

1. What are food crop plants?

Plants which are grown and cared in the fields, to serve as food or as a source of any food product and harvested seasonally are called food crop plants.

2. How are crop plants classified? Give example for each.

Crop plants are classified on the basis of the products obtained into cereals

	Crop type	Example	Additional examples
1.	Cereals	Paddy (rice)	Maize, Wheat, oats
2.	Pulses	Beans	Peas, dal
3.	Spices	Pepper	turmeric, garlic, cloves
4.	Beverages	Coffee	tea, coco
5.	Oil crops	Ground nut	coconut, olive, corn
6.	Sugar crops	Sugar cane	beetroot
7.	Fibre crops	Cotton	jute, flax, hemp
8.	Plantation crops	Coconut	banana, rubber, cashew
9.	Root crops	Carrot	raddish, onion
10.	Tuber crops	Potato	groundnut, yam

3. How are food crops classified?

Food crops are classified into two types based on the season of cultivation or harvesting. They are a) Kharif crops 2) Rabi crops.

4. What are Kharif crops? Give example.

The crops that are raised in rainy season and harvested at the end of monsoon season (during September and October) are called Kharif crops. Ex: Rice, maize, pea, groundnut

5. What are Rabi crops? Give example.

The crops that are raised in winter season and harvested in the summer (during March & April) are called Rabi crops. Ex: Wheat, barley, mustard

6. Differentiate between Kharif and Rabi crops.

Kharif crop	Rabi crop
The crops that are raised in rainy season and harvested at the end of monsoon season (during September and October)	The crops that are raised in winter season and harvested in the summer (during March & April)

7. What does conventional plant breeding involve?

- a) Developing new varieties of plants to suit varying climatic conditions.
- b) Improving taste or nutritional value
- c) Equip the plants to cope better with diseases and pests.
- d) Making the plants to use water and nutrients more efficiently.

8. What is the aim of conventional plant breeding?

The aim of conventional plant breeding is crossing of two closely related plants to combine the favourable traits from both the plants and eliminate their unwanted traits.

9. Define the term variety with respect to plant breeding.

The term variety describes a group of plants similar in their gene composition but different in a few characteristics.

10. What are the different procedures followed in conventional plant breeding?

a) Selection b) Hybridization c) Polyploidy d) Induced mutation

11. What is meant by selection in conventional plant breeding?

Selection is the process where a breeder selects from a population of plants having desirable characteristics. It is the most ancient and basic procedure.

12. What is meant by hybridization?

Hybridization is a technique of plant breeding that brings together desired traits through cross pollination.

13. Mention the types of hybridization.

The three types of hybridization are:

- a) Intervarietal hybridization
- b) Interspecific hybridization
- c) Intergeneric hybridization

14. What is intervarietal hybridization?

Intervarietal hybridization is a technique in which different varieties of the same species are mated to obtain a new variety. Ex: Different varieties wheat can be mated to obtain a new variety.

15. What is interspecific hybridization?

Interspecific hybridization is a technique in which crop species are mated with a related species. Ex: Sugarcane varieties are grown by interspecific hybridization.

16. What is intergeneric hybridization?

Intergeneric hybridization is a technique in which two members of two related genera are mated to get a totally new kind of plant.

Ex: A specie of wheat, *Triticum turgidum* is created by cross breeding with a species of rye to get a new variety called *Triticale*.

17. Differentiate between inter-specific hybridization and inter-generic hybridization.

Inter-specific hybridization	Inter-generic hybridization
A technique in which crop species are mated with a related species.	A technique in which two members of two related genera are mated to get a totally new kind of plant.

18. What is meant by polyploidy?

The technique of developing polyploids is called polyploidy.

19. What are polyploids?

Plants with multiple sets of chromosomes are called polyploids.

20. How are polyploids achieved?

In a normal plant, 2 sets of chromosomes (diploid) are present. It is increased to $3n$ or $4n$ or $6n$ artificially by a chemical called colchicine.

21. What is the advantage of polyploid plants?

- a) Polyploid plants are bigger in size.
- b) Polyploid plants show greater genetic variability.

22. What is the disadvantage of polyploid plants?

Polyploid plants less fertile and growth is very slow.

23. Give reason: Polyploids have both advantages and limitations.

Polyploid plants are bigger in size and show greater genetic variability but the plant fertility is lower and growth is very slow.

24. What is induced mutation?

The technique of growing crop plants by making genetic changes by using certain agents is called induced mutations.

25. What are mutagens?

The agents which bring about genetic changes in plants are called mutagens.

26. What are mutants?

The plants which are genetically changed by using chemical are called mutants.

27. Differentiate between mutant and mutagens.

The plants which are genetically changed by using chemical are called mutants and the agent which brings about changes in plants are called mutagens.

28. Give reason: Induced mutation is not widely used.

The method of induced mutations is not widely used since the site of mutation cannot be controlled.

29. What is tissue culture?

The technique of growing plant cells and tissues in a suitable culture medium, under controlled laboratory conditions is called tissue culture.

OR

Tissue culture is the practice of growing an entire plant from a single cell or tissue under aseptic, laboratory conditions.

30. Define totipotency.

Totipotency is the capacity of a cell to differentiate into a new organism.

31. Mention the uses of tissue culture.

- a) Tissue culture is extensively used for large scale propagation of medicinal and ornamental plants.
- b) It is also used for propagating crop and forest plants.
- c) It is used for developing disease free plants.
- d) Cell culture is used for the extraction of many useful metabolites.

32. What is genetic modification?

The process in which a specific gene responsible for desired trait is selected and introduced directly into the new plant variety is called genetic modification.

33. What are genetically modified plants or transgenic plants?

The plants in which a specific gene responsible for desired trait is selected and introduced directly into the new plant variety are called genetically modified or transgenic plants.

34. What are the merits and demerits of transgenic plants?Merits of transgenic plants:

- a) Crops are more productive and have a larger yield.
- b) Transgenic plants can offer more nutrition and flavour.
- c) A possibility that they could eliminate allergy causing properties in some foods.
- d) Crops can have resistance to pests, weeds and disease.
- e) Crops are more capable of surviving in regions with poor soil or adverse climates.
- f) Crops are more environment friendly as they require less herbicides and pesticides.
- g) Foods are more resistant and stay ripe for longer so they can be shipped long distances or kept on shop shelves for longer periods.
- h) Crops can be grown on small part of land.

Demerits of transgenic plants:

- a) The use of genetically modified food should not be encouraged without research into the risks.
- b) Not labelling transgenic foods is wrong and unfair to the consumers who should have the right to know what they are buying so they can decide for themselves whether they want to buy the food or not.
- c) Genetically modified crops pose a risk to food diversity as the plants are much more dominant.
- d) Transgenic crops could give rise to super-weeds and super-pests that would need newer, stronger chemicals to destroy them.
- e) Transgenic crops cross-pollinate with nearby non-transgenic plants and could create ecological problems.
- f) The new technology interferes with traditional agricultural methods.

35. What is recombinant DNA technology?

Recombinant DNA technology is the technique of manipulation of genetic material of an organism under laboratory conditions. DNA containing the desired gene is isolated from a cell and then transferred into a new host cell with the help of carrier or Vector DNA.

36. What is carrier DNA or vector DNA?

The DNA which is used to transfer the desired gene isolated from another cell into a new host is called carrier DNA or vector DNA.

37. Give examples of some genetically modified plants.

No.	Traits/products	Example
1	Herbicide resistant	Corn, potato, tomato, tobacco, cotton
2	Pest resistant	Corn, cotton, potato, tomato
3	Virus resistant	Papaya, cucumber, water melon, tomato, potato
4	Nitrogen fixation	Leguminous plants
5	Vitamin A enriched	Golden rice

38. Write a note on BT Cotton.

BT Cotton is a genetically modified or transgenic plant. It is a new variety in which a gene isolated from a bacterium called *Bacillus thuringiensis* has been newly introduced. The gene is responsible for producing a toxin which can kill the boll worm that attacks the cotton plants.

39. What is hydroponics?

Hydroponics is the practice of growing plants in mineral nutrient solutions in water, without soil.

40. What is the principle of hydroponics?

Hydroponics is based on the principle that when the required mineral nutrients are directly introduced into the supply system of a plant artificially, soil is no longer required for a plant to survive.

41. How are plants grown by hydroponics?

In hydroponics, terrestrial plants are grown by immersing their roots in nutrient solution in specially designed containers.

42. Mention the advantages of growing plants by hydroponics.

- Soil is not required.
- Water requirement is less.
- Yields are stable and high.
- There will be no weeds to remove.
- Plants grow healthier.

43. What is the disadvantage of growing plants by hydroponics?

The main disadvantage of growing plants by hydroponics is that it leads to rapid plant death.

44. What is meant by aeroponics?

The practice of growing plants where the roots of a plant are either continuously or discontinuously kept in an environment saturated with fine drops of mineral nutrients.

45. How are plants grown by aeroponics?

Plants are grown in a green chamber with excellent aeration. The roots hang in air. Nutrient solutions are sprayed frequently.

46. Name the plants that can be grown by aeroponics.

Potato, tomato and many leafy vegetables.

47. Give reason: hydroponics and aeroponics methods are important for space research organisations

Hydroponics and aeroponics methods are significant for space research organizations in developing special kind of food for astronauts. Mist is easier to handle in zero gravity situations than liquids in zero gravity situations.

48. Differentiate between hydroponics and aeroponics.

Hydroponics	Aeroponics
The practice of growing plants in mineral nutrient solutions in water, without soil.	The practice of growing plants where the roots of a plant are either continuously or discontinuously kept in an environment saturated with fine drops of mineral nutrients

49. What is meant by roof-top gardening?

The technique of growing plants on roof top in urban areas where sufficient space is not available is called roof-top gardening.

50. What are the steps to be taken before starting roof-top garden?

Precautions must be taken to prevent the leakage of water from roof due to seepage of water.

Measures must be taken to enable the roof to bear the additional weight of plants. And soil.

51. Give reason: Roof-top gardening may be a solution to various environmental problems. Explain

What are the benefits of roof-top gardening?

In urban areas where sufficient space is not available for growing plants, roof-top garden helps.

- Roof-top gardens increase access to safe outdoor green space.
- It improves air quality due to increased absorption of carbon dioxide.
- It provides habitat for butterflies and birds.
- It becomes a source of recreation.
- It encourages urban food production.
- It also provides a temperature control mechanism, by insulating the heat.
- Rooms under roof-top garden are 3 to 4 degree Celsius cooler than the surrounding temperature.

52. Define animal husbandry.

The various aspects related to feeding, breeding, caring and sheltering of animals in service of mankind is called animal husbandry.

53. Define livestock.

Live stock is a collective term used to describe animals domesticated by man for various uses.

Cattle, pig, sheep, goat, fowl and duck are common examples of livestock.

54. How is livestock classified? Give one example of each.

On the basis of their utility, livestock is classified into:

Utility	Examples
Milk yielding animals	Cow, goat, buffalo, camel
Meat & egg yielding animals	Fowl, duck, hen
Animals for agriculture & transport	Bullocks, camel
Wool & leather yielding animals	Sheep, camel
Honey, silk and lac yielding	Honey bee, silkworm, lac insect

55. What are the main objectives of animal breeding?

- Improving the growth rate.
- Increasing the production of milk, meat, egg, wool and other products.
- Improving the quality of products.
- Improving the resistance to diseases.
- Improving the span of productivity.
- Increasing the rate of reproduction.

56. State the main approaches for animal breeding.

The main approaches for animal breeding are in-breeding, out-crossing and hybridization.

57. What is meant by in-breeding?

In-breeding is a method of animal breeding in which male and female individuals of the same species among the breeds.

58. What is meant by out-crossing?

Out-crossing is a method of animal breeding in which superior male of one breed is crossed with superior females of another breed.

59. What is meant by hybridization?

Hybridization is a method of animal breeding in which superior male of one species is mated with superior female of a different species.

60. Mention the difference between in-breeding and out-crossing.

In-breeding	Out-crossing
Crossing of male and female individuals of the same species.	Crossing of male and female with another breed.

Genetic disorders are common in off springs	Desirable qualities of two breeds appear in the off springs.
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61. Name some indigenous breeds of cow

Sindhi, Sahiwal, Gir, Hallikar

62. Name some exotic breeds of cow.

Jersey, Holstein, Brown Swiss, Friesian

63. Name some cross breeds of cows.

Karan Swiss, Karan Fries, Frieswal, Karan

64. What are transgenic animals?

Animals in which a specific gene responsible for desired trait is selected and introduced directly into the new animal variety are called transgenic animals.

65. Give some examples of transgenic animals.

- Introducing certain human gene sequences into cattle, goat and sheep for enhanced growth, meat and milk production.
- Bacterial genes introduced into sheep have resulted in improved wool output.
- Cattle containing human gene responsible for production of growth hormone, have shown production of milk containing human growth hormone.

66. What are food additives? How are they classified?

The substances which increase the shelf-life and nature of food are collectively known as food additives.

Food additives are classified into

- Natural additives
- Man-made additives
- Artificial additives
- Antioxidants
- Colourants
- Flavourants
- Sweeteners

67. Name some natural additives.

Extracts from saffron, beetroot plant are used as colouring agents.

68. Name a man-made additive.

The additives which are synthetic copies of naturally occurring substances. Ex: Saccharine

69. Name some artificial additives.

The additives which are produced synthetically and not found in nature.

70. What are preservatives?

The substances which prevent the growth of microorganisms that cause spoilage of food are called preservatives. Ex: Common salt

71. What are antioxidants?

The substances which prevent food containing fat or oil from developing a foul smell are called antioxidants.

72. What are colourants?

The substances which restore colour lost during processing of food are called colourants.

73. What are flavourants?

The substances that are used to add a particular taste are called flavourants.

74. What are sweeteners?

Substances that are added to increase the intensity of sweetness are called sweeteners.

75. Differentiate between antioxidant and colourant.

Antioxidant	Colourant
The substances which prevent food containing fat or oil from developing a foul smell.	The substances which restore colour lost during processing of food

76. Give reason:**a) Food additives are widely used in modern life.**

Food additives are widely used to increase the shelf-life and nature of foods.

b) Addition of artificial food additives should be minimized.

Food additives if used regularly can cause health problems.

Fill in the blanks:

- Plants which are grown and cared in the fields are called **crops**.
- The crops that are raised in rainy season and harvested at the end of monsoon season are called **Kharif crops**.
- Rice** is an example of **kharif** crop.
- The crops that are raised in winter season and harvested in the summer are called **Rabi crops**.
- Wheat** is an example of **Rabi** crop.
- The process where a breeder selects from a population of plants having desirable characteristics is called **Selection**.
- Variety** describes a group of plants similar in their gene composition but different in a few characteristics.
- Hybridization** is a technique of plant breeding that brings together desired traits through cross pollination.
- The technique in which crop species are mated with a related species is called **interspecific hybridization**.
- The technique in which different varieties of the same species are mated to obtain a new variety is called **intervarietal hybridization**.
- A technique in which two members of two related genera are mated to get a totally new kind of plant is called **intergeneric hybridization**.
- An example of a crop grown by **intervarietal** hybridization is **wheat**.
- An example of a crop grown by **interspecific** hybridization is **sugarcane**.
- An example of a crop grown by **intergeneric** hybridization is **triticale**.
- Triticale is obtained from intergeneric hybridization of a species of **rye**.
- The number of chromosomes in a normal plant is **2n**.
- The number of chromosomes in polyploids is **3n / 4n / 6n**.
- The technique of developing polyploids is called **polyploidy**.

19. Plants with multiple sets of chromosomes are called **polyploids**.
20. A chemical used to induce polyploidy is **colchicine**.
21. The technique used to obtain genetically modified plants is called **induced mutations**.
22. Genetic changes can be brought in a plant by using certain agents called **mutagens**.
23. The plants which have been genetically changed are called **mutants**.
24. The practice of growing an entire plant from a single cell or tissue in aseptic, laboratory conditions is called **tissue culture**.
25. The basis for tissue culture is **totipotency** of plant cells.
26. The capacity of a cell to differentiate into a new organism is called **totipotency**.
27. Transgenic plants are obtained by using **recombinant DNA technology**.
28. Carrier gene used to transfer the desired gene into a new host cell is called **vector DNA**.
29. The plants in which a specific gene responsible for desired trait is selected and introduced directly into the new plant variety are called **genetically modified or transgenic plants**.
30. The practice of growing plants in mineral nutrient solutions in water, without soil is called **hydroponics**.
31. In hydroponics, **soil** is not required.
32. The disadvantage of hydroponics is **rapid death of plant**.
33. The practice of growing plants where the roots of a plant are either continuously or discontinuously kept in an environment saturated with fine drops of mineral nutrients is called **aeroponics**.
34. An example of a plant grown by aeroponics is **potato/ tomato/leafy vegetables**.
35. Hydroponics and aeroponics are significant in the field of **space science**.
36. The technique of growing plants on roof top in urban areas where sufficient space is not available is called **roof-top gardening**.
37. Roof-top gardens improve air quality due to increased absorption of **carbon dioxide**.
38. The various aspects related to feeding, breeding, caring and sheltering of animals in service of mankind is called **animal husbandry**.
39. The collective term used to describe animals domesticated by man for various uses is **livestock**.
40. An example of livestock is cattle, pig, sheep, goat, fowl and duck.
41. The method of animal breeding in which male and female individuals of the same species are mated is called **in-breeding**.
42. The method of animal breeding in which superior male of one breed is crossed with superior females of another breed is called **out-crossing**.
43. An example of indigenous breed of cow is **Sindhi/Sahiwal/Gir/Hallikar**.
44. An example of exotic breed of cow is **Jersey/Holstein/Brown Swiss/Friesian**.
45. An example of cross breed of cow is **Karan Swiss/Karan Fries/Frieswal Karan**.
46. The substances which increase the shelf-life and nature of food are collectively known as **food additives**.
47. Substances used to improve the nature of food with an increase in its shelf-life is called **food additive**.
48. The method of animal breeding in which superior male of one species is mated with superior female of a different species is called **hybridization**.
49. Animals in which a specific gene responsible for desired trait is selected and introduced directly into the new animal variety are called **transgenic animals**.
50. The substances which increase the shelf-life and nature of food are collectively known as **food additives**.

51. An example of a natural additive is **saffron/beetroot**.
52. An example of a man made additive is **Saccharine**.
53. The additives which are synthetic copies of naturally occurring substances are called **man made additives**.
54. The additives which are produced synthetically and not found in nature are called **artificial additives**.
55. The substances which prevent the growth of microorganisms are called **preservatives**.
56. Food additives used to prevent the spoilage of food are called pre
57. The substances which prevent food containing fat or oil from developing a foul smell are called **antioxidants**.
58. The substances which restore colour lost during processing of food are called **colourants**.
59. The substances that are used to add a particular taste are called **flavourants**.
60. The substances that are added to increase the intensity of sweetness are called **sweeteners**.
61. The substances which prevent the growth of microorganisms that cause the spoilage of food are called **preservatives**.
62. The substances which increase the shelf life of food is called **preservative**.
