

Topic :- Biotechnology & It's Applications

- 1 **(b)**
Specific *Bt* toxin genes obtained from bacteria *Bacillus thuringiensis* are used in several crop plants like cotton. It is easier to produce transgenic plants than animals. A single cell in most plant species can regenerate a whole plant. Thus, a single genetically engineered cell can produce a new plant with new traits. *Bacillus thuringiensis* forms the protein crystals which contains a toxic insecticidal protein
- 2 **(c)**
Restriction endonuclease recognizes a particular palindromic sequence and degrades the same. It was so, called because it restricted the growth of bacteriophage in the bacterium (*e.g., E. coli*). The convention for naming these enzymes is the first latter of the name comes from the bacterial genus; the second two letters come from the species, and the fourth letter from strain, e.g., Eco RI comes from *Escherichia coli* RY 13. Roman numbers following the names indicate the order in which the enzymes were isolated.
- 3 **(a)**
Animals whose DNA is manipulated to possess and express an extra (foreign) gene are known as transgenic animals. Transgenic rats, rabbits, pigs, sheep and cows have been produced
- 4 **(d)**
The plant tissue or organ excised and used for in vitro culture is known as **explant**. Any plant part such as shoot tip, root tip, leaf tip, pollen grains, etc, may be used as an explant. The choice of explant depends mainly on the objective of the

culture and the regeneration potential of the different organs of a plant species.

5 **(b)**

A transgenic crop is a crop which contains and expresses a transgene. A popular term for transgenic crop is genetically modified crops or GM crops. *Flavr savr* tomato was the first commercially grown genetically engineered food to be granted a license for human consumption. These tomato can be fresh for long time than other varieties of tomato.

6 **(d)**

Bt cotton is resistant to insects. Insect resistant transgenic cotton was produced through genetic engineering by inserting a piece of DNA from the bacterium *Bacillus thuringiensis*. Hence, this cotton is called transgenic cotton or *Bt* cotton. It provides resistance against the bollworm of cotton

7 **(a)**

PCR is now, used to detect HIV in suspected AIDS patients

8 **(b)**

Alleviation of vitamin-A deficiency. Golden rice a variety of *Oryza sativa* is produced through the genetic engineering of biosynthesis beta-carotene, a precursor of provitamin-A in the edible parts of rice. The research that led to golden rice was conducted with the goal of helping children who suffer from vitamin-A deficiency and blindness in poor countries. Golden rice has been breed to be especially disease-resistant, resulting in better crop yield

9 **(d)**

In genetic engineering, a desired part of DNA is taken and then inserted into another suitable organism for their expression. Thus, genetic engineering is an artificial process. But in nature, *Agrobacterium tumefaciens* (a bacterium) does this process normally. This bacterium has a plasmid, which contains a 23 base pair direct repeat sequences, called as T-DNA. This T-DNA

has the ability to transfer itself from *A. tumefaciens* to an infected plant chromosome.

- 10 **(d)**
In 1997, the first transgenic cow, Rosie produced human protein – enriched milk (2.4 g/L). The milk contained the human α -lactalbumin and was nutritionally balanced for human babies than natural cow milk
- 11 **(b)**
Example of gene therapy Introduction of gene for adenosine deaminase in person suffering from Severe Combined Immune Deficiency (SCID)
- 12 **(a)**
In callus culture, cell division in explant (differentiated mass of mature cells) forms callus. Callus is an irregular unorganized and undifferentiated mass of actively dividing cells. Callus is obtained within 2-3 weeks. The process is called **de-differentiation**.
- 13 **(a)**
The first human drug made by using genetic engineering technique was insulin. Insulin is an important life saving drug for diabetic patients
- 14 **(a)**
In tissue culture, shoot regeneration is promoted by cytokinin, and root generation is promoted by auxin like NAA (Naphthalene Acetic Acid). An excess of auxin promotes root regeneration, whereas that of cytokinin promotes shoot regeneration. Roots regenerate from the lower end of these shoots to give complete plantlets.
- 15 **(d)**
Human insulin is made up of 51 amino acids arranged in two polypeptide chains. A having 21 amino acids and B with 30 amino acids. The two polypeptide chains are interconnected by two disulphide bridges or S-S linkages. S-S linkage also occurs in A-chain. The hormone develops from the storage product is called proinsulin. Proinsulin has three chains, A, B and C. C chain with 33 amino acids is removed prior to insulin

- formation
- 16 **(c)**
Polymorphism in sequence is the basis of DNA fingerprinting.
- 17 **(a)**
Ligase enzyme catalyses condensation of ATP or any other such triphosphate. DNA ligase is used to join bits of DNA.
- 18 **(a)**
Transgenic animals are made to carry genes which makes them more sensitive to the toxic substance than non-transgenic animals
(i) Useful biological products can be produced by introducing into transgenic animals the portion of DNA (or genes) which codes for a particular product, *e.g.*, human protein (α -1-antitrypsin) is used to treat emphysema
(ii) Brazzein is protein produced by a west African plant, *Pentadiplandra brazzeana*, which is approximately 2000 times as sweet as sugar. It is used as a low calorie sweetener. Local people have been using the super sweet berries of this plant for centuries. But the protein brazzein was patented in USA
- 19 **(a)**
Recombinant DNA molecule is a vector (e.g., plasmid, phage or virus) into which the desired DNA fragment has been inserted to enable its cloning in an appropriate host. pBr 322 of *E. coli* was the first most widely used plasmid for construction of recombinant DNA.

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	B	C	A	D	B	D	A	B	D	D
Q.	11	12	13	14	15	16	17	18	19	20
A.	B	A	A	A	D	C	A	A	A	C