

Genetically Modified Crops

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Plant genetic engineering methods were developed over 30 years ago, and since then, genetically modified (GM) crops or transgenic crops have become commercially available and widely adopted in many countries. In these plants, one or more genetic codes for desirable traits have been inserted.

Features of GM crops

- The genes may come from the **same or another plant species, or from totally unrelated organisms.**
- Because genetic engineering allows for direct gene transfer across species boundaries, some traits that were previously difficult or impossible to breed can now be developed with relative ease.
- The first-generation GM crops have **improved traits like herbicide resistance** (soybeans and maize), pest resistance (cotton and corn).
- Second-generation GM crops involve **enhanced quality traits**, such as higher nutrient content. Golden rice, one of the very first GM crops, is biofortified to address vitamin A deficiency.

GM Crops in India

- India has the world's fifth largest cultivated area under genetically modified (GM) crops, at 11.4 million hectares (mh) in 2017.
- The **entire GM crop area is under a single crop-cotton**, incorporating genes from the **Bacillus Thuringiensis** or BT **soil bacterium coding** for resistance against heliothis bollworm insect pests.
- The GEAC in 2007, recommended the commercial release of BT Brinjal, which was developed by Mahyco (Maharashtra Hybrid Seeds Company) in collaboration with the Dharwad University of Agricultural sciences and the Tamil Nadu

Agricultural University. But the **initiative was blocked in 2010.**

- Dhara Mustard Hybrid-11 or DMH-11 is a genetically modified variety of mustard developed by the Delhi University's Centre for Genetic Manipulation of Crop Plants. It was developed using "**barnase / barstar**" **technology** and is a herbicide tolerant crop. DMH-11 has not yet been approved for commercialization.

GM Crops Approval Mechanism in India

- The top biotech regulator in India is **Genetic Engineering Appraisal Committee (GEAC)**. The committee functions as a **statutory body under the Environment Protection Act 1986** of the Ministry of Environment & Forests (MoEF).
 - Under the EPA 1986 "Rules for manufacture, use, import, export and storage of hazardous microorganisms/genetically engineered organisms or cells 1989", GEAC is **responsible for granting permits** to conduct experimental and large scale open field **trials** and also grant approval for **commercial release** of biotech crops.
 - The Rules 1989 also define the competent authorities and composition of such authorities for handling various aspects of the rules.
- . **Recombinant DNA Advisory Committee (RDAC):** Function is of advisory nature and involves review of developments in biotechnology at national and international levels and recommend suitable and appropriate safety regulations.
- . **Review Committee on Genetic Manipulation (RCGM):** Established under the Department of Biotechnology, function is to monitor the safety related aspects in respect of on-going research projects and bring out manuals and guidelines specifying procedure for regulatory process.
- . **Genetic Engineering Appraisal Committee (GEAC):** Function is

approval of activities involving large scale use of hazardous microorganisms and recombinants in research and industrial production from the environmental angle.

. **State Biotechnology Coordination Committee (SBCCs):** It has powers to inspect, investigate and take punitive action in case of violations of statutory provisions.

. **District Level Committees (DLCs)**

. **Institutional Biosafety Committee (IBSC)**