

12. How does Bt gene work?

Bt gene encodes Cry protein which is toxic to the insects. When Cry proteins are ingested by insects, it gets dissolved by the alkaline juices present in the insect midgut lumen and converted into the core toxic fragments. Only this active fragment is recognised by the receptors present in brush border of insect midgut epithelial cells. As a result, such cells develop pores allowing influx of ions and water and ultimately lysis of the cells.

13. What advantages have the farmers derived from the cultivation of Bt cotton?

Farmers have immensely benefitted from cultivation of Bt cotton with respect to higher yield and reduction in use of chemical pesticides. The area under Bt cotton has increased to almost 200 times in last ten years, which shows that farmers are showing more and more interest for this technology as well as Bt cotton.

14. What types of test are conducted before commercialization of transgenic crops?

Genetic Engineering Approval Committee (GEAC) is the apex body in India which gives approvals for commercial use of transgenic/GM crops. The approval is given only after various biosafety tests conducted at different levels i.e. laboratory, net house, confined field,

etc. Once the crop is found to be safe for animal and human consumption and environment, it is allowed for growing in farmer's field.

15. What can we expect in the future from transgenic technology in Agriculture crops?

Transgenic development is a powerful technology and further research in this direction should lead to enhancement in crop yield and nutritional fortification. Transgenic technology also offers the opportunity to develop salt, drought and heat tolerant crops varieties, and even plants that can produce commercial compounds e.g. industrial oils, plastics, drugs, vaccines etc.

Contact

Dr. T. R. Sharma
Project Director

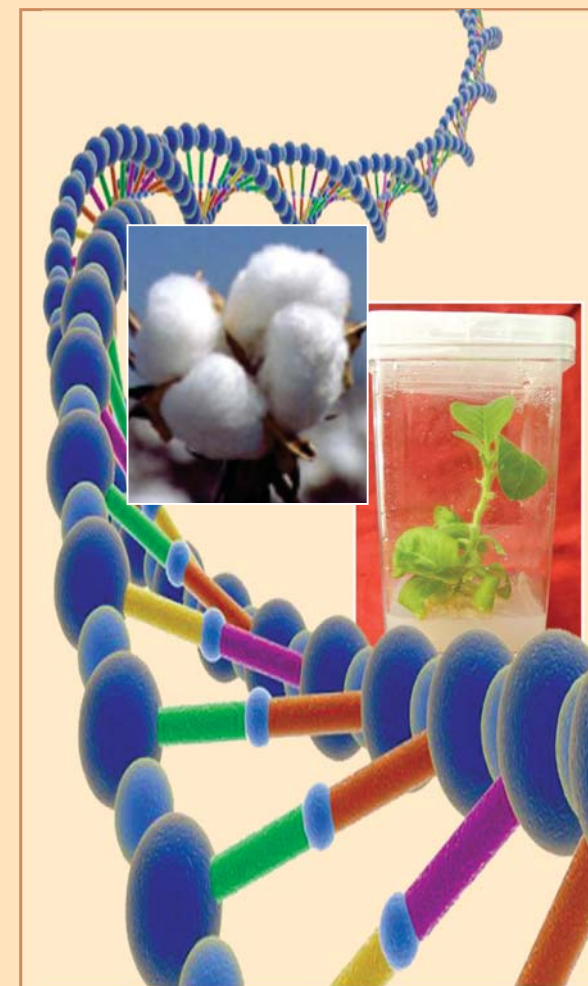
ICAR-National Research Centre on Plant Biotechnology

Pusa Campus, New Delhi-110012
Phone: +91-11-25848783
Fax: +91-11-25843984
Email: pd@nrpcb.org
Website: nrpcb.org

Compiled and edited by:

Dr. Subodh Kumar Sinha
Dr. Jasdeep Chatrath Padaria

Let's know about Transgenic crops & Technology



**ICAR-National Research Centre on
Plant Biotechnology**

Pusa Campus, New Delhi - 110 012 (India)

1. What is DNA?

DNA is a molecule that carries the genetic information of any living organism and is responsible for inheritance of traits such as size, shape, colour, etc from parents to offsprings. DNA of an organism determines as to how that organism will look and function.

2. What is biotechnology?

Biotechnology involves application of cellular and biomolecular processes, and principles of engineering to use any living organism for producing specific product or to modify a process for improving human life.

3. What is transgenic technology?

Transgenic technology is one in which modern biotechnology tools are used to deliberately transfer gene(s) of desired traits from any organism to another organism for a specific purpose.

4. What is the need of transgenic technology in crop improvement?

Transgenic technology is used for further improvement of crops for different traits. It reduces the dependency on conventional breeding approach.

5. What is transgenic crop or Genetically Modified (GM) crop?

Transgenic crop is one in which a foreign gene is transferred into its genome. In this technology, gene can be taken from same plant or related plants or from entirely different species, genera or kingdom.

6. In which circumstances, transgenic crops are made?

Most of the plants face diverse types of biotic and abiotic stresses in their life for which sometimes they do not have appropriate traits to combat these stresses resulting in great loss of agricultural production and productivity. If we have knowledge about the gene(s) which can impart resistance against these stresses even in entirely different organism, we can interogress the resistance trait into the desirable one. Since we cannot transfer such traits from a different species through conventional breeding, transgenic approach is adopted to transfer the desired traits into the offsprings.

7. What are the advantages of transgenic crops?

The production and productivity of agricultural crops have become a major challenge throughout the world. Transgenic technology can be used to develop crops resistant to insect-pest, pathogen and adverse effects of climate change. In fact, we can transfer such traits which are

either difficult or not possible through conventional breeding approaches.

8. What will happen when we or our cattle eat transgenic crops?

So far there is no scientific evidence which shows the adverse effect of consuming transgenic crops containing foreign DNA on human beings/animals. During digestion, the DNA either get broken down or excreted from the body.

9. What will be the effect of transgenic crops on soil and its surroundings?

Scientific evidences show that there is no adverse effect of growing transgenic crops on soil or environment.

10. Which transgenic crop is being cultivated by farmers in India?

In India, Bt Cotton is being widely cultivated which is resistant to bollworm infestation.

11. What is Bt cotton?

Bt cotton is an example of transgenic crop which has special trait of producing an insecticidal protein. The gene responsible for this insecticidal protein was isolated from a soil bacterium known as *Bacillus thuringiensis*.