

**61. Poultry Diseases :** The poultry birds suffer from various diseases caused by :

- Virus — Fowl pox.
- Bacteria — Tuberculosis, Cholera, Diarrhoea
- Fungi — Aspergillosis
- Parasites — Worms, mites, lice, etc.

They also suffer from nutritional deficiency diseases.

**62. Variety Improvement of Poultry Farming :** It involves cross breeding of indigenous varieties with exotic breeds. The improved varieties are developed for the following desirable traits :

- (i) Quality and quantity of chicks.
- (ii) Dwarf broiler parent for commercial chick production.
- (iii) Summer adaptation capacity/tolerance to high temperature.
- (iv) Low maintenance requirements.
- (v) Reduction in the size of the egg-laying bird with ability to utilise more fibrous cheaper diets formulated using agricultural by-products.

**63. Egg Production :** In chicken, egg production is the most economic trait. A layer hen starts laying eggs at the age of 20 weeks. The egg production period in commercial layer is 500 days. For increasing the egg production for the development of new variety with respect to quantity and quality of eggs, the following points are to be considered—

- (i) Egg number
- (ii) Sexual maturity
- (iii) Egg weight
- (iv) Body weight
- (v) Feed efficiency
- (vi) Egg size
- (vii) Egg shape
- (viii) Shell colour
- (ix) Shell quality and
- (x) Internal quality of egg.

**64. Broiler Production :** Chickens are raised upto 6-7 weeks in the poultry farm. They grow to a weight of 700 gm to 1.5 kg in this period. They are fed with vitamin rich supplementary feed for good growth rate, better feed efficiency. Care is taken to avoid mortality and for feathering and carcass quality. They are produced as broilers and sent to market for meat purposes.

**65. Prevention of Poultry Diseases :** To prevent the poultry from diseases the following measures should be taken :

- (i) The poultry birds should be kept in good spacious, airy and ventilated shelter.
- (ii) The shelter should be cleaned properly and regularly. Quick and hygienic disposal of excreta should be ensured.
- (iii) External parasites should be controlled by applying insecticide solution.
- (iv) Disinfectant should be sprayed to kill mosquitoes and other external parasites.
- (v) Every animal should be vaccinated at regular interval to minimise it against common infections and diseases.

**66. Fish Production :**

- It includes the finned true fish as well as shellfish such as prawns and molluscs.
- There are two ways of obtaining fish. One is from natural resources, which is called **capture fishing**. The other way is by fish farming which is called **culture fishery**.
- The water source of the fish can be either sea water or fresh water such as rivers and ponds.
- Therefore, fishing can be done both by capture of fish in marine and freshwater ecosystems.

**44. Animal Husbandry :** It is the science of rearing, feeding, caring, breeding and utilisation of animals. In other words, it is the scientific management of animal livestock.

**45. Livestock :** It refers to the domestic animals kept or dealt in use for milk, ride, flesh and includes cattle, buffaloes, sheep, goat, pigs, horses and elephants.

**46. Need for Animal Husbandry :** There is an urgent need for improving the livestock with the help of various techniques and tools developed by animal husbandry. The reasons are to increase—

- (i) Milk production
- (ii) Egg production
- (iii) Meat production
- (iv) Fish production
- (v) For proper utilisation of animal wastes like animal dung, etc.

**47. Advantages of Animal Husbandry :**

- (i) It helps us to undertake proper management of domestic animals.
- (ii) It provides methods to produce good quality, high yielding breeds of domestic animals.
- (iii) Animal wastes, enrich the soil.
- (iv) It is beneficial for the farmers as increased yield brings more income to the farmer and raises his living standard.

**48. Cattle Farming :** Cattle husbandry is done for two purposes—milk and draught labour for agricultural work such as tilling, irrigation and carting.

**49. Milch Animals :** The milk-producing animals or breeds such as cows, buffaloes, goats and camels are known as milch animals.

**50. Breeds of Cow :** There are thirty popular breeds of cow in our country. These breeds of cow are classified into three categories :

- (i) **Draught Breeds :** They are strong, sturdy and are the “beasts of burden”. These breeds produce less milk.
- (ii) **Dairy Breeds :** Cows of these breeds are high milk yielders.
- (iii) **Dual-purpose Breeds :** The cows are good milk yielders and the bullocks are good for draught work.

There are three types of breeds of dairy cows :

(a) **Indigenous breeds (Indian breeds) of cow :** They are of three types :

- (i) Red Sindhi—medium sized cows with red colour.
- (ii) Sahiwal—large sized and heavier built animals.
- (iii) Gir—medium sized cows with good milk yield and native of Gir forest in Gujarat.

(b) **Exotic breeds of cow :** These cows are used for cross-breeding in our country which includes Jersey, *Holstein-Friesian* and Brown-Swiss.

(c) **Improved breeds of cow :** These have been developed in National Dairy Research Institute (NDRI) at Karnal in Haryana, by cross-breeding between exotic and indigenous breeds of cows.

Some such breeds are- *Karan Swiss, Karan Fries* and *Frieswal*.

These can yield two to three times more milk than our indigenous cows.

**51. Food Requirements of Dairy Animals :** These are of two types :

- (i) Maintenance requirement, which is the food required to support the animal to live in a healthy life, and
- (ii) Milk producing requirement, which is the type of food required during the lactation period.

- (ii) **Cultural Methods** : Proper seed bed preparation, timely sowing of crops, intercropping and crop rotation.
- (iii) **Chemical Methods** : Spraying of chemicals like herbicides or weedicides.  
e.g., atrazine, isoproturon, etc.
- (iv) **Biological Control** : Use of insects or some organisms which consume and destroy the weed plants.  
**Example** : Prickly-pear cactus (*Opuntia*) is controlled by cochineal insect and aquatic weeds are controlled by fish grass carp.

**38. Some Common Stored Grain Insect Pests :**

Name of Insect Pests	Zoological Name
(i) Pulse beetle	<i>Callosobruchus maculatus</i>
(ii) Rice weevil	<i>Sitophilus oryzae</i>
(iii) Khapra weevil	<i>Trogoderma granarium</i>
(iv) Grain and flour moth	<i>Sitotroga cerealella</i>
(v) Rust red flour beetle	<i>Tribolium castaneum</i>
(vi) Rice moth	<i>Corcyra cephalonica</i>
(vii) Lesser grain borer	<i>Rhizopertha dominica</i>

- 39. Factors Responsible for Loss during Storage** : There are mainly two types of factors :
- (i) **Biotic factors** such as insects, rodents, birds, mites and bacteria.
  - (ii) **Abiotic factors** such as moisture content, temperature and humidity.
- 40. Preventive Measures for Stored Grains** : The preventive measures that are used before grains are stored for future use are : (i) Drying, (ii) Maintenance of hygiene, (iii) Prophylactic treatment and (iv) Improved storage structures.
- 41. Control Measures against Pests attacking Stored Grains** : The grains which are meant for human or animal consumption, should be exposed to sun or fumigated. The various control measures are :
- (i) **Chemical Control** : Insecticides can be applied by spraying over the gunny bags containing food grains by a manual or mechanical sprayer.
  - (ii) **Fumigation** : In this method, the insecticide solution is converted into fumes to kill the insects. These insecticides are called fumigants. Fumigants occur in three states—liquid, solid and gaseous.
  - (iii) **Plant Products** : The practice of adding small quantity of vegetable oil or mineral oil to grains or legumes to protect them from insect pests and mixing of neem kernel powder, crushed dried fruit of black pepper or cloves is also effective in controlling insects.
- 42. Pathogen** : These are disease causing organisms or pests such as bacteria, viruses, fungi and insects.
- 43. Hybridisation** : This refers to crossing between genetically dissimilar plants. This crossing may be of three types :
- (i) **Intervarietal** : i.e., cross-breeding between two different varieties.
  - (ii) **Interspecific** : i.e., cross-breeding between two different species of the same genus.
  - (iii) **Intergeneric** : i.e., cross-breeding between different genera.
- In plant breeding, intervarietal hybridisation is extensively used.  
The breeding methods viz., introduction, selection and hybridization have been used to develop number of improved varieties of plants of HYV (High-Yielding Variety).

(iv) Fertility of the soil is improved by growing two crops simultaneously.

(v) Chances of pest infestation are greatly reduced.

**25. Intercropping :** It is the process of growing two or more crops simultaneously on the same field in a definite pattern. A few rows of one crop alternate with a few rows of a second crop.

**Example :** Soyabean + maize or finger millet (bajra) + cowpea (lobia).

The crops are selected such that their nutrient requirements are different.

**26. Advantages of Intercropping :**

(i) It ensures maximum utilisation of the nutrients supplied.

(ii) It also prevents pests and diseases from spreading to all the plants belonging to one crop in a field. In this way, both crops can give better returns.

(iii) Soil erosion is effectively arrested.

(iv) It helps to maintain soil fertility.

**27. Differences between :**

Mixed Cropping	Intercropping
(i) It has target to minimise risk of crop failure.	(i) It has target to increase productivity per unit area.
(ii) Seeds of two crops are mixed before sowing.	(ii) Seeds of two crops are not mixed.
(iii) It involves no set pattern of rows of crops.	(iii) It involves set patterns of rows of crops.
(iv) In this method there is a difficulty of fertiliser application to individual crops.	(iv) Intercropping fertiliser can be applied as per need of the crops.
(v) Spraying for pest control to individual crop is difficult.	(v) Pesticides can be easily applied to individual crop.
(vi) Harvesting and threshing of crops separately not possible.	(vi) Both crops can be easily harvested and threshed separately.
(vii) Marketing and consumption of only mixed produce is possible.	(vii) Product of each crop can be marketed and consumed separately.

**28. Crop Rotation :** It is defined as the practice of growing of different crops on a piece of land in a preplanned succession.

Depending upon the duration, crop rotation is done for different crop combinations. If crop rotation is done properly then two or three crops can be grown in one year with good harvests.

**29. Advantages of Crop Rotation :**

(i) Crop rotation helps in replenishment of soil fertility.

(ii) It prevents depletion of selective nutrients.

(iii) It prevents building up of diseases and pests of particular crop.

(iv) It enhances the production by increasing the soil fertility.

**30. Crop Protection Management :** In fields, crops have to be protected from weeds, insects-pests and disease-causing organisms like fungi.

All these cause damage to crop plants so much that most of the crop is lost. Thus, crops can be protected by the following methods :

(i) Use of pesticides

(ii) Use of resistant varieties





**14. Disadvantages of Manures :**

- (i) Manures are inconvenient to handle, store and transport as they are bulky.
- (ii) The nutrients of manures are released slowly.
- (iii) They are not nutrient specific.

**15. Fertilisers :**

- Fertilisers are inorganic or organic compounds containing one or more essential plant nutrients which are used for increasing the fertility of soil.
- They contain much higher amount of nutrients in comparison to manures and are therefore required in very small quantities.
- They are manufactured commercially from chemicals and are marketed in concentrated form.
- They are easy to use, store and transport.
- Being soluble in water, they are easily absorbed by plants.
- Fertilisers are generally nutrient-specific *i.e.*, these supply one or more specific nutrients.

**16. Types of Fertilisers :** Fertilisers are the substances which improve the fertility of soil and help the plants to grow and synthesise more food crops. They are divided into four groups—

- (i) **Nitrogenous Fertilisers :** These fertilizers supply the macronutrient nitrogen.  
**Examples :** Urea, Ammonium nitrate, etc.
- (ii) **Phosphatic Fertilisers :** They are the source of macronutrient phosphorus.  
**Examples :** Single Superphosphate, Triple Superphosphate.
- (iii) **Potassic Fertilisers :** These fertilisers supply potassium which is one of the essential macronutrients to the plants.  
**Examples :** Potassium Chloride, Potassium Sulphate, etc.
- (iv) **Complex Fertilisers :** When a fertiliser contains at least two or more nutrients it is called complex fertilisers.  
**Examples :** Nitrophosphate, Ammonium phosphate, etc.

**17. Differences between :**

Manure	Fertiliser
(i) A manure is a natural substance obtained by the decomposition of animal wastes and plant residues.	(i) A fertiliser is a man-made substance. It is an inorganic salt or an organic compound.
(ii) It contains small amounts of essential plant nutrients such as nitrogen, phosphorus and potassium.	(ii) It is very rich in plant nutrients such as nitrogen, phosphorus and potassium.
(iii) It adds great amount of organic matter in the form of humus in the soil.	(iii) It does not add any humus to the soil.
(iv) Nutrients present in the manure are absorbed slowly by the crop plants since manure is not soluble in water.	(iv) Being soluble in water, a fertiliser is readily absorbed by the crop plants.
(v) It is not nutrient specific and tends to remove general deficiency of the soil.	(v) It is nutrient specific and can provide specifically nitrogen, phosphorus and potassium to the soil.
(vi) It is voluminous and bulky, so it is inconvenient to store, transport, handle and apply to the crop.	(vi) It is compact and concentrated so it is easy to store, transport and apply to the crops.
(vii) A manure is cheap and is prepared in rural homes or fields.	(vii) A fertiliser is costly and is prepared in factories.

**9. Sources of Essential Plant Nutrients :** On the basis of the sources, essential plant nutrients are classified as follows :

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

**10. Classification of Nutrients :** On the basis of quantities required, the 13 nutrients needed for plant growth have been grouped into following two classes :

(i) **Macronutrients** : The essential elements utilised by plants relatively in large quantities are called **major nutrients** or **macronutrients**. The six essential nutrients form the macronutrients — Nitrogen, Phosphorus, Potassium, Calcium, Magnesium and Sulphur.

Of these six macronutrients, nitrogen, phosphorus and potassium (*i.e.*, NPK) are required by plants in greater amounts and are called **primary elements** or **primary nutrients**.

(ii) **Micronutrients** : They are the essential elements which are used by plants in small quantities or traces. The seven essential nutrients form the micronutrients. These are Iron, Manganese, Boron, Zinc, Copper, Molybdenum and Chlorine.

**11. Manures :**

- Manures are organic substances obtained through the decomposition of plant wastes like straw and animal wastes like cow dung. The decomposition is brought about by the action of microbes.
- Manures contain large quantities of organic matter.
- Manures contain nutrients in small quantities and therefore are needed to be supplied to crops in large quantities.
- Manures are bulky and so it is inconvenient to store and transport them.

**12. Types of Manures :** Based on the kind of biological material used, manures are classified as follows :

(i) **Farmyard Manure (FYM)** : It is the decomposed mixture of cattle excreta and urine along with litter and left over organic matter such as roughage or fodder.

(ii) **Compost** : It is the process in which farm waste material like livestock excreta, vegetable waste, animal refuse, domestic waste, sewage waste, straw, eradicated weeds etc. are decomposed in pits.

(iii) **Vermi-compost** : It is the process when compost is prepared by using earthworms to hasten the process of decomposition of plants and animal refuse. Here the earthworms help to breakdown the wastes. This activity along with the excreta of the worms makes the compost rich in nutrients.

(iv) **Green Manure** : This practice includes growing or ploughing and mixing of green crops with soil to improve physical structure and soil fertility.

**Examples :** Both leguminous and non-leguminous plants.

**13. Advantages of Manures :**

- (i) Manures enrich the soil with nutrients.
- (ii) Manures add organic matter to the soil, which improves soil texture and increases water holding capacity and drainage in soil.
- (iii) They provide food for soil organisms.

(ii) **Rabi Season** : These crops are grown in winter season, *i.e.*, rabi season from November to April.

**Examples** are wheat, gram, peas, mustard, linseed, etc.

**4. Improvement in Crop yields** : The increased production can be achieved by adopting practices involved in farming and are divided into three stages—

Firstly, the choice of seeds for plants;

secondly, the nurturing of the crop plants and

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

(i) Crop variety improvement,

(ii) Crop production improvement and

(iii) Crop protection management.

**5. Crop Variety Improvement** : This approach depends on finding a crop variety that can give a good yield. Varieties of crops can be selected by breeding for various useful characteristics such as disease resistance, response to fertilisers, product quality and high yields. One way of incorporating desirable characters into crop varieties is by hybridisation. Another way of improving the crop is by introducing gene that would provide desired characteristics. This results in genetically modified crops.

Cultivation practices and crop yield are related to weather, soil quality and availability of water. Some factors for which variety improvement is done are :

(i) **Higher Yield** : To increase the productivity of crop per acre.

(ii) **Improved quality** : Quality consideration such as baking quality, protein quality, oil quality and preserving quality of crop products vary from crop to crop.

(iii) **Biotic and Abiotic Resistance** : Crops production can go down due to biotic and abiotic stresses under different situations. Varieties resistant to these stresses can improve crop production.

(iv) **Change in Maturity Duration** : The shorter the duration of the crop from sowing to harvesting, the more economical is the variety.

(v) **Wider Adaptability** : Developing varieties for wider adaptability will help in stabilising the crop production under different environmental conditions.

(vi) **Desirable Agronomic Characteristics** : Developing varieties of desired agronomic characters helps to give higher productivity.

**6. Crop Production Management** : It depends upon the financial condition of the farmer, as to which cropping system and production practices he uses. Thus, production practices can be at different levels. They include 'no cost' production, 'low cost' production and 'high cost' production practices.

Uses of manures and fertilisers for supply of nutrients; irrigation, mixed cropping, inter cropping, crop rotation are some of the crop production practices required for obtaining high yields.

**7. Nutrient Management** : The inorganic chemical substances which the plants absorb from their surroundings are called **nutrients**. Nutrients are supplied to plants by air, water and soil. There are sixteen nutrients essential for plants. Deficiency of these nutrients affects physiological process in plants. To increase yield, the soil can supply nutrients in the form of manures and fertilisers.

**8. Characteristics of an Essential Plant Nutrient** : An element must fulfil the following requirements to be an essential plant nutrient :

(i) In the absence of the element, the plant is not able to complete its life cycle.

(ii) The deficiency of a particular element can be prevented or corrected only by supplying that nutrient.

(iii) The element must have a direct influence on the plant nutrition and metabolism.



# Improvement in Food Resources

## CHAPTER COVERAGE

Plant and animal breeding and selection for quality improvement and management; use of fertilisers, manures; protection from pests and diseases; organic farming.

### INTRODUCTION

Food is an organic substance which is necessary for the existence of all living organisms. It supplies nutrients like proteins, carbohydrates, fats, vitamins and minerals to our body. Thus, we are dependent on animals and plants for food. We obtain most of this food from agriculture and animal husbandry. Therefore, it is necessary to increase our production efficiency for both crops and livestock.

The green revolution has contributed to increase food-grain production and the white revolution has led to better and more efficient use as well as availability of milk. Thus, these revolutions have made uses of our natural resources more intensively. Majority of our population depends on agriculture for their livelihood. Scientific management practices should be undertaken to obtain high yields from farms. For sustained livelihood, one should undertake mixed farming, intercropping and integrated farming practices and by combining agriculture with livestock, poultry, fisheries and bee-keeping.

### IMPORTANT TERMS AND CONCEPTS

- 1. Crop Production :** Crops are plants cultivated by human beings for food, fodder and other materials. The important types of crops are :
  - (i) Cereal Crops :** Wheat, rice, maize, millets and sorghum provide carbohydrates for energy requirement.
  - (ii) Pulses** like gram, pea, black gram, green gram, pigeon pea, lentil provide proteins.
  - (iii) Oilseed Crops :** Groundnut, soyabean, sesame, castor, mustard, linseed and sunflower provide fats.
  - (iv) Vegetables, spices and fruits** provide a range of vitamins and minerals along with small quantities of proteins, carbohydrates and fats.
  - (v) Food Crops and Fodder Crops :** Berseem, oats or sudan grass are raised for food for the livestock.
- 2. Photoperiod :** It is the response of an organism to changes in day length, *i.e.*, photoperiods are related to the duration of sunlight. Growth of plants and flowering are dependent on sunlight.
- 3. Crop Seasons :** Different crops require different climatic conditions, temperatures and photoperiods for their growth and completion of their life cycle. Cropping activities go on all the year-round in India, provided water is available for the crops.

There are two distinct seasons :

- (i) Kharif Season :** These crops are grown in rainy season, *i.e.*, kharif season from the month of June to October.  
Examples are paddy, soyabean, pigeon pea, maize, cotton, green gram and black gram.

**67. Marine Fisheries :** India's marine fishery resources include 7500 km of coastline and the deep seas beyond it. Popular marine fish varieties include pomphret, mackerel, tuna, sardines and Bombay duck. Marine fish are caught using many kinds of fishing nets from fishing boats. The modern technologies for catching more fish include echosounders and use of satellite. Some marine fish of high economic value are also farmed in sea water. This includes finned fishes like mullets, bhetki and pearl spots, shellfish such as prawns, mussels and oysters.

**68. Inland Fisheries :** It consists of fisheries in freshwater and brackish water. Most of the fish production is through aquaculture practices. Some of the fresh water fish culture systems are—

- (i) Composite fish culture (Carp culture)
- (ii) Sewage fed fish culture
- (iii) Paddy-cum-fish culture
- (iv) Integrated fish culture
- (v) Fresh water pearl culture

In fresh water fishery, fish eggs also called fish seeds are put in nurseries called **hatcheries**.

**Composite fish culture** is the most prevalent and advantageous system of fish culture. In such a system, a combination of five or six fish species is used in a single fish pond. These fish have different food habits and do not compete each other for food.

**Examples,** Catla is a surface feeder, Rohu feeds in the middle of the pond (column feeder), Mrigal and common carp feed at the bottom and grass carp feeds on aquatic plants in the pond.

**69. Bee-keeping** or apiculture is the rearing, care and management of honey bees for obtaining honey, wax and other substances.

- Bee-keeping needs low investments, so farmers use it as additional income generating activity.
- Besides honey, other products of bee-keeping are beeswax, propolis, bee venom and royal jelly.
- Bee-keeping also helps in cross pollination of crops because honey bees transfer pollen grains from one flower to another while collecting nectar.
- Local varieties of bees used for commercial honey production are *Apis cerana indica* known as Indian bee, *Apis dorsata*—the rock bee, *Apis florea*—the little bee. An Italian bee *Apis mellifera* has also been brought to increase yield of honey. This variety is commonly used for commercial honey production.
- Honey bees are social, polymorphic insects which live in colonies in nests or hives. The colony of honey bees has three types of castes—queen, drones and workers.
- The quality of honey depends upon the pasturage or flowers available to the bees for nectar and pollen collection. It will also determine the taste of the honey.