

**Class: 12**  
**Subject: Biology**  
**Topic: Strategies for Enhancement**  
**No. of Questions: 25**

Q1. What is meant by the term 'breed'? What are the objectives of animal breeding?

Sol. The group of animals having same ancestry characters, general appearance, size, etc. are called 'breed'. They have been developed as a result of animal breeding which aims at increasing the yield of animals and improving the desirable qualities of the produce.

Q2. Define the term 'surface sterilisation'.

Sol. The procedure of treating explants (the plant parts excised from their original location and used for culturing) with specific antimicrobial chemicals to make them free from microbes is called surface sterilization.

Q3. Why is quarantine a must before introduction of a plant species from a different country?

Sol. Plant species are carefully examined for the presence of weeds, insects and disease causing organisms before introduction to reduce the risk of entry of a pathogen in the country. This is called plant quarantine.

Q4. How are the two following varieties of sugarcane different from each other?

- (i) Saccharum barberi
- (ii) Saccharum officinarum

Sol. Saccharum barberi has poor sugar content and yield whereas Saccharum officinarum has thicker stem and higher sugar content. S. barberi was originally grown in north India and S. officinarum in south India.

Q5. Millions of chickens were killed in West Bengal, Assam, Orissa and Maharashtra. What was the reason?

Sol. Because these were infected by bird flu disease which can cause infection to other birds. The eggs and chickens of diseased birds are not good for human consumption.

Q6. Write the aims of plant breeding.

Sol. Plant breeding is mainly concerned with the production of plants having desired characters such as higher yields. Better qualities, resistance to diseases and stresses, etc.

Q7. Why hardening is essential for establishment of plantlets in the field?

Sol. Plantlets raised in tissue culture get favourable conditions for growth and development. They must be kept under reduced light and high humidity for a suitable period of time so that can tolerate the relatively harsher environment of the field.

Q8. What is dedifferentiation and redifferentiation?

Sol. Transformation of mature cells into meristematic cells leading to the formation of callus is called dedifferentiation. Development of entire plants from the components cells of callus is called redifferentiation.

Q9. MOET programme has helped in increasing the herd size of the desired variety of cattle. List the steps involved in conducting the programme.

Sol. Conduction of MOET programme involves the following steps: (i) A cow is administered hormones, with FSH-like activity, to induce follicular maturation and super ovulation. (ii) The cow is mated with an elite bull or fertilised by artificial insemination. (iii) The fertilised eggs are allowed to grow upto 8-32 called stage and then recovered and transferred to surrogate mothers.

Q10. What is interspecific hybridization? Explain the term by taking an example of animal breeding.

Sol. A cross or mating between two different related species is called interspecific hybridization. The progeny obtained from such a mating are usually different from both paternal and maternal parents. Some time the progeny combines the desirable features of both the parents. An example of interspecific hybridization is production of mule which is produced from a cross between female horse (mare) and male donkey. It inherits size from the horse and sure footedness, great endurance to hardship, and ability to live on rough food from the donkey. It is more useful as a beast of burden, particularly in the hills, than, either of the parents. However, with all its hybrid vigour, the mule is sterile, i.e. unable to reproduce. Therefore, mule have to

be produced a new every time. The female mule produce youngones with the male horse or ass. The hybrid between the female ass and stallion (horse) is called hinny.

- Q11. A. What is callus?  
B. What do you understand by totipotency of a cell? Name the scientist who coined the term.

Sol.

- A. An unorganized mass of cells is called callus. It is usually produced by culturing explant in tissue culture laboratories. A superficial tissue developing in woody plants, usually through cambial activity, in response to wounding is also called callus. This tissue develops for protecting the injured surface.
- B. Totipotency is the ability or capability or capacity of a cell to give rise a complete organism, when cultured in a suitable culture medium at appropriate temperature and aeration conditions. The term totipotency was coined by German Botanist Gottlieb Haberlandt in 1902.

- Q12. What are somatic hybrids? How are they produced? What are their common uses?

Sol. Somatic hybrids are hybrids produced by fusion of somatic cells of two varieties or species. They are produced by somatic hybridization. During this process, the cell walls of plant cells are removed by digestion with a combination of pectinase and cellulose. The naked protoplasts of desired parents are induced to fuse by using a solution of polyethylene glycol (PEG) and a very brief voltage electric current. Such protoplasts, when transferred to suitable culture medium develop cell walls and begin to divide. These somatic hybrids are used for gene transfer, of cytoplasm and production of useful allopolyploids.

- Q13. (a) Explain how to overcome inbreeding depression in cattle. (b) List three advantages of inbreeding in cattle. (c) Name an improved breed of cattle.

Sol.

- (a) Inbreeding depression in cattle can be made overcome by outbreeding i.e. mating some selected animals of the breeding population with unrelated superior animals of the same breed.
- (b) Advantages of inbreeding in cattle: (i) Superior animals of the same breed. Of progeny is obtained. (iii) Elimination of deleterious alleles as they are not passed to future generations.
- (c) Jersey is an improved breed of cattle.

- Q14. A. Name the ways through which breeders create desired genetic variation in plants.  
B List the chief objectives of animal breeding.  
C What are the three main approaches of animal breeding.  
D What is quarantine?  
E. What is emasculation?

Sol.

- A. The different ways through which the breeders creates desired genetic variation in plants are listed below: (i) Domestication (ii) Germplasm collection (iii) Plant Introduction (iv) Selection (v) Hybridisation (vi) Polyploidy (vii) Mutation (viii) Genetic engineering  
B. The chief objectives of animal breeding are listed below: (i) Improvement in growth rate (ii) Increase in the production of milk, meat, egg, wool etc. (iii) Increase in the quality (vi) Polyploidy (vii) Mutation (viii) Genetic engineering  
C. The three main approaches of animal breeding are – (i) Inbreeding (ii) Out of crossing, and (iii) Interspecific hybridization.  
D. Quarantine is the legally forced restriction of the movement of diseased plant material or of fungi, bacteria or viruses, that cause diseases in plants.  
E. Emasculation is the removal of stamens or anthers or killing the pollen grains of the flower without affecting the female reproductive organs. Emasculation is the method to convert a bisexual flower into female flowers.

- Q15. What is the difference between Pisciculture and Aquaculture? What are the benefits of both kinds of cultures?

Sol. Pisciculture involves only the culture and rearing of fish whereas aquaculture involves culture and rearing of fish as well as other aquatic organisms such as prawn, oyster, etc. Through these cultures the production of aquatic plants and animals both marine and fresh water have been enormously increases. This has enhanced the economy of our country.

- Q16. What is the main reason for low milk production In India? How can it be improved?

Sol. The main reasons for low milk production in India are insufficient number of improved breeds and the improper feeding of the cattle. Improved breeds should be increased in number by proper management which include facilities, processes, materials and labour. Cattle should be fed with proper and balanced feed consisting of appropriate quantities of proteins, carbohydrates, fats, vitamins and water.

Q17. List the main steps of hybridization in plants. Explain any two of them.

Sol. The main steps of hybridization are – (i) Selection of parents (ii) Selfing of parents (to induce homozygosity) (iii) Emasculation (iv) Bagging (v) Crossing of desired and selected plants (vi) Seed setting and harvesting. Emasculation is the removal of anthers before anthesis (e.e. first opening of flower) to convert bisexual flower into female flower. This is done to avoid self pollination and inbreeding.

Bagging is the process of covering female flowers with bags so that no undesirable pollen may fall on stigma.

Q18. What is importance of biofortification? Does this process require genetic engineering?

Sol. The process of breeding food crops to improve their nutritional quality (particularly bioavailable micronutrients), is called biofortification. It is a modern practice being used to confront nutritional deficiencies in diets. While nutrients are traditionally being added to foods in processing stages, biofortification seeks to pack nutrients into staple food which they are growing. Biofortification does not require genetic engineering. It is done by traditional plant breeding techniques.

Q19. Recently, Anil read in an article that India and China have more than 70% of world livestock and there are about 227 million cattle in India. However, their contribution to the world farm produce is less than 25%. He also read that scientist are busy in developing breeds that are specially adapted for meat production, milk production and agriculture work especially in the hot climate.

Read the above passage and answer the following question:

- (i) How can we increase production of dairy products?
- (ii) How can we increase milk production?
- (iii) What value is displayed by Anil.

Sol.

- (i) We can increase production of dairy products by better management practices including modern methods of storage and processing of milk products.
- (ii) We can increase milk production by cross breeding native cattle with improved varieties which yield large quantity of better quality milk.
- (iii) Anil was concerned about low productivity of live stock in his country.

Q20. What is selection? Name the two methods of selection.

Sol. When individual plants or group of plants having the desired characters are picked up from a population eliminating the undesirable ones, it is called selection. The two methods of selection are—Mass selection and Pure-line selection.

Q21. Hybrid vigour is mostly due to

- a) Homozygosity of pure characters
- b) Superiority of all the genes
- c) Heterozygosity
- d) Mixing up of cytoplasm of the male with that of female

Sol. (c)

Q22. Main objective of production/use of herbicide resistant Genetically modified crops is to:

- a) Reduce herbicide accumulation in food articles for health safety
- b) Eliminate weeds from the field without the use of manual labor
- c) Eliminate weeds from the field without the use of herbicides
- d) Encourage eco-friendly herbicides

Sol. (a)

Q23. In order to obtain disease-free plants through tissue culture techniques, the best method is

- a) Protoplast culture
- b) Anther culture
- c) Embryo rescue
- d) Meristem culture

Sol. (d)

Q24. The dividing and undifferentiated cells are known as

- a. Embryo
- b. Proembryo
- c. Callus
- d. Primordium

Sol. (c)

- Q25. Cloning is meant for
- Production of HGH gene in E. coli.
  - To preserve the genotype of organism
  - To replace the original one
  - all of these

Sol. d

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