IMPROVEMENT IN FOOD RESOURCES

CONTENTS

All living organism require food for their existence. Food provide energy for their growth, development & body repair.

➢ CROP SEASONS

◈ **Kharif Season Crops :**

- These crops are grown during the rainy season from the month of **June to October**, e.g., Paddy (rice), soyabean.

◈ **Rabi Season Crops :**

- These crops are grown during the winter reason from the month of **November to April**. e.g. wheat, gram, peas.
- Crop rotation can be defined as the practice of growing of different crops on a piece of land in a preplanned succession.

Improvement in food resources can be classified into three steps -

➢ CROP VARIETY IMPROVEMENT

This step is depends on a crop variety that can give a good yield.

A common way for getting a new variety having all desirable change is "Hybridization."

Crops for high yield, should have following characters -

(i) Resisstance for biotic & abiotic factors.

(ii) Resistance to disease & pests.

(iii) Desirable agronomic characters like tallness is desirable for fodder crops & dwarfness is desirable for cereals.

➢ CROP PRODUCTION MANAGEMENT

Crop production management included practices which help in lomering of soil erosion., provide better facility for maximum utilization of nutrient, improve the fertility of soil enhance crop production.

◈ **Nutrient management :**

- Like other living organisms, plants also require nutrients for building their structure and maintaining their body functions. The plants require inorganic elements, which they chiefly obtain from the soil, where these elements occur in the form of **minerals.** Besides soil, the nutrients are also supplied to plants by air and water. The major elements supplied by air are carbon and oxygen. The hydrogen comes mainly from water. Soil is the main source to supply rest of essential elements to plants. There are sixteen elements which are essential for plants. These are

1. Carbon, 2. Hydrogen, 3. Oxygen
4. Nitrogen 5. Phosphorus, 6. Potassium,
7. Calcium, 8. Magnesium, 9. Sulphur
10. Iron, 11. Manganese 12. Boron,
13. Zinc, 14. Copper,
15. Molybdenum 16. Chlorine.

- Out of sixteen nutrient elements required by plants, Carbon and oxygen are supplied by air, Hydrogen is supplied by water and remaining thirteen (13) elements are supplied by soil. Six of these elements are required in large amounts. They are called **macro-nutrients.** The elements categorized as macronutrients are : Nitrogen, Phosphorus, Potassium, Calcium, Magnesium and sulphur. The remaining seven elements , required in trace or micro amounts, are called **micronutrients.** They are Iron, Boron, Zinc, Copper, Molybdenum and Chlorine.

Nutrients Supplied by air, water and soil.

Source	Nutrients
Air	Carbon, Oxygen
Water	Hydrogen
Soil	(i) **Macronutrients.** Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Sulphur.
	(ii) **Micronutrients.** Iron, Manganese, Boron, Zinc, Copper, Molybdenum, Chlorine.

- To overcome the problem of deficiency of mineral nutrients and to increase the yield, the soil can be enriched by supplying these nutrients from the external sources. The major materials which are added into the soil to improve and maintain its fertility are grouped under two broad categories :

◈ **Manures and fertilizers :**

Manures :

- Manure are organic substances obtained from the decomposition of animal wastes, like cow dung and vegetable wastes by the action of microbes.

- **Types of Manures :**

(i) Farmyard Manure (FYM) -

- It is formed by the decomposition of a mixture of cattle excreta (dung), urine of cattle, litter and roughage.
- By the action of micro-organisms all these materials decompose and are used as farmyard manure (FYM).

(ii) Compost :

- Compost is a biological process in which the above mentioned organic matter is decomposed by both aerobic and anaerobic micro-organisms.

(iii) Green Manuring :

- The practice of green manuring includes growing turning or ploughing and mixing of green crops with soil to improve physical structure and soil fertility.
- Green manures may include both leguminous and non leguminous plants.

Fertilizers :

- Fertilizers are the sources of plant nutrients manufactured commercially from chemicals. They are inorganic or organic compounds containing necessary plant nutrients such as nitrogen, phosphorus and potassium.
- The chemical substance which can be used as a fertilizer must have the following characteristics :
- It must be soluble in water.
- It should be easily assimilated by plants.
- It should be fairly stable.
- It should not be injurious to plants.
- It should not disturb pH of the soil.
- It should be cheap.

- Fertilizers are classified according to the element (N, P or K) which they supply to the soil.
  (i) Nitrogeneous fertilizers
  (ii) Phosphatic fertilizers
  (iii) Potash fertilizers
  (iv) NPK fertilizers

(i) Nitrogenous Fertilizers :

- The important nitrogenous compounds used as fertilizers are :
  Ammonium sulphate, $(NH_4)_2SO_4$
  Calcium cyanamide, $CaCN_2$
  Calcium ammonium nitrate, $Ca(NO_3)_2$, NH_4NO_3
  Basic calcium nitrate, $Ca(NO_3)_2$, CaO
  Urea, $(NH_2–CO–NH_2)$

(ii) Phosphatic Fertilizers :

- The minerals of phosphorus such as phosphorite, $[Ca_3(PO_4)_2]$ and apatire, $[3Ca_3(PO_4)_2 \cdot CaF_2]$ are sparingly soluble in water and thus do not serve as source of phosphorus for plants. These are, therefore, converted into soluble materials which can act as good fertilizers. The important phosphatic fertilizers are :
  Calcium superphosphate
  Nitrophosphate
  Triple phosphate
  Phosphatic slag

(iii) Potash Fertilizers :

- Potassium nitrate, potassium chloride and potassium sulphate are used as fertilizers.

(iv) NPK Fertilizers :

- Fertilizers containing N, P and K in suitable adjusted proportions are known as NPK fertilizers. These are obtained by mixing nitrogenous, phosphatic and potash fertilizers in suitable proportions.

◈ **Irrigation :**

- Irrigation the process of providing water to the soil for the purpose of supplying moisture essential for plant growth.

◈ **Irrigation method :**

- Wells : There are two types of wells, namely dug wells and tube wells. In a dug well, water is collected from water bearing strate. Tube wells can tap water from the deeper strate. From these wells, water is lifted by pumps for irrigation.
- **Canals :** This is usually an elaborate and extensive irrigation system. In this system canals receive water from one or more reservoirs or from rivers. The main canal is divided into branch canals having further distributaries to irrigate fields.
- River Lift Systems : In areas where canal flow is insufficient or irregular due to inadequate reservoir release, the lift system is more rational. Water is directly drawn from the rivers for supplementing irrigation in areas close to river.
- Tanks : These are small storage reservoirs, which intercept and store the run-off of smaller catchement areas.

◈ **Cropping pattern**

Mixed Croppoing :

- The process of mixing seeds of two or more different crops and then sowing then in the same field is called **mixed cropping**.
- Example of mixed cropping -
  (a) Wheat + mustard
  (b) Maize + urad
  (c) Arhar + mung
  (d) Ground nut + sunflower

◈ Advantages of Mixed Cropping :

- There is lesser risk of total crop failure because if one crop fails, then the other crop helps the farmers to overcome his loss.
- Farmers get a variety of products for their family by growing crops under the mixed cropping system, e.g. cereals, pulses, fodder and vegetables may be grown simultaneously.

◈ Intercropping :

- Intercropping is a special type of mixed cropping in which two or more crops are grown simultaneously in the same field following a definite row pattern.

Differences between mixed cropping and intercropping :

	Mixed cropping	Intercropping
1	Marketing of only mixed produce is possible	Produce of each crop can be marketed sepa- rately
2	It is difficult to apply pesticides to individ- ual crop	Pesticides can be app- lied easily to the indiv- idual crop
3	Prior to sowing, the seeds of two crops are mixed	Seeds of two crops are not mixed before sow- ing
4	There is no set pattern of rows	A pattern of rows is observed

➢ CROP ROTATION

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The growing of different crops on a piece of land in a pre-planned succession is called crop rotation.

Depending upon the duration, crop rotation may be of following three types :

(a) One year rotation

1. Maize - Mustard
2. Rice - Wheat

(b) Two years rotation

1. Maize - Mustard-Sugarcane - Fenugreek
2. Maize - Potato- Sugarcane - Peas

(c) Three years rotation

1. Rice - Wheat - Mung - Mustard
2. Sugarcane - Berseem
3. Cotton - Oat - Sugarcane - Peas - Maize - Wheat

◈ Selection of Crops of Rotation :

- Source of moisture (through rain or irrigation).
- Status of nutrients in the soil.
- Availability of inputs (such as fertilizers, pesticides, man power and machine power).
- Duration of crop short or long
- Marketing and processing facilities.

◈ Advantages of Crops Rotation :

- Crop rotation helps in replenishment of soil fertility.
- It prevents depletion of selective nutrients.
- It prevents building up of diseases and pests of particular crop.
- It enhances the production by increasing the soil fertility.

◈ Organic Farming :

- Manures are natural fertilizers. They are bulky sources of organic matter which supply nutrients in small quantities but organic matter in large quantities. Manures include farmyard manure (FYM). Compost, green manures, vermicompost, etc.

◈ Advantages of Manures :

Manures affect the soil in following three ways :

- The manures enrich the soil with nutrients. They replenish the general deficiency of nutrients in the soil. Since manures contain nutrients in small quantities, they are needed to be applied in large quantities.
- The manures add organic matter (called humus) to the soil which restores the soil texture for better retention of water and for aeration of soil. For example, organic matter present in the manures increases the water holding capacity in sandy soils and drainage in clayey soil
- The organic matter of manures provide food for the soil organisms (decomposers such as bacteria, fungi, etc.) which help in making nutrients available to plants.
- Thus, organ is manures help to improve the physical properties of soil, reduce soil erosion, increase the moisture holding capacity of soil and above all these advantages, they are low cost nutrient carriers.

➢ CROP PROTECTION MANAGEMENT

◈ Crop protection management :

- Field crops are affected by a large number of weeds, pestes disease which cause damage the crops & reduce their productivity.

◈ Weeds :

Weeds are unwanted plants which complete with main crop for nutrition & reduce the growth of crop.

Examples of weeds : -

* Wild sorghum
* Chaulai
* Bathua
* Parthenium

◈ Methods of weed control :

- Mechanical methods
- Chemical or use of weedicides
- Biological

◈ Pests :

- Harmful creatures for our crop plants are small insects which attack the plants in three ways :

◈ Insect Pest Control :

- Based on the mode of attack, the insect pests are of following three types :

◈ Chewing Insects :

- They cut and chew root, stem and leaves of the plants with the help of their chewing type of mouth parts. e.g., grass hoppers, locusts, caterpillars, grubs etc.

◈ Sucking Insects :

- They suck the cell sap from different parts of the plants with the help of piercing and sucking mouth parts. eg. Aphids, leaf hoppers, plant bugs, etc.

◈ Borer Insects :

- They bore and enter different plant parts, and feed on the plant tissues eg. Sugarcane borer, pod borers, cotton ball weevil, grain weevils, etc.

◈ Methods of Insect Pest Control :

- The root cutting type of insects can be controlled by mixing insecticide in the soil.
- The stem and leaf cutting and boring type of insects can be controlled by dusting or spraying the contact insecticides. eg., malathion, lindane.
- The sap sucking insects can be controlled by spraying systemic insecticides.

➢ DISEASE CONTROL

- A wide variety of plant pathogens such as bacteria, viruses and fungi, exist in our environment.
- Pest infect and cause serious diseases in our crops.
- The diseases caused by these pathogens include blast in paddy (rice), rust in wheat, red rot in sugarcane.
- Based on the mode of transmission, plant diseases are of following four types -

Seed Borne Diseases :

- The diseases which spread through seeds are called seed borne diseases, e.g., loose smut of wheat, leaf spot of rice.

Soil Borne Diseases :

- The soil borne diseases mostly affect roots and stems of crop plants, e.g., smut of bajra, tikka disease of groundnut.

Air Borne Diseases :

- The air diseases attack all aerial parts of the plants like leaves, flowers and fruits. e.g., rust of wheat, blast of rice.

Water Borne Diseases :

- The diseases which are transmitted through water are termed as water borne diseases. e.g., bacterial blight of rice.

➢ STORAGE OF GRAINS

- Proper and safe storage of food grains is necessary to ensure their availability throughout the year.
- The various factors that contributes to this loss can be placed into two categories -

Biotic Factor :

- Such as insects, rodents (e.g., squirrel, rat), birds (e.g., sparrow, crow, pigeon), fungi, mites and bacteria.

Abiotic Factor :

- Such as moisture content and temperature.
- Higher temperature (i.e., 30 – 32ºC) of stored grains make them liable to decay.
- The various types of damages caused by the above factors include
  (a) Infestation in insects,
  (b) Degradation in quality,
  (c) Loss in weight,
  (d) Poor germinability,
  (e) Discolouration of produce
  (f) Poor marketability

➢ ANIMAL HUSBANDRY

Animal husbandary is the management of animal livestock which includes various aspects such as animal's feeding, breeding & disease control. Good animal husbandary practices are needed to meet out the growing demand of milk, eggs, meat etc.

◈ Cattle Farming :

- Cattle faring is also called **'Cattle Husbandry'**.
- In our country cattle husbandry is done for two purposes for milk and drought labour for agricultural work.
- The milk producing females are called milch animals.
- Those used for farm labour are called drought animals.

◈ Poultry :

- Poultry provides the best source of animal protein and fats.

- An egg laying poultry is called egger or layer and the poultry reared for obtaining meat is called **chicken** or **broiler**.

(i) Poultry Breeds :

Indigenous Breeds :

- Aseel or Indian game bird is one of the indigenous breed of fowl. It is most popular breed of India and selected for poultry farming.
- There occur only four popular varieties of Aseel, namely :
  (a) Peela (golden red),
  (b) Yakub (black and red)
  (c) Nurie (white)
  (d) Kajal (black)

(ii) Exotic Breeds :

- Though there are present numerous exotic breeds of fowl, but the following two are most popularly used in India.
  (a) White leghorn
  (b) Rhode island red
  (c) Cross breed

◈ **Poultry Diseases :**

- The poultry birds suffer from various diseases caused by virus (Fowl pox, Ranikhet), bacteria (Tuberculosis, Cholera, Diarrhoea), fungi (Aspergillosis), parasite (worms, mites, lice), etc.

◈ **Fish Production :**

- Capture fishing i.e., obtaining fishes from natural resources.
- Culture fishery i.e., fish farming.
- The fishes which are obtained from island water bodies such as ponds, lakes, rivers and streams are called fresh water fishes Ex- labeo, while those obtained from sea are called marine fish Ex - Harpodon (Bombay duck), Mackerel, bhetki, pomfret, Tuna, sardine.

◈ **Composite Fish Farming :**

- The intensive fish farming can be done in composite fish culture systems.
- In such a system, a combination of five or six fish species are grown in a single fish pond.
- For example catla are surface feeders, Rohu feed in the middle zone of the pond, and common carps are bottom feeders and Grass carps feed on the weeds. Such farming increases the fish yield.

◈ **Bee Keeping :**

Apiculture-Care and Management of Honeybees :

- Human beings obtain many commercial products from insects like honeybees. This is known as Apiculture.
- Honey has great importance for human beings because of its medicinal value, specially in disorders related to digestion, dysentery, vomiting and liver ailments.
- Bee farms or apiaries are established for commercial production of honey.
- Different varieties of bee are used for commercial production of honey.

◈ **The Local Varieties of Bees :**

- Apis cerana indica (commonly known as Indian bee). A. dorsata (the rock bee) and A.florae (little bee).

◈ **Exotic Variety :**

- A. mellifera (Italian bee)

Lac Culture :

- Human beings obtain commercial products from lac insects. Lac is secreted as a protective covering mostly by the females. The encrustation is scraped and processed to obtain lac. Lac is a resinous secretion of Laccifer lacca or lac insect which feeds on the sap of a number of forest trees

Seri Culture :

- If commercial product like silk are obtained from silkworms. Silk is fibrous secretion which is secreted by caterpillar over it during coccon formation. Common silk is **Mulberry silk**. Mullberry silk is obtained from *Bombyx mori* which feeds on leaves of Mulberry (Morus alba). Mulberry specially grown for silkworm is called **Moriculture.**

Pearl Culture :

- Pearl is produced by members of phyllum mollusca. Pearl producing Indian variety is Pinctada vulgaris. Father of Pearl Industry is **Kokichi Mikimoto.**