Centre for CIVIL SOCIETY
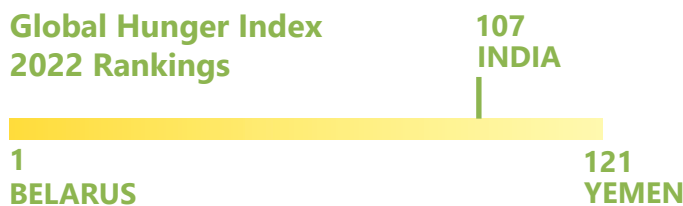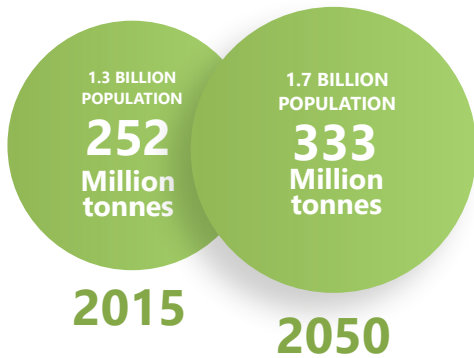SOCIAL CHANGE THROUGH PUBLIC POLICY
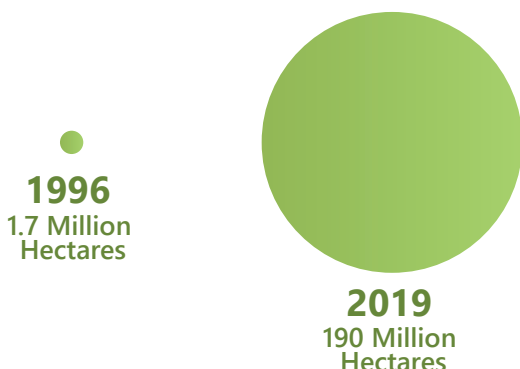
GM Crops in India

What's a GMO?

Genetically Modified Organism (GMO) is defined as an organism in which the genetic material has been **altered** in a way that **does not occur naturally by mating**. Cross-bred organism does not classify as a GMO.

India's need for domestic food production

1.3 BILLION POPULATION
252 Million tonnes

1.7 BILLION POPULATION
333 Million tonnes

2015

2050

Global Hunger Index 2022 Rankings

107 INDIA

1 BELARUS

121 YEMEN

This is based on nutritional parameters and GM crops in staples have enhanced nutritional values.

The Global Rise of GM Crops

1996
1.7 Million Hectares
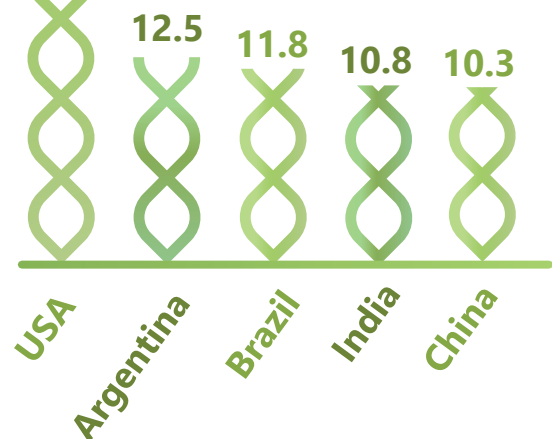
2019
190 Million Hectares

107 Nobel laureates pitch for GM Crops

In 2016, 107 Nobel laureates signed a letter urging Greenpeace to revoke its anti-GM stance by citing the findings of various scientific bodies that suggest that GM crops are immensely beneficial to farmers and society at large.

WHO endorses existing GM foods

The World Health Organization (WHO) states that existing GM foods in the market have passed safety assessments and are unlikely to pose any health hazards.

43.6

12.5
11.8
10.8
10.3

% of Total Global Increase in Farm Income from GM Crops

1996-2018

USA

Argentina

Brazil

India

China

From the Beginning...

1994
FIRST GM CROP INTRODUCED
Named 'Flavr Savr Tomato' developed by the Californian company Calgene, later acquired by Monsanto

1995
BT COTTON INTRODUCED IN INDIA
Maharashtra based Mahyco gained permission to import Bt material from Monsanto

2000
TECHNICAL GO AHEAD FOR BT COTTON
The Review Committee on Genetic Manipulation (RCGM) gave technical go-ahead to Bt Cotton

2001
COMMERCIAL APPROVAL FOR BT COTTON DENIIED
The Genetic Engineering Approval Committee (GEAC) denies commercial approval, requests Indian Council of Agricultural Research (ICAR) to step in & provide independent advice

2002
BT COTTON APPROVED FOR COMERICAL RELEASE
GEAC approved commercial release for an initial 3 year period in 6 cotton growing states, which was later extended

2009
BT BRINJAL COMMERCIALLY APPROVED
First ever GM food crop to be commercially approved in India. Developed by Mahyco & Monsanto

2010
INDEFINITE PROHIBITION ON BT BRINJAL
MoEF&CC in 2010 indefinitely put a moratorium on Bt Brinjal after public consultations

2011
MANDATE TO OBTAIN NOC FROM STATE GOVTS
GEAC makes it mandatory for applicants to obtain 'no objection certificates' from state governments prior to field trials

2014
11 STATES REFUSE TO ISSUE NOC
Gujarat, along with 10 other states, refused to issue NOCs for field trials of GM food crops

2017
RECOMMENDATION FOR APPROVAL OF GM MUSTARD
Developed by Dr. Deepak Pental & team, University of Delhi. Officially known as Dhara Mustard Hybrid-11 given technical clearance by GEAC

2018
APPROVAL FOR GM MUSTARD HALTED
After facing opposition from the bee keeping industry, MoEF&CC says they are "studying the issue with meticulous precision"

2019
APPROVAL FOR FIELD TRIALS OF BT BRINJAL
GEAC approves field trials in 8 states during 2020-23, provided the state govts grant NOCs for the trials

2022
APPROVAL OF GM MUSTARD
GEAC approves commercial cultivation of GM mustard in its 147th Meeting

2022
SUPREME COURT HALTS GM MUSTARD
Supreme Court orders to halt the planting of GM Mustard within 1 week of GEAC approval

Farmers want Access to Technology

Many biotech proponents indicated the illegal cultivation of GM crops as a signal of farmers' willingness to embrace GM technologies.

15% of cotton farmers in major cotton growing states had **switched to the HtBt variant in 2017** (Department of Biotechnology)
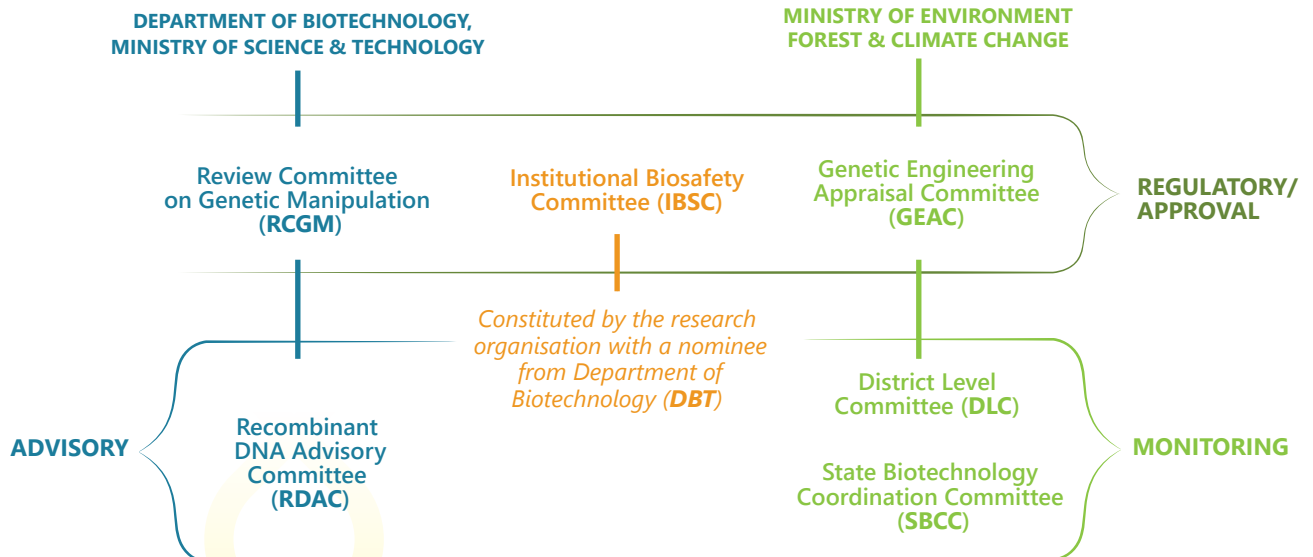
GUJARAT, 2001
11,000 hectares of illegal GM cotton worth **$30 million** discovered

MAHARASHTRA, 2021
Nearly **50% of cotton** cultivated in Maharashtra in 2021 was expected to be **HtBt Cotton**

Sales of **illegal HtBt cotton** have **doubled** during 2020-2021 from **3.5 million to 7.5 million** packets

AKOLA, 2019
1,500 farmers led by Shetkari Sanghatana, a **pro-GM farmers union,** gathered to plant HtBt cotton in protest of the regulatory logjam

How GM Crops are Regulated in India

In India, genetically modified organisms (GMOs) are broadly regulated under *Rules for the manufacture, use, import, export & storage of hazardous microorganisms, genetically engineered organisms or cells, 1989* notified under the Environment Protection Act, 1986 (EPA, 1986).
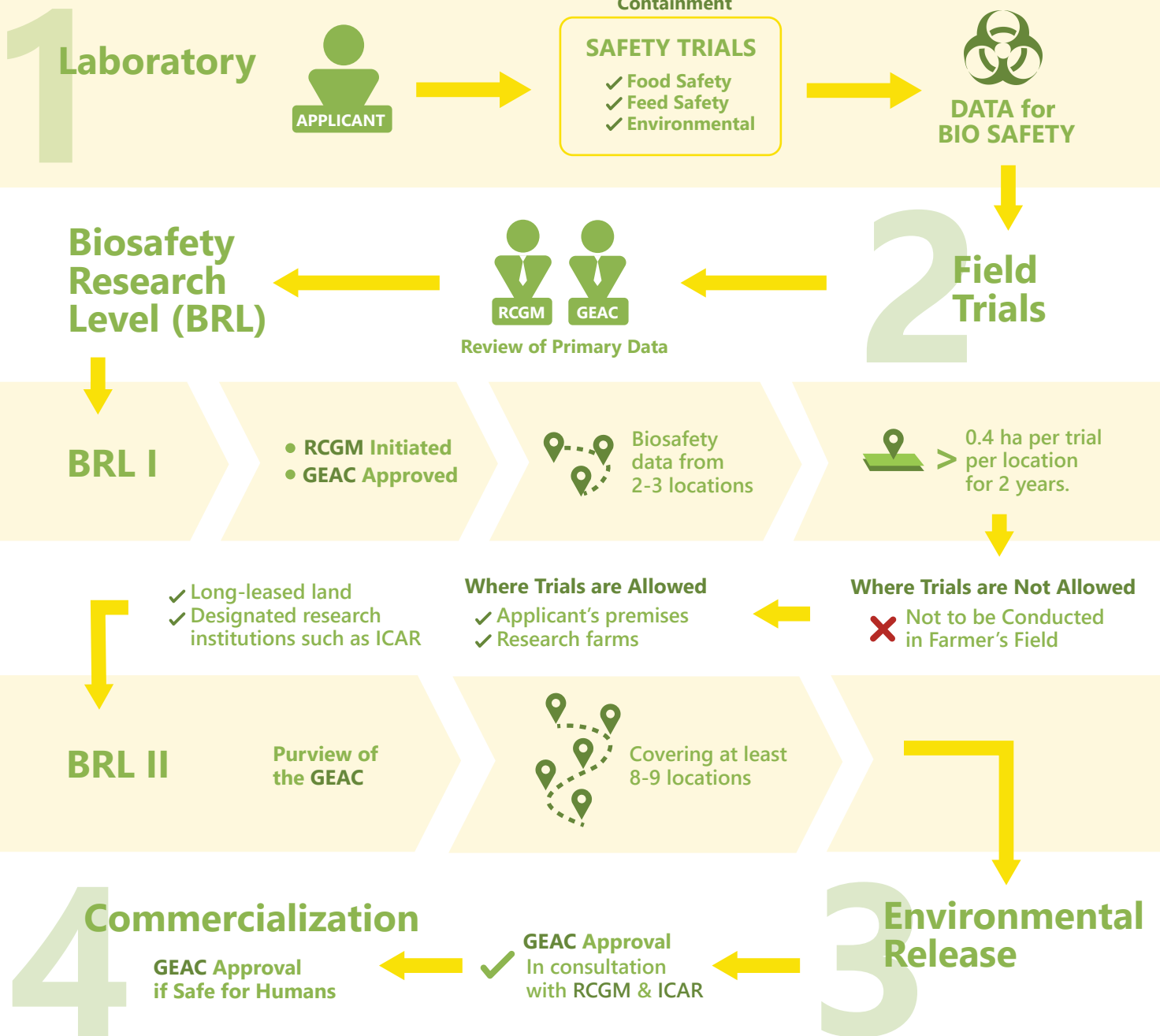
SIX AUTHORITIES IMPLEMENTING THE 1989 RULES

DEPARTMENT OF BIOTECHNOLOGY, MINISTRY OF SCIENCE & TECHNOLOGY

MINISTRY OF ENVIRONMENT FOREST & CLIMATE CHANGE

Review Committee on Genetic Manipulation (**RCGM**)

Institutional Biosafety Committee (**IBSC**)

Genetic Engineering Appraisal Committee (**GEAC**)

REGULATORY/ APPROVAL

Constituted by the research organisation with a nominee from Department of Biotechnology (DBT)

District Level Committee (**DLC**)

ADVISORY

Recombinant DNA Advisory Committee (**RDAC**)

State Biotechnology Coordination Committee (**SBCC**)

MONITORING

Words Matter

It is interesting to note how...

The **1989 Rule** on GMOs by definition regards GMO as **Hazardous** (*...hazardous microorganisms of genetically engineered organisms...*).

GEAC changed its name from Genetic Engineering **Approval** Committee to Genetic Engineering **Appraisal** Committee in 2010. The name change was deemed to be more "psychological" and grounded in a "mindset change"

GM Crop Appoval Process

1 Laboratory

APPLICANT → **Containment**

SAFETY TRIALS
✓ Food Safety
✓ Feed Safety
✓ Environmental

→ **DATA for BIO SAFETY**

2 Field Trials

Biosafety Research Level (BRL) ← **Review of Primary Data** (RCGM, GEAC) ←

BRL I
- **RCGM** Initiated
- **GEAC** Approved

Biosafety data from 2-3 locations

> 0.4 ha per trial per location for 2 years.

Where Trials are Allowed
✓ Applicant's premises
✓ Research farms

← **Where Trials are Not Allowed**
✗ Not to be Conducted in Farmer's Field

✓ Long-leased land
✓ Designated research institutions such as ICAR

BRL II
Purview of the GEAC

Covering at least 8-9 locations

3 Environmental Release

GEAC Approval In consultation with **RCGM & ICAR** →

4 Commercialization

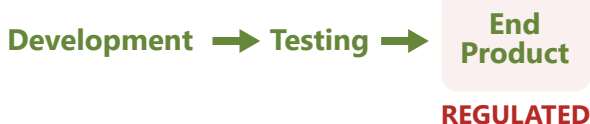**GEAC Approval** if Safe for Humans

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Product vs Process

Regimes across the world either treat GMOs as a 'Product' or a 'Process' before creating a regulatory set up

GMO AS PRODUCT
Examples: US, Argentina, Canada

Development → Testing → **End Product**

REGULATED

GMO AS PROCESS
Examples: India, Brazil, China

Development → Testing → **End Product**

REGULATED

Global Acceptance of GM Crops

Over the years, many countries who previously held a conservative opinion on GM crops have realised its benefits of GM crops and have approved its cultivation.

USA
Approved the GM purple tomato in September 2022.

China
Approved 12 GM corn and 3 GM soybean varieties in 2021 after coronavirus outbreak added to food security concerns.

Philippines
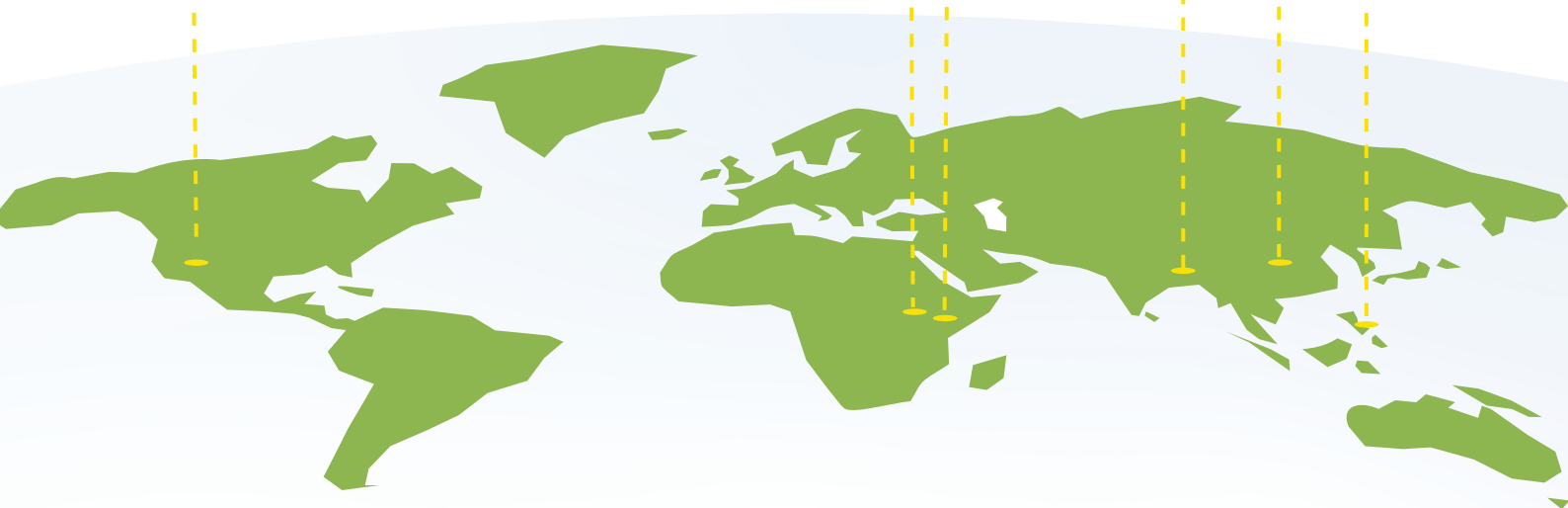Recently approved the commercial cultivation of Bt Brinjal in October 2022.

Kenya
Lifted a 10-year ban on GM crops to combat droughts by reducing its dependence on water intensive agriculture and to provide food relief in times of environmental stresses.

Bangladesh
Approving Bt Brinjal in 2013, has managed to cut pesticide use by 61% and increased profits six-fold.

Ethiopia
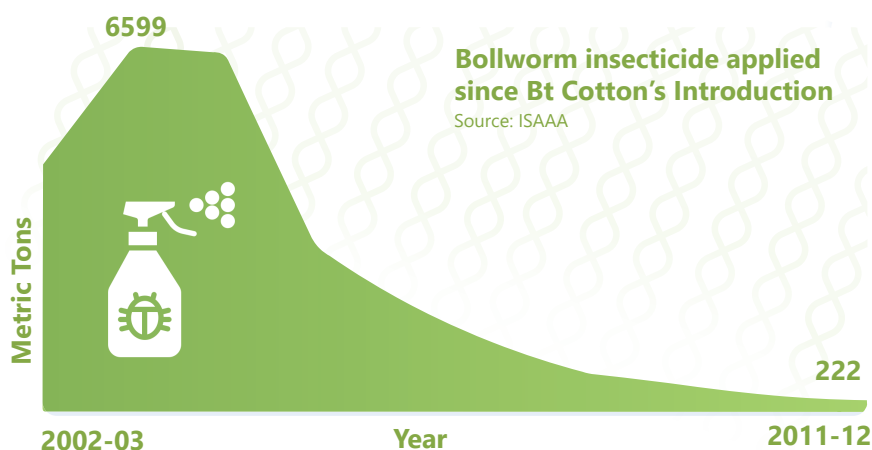Historically opposed GM crops, approves the field trials for fungal resistant GM potato in 2022.

The GEAC recommended the environmental release of genetically modified (GM) mustard (Brassica juncea) variety DMH (Dhara Mustard Hybrid)-11 in October 2022 for the advancement and development of a new generation hybrid, laying the foundation for the commercialization of the nation's first GM food crop. However, within a week, the Supreme Court ordered to halt the planting of GM Mustard as long as the matter remains subjudice.

Bt Cotton in India

Bt - Bacillus thuringiensis

Since its introduction in 2002, Bt Cotton saw a rapid growing adoption.

7/8 Million Cotton Farmers have adopted Bt Cotton in India

6599

Bollworm insecticide applied since Bt Cotton's Introduction
Source: ISAAA

Metric Tons

222

2002-03   Year   2011-12

While Bt Cotton being the **only approved GM crop in India**, this one crop alone makes India occupy **6% of global acreage** under GM crops, ranking 5th in GM cropland.

The Need for GM Mustard in India

65%
of India's edble oil requirements are **imported from other countries**.

2x
Edible oil prices in India have **more than doubled** in the last decade.

Plot-level trials of GM mustard have shown that its yields are **28% Higher** than the non-GMO Varuna Variety.

Australia's Approval of Indian GM Mustard

In October 2022, the OTGR granted the licence to BASF Australia Ltd and authorised the commercial release of Indian mustard genetically modified (GM) for herbicide tolerance & male fertility restoration.

"*GM Indian mustard poses negligible risk to the health and safety of people or the environment. General conditions have been imposed to ensure that there is ongoing oversight of the release.*"

— **Office of the Gene Technology Regulator (OTGR)**, Australian Government Department of Health and Aged Care

5 **Risk scenarios** were postulated during the approval process. The level of risk for each scenario was considered negligible in relation to both the seriousness and likelihood of harm both in the short and long term.

The licence holder must also provide an **annual report** regulator which shall contain information about GMO grown for commercial and non-commericial purposes, and any and all information about the **GMO's adverse effects**.

ANNUAL
REPORT

Concerns to be Addressed

Gridlock of Bureaucracy
The ever growing, micromanaging bureaucracy of GM crops in India hinders economic growth.

Decoupling of Politics & Science
Vested interests influencing government polices for the sake of vote bank.

Seed Monopolization through Stringent Intellectual Property Regime
Notable GMO critics argue about the lack of autonomy for the farmer when only a few corporations have IP rights over seeds.

CENTRE FOR CIVIL SOCIETY

Founded in August 1997 on the 50th Anniversary of India's independence, Centre for Civil Society (CCS) is a leading public policy think tank today, ranked 5th in India and 83rd in the world by the TTCSP 2021 report.

CCS champions individual choice and institutional accountability by shaping India's public policy, using evidence-based research, outreach programs, and policy training. Our areas of work include education, livelihoods, governance, environment, agriculture, and science & technology policy. Since its founding in 1997, CCS has stayed non-partisan and independent, providing objective analysis and inputs on public policy. Our work promotes choice and accountability across the public and private sector.