Improvement in Food Resources

Plants
↑
Herbivores ← Carnivores

Human beings major food resource
→ Plants, Animals

The resources are not sufficient for growing population.

Need of improvement

15.1 Improvement in Crop Yields

Carbs, Necessary Fats, Proteins, Vitamins and minerals

Cereals such as wheat, rice, maize, millets and sorghum provide us carbohydrate for energy requirement.

Plant's basic requirement
↑
Sunlight, water, air, nutrients etc.

Rajasthan → Rain ↓
Meghalaya → Rain ↑
Diff plants

Sunlight ↑ Flowers ↑
Sunlight ↓ Vegetative growth ↑

Different crops require different climatic conditions, temperature and photoperiods for their growth and completion of their life cycle. Photoperiods are related to the duration of sunlight. Growth of plants and flowering are dependent on sunlight. As we all know, plants manufacture their food in sunlight by the process of photosynthesis. There are some

Kharif Season → Rainy season → June to October
ex - Rice, Soyabean, Sugarcane etc.

Rabi Season → winter Season → Nov to April → ex. Wheat, Potato, Mustard etc.

harvested crops from loss. Thus, the major groups of activities for improving crop yields can be classified as:

- Crop variety improvement
- Crop production improvement
- Crop protection management.

Crop Variety Improvement

max 30°C → Max 35°C

better flavour + disease resistance → disease resistance + better flavour

varieties is by hybridisation. Hybridisation refers to crossing between genetically dissimilar plants. This crossing may be intervarietal (between different varieties), interspecific (between two different species of the same genus) or intergeneric (between different genera). Another way of improving

intervarietal → Wheat + Rice
interspecific → Mango → Diff species → Genus same, species differ
intergeneric → Mule → (Male donkey + Female horse) → Genus and species different

→ Another way of improving the crop is by introducing a gene that would provide the desired characteristics.

Factors of crop variety improvement

- Higher yield: To increase the productivity of the crop per acre.
- Improved quality: Quality considerations of crop products vary from crop to crop. Baking quality is important in wheat, protein quality in pulses, oil quality in oilseeds and preserving quality in fruits and vegetables.
- Biotic and abiotic resistance: Crops production can go down due to biotic (diseases, insects and nematodes) and abiotic (drought, salinity, water logging, heat, cold and frost) stresses under different situations. Varieties resistant to these stresses can improve crop production.
- Change in maturity duration: The shorter the duration of the crop from sowing to harvesting, the more economical is the variety. Such short durations allow farmers to grow multiple rounds of crops in a year. Short duration also reduces the cost of crop production. Uniform maturity makes the harvesting process easy and reduces losses during harvesting.
- Wider adaptability: Developing varieties for wider adaptability will help in stabilising the crop production under different environmental conditions. One variety can then be grown under different climatic conditions in different areas.

Pulses → Protein — Amino acids
Oil seeds → oil → Fatty acids

Using hybridisation or genetically modification.

3-4 months → 3-4 mon
2 → 3
20ps / 1 yr → Kashmir → Apple is

- Desirable agronomic characteristics: Tallness and profuse branching are desirable characters for fodder crops. Dwarfness is desired in cereals, so

Proof

that less nutrients are consumed by these crops. Thus developing varieties of desired agronomic characters help give higher productivity.

Grown primarily as food for animals.

15.1.2 Crop Production Management

high cost → Good quality seeds, high tech machinery
No cost → Poor Financial conditions.
low cost → Medium Financial condition.

Nutrient Management

Humans — balanced diet

Nutrients are supplied to plants
↳ air, water and soil.

16 major elements → (C, H, O) → from air & water

Rest 13 elements are supplied by soil.

→ Macronutrients - large
→ Micronutrients - small

Macronutrients
↳ NPK and three other nutrients are called Mega Super.
Nitrogen, Phosphorus, potassium
Calcium, Magnesium, Sulphur

Micronutrients
↳ FeB Morning CuMn Nick Zn Class chlorine
Iron, Boron, Molybdenum, copper, Manganese, Nickel, Zinc

Manure

✓ Most of the nutrients for plant growth come from soil (Humus of soil).

✓ Small quantities of nutrients to the soil.

→ Manures are also known as Natural Fertilizers?

Why? Soil infertile ↳ Natural calamities
↳ Cultivating the crops again and again.

Manure < Compost and vermicompost, Green manure.

11:30 AM

Compost and Vermicompost

→ composting

↑ using earthworms to hasten the process — Vermicompost

Green Manure

6–8 weeks (Flowering stage)

1–2 months (buried)

enriching the soil in Nitrogen and phosphorus.

In soil organic matter + nutrients

Fertilizers

✓ Commercially produced plant nutrients.

✓ N, K, P.

→ Fertilizers can't be applied in Juvenile stage

Irrigation

→ All living organisms require water – (humans as well as plants)

↑ photosynthesis – sunlight, water, CO_2

→ plants water requirement are fulfilled by rain as well

Irrigation { Fresh water resources }
- Rivers
- Ground water

Wells – Two types of wells
- Dug wells
- Tube well

Water bearing strata – Earth's layer where water is present.

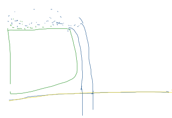
Canals

→ distributories

River lift systems – Canal system fails, River lift systems comes into picture

Tanks → Overhead Tanks → Ground Tanks

Rainwater harvesting →



Cropping patterns

→ Farming with planning → Planned Farming

→ Grow suitable crops with respect to the Soil & climatic conditions of that region.

Mixed Cropping

Eg – Rice – 6 months ↑ No income

along with Rice, we'll also cultivate some other crops which can be harvested in 2–3 months so that it could give me some

Intercropping

Inter-cropping is growing two or more crops simultaneously on the same field in a definite pattern (Fig.15.2). A few rows of one

1:1 (main crop, inter crop), 1:2, 1:3 (main, inter)

ex – Wheat + Gram ↑ leguminous crops ↳ does Nitrogen Fixation

Wheat	Gram

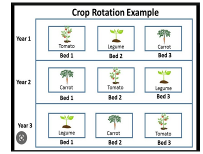
↳ it increase the nitrogen in soil.

1:2

Crop A → Ca; Crop B → N

Crop rotation

✓ Legumes :- Converts atmospheric Nitrogen into Nitrogen oxide because it contains Nitrogen Fixing bacteria.



✓ Mostly legumes are included in crop rotation to increase soil fertility.

→ Fertilizers use is decreased.

Crop Protection mgmt

Crops have to protected from :-
(i) Weeds
(ii) Insect pest
(iii) Diseases

Weeds

→ wild, unwanted plants, grow in between crops are called weeds.

E.g – Xanthium, Parthenium, Cyperinus rotundus

→ weeds complete for food, nutrients, water, space and light, thus reduce the growth of crop.

Methods to control weeds

(i) Mechanical methods – uprooting of weeds with the help of hand, shovel, ploughing etc.

(ii) Preventive methods – This include
- → Proper bed preparation.
- → Timely sowing of seed.
- → Intercropping, crop rotation.

(iii) Chemical methods ↓ Spraying weedicides.

Pests

– Insects or animals which destroy the crop plants are called pests.

Generally insect pests attack the plants in three ways: (i) they cut the root, stem and leaf, (ii) they suck the cell sap from various parts of the plant, and (iii) they bore into stem and fruits. They thus affect the health of the crop and reduce yields.

Pests can be controlled by –
- → Using resistant varieties
- → Summer ploughing – During summer, fields are ploughed deep to destroy weeds & pests.

Crop diseases

- Diseases are caused by pathogens like - bacteria, fungi & viruses
- Pathogen are transmitted through soil, water & air.
- → Diseases are controlled by the use of :
  - Fungicides
  - Disease resistance variety.

Storage of grains

During storage of grains, high losses can occur.

→ Factors responsible for losses can be :

(i) Biotic (living) factors :- rodents, fungi, insects, mites & bacteria.

(ii) Abiotic (non living) factors :- Inappropriate moisture & temperature in the place of storage.

These factors cause :

(i) Degradation in quality.

(ii) Poor germination capacity.

(iii) Discolouration of produce.

(iv) Loss in weight.

These lead to poor marketability & economic loss.

Preventive and control measures are used before grains are stored for future use. They include strict cleaning of the produce before storage, proper drying of the produce first in sunlight and then in shade, and fumigation using chemicals that can kill pests. → with fumes you're killing the pests.

(i) Proper treatment & systematic management of warehouse.

Animal husbandry

scientific regime of animal livestock.

Cattle farming

purposes

Milk

The milk producing females are called milch animals (or dairy animals).

Draught labour

The male used for farm labour are called draught animals.

(tilling, irrigation, carting)

→ Indian cattle species

(i) Cow — Bos indicus

(ii) Buffalow - Bos bubalis

Lactation period → duration of milk production after the birth of a calf.

Breeds

- Exotic or foreign breeds (long lactation period)
  Eg :- Jersey, Brown swiss
- Indigenous or local breed (disease resistant)
  Eg :- Red sindhi, sahiwal

→ cross breed (desired quality)

Farm management

- Regular brushing of animals to remove dirt & loose hairs.
- Sheds should be well ventilated & roofed shed.
- The floor of cattle-sheds needs to be sloping.
- Cattle shed should be spacious & cleaned regularly.

Food

purpose

For maintenance (Food for healthy life)

For producing milk (Food during lactation period)

Cattle feed

Roughage

- Mainly fibrous with low nutrients
- Eg :- Green fodder, silage, hay, legumes etc.

Concentrate

low fibre but high proteins & other nutrients.

Eg - Gram, bajra etc.

Diseases

→ Diseases caused by parasites

External

Eg - lice, mites etc.

Internal

Eg - worms, flukes etc.

→ Infectious disease

→ Non infectious disease

- Vaccination can be given to farm animals against virus & bacterial diseases.

Poultry farming

- Purpose
  - eggs — Layers ← hens preserved for eggs
  - meat — Broilers ← " " meat

- Breeds
  - Indian breed (e.g. Aseel)
  - foreign breed (e.g. Leghorn)

Both Indian and foreign breeds are crossed to get new variety with desirable traits like :

(i) Increase in the number & Quality of chick.
(ii) Reduction in size of egg laying bird.
(iii) Dwarf broiler parent for commercial chick production
(iv) Summer adaptation / tolerance to high temp.
(v) low maintenance requirement.