

# Dual Use Concerns of Genetically Modified (GM) Crops

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Seeds



Surface sterilization



Germination in pots/petridish



Bacterial infection

## Current work Transgenic plant technology

Floral dip/  
Callus, nodes etc.

Genetic  
construct with  
*DREB* gene



Co-cultivation



Selection on marker genes



Germination in pots



Transfer of plantlets to green house



Molecular Analysis

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## First Era

The first era deals with the development of Genetically Modified (GM) crops like soybean, corn, canola, tomato etc.

## Second Era

various social, political, environmental and technical issues related to transgenic crops took their birth.

## Food issues

It produce toxins, allergens or genetic hazards in foods. It effect on grain quality consequently impose a hazard to human health.

## Marker gene issues

Selectable marker genes such as antibiotic (kan, hyg etc.) and other toxic chemicals remains as end product in GM plants. The presence of these toxic genes in our food, feed, and environment raise many biosafety issues.

## Constitutive promoter issues

CaMV 35S promoter might be harmful if it invades human cells and activate certain genes.

# Genetically Modified (GM) Crops

## Negative impacts of GM crops on non-target organism

- 1. Beneficial species** including natural enemies of pests (e.g. lacewings, parasitic wasps etc.).
- 2. Non target Organisms** (canola, whiteflies etc.
- 3. Soil micro-organisms**
- 4. Biodiversity**, which is the entire community of species in a given region
- 5. Species of conservation concern**, including endangered species and popular, Monarch butterfly.
- 6. Bt crops effects beneficial animals** like cows, goats, herbivores and human

## Public Concerns?

### Economics

Are we *changing the economics on the farm?*

### Environmental

Are we *irreversibly modifying the environment?*

### Globalization

Is technology becoming *centralized in too few hands?*

### Social

Will we develop a class of *genetic outcasts?*

### Religious

Are we *playing God?*

# Conclusion and Future Recommendations

## Genetically Modified (GM) crops offer

**GM crops are used to improve yields, nutritional value, longer shelf life, and resistance to biotic and abiotic stress.**

**There exists a thought that the pace of research in genetic engineering of crop plants may someday lead to the development of variations that will not ensure the survival of living creatures including human beings.**

**So there is needed to develop 1. marker free transgenic crops, 2. use of no or less toxic promoter genes and 3. to develop transgene free crops using CRISPR-Cas technology etc.**

**In addition it is the responsibilities of all stakeholders, donor institutes, young scientists, etc. to develop new policies and codes which ensure to minimize such hazards and to establish a baseline for the acceptance of transgenic technology with no or minimal dual use issues.**

**It is the responsibility of concerned researchers to interpret such hazards and their solutions on technical basis and, therefore, establish a based line of acceptance for transgenic crops to the consumers.**

# References

**S.A. Jan., S.H. Shah, N Ahmad, S.U. Khan, and A. Ali. 2015. Use of Different Promoters in Transgenic Plant Development: Current Challenges and Future Perspectives. *American-Eurasian J. Agric. & Environ. Sci.*15 (4), 664-675**

**M.A. Zia, S.A. Jan, Z.K. Shinwari. 2015. Impact of *Bt* cotton on animal health. An overview. *Global veterinaria.* 14(3).377-381**

**S.A. Jan and Z.K. Shinwari. 2014. *Review Advances in Production of Marker Free Transgenic Plants: Current Challenges and Future Perspectives.* 2014. *Euro. Acad, Res* 2(3): 3712-3722.**

