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Precision Farming Handwritten Notes

Learn Grow Apply Succeed!

Small Steps Big Changes Greener Tomorrow!

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Data to Better Decisions

Observe Plan Improve

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Weather Data Healthier Plants

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Right Water Right Nutrients Better Yield!

Fresh Healthy Local

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Greener Ideas Brighter Futures!



Care Today Greener Tomorrow!

Good Practices → Healthy Plants → A Greener Planet

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Chapter 3

Precision Farming

"Smart Farming for a Better Tomorrow"



Figure 3.1: *'Health map' used for monitoring crop conditions in a field using remote sensing (satellite or drone imagery).*

In the figure, 17% of crops are in poor health and only 1% are in good health. Farmers use these data to make decisions related to irrigation, fertilisation and pest management for small areas of land.

Small Steps, Smart Technology, Big Impact!

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In this chapter, you will learn:



Learn about the use of technology in farming



Use agro-climatic data for deciding the mode of crop protection



Set up a humidity chamber for production of healthy seedlings



Estimate the quantity of compost for healthg growth of plants



Prepare a bio-fertiliser (LAB culture)



Build a low-tunnel



Harvest and label produce for distribution

Science
+
Technology
+
Better Yields
+
A Greener Planet

Precision Farming
= Healthy Plants
Healthy People
Healthy Planet

3.1 Introduction

- Precision farming uses science and technology to improve agricultural yield, while caring for the environment.
- 'Precision' means exactly as required and consistent, the same every time.
- It gives plants exactly what they need – the right amount of water, nutrients and care at the right time.

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3

Traditional Farming vs Precision Farming

Aspect	Traditional Farming	Precision Farming
Agro-climatic impact	No control on climatic parameters	Precise control on temperature, humidity, light intensity etc., through greenhouse, shade-net and forecast using meteorological data.
Seed sowing	Seed broadcasting or sowing with manual tools	Sowing with machinery at proper spacing and depth; modern nursery management.
Irrigation	Flood irrigation (watering entire field)	Targeted watering using drip/ sprinkler, guided by soil-moisture sensors and automated systems.
Fertiliser & pest management	Estimation of doses by experience	Need-based application based on soil analysis, data from drones, satellites, apps and experts.
Harvesting & packaging	Higher losses due to poor handling and packaging	Lower losses due to automated harvesters, sensors and advanced packaging with digital labels.

Why Precision Farming?

- Saves water and reduces wastage.
- Reduces excess use of fertilisers and pesticides.
- Grows healthier plants (especially useful in small nurseries).
- Examples: Greenhouses and shade-net.

Right Input
Right Time
Right Place
Better Yield!

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3.2 Process Chart

- A process chart lists all the tasks to be done, along with the estimated dates and the person responsible.
- It helps in planning the work in a systematic manner.
- It ensures that no important step is missed.
- It makes the project well organised and easy to follow.



3.2.1 Scoping Work

Before starting, we need to decide the scope of work:

1. **Work with farmers** – Assist local farmers who already use precision farming (work in small groups of 5-10).
2. **Set up a unit in school** – Establish a precision farming unit including a small plant nursery.
3. **Convert school garden** – Use technology-based inputs for decision making.

Questions to consider:

- ✓ Which plants should be grown?
- ✓ What is useful for school/ community?
- ✓ Where to set up the unit?

Key requirements:

- ✓ Level area with good ventilation.
- ✓ Space for greenhouse or support structures.
- ✓ Reliable water source for irrigation.
- ✓ Separate area for storage.
- ✓ Ensure sunlight and proper airflow.

3.2.2 Making a Process Chart

- List all activities (e.g., site visit, material collection, layout, sowing, maintenance, harvesting).
- Estimate the time required for each activity.
- Assign responsibility to team members.
- Use a table or flowchart format.

A good plan today leads to a successful precision farming unit tomorrow!

3.3 Site Visit

- Visit nearby farms or nurseries using precision farming.
- Observe the layout, irrigation, plant health and technologies used.
- Interact with farmers/experts and ask questions.
- Note down key observations to help in your own plan.



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3.4 Setting Up a Precision Farming Unit

A precision farming unit can be set up in a school, community area or in collaboration with local farmers. It uses technology and scientific methods to grow healthy plants efficiently in a limited space.

Key Components

1. Protected structure (greenhouse / shade-net)
2. Growing area (beds / trays / containers)
3. Irrigation system (drip / sprinkler)
4. Sensors and weather data
5. Nutrient and pest management
6. Storage and work area

Plan
Set up
Grow
Learn
Share!

Model of a Precision Farming Unit



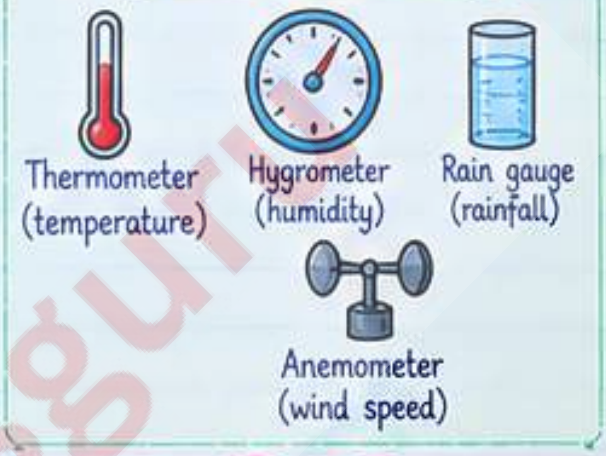
Even a small precision farming unit can make a big difference!
Start small, plan well and expand gradually.

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3.4.1 Collecting and Using Weather Data

- Weather data helps in deciding the right time for sowing, irrigation, fertilisation and crop protection.
- Important data: temperature, humidity, rainfall, sunlight, wind speed.
- Sources: weather stations, mobile apps, school weather instruments or government websites.
- Observe and record data regularly in a notebook or digital sheet.

Weather Instruments



Use of Weather Data

- ✓ Plan sowing and transplanting
- ✓ Schedule irrigation
- ✓ Decide on use of shade-net or greenhouse
- ✓ Predict pest and disease occurrence
- ✓ Choose suitable crops for the season

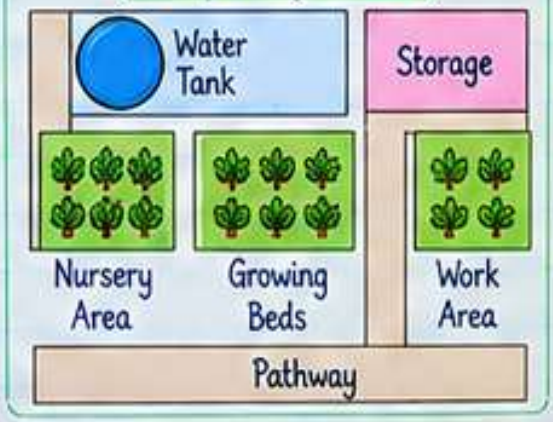
Right Information
Right Decisions
Better Crops!



3.4.2 Layout of the Unit

- Choose a level area with good sunlight and ventilation.
- Divide the space into different sections: nursery, growing area, water system, storage and work area.
- Keep pathways for movement and maintenance.
- Ensure proper drainage and water supply.
- Design according to available space and budget.

Example Layout Plan

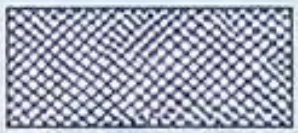


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3.5 Selecting Materials

- Choose materials that are durable, eco-friendly and easily available.
- Use recycled materials where possible.
- Select materials based on type of plants, available space and budget.
- Consider local climate and weight limits (if on rooftop).

Common Materials Used

 Pots / Containers (clay or plastic)	 Grow Bags (easy to handle)	 Wooden Boxes (recycled wood)	 Seed Trays (for nursery)
 Garden Soil	 Compost / Vermicompost	 Cocopeat (holds moisture)	 Gravel / Pebbles (for drainage)
 Shade-net (protection)	 UV Plastic Sheet (for greenhouse)	 Drip Irrigation Pipes (water saving)	 Net / Trellis (support for climbers)



Reuse ♻ Reduce ♻ Recycle

Save resources, save the environment!



Choose materials wisely to build a sustainable farming unit!

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3.6 Selecting Tools

- Use the right tools to make your work easier, faster and more efficient.
- Choose tools that are safe, easy to use and suitable for the available space.

Essential Tools for Precision Farming


Hand Trowel (for digging)


Pruning Shears (for cutting)


Watering Can (for light watering)


Hand Rake (for loosening soil)


Sprayer (for organic solutions)


Gloves (for safety)


pH Meter (for soil testing)

3.7 Bill of Materials (BoM)

- Make a list of all the materials, tools and other items required.
- Estimate the quantity and cost.
- This helps in budgeting and avoids last-minute expenses.

Example Bill of Materials for a Small Unit

S. No.	Item	Quantity	Estimated Cost (₹)
1	Grow bags (12 inch)	10	500
2	Potting mixture (soil + compost + cocopeat)	50 kg	300
3	Seed trays	5	250
4	Drip irrigation kit	1 set	700
5	Hand tools (trowel, rake, pruner)	1 set	400
6	Shade-net (2 m × 3 m)	1 piece	600
7	Miscellaneous (labels, trays, gloves etc.)	–	300

Benefits of Making BoM:

- ✔ Helps in planning
- ✔ Stays within budget
- ✔ Avoids wastage
- ✔ Easy to arrange materials
- ✔ Useful for future reference

Plan Today for a Greener Tomorrow!



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3.8 Building a Precision Farming Unit

- A precision farming unit cae built using simple structures and low-cost technology. It provides a controlled environment for better plant growth.

Key Components

- ✅ Humidity chamber (for seedlings)
- ✅ Low-tunnel (for protection)
- ✅ Drip irrigation system
- ✅ Use of organic fertiliser and biofertiliser
- ✅ Proper layout and regular maintenance

Small Steps
Big Changes
Healthy Plants
Happier Planet!

3.8.1 Humidity Chamber for Plant Nursery

- Helps in germination and healthy growth of seedlings.
- Maintains humidity, temperature and light as per requirement.
- Can be made using a transparent box, polythene sheet or old aquarium.
- Keep the chamber in a well-lit area (indirect sunlight).
- Open for some time daily for air circulation.

Use clean trays, good quality seeds and sterilised growing media.

Simple Humidity Chamber



Transparent cover (maintains humidity)

3.9 Preparing Organic Biofertiliser (LAB Culture)

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3.8.2 Low-Tunnel

- A low-tunnel is a small, covered structure made using a frame (bamboo/metal/plastic) and polythene sheet.
- It protects plants from cold, heavy rain, strong wind, pests and excessive sunlight.
- Useful for growing vegetables and leafy greens.
- It is inexpensive and easy to build.



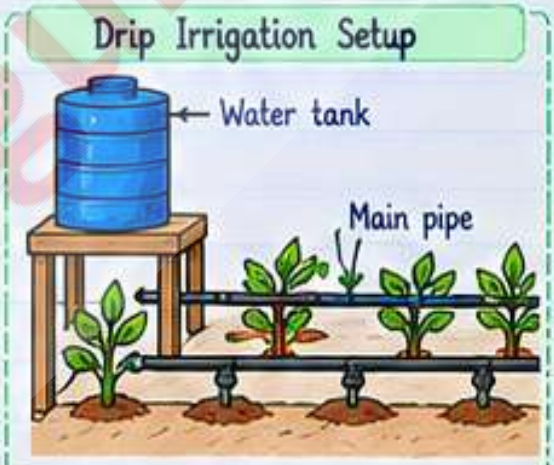
Polythene sheet over frame

3.8.3 Drip Irrigation System

- Supplies water directly to the root zone of plants.
- Saves water and reduces weed growth.
- Can be set up using pipes, drippers and a water tank.
- Useful for pots, grow bags and small plots.
- Ensure regular cleaning to avoid clogging.



Right amount of water
Right time
Healthier plants!



3.8.4 Use of Organic Fertiliser

- Organic fertilisers like compost, vermicompost and cocopeat improve soil health.
- They provide essential nutrients and increase water holding capacity.
- Use well-decomposed compost to avoid harmful effects.
- Mix in soil or potting mixture before planting.



Compost
for Healthy Soil

3.11 Harvesting, Packaging and Storage

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- LAB (Lactic Acid Bacteria) culture is a natural biofertiliser.
- It helps in faster decomposition of organic matter.
- Improves soil health and promotes plant growth.
- Easy and low-cost method.

Natural
Safe
Eco-friendly
Good for Soil
Good for Plants

Simple Method to Preparre LAB (Rice Water Method)



1. Take 1 cup cooked rice + 3 cups water (in a clean jar)



2. Cover with cloth and keep in a warm place for 3-5 days



3. Strain the liquid (white, slightly sour smell)



4. Store in a clean bottle (use within 1-2 months)

3.10 Pest Management

- Regular monitoring helps in early identification of pests.
- Use organic methods like neem oil spray, soap solution or garlic-chilli spray.
- Encourage beneficial insects (ladybugs, lacewings).
- Keep the area clean and remove affected leaves.
- Avoid excessive use of chemical pesticides.

Healthy Plants
Healthy Food
Better Future!



Neem oil spray (natural pesticide)



Beneficial insect (ladybug)



Keep plants healthy and pest-free!

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Harvesting

- Harvest at the right time (for best quality and taste).
- Use clean scissors or knife.
- Handle produce carefully to avoid damage.



Freshly Harvested
Freshly Enjoyed!

Packaging

- Clean and sort the produce.
- Remove damaged or unhealthy parts.
- Use eco-friendly and reusable packaging (paper bags, cloth bags, baskets).
- Label the produce (if required).

Storage

- Store in a cool, clean and dry place.
- Some vegetables can be refrigerated for longer shelf life.
- Keep away from direct sunlight.
- Use proper containers to maintain freshness.

3.12 Safety and Good Practices

- Use tools and equipment carefully.
- Wear gloves while handling soil, compost or biofertilisers.
- Keep the area clean and hygienic.
- Ensure proper ventilation and sunlight.
- Use safe and organic methods for pest control.
- Save water and avoid wastage.
- Follow all safety guidelines while working.

Safe Gardening
Happy Gardening!





3.13 Let's Assess Your Learning

- ☐ What is precision farming?
- ☐ List the main components of a precision farming unit.
- ☐ How does a humidity chamber help in plant growth?
- ☐ Why is drip irrigation useful?
- ☐ What is LAB culture?
- ☐ How can pests be managed organically?
- ☐ Write the steps for harvesting and storing produce.
- ☐ Give two safety measures while working in the garden.

Learn
Apply
Grow
Do Better!

Green Ideas Today, Greener Tomorrow!