

◆ Introduction

- Food provides nutrients (carbohydrates, proteins, fats, vitamins, minerals) for growth & health.
- Main food sources: Plants (agriculture) and animals (husbandry).
- India needs higher food production due to growing population.
- Limited land → focus on improved production techniques → sustainable agriculture is the key.

✓ Mixed farming, intercropping, and integrated farming systems are suggested for better income and food security.

◆ 12.1 Improvement in Crop Yields

Main food crops:

- Cereals → wheat, rice, maize
- Pulses → gram, pea, moong, urad
- Oilseeds → mustard, sunflower, groundnut
- Vegetables & fruits → vitamins & minerals
- Fodder crops → berseem, oats, Sudan grass

📅 Cropping seasons:

- Kharif (June–Oct) → paddy, maize, soybean
- Rabi (Nov–April) → wheat, mustard, gram

◆ 12.1.1 Crop Variety Improvement

📖 **Definition:** Developing new varieties with better characteristics.

✓ Methods:

- Hybridisation: Crossing of different varieties
→ intervarietal, interspecific, intergeneric
- Genetic modification (GM): Adding desirable genes

✓ Features desired:

- High yield
- Better quality (e.g., protein in pulses)
- Resistance to biotic (diseases, pests) & abiotic stress (drought, salinity)
- Short maturity → more crops/year
- Wider adaptability (grow in different areas)
- Desirable traits (e.g., dwarfness in cereals, tall in fodder)

◆ 12.1.2 Crop Production Management

📖 Depends on farmer's resources:

- No cost → traditional methods
- Low cost → improved practices
- High cost → fertilizers, machinery

(i) Nutrient Management

📖 Plants need:

- Macronutrients → N, P, K, Ca, Mg, S
- Micronutrients → Fe, Zn, Cu, Mn, B, Mo, Cl

📖 Sources:

- Air → Carbon, Oxygen
- Water → Hydrogen
- Soil → rest of the nutrients (🇮🇹 Table 12.1)

📖 Types:

- Manure → from waste, adds organic matter
 - Compost/vermi-compost
 - Green manure (e.g., sun hemp, guar)
- Fertilizers → chemical compounds with NPK
 - Boost yield but overuse harms soil & water

📖 Organic farming:

Use of manure, bio-agents (e.g., neem, turmeric), crop rotation for sustainability.

(ii) Irrigation

📖 Irrigation = water supply during crop growth
→ Increases yield even in poor monsoon

Types:


- Wells → Dug well, tube well
- Canals → large-scale irrigation system
- River lift → water pumped from rivers
- Tanks → small storage ponds

New methods:

Rainwater harvesting, watershed management (check dams)

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(iii) Cropping Patterns

- Mixed cropping → Two/more crops on same field (e.g., wheat + mustard)
 - Intercropping → Crops in definite row pattern (e.g., bajra + cowpea)  Fig. 12.2
 - Crop rotation → Crops grown in a planned sequence
→ Improves soil health, prevents pest buildup
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◆ **12.1.3 Crop Protection Management**

Problems:

- Weeds → compete for nutrients
- Insects → cut, suck or bore crops
- Diseases → by fungi, bacteria, viruses

Control:

- Chemical → pesticides, herbicides, fungicides
 - Mechanical → hand weeding
 - Preventive → crop rotation, intercropping, summer ploughing
 - Resistant varieties & timely sowing
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Activity 12.1:

Visit field & list weeds, pests, and crops found.

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◆ **Storage of Grains**

Problems:

- Biotic → insects, rats, fungi
- Abiotic → moisture, temperature

Preventive Measures:

- Dry grains well
- Clean storage
- Fumigation before storage

Activity 12.2:

Collect cereal/pulse/oilseed samples & note sowing-harvest seasons.

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◆ **12.2 Animal Husbandry**

 **Definition:** Scientific care of livestock for food (milk, eggs, meat).

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◆ **12.2.1 Cattle Farming**

 **Purpose:**

- Milch animals → milk (e.g., Red Sindhi, Jersey)
- Draught animals → farm work (e.g., bulls)

 **Improved by:**

- Cross-breeding (foreign + local breeds)
- Proper feeding → roughage + concentrate
- Clean sheds, vaccinations
- Parasite control → internal & external

Activity 12.3:

Visit a dairy farm and note breeds, milk output, feed.



 *Fig. 12.3 – Indian cattle breed*

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◆ 12.2.2 Poultry Farming

📖 For:

- Layers → egg production
- Broilers → meat

✅ Breeding aims for:

- Healthy chicks
- Dwarf parents (less feed)
- Heat resistance
- Better feed conversion

📖 Management:

- Clean housing
- Balanced feed (protein, vit A, K)
- Vaccinations

🔬 Activity 12.4:

Visit poultry farm and record feed, lighting, types of birds.



Aseel



Leghorn

📷 Fig. 12.4 – Aseel and Leghorn

◆ 12.2.3 Fish Production

📖 Types:

- Capture fishing → natural water bodies
- Culture fishery → farmed (aquaculture)

✅ Water types:

- Marine → Tuna, Pomphret, Prawns
(using nets, sonar, satellites)
→ Also mariculture = seawater farming

- Inland → Canals, rivers, ponds
→ Composite fish culture = 5–6 species in 1 pond
(e.g., Catla, Rohu, Mrigal, Grass carp)

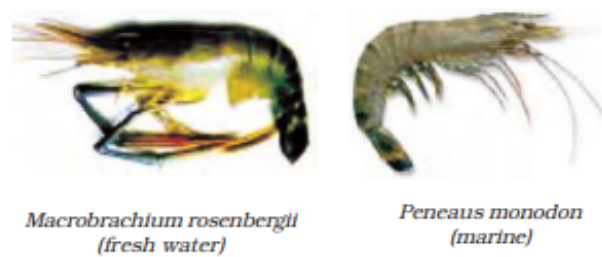


Fig. 12.5 : Fresh water and marine prawns

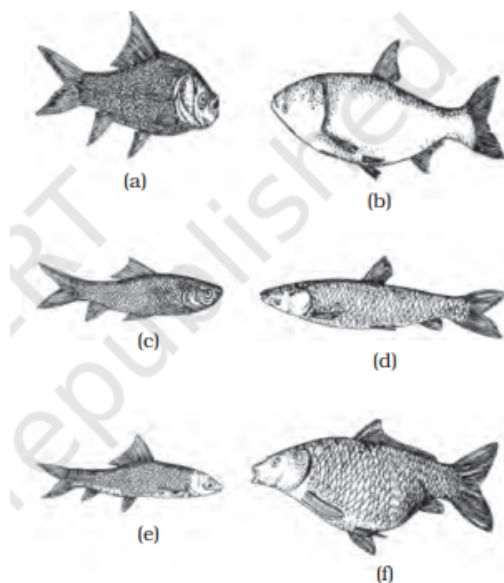


Fig. 12.6: (a) Catla (b) Silver carp (c) Rohu (d) Grass Carp (e) Mrigal (f) Common Carp

Fig. 12.5 & 12.6 – Fish species

✓ Problem:

Seasonal breeding → solved by hormonal breeding

Activity 12.5:

Visit fish farm, note fish types, pond system, feed.

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◆ **12.2.4 Bee-Keeping (Apiculture)**

Products: Honey, wax

→ Low investment, high return

Common bee species:

- Indian bee → *Apis cerana indica*

- Italian bee → *Apis mellifera*
→ more honey, docile, better breeding

📖 Pasturage = Flowers available for nectar
→ Determines quality/taste of honey



*Fig. 12.7: (a) Arrangement of beehive in an apiary
(b) honey extractor*

📷 Fig. 12.7 – Beehive, Honey extractor

📖 Summary – What You Have Learnt

- Crop variety & production can be improved with proper planning.
- Nutrients come from manure, fertilizers, and water.
- Organic farming avoids chemicals, focuses on natural input.
- Cropping patterns like intercropping & rotation improve yield.
- Animal husbandry includes proper shelter, feeding & vaccination.
- Poultry & fish farming need careful selection & care.
- Bee-keeping = low-cost, profitable enterprise.