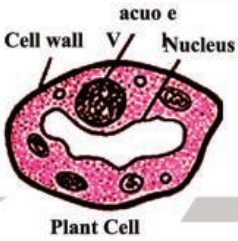
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CLASS XII BIOLOGY NOTES

Key Notes and Important Questions with Answers

STRATEGIES FOR ENHANCEMENT IN FOOD PRODUCTION





Chapter - 9 Strategies for Enhancement in Food Production

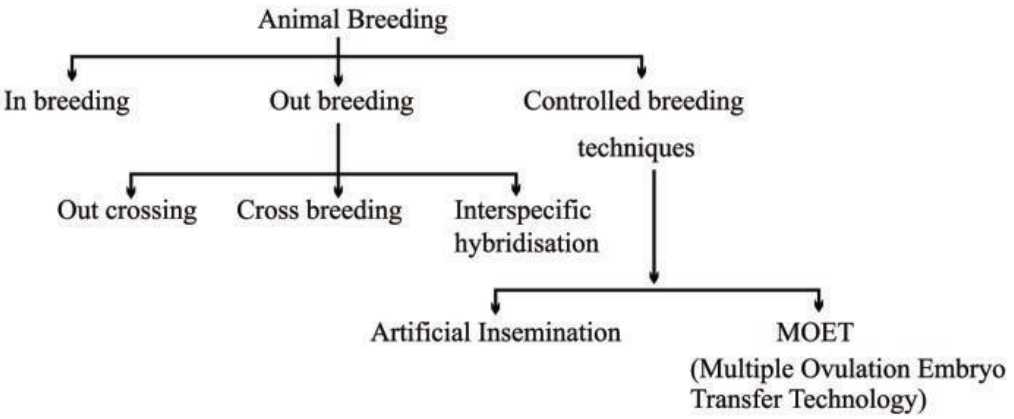
Apiculture : Rearing of honeybees for the production of honey, beewax, royal jelly and bee venom.

Artificial insemination : Introduction of semen of good quality of male into the vagina of female by artificial means.

Explant : Any part of plant excised from its original location and used for tissue culture.

Germplasm Collection : The entire collection having all the diverse alleles for all the genes in a given crop.

Totipotency : The ability or capacity of a cell or explant to give rise to a complete plant is called totipotency.



Inbreeding : Inbreeding refers to the mating of more closely related individuals within the same breed for 4-6 generations.

Out-breeding : Out-breeding is the breeding of the unrelated animals, which may be between individuals of the same breed (but having no common ancestors), or between different breeds (cross breeding or different species (interspecific hybridisation).

Inbreeding depression : Continued close inbreeding decreases the fertility and productivity.

- **Out crossing :** Out-breeding is the breeding of the unrelated animals, which may be between individuals of the same breed (but having no common ancestors), or between different breeds (cross breeding or different species (interspecific hybridisation)

- **Cross breeding :** The practice of mating of animals of same breed but have no common ancestor on either side of pedigree upto 4-6 generations. A single outcross helps to overcome the inbreeding depression.

The Multiple Ovulation Embryo Transfer (MOET) : Technology can improve the success rate of fertilisation. In this procedure, a cow is given hormonal treatment (FSH), so that more than one ova/eggs (6-8) are produced per cycle. After mating or artificial insemination the embryos at 8-32 celled-stage are transferred to different surrogate mother cows. This technology has been successfully used for cattle, sheep, rabbit, mares and buffaloes.

Abbreviations

ET	**:**	Embryo Transfer
IARI	**:**	Indian Agricultural Research Institute
IRRI	**:**	International Rice Research Institute
ICAR	**:**	Indian Council of Agriculture Research
MOET	**:**	Multiple Ovulation Embryo Transfer Technology
NDRI	**:**	National Dairy Research Institute

Bee-keeping

Apiculture or Bee-keeping is the maintenance of hives of honeybees for the production of honey. Apiculture is beneficial for farmers in many ways. Honey bee also produces beewax which is used in industries, such as in preparation of cosmetics and polishes of various kinds. If Bee-keeping is practiced in any area the commercial flowers are cultivated, it will be beneficial in the following ways.

(i) Bees are pollinators of many crop species including flowering crops such as sunflower.

(ii) It improves the honey yield, because honeybees collect the nectar from flowers for making honey. *Apis indica* is the most common species which is reared in India.

Management of fisheries :

(i) Fresh water fishes : *Catla, Rohu, Common Carp*

(ii) Marine fishes : *Hilsa*, Sardines, Mackerel and Pomfrets etc.

Aquaculture and Pisciculture : The production of useful aquatic plants and animals (both freshwater and marine) like fishes, prawns, lobsters and edible oysters is called aquaculture while the production of fishes only is called pisciculture.

Blue Revolution : Increase in fish production due to utilisation of modern technology.

Plant breeding : Manipulation of plant species to create plants with desired qualities like high yield and disease resistance.

Main steps in breeding a new genetic variety of crop :

(i) Germ-plasm collection or collection of variability

(ii) Evaluation and selection of parents

(iii) Cross breeding or hybridisation of selected parents.

(iv) Selection and testing of superior recombinants

(v) Testing, release and commercialisation of new cultivars.

High Yielding Varieties :

(i) Wheat : *Sonalika, Kalyan Sona.*

(ii) Rice : IR-8, *Jaya, Ratna, Padma*

(iii) Sugarcane :

Saccharum officinarum	***Saccharum barberi***
(South Indian)	**(North Indian)**
Thick stem, high sugar content (did not grow in North India)	Poor Sugar content and yield

Hybrid

High yield, thick stem, high sugar content

It can grow in North India

Diseases of Plants :

(i) **Viral :** Tobacco mosaic, turnip mosaic.

(ii) **Bacterial :** Black rot of crucifers, blight of rice.

(iii) **Fungal :** Rust of wheat, red rot of sugarcane, late blight of potato.

Mutation : Sudden inheritable change in the characters of an organism due to change in the sequence of bases in the gene(s).

- Mutation results in a new character or trait, not found in the parental type.
- It can also be induced by using mutagens like gamma radiations.
- Such plant materials are used as such or used for breeding new varieties.
- Mung bean resistance to yellow mosaic virus and powdery mildew.

Mutational breeding : When mutations are artificially induced and such plants with desirable traits are selected. This process is called mutational breeding.

Steps of mutational breeding : Mutations are induced by physical (low or high temperature) chemical (hydrazines, nitrous acid) or radiations (x-rays)

- Mutants are tested for the desired trait
- If desired trait obtained then they are used to transfer this trait to desirable varieties

e.g. mung bean obtained resistant to yellow mosaic virus.

Biofortification :

Biofortification is the plant breeding programme designed to increase vitamins, minerals, higher proteins and healthier fat content in crops. This programme improves the quality of food products. It is required to prevent hidden hunger. Some of the examples of fortified crops are :

(i) **New hybrid of maize :** twice the amount of amino acid lysine and tryptophan.

(ii) **Wheat :** Atlas 66, having a high protein content

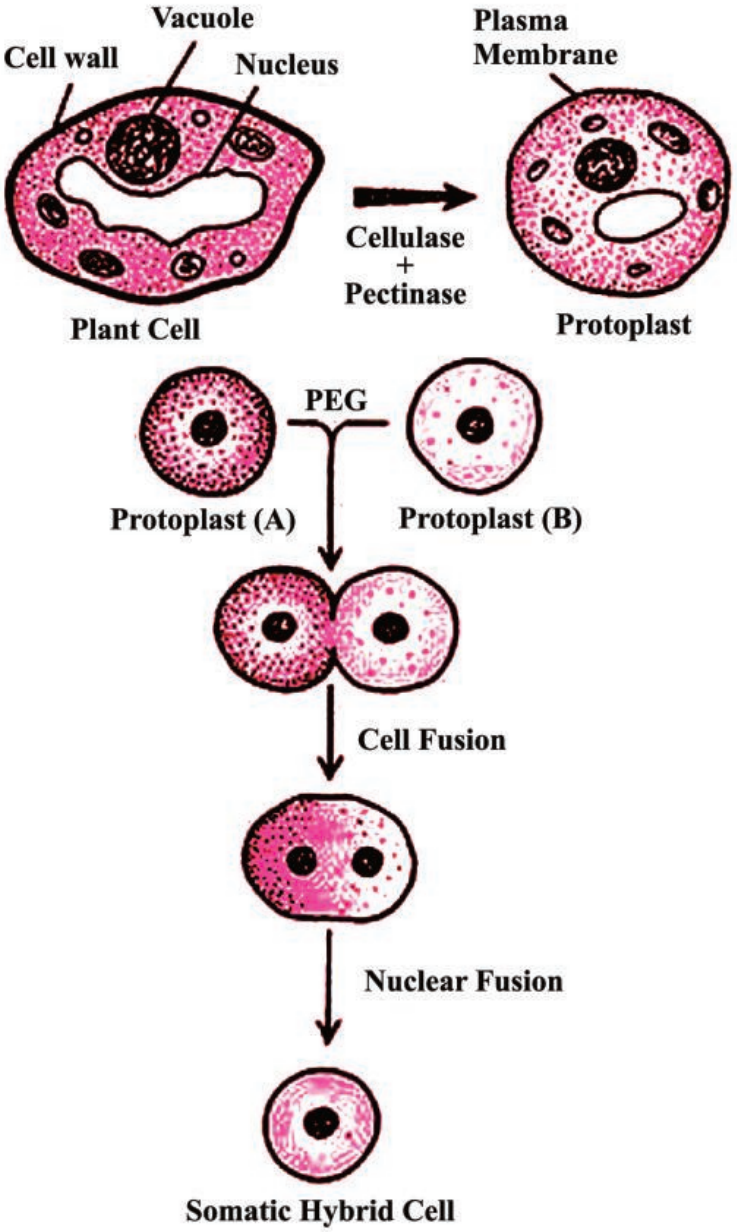
(iii) **Rice :** 5 times iron than the normal amount. IARI Delhi has released several crops which are rich in vitamins and minerals. Consumption of such biofortified food will vastly improve the public health.

Single Cell Protein (SCP) : Protein Rich food obtained from microbes such as algae, bacteria, yeast e.g. *Methylophilus methylotrophus, Spirulina*, Mushrooms.

It is a quick method of protein production because the growth rate of microbes is enormous.

Tissue Culture : In this method any vegetative part of plant such as leaf, stem or meristem is placed in a nutrient medium containing sugar, salt, vitamins and growth regulator under optimal condition. This gives rise to plants identical to parent plant.

This method is used for micropropagation as thousands of plants which are genetically identical to parent plant (Somaclones) can be obtained in a short duration.



SOMATIC HYBRIDISATION

QUESTIONS

VSA (1 Mark)

1. Why is inbreeding necessary in animal husbandry ?
2. Which product of Apiculture is used in cosmetics and polishes ?
3. Semi-dwarf varieties of a crop plant were derived from IR-8. Name that crop.

SA - I (2 Marks)

4. A new breed of sheep was developed in Punjab by crossing two different breeds of Sheep. Name the two breeds which were crossed and the new breed developed.

Study the table given below and fill in the blanks marked A, B, C and D

S.No.	Crop	Variety	Resustant to Disease
1.	Wheat	Himgiri	(A)
2.	*Brassica*	(B)	White rust
3.	(C)	Pusa Komal	Bacterial blight
4.	Chilli	(D)	Chilly mosaic virus, Tobacco mosaic virus and leaf curl

6. Enlist objective of breeding for improved nutritional quality.
7. To which product, the following are related (a) Blue revolution (b) White revolution (c) Green revolution.
8. Write disadvantages of continuous inbreeding.

SA-II (3 Marks)

9. What is micropropagation ? Why are plant produced by this techneque called somaclones ? Name any two plant which are produced by this method.

LA (5 Marks)

10. Briefly describe various steps involved in the development of improved varieties of crop.

ANSWERS

VSA (1 Mark)

1. Inbreeding increases homogyosity/accumulate superior genes/eliminate less desirable gene/exposes harmful recessive gene which is eliminated by selection.
2. Beewax.
3. Paddy crop (rice)

SA-I (2 Marks)

4. By crossing Bikaneri ewes and Marino rams, the new breed *Hisardale* was developed.
5. A—Leaf and Stripe rust, hill bunt.

   B—*Pusa swarnim* (Karan rai).

   C—Cowpea

   D—*Pusa Sadabahar*
6. **Objective are :** (i) Protein content and quality

   (ii) Oil content and quality

   (iii) Micro nutrient and mineral content

   (iv) Vitamin content.
7. (a) Fish production (b) Milk production

   (c) Crop production
8. Inbreeding causing inbreeding depression, reduces fertility and even productivity.

SA-II (3 Marks)

9. • The method of producing many plants through tissue culture is called micropropagation.
   • The plants produced by micropropagation will be genetically identical to the original plant from which they were grown, hence are called somaclones.
   • Tomato, banana, apple.

LA (5 Marks)

10. Refer Page No. 171 NCERT Text Book Class-XII.