COMMENTARY

Genetically modified crops

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DESCRIPTION

Genetic modification

GM is a technology that involves insertion of target DNA into the genome of an organism.

Genetically modified crops

GM crops are plants used in agriculture, in which DNA has been modified using genetic engineering methods.

The characteristics of all living organisms are determined by their genetic makeup and its interaction with the environment. The genetic makeup of an organism is nothing but its genome, in plants and animals, it is made of DNA. The genome contains genes, regions of DNA that usually carry the instructions for making proteins which gives the plant its specific characteristics. For example, the colour of leaves is determined by genes that carry the instructions for making proteins involved in producing the pigments of that particular colour of leaves.

Modification to produce desired traits in plants used for food began about 10,000 years ago. These changes, along with natural evolutionary changes, resulted in food species that are present genetically different from their ancestors.

Genetic modification of plants involves adding a specific stretch of DNA into the genome of the plant, which results in new or different characteristics. This may result in changing the way of plant growth, or making it resistant to a particular disease. The new DNA becomes part of the GM plant's genome, the seeds produced by these plants will contain it.

Types of modifications

1. **Transgenic:** Transgenic plants have genes inserted into them that are derived from another species.
2. **Cisgenic:** Cisgenic plants are made using genes found within the same species or a closely related one, where conventional plant breeding can occur.
3. **Subgenic:** Genetically modified plants can also be developed using gene knockdown or gene knockout to alter the genetic makeup of a plant without incorporating genes from other plants.
4. **Multiple trait integration:** With multiple trait integration, several new traits may be integrated into a new crop.

Techniques for plant genetic modification

1. Genetic Engineering methods

- Microbial Vectors
- Micro projectile Bombardment
- Electroporation
- Microinjection
- Transposons/Transposable Elements

2. Techniques Other than Genetic Engineering

- Simple Selection
- Crossing
- Interspecies Crossing
- Embryo Rescue
- Somatic Hybridization
- Somaclonal Variation
- Mutation Breeding: Induced Chemical and X-ray Mutagenesis
- Cell Selection

3. Non-transgenic Molecular Methods of Manipulation

Genetic features can be added to plants without inserting foreign DNA into the recipient organism's native genome. DNA of interest may be delivered to a plant cell which may express a new protein and results forming a new trait without becoming integrated into the host-cell DNA.

Advantages of genetically modified crops

1. It improves production and raise farmer's income.

2. It reduces the use of pesticide and insecticide that might be great moves for the betterment of the food supply.

3. It can feed a rapidly increasing population because it shows dramatically increased yields.

4. It can produce high yields in small area of land.

5. India introduced BT cotton seeds in 2002. It has greatly reduced the use of toxic pesticides.

Disadvantages of genetically modified or GM crops

1. The production imposes high risks of disruption towards ecosystem and biodiversity

2. It increases the cost of cultivation.

3. The transgenic crops devastate not only farmers but also the trade, and the environment as well.

4. As it is biologically altered, biotech foods may end up human health risk.

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