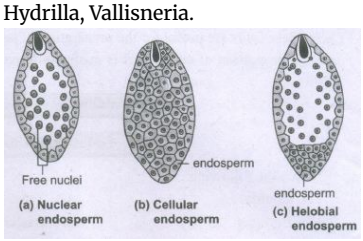
Visit QB365-SLMS - https://www.qb365.in/slms/ Complete Questions and Answers

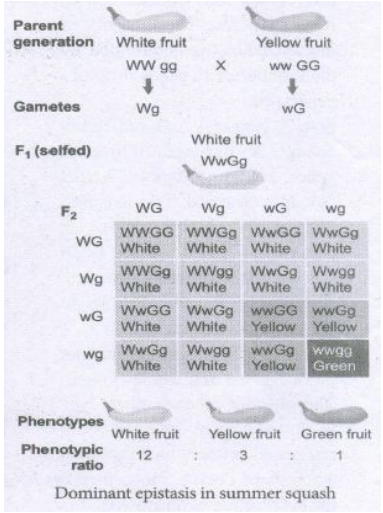
Answers Key:

IV. Answer the following questions:

1. (i) The primary endosperm nucleus divides immediately after fertilization and develops into an endosperm.
(ii) It is a nutritive tissue, and regulatory structure by undergoing repeated mitosis to form triploid (3n) endosperm that nourishes the developing embryo.
Depending upon the mode of development three types of endosperm are recognized.
1) Nuclear endosperm:
(i) Primary endosperm, (PEN) nucleus undergoes several mitotic divisions. There is no cell wall formation So free nuclear condition exists in the endosperm.
Example:
Coccinia, Capsella, Arachis
2) Cellular endosperm:
(i) Primary endosperm nucleus divides into two nuclei There is cell wall formation.
(ii) Subsequent division also follows cell wall formation. It is said to be cellular endosperm
Example:
Adoxa, Helianthus, Scoparia.
3) Helobial endosperm:
(i) Primary Endosperm Nucleus moves towards the base of embryo sac.
(ii) Divides into two nuclei cell wall formation occurs forming a large micropylar chamber and a small chalazal chamber.
(iii) The nucleus of micropylar chamber further undergoes several free nuclear divisions. The nucleus of the chalazal chamber may or may not divide.
Example:
Hydrilla, Vallisneria.



2. Interlocus interactions take place between the alleles at different loci i.e. between alleles of different genes
Dominant Epistasis: It is a gene interaction in which 2 alleles of a gene at one locus interfere & suppress or mask the phenotypic expression or mask the phenotypic expression of a different pair of alleles of another gene at another locus.
The gene that suppresses or masks the phenotypic expression of a gene at another locus is known as epistatic. The gene whose expression is interfered by non-allelic genes & prevents from exhibiting its character is known as hypostatic.
When both the genes are present together, the phenotype is determined by the epistatic gene and not by the hypostatic gene.
In the summer squash, the fruit colour locus has a dominant allele 'W' for white colour & a recessive allele 'w' for coloured fruit.
'W' allele is donminant that masks the expression of any colour. In another locus hypostatic allele 'G' is for yellow fruit and its recessive allele 'g' for green fruit.
In the first locus the white is dominant to colour where as in the second locus yellow is dominant to green.
When the white fruit with genotype WWgg is crossed with yellow fruit with genotype wwGG, the F1 plants have white fruit and are heterozygous (WwGg).
When F1 heterozygous plants are crossed they give rise to F2 with the phenotypic ratio of 12 white:3 yellow: 1 green.



Dominant epistasis in summer squash

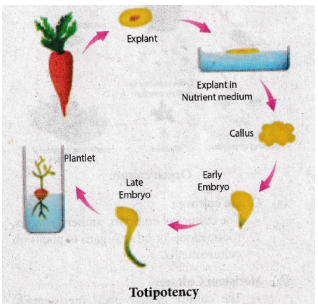
Since W is epistatic to the alleles 'G' and 'g'. the white which is dominant, masks the effect of yellow or green.
Homozygous recessive ww genotypes only can give the coloured fruits (4/16).
Double recessive 'wwgg' will give green fruit (1/16).
The Plants having only 'G' in its genotype (wwGg or wwGG) will give the yellow fruit(3/16).

3. **Applications of Biotechnology**

1. Biotechnology is one of the most important applied interdisciplinary sciences of the 21st century. It is the trusted area that enables us to find the beneficial way of life.
2. Biotechnology has wide applications in various sectors like agriculture, medicine, environment and commercial industries.
3. This science has an invaluable outcome like transgenic varieties of plants e.g. transgenic cotton (Bt-cotton), rice, tomato, tobacco, cauliflower, potato and banana.
4. The development of transgenics as pesticide resistant, stress resistant and disease resistant varieties of agricultural crops is the immense outcome of biotechnology.
5. The synthesis of human insulin and blood protein in E.coli and utilized for insulin deficiency disorder in human is a breakthrough in biotech industries in medicine.
6. The synthesis of vaccines, enzymes, antibiotics, dairy products and beverages are the products of biotech industries.
7. Biochip based biological computer is one of the successes of biotechnology.
8. Genetic engineering involves genetic manipulation, tissue culture involves aseptic cultivation of totipotent plant cell into plant clones under controlled atmospheric conditions.
9. Single cell protein from Spirulina is utilized in food industries.
10. Production of secondary metabolites, biofertilizers, biopesticides and enzymes.
11. Biomass energy, biofuel, bioremediation and phytoremediation for environmental biotechnology.

4. **Basic concepts of Tissue Culture**

Basic concepts of plant tissue culture are totipotency, differentiation, dedifferentiation and redifferentiation.
Totipotency
The property of live plant cells that they have the genetic potential when cultured in nutrient medium to give rise to a complete individual plant.
Differentiation
The process of biochemical and structural changes by which cells become specialized in form and function.



QB 365 TM Study Material
QUESTION BANK 365

Redifferentiation
The further differentiation of already differentiated cell into another type of cell. For example, when the component cells of callus have the ability to form a whole plant in a nutrient medium, the phenomenon is called redifferentiation.
Dedifferentiation
The phenomenon of the reversion of mature cells to the meristematic state leading to the formation of callus is called dedifferentiation. These two phenomena of redifferentiation and dedifferentiation are the inherent capacities of living plant cells or tissue. This is described as totipotency.

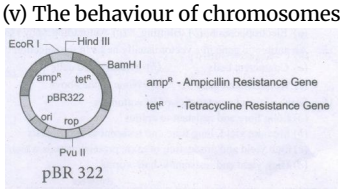
III. Answer any three questions: (Q.NO 19 is compulsory)

5. **Grafting Layering Types** Types of grafting Bud/Approach/Tongue Crown/Wedge Types of layering mound / Air **Benefits** More useful to get more varieties from a single Plant Can get only one type of offspring **Usage** More useful in horticultural filed Less useful technique in horticultural field **Result** Can get highly desirable characters from parent stock to different scion Can get same characteristics from parent to offspring

6.

Incomplete Dominance	Co-dominance
When one allele is not completely dominant to another allele.	It occurs due to simultaneous expression of both alleles in the heterozygote.
E.g: Flowers colour of Mirabilis Jalapa	E.g: ABO blood group system in human beings.

7. (i) Sutton and Boveri independently proposed the chromosome theory of inheritance.
(ii) Somatic cells of organisms are derived from the zygote by repeated mitotic division. These consist of two identical sets of chromosomes. One set is received from female parent and the other from male parent which constitute the homologous pair.
(iii) Chromosomes retain their structural uniqueness and individuality throughout the life cycle of an organism.
(iv) Each chromosome carries specific determiners or Mendelian factors which are now termed as genes.
(v) The behaviour of chromosomes during the gamete formation provides evidence to the fact that genes are located on chromosomes.

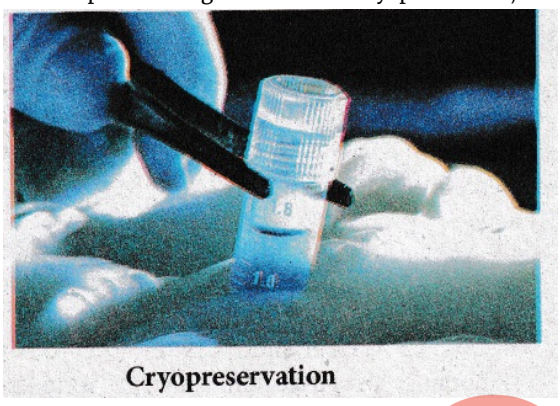


8.

(i) pBR 322 plasmid is a reconstructed plasmid and most widely used as cloning vector;
(ii) It contains 4361 base pairs. In pBR, p denotes plasmid, Band R respectively the names of scientist Boliver and Rodriguez who developed this plasmid.
(iii) The number 322 is the number of plasmid developed from their laboratory.
(iv) It contains amp^R and tet^R two different antibiotic resistance genes and recognition sites for several restriction enzymes.
(v) ori and antibiotic resistance genes. Rop codes for the proteins involved in the replication of the plasmid.

9. **Cryopreservation (- 195.C)**

1. Cryopreservation, also known as Cryo conservation.
2. A process by which protoplasts, cells, tissues, organelles, organs, extracellular matrix, enzymes or any other biological materials are subjected to preservation by cooling to very low temperature of -196^{0}C using liquid nitrogen.
3. At this extreme low temperature any enzymatic or chemical activity of the biological material will be totally stopped and this leads to preservation of material in dormant status.
4. Later these materials can be activated by bringing to room temperature slowly for any experimental work.
5. Protective agents like dimethyl sulphoxide, glycerol or sucrose are added before cryopreservation Process.
6. These protective agents are called cryoprotectants, since they protect the cells, or tissues from the stress of freezing temperature.


Cryopreservation

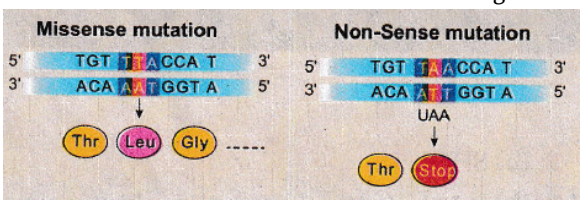
QB 365 Study Material

II. Answer any four questions:

10. A diploid embryosac is formed from megaspore mother cell without a regular meiotic division
Example:
Eupatorium, Aerva

11. (i) Back cross is a cross of F, hybrid with any one of the parental genotypes.
(ii) They are of two types - Dominant back cross recessive back cross.

12. **Missense Mutation Non-sense Mutation** The mutation where the codon for one amino acid is changed into a codon for another amino acid. The mutations where codon for one amino acid is changed into a termination or stop codon.



13. Polyethylene Glycol (PEG) and Dextran Sulphate.
14. Pineapple, banana, strawberry and potato.
15.

Flush End	Cohesive End
Some restriction enzymes cut the strands of DNA through the centre resulting in blunt end or flush end or symmetric cuts.	Some restriction enzymes cut the strands in a way producing protruding and recessed ends known as cohesive end or sticky end or asymmetric cuts.

I. Choose the correct answer:

16. (b) air
17. (b) Dominant epistasis
18. (c) A is wrong. R is correct
19. (d) Polymerase Chain Reaction
20. (d) Anti-cancinogenic property is not seen in Catharanthus roseus.
21. (b) W. Bateson
22. (c) Tapetum
23. (c) Alkaline phosphate