



Class 9th

BIOLOGY

IMPROVEMENT IN FOOD RESOURCES

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- (i) Food is the basic necessity of all living organisms. Food supplies proteins, carbohydrates, fats, vitamins and minerals, all of which are required for body development, growth and health. The major sources of our food are plants and animals.
- (ii) Agriculture and animal husbandry provide us with all our animal and plant food.
- (iii) Agriculture is the practice of growing of plants in an organised way for obtaining food.
- (iv) To feed the ever growing population in India more food is required to be produced. This can be done by farming on more land. But India is already intensively cultivated. As a result, we do not have any major scope for increasing the area of land under cultivation. Therefore, it is necessary to increase our production efficiency for both crops and livestock.
- (v) The green revolution has contributed in increasing the food grain production, the white revolution has led to better availability of milk.

IMPROVEMENT IN CROP YIELDS

- (i) Food crops give us carbohydrates, proteins, fats, vitamins and minerals.
- (ii) Pulses like gram, pea, pigeon pea, lentil, provides with proteins.
- (iii) Oil seeds including soybean, groundnut, sesame, castor, mustard, linseed and sunflower provide us with necessary fats.
- (iv) Vegetables, spices and fruits provide a range of vitamins and minerals in addition to small amounts of proteins, carbohydrates and fats.
- (v) Fodder crops like *berseem* and oats are raised as food for the livestock.
- (vi) The optimum requirement of temperature, water, sunlight, and other conditions varies for different crops for growth and completion of their life cycle.
- (vii) Activities like crop variety improvement, crop production improvement and crop protection and management help to increase the crop yields.

Crop Variety Improvement

- The main aim of this practice is to find a variety of crops which can withstand different environmental conditions like high soil salinity, water availability etc., and can give a good yield.
- Hybridisation and genetic modification techniques introduce the useful or desired characters into the crop plants. This helps the plants to survive and give good yields in different climatic conditions and areas.

Hybridisation refers to crossing between genetically dissimilar plants to produce new type (hybrid) or high yielding varieties. This crossing may be intervarietal (between different varieties), interspecific (between two different species of the same genus) or intergeneric (between different genera).



Genetic modification involves the introduction of a gene (i.e., DNA fragment) that would provide the desired characteristic. This results in genetically modified crops.

- (i) Increased yield
- (ii) Improved quality
- (iii) Resistance to biotic and abiotic factors, especially those harming the plant.
- (iv) Reduction in duration of plant maturity.
- (v) Broad range adaptability of the crop plant from various environmental conditions.
- (vi) Desired agronomic characteristics particular to a plant.

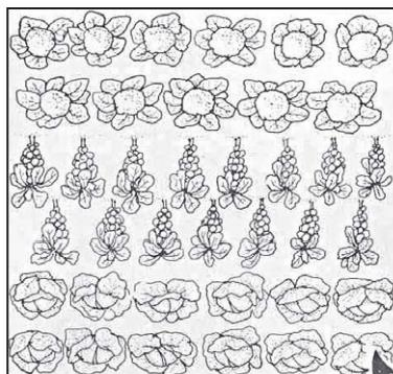
Variety improvement may be done for one or several of these characteristics.

Crop production management

Production of crops can be improved by practising different cropping patterns, by adding nutrients and manure required for growth and by proper irrigation of crops.

Cropping patterns

- (i) High yields from farms can be obtained by undertaking scientific management practices like mixed farming, intercropping and crop rotation.
- (ii) In mixed cropping, two or more crops are grown together on the same field. For example, wheat+ gram, groundnut + sunflower. This reduces risk and gives some insurance against failure of one of the crops.
- (iii) In intercropping, two or more crops with different nutritional requirements are grown in different rows on the same farm in a definite row pattern (1:1, 1:2 and 1:3). So as to utilise maximum nutrients and prevent spread of diseases and pests. For example, soybean + maize, bajra + cowpea.



- (iv) In crop rotation, different crop combinations are grown on the same field in a pre-planned succession so as to get maximum returns.

Nutrients

Nutrients are important for the growth of plants which are supplied to them by air, water and soil.

Macro-nutrients	Micro-nutrients
They are needed in large amount by the plants which include carbon, hydrogen, oxygen, nitrogen phosphorus, potassium, calcium, magnesium and sulphur.	They are required in small quantities such as iron, manganese, boron, copper, molybdenum, chlorine and nickel

Manures

It is obtained from decaying plant matter such as straw, animal dung etc, by the action of microorganisms present in the soil.

It is classified into three categories on the basis of types of biological materials used which are as follows:



Green manure	Compost	Vermi-composting
(i) Before sowing seeds of crops, some plants like leguminous and non-leguminous plants are - grown. (ii) They are then mulched by ploughing into the soil. These plants thus turn into green manure which helps in enriching the soil in nitrogen and phosphorus content.	(i) It includes farm wastes like livestock excreta (cow dung), leftover vegetable, domestic waste, sewage waste, straw, eradicated weeds, etc. (ii) These substances are decomposed in pits and the process of decomposition is called composting. (iii) The compost is rich in organic matter and nutrients	(i) The process by which compost is prepared by the decomposition of plant and animal refuse with the help of earthworm is called vermi-composting. (ii) The compost is ingested by the earthworms and then excreted out which makes the compost rich in nutrients.

Advantages and disadvantages of manure

Advantages	Disadvantages
(i) It helps in enriching the soil with nutrients. (ii) It consists of humus that restores the texture of soil for better retention of water. (iii) It is eco-friendly.	(i) The amount of nutrients present in manures is less which is not sufficient to fulfill the requirement of the crops. (ii) Their storage and transportation is not convenient because of their billy nature.

FERTILIZERS

It is a chemical which consists of salt and other organic compound necessary for plant growth.

Advantages	Disadvantages
(i) Plants absorb them as they are water soluble and nutrient specific. (ii) Its transportation and storage is easy as it is required in small quantities.	(i) It can lead to soil and water pollution as through rain it seeps deep into the soil. (ii) Long term use of fertilizers can reduce the fertility of soil by changing its texture.

Irrigation is the process of supplying water to crop plants, in fields by different means of irrigation system. Wells, canals, rivers and tanks are some important irrigation systems in our country.

- (i) **Wells:** There are two types of wells, namely dug wells and tube wells. In a dug well, water is collected from water bearing strata. Tube wells can tap water from the deeper strata. From these wells, water is lifted by pumps for irrigation.
- (ii) **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.
- (iii) **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 rivers.
- (iv) **Tanks:** These are small storage reservoirs, which intercept and store the run-off of smaller catchment areas.



CROP PROTECTION MANAGEMENT

It includes methods to reduce the different kinds of infestation caused by weeds, pests and insects.

Weeds, pests and disease can destroy large amounts of crop plants.

Weeds removal from the crop fields is essential since they use up the requirements of crop plants like food, space, light etc.

Insect pests and plant pathogens attack different parts of the plant in three different ways and thus, reduce crop yield.

- (i) They cut the root, stem and leaf.
- (ii) They suck the cell sap from various parts of the plant.
- (iii) They bore into stem and fruits and reduce yields.

→ Diseases in plants are caused by pathogens such as bacteria, fungi and viruses. These pathogens can be transmitted through the soil, water and air.

Weeds, insects and diseases can be controlled by various methods:

- One of the most commonly used methods is the use of pesticides which include herbicides, insecticides and fungicides. They are used to control weeds, insects and diseases, but they should be used only as much as needed to avoid environmental pollution and health hazards.
- Weed control methods also include mechanical removal.
- Preventive methods such as proper seedbed preparation, timely sowing of crops, intercropping and crop rotation also help in weed control.
- Some other preventive measures against pests are the use of resistant varieties, and summer ploughing, in which fields are ploughed deep in summer to destroy weeds and pests.

ANIMAL HUSBANDRY

1. It is the scientific management of animal livestock. It is animal based farming of cattle, goat, sheep, poultry and fish farming.
2. Management of livestock includes various aspects such as animal's shelter, feeding, breeding, health and disease control.

CATTLE FARMING

It is mainly done for two purposes.

- (i) For obtaining milk from dairy animals.
- (ii) For using draught animals in agriculture and transport purposes.

Milk production depends on lactation period and thus, long lactation period is a desirable quality to consider during cattle farming. Hence, exotic breeds (e.g., Jersey, Brown Swiss) showing long lactation periods are crossed with local breeds(e.g., Red Sindhi, Sahiwal) showing resistance to disease to obtain high quality breeds.

In cattle farming, the cattle shelter should be well ventilated, hygienic and dry.

Cattle food should include roughage and concentrate in balanced amounts.



Cattle suffer from a number of diseases. These diseases are caused by bacteria, virus, and parasites. This affects the health of the cattle and also affects the milk production.



Poultry farming

It includes housing, rearing, sanitation, disease-control and marketing of poultry birds.

This type of farming targets egg production from layers(egg laying poultry) and meat production from broilers(poultry reared for obtaining meat).

Cross-breeding is done between the Indian or indigenous (e.g., Aseel) and foreign (e.g., Leghorn) breeds of poultry to obtain a large number of improved varieties of poultry containing desirable traits such as tolerance to high temperature, dwarf broiler parent, low maintenance requirements and reduction in size of the layers.



Aseel



Leghorn

Broilers chickens are fed with vitamin-rich supplementary feed (vitamin A and K) for good growth rate and better feed efficiency.

Poultry birds are needed to be protected from various disease caused by bacteria, fungi, viruses, parasites or due to nutritional deficiencies, through proper treatment, sanitation and vaccination.

Fish production

It refers to capturing and culturing of fish as a source of edible animal protein for us. It is a cheap source of animal protein.

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.

Fish culture can be done either in marine or in freshwater ecosystems.

Types of fisheries

(i) Marine

These are caught using modern as well as traditional methods. Traditional methods include the use of nets and gears while modern methods include use of satellites to locate the fishes.

It includes sardines, Mackerel, Hilsa, Tuna, pomfret, mussels, prawns, oysters, **salmon, mullets, seaweed etc.**



Macrobrachium rosenbergii
(fresh water)

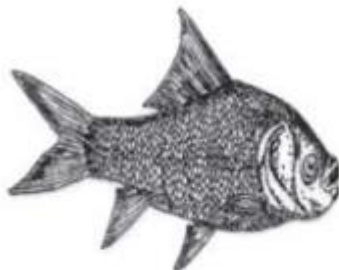


Peneaus monodon
(marine)

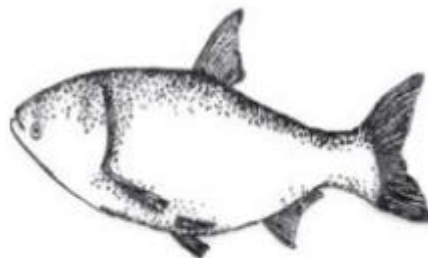
(ii) Inland

When fishing is done in freshwater bodies, like lakes, ponds, rivers, and tanks it is called fisheries.

Common varieties cultivated are Rohu, Catla, Grass carp, Common carp etc.



(a)



(b)



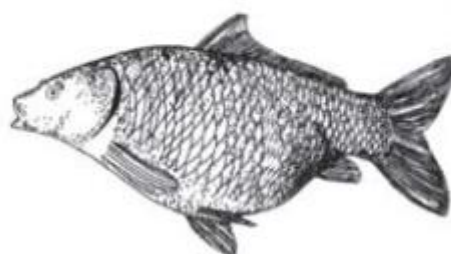
(c)



(d)



(e)



(f)



Composite culture

Intensive fish farming can be done in composite fish culture system. Both local and imported fish species are used in such systems. In this systems, five to six species can be cultured in a single fishpond. The species that are selected has different food habits so that they do not compete for food among themselves. Catlas are surface feeders, Rohu feeds in the middle zone of the pond, Mrigal and common carps are bottom feeders and grass Carps feed on the aquatic weeds.

Advantages	Disadvantages
(i) The fishes do not compete for food. (ii) The food available in all the part of the pond is used. (iii) Five to six different types of fishes are reared together. (iv) This method increase the yield.	(i) It is difficult to recognize which seed belongs to which species. (ii) Some fishes rear only during monsoon. (iii) Lack of availability of good quality seeds.

Bee-keeping

- (i) The practise of bee-keeping is known as apiculture. It is low investment activity which involves rearing, care and management of honey bee for obtaining honey, wax etc. For commercial honey production, apiaries or bee farms are established.
- (ii) Indigenous bee varieties are *Apis cerana indica*(Indian bees), *Apis dorsata* (rock bee) and *Apis florea* (little bee) whereas *Apis mellifera* is an Italian variety used for commercial production of honey.
- (iii) The availability of sufficient amount of pasturage as well as the type of flowers available to the bees for nectar and pollen collection determines the quality and taste of the honey.