Let's Cultivate And Reap Goodness

Innovations in the Field of Agriculture

School student seeks patent for tapioca harvester

A school student has garnered media attention for developing a simple machine for harvesting tapioca. This little scientist has applied for a patent for his invention.

Success in banana leaf

Edappal: Instead of banana bunches, a young postgraduate farmer from Edappal has scripted a new success story through the marketing of banana leaves. The idea struck when banana bunches were selling at a low price, prompting him to think: 'What if I sell banana leaves instead?'

Student's leafy greens shop

A college student's startup, aimed at utilising the market value of nutrient rich leafy greens achieved record sales within a year of its inception.

Entrepreneur through turmeric cultivation

Wayanad: A young man who started turmeric cultivation on two acres of land faced difficulties during harvest time due to low market prices. When he realised that numerous value-added products could be made from turmeric, he became a new entrepreneur.

New brand for Gandhakshala

Gandhakshala, the valuable variety of rice was cultivated in a unique way and it was launched in the market under a special brand, received a good response in the market. Inspired by this, more young entrepreneursare planning to start cultivation at more places.

Based on the hints discuss the following

What are the ideas you have learned from the news reports?

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Based on the hints discuss the following

- What are the circumstances that lead to promotion of these new ways by the farmers?

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- What are the other possibilities for making farming profitable?

1) .....
2) .....
3) .....
4) .....
5) .....

Based on the hints discuss the following

- What are the ideas you have learned from the news reports?

The design and development of small-scale machinery play a major role in reducing the labor burden in this sector. In addition, activities such as the production of value-added products, marketing products under a special brand, collecting and marketing local leafy vegetables, and delivering pesticide-free and contaminant-free vegetables and other produce directly to consumers are also included in these initiatives.

Based on the hints discuss the following

- **What are the circumstances that lead to promotion of these new ways by the farmers?**

The problems and issues faced by the farmers during cultivation lead to the promotion these new ideas.

- **What are the other possibilities for making farming profitable?**

1) Making of value added products.
2) Understanding the market of the farmed products.
3) Production of organic fertilizers and their distribution
4) Making use of digital marketing.
5) Pesticide free products

Agriculture – A success story

- Online System
  - Collection of information regarding disease, pest infection and effective solutions
  - Financial support
  - Provides information regarding climate and climatic changes
- Cooperative society
  - Collection of products
  - Providing fertilizers at low cost and promotion of products
  - Promotion/ Commercialization
- Family members
  - Financial Aids
  - Physcial Labour
  - Support
- Local- self Government bodies
  - Equipments for farming
  - Awards
  - Subsidy for fertilizers and farming equipments
- Agriculture office/ Krishibhavan
  - Pamphlet regarding agriculture
  - Soil testing
  - Training programmes

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Methods to maximise land utilisation

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Sack Farming

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Terrace Farming

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Vertical Farming

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Pot Farming

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Pet Bottle Farming

FREEPIK

Aquaponics

Sack Farming

Scope

- Ideal for urban areas, especially where space is limited.
  Suitable for rooftops, balconies, courtyards, or areas with poor soil conditions.

Advantages

- Requires very little space, ideal for cramped urban settings.
- Low-cost setup; sacks can be reused materials like rice bags or plastic sacks.

Disadvantages

- Limited space per sack; suitable only for small plants or shallow-rooted crops.
- Over time, sacks can degrade or tear, especially under sun and rain exposure.

Aquaponics

Scope

- Combines fish farming (aquaculture) and plant cultivation (hydroponics) in one system.
- Ideal for urban farming, rooftops, greenhouses, and areas with limited land.
- Can be practiced indoors or outdoors, making it versatile.

Advantages

- Uses 90% less water compared to traditional farming — water recirculates in the system.
- No need for chemical fertilizers — fish waste provides nutrients to plants.

Disadvantages

- High initial setup cost — tanks, pumps, grow beds, filters, etc.
- Requires constant monitoring — water quality, pH, etc.

Petbottle Farming

Scope

- Best for urban spaces, especially apartments, balconies, rooftops, and small homes.
- Promotes recycling and reuse of plastic bottles, reducing environmental waste.

Advantages

- Low-cost setup — uses waste plastic bottles easily available at home.
- Ideal for small-space gardening in cities.
- Encourages recycling — reduces plastic waste.

Disadvantages

- Limited space — suitable only for small or shallow-rooted plants.
- Plastic bottles can degrade or break under sun exposure over time.

Pot Farming

Scope

- Ideal for urban areas, apartments, balconies, rooftops, and courtyards.
- Suitable for both ornamental plants and vegetables in small spaces.
- Enables home gardening without requiring large land areas.

Advantages

- Requires minimal space, ideal for urban lifestyles.
- Easy to move and rearrange pots based on sunlight or convenience.

Disadvantages

- Limited space in each pot — restricts plant size and root development.
- Needs regular watering — soil in pots dries faster than in the ground.

Terrace Farming

Scope

- Best suited for urban homes, apartments, commercial buildings with flat rooftops.
- Allows maximum utilization of unused rooftop space..

Advantages

- Makes effective use of otherwise unused roof space.
- Provides fresh, pesticide-free vegetables at home.
- Reduces electricity bills — plants provide shade, lowering roof temperature.

Disadvantages

- Initial setup costs — waterproofing, soil preparation, containers, etc.
- Improper planning may cause water leakage and damage to the building structure.

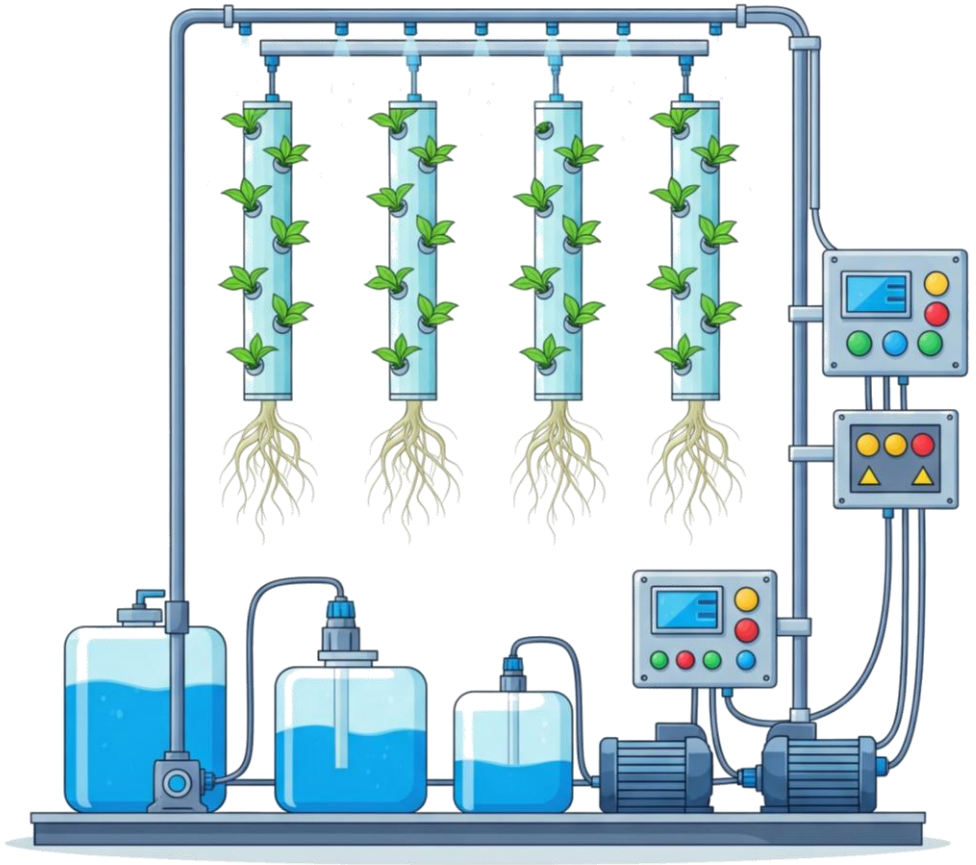
Vertical Farming

- Plants are arranged in layers one above the other.
- Stacking the plants in layers above each other helps to save space.
- It can be done in two ways
    1. Hydroponics: Plants are grown in nutrient solution
    2. Aeroponics: Aeroponics is a modern, soil-less farming technique where plants are grown with their roots suspended in air, and a nutrient-rich mist or spray is regularly applied to the roots..
- It can be done in schools/college terraces, cities, and in urban areas where there is limited space

- It can be protected from rain and other climatic changes.
- Can be made and maintained in limited space.
- As the plants are stacked into layers the slanting rays can strike the plants.
- Drip and wick irrigation can be incorporated to reduce water loss.
- The initial cost is very high. But, in the long run it is beneficial.
- Vertical farming can be done by reusing the materials at home (plastic bottles, trays, old cupboards, etc) which can reduce the cost.

Hydroponics

Aeroponics



Fertilizers

(Fertilizers are natural or artificial substances that supply essential nutrients to plants to help them grow healthy and produce better yields.)

Purpose of Fertilizers

- Provide plants with vital nutrients like Nitrogen (N), Phosphorus (P), and Potassium (K).
- Improve soil fertility and plant growth.
- Increase crop yield and food production.
- Correct nutrient deficiencies in the soil.

Things to Ensure before Applying Fertilizers

Soil Testing

- Helps in identifying the amount of nutrients in the soil.
- Supply only the nutrients that are needed

Water

- Supply the required amount of water.
- Helps in nutrient absorption and growth of decomposers.
- Excess water leads to the washing away of fertlizers.

Types of Fertilizers

Plant Nutrients

- Plants require nutrient to grow.
- They are supplied through fertilizers.
- Nutrients are classified into two types based in the quantities
- **Macro Nutrients:** The nutrients that are required in large quantities. Eg: nitrogen, phosphorous, pottasium, calcium, magnesium, sulphur
- **Micro Nutrients:** Nutrients that are required in small quantities Eg: magnesium, iron, boron, zinc, copper, molybdenum, chlorine

Biofertilizers

Helps to fix nitrogen and phosphorus in the soil.

Eg: Rizobium, Azospirillum, Mycorizha

Advantages

- Does not harm the texture of the soil.
- Less cost

Limitations

- Each nutrients require individual micro-organism
- Microrgansims that provide all the necessary nutrients are not available.

Organic Fertilizers

Naturally made

Eg: vermicompost, biogas

Advantages

- Does not effect the texture of soil or decomposers
- Can be prepared at home/schools/colleges.
- Reduces pollution

Disadvantages

- Only those nutrients that can be decomposed by the decomposers reach the plants.
- Lower quanity of nutrients
- The decomposition process is slow

Artifical Fertilizers

Made in labs

Eg: Ammonium phosphate, Urea, ammonium Sulphate

Advantages

- Can be easily absorbed by plants.
- Nutrients can be added by testing the soiling. This reduces the cost

Disadvantages

- Excess use effects the soil texture
- Effects the multiplication of decomposers

Nano Fertilizers

Nano fertilizers are nano particles that can enrich the soil with nutrients (1 nano meter = 10^{-6} m)

Eg: nano urea, nano phosphate, nano magnesium sulpahte

Advantages

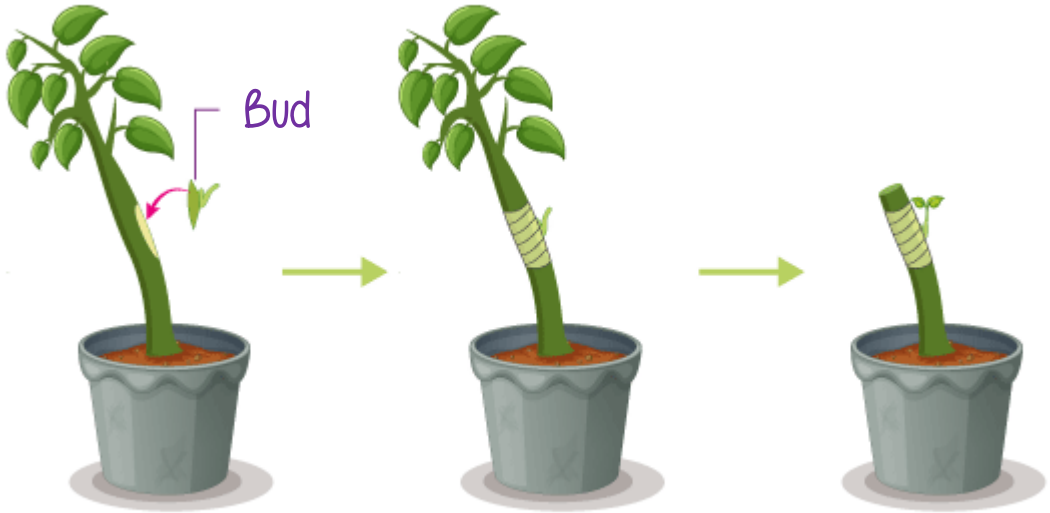
- Required only in small quantities.
- Can be absorbed easily
- Does not effect the composition of soil.
- Lesser pollution

Disadvantages

Higher cost of production

Effects micro organisms in the soil.

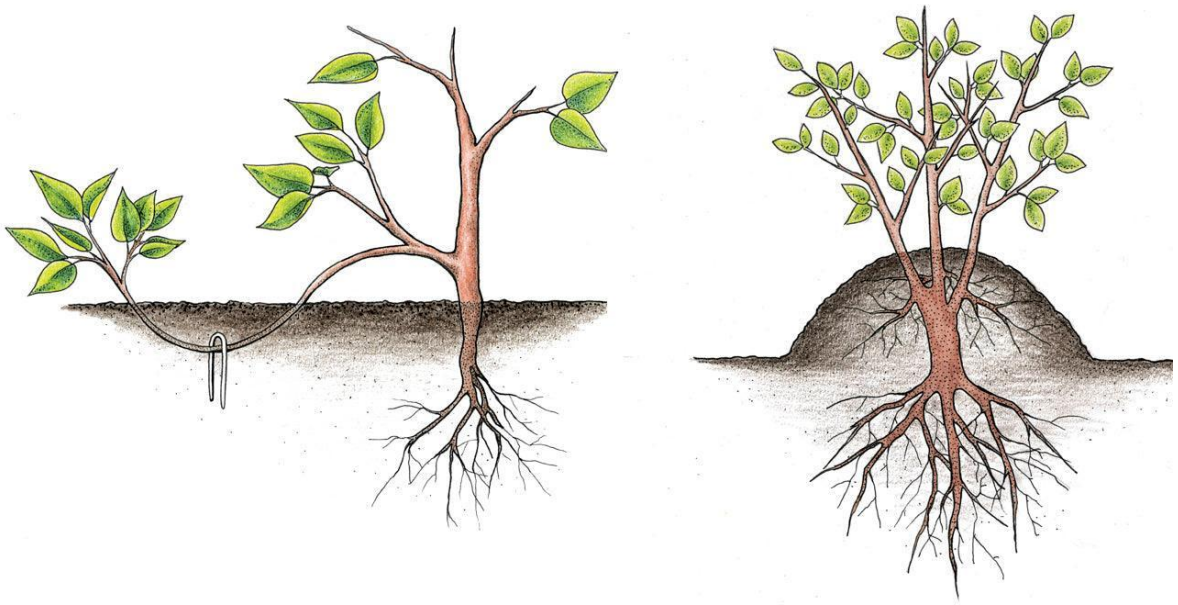
For Better Yield, High Quality Planting Materials



Budding

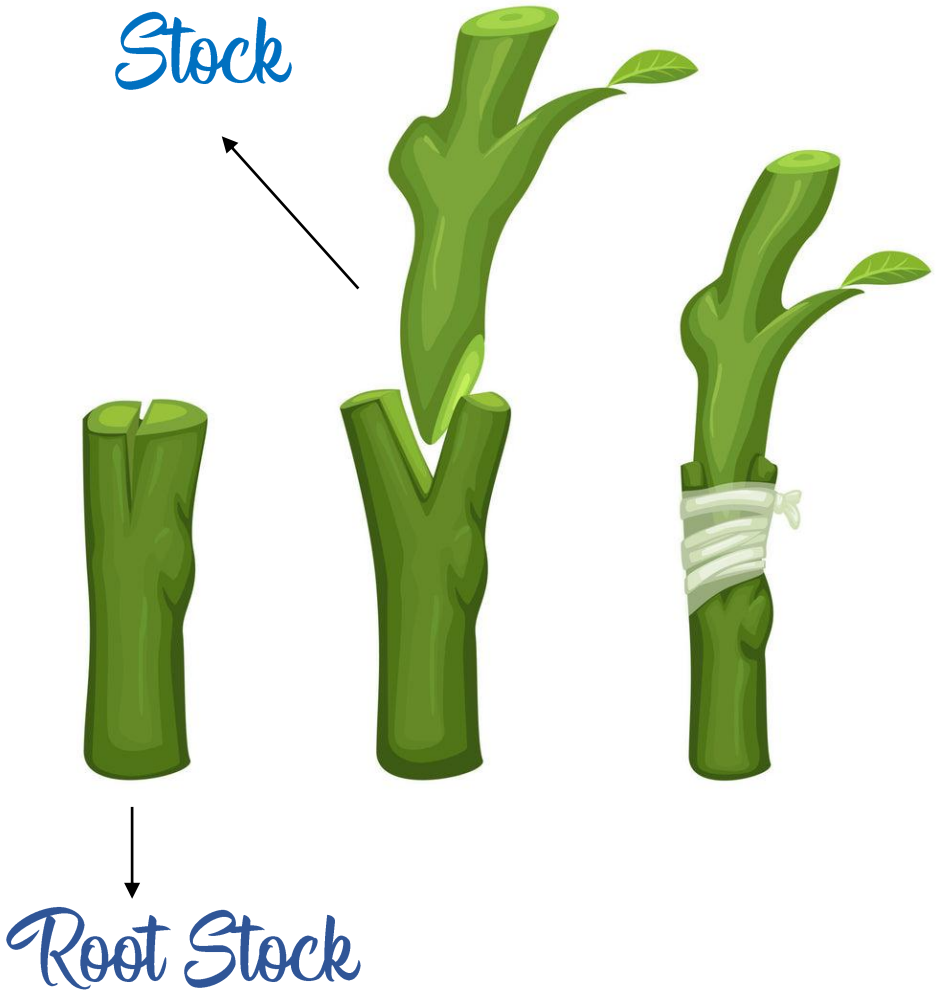
The bud from one plant is taken and attached to another's stem.

Eg: Rose, Apple



Layering

Layering is a technique where a stem or branch is bent down to the ground (or a growing medium) and covered with soil while still attached to the parent plant. Once roots develop from the buried portion, the new plant can be cut from the parent and grown independently.
Eg: Jasmine, Guava, etc.



Grafting

- Two different plant parts stock and scion joined together to from a new plant
- Eg: mango, lime, apple

Tissue Culture

- A part of the plant is taken and grown in the nutrient medium.
- They have the same characters as that of parents.
- Large number of plants can be produced.
- Eg: Orchid, banana etc.

GM Crops

- New characters are incorporated by changing the genetic constitution.
- It is attained through genetic engineering.
- Eg: pest resistant cotton, soyabean that is weedicide resistant, rice variety that contain vitamin A.
- Can be a threat to indigenous species.

Hybridization

- Production of plants that have the characters of both plants.
- The pollen grain from the plant is transferred to the stigma of other plant.

Have you stopped vegetable farming?

Sometimes continuous rain. Sometimes severe drought not having a drop of water. What shall I do?

What all can be done to resolve this issue?

JOE FREDY (HST)

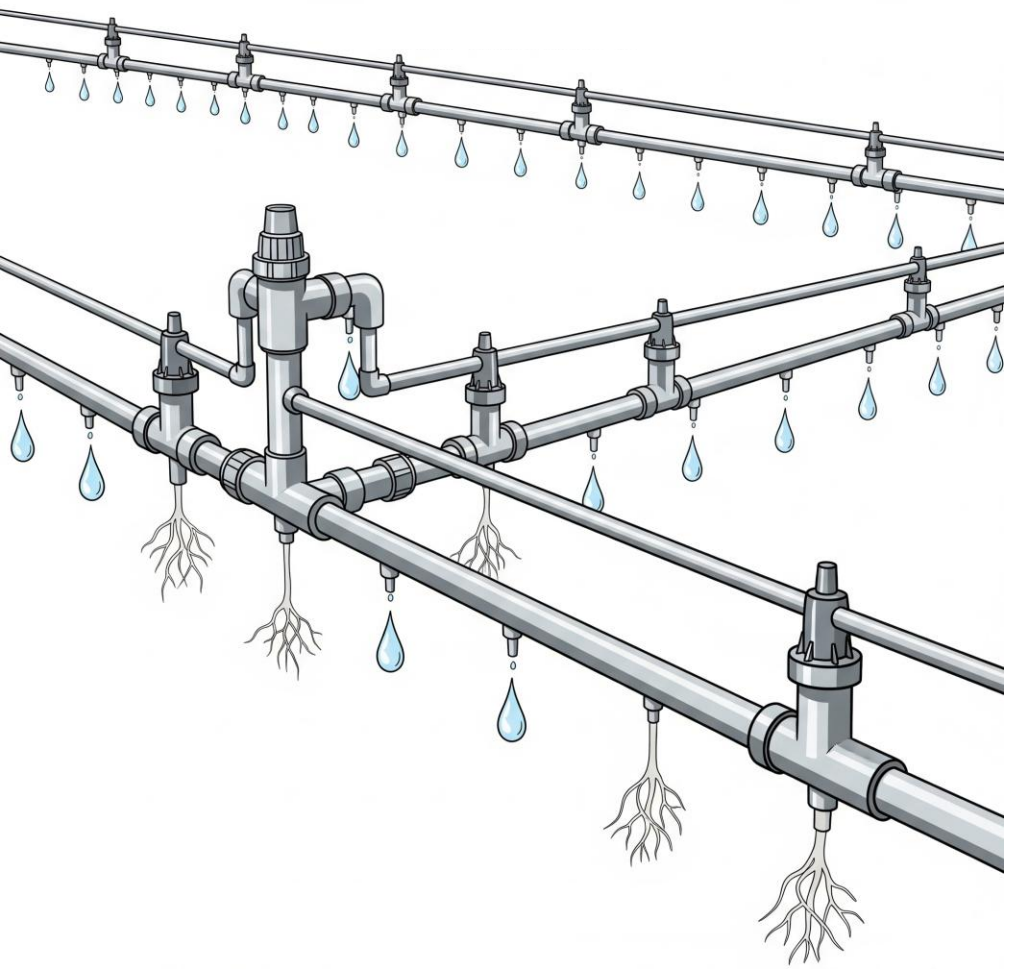
Green House

It is made by using sheets of plastic, polyethene, etc.

Advantages

- Plants can be grown in rainy as well as in summer season.
- Pest attack can be reduced.

Drip Irrigation

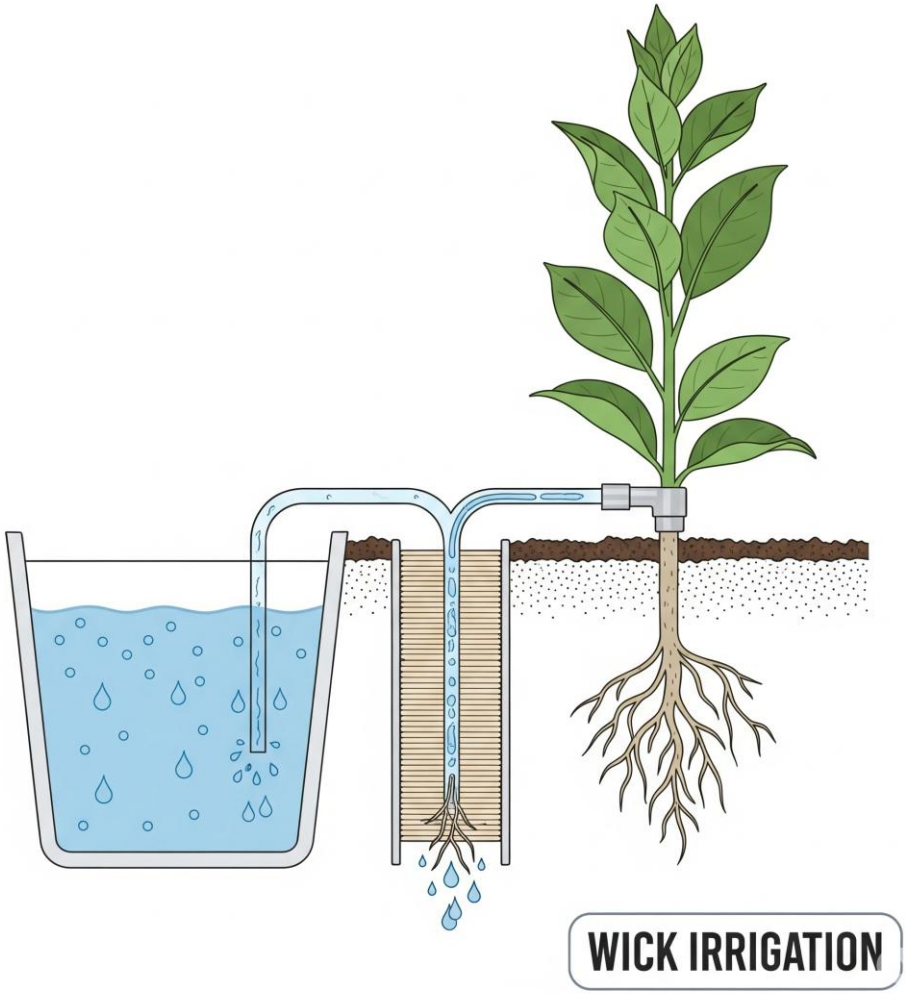


The method uses supply water in drops to the roots using pipes and valves.

Advantages

- Helps to conserve water.
- Water is made available to all plants.

Wick Irrigation



Supplying of water directly to roots with a cotton cloth from a water source.

Advantage

Requires less water than drip irrigation.

Mulching

The traditional method of reducing evaporation by covering the soil with dry leaves, hay etc.

Advantages

- Reduces water loss
- Reduces the growth of weeds

Observe The Images And Complete The Table

A. Pod borer (Legume)

B. Leaf-rolling Caterpillar (Okra)

C. Stem Borer (Brinjal)

Pest	Plant effected
Pod boarer	
Leaf- rolling Caterpillar	
Stem Borer	

Observe The Images And Complete The Table

A. Pod borer (Legume)

B. Leaf-rolling Caterpillar (Okra)

C. Stem Borer (Brinjal)

Pest	Plant effected
Pod boarer	Legume plants
Leaf- rolling Caterpillar	Okra
Stem Borer	Brinjal

Integrated Pest Management

The method of controlling the multiplication of pest without killing.

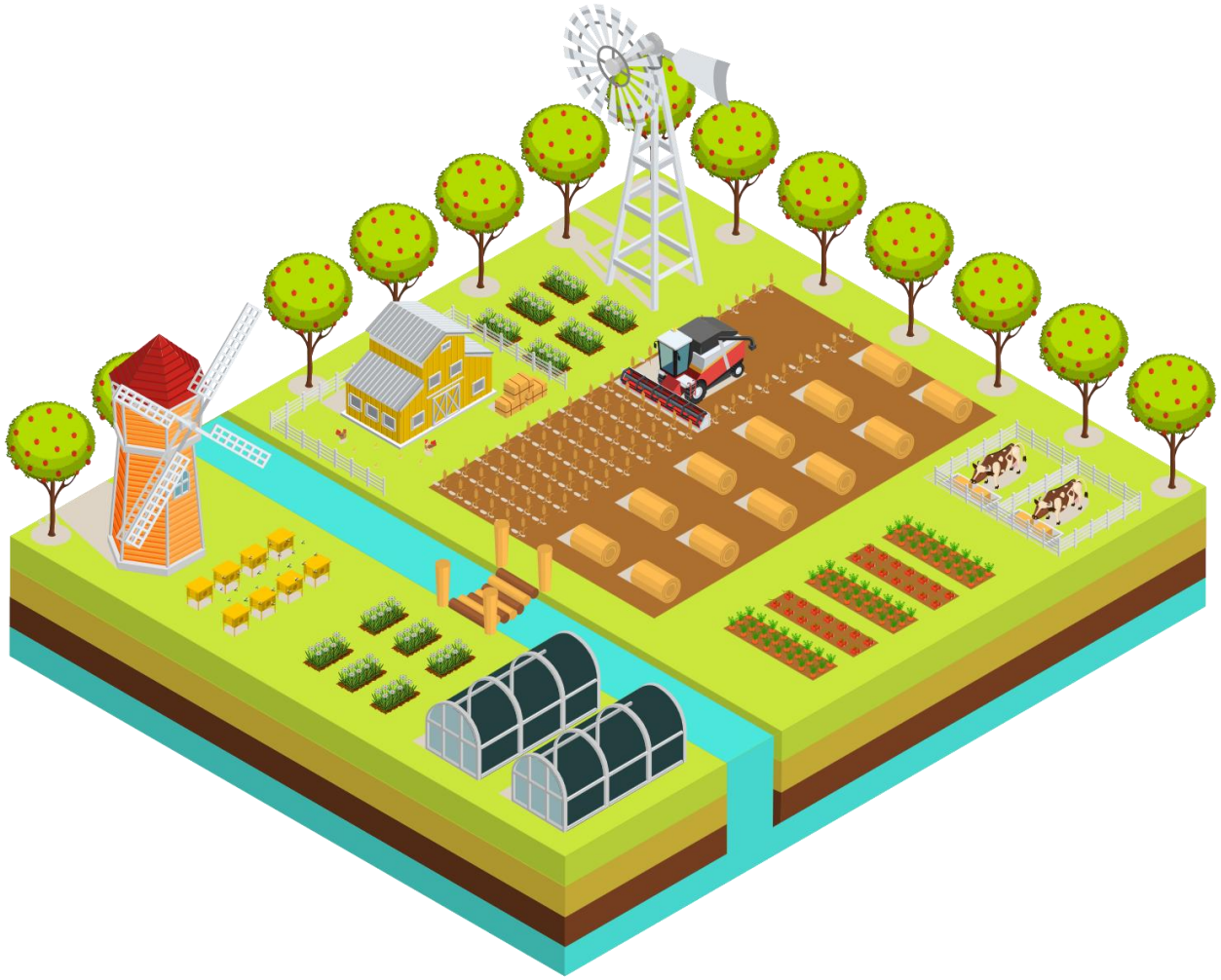
Things to Consider

- Population density of pest
- Nature of pest
- Environmental impact
- Use of ecofriendly pesticides

Mechanical Control

- Nets and Traps
- Utilizing friendly pest
- Use of resistant variety.

In case of increased pest attack pesticides should only be used in suggested quantities, keeping the precaution



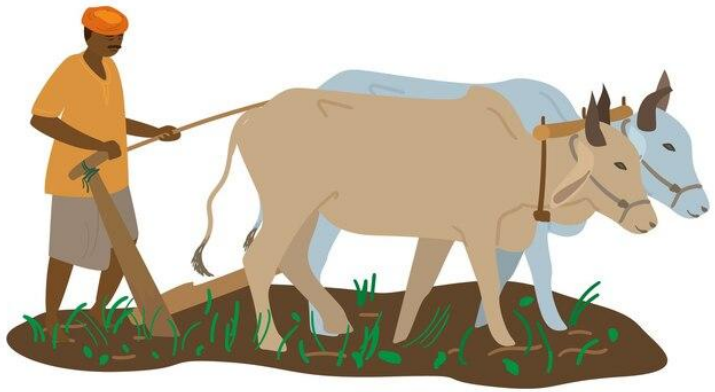
Integrated Farming

Nurturing diverse organisms together

JOE FREDY (HST)

Advantages

- Waste from one activity (like animal manure) is used as input for another (fertilizer for crops).
- Farmers earn from multiple sources: crops, fish, poultry, dairy, etc.
- If one farming activity fails, income from others provides security.
- Organic matter from livestock and crop residues enriches the soil.



Possibilities

- Combination of Crop + Dairy Farming
- Poultry Farming with vegetable cultivation
- Fish Farming integrated with rice fields (Rice-Fish culture)
- Horticulture + Bee Keeping for added income.
- Use of Biogas plants, utilizing animal waste for energy

Food Security

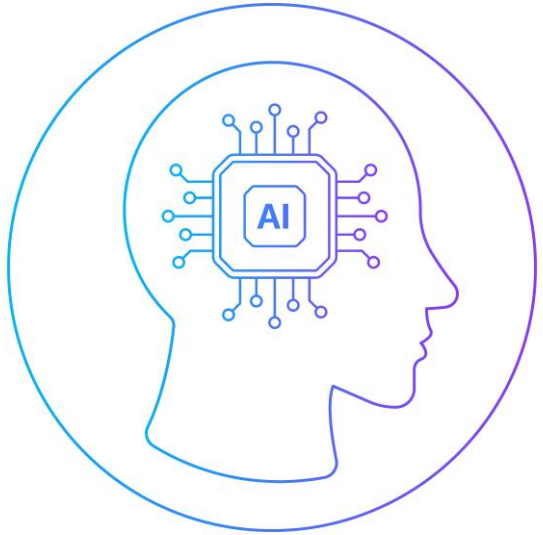
Integrated Farming enhances food security by ensuring continuous, diversified, and sustainable food production. By combining crops, livestock, poultry, fish, and horticulture on the same farm.

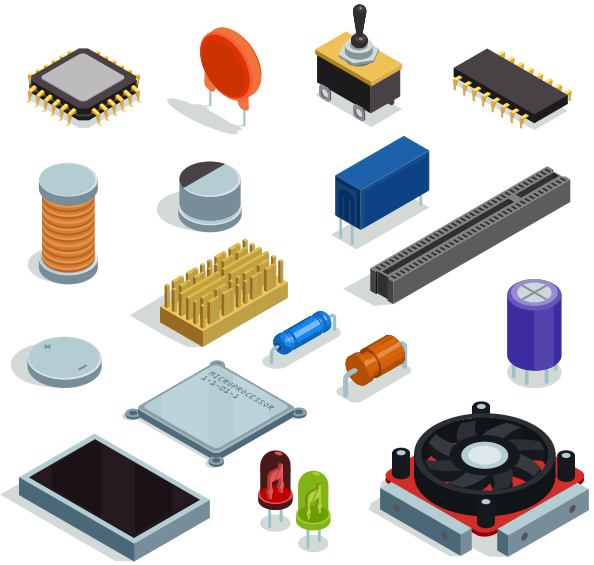
Reducing cost of production

The product of one become ones food or fertilizer. Animal waste (like cow dung, poultry droppings) is used as organic fertilizer for crops.Crop residues are used as animal feed or organic matter for soil improvement.

Smart Farming

- Smart farming is method that incorporates the use of sensor, GPS and Artificial Intelligence in farming.
- Using sensors, artificial intelligence, and the internet, reducing human effort with the help of modern machinery in the agricultural sector is referred to as Smart Farming.
- it mainly focuses on a system that can solve the issues of farming on its own.





The Young Farmer Is The Center Of Attention

Ernakulam: A young farmer in Ernakulam has become a role model by leaving his highly paid job in the IT sector to focus on farming. He has achieved great success by combining modern agricultural techniques with his IT expertise. He refers to his farming method as “Smart Farming”.

Possibilities of smart farming

Artificial Intelligence

By sharing images and information related to crops, you can find solutions to problems with the helpof artificial intelligence.

Internet of Things (IoT)

With the help of sensors, moisture, fertility and pest infestation are identified and a problem-solving system is prepared with the help of machines.

Hydroponics

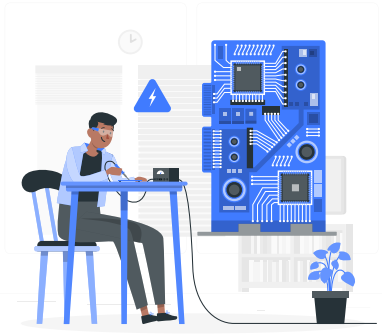
Plants are grown in nutrient solutions and with the help of sensors, the amount of nutrients is detected and provided as needed.

Aeroponics

Water and nutrients are delivered to the roots that grow into the air in a timely manner with the help of sensors.

Importance of Artificial Intelligence (AI)

Sharing of pictures and information regarding the farming which enables the solving of various issues such as application of fertilizers, types of fertilizers, pest control measures. The farmers can access these solutions in real time and use it in day to day bases.



Importance of Sensors

Internet of Things

The information obtained from sensors is transmitted to servers with the help of the internet, where it is analyzed, and the necessary instructions are sent to the machinery in the agricultural field. The machines operate accordingly to resolve issues. Activities like irrigation, fertilization, and pest control can be performed without human effort.

Hydroponics & Aeroponics

With the help of sensors, deficiencies in nutrients and moisture levels are detected, and they are supplied as required.

Efforts underway to get geographical indication status for Kerala Cashew

Kollam: Kerala is making a move to obtain a Geographical Indication (GI) tag for its cashews, specifically under the name "Kerala Cashew". This effort is being driven by the Kerala State Cashew Development Agency's Special Officer, who has submitted a recommendation to the central government. The Ministry of Commerce and Industry has to review and approve the application.

Geographical Indication

- GI (Geographical Indication) Tags are special label given to products that originate from a specific geographical area and have unique qualities, reputation, or characteristics linked to that locatic, ..
- GI tag protects products that are naturally or traditionally linked to a place. Ensures only products genuinely originating from that area can use the name.

Palakkadan Matta Rice

Malabar pepper

Kodungallur pottuvellari

Tirur Vettila

Kuttitattor Mango

Diversity in Agriculture

Farming of banana leaf

Horticulture

Poultry Farming

Betel Cultivation

Flori culture

Medicinal Plant Cultivation

Ornamental Fish Farming

Raising Pets

Benefits

- Protects environment
- Conserve biodiversity
- If one crop fails due to pests, diseases, or weather, income from other crops or activities helps.

Agriculture that can be done in limited space.

Horticulture can be done in limited spaces in bags and other.