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Agriculture Through Agri-tech: GM Crops

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This article is based on **Driving a 2nd green revolution via agri-biotech** which was published in The Hindu Business Line on 15/08/2021. It talks about the issues related to the use of GM crops and the way forward.

Indian agriculture has come a long way since the country saw the **Green Revolution** in the late Sixties, which saved the country from food shortages and severe farming distress. The science behind the revolution is what made all the difference.

Today, India is once again at the cross-roads, though it's in a much stronger position than it was five decades ago. Today India is a leading producer of a variety of crops. They include rice, wheat, cotton, sugarcane and an impressive list of fruits and vegetables.

But, in terms of yield or output per unit of land, India lag behind countries that are major cultivators of food crops. A variety of reasons affect crop yields include climate conditions, access to high-quality farm inputs, mechanisation, access to capital and a good knowledge of the latest farming techniques.

However, none of these will mean much if the seeds that go into our lands are not of the best quality or do not have resistance to many of the pests and diseases.

Benefits of GM Tech

- **India Became Importer to Net-Exporter:** In India the benefits of **GM technology** were almost immediate and very impressive.

Ever since the farm sector has been opened to the **genetically-modified cotton (Bt Cotton)**, the country has emerged as one of the major producers of Cotton cash crop and in less than four or five years, became a net exporter.

- **Add Various Attributes:** Transgenic or GM seeds are nothing but seeds which have some attributes added by introducing genes extracted from another species.

There are a number of attributes that can be added to a seed to **improve its taste, colour, quality, nutrition value** and make them resistant to common diseases or ward off pests such as the bollworm that attack the cotton plants.

- **Climate Resilient Crops:** Another critical need for the future – climate resilient crops – could also be attempted through GM technology.
- The **other possible benefits** of genetic engineering food include:
 - Disease- and drought-resistant plants that require fewer environmental resources (such as water and fertilizer)
 - Less use of pesticides
 - Increased supply of food with reduced cost and longer shelf life
 - Faster growing plants and animals
 - Food with more desirable traits, such as potatoes that produce less of a cancer-causing substance when fried
 - Medicinal foods that could be used as vaccines or other medicines.

Challenges With GM Crops

- **Need For Other GM Crops:** The benefits enjoyed by the cotton farmers have not spread to other crops.
 - A major part of China's maize imports come from the North and South American countries.
 - Meanwhile, as China's next-door neighbour, India is unable to profit from these opportunities or have a competitive price because of the current levels of productivity.
- **Did not Keep Pace With Tech Advancement:** Indian agriculture is not averse to science but has not kept pace with the adoption of science in agriculture.

For instance, gene edited crops have shown great promise and are being cultivated in other parts of the world for benefits like quality of produce.
- **Unknown Consequences:** There may be unknown consequences to altering the natural state of an organism through foreign gene expression.

Such alterations can change the organism's metabolism, growth rate, and/or response to external environmental factors.
- **Health Risks:** Potential health risks to humans include the possibility of exposure to new allergens in genetically modified foods, as well as the transfer of antibiotic-resistant genes to gut flora.
- **Ecological Imbalance:** The consequences influence not only the GMO itself, but also the natural environment in which that organism is allowed to proliferate.

Gene transfer of pesticide, herbicide, or antibiotic resistance to other organisms would not only put humans at risk, but it may also cause ecological imbalances, allowing previously innocuous plants to grow uncontrolled, thus promoting the spread of disease among both plants and animals.

Way Forward

- **Keeping Pace With Agri-biotech:** Other GMO crops, such as **Bt brinjal**, **DMH-11 mustard**, can be granted permission after the exhaustive **Environmental impact assessment**.

The government should go for commercialization of GM seeds only after the core and deep research on the long term prospects and benefits of commercialization of GM seeds in India.

- **Indigenous Technology:** Encouraging home-grown technologies and supporting them with the necessary regulatory steps without any compromise on the science and safety is vital for '**Doubling farmers' income**'.

Promoting investment will motivate all technology developers to take interest in crops that are relevant to India and using technologies for which there is a clear regulatory framework.

- **Faith in the Good Science:** GM crop technologies undergo several years of testing for their trait efficacy, safety and overall performance enhancement of the crop.

We should have faith in all the good science in place for evaluating these technologies and what emerges as safe and good for the crop should be made available to the farming community.

- **Other Measures:**

- In order to curb the illegal cultivation of GM seeds, the **Genetic Engineering Appraisal Committee** (GEAC) should:

- Collaborate with state governments and launch a nation-wide investigation drive.
- Take action on threats of deliberate GM crop cultivation.
- Investigate and prosecute those involved in the illegal supply of GM Seeds.

- Encourage **organic farming** along with the GMO crops.

Conclusion

Unless the farmers stand to gain in the long run, nobody wins. This is undoubtedly one objective that can bring all stakeholders, including regulators, farmers' lobby, activists and investors closer to create an atmosphere of trust.

Drishti Mains Question

Encouraging GM crops is a sure shot to doubling farmers' incomes and relieving rural distress. Critically discuss.
