

Improvement in Food Resources

TALENT & OLYMPIAD



Introduction

We know that all the living organisms need food for their survival. We use both plants and animals for our food, but most of our food is obtained from **agriculture and animal husbandry**. The population of our country is above one billion and still increasing at very fast rate. Hence the demand of food is also increasing day by day, but the land area under cultivation is not increasing and is almost fixed. We do not have enough space for expansion, but at the same time we have to meet the requirement of the food. Therefore, we have to increase the food production using advanced technique for agriculture. While our effort have increased the food production but at the same time it is using the natural resources extensively and is getting depleted very fast. As a result, we are causing more and more damage to our environment and disturbing the natural balance. Therefore, the need of the hour is to follow sustainable use of resources.

Simply increasing the food production cannot solve the problem of malnutrition and hunger. The food security depends on both availability of food and access to it. The scientific management practices should be undertaken to obtain high yields from agriculture and animal husbandry. The different methods we should follow to increase the food production are **mixed farming, intercropping and integrated farming practices**.



Improvement in Crop Production

The successful management of natural resources for agriculture to satisfy the human needs, at the same time maintaining the quality of environment and conserving natural resources, is called **sustainable agriculture**. Agriculture can also be defined as the science dealing with the mass production of plants and animals, useful for human needs. Different crops require different climatic condition, temperature and photoperiod for the growth and development. In India there are two major crop season Rabi and kharif crop season.

- ❖ **Rabi Season Crops:** The crops which grows during the month of **October to March** are called **rabi crops**. For example **wheat, rice, grams, pea, mustard, etc.**
- ❖ **Kharif season crops:** The crops which grow during summer season i.e. during the month of **June to October** are called **kharif crops**. For example **paddy, soyabean, arhar, maize, barley etc.**

The crop yields can be increased by following methods as:

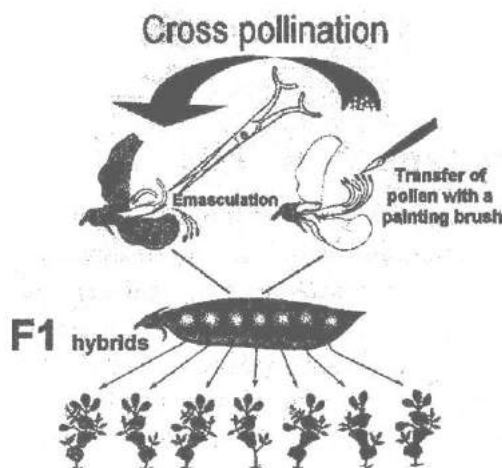
- ❖ Variety Improvement
- ❖ Production improvement
- ❖ Crop Protection Management



Crop Variety Improvement

We can improve the crop production by incorporating certain quality like high yields and disease resistant. Such traits can arise through mutation. We can improve the variety of seeds with an incorporation of the desirable character by hybridization, mutation, polyploid, and DNA recombinant technology. A gene of hybrid is inserted into the DNA of lowbrid plants and the plant express DNA of hybrid plant. It is called transgenic plants.

- ❖ **Hybridization:** The cross over between genetically dissimilar plants to produce a new kind of plant is called **hybridization**.



Selection and hybridization is useful in the country like India where repeated mating and selection procedure is used more often than not. In India crops are grown in diverse types of soil and climatic conditions. The yields of the crops depend on the **weather condition**, soil quality and on the availability of water resources. The cultivation and yield of crops are directly related to agronomic condition. The condition are based on soil quality, availability of water resources, and weather condition. The prime objective of crop improvement is to develop superior quality of plants.

Crop variety improvement is done for the following reasons:

- ❖ The main aim of crop variety improvement is to increase the production per unit hectare.
- ❖ **Quality Improvement:** Quality consideration of crop products varies from crop to crop. For example, baking quality of wheat, protein quality in pulse, oil quality in oil seed and preserve quality of fruits and vegetables.
- ❖ **Biotic and abiotic resistance:** Crops production can go down due to biotic and abiotic stresses under different condition. Varieties resistance to these stresses can improve crop production.
- ❖ **Change in maturity duration:** Shortening the duration of crop maturity increases the production and multiple crops can be produced at the same time.
- ❖ **Wider adaptability:** Developing the crop varieties of wider adaptability will help in stabilizing the crop production under different environmental conditions and hence will able to produce more crops of different kinds in different region.
- ❖ **Desirable agronomic traits:** Development of crops of desired agronomic traits, such as, cereal plant of dwarf size will help to produce more cereals in the small area and will also intake less nutrients.



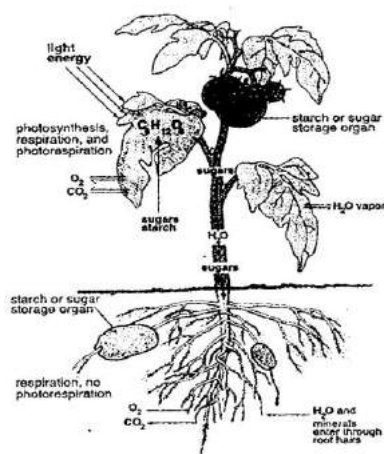
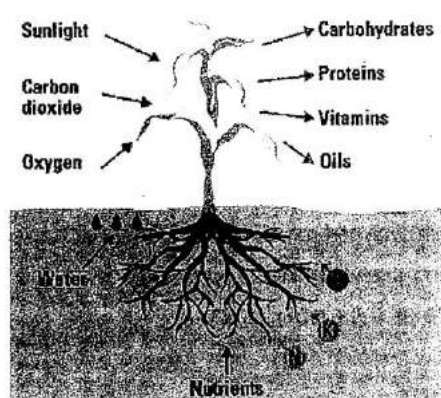
Crop Production Management

India is a large country with three fourth of the population depending on agriculture. Natural resources like **forest, agriculture, and fisheries** are the main stay for Indian economy. Due to the subtropical climate and lack of forest in most part of country, crop can be grown throughout the year. In India there are three types of farmer that is **small farmers, marginal farmers, and progressive farmers**. The extent to which farmer can grow crops depends on his financial condition and the resources he can have.

- ❖ **Nutrient Management:** Just as human being needs nutrient for his growth and development, the plants also requires nutrient for its proper growth and development. Plants get its nutrients from soil, water

and air. There are sixteen nutrients required by the plants for its proper growth and development. These nutrients are divided into two groups as **macronutrients** and **micronutrients**. Out of these, carbon and oxygen are supplied by air, hydrogen is supplied by water and remaining thirteen nutrients are supplied by soil.

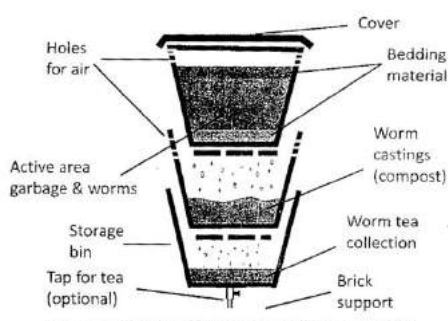
- ❖ **Micronutrients:** The nutrients which are required by the plants in small quantity are called the micronutrients. There are seven micronutrients such as chlorine, zinc, copper, iron, manganese, boron, and molybdenum.
- ❖ **Macronutrients:** The nutrients which are required by the plants in large quantity are called macronutrients. There are six macronutrients as **nitrogen, phosphorous, potassium, calcium, sulphur and magnesium**.



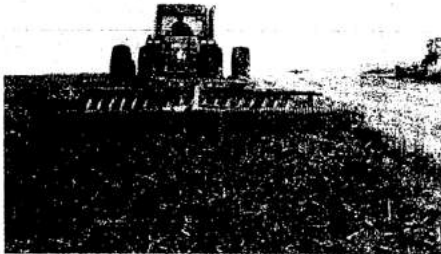
Manure

Manures are obtained from the natural materials, such as, decomposition of plant waste and animal waste. These manures include compost, green manures, vermicompost, and farmyard manure. These manures helps to improve the physical properties of soil, reduce the soil erosion, increase the moisture holding capacity of soil and are cheaper. It also do not cause environmental pollution. There are some disadvantages of using natural manure the nutrient content of manure is very low and hence required in large quantity. They are inconvenient to store and transport from one place to another. Further it is not nutrient specific and hence not useful when a particular nutrient is required by the plant or the soil is deficient in particular nutrient. Different types of manures are:

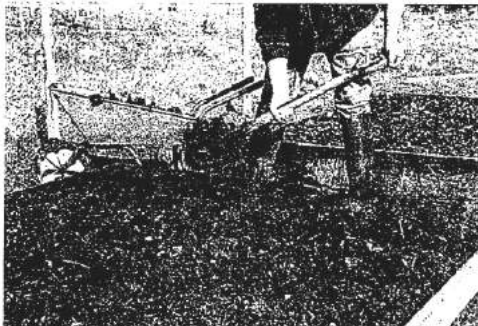
- ❖ **Compost:** It is prepared by decomposition of plant waste, animal wastes and urins of animals. They are collected in a pit and allowed to decompose over a long period of time, by the microorganisms, in the presence of oxygen. It takes about three to four month to prepare the compost.



- ❖ **Green Manure:** The green manure is prepared by growing the crop for six to eight week and then mulching it into the field by ploughing and mixing it with the soil. These crops are left buried into the field for about one to two month, during which it completely get decomposed into the soil and the nutrient content of the soil is increased.



- ❖ **Farm Yard Manure:** It is obtained by decomposing the mixture of animal waste and urins along with litter, and left over organic matters, such as roughage or fodders. These waste materials are collected daily from the cattle shed. It is then and stored into the pit and are allowed to decompose by the microorganisms such as bacteria and fungus. The main components of FYM is nitrogen, phopphorous, and potassium.



Fertilizers

Fertilizers are also the source of plant nutrients, which are manufactured commercially from the chemicals. These fertilizers supply nitrogen, phopphorous and potassium. Depending on the contents, they are divided into four groups, such as nitrogenous fertilizer, phosphatic fertilizers, potassic fertilizers and complex fertilizers.



Nitrogenous fertilizers supply macronutrient such as nitrogen. The common nitrogenous fertilizer are Urea ($CO(NH_2)_2$), Ammonium nitrate (NH_4NO_3), Sodium nitrate ($NaNO_3$), etc.

Phosphatic fertilizers are the main sources of phosphorous. The common phosphatic fertilizers are **Superphosphate-1, Triple superphosphate and dicalcium phosphate, etc.**

Potassic fertilizers are the main sources of potassium. The common potassic fertilizers are potassium chloride, potassium sulphate and **potassium nitrate**. Complex fertilizers are those which contains atleast two or more nutrients.

The common complex fertilizers are **urea ammonium phosphate and ammonium phosphate**.

Irrigation

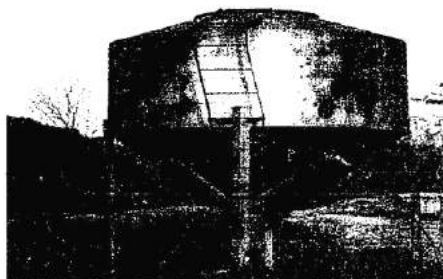
Water is one of the important requirement for crop production. To have good harvest we should have proper arrangement of water (known as irrigation) for the agriculture. It is not necessary that there will be proper rainfall at the time of farming, in such case we should have proper arrangement of water supply for the agriculture. There are different system of irrigation that are in practice.

These are:

- ❖ **Canal System:** Canals are dug connecting the main river system to the reservoir or the field and water is supplied through these canal to the field at the time of requirement.



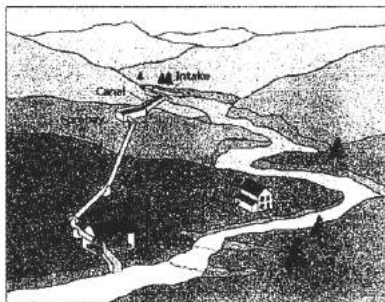
- ❖ **Tank System:** Tanks are the small reservoirs, which are built to store the runoff of smaller catchment areas. These are built at higher elevation so that the water can be supplied to the low laying areas without much difficulties.



- ❖ **Well System:** There are mainly two types of well that is dug wells and tube wells. In dug well the water is collected from bearing strata and in tube well water is collected from deep strata. Water can be lifted from these wells using motor pumps



- ❖ **River Lift System:** In this system water is directly collected from river as the canal system or the other reservoir system is insufficient to meet the requirement of water for irrigation. This method is useful in bottom flat lands of the valleys and are used for growing crops such as rice, wheat, etc.



☀ Cropping Patterns

The different cropping patterns can be followed to increase the productivity of the crops. The different cropping patterns are **Mixed cropping, Inter cropping, and Crop rotation.**

- ❖ **Mixed Cropping:** In this technique two or more crops are grown simultaneously on the same piece of land. The mixed cropping minimize the risk of crop failure due to abnormal weather conditions. Some of the major crop combinations are **wheat and chick pea, maize and urad bean, groundnut and sunflower, cotton and moong bean, etc.** While selecting the crop for mixed cropping we have to take care of the following things, such as, product and waste material of one crop stimulates the growth of the other crop, they should not have same nutrient requirement so that they compete for the nutrients, light and water. One should be of long duration and other should be of short duration of maturity. One should be tall and other should be dwarf, one should be deep rooted and other should be shallow rooted, and one should have less nutrient and water requirement than the other.
The main advantage of this pattern is, that the risk of total crop failure due to monsoon failure is minimum. One can harvest more than one variety of crop in the same time and in the same piece of land. Further, fertility of the soil is maintained and chances of pest infection is minimum.
- ❖ **Intercropping:** In this method two or more crop is grown in the same piece of land in a definite pattern of rows and columns. The pattern may be 1:2, 1:1, or 1:3. This cropping pattern make use of better natural resources such as sunlight, water and nutrients, it also leads to production of large variety of crops in a single time and also maintains the balance of soil nutrients.
- ❖ **Crop Rotation:** In this method different crops are grown in a same piece of land, in a preplanned manners. The main advantage of crop rotation is that it controls the need of fertilizers, maintains the fertility of the soil and also balance the nutrients in the soil. Several crops can be grown in succession with only one soil preparation



Crop Protection Management

Crops are infected by large number of **weeds, insect pests and diseases**. If these are not controlled at right time, it can lead to large scale destruction of crops. The chemical used to kill the pests are known as pesticides. These pesticides includes **insecticides, weedicides, and fungicides**.

Weeds are the unwanted plants which grow along with the crops and hinder the growth of the crops. The common weeds are xanthium, parthenium. These weeds take away the nutrients from the soil and compete for the light and water with the crop plants. Some of the common methods to control the weeds are uprooting, hand picking, burning, and flooding. This can also be done with the help of using chemicals such as **2, 4- dichlorophenoxyacetic acid, atrazine, etc.**



Some of the common disease of the crops are:

Sl. No.	Crops	Diseases	Pathogens
1.	Rice	Blast	Fungus
2.	Wheat	Rust	Fungus
3.	Chick Pea	Wilt	Fungus
4.	Pigeon Pea	Stem Rot	Fungus



Storage of Grains

One of the big problem our country is facing today is the lack of proper storage facility of the grains, which our farmers produce after so much hard work. Large amount of food grains are wasted due to the lack of proper storage facilities. The factors which are responsible for such losses are biotic and abiotic factors.

The biotic factors includes rats, mites, rodents, insects, fungi, and bacteria. On the other hand abiotic factors are inappropriate moisture, temperature, storage place, proper ventilation, poor germinability etc.

The preventive measures, which can be taken for storage of grains are; the grains should be properly dried and cleaned before cleaning, the godown should be properly cleaned and dried before storing the grains. There should be proper arrangement for aeration, temperature control, and protection from rodents and insects. Fumigation i.e. chemical pesticides should be sprayed to kill the germs and insects to protect the grains.

Commonly Asked QUESTIONS



Which one of the following nutrients do we get from cereals?

- (a) Vitamins
- (b) Protein
- (c) Carbohydrates
- (d) Minerals
- (e) None of these

Answer: (c)



The rust disease in wheat is caused by which one of the following microorganism?

- (a) Puccinia
- (b) Wachuria
- (c) Pyricularis
- (d) Smut
- (e) None of these

Answer: (a)



The unwanted plants which grow along with the crop plant and hindered its growth is called:

- (a) Herbs
- (b) Xanthum
- (c) Shrubs
- (d) Weeds
- (e) None of these

Answer: (d)



Animal Husbandry

It is the branch of science which deals with the rearing and management of animals, for commercial purposes. Some of the common animals used for rearing are cow, goat, buffalo, fish, poultry, and bee keeping.

❖ **Cattle Farming:** Cattle farming is done for two purpose, that is, for **milk and transportation**. Cows are classified as drought breed, dairy breed, and dual purpose breed. Milk producing cows are called dairy breed. There are two high yielding breeds of cows such as indigenous breed and diary breed. Indigenous breed of cows include **red shindhi, sahiwal, gir**.

Some of the high yielding breeds of buffaloes are **Murrah, Mehsana and Surti**. The lactation period for these animals are different. For example, for red shindhi it is 321 to 345 days, for sahiwal it is 184 to 354 days, and for Gir it is **230 to 394 days**. There are two methods of breeding animals, such as, natural method and artificial methods. In artificial methods semens of desired male bull is injected into the genital tract of female animal, during the deat period and fertilization takes places. It is known as artificial insemination.

Now the cattle feed is also equally important. The animal feed includes two types of substance: **Roughage and Concentrates**. The roughage largely consists of fibres, silage, hay and legumes, while the concentrates includes the mixtures of substance which are rich in vitamins, minerals, and carbohydrates.

The common diseases which are found in cattles and buffalo are parasitic disease such as ticks and mites, and infectious disease includes foot and mouth disease, anthrax, hemorrhagic septicemia, black quarter etc.

- ❖ **Poultry Farming:** Rearing and management of hen for meat and eggs is called poultry farming. **There are three types of poultry indigenous, exotic and cross breeds.** The Indigenous breeds includes **aseel, kadaknath, bursa.** The indigenous breeds are hardy and possess natural immunity against some of the common diseases. They are smaller in size and grows very slowly and lay less number of eggs. The other one is exotic breeds which include white leghorn, **rhode island red.** They are larger in size and lay large number of eggs. They take less time to grow and produce more meat. The third is the cross breeds which includes **HH260, IBL80, B77, and IIS82.**

Some of the common traits of new varieties of poultry are: it should be able to produce large number and large quantity of meats in less time and should be able to adjust in various climatic conditions. It should have low maintenance cost and product should be high nutrients. Some of the common diseases found in the poultry are caused by virus, such as, bird flu, cholera, aspergillosis etc.

- ❖ **Fish Production:** The rearing and management of fish on large scale for commercial purposes is called pisciculture. There are two types of fisheries: marine water fisheries and fresh water fisheries. The marine fisheries includes fisheries of ocean and sea. The fresh water fisheries includes river, lakes, ponds, and fields. Our marine fisheries include 7500 km of coastal line. The fish which are caught from the sea and oceans are sea fish, flying fish, hilsa, ribbon fish and salmon.

The Inland fisheries include rivers, ponds, lake, etc. The common fish found in this region are catia, labao, mugil, etc.



Bee Keeping

Rearing and management of bee on large scale for honey, wax etc is called **apiculture or bee keeping.** There are two varieties of bee used for this purposes such as indigenous and exotic breeds. The indigenous breeds include **apis cerana indica, apis dorsata and apis florea.** The exotic breeds includes **apis mellifera, and apis adamsoni.**



Commonly Asked Questions



The rust disease in wheat is caused by which one of the following microorganism?

- (a) Puccinia
- (b) Wachuria
- (c) Pyricularis
- (d) Smut
- (e) None of these

Answer: (a)



The lactation period for red shindhi is:

- | | |
|---------------------|---------------------|
| (a) 184 to 354 days | (b) 230 to 394 days |
| (c) 250 to 410 days | (d) 231 to 394 days |
| (e) None of these | |

Answer: (d)



Who carried out the first experiment of artificial insemination?

- | | |
|--------------------|-----------------|
| (a) John Dove | (b) Spallanzani |
| (c) Charles martin | (d) Whitalker |
| (e) None of these | |

Answer: (b)

SUMMARY



- ❖ The growing of crops to fulfil the needs and requirement of human beings is called sustainable agriculture.
- ❖ There are two types of crops in India, **rabi crops and kharif**.
- ❖ Plants require two types of nutrients **macronutrients and micronutrients**.
- ❖ Manures are the substance which are formed by decomposition of plants and animals wastes.
- ❖ **Weeds** are the unwanted plants which grow along with the crop plants.
- ❖ **Weedicides** are the chemicals which kills the weeds without damaging the crops.

Self Evaluation **TEST**



Duration
10 Minutes

-
1. Which one of the following is called water agriculture?
- | | |
|----------------------|---------------------|
| (a) Lotus production | (b) Fish production |
| (c) Prawn production | (d) Salt production |
| (e) None of these | |
-
2. Which one of the following is a exotic breeds of bees?
- | | |
|------------------------|--------------------|
| (a) Apis cerana indica | (b) Apis dorsata |
| (c) Apis florae | (d) Apis mellifera |
| (e) None of these | |
-
3. The grazing ground for cattle having grass and herbage is called:
- | | |
|-------------------|------------|
| (a) Crop | (b) Flora |
| (c) Pasturage | (d) Apiary |
| (e) None of these | |
-
4. Cereals are the important sources of:
- | | |
|---------------------|--------------|
| (a) Food and fodder | (b) Vitamins |
| (c) Minerals | (d) Fats |
| (e) None of these | |
-
5. Vigorous vegetative growth is caused by:
- | | |
|-------------------|------------------------|
| (a) Potash manure | (b) Phosphate manure |
| (c) Compost | (d) Nitrogenous manure |
| (e) None of these | |
-
6. Identify the weeds among the following:
- | | |
|-------------------|------------------|
| (a) Mandoosi | (b) Attrazine |
| (c) 2, 4,-D | (d) Fluchloralin |
| (e) None of these | |
-

7. Gundhy bug is a pest of which one of the following crops?

- (a) Wheat (b) Rice
(c) Pulse (d) Sugarcane
(e) None of these
-

8. Which part of plant breeding is an art?

- (a) Heat treatment (b) Hormone treatment
(c) Breeding with their wild relative (d) Artificial methods
(e) None of these
-

9. The exotic breed of bull from England use for cross breeding is:

- (a) Gir (b) Murrah
(c) Redshindhi (d) Jersey
(e) None of these
-

10. Wax gland of honey bee are present in which one of the following?

- (a) Queen (b) Drone
(c) Workers (d) All of these
(e) None of these
-

Answers – Self Evaluation Test

1.	B	2.	D	3.	C	4.	A	5.	D	6.	A	7.	B	8.	C	9.	D	10.	C
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