Online Training Course on Hydroponics for Caribbean and Latin American Countries

Seedling, Planting, and Maintenance

By. Sani Hanifah







OBJECTIVES

After this session:

Participants expected to understand the importance of seedling, planting, and maintenance in hydroponics

Hydroponic Growing Process









Seed

Put the seed into the sponge and wait for sprout

Sprout

Leaf eating vegetables will need 3-10 days to sprout. fruit eating plants will need longer



Seedling

When it grow in certain period, it needs to be tranplanted

Transplant

Transplant to planting hole with the sponge together



After 30-60 days, vegetables are ready for harvest



Harvest

Taste your own planting vegetables





SEEDLING





Why We Need Seedling



The seedling method can optimize plant growth



Easy to care for when growing early planting



Seedling makes plants quick adapt



Plant sorting process

Several things need to consider before cultivating plants hydroponically, including:

- Plants according to geographical conditions
- Climatic conditions
- Plants with economic value
- Selection of quality seeds

DFT SYSTEM



Water spinach



Spinach



Mustard

DFT SYSTEM



Pakchoy



Kailan



Lettuce

DRIP IRRIGATION SYSTEM



Paprika



Tomato



Chili

DRIP IRRIGATION SYSTEM



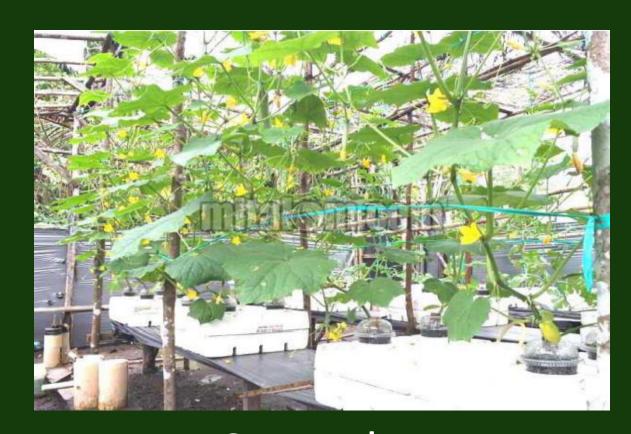
Watermelon



Strawberry



Melon



Cucumber

NFT SYSTEM



Lettuce



Melon



Tomato

WATER CULTURE SYSTEM



Celery



Orchid



Tomato

WICK SYSTEM



Roses



Pakchoy



Water spinach

AEROPONIC



Potato



Lettuce



Water spinach



01 Prepare land for nursery site

Sterilization of The Nursery House

- Prepare 5 ml of carbolic acid per liter of water, for 10 liters it will need about 50 ml of water, stir it evenly.
- Pour the carbolic solution into the sprayer, spray it all over the nursery's house, wait for a days.





02 Choose varieties seeds

- Lettuce
- Tomato
- Chili
- Potato
- Squash, etc.

Characteristics of Quality Seeds

- Known variety, certified or labeled
- The purity level reaches 98%
- Its growth power is above 80%
- Clean and uniform

- The yield potential is high
- Healthy means are free from fungal infections and free from pests
- Not expired





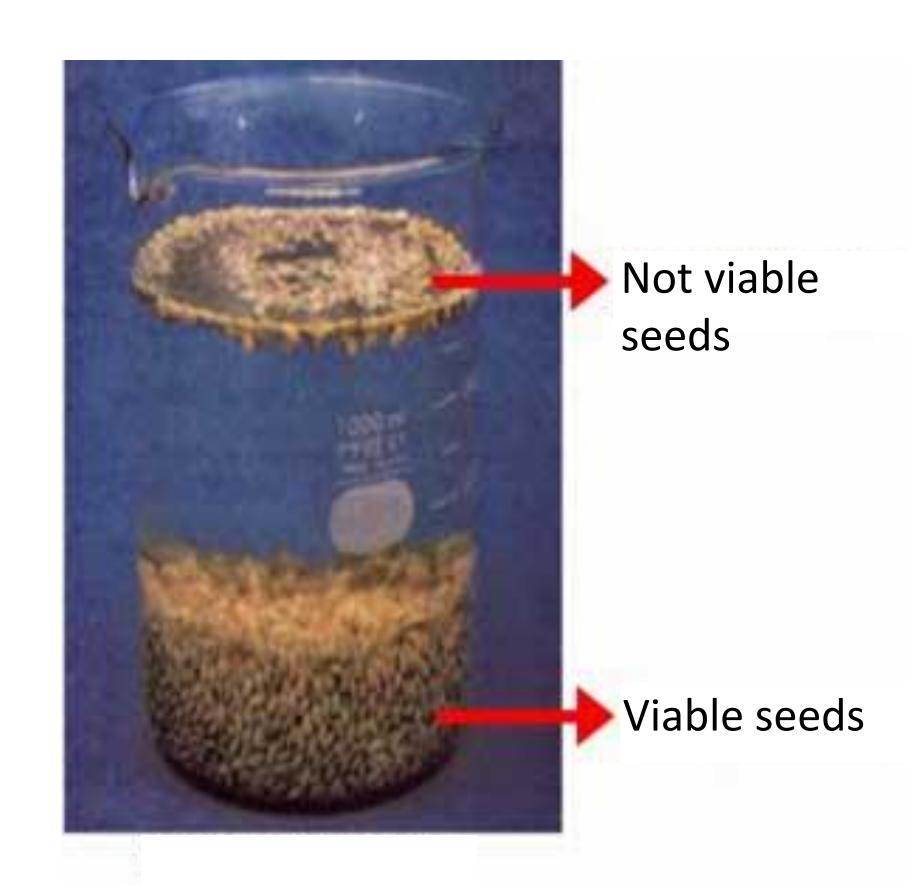




Seed Treatment

Soaking seeds on tap water before planting

- 1. Breaking dormancy to speed up germination
- 2. Seed sorting
- 3. Soft seed (water spinach, spinach, lettuce, mustard green, etc.) soaked in <u>+</u> 15 minute
- 4. Hard seeds (chili, pepper bell, watermelon, melon, etc.) soaked in ± 1 hour





03 Preparing the growing media

Characteristics of growing medium



- ➤ The medium must be able to store water content so that plants get enough nutrients from the water content stored in the media.
- > The medium has a loose structure, fertile, and can absorb water well.
- Has a low salt content.
- Not easy to change shape or it is not easy to become dry when the temperature in the room changes.
- Does not have pests or disease that can interfere with plant growth.

Alternative Media

Organic Media

- Husk charcoal
- Fern
- Moss
- Cocopeat

Anorganic Media

- Hydrogel
- Sand
- Gravel
- Sponge
- Zeolit
- Vermiculite







Rockwool

Rockwool

Advantages

- Environmentally friendly.
- Do not contain pathogens.
- Able to hold water 14 times the capacity of the soil.
- Can minimize the use of disinfectants.
- Can optimize the role of fertilizer.

Disadvantages

- Has a light density.
- The presence of wind can fly Rockwool.







Husk charcoal

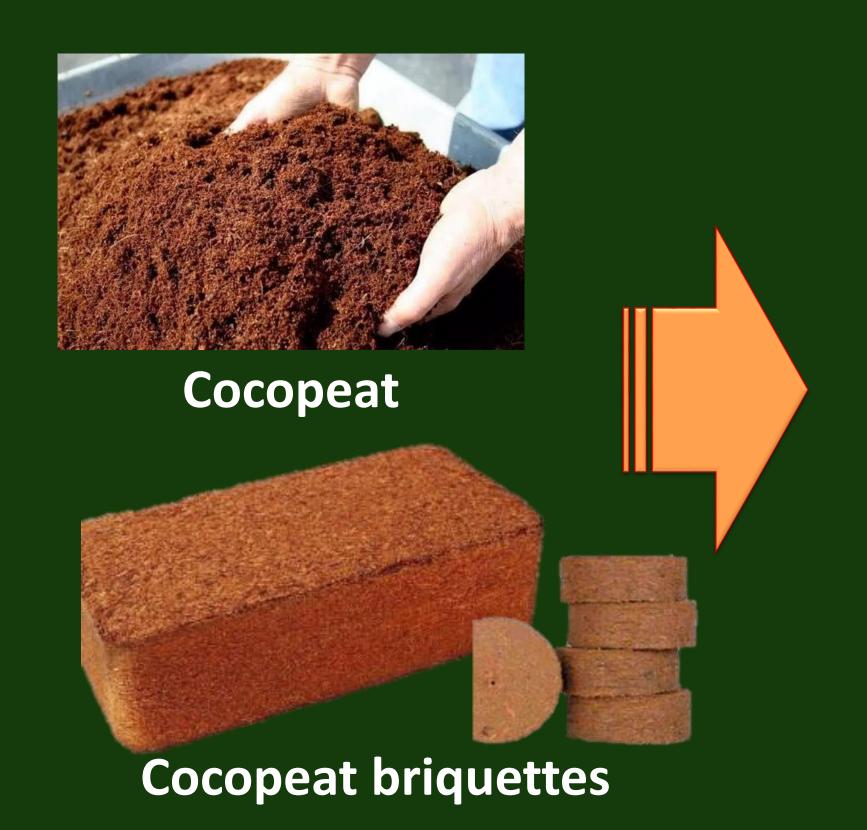
Husk Charcoal

Advantages

- The price is relatively cheap.
- The material s easy to obtain.
- The weight is light.
- The media is more sterile.
- It has a high porosity.

Disadvantages

- Rarely available on the market.
- It can only use twice.











Hydrotone

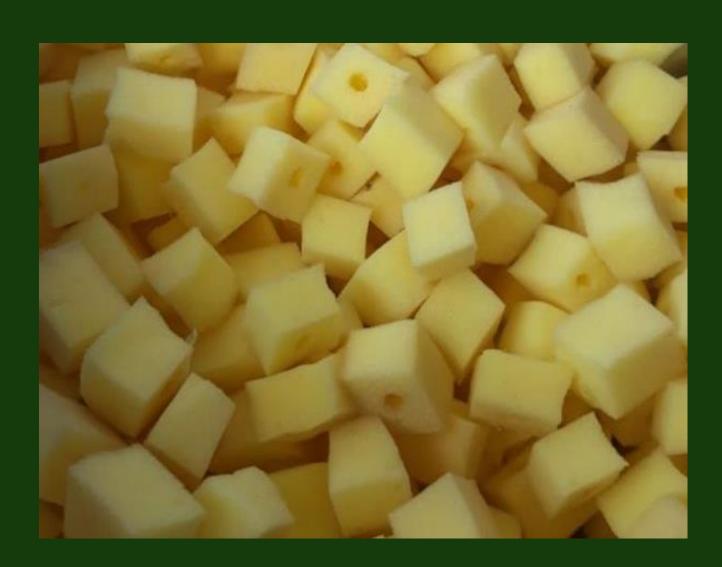
Hydrotone

Advantages

- High porosity level so that rarely the occurrence of blockage.
- Able to maintain plant roots cause always oxidize.
- Environmentally friendly and renewable.
- Reusable
- Easy to use.

Disadvantages

- Hydrotone has low water connective power.
- Hydrotone price is relatively costly.
- Can cause blockage of pipes.



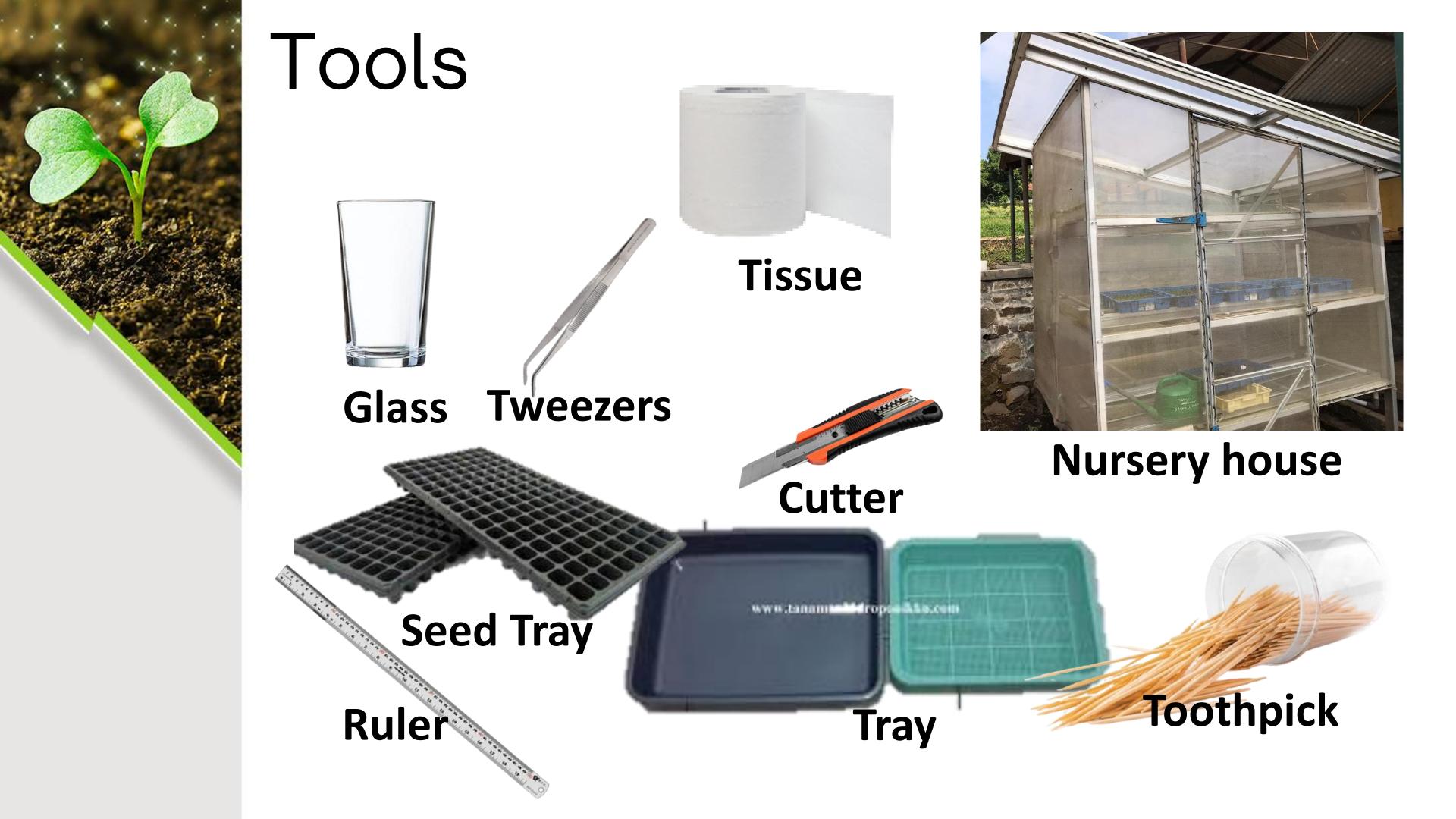




Sponge



Hydrogel





Materials



Seed





AB mix nutrition















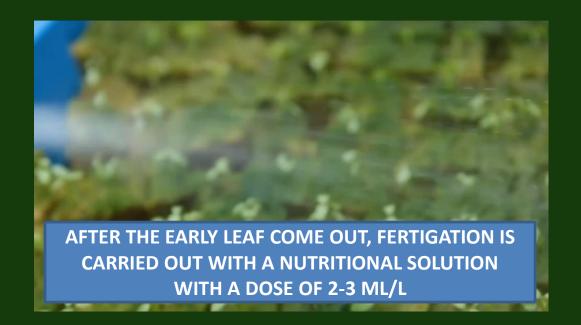


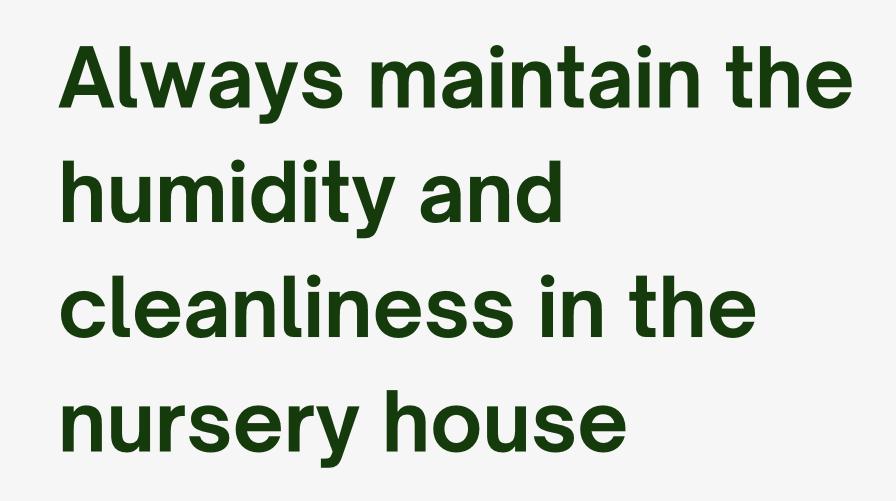
THE DRAINED SEEDS ARE TRANSFERRED TO THE ROCK WOOL HOLE













Prepare the husk charcoal, put in tray

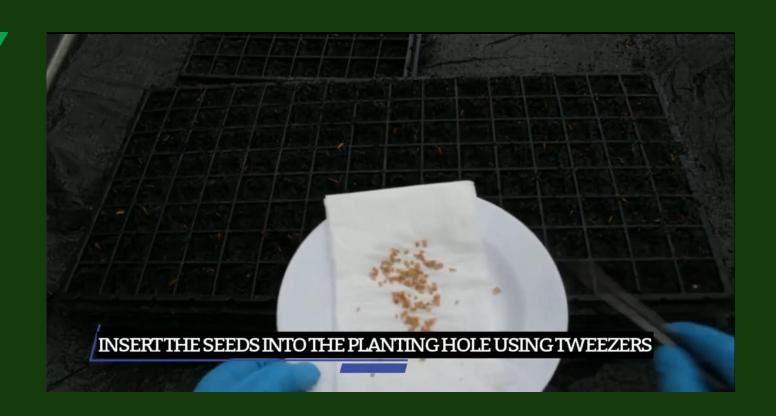




















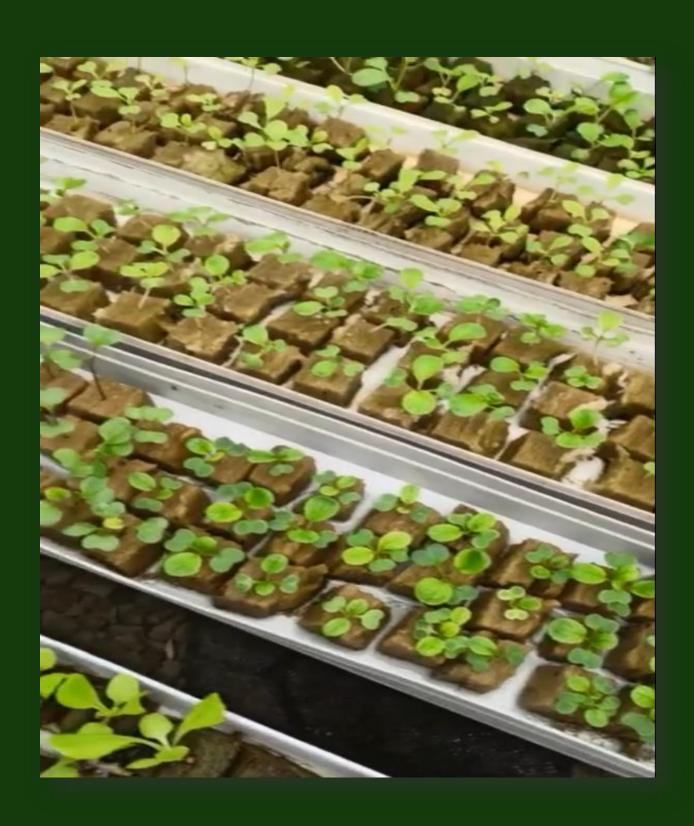


MAINTENANCE AT THE NURSERY

- Stage using husk charcoal, carried out using fertilizer as is done in a nursery using rockwool.
- Use foliar fertilizer at a dose of 5 gram/10 liters of water or NPK at a dose of 15 gram/10 liters of water done at the age of 3-4 weeks of the nursery.



Gutter







Wick System



Water Culture System



O1 Prepare a container filled with nutrient solution



Put rockwool in the planting hole, let it get wet



O2 Cover with styrofoam board



Put the seeds into rockwool

PLANTING



Tools



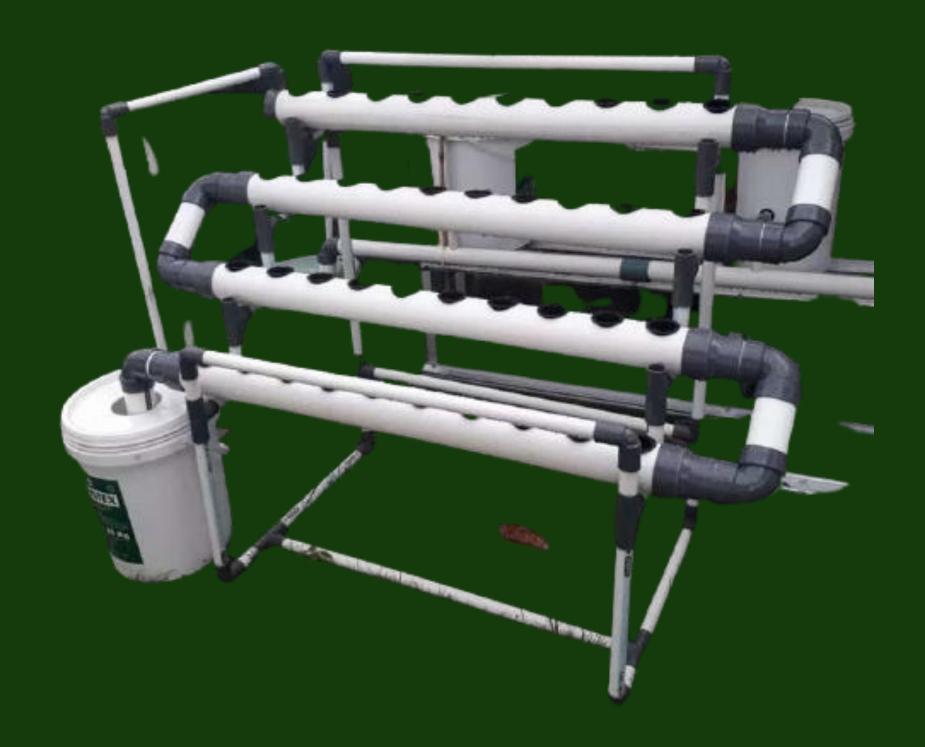




Bucket



NFT installation



DFT installation



Vertical hydroponic installation



Bucket installation

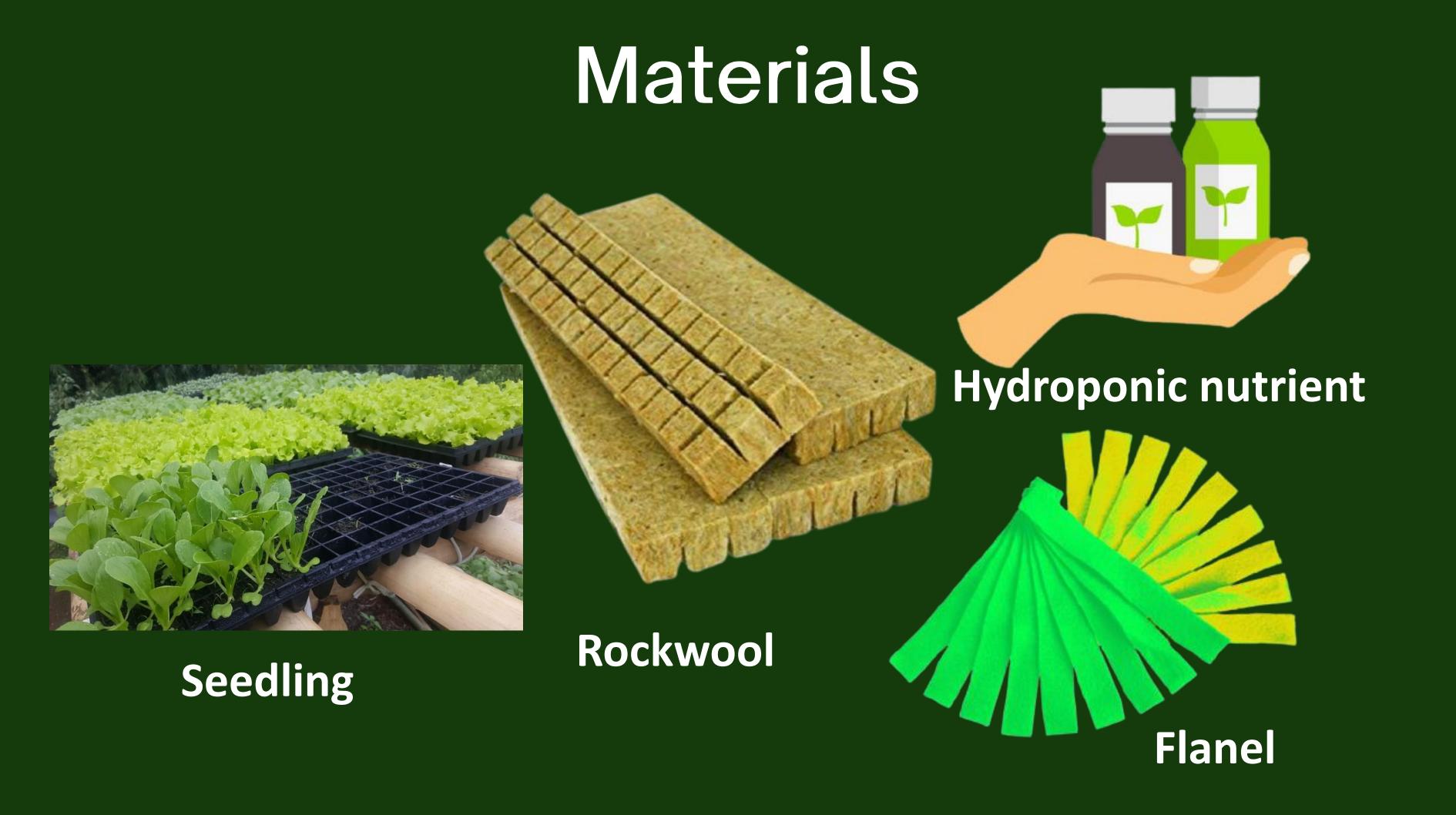
Hydroponic Installation from Used Materials







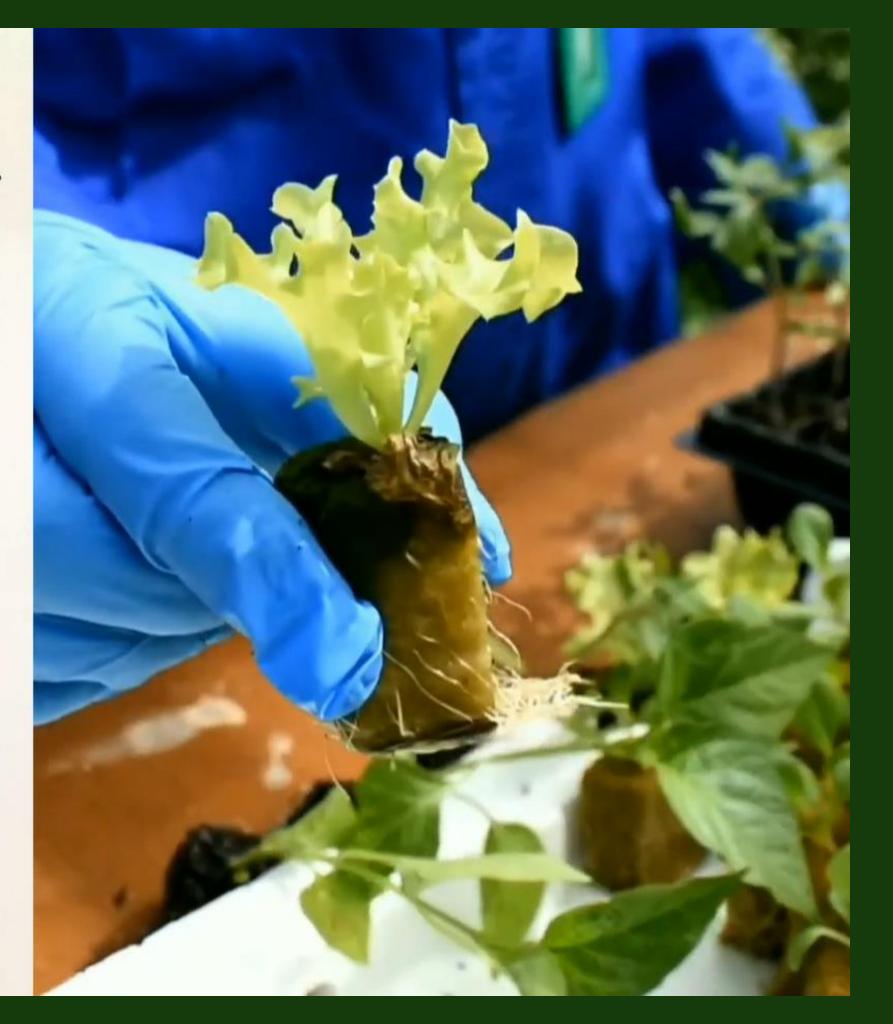




THE FIRST THING TO DO IS SEED SELECTION.

GOOD QUALITY SEEDS ARE ESSENTIAL,
SO THEY ARE EASIER TO MAINTAIN
AND PRODUCE OPTIMAL YIELD.
THE BEST SEEDS ARE THOSE THAT LOOK
VIGOROUS, FRESH AND PHYSICALLY GOOD.

THE AGE IS SUFFICIENT E.G:
LETTUCE AND PAK CHOY SEEDS HAVE
BEEN SOWING FOR 14-21 DAYS, WHILE
CHILLIES AND TOMATOES HAVE BEEN
SOWN FOR 21-30 DAYS.



01 Planting Lettuce



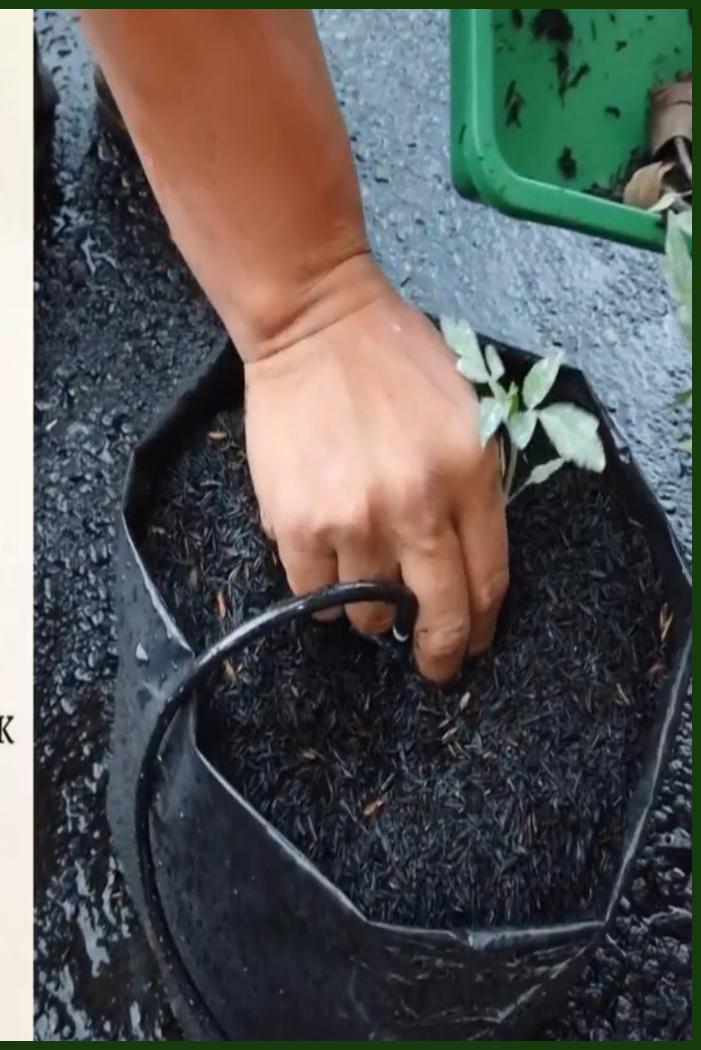
Prepare the netpot



Put the plants that have been wrapped with rockwool into the netpot on NFT system

02 Planting Tomato

PUT THE ROASTED HUSKS INTO THE
POLYBAG UP TO 3/4 OF THE HEIGHT
OF THE POLYBAG. PUT THE PLANT
SEEDS IN A POLY BAG, RIGHT IN
THE MIDDLE, UNTIL IT IS CLOSE
TO THE BASE OF THE STEM. INSERT THE
DRIP IRRIGATION PE HOSE INTO THE HUSK



MAINTENANCE



01 pH and Nutrition Control

Nutrition check

Added nutrition

Nutritional replacement

Making nutrition

Nutrient concentration









Nutrient Density and Acidity

- The concentration of the nutrient solution the plant needs:

Plant age	TDS (ppm)	EC (mS/cm)
Early planting	200 – 400	1,2
14 dap	600 – 800	1,5 - 2,0
30 dap	800 – 1000	2,0 - 2,5
Generative	1200	2,5 - 3,0

- The acidity (pH) of the nutrient solution is in the range 5.8 - 6.5

Digital Lux Meter Power supply: 6F2Z 9V battery DIGITAL LUX METER

Digital Lux Meter

02 Set the Lighting

Excess sunlight

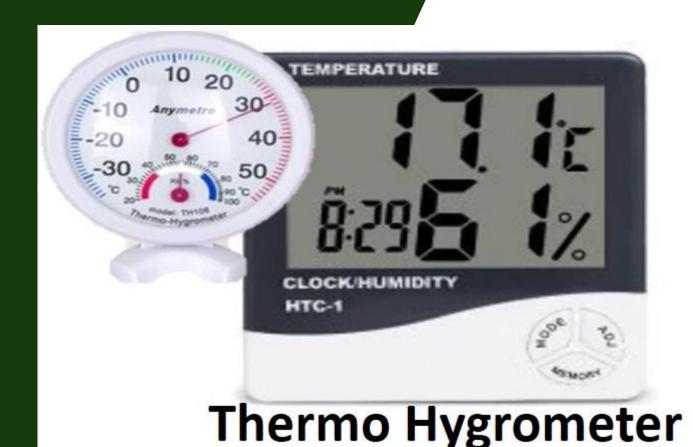


- Installing a paranet/shade net.
- Will cause wilting of plants and bitter taste of vegetables.

Lack of sunlight



- Move it into a place that has sufficient light.
- Installing additional LED lights will result in a waste of electricity.
- Causes plants to wilt, etiolate, and growth are less than optimal.



Check Temperature and Humidity

Temperature



- Use a fan to control the temperature in the greenhouse.
- Place the tank in a shady place to control the temperature in the nutrient tank.

Humidity



- In the high humidity, the absorption nutrient will reduce.
- If the humidity is low, the plant will be wilting. The solution is to install paranet and sprinklers in the greenhouse.





Cleanliness



- Clean means no moss.
- Schedule washing installation, after harvest time.

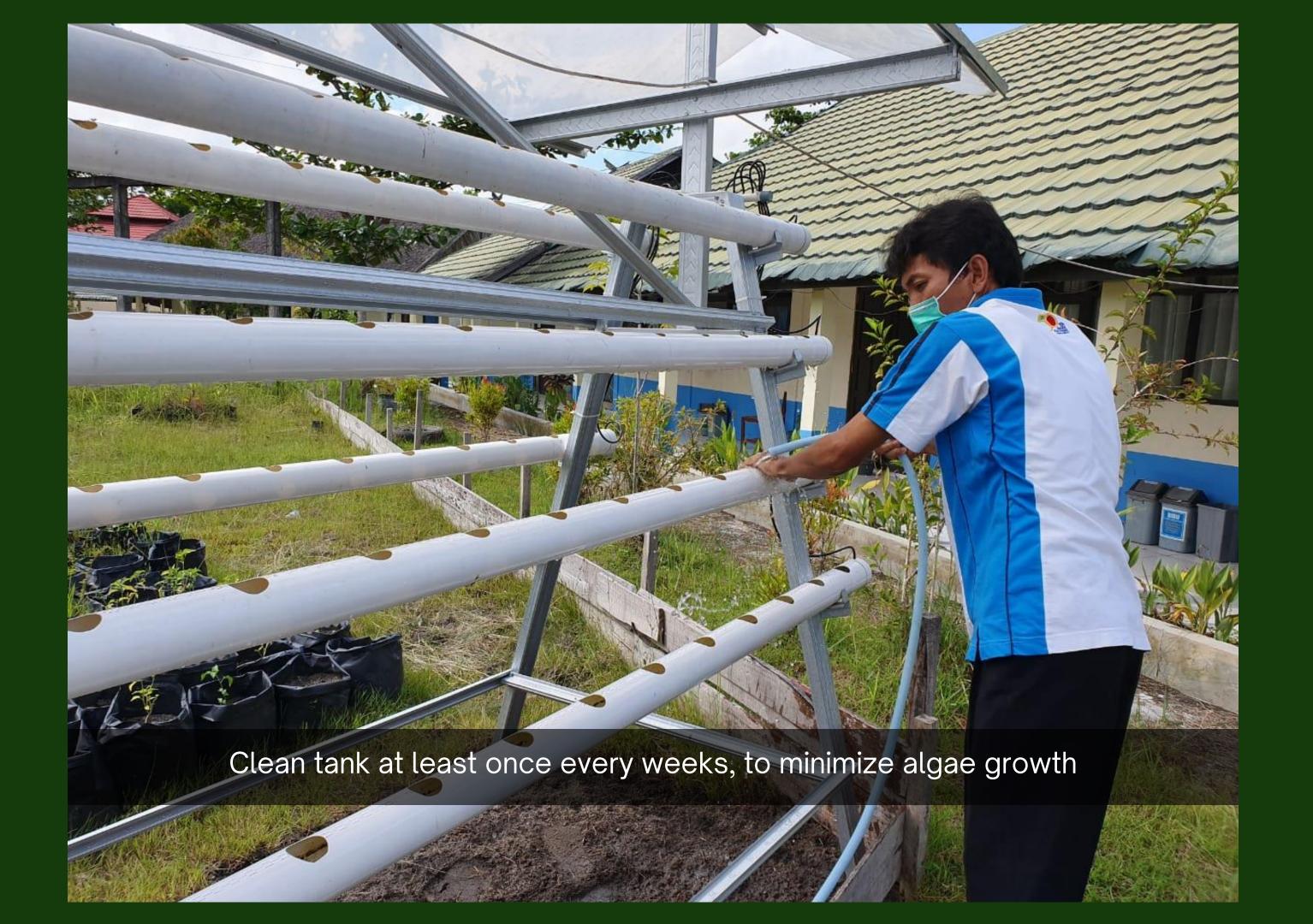
No leakage



If there is a leak, apply adhesive or paralon glue.











Pest and Disease Control

Using organic pesticides



Extracts of neem leaves, soursop leaves, garlic, betel leaf, tobacco, lemongrass.

Use traps



Paint the bottle with light color (yellow) and smeared the board with glue.



06 Harvest

- Harvesting is done after the plants enter the harvest time or have met the harvest criteria.
- Harvest time and criteria for each commodity are different.



Hydroponics Plant Harvest Time Table

Vegetable Harvest Time			Vegetable Harvest Time		
No.	Vegetable Name	Harvest Time (day after sowing)	No.	Vegetable Name	Harvest Time (day after sowing)
1	Mustard greens	40 - 60	7	Chili	65 - 75
2	Spinach	30 - 40	8	Cucumber	60 - 70
3	Lettuce	30 - 50	9	Eggplant	70 - 80
4	Water spinach	27 - 35	10	Pakcoy	45 - 60
5	Tomato	45 - 75			





Harvesting

Harvest time



Each plant has a different harvest periode.

Do the harvest when the weather is not too hot



Generally in the afternoon in order to reduce the risk of wilting and damage to plants.



How to Harvest

Harvest crops with roots



- + Make the condition of vegetables stay fresh and last longer shelf life
- + Ensure plant certainty from hydroponics
- It is necessary to re-seed immediately, the harvest will take longer

Harvest crops without roots



- + Save on crop usage and can harvest faster
- Vegetable storage can not last long (except storage in the refrigerator)



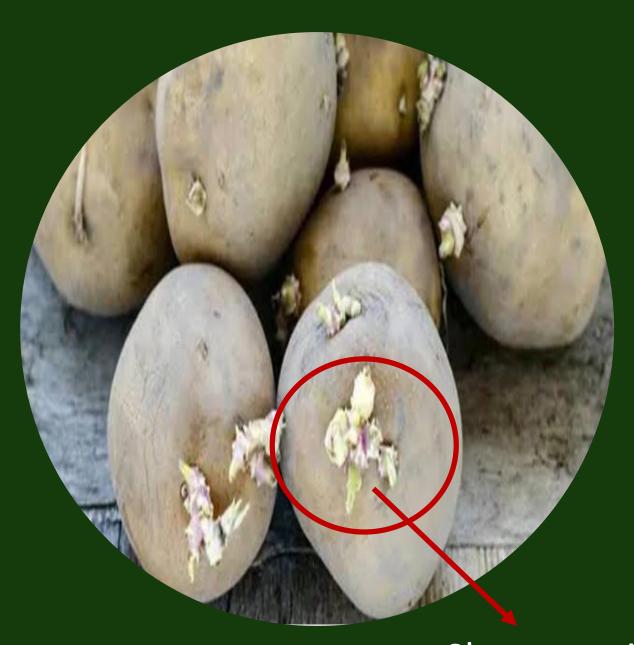


TOOLS

- DFT installation
- EC/TDS meter
- pH meter
- Tray
- Tweezers
- Handsprayer
- Bucket

MATERIALS

- Potato plantlet
- AB Mix nutrition
- Husk charcoal
- 70% alcohol
- Insecticide
- Detergent
- Clorox
- Water







01 Sterilized the screen house and DFT instalation





Screen house

DFT Instalation





Prepare the growing media, put in tray







Open the botle and remove planlet

★
Clean the planlet

02 Cut the planlet

Plant it into the growing media

Placed the tray in DFT

used the AB mix

check the solution EC

in 14 - 21 days its ready for cuttings













 Cut the seedling from planlet after 14-21 days in tray

Dip into root hormone

- Plant into seedling tray contain media
- Maintain the cutting as in the nursery
- After the plant age is 21 dap. or it already have 5-7 leaves. The plant was able to move into aeroponics container



Remove the plant from tray and it

was cleaned



Dip into fungicides



Put into styrofoam, using rockwool or sponge

05 Plant into the aeroponic container







06 Maintenance





07 Harvest



