0.00	<1.5 [a]	±0.00	<1.5 [a]	±0.00	**<1.5**	±0.00
Cr	3.98 [a]	±0.64	7.42 [b]	±1.25	3.63 [a]	±0.57	**5.01**	±2.09
Cu	29.83 [a]	±1.65	77.00 [b]	±1.89	19.83 [c]	±1.18	**42.22**	±30.53
Fe	704.17 [a]	±23.33	1,296.67 [b]	±29.70	1,009.83 [c]	±23.81	**1,003.56**	±296.30
Hg	<0.05 [a]	±0.00	0.05 [a]	±0.00	<0.05 [a]	±0.00	**<0.05**	±0.00
Mn	391.17 [b]	±3.06	755.50 [a]	±3.06	941.17 [a]	±117.62	**695.94**	±279.79
Mo	<2.5 [a]	±0.00	<2.5 [a]	±0.00	<2.5 [a]	±0.00	**<2.5**	±0.00
Ni	<4.0 [a]	±0.43	4.68 [a]	±0.99	<4.0 [a]	±0.58	**<4.0**	±0.00
Pb	<5.0 [a]	±0.00	<5.0 [a]	±0.00	<5.0 [a]	±0.00	**<5.0**	±0.00
Se	<1.0 [b]	±0.11	1.68 [a]	±0.02	<1.0 [b]	±0.01	**<1.0**	±0.00
Zn	535.00 [a]	±11.79	890.00 [a]	±47.14	436.67 [b]	±9.43	**620.56**	±238.47

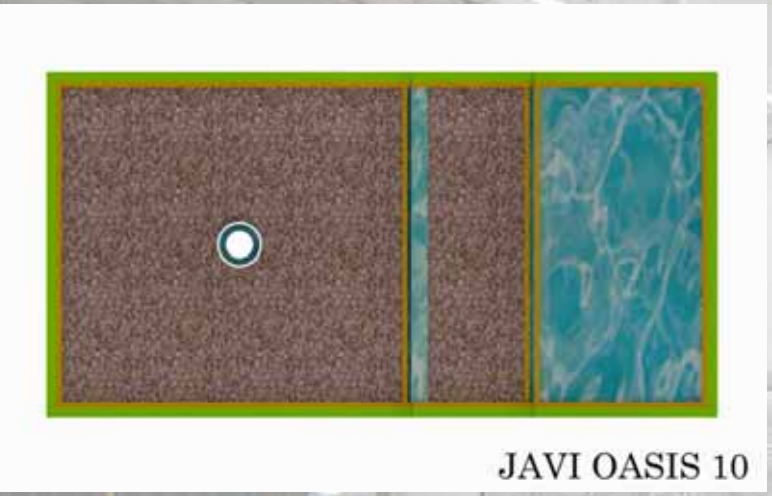
Why Bioreactor?

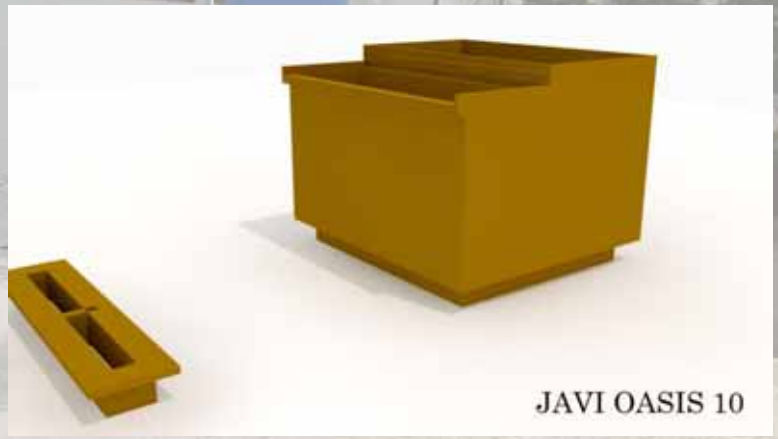
- Waste ≠ Fertilizer
- Nitrification
- Solid Removal
- Pathogen Control

Javi Oasis 10 Bio-Reactor

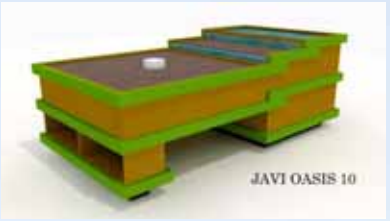
2





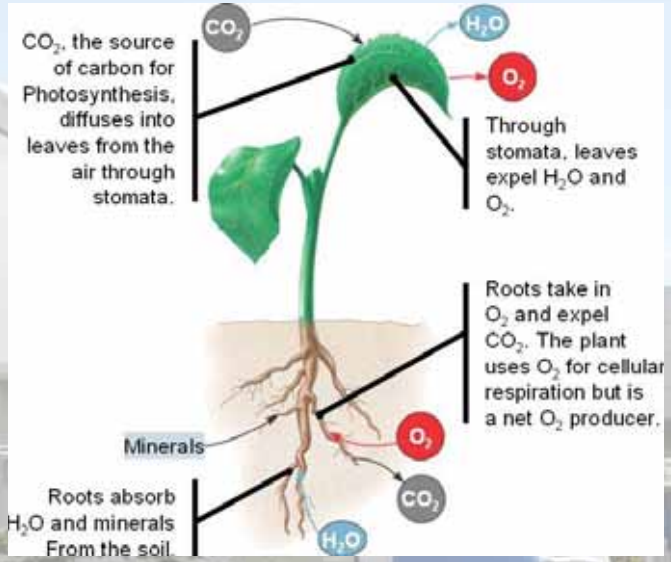


Javi Oasis 10 *Why the Grow Bed* 3



Plant's Require

- Sunlight
  - Photosynthesis
- Carbon Source
  - CO2
- Water
  - Trans/Evaporation
- Nutrients
  - Primary
  - Macro
  - Micro

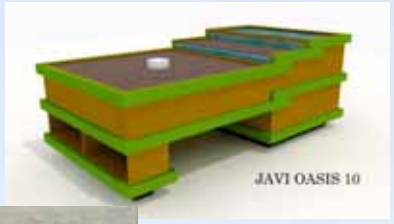


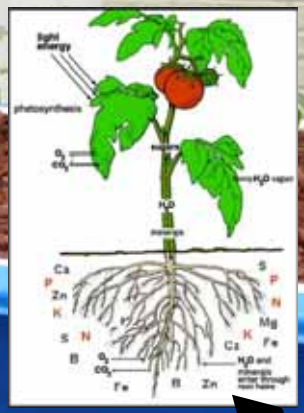
Element	Amount (μmol g^{-1} DW)	Role	Australian Fertilizer Use (Mt y^{-1})
N	1000	Protein, nucleic acids	0.9
K	250	Major cytoplasmic cation, protein synthesis	
Ca	125	Cell walls and membranes	
Mg	80	Chlorophyll, protein and DNA synthesis	
P	60	Nucleic acids, P-esters	1.6
S	30	Cysteine, Methionine, redox reactions	
Cl	3	Oxygen evolving complex	
B	2	?	
Fe	2	Redox reactions, cytochromes	
Mn	1	Oxygen evolving complex, SOD	
Zn	0.3	ADH, CA, SOD RNA polymerase	
Cu	0.1	Plastocyanin, cytochrome oxidase, SOD	
Mo	0.001	Nitrate reductase, nitrogenase	

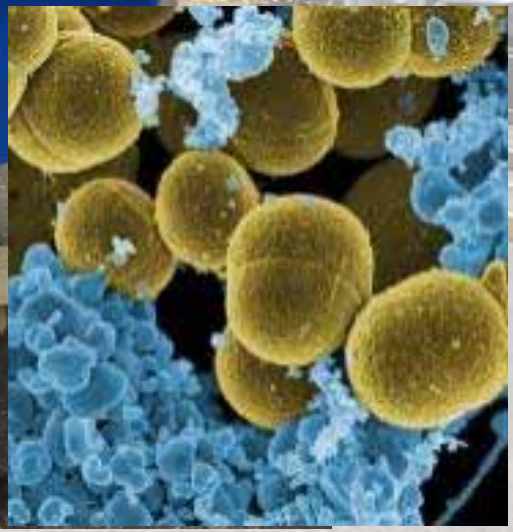
Table 1 Essential elements and their amounts in plant tissue (Marschner, 1986) and the amount applied as fertilizer (McLennan, 1998).

Javi Oasis 10 *Grow Bed*

3

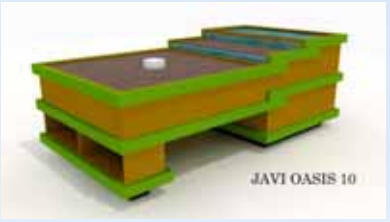


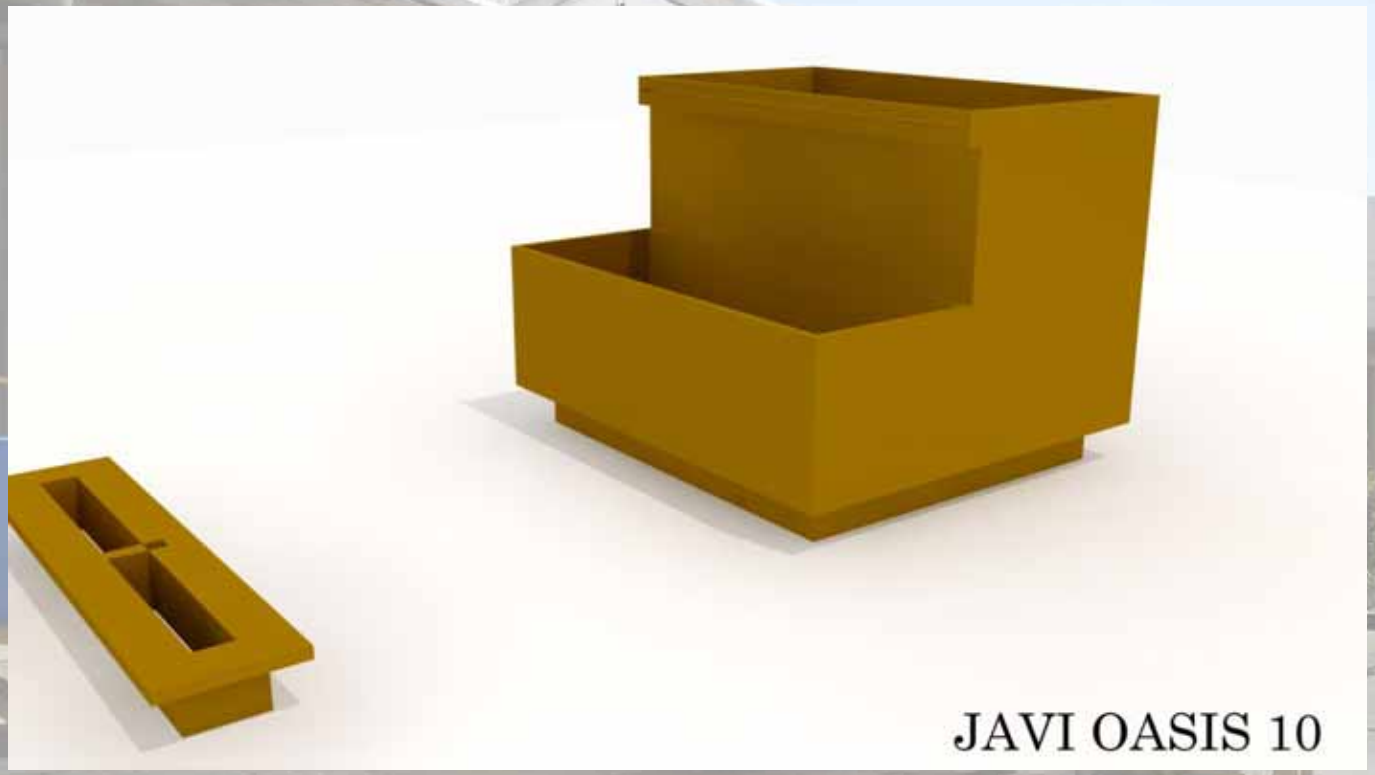


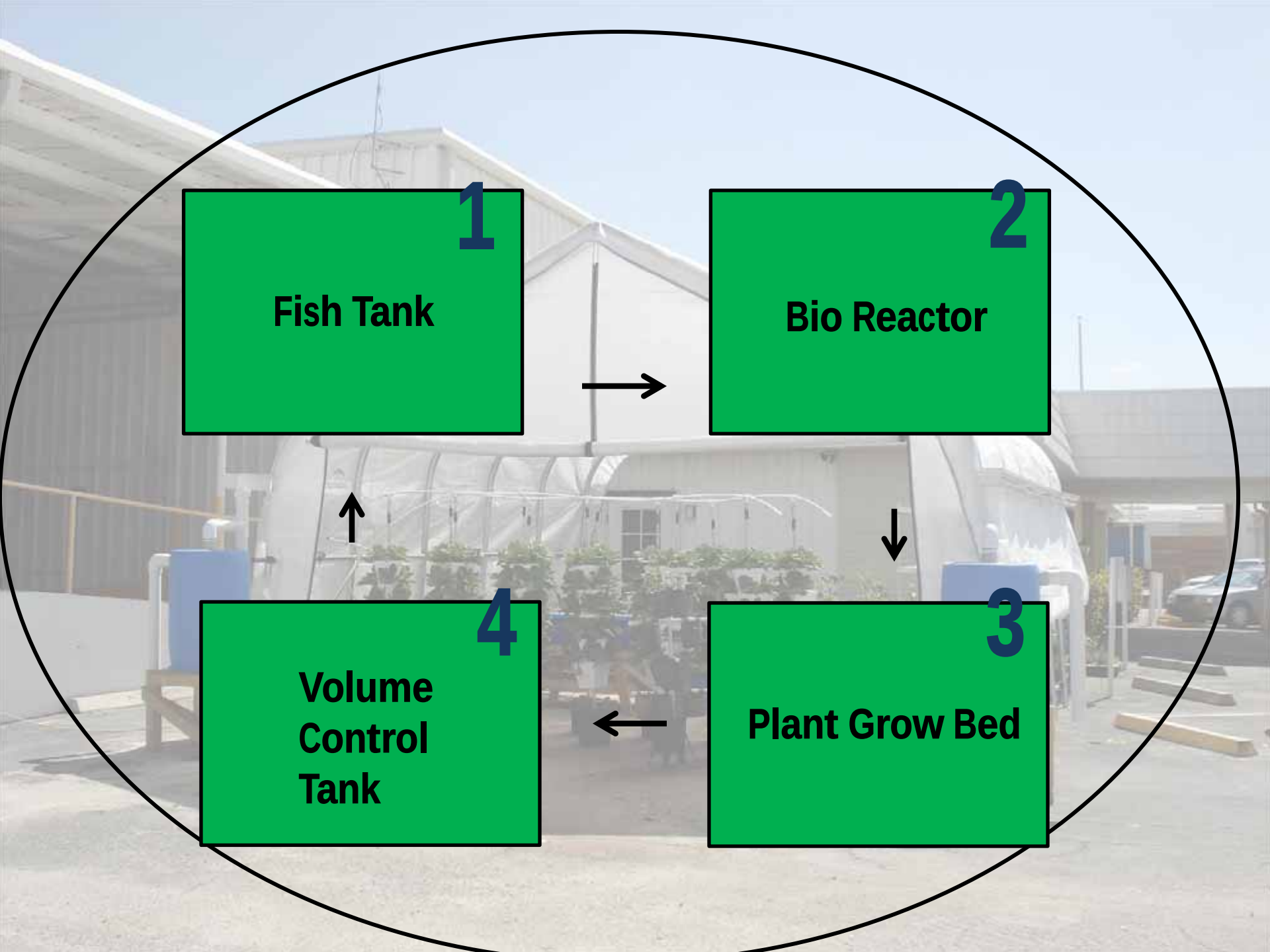


Javi Oasis 10 *Surge Protection*

4






1
Fish Tank
2
Bio Reactor
3
Plant Grow Bed
4
Volume
Control
Tank

Javi Oasis 1.0

Javi Oasis 1.0