



GM-CROPS: SCIENCE & TECHNOLOGY

NEWS: GM crops can help fight hunger — depending on how they are farmed

WHAT'S IN THE NEWS?

GM crops like Bt and HT varieties enhance food production by reducing pesticide use, improving yields, and supporting no-till farming. However, challenges like pest resistance, biodiversity loss, and herbicide toxicity persist, requiring balanced regulation and integrated pest management for long-term sustainability.

The Growing Need for Food and Sustainable Agriculture

Rising Global Population:

- Increasing population drives demand for higher food production.
- Unsustainable expansion of agricultural land leads to deforestation, soil degradation, and biodiversity loss.

Environmental Concerns in Agriculture:

- Excessive pesticide use harms ecosystems and depletes groundwater.
- Need for sustainable practices to balance food production and environmental health.

Genetically Modified (GM) Crops – How They Work

Genetic Engineering:

- Genes from other organisms are introduced to crops for specific traits.
- Examples include pest resistance, herbicide tolerance, and improved nutritional content.

Key Innovations:

- **Bt Crops:** Contain *Bacillus thuringiensis* (Bt) genes, producing toxins that target specific pests, reducing the need for insecticides.
- **Herbicide-Tolerant (HT) Crops:** Resist specific herbicides, enabling better weed control without damaging crops.

Benefits of GM Crops

- **Reduction in Pesticide Use:** Bt crops lower the need for harmful insecticides, benefiting the environment and farmer safety.
- **Enhanced Farming Practices:** HT crops support no-till farming, reducing soil disturbance, improving carbon sequestration, and mitigating climate change.
- **Increased Yield and Nutrition:** Genetic modifications improve crop productivity and nutritional value, addressing malnutrition and food security challenges.

Challenges and Risks

Resistance Development:



- Over time, pests and weeds adapt, reducing the effectiveness of Bt toxins and herbicides.
- Requires diversified pest and weed management strategies.

Herbicide Overuse:

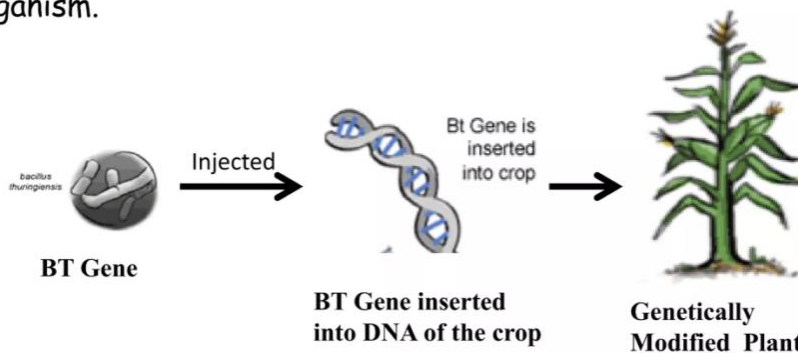
- Excessive glyphosate application raises toxicity concerns and damages the environment.
- Analogous to antibiotic resistance in medicine, overuse leads to diminished efficacy.

Biodiversity Impacts:

- Limited evidence on GM crops' effects on biodiversity; research often industry-sponsored.
- Habitat loss and urbanisation also contribute to biodiversity decline.

What is GM crops/ food?

According to 'World Health Organisation' - "Genetically modified (GM) foods are foods derived from organisms whose genetic material (DNA) has been modified in a way that does not occur naturally, i.e. through the introduction of a gene from a different organism.



The Role of Regulation and Emerging Technologies

Regulatory Challenges:

- Costly and stringent regulations limit smaller players and public institutions from developing GM crops.
- Need for inclusive policies to promote innovation.

Emerging Technologies:

- Tools like CRISPR offer cost-effective genetic editing but face regulatory bottlenecks.

Integrated Pest Management (IPM)



Evidence-Based Strategies:

- Balance GM crop use with practices like crop rotation and minimal weed presence.
- Reduces dependency on agro-chemicals and slows resistance development.

Sustainable Pest Control:

- Promotes ecological balance while ensuring crop health.

Conclusion

- GM crops play a significant role in sustainable agriculture by improving yields and reducing agro-chemical usage.
- Addressing challenges like pest resistance, biodiversity loss, and regulatory hurdles is vital for maximising their potential.
- A holistic approach combining innovation, regulation, and sustainable practices is essential to meet global food demands.