



BAL BHARATI PUBLIC SCHOOL, PITAMPURA, DELHI-110034
BIOLOGY-NOTES CLASS 9- IMPROVEMENT IN FOOD RESOURCES
-TERM1

INTRODUCTION

There is a need to introduce production efficiency of crops and livestock because

1. rapid increase in population
2. No major scope of increasing area of land under cultivation.

Increase in food production without degrading our environment and disturbing the ecological balance i.e. **Sustainable Practices** are required in agriculture and animal husbandry.

TYPES OF CROPS

Cereals: wheat, rice, maize, millets and sorghum. Provide carbohydrates for energy requirements.

Pulses: pea, gram, black gram, green gram, pigeon pea and lentil. Provide proteins

Oilseeds: soya bean, ground nut, sesame, castor, mustard, linseed and sun flower. Provide necessary fats.

Vegetables, spices and fruits provide vitamins and minerals.

**** Different crop require different climatic conditions, temperature and photoperiods for their growth and completion of life cycle. Crops which grown in rainy season are called kharif crops and those which grown in winter season are called rabi crops.**

Kharif crops: paddy, soya bean, pigeon pea, cotton, green gram etc.

Rabi crops: wheat, gram, peas, mustard, linseed etc.

Difference between kharif and rabi crops

Kharif crop	Rabi crop
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1. Sown in the months of June- July.	1. Sown in the months of October- November.
2. Crops grow in hot and wet conditions	2. Crops grow in cold and dry conditions.
3. Crops are harvested during September- October.	3. Crops are harvested during March- April.

IMPROVING CROP YIELD

The practices involved in farming are divided into three stages. They are

(A) Choice of seeds for planting

(b) Nurturing of the crop plants

(c) Protection of the growing and harvested crops from loss.

Hence the major activities for improving crop yields can be classified as

- Crop variety improvement
- Crop production improvement
- Crop protection improvement

Crop Variety Improvement

This approach depends on finding a crop that can give a good yield. Some of the factors for which variety improvement is done are:

Higher yield: for increasing the productivity per acre.

Improved quality: quality considerations vary from crop to crop as per the requirements.

Biotic and abiotic resistance: crops should have sufficient resistance to biotic factors (diseases, insects and nematodes) and abiotic stresses (heat, cold, frost etc.)

Change in maturity duration: the shorter the duration, the more economical is the variety.

Wider adaptability: it can be grown in different climatic conditions.

Desirable agronomic characteristics: tallness and profuse branching for fodder crops. Dwarfness is desired for cereals.

This can be achieved by two methods; hybridisation and genetically modified crops.

1. **Hybridisation:** In genetics, hybridisation is the process of combining different varieties or species of organisms which are genetically dissimilar to create a hybrid. It can be inter varietal, inter specific, intergeneric.
2. **Genetically modified crops:** here the crop is improved by introducing a gene that would provide desired characteristics.

CROP PRODUCTION

It involves different practices carried out by farmer to achieve higher standards of crop production.

It includes the following:

1. NUTRIENT MANAGEMENT (MANURE, FERTILIZERS AND ORGANIC FARMING)
2. IRRIGATION
3. CROPPING PATTERN

1.NUTRIENT MANAGEMENT:

There are 16 nutrients which are essential for plants as deficiency of these nutrients will affect the physiological processes of plants such as growth, reproduction etc. Out of these nutrients 13 nutrients are supplied by soil; oxygen and carbon by air; hydrogen by water. Out of 13 nutrients 6 are classified as macronutrients and rest as micronutrients.

MICRONUTRIENTS- they are needed in only very small (micro) quantities. They are also called as minor elements or trace elements. These include elements like boron, zinc etc.

MACRONUTRIENTS: they are required by plants in relatively large amounts. The major macronutrients are nitrogen (N), phosphorous (P), potassium (K), Calcium (Ca), magnesium (Mg), and sulfur (S).

METHODS INVOLVED IN ENRICHING THE SOIL TO INCREASE THE YIELD:

A) MANURE: it is defined as the decomposition of animal excreta and plant waste.

Advantages of Manure

1. Manures helps in enriching the soil with organic matter and nutrients.
2. It helps in increasing the soil fertility.
3. Water holding capacity of soil is increased.
4. Helps in improving soil texture.
5. Save our environment from excessive use of fertilizers.

Manure is classified into **two types** according to the biological material used:

A) *compost and vermi-compost:*

Composting is the process in which farm waste material (cow dung, domestic waste, sewage waste etc) is decomposed in pits. Compost is the aerobically decomposed remnants of organic matter which is rich in nutrients.

Vermicomposting: it is the process which involve use of earthworms to hasten the process of decomposition of plant and animal refuse.

B) Green Manure:

Plants like sun hemp or guar are grown and mulched by ploughing them into soil which is turned into green manure. It helps in enriching the soil in nitrogen and phosphorus.

FERTILIZERS:

These are produced commercially from chemicals rich in nitrogen, phosphorus and potassium.

Advantage: they help in good vegetative growth and produce healthy plants.

Disadvantage :

a) Excessive use of fertilizer leads to pollution of water.

b) Continuous use of fertilizer lead to decrease in soil fertility because organic matter of the soil cannot be replenished as microorganisms present in soil get harmed due to fertilizer.

ORGANIC FARMING:

It's a farming system in which use of chemicals such as fertilizers, herbicides, pesticides etc are reduced

It involves the use of following components:

- a) Organic manure
- b) Recycled farm waste
- c) Bio-agents such as culture of blue green algae in preparation of bio fertilizers
- d) Bio pesticides such as leaves of neem or turmeric for grain storage
- e) Healthy cropping patterns such as mixed cropping, intercropping and crop rotation which will also help in controlling growth of weed, pest and insects.

2.IRRIGATION-

Irrigation is necessary for crops to get water during their growing season.

source of irrigation:

- a) **Wells-** dug wells carry water from the main source. Tube wells collect water from the underground. Pumps then lift water to irrigate fields.

- b) **Canals**- water from the main river or reservoir is carried by canal into the field which may be again divided into the small canals providing water to the field efficiently.
- c) **River lift system**: from the nearby river areas water is directly taken to irrigate fields. It is used where insufficient flow from canals occur.
- d) **Tanks**: these are small water storage reservoir
- e) **Rain water harvesting**
- f) **Watershed management**: building of small check dams which helps in increasing ground water level and helps in reducing soil erosion.

CROPPING PATTERNS:

Mixed Cropping

:It is growing of two or more crops simultaneously on the same piece of land. It is also known as multiple cropping. This type of cropping leads to an improvement in the fertility of the soil and hence increase in crop yield because when the two crops are properly chosen, the products and refuse from one crop help in the growth of the other crop plant and vice-versa. Mixed cropping is an insurance against crop failure due to abnormal weather and plant pests.

Soyabean + pigeon pea, Maize + urad dal (black gram), Groundnut + sunflower, Wheat + Chick Pea

Advantages of Mixed cropping: No risk of crop failure, Increase in yield, Improvement in soil fertility and Minimizing Pest Damage.

Inter Cropping

Intercropping is the agricultural practice of cultivating two or more crops in the same space at the same time in a definite pattern. Row-type intercropping involves the component crops arranged in alternate rows. This may also be called **alley cropping**. A variation of row cropping is strip cropping, where multiple rows (or a strip) of one crop are alternated with multiple rows of another crop. Intercropping also uses the practice of sowing a fast growing crop with a slow growing crop, so that the fast growing crop is harvested before the slow growing crop starts to mature.

Selection of crops for Mixed cropping and intercropping:

Crops are chosen whose nutrient requirements are different so that maximum utilisation of the soil nutrient takes place. Also, their water needs, rooting pattern etc. are different. Besides the advantages mentioned for mixed cropping,

Intercropping has the following additional advantages:

- Application of pesticides and fertilizers is more convenient due to well defined patterns of crops.
- Harvesting of crops is also easier.

Crop rotation

is the practice of growing a series of dissimilar types of crops in the same area in sequential seasons for various benefits such as to avoid the buildup of pathogens and pests that often occurs when one species is continuously cropped. Crop rotation also seeks to balance the fertility demands of various crops to avoid excessive depletion of soil nutrients. A traditional component of crop rotation is the replenishment of nitrogen through the use of green manure in sequence with cereals and other crops. Crop rotation can also improve soil structure and fertility by alternating deep-rooted and shallow-rooted plants.

Advantages:

Crop rotation avoids a decrease in soil fertility, as growing the same crop repeatedly in the same place eventually depletes the soil of various nutrients. A crop that leaches the soil of one kind of nutrient is followed during the next growing season by a dissimilar crop that returns that nutrient to the soil or draws a different ratio of nutrients, for example, rice followed by cottons. By crop rotation farmers can keep their fields under continuous production, without the need to let them lay fallow, and reducing the need for artificial fertilizers, both of which can be expensive. Rotating crops adds nutrients to the soil.

Crop Protection Management

When the crop is in the field, it needs protection against:

a) **Weeds** e.g. – Xanthium, Parthenium (weeds are considered to be harmful as they compete for food, space and light with the desired crop. They reduce crop production taking up the nutrients meant for the crops.

b) **Insect Pests** - attack the plant in three ways (cut root, stem and leaf, suck cell sap from various parts & bore into stem & fruits)

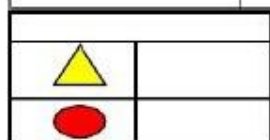
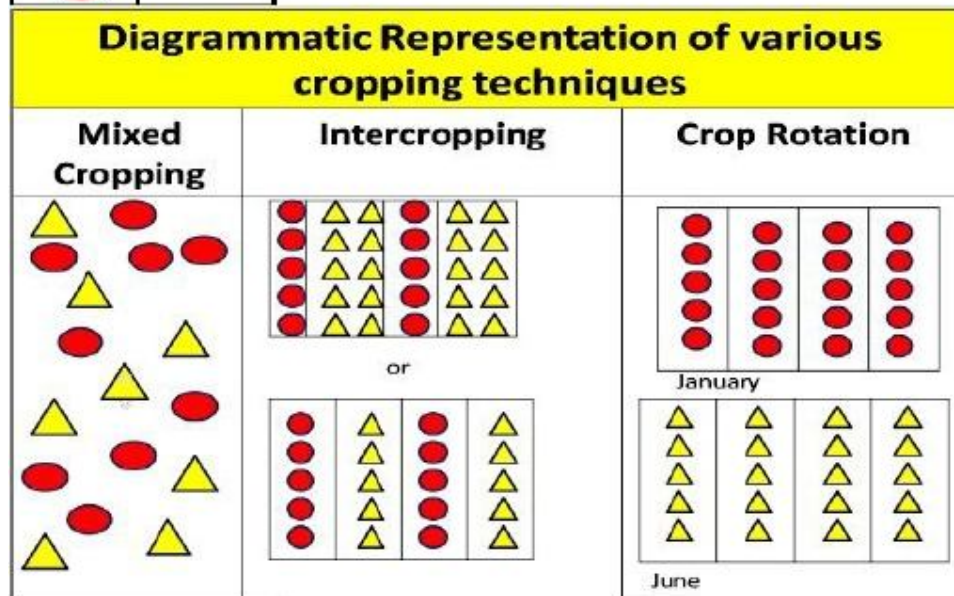
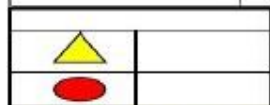
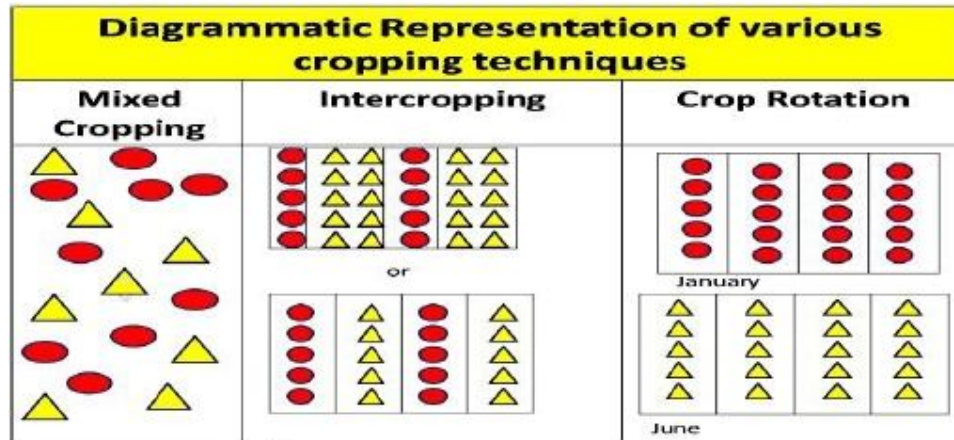
c) **Pathogens**- Microbes like bacteria, fungi and viruses cause diseases. Spores of these pathogens may be transmitted through soil, water and air.

To control these:

Herbicides, Pesticides, fungicides should be used.

For Weed control

- the methods used are : mechanical removal, use of herbicides, summer ploughing (fields are ploughed deep in summers to destroy weeds and pests.)



Prevention- for preventing the growth of weeds.

- Proper seed bed preparation,
- timely growing of crops,
- intercropping , crop rotation,
- use of resistant varieties and
- summer ploughing is done.

Storage of grains

: Factors responsible for grain loss-Biotic (Insects, Rodents (members of rat family), Fungi, mites, bacteria- Abiotic (inappropriate moisture and temperature)

Negative Effects of these factors on grains:

- Degradation in quality,
 - loss in weight,
 - poor germinability,
 - discoloration of produce-
- Leadsto poor marketability

Prevention and control methods used before grains are stored:

- Cleaning of produce before storage
- Drying of produce first in sunlight and then in shade to reduce moisture content
- Fumigation using chemicals (fumigants) to kill pests

ANIMAL HUSBANDRY-it is the scientific management of livestock. It includes feeding, breeding and disease control.

NEED FOR ANIMAL HUSBANDRY-1 To increase milk production.

2. To increase milk production.

3. To increase egg production.

4. t To increase meat production

5 To increase fish production

CATTLE FARMING-It is the raising of cattle for yield of milk by females and draught labour for agriculture work.

MILCH ANIMALS-are milk producing animals

DRAUGHT ANIMALS-are used for agriculture work.

BREEDS OF COW-1 **indigenous breeds** (local or desi breeds)-RED SINDHI and SAHIWAL (selected for long lactation period)

2 EXOTIC BREEDS-(Foreign breeds)-eg-JERSEY and BROWN SWISS(shows resistance to diseases)

3HYBRID BREEDS-are the offsprings of cross between indigenous and exotic breeds to get desirable character.

ANIMAL HUSBANDRY-has 4 components-

-1shelter of cattle 2feeding 3grooming 4 protection from diseases

-1shelter of cattle -

FEATURES OF GOOD ANIMAL SHELTER -1It should be spaciousenough to provide proper space for each animal.

2 It should br clean ,dry and ventilated.

3 Proper arrangement for the disposal of animal waste.

2 FEEDING-The food requirement of the animal is of two types-

a)**ROUGHAGE and CONCENTRATE**

ROUGHAGE-IRT CONSIST OPF COARSE AND FIBROUS SUBSTANCE having low nutrient content.eg fodder,hay ,straw.

CONCENTRATE- is low in fibres but contain relatively high proteins and other nutrients.eg oil seed cake,gram husk.

4 Protection from diseases-Cattle suffer from various diseases. External parasites live on skin and cause skin disease. Internal parasites like worm affect stomach and fluke damages liver.

POULTRY-is the rearing of domesticated fowl, ducks ,geese, turkey. It is the cheap source of protein.

It is done for egg production and meat production.

Breeds of poultry

1 **Indegenous breeds** eg Aseel

2 **EXOTIC BREEDS** eg Leghorn

LAYERS- 1) are egg laying birds.

2) They are fed with high fibre content. eg grit of stones for calcium and grains for fibre.

BROILERS-1) are the birds raised for meat production.

2) They require high protein and fat and vitamin A and K rich diet.

The following practices are needed to take care of for birds-

1 Hygienic conditions in housing.-proper sanitation and spraying of disinfectants.

2 Protection from diseases-they suffer from diseases caused by virus, bacteria, fungi.

3 Management of temperature.

COMMON MANAGEMENT PRACTICES IN DAIRY AND POULTRY FARMING-

1 Proper shelter ,its hygiene ,temperature

2 Proper Feed.

3 Prevention of control and diseases.

FISH PRODUCTION

Fish is a natural source of proteins for us.

True /finned fish are the ones that include marine & freshwater fish such as pomphret, tuna ,cod, catla, prawns, rohu, mrigal,etc.

Shellfish include unio, lobster, crabs, etc

CAPTURE FISHERY- Done from natural resources both marine & freshwater with the help of boats & nets.

CULTURE FISHERY- Fish farming of economically valuable varieties of finned & shell fish.

MARINE FISHERIES:-

The practice of rearing & culturing marine fish, ie:- fish found in seas & oceans is called **MARICULTURE**

Tuna ,cod, sardines, Bombay duck, pomphret, mackerel ,etc are common **marine fish**. They are caught with the help of fishing nets from fishing boats in areas where there are large schools of fish. This can be determined using satellites & echo sounders.

Fish farming is also done for some marine shelled & finned fish based on their economic value:-

Finned fish :- Bhetki, mullets & pearl spot.

Shellfish:- Oysters (for pearls), mussels (mollusc)

INLAND FISHERIES:-

Fresh water sources include rivers, ponds, streams, canals, reservoirs, brackish water. Brackish water is found in estuaries & lagoons where sea & fresh water mix. Fish farming, both capture & culture, done in such water bodies is called **AQUACULTURE**.

COMPOSITE FISH CULTURE:-

Sometimes fish culture is done in combination with rice crops so that fish grow along with paddy in the standing water. Both local & imported varieties of fish can be used in such systems.

In such a system, 5/6 species of fish are selected & reared in a single fish pond. The species are selected on the basis of their feeding habits, ie, they should not compete for food & should not kill each other in the pond. Fishes are at three levels-

- 1) Surface feeders- Catla
- 2) Middle zone- Rohu
- 3) Bottom feeders- Mrigals & carps

Advantages:-

1. Fish do not compete for food
2. Food available in different zones is utilized
3. Carps consume only aquatic weeds
4. Very high yield is obtained

Disadvantages:-

1. Many fish breed only in the rainy season so hormonal stimulation has to be given.
2. Good quality seeds (ie- organisms used for reproduction) are not available.

BEE KEEPING/APICULTURE

It is the practice of rearing /keeping, caring & management of honeybees on a large scale for obtaining honey & wax.

Honey is widely used & other products of bee-keeping are bee wax, bee venom, jelly.

APIARIES /BEE FARMS are places where the bees are raised for commercial honey production.

Common species of indigenous honey bee-

1. *Apis cerana indica*- Indian bee
2. *Apis dorsata*- Rock bee
3. *Apis florea*- Little bee

An exotic (foreign) Italian variety domesticated in India is- *Apis mellifera*.as it has benefits like-

They are gentle in nature, sting less, high honey collecting capacity & stay in the beehive for longer periods.

IMPORTANT CONSIDERATIONS FOR GOOD QUALITY & YIELD OF HONEY-

1. Quality of **Pasturage** (flowers available to bees for nectar)
2. Quantity of pasturage
3. Location of apiary is within 1-2km radius of pasturage