



MINISTRY OF ENVIRONMENT /
ENVIRONMENTAL PROTECTION AGENCY
REPUBLIC OF INDONESIA

Hybrid from Smallholders in the Global Arena:

The Socio-Economic Impact of GM Adoption
in Indonesia and Beyond

Convened by:
International Service for the Acquisition of Agribiotech Applications, Inc. (ISAAA Inc.)

Genetically Modified Organism (GMO) Policy in Indonesia

By

Director of Biodiversity Conservation
Deputy Ministry for Environmental Pollution and Degradation Control
Ministry of Environment/Environmental Protection Agency
Republic of Indonesia

Jakarta, October 14th, 2026



MINISTRY OF ENVIRONMENT /
ENVIRONMENTAL PROTECTION AGENCY
REPUBLIC OF INDONESIA

1. Background



Indonesia is a megadiverse nation with biodiversity vital to national well-being.



Modern biotechnology and GMPs can support agricultural productivity, food security, and quality of life.



GMPs may offer benefits, but **potential risks** to human health, biodiversity, and the environment must be assessed.



Indonesia supports responsible innovation through science-based assessment, the precautionary approach, and effective regulation.





2. Legal Foundations



Sustainable Development

Indonesia possesses immense biodiversity that must be managed effectively to achieve **sustainable development** and advance public welfare.



International Biosafety Commitments

Indonesia ratified the **United Nations Convention on Biological Diversity** through Law No. 5 of 1994, which mandates the establishment of a biosafety protocol.



Science and Innovation Expansion

Rapid developments in science and technology have driven an expansion in **biotechnology research and development**, producing genetically modified organisms utilized across food, agriculture, forestry, pharmacy, and industry.



Risk Management

Because genetically modified organisms carry inherent risks that could adversely affect the **environment and human health**, their transfer, handling, and utilization must be strictly regulated to ensure high levels of biosafety.



Law of the Republic of Indonesia No. 21 of 2004

Officially ratifies the **Cartagena Protocol on Biosafety to the Convention on Biological Diversity**.



2. Legal Foundations



Government Regulation No. 21 of 2005 on the Biosafety of Genetically Modified Products

The biosafety framework for genetically modified products covers three pillars: **environmental safety, food safety, and feed safety.**

Biosafety Pillar	Scope
 Environmental Safety	The conditions and efforts required to prevent potential risks that could harm biodiversity resulting from the utilization of GMPs.
 Food Safety	The conditions and efforts required to prevent potential adverse impacts and hazards to human health arising from the production, preparation, storage, distribution, and utilization of food derived from GMPs.
 Feed Safety	The conditions and efforts required to prevent potential adverse impacts and hazards to animal and fish health arising from the production, preparation, storage, distribution, and utilization of feed derived from GMPs.



The assessment process considers the **characteristics of the product, its intended use, and the relevant scientific evidence.**



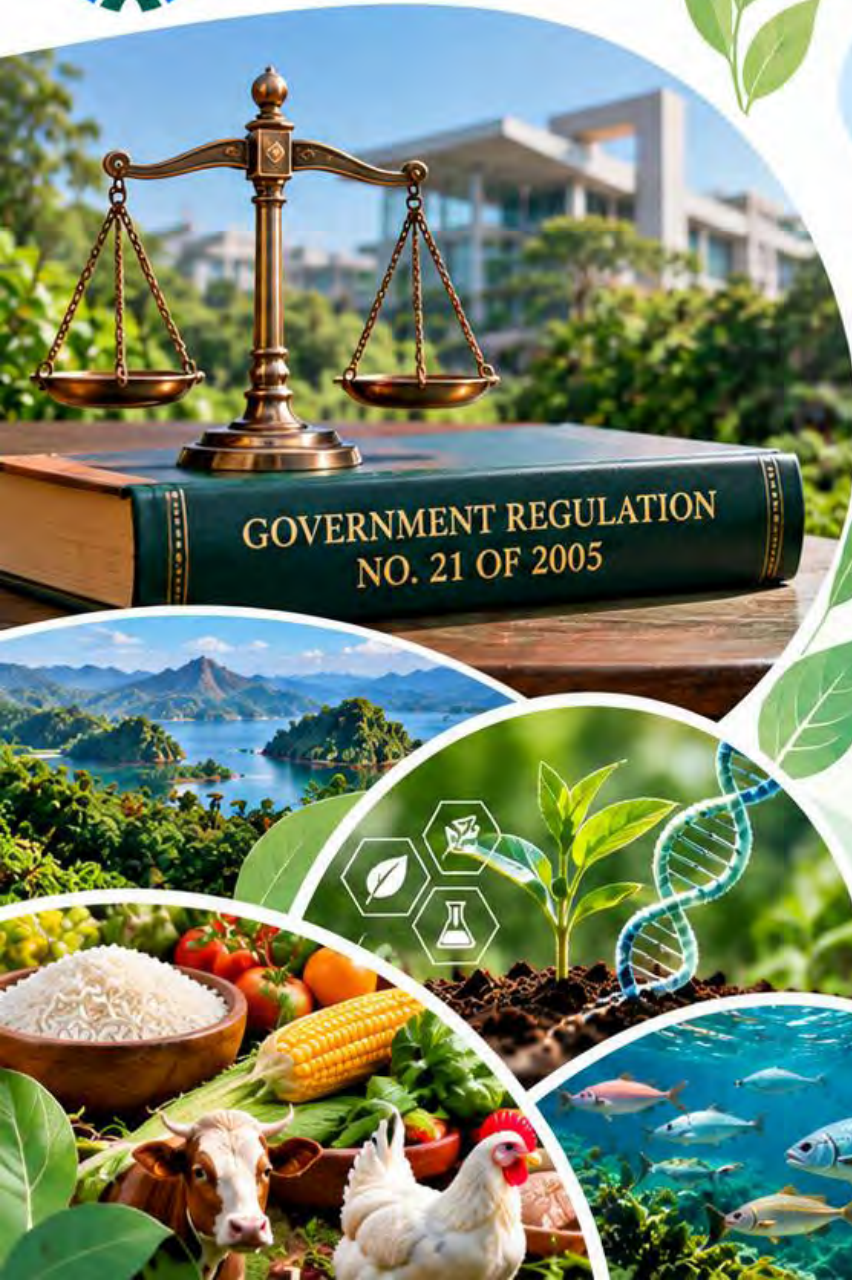
From an environmental perspective, important considerations may include **potential gene flow, effects on non-target organisms**, and possible impacts on **biodiversity and ecological processes**.



These considerations are particularly important for Indonesia, given our **rich biological resources and diverse ecosystems**.



We believe that biosafety decisions must be supported by **sound science, appropriate risk assessment**, and **effective coordination** among relevant ministries and agencies.





MINISTRY OF ENVIRONMENT /
ENVIRONMENTAL PROTECTION AGENCY
REPUBLIC OF INDONESIA

2. Legal Foundations



Indonesian Policy on Research, Testing, and Commercialization Protocols of GMP

The Government regulates research, testing, and commercialization of genetically modified products (GMPs) to ensure environmental, food, and feed safety while encouraging innovation for national interests.

01

Baseline Information Requirements



All domestic and imported GMPs evaluated for release or distribution in Indonesia must be accompanied by comprehensive baseline information demonstrating compliance with environmental, food, and feed safety standards.



Environmental
Safety



Food
Safety



Feed
Safety

02

Researcher Liability



Anyone conducting research and development on GMPs is legally obligated to prevent and mitigate any negative impacts of their activities on human health and the environment.



03

Staged Testing Environments

Testing during the research and development phase must be confined to laboratories, **contained trials facilities**, and/or **confined field trials**.



Laboratories



Contained
Trials Facilities



Confined
Field Trials

04

Efficacy and Clearance



GMPs generated from research and development must undergo efficacy testing and meet biosafety requirements before they can be proposed for release or commercial distribution.



Efficacy
Testing



Biosafety
Requirements



Release /
Commercial
Distribution

05

Public Participation & Incentives

The Government fosters participation across all sectors of society to conduct domestic GMP research and development. To encourage this, the Government may grant awards to citizens who develop new GMPs that benefit the national interest. If the public lacks the capacity to participate, the Government will carry out the necessary research and development directly.



Participation from
All Sectors



Awards for
Innovation



Direct Government
Research if Needed



2. Legal Foundations



Import/Introduction and Risk Assessment Regulations

The Government regulates the import of genetically modified products (GMPs) through strict approval, documentation, risk assessment, and biosafety management to ensure environmental, food, and feed safety for Indonesia.

01

First-Time Import Approval



Anyone intending to import a specific type of GMP into Indonesia for the first time must submit an official application to the competent Minister or the Head of the relevant Non-Departmental Government Agency (LPND).



Minister / LPND

02

Mandatory Documentation



Import applications must include documents proving compliance with environmental, food, and/or feed safety standards.



Environmental
Safety



Food
Safety



Feed
Safety

03

Import Prerequisites

Imported GMPs must be accompanied by a **Certificate of Free Trade** from the country of origin, alongside risk assessment and risk management documentation from the authorized institution where the initial risk assessment was conducted.



04

Mandatory Risk Assessment

A formal risk assessment is strictly required prior to the release and distribution of any GMP.



Environmental
Risks



Human Health
Risks



Food and Feed
Safety Risks



Risk Management
Measures



RISK
ASSESSMENT

05

First-Time Environmental Testing

Applicants must conduct environmental safety testing in laboratories, contained trial facilities, and/or confined field trials for GMPs requested for environmental release or distribution for the first time.



Laboratories



Contained
Trial Facilities



Confined
Field Trials

06

Institutional Roles

The Biosafety Clearing-House (BKKH) operates under the Biosafety Committee (KKH) to manage and present information to the public, while the Biosafety Technical Team (TTKH) is tasked with assisting the KKH in conducting technical biosafety assessments.



Biosafety Committee
(KKH)



Biosafety
Clearing-House
(BKKH)

Manages and presents
information to the public



Biosafety
Technical Team
(TTKH)

Assists the KKH in conducting
technical biosafety assessments



3. Indonesia's Approach to Genome Editing



Genome editing offers new opportunities for agricultural research and crop improvement. However, it also raises important questions concerning the appropriate regulatory treatment of different products.

01 Ongoing Discussions Since 2018



In Indonesia, discussions on genome editing have involved relevant government institutions and scientific experts since 2018.

2018



These discussions led to a recommendation by KKH PRG in December 2020.

KKH PRG
Recommendation
(December 2020)

02 Distinguishing SDN Types

The recommendation recognizes the importance of distinguishing between SDN-1, SDN-2, and SDN-3 applications and examining the characteristics of the final product.

SDN-1



Small genetic changes (e.g. point mutations)

SDN-2



Multiple small changes

SDN-3



Insertion of larger DNA fragments

04 No Automatic Inclusion or Exclusion

Genome editing should not automatically result in either the inclusion or exclusion of a product from biosafety regulation.



05 Preliminary Assessment by KKH PRG

KKH PRG may conduct a preliminary assessment to determine whether a genome-edited product should be classified as PRG or non-PRG.



Preliminary
Assessment
by KKH PRG



Classified
as PRG



Classified
as non-PRG

07 Harmonizing Technical Guidelines



At this stage, Indonesia emphasizes the importance of harmonizing technical guidelines among relevant ministries and agencies to ensure regulatory consistency and legal certainty.



Relevant Ministries
and Agencies

08 National Regulatory Space

We also believe that countries should retain appropriate national regulatory space to assess genome-edited products according to their scientific evidence, national circumstances, and applicable legal frameworks.



Scientific
Evidence



National
Circumstances



Applicable
Legal Frameworks

03 Not All Products Have the Same Regulatory Status

Indonesia's approach is that not all genome-edited products necessarily have the same regulatory status. Their classification should consider:



Nature of the
genetic changes



Available
molecular
evidence



Applicable
legal criteria

06 Applicable Procedures



Products classified as PRG follow the applicable biosafety assessment procedures under Government Regulation Number 21 of 2005.



Government
Regulation
No. 21 of 2005



Products classified as non-PRG are processed under the relevant procedures for non-PRG products.



Relevant non-PRG
procedures



4. Benefits



The theme of this forum also highlights the socioeconomic implications of genetically modified crops for smallholder farmers.

Based on the official policy foundations and the current agricultural landscape, the adoption and development of Genetically Modified Organisms (GMOs) or Genetically Modified Products (GMPs) offer several key socio-economic and environmental benefits for Indonesia.

01

Strengthening Agricultural Production & Food Security



Closing the Supply Gap

Indonesia relies heavily on imports for staple commodities like soybeans and corn. Local cultivation of GM crops reduces this import dependency.



Securing Yield Stability

Crops engineered for optimized traits can achieve higher, more predictable seasonal outputs to feed a growing population.



02

Enhanced Crop Resilience and Resistance



Pest and Disease Management

GM varieties (e.g. Bt crops) resist specific destructive pests and diseases, reducing crop failure and ensuring healthier yields.



Climate Stress Tolerance

Biotechnology enables crops that tolerate drought, flooding, or high soil salinity — conditions increasingly common in Indonesia.



03

Economic Benefits for Farmers



Lower Production Costs

Built-in pest and disease resistance lowers the frequency and volume of chemical pesticide applications, reducing seasonal operational costs for smallholders.



Higher Net Profits

Decreased pesticide expenditures and minimized crop losses increase the overall profit margins per hectare for Indonesian farmers.



04

Environmental and Health Advantages



Reduced Chemical Footprint

Lower reliance on chemical pesticides mitigates toxic runoff into local water systems, preserving rural ecosystems and protecting farmers from hazardous chemical exposure.



Resource Optimization

GM crops engineered for high yields optimize land use, allowing farmers to produce more food on existing agricultural footprints without encroaching on Indonesia's forests and biodiversity.



05

National Innovation & Public Incentives



Empowering Domestic Research

As outlined in Government Regulation No. 21 of 2005, the Indonesian government actively fosters domestic research and development.



State Recognition

The policy framework includes provision for state-level awards and incentives for citizens or local scientists who innovate and develop new, beneficial GMPs that advance the national interest.



Research Grants



Awards and Incentives



Innovation for National Interest



Support for Local Scientists



5. Challenges



The socioeconomic implications of genetically modified crops for smallholder farmers can be a challenge. Potential benefits should be evaluated using reliable evidence and appropriate methodologies. Product safety and socioeconomic performance are complementary but distinct considerations. Responsible innovation requires appropriate regulation, transparent communication, reliable scientific information, and effective stakeholder engagement, as well as post-approval monitoring where applicable.

01

Loss of Seed Sovereignty and Farmer Dependency



Corporate Monopolies

Major farming unions, such as the Serikat Petani Indonesia (SPI), argue that GMO commercialization traps smallholders in a cycle of economic dependence. GM seeds are patented by multinational corporations, so farmers cannot legally save seeds for the next season.



Rising Input Costs

Farmers are forced to buy expensive, imported proprietary seeds and compatible chemical herbicides every planting season. If crop prices drop or yields fail, smallholders face severe financial losses and debt.

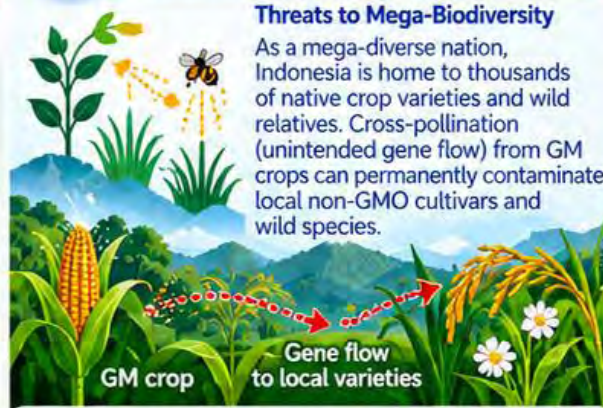


Failure of Past Initiatives

Indonesia's early commercial trial of Bt cotton in South Sulawesi (2001–2003) was pulled due to low yields, high seed costs, and intense farmer dissatisfaction.

02

Ecological Risks and Biodiversity Loss



Threats to Mega-Biodiversity

As a mega-diverse nation, Indonesia is home to thousands of native crop varieties and wild relatives. Cross-pollination (unintended gene flow) from GM crops can permanently contaminate local non-GMO cultivars and wild species.



Development of "Superweeds" and Resistant Pests

Widespread use of herbicide-tolerant crops promotes heavy use of specific chemicals, triggering a "treadmill effect" where weeds and pests develop resistance, forcing farmers to buy stronger, more toxic chemicals.

03

Socio-Economic Inequality and Capital Bias



Marginalization of Smallholders

Civil society organizations note that biotechnology introduces a strong "capital bias". Wealthier land owners with access to credit can easily afford expensive seed packages, while resource-poor farmers are left behind, widening the rural wealth gap.



Misaligned Fixes for Structural Problems

Agricultural experts argue that pursuing GMOs is an unnecessary or ineffective "technical fix". Indonesia's low domestic production (especially in soybeans) stems from structural issues—such as land scarcity, lack of smallholder credit, poor market distribution, and uncompetitive pricing—which biotechnology cannot fix.



04

Need for Reliable Evidence, Monitoring, and Stakeholder Engagement



Evidence-Based Evaluation

Potential benefits, such as improved productivity and production efficiency, should be evaluated using reliable evidence and appropriate methodologies.



Biosafety Remains Essential

Socioeconomic benefits do not replace the need for biosafety assessment. Product safety and socioeconomic performance are complementary but distinct considerations.



Post-Approval Monitoring

Appropriate post-approval monitoring, where applicable, is important to support continued evaluation of authorized products and the identification of potential environmental concerns.



Transparent Communication and Stakeholder Engagement

Responsible innovation requires transparent communication, reliable scientific information, and effective engagement with farmers, researchers, and other stakeholders.



MINISTRY OF ENVIRONMENT /
ENVIRONMENTAL PROTECTION AGENCY
REPUBLIC OF INDONESIA

6. Role Sharing



To ensure that the benefits of Genetically Modified Products (GMPs) are maximized while mitigating the socio-economic losses and ecological risks, a coordinated, multi-sectors approach is needed.

01



Agriculture

Primary Jurisdiction

Upstream Production & Farming



Confined field trials



Environmental safety



Feed approvals



Farmer seed rights

02



Industry

Primary Jurisdiction

Midstream Processing & Manufacturing



Industrial safety standards



Raw material tracking



Bio-industrial manufacturing

03



Trade

Primary Jurisdiction

Downstream Distribution & Markets



Import permits



Certificate of Free Trade validation



Consumer GMO labeling



Cross-Cutting Support and Coordination



Research & Development

Generate evidence, develop local varieties, and provide innovation for national interests.



Biosafety Assessment

Conduct risk assessment and ensure compliance with Government Regulation No. 21 of 2005.



Environment & Biodiversity

Monitor potential impacts, preserve ecosystems, and support post-approval monitoring.



Farmers & Communities

Ensure transparent communication, capacity building, and inclusive engagement.



Policy Coordination

Harmonize guidelines among relevant ministries and agencies for regulatory consistency and legal certainty.



MINISTRY OF ENVIRONMENT /
ENVIRONMENTAL PROTECTION AGENCY
REPUBLIC OF INDONESIA

Indonesia's Priorities & Vision for Biotechnology

1 Key Priorities



Internal Governance

Strengthen inter-agency coordination and harmonize technical guidelines.



Science & Risk Assessment

Enhance scientific capacity, supporting data, and environmental risk evaluation.

2 International Cooperation



Global Partnerships

Exchange scientific knowledge and technical capacity while respecting national regulatory frameworks.

3 Sustainable Vision



Innovation & Conservation

Support agricultural innovation and food security through sound science and regulatory oversight.



Core Principle

Technological innovation and biodiversity protection must go hand in hand.



MINISTRY OF ENVIRONMENT /
ENVIRONMENTAL PROTECTION AGENCY
REPUBLIC OF INDONESIA



Thank You

Terima Kasih

*“Innovating for Food Security,
Conserving for Our Biodiversity”*

