Bearing Hydroponics

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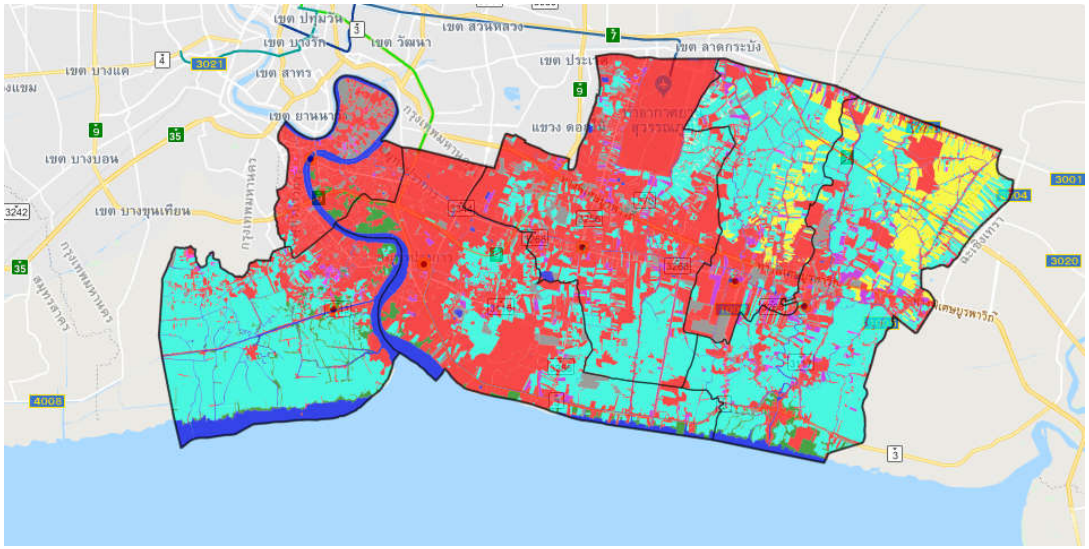
Outline

- Introduction
- Farm overview
- Bearing hydroponics products
- Hydroponics
- Control system
- Workshop

Samutprakarn, Thailand

- Central of Thailand
- 2,089,200 Populations
- 6 District
- 724 village
- 1,004.1 km2
- 13,550 Farmer household

Area

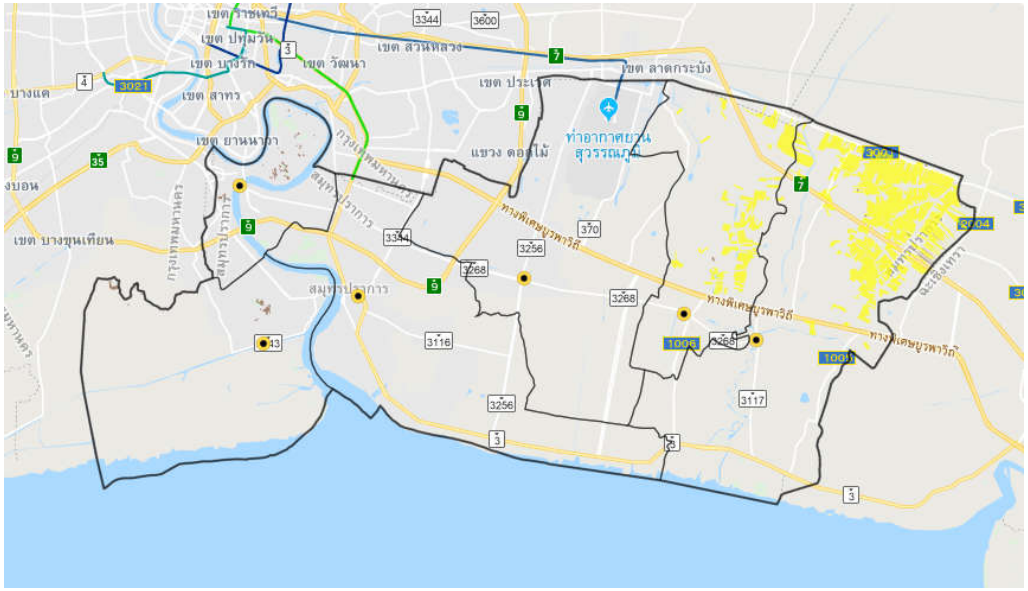


Type	Area	Percent
Community Areas and Buildings	245,830	40.67
Aquaculture facilities	230,658	38.16
Water area	40,147	6.64
Land	30,048	4.97
Miscellaneous area	28,436	4.70
Forest area	13,379	2.21
Lowland	12,920	2.13
Fruit	1,765	0.29
Aquatic plant	1,086	0.17
Field and animal farm	65	0.01
Perennial	63	0.01
Garden tree	25	0.00

Source

Agri-Map

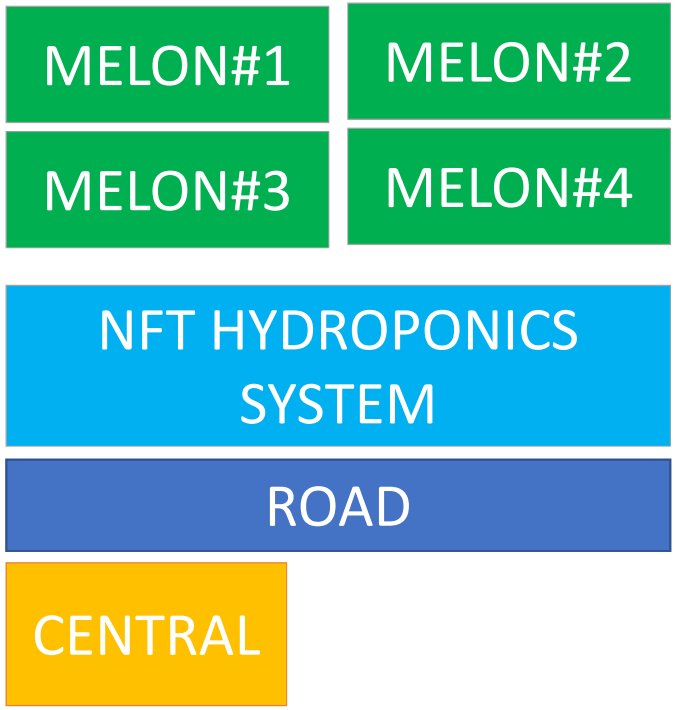
Main economic crop



Type	Area (Rai)	Percent
Rice	29,390	97.22
Coconut	840	2.77

Source

Agri-Map



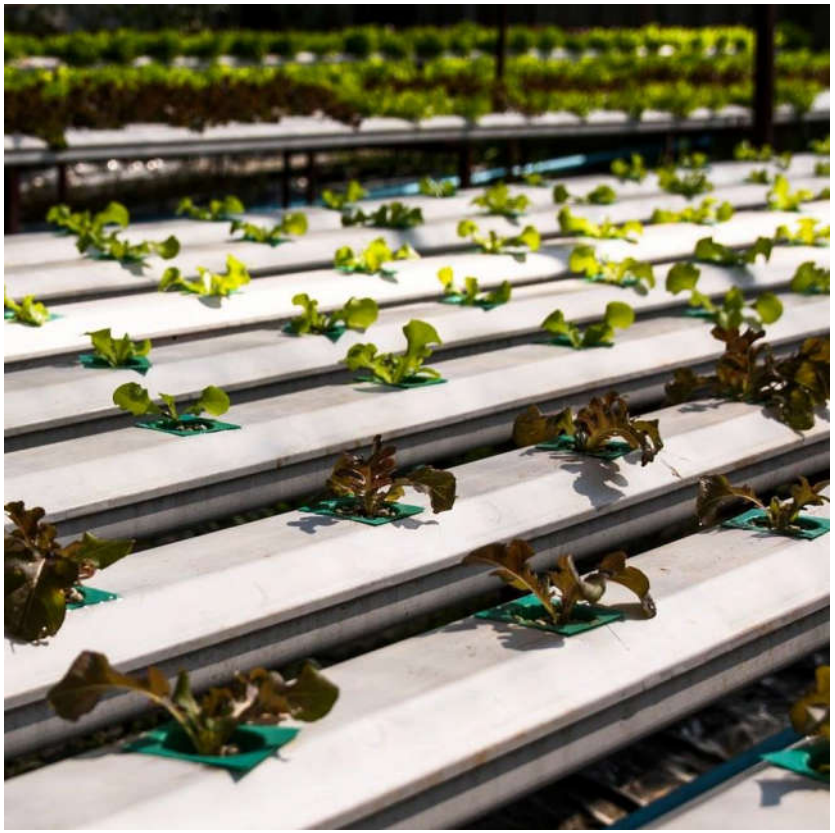
Melon
System : Soil
Dimension : 6 x 12 m.(4)
Production : 200 / crop

Lettuce
System : NFT hydroponics
Dimension : 1.6 x 12 m. (12)
Production : 144 kg. / crop

LETTUCE WITH HYDROPONICS

LETTUCE WITH HYDROPONICS(cont.)

LETTUCE WITH HYDROPONICS(cont.)

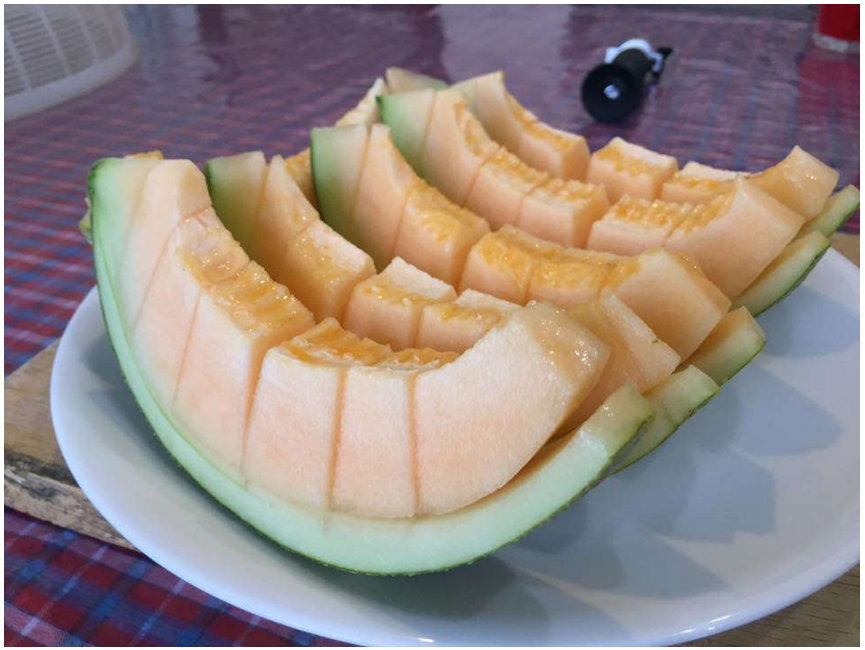


LETTUCE WITH HYDROPONICS(cont.)

LETTUCE WITH HYDROPONICS(cont.)

MELON WITH HYDROPONICS

MELON WITH HYDROPONICS



What is hydroponics?

- Hydroponic is greek term hydro, means water and ponos, means power
- Hydroponic means plant cultivation that use water without soil as medium or soilless

What is hydroponics?

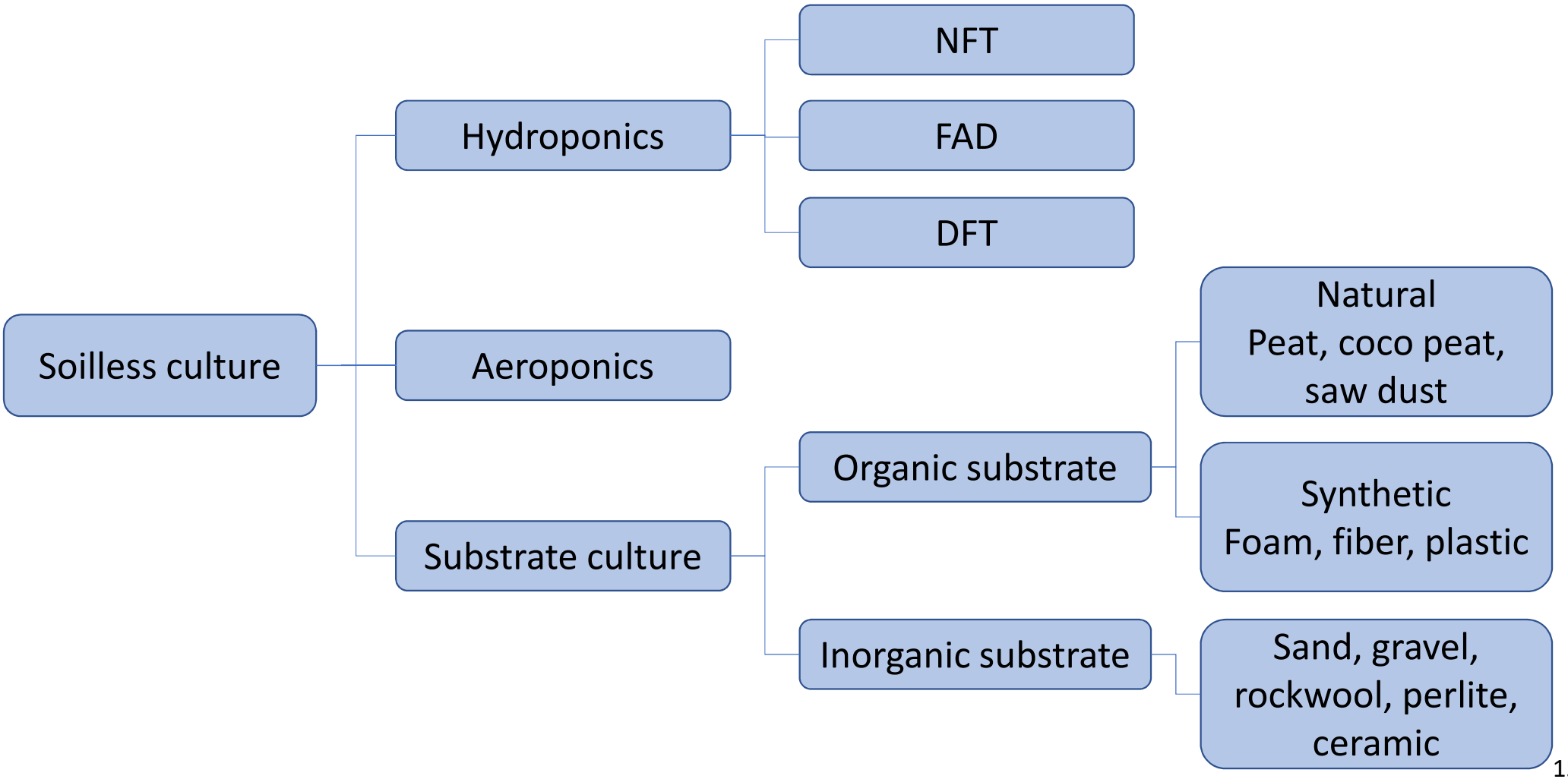
Advantages

- Plant is easy to generated depend on land condition and seasons
- Adjustable growth and harvest quality
- Less employee cost - Cleaner and more hygienic product
- Less water and fertilizer needs (Environmental friendly)
- Shorter planting time
- Less operational costs

What is hydroponics?

Weakness

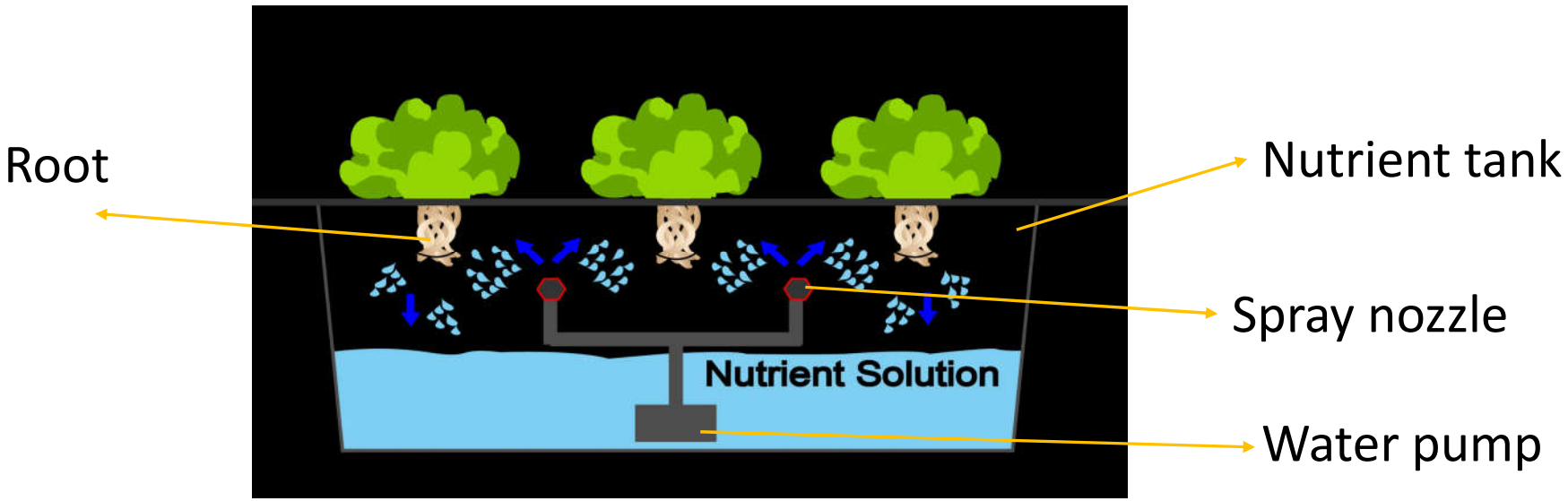
- Initial investment cost is more expensive
- Highly affected by fertilizer concentration and composition, pH and temperature


Soilless culture
Hydroponics
NFT
FAD
DFT
Aeroponics
Substrate culture
Organic substrate
Natural
Peat, coco peat, saw dust
Synthetic
Foam, fiber, plastic
Inorganic substrate
Sand, gravel, rockwool, perlite, ceramic

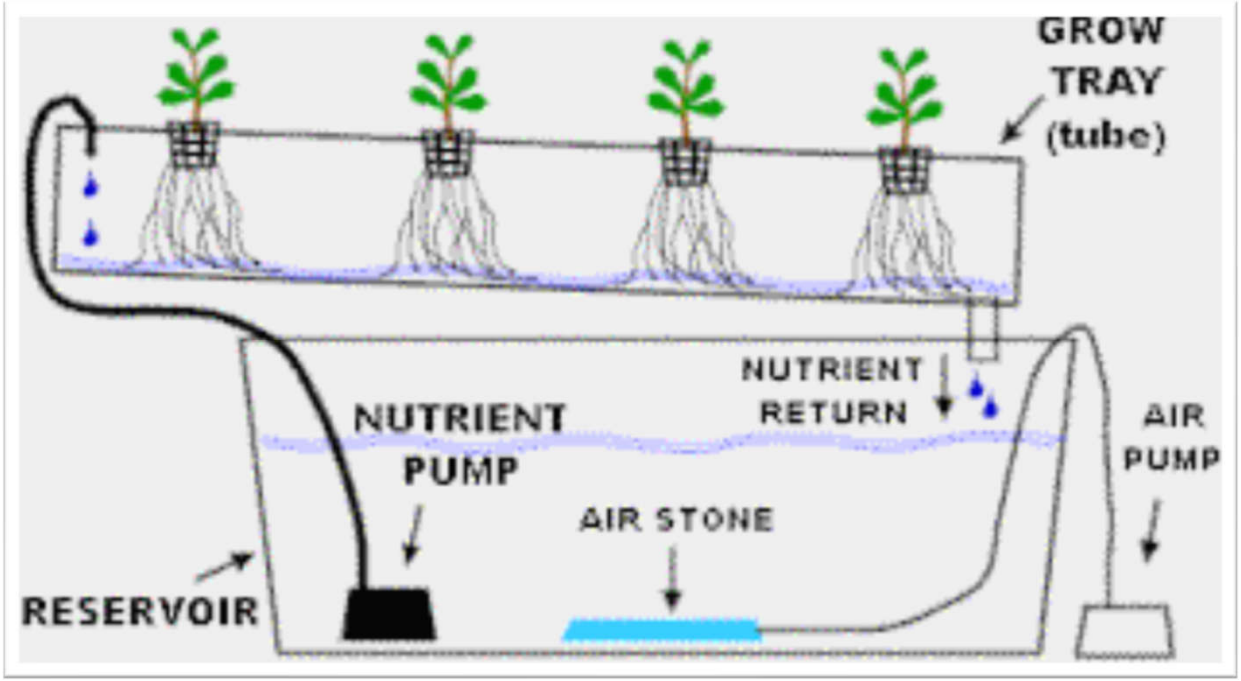
Hydroponics types

1. Aeroponics
2. NFT (Nutrient Film Technique)
3. Drip Irrigation
4. DFT (Deep Flow Technique)

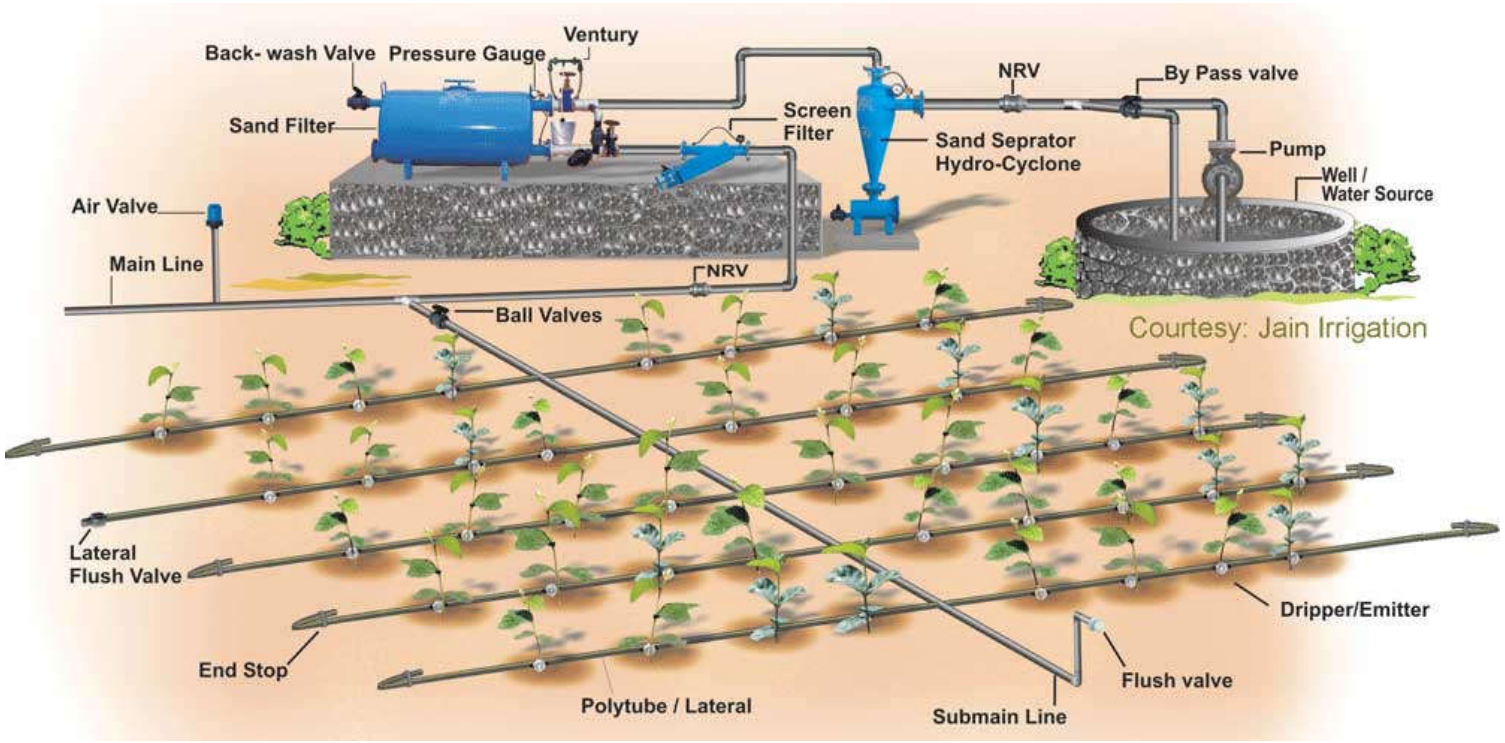
Aeroponics


Root
Nutrient tank
Spray nozzle
Water pump
Nutrient Solution

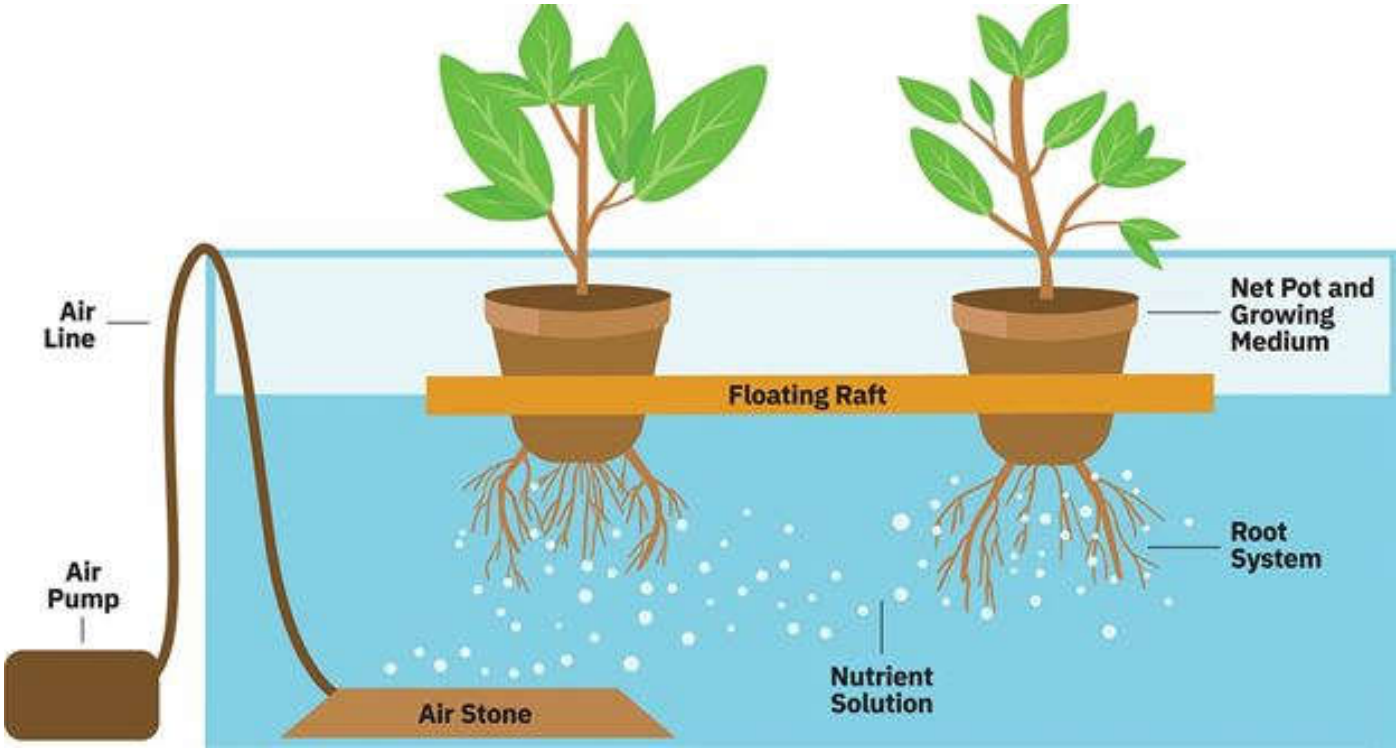
NFT (Nutrient Film Technique)



Drip Irrigation



DFT (Deep Flow Technique)



Growth factor

Internal factor

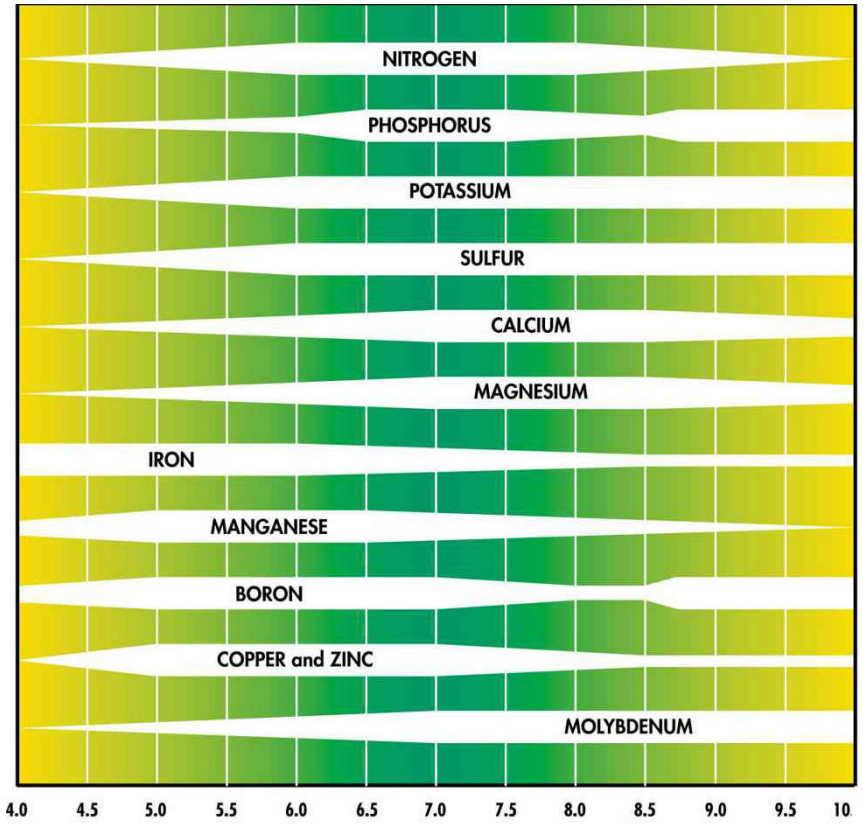
- Genetic factor
- Self hormone
- Synthetic hormone

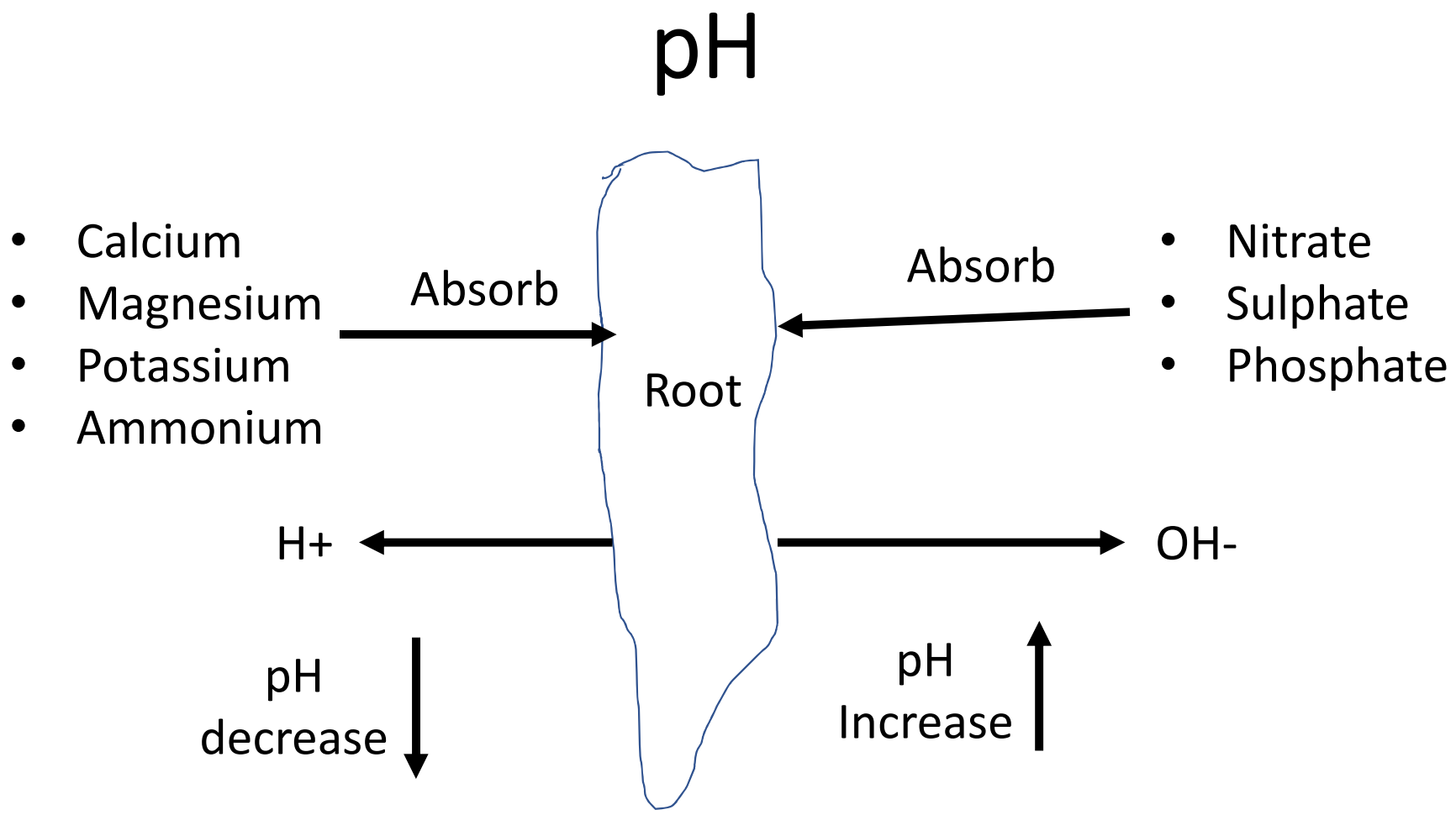
Environment factors

- Temperature
- Humidity
- Light
- pH
- Nutrient
- Oxygen
- Carbon dioxide
- DO

$$CO_2 + H_2O \xrightarrow[\text{Light}]{\text{Chlorophyll}} C_6H_{12}O_6 + 6O_2$$

pH


NITROGEN
PHOSPHORUS
POTASSIUM
SULFUR
CALCIUM
MAGNESIUM
IRON
MANGANESE
BORON
COPPER and ZINC
MOLYBDENUM
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
9.0
9.5
10


pH
Calcium
Magnesium
Potassium
Ammonium
Absorb
Root
Absorb
Nitrate
Sulphate
Phosphate
H+
OH-
pH
decrease
pH
Increase

Nutrient

Primary

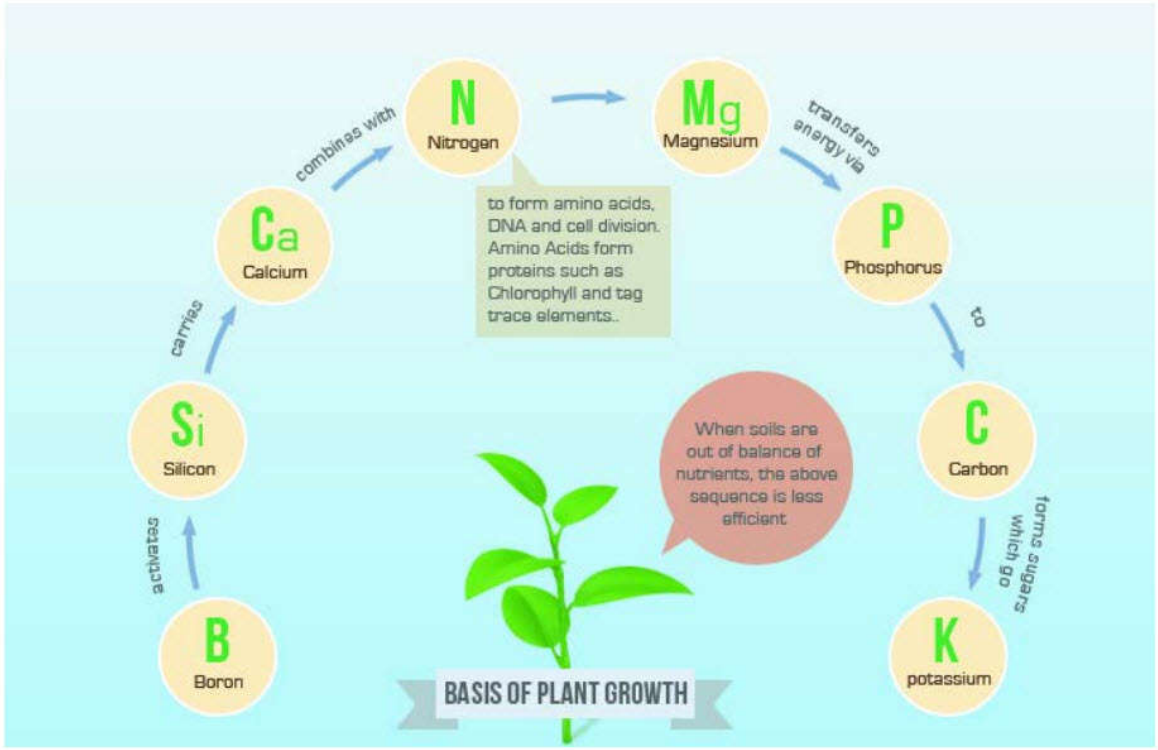
- Carbon
- Hydrogen
- Oxygen
- Nitrogen
- Phosphorous
- Potassium

Secondary

- Calcium
- Sulphur
- Magnesium

Micronutrient

- Iron
- Manganese
- Copper
- Zinc
- Boron
- Molybdenum
- Chlorine



Microbial-Induced Nutrient Cascading

โบรอน > ซิลิคอน > *แคลเซียม* > ไนโจรเจน > แมกนีเซียม > ฟอสฟอรัส > คาร์บอน > โพแทสเซียม

Example nutrient for lettuce
10 liters

Stock A

- Calcium nitrate (15-0-0) 1,150 g.
- Fe-DTPA 30 g.
- Fe-EDTA 30 g.
- Fe-EDDHA 30 g.

DTPA	pH range	< 6.0
EDTA	pH range	< 7.0
EDDHA	ph range	< 10.0

Example nutrient for lettuce
10 liters

Stock B

• Potassium nitrate (13-0-46)	600 g.
• Magnesium sulphate	500 g.
• Monopotassium phosphate (0-52-34)	300 g.
• Micronutrient	50 g.
• Manganese EDTA	10 g.

Equipment for growing

Seed

Media (Perlite & Vermiculite)

Tray

Nutrient A & B

Growing Cup

Pump

Setup the system

Step :

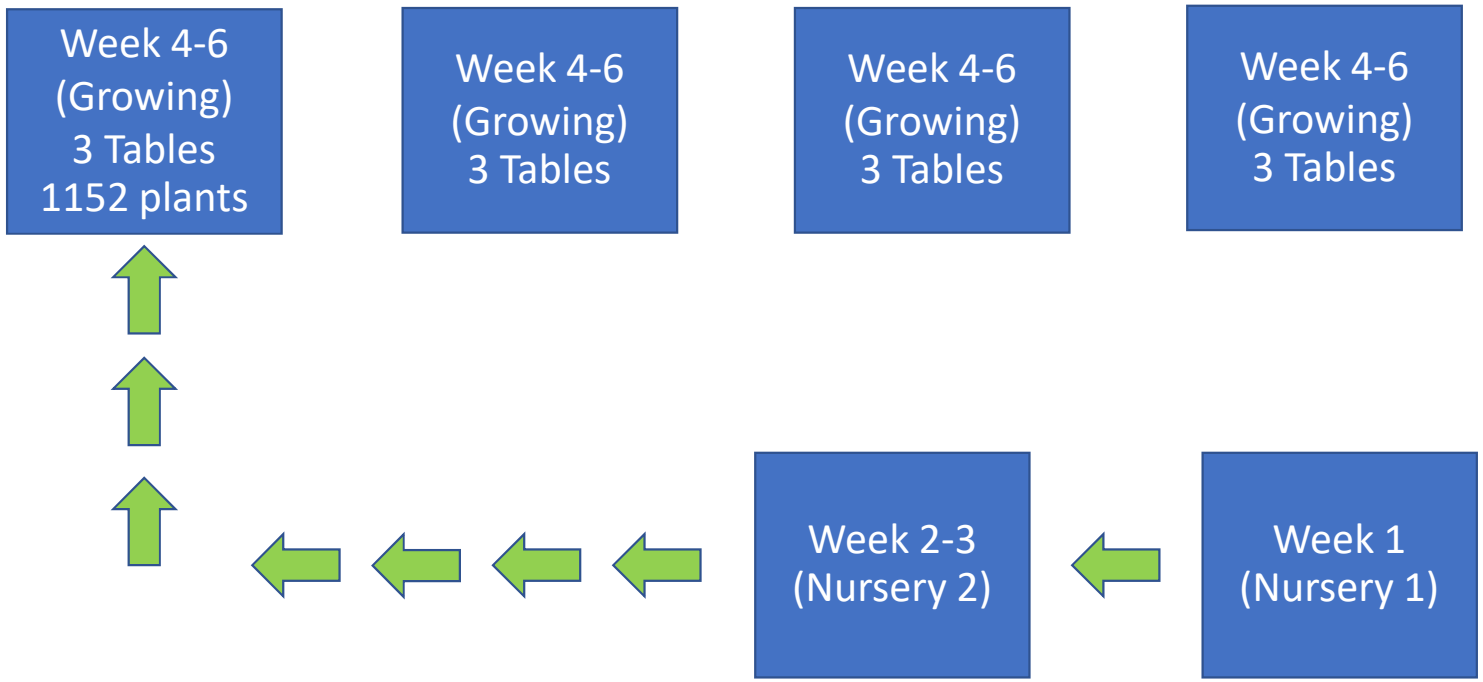
1. Setup the system by making support and tray slope at 15%
2. Setup water circulation pipe from nutrient tank to tray and return pipe for water return
3. Setup water spray for maintain water level in vegetable

Prepare seeding

Step :

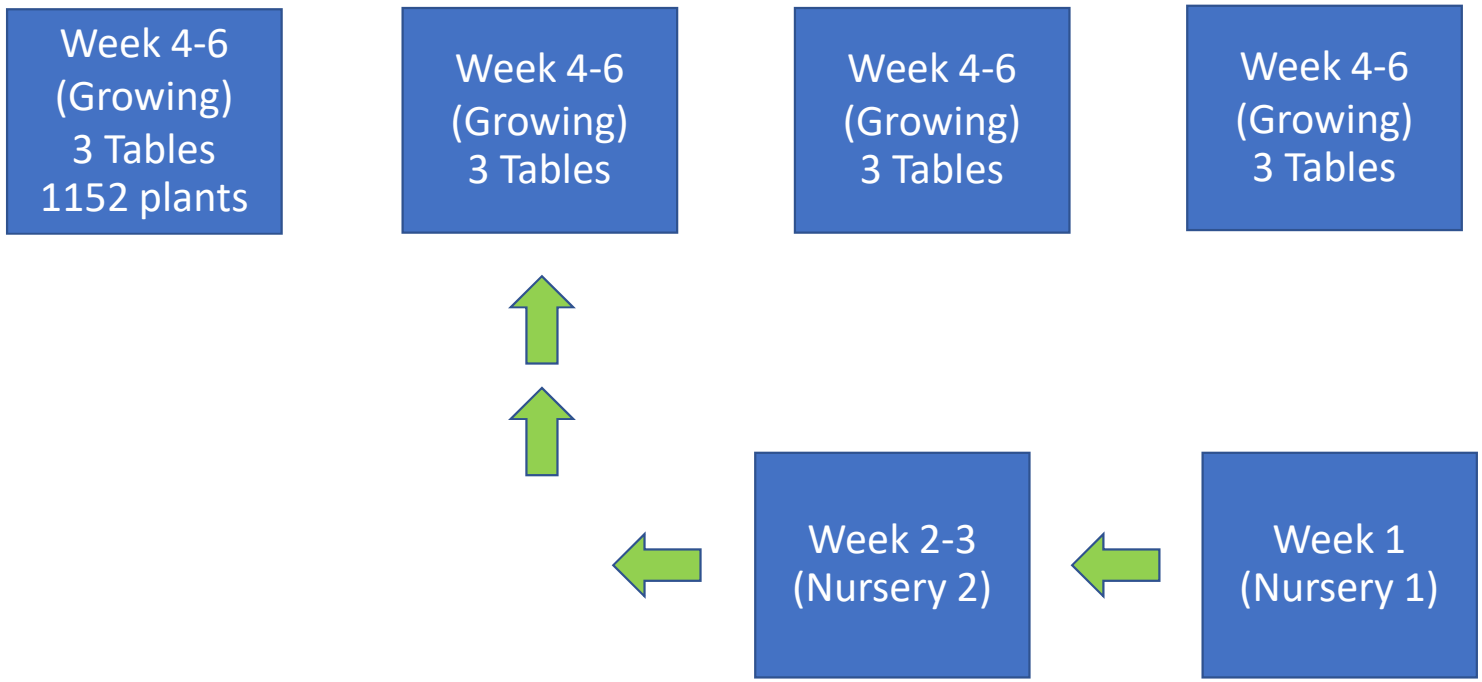
1. Mix perlite and Vermiculite ratio 4:1
2. Put a seed in a media deep 0.5 cm.
3. Watering 3 times (Moring, Noon, Evening)

Planning

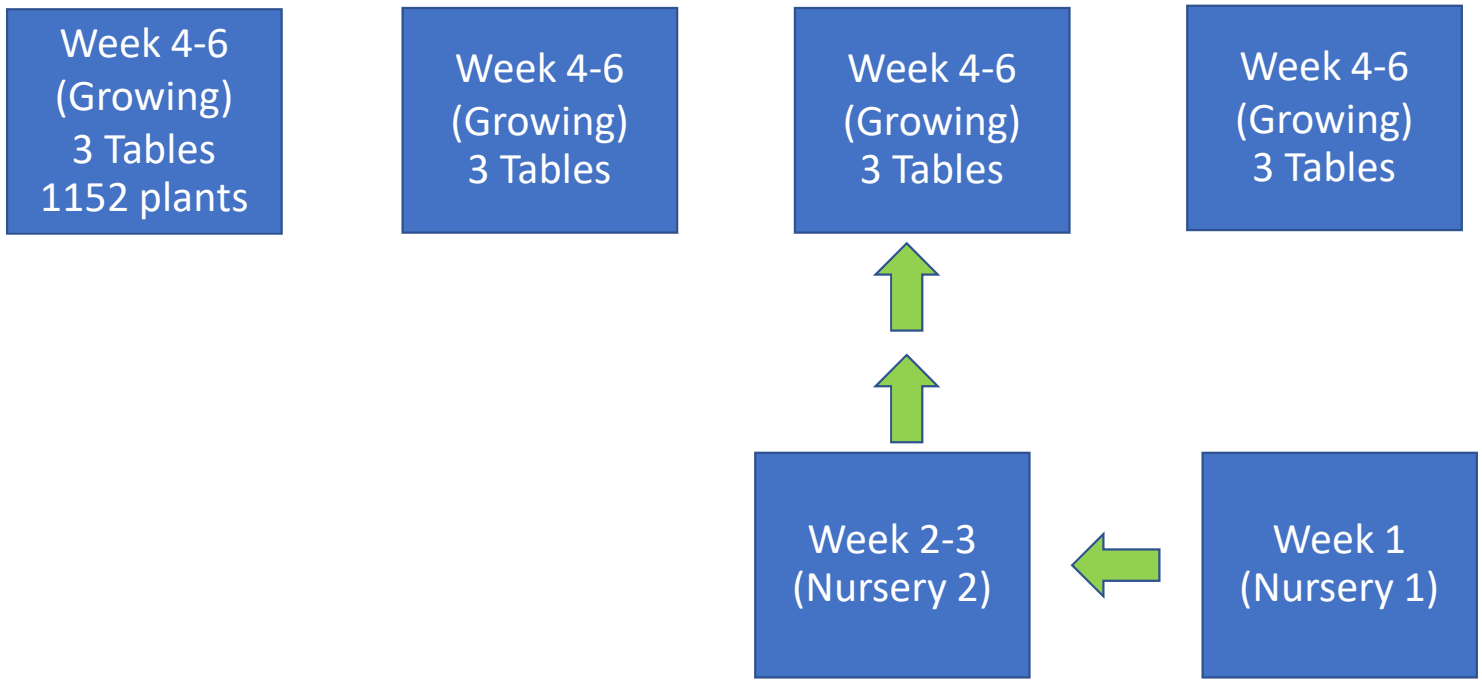


Seeding every 7 days

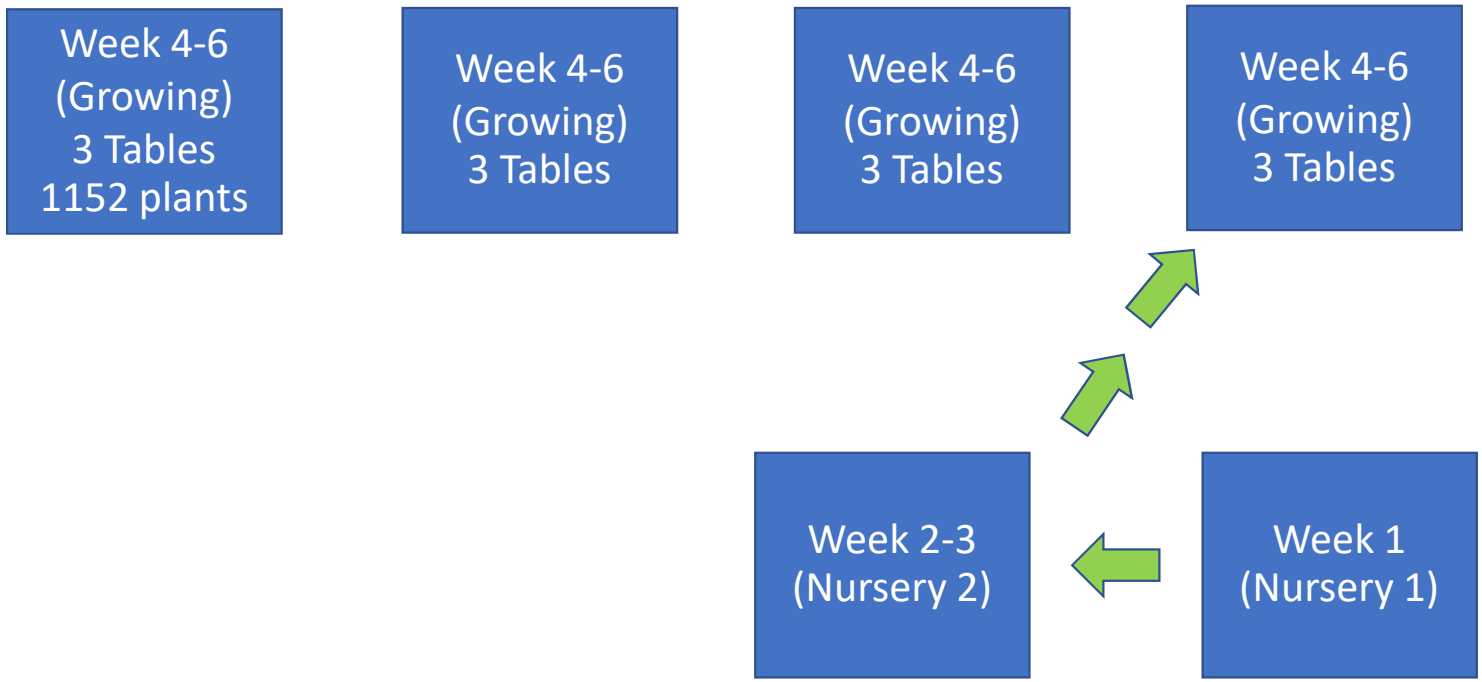
Planning


Week 4-6 (Growing) 3 Tables 1152 plants
Week 4-6 (Growing) 3 Tables
Week 4-6 (Growing) 3 Tables
Week 4-6 (Growing) 3 Tables
Week 2-3 (Nursery 2)
Week 1 (Nursery 1)

Planning


Week 4-6
(Growing)
3 Tables
1152 plants
Week 4-6
(Growing)
3 Tables
Week 4-6
(Growing)
3 Tables
Week 4-6
(Growing)
3 Tables
Week 2-3
(Nursery 2)
Week 1
(Nursery 1)

Planning


Week 4-6 (Growing) 3 Tables 1152 plants
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Week 2-3 (Nursery 2)
Week 1 (Nursery 1)

Measurements

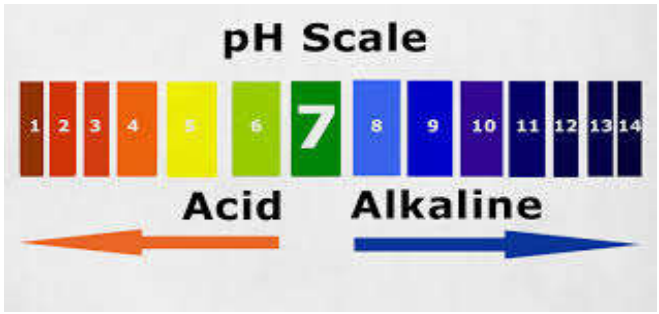
EC Meter

pH Meter

Daily works

Step :

1. Check water level in nutrient tank
2. Measure pH and EC level
3. Adjust pH in 6.0-6.5 (Morning, evening)
4. Adjust EC 1.6 mS/cm (Morning)



Problem

Insect:

Thrips

Beauveria bassiana

Problem

Insect:

Worm

Bacillus thuringiensis (BT)

Problem

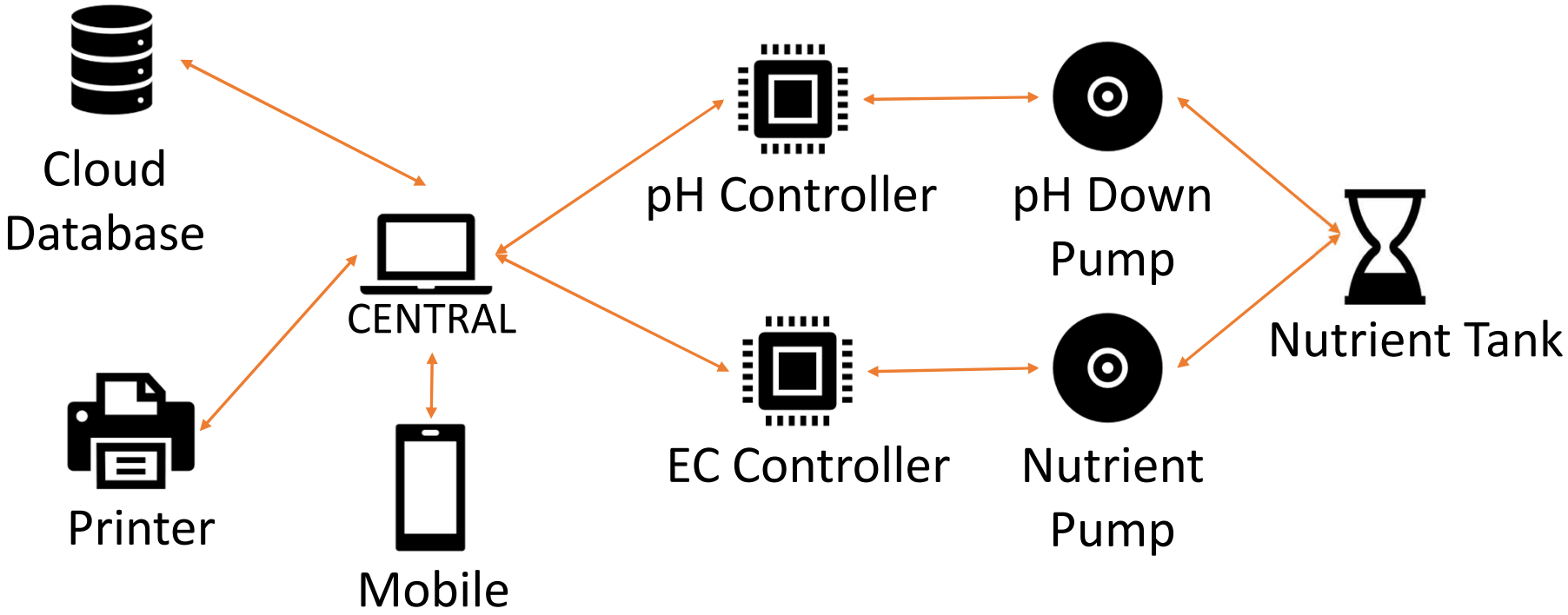
Plant diseased:

Problem

Plant diseased:

Trichoderma harzianum for protect plant diseased

System Overview



Water management for Hydroponics

- Manual/Auto
- EC Control
- pH Control
- Temp. Control
- Main water Control
- Water spray

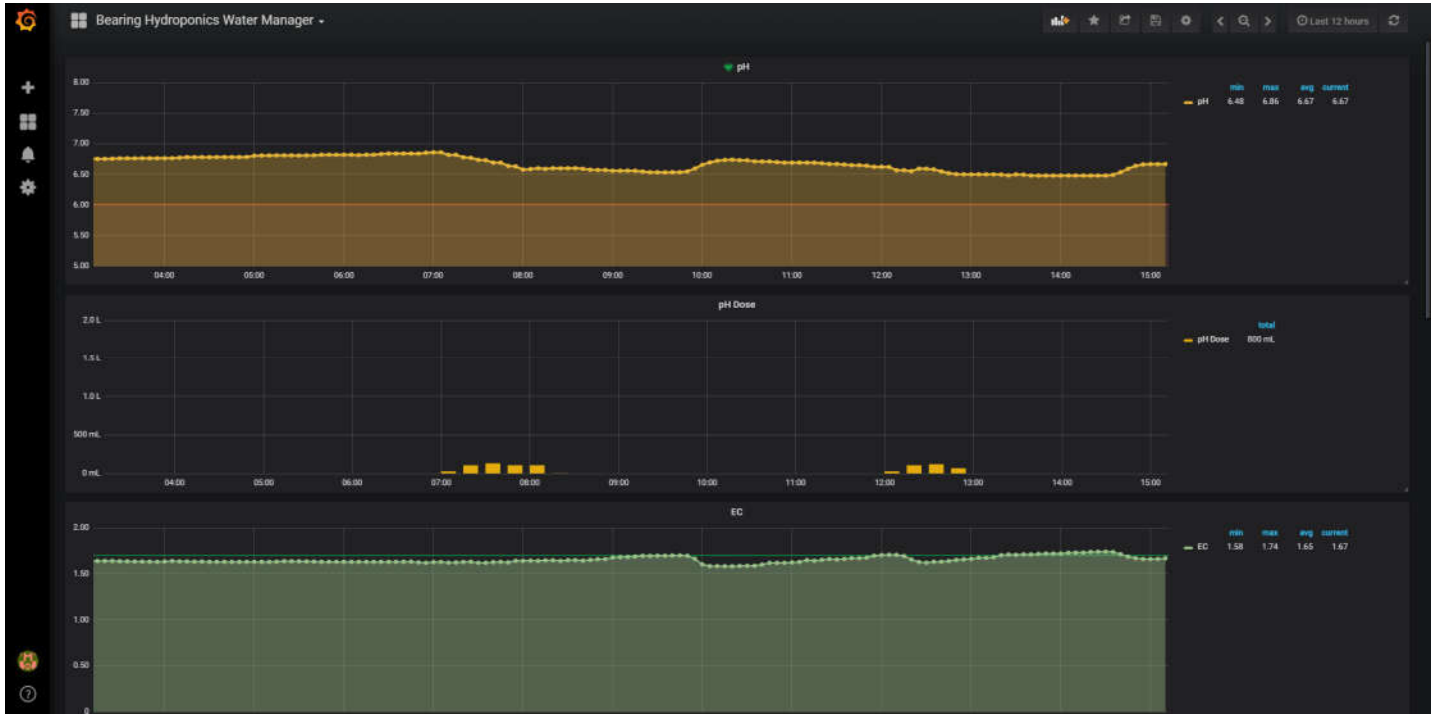
Doser

- Nutrient pump
- pH Down pump

Water management for Greenhouse Hydroponics

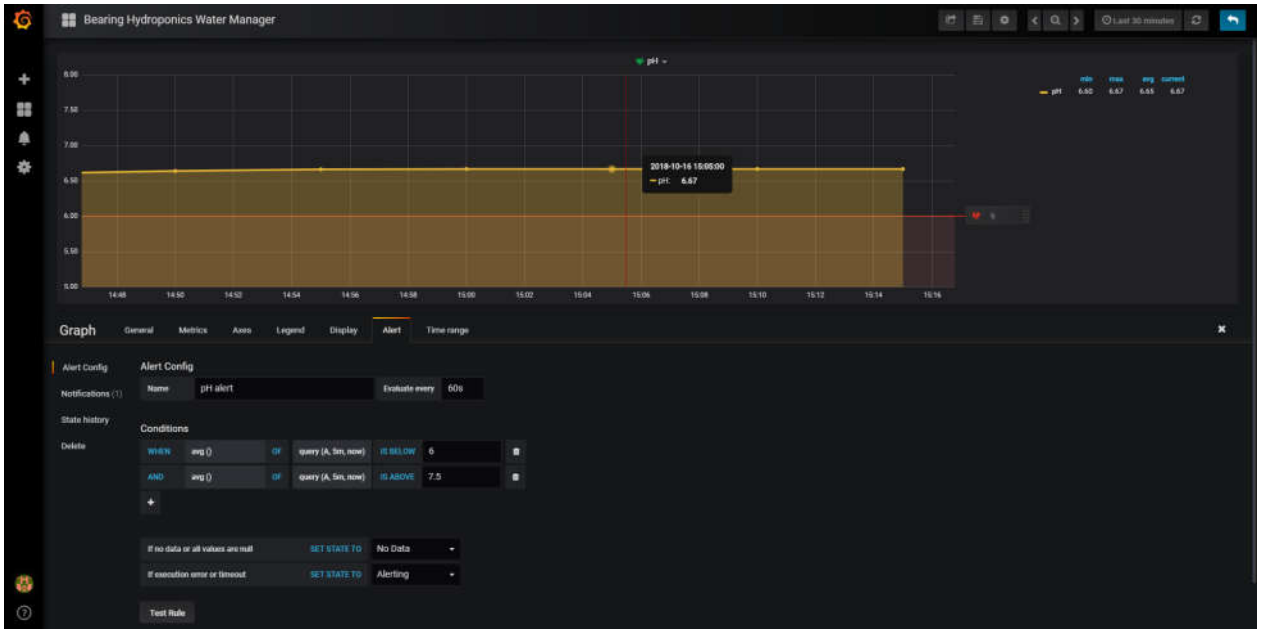
- Manual/Auto
- EC Control
- pH Control

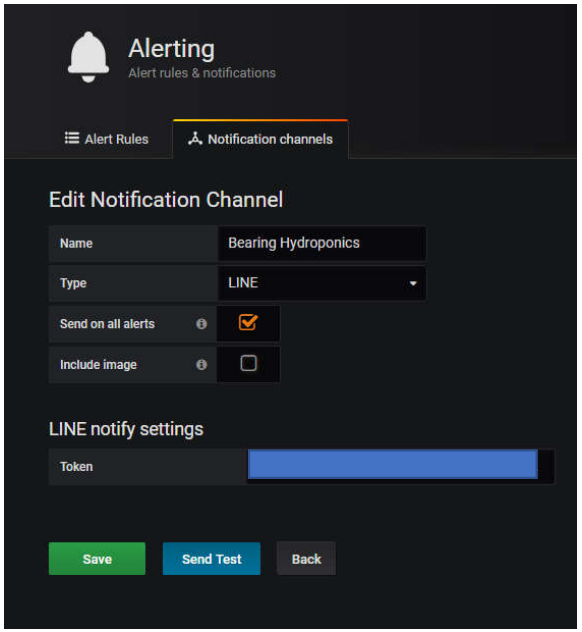
Monitoring



- Low cost
- PC, Laptop
- Mobile

Alarm with LINE application





THANK YOU
Q&A

https://github.com/rachot/hydroponics