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Class : 12th Biology
Chapter- 12 : Biotechnology and its Application

Biotechnology and its Application

In Agriculture

Advantages of GM Crops

- Makes crops more tolerant to abiotic stresses
- Reduces resilience on chemical pesticides.
- Helps to reduce post-harvest losses.
- Increases efficiency of mineral usage by plants.
- Enhances nutritional value of food. E.g. Golden rice

Pest resistance in cotton plant

- Bacillus thuringiensis contain Bt toxin, which is in inactive form.
- It becomes active toxin in the alkaline pH of insect gut.
- The activated toxin binds to the surface of midgut epithelial cells of insect and creates pores.
- This causes cell swelling and lysis and eventually death of the insect.

Pest resistance in Tobacco plant

RNA interference (RNAi) strategy is used to prevent the infestation of tobacco plants by Nematode (Meloidegyne incognitia).

Biopiracy and biopatent

- Use of bio-resources by multinational companies and other organizations without proper authorization from the countries and people concerned is biopiracy.
- Patents granted for biological entities and for products derived from them are called biopatents.E.g. Basmati Rice.

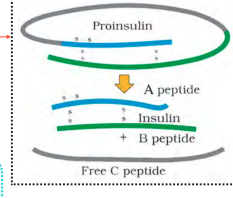
GEAC

- Make decisions about the validity of GM research.
- Safety of GM-organisms for public services.

Gene Therapy

- Technique for correcting a defective gene through gene manipulation.
- First clinical gene therapy was given in 1990 to a 4-year old girl with adenosine deaminase (ADA) deficiency.

In Medicine Genetically Engineered insulin



Molecular diagnosis

- Polymerase Chain Reaction.
- Enzyme Linked Immuno-sorbent Assay (ELISA)

Transgenic animals

Definition

- Animals that have their DNA manipulated to possess or express an extra gene.
- E.g. Transgenic rats, rabbits, pigs, sheep, Rosie cow and fish.

Advantages

- To study normal physiology and development.
- To study the contribution of genes in the development of a disease.
- Biological products.
- Vaccine safety testing.
- Chemical safety testing

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