MINISTRY OF NATURAL RESOURCES
AND ENVIRONMENTAL SUSTAINABILITY

BIOSYM
BIOSAFETY SYMPOSIUM 2025
21 AUGUST 2025

JABATAN BIOKESELAMATAN

BIOSAFETY
SYMPOSIUM

STRENGTHENING BIOSAFETY
FOR FUTURE SUSTAINABILITY

21 August 2025 | Thursday
DoubleTree by Hilton, Shah Alam

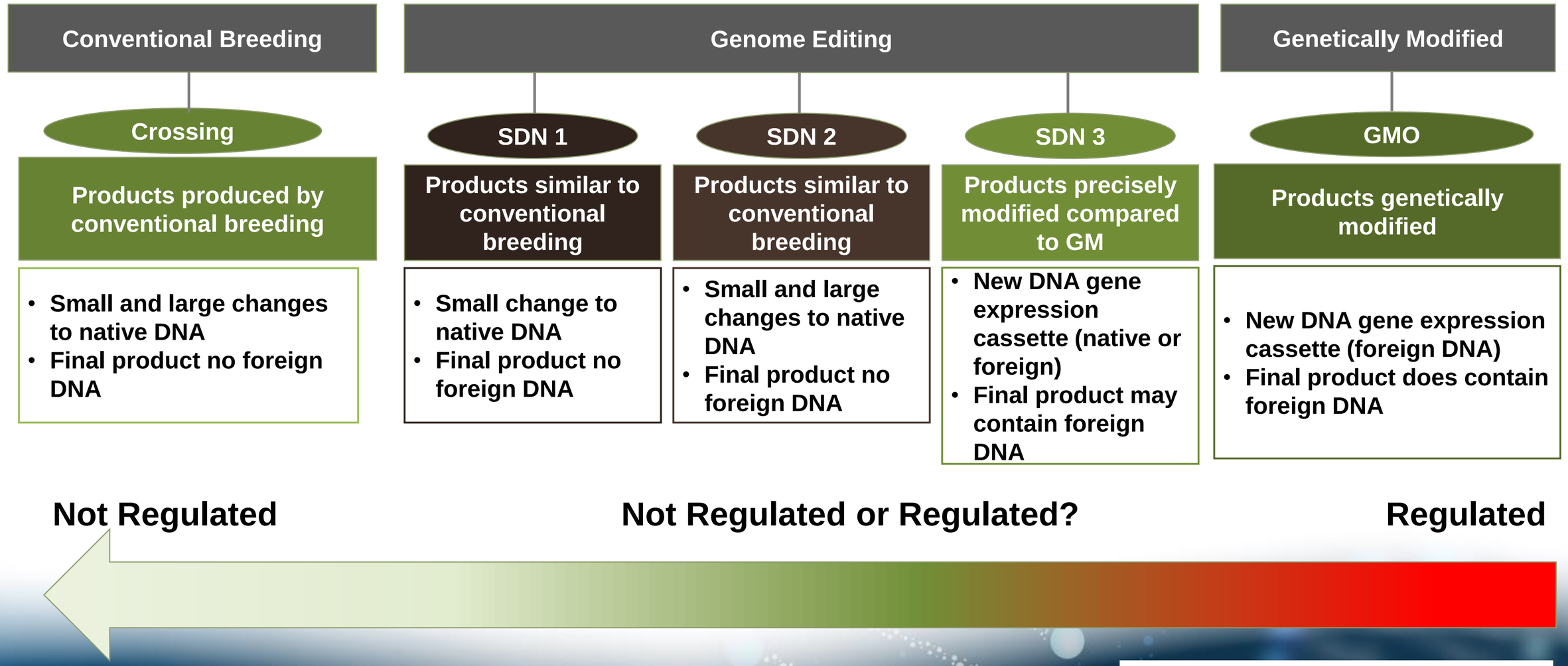
gef UN environment programme | ASEAN MALAYSIA 2025 | MALAYSIA MADANI kemampanan | Visit Malaysia 2026 Truly Asia

Preparedness for GMO Food Innovation and Safety in Malaysia

Ahmad Parveez Hj. Ghulam Kadir
PJN. PhD. FASc.
Director General of Malaysian Palm Oil Board (MPOB)

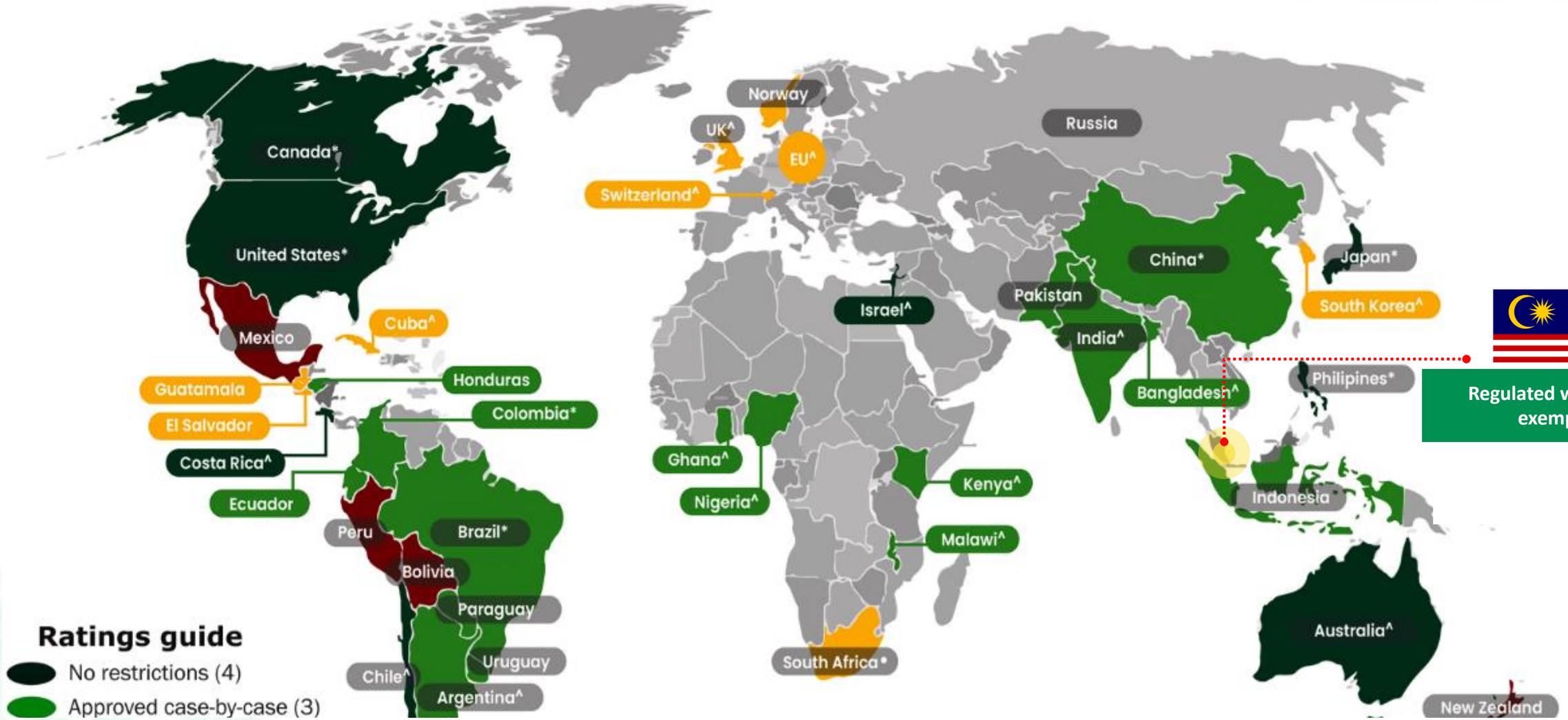
DIALOGUE SESSION
With Great Technology Comes Great Responsibility: Genetically Modified Food from Farm to Plate

OVERVIEW OF CONVENTIONAL BREEDING, GENOME EDITING AND GENETICALLY MODIFIED PRODUCTS



Lisa Zannoni https://www.liebertpub.com/doi/10.1089/crispr.2018.0016

Global Landscape Genome Edited Crops



Source: Global Gene editing Regulation Tracker

AKTA BIOKESELAMATAN 2007

PENGECUALIAN OLEH MENTERI

DALAM menjalankan kuasa yang diberikan oleh seksyen 68 Akta Biokeselamatan 2007 [Akta 678], Menteri, atas syor Lembaga, mengecualikan daripada keperluan Bahagian IV Akta bagi aktiviti pengeksportan, kegunaan terkawal dan pengimportan untuk kegunaan terkawal organisma diubah suai yang hidup (tumbuhan) melibatkan penyuntingan genom dan perlu dipantau oleh jawatankuasa keinstitusian biokeselamatan organisasi yang berdaftar. Penyuntingan genom tumbuhan berikut dikecualikan -

1. sebarang aktiviti yang melibatkan *Site-Directed Nuclease* 1 (SDN-1); dan

2. sebarang aktiviti yang melibatkan *Site-Directed Nuclease* 2 (SDN-2) dan penyelitan 20 pasangan bes atau kurang asid deoksiribonukleik (DNA).

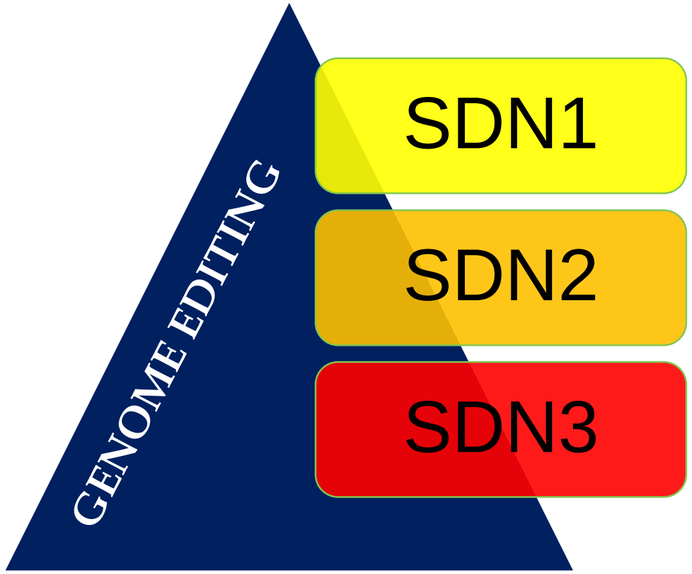
Tarikh 7 Mei 2025
[JBK(S)100-5/1/1 Jld. 6 (8)]

NIK NAZMI BIN NIK AHMAD
Menteri Sumber Asli dan Kelestarian Alam

Minister Exemption

Plant Genome Editing

-Contained Used Activity



Exemption from Akta Biokeselamatan 2007

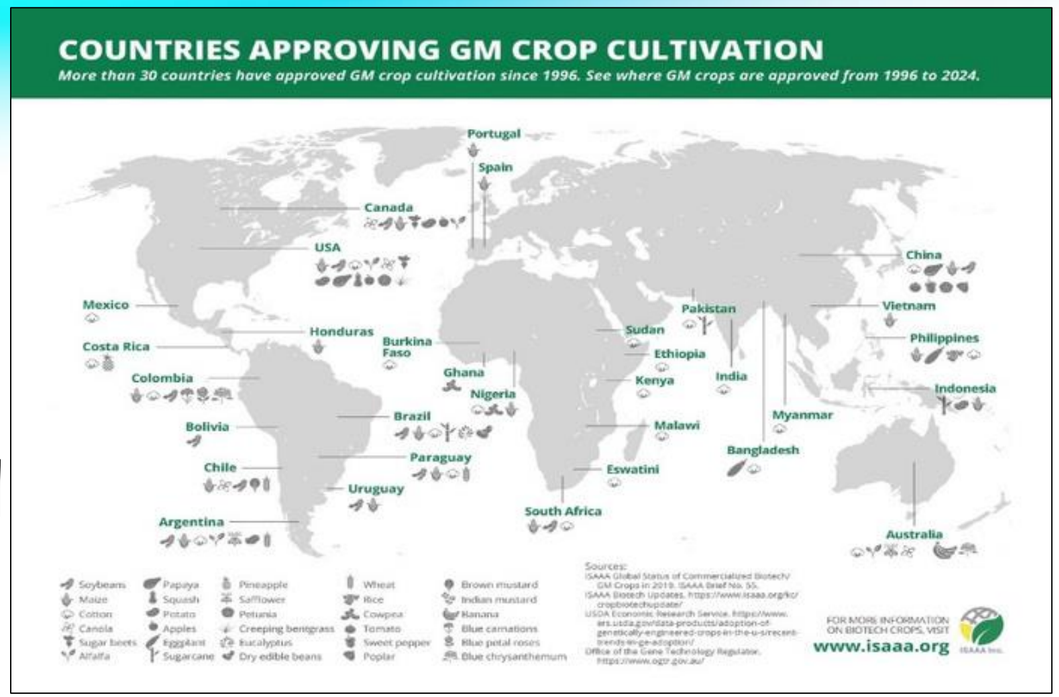
less than 20 bp integration

more than 20 bp integration

Under regulation similar as LMO

Announcement during the Seminar IBC Kebangsaan 2025 on 25 June 2025

GLOBAL & MALAYSIA SCENARIOS ON GENETICALLY MODIFICATION (GM) CROPS



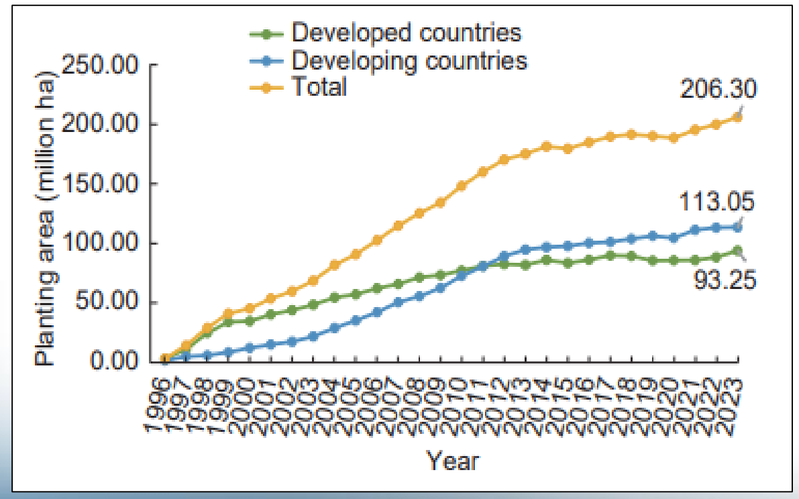
In 2023, **206.3 million hectares of GM crops** were planted in 27 countries and regions, representing **3.05% growth** over the previous year (Agbio Investor 2024).

The **top five countries** including **United States, Brazil, Argentina, India, and Canada** represented **91%** of the world's GM crops planting area.

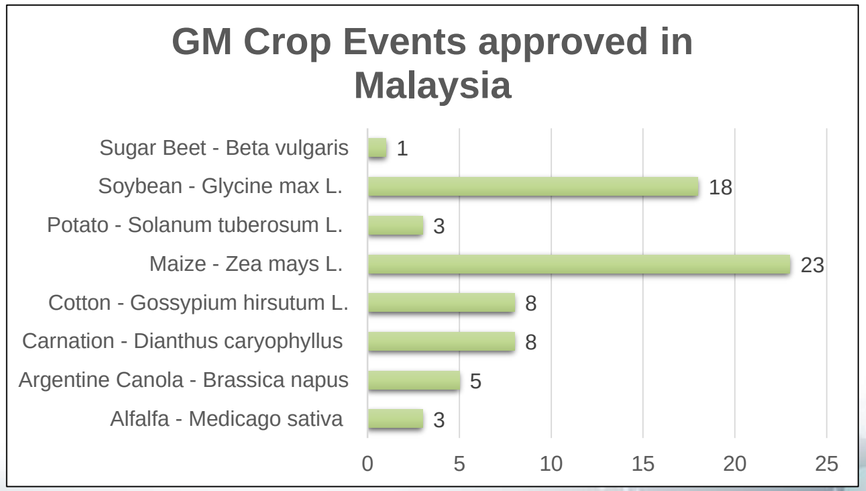
To date, Malaysia has approved 68 GMO events for imported FFP (food, feed, and processing purposes)

Nine (9) release/trials of GMO events

No GM food crop is currently cultivated commercially in Malaysia.



Trends in the global planting area of genetically modifed (GM) crops, 1996–2023



Source: ISAAA webpage; Agbio Investor 2024

Current Regulatory Framework in Malaysia

Governed Under

- Cartagena Protocol on Biosafety to the Convention on Biological Diversity (2000)
- Malaysian Biosafety Act 2007 and Regulations 2010
- Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress (2010)

- National Biosafety Board (NBB)
- Genetic Modification Advisory Committee (GMAC)
- Department of Biosafety (JBK)
- Institution Biosafety Committee

Scope Regulations

Release, importation, exportation and contained use activities of living modified organisms (LMOs) and their products, with the goal of protecting human, animal, and plant health.

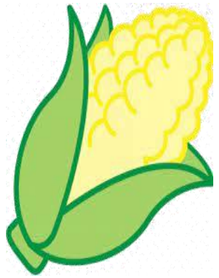
APPROVED FOR RELEASE/ MARKET

- Placing in the market
- Food, Feed and Processing

68

Sugar beet

Eg. H7-1



Corn

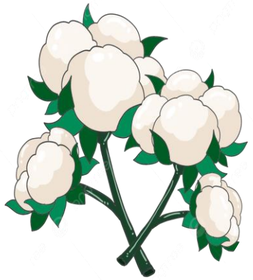
Eg. MON87460 etc.

Soy

Eg. HB4 etc.

Alfalfa

Eg. J101, J163 etc.



Cotton

Eg. MON88913 etc.

Potato

Eg. X17

Oilseed rape

Eg. MON94100,
MON 88392 etc.

APPROVED FOR RELEASE

5 Others

- Enzyme
- Larvicide
- Cut flowers
- Single cell protein
- TMOF yeast

4 Field Trials

- Mosquito
- Papaya
- Rubber

0 Commercial Planting

- No requests

NBB FIELD TRIAL APPROVALS

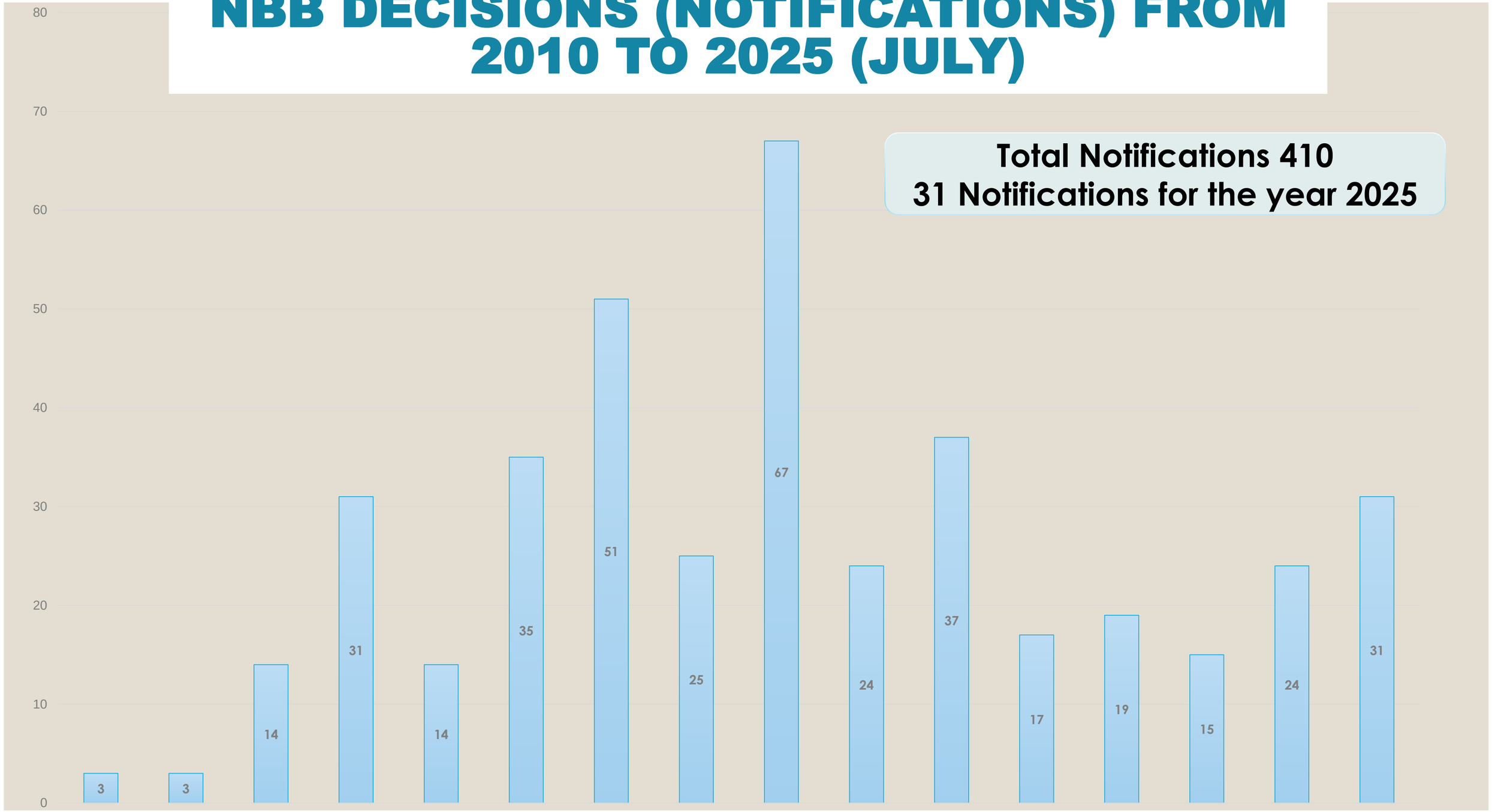
Papaya Trees

Mosquito

Rubber trees

NO COMMERCIAL PLANTING OF GMO IN MALAYSIA TO DATE

NBB DECISIONS (NOTIFICATIONS) FROM 2010 TO 2025 (JULY)



TYPES OF LMO

- BACTERIA
- PLANT
- ANIMAL (MICE)
- HUMAN CELL LINE
- ALGAE
- YEAST
- AQUATIC (FISH)
- ARTHROPOD

70 REGISTERED IBC IN MALAYSIA

LABORATORY CAPACITY FOR GMO TESTING

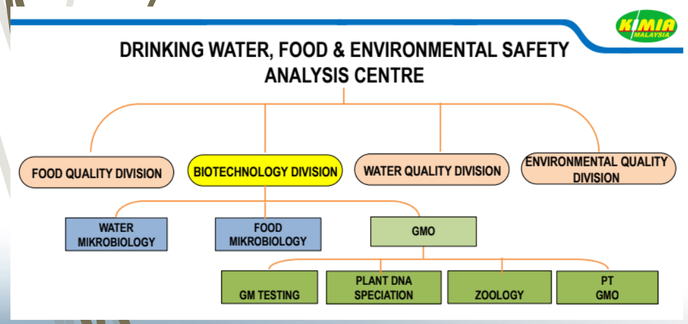
Department of Chemistry Malaysia (Biotechnology Division)

01 National reference agency for **GMO detection and enforcement.**

02 Performs **PCR, real-time PCR (qPCR) and Droplet Digital PCR** for qualitative and quantitative testing.

03 Validates and develops **event-specific and construct-specific detection methods**

04 Supports the **National Biosafety Board (NBB)** and **customs enforcement** at ports.



GM Crops That Can Be Tested in the Lab

Soybean, Alfalfa, Rice, Maize, Papaya, Cotton, Potato, Wheat, Canola, Sugar beet, Tomato

GM Elements Screening Using PCR/ Real-Time PCR

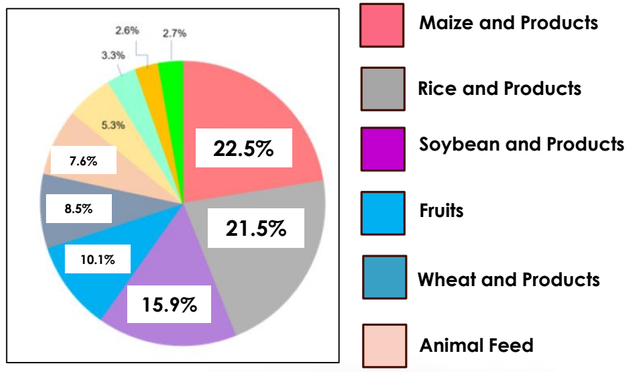
Promoter 35S, Promoter NOS, Terminator NOS, pat gene, bar gene, ctp2-cp4epsps, cry1A(b) gene, nptII gene

Other Laboratories for GMO Testing:

- **Arachem (M) Sdn Bhd**
- **ChemLab**
- **Romer Labs Malaysia Sdn Bhd**
- **SGS Malaysia**

Sample Findings (2019–2021):

- >50% soybean & ~30% maize samples GMO-positive.
- 100% of animal feed tested positive.
- No GM rice detected; unauthorized GM papaya found.



Percentage of crops and its products that were sent to the National Reference Laboratory for testing for the period of 2019-2021 **(Swaran and Kupusamy, 2025)**

Oil Palm Genetic Engineering and Genome Editing Programmes

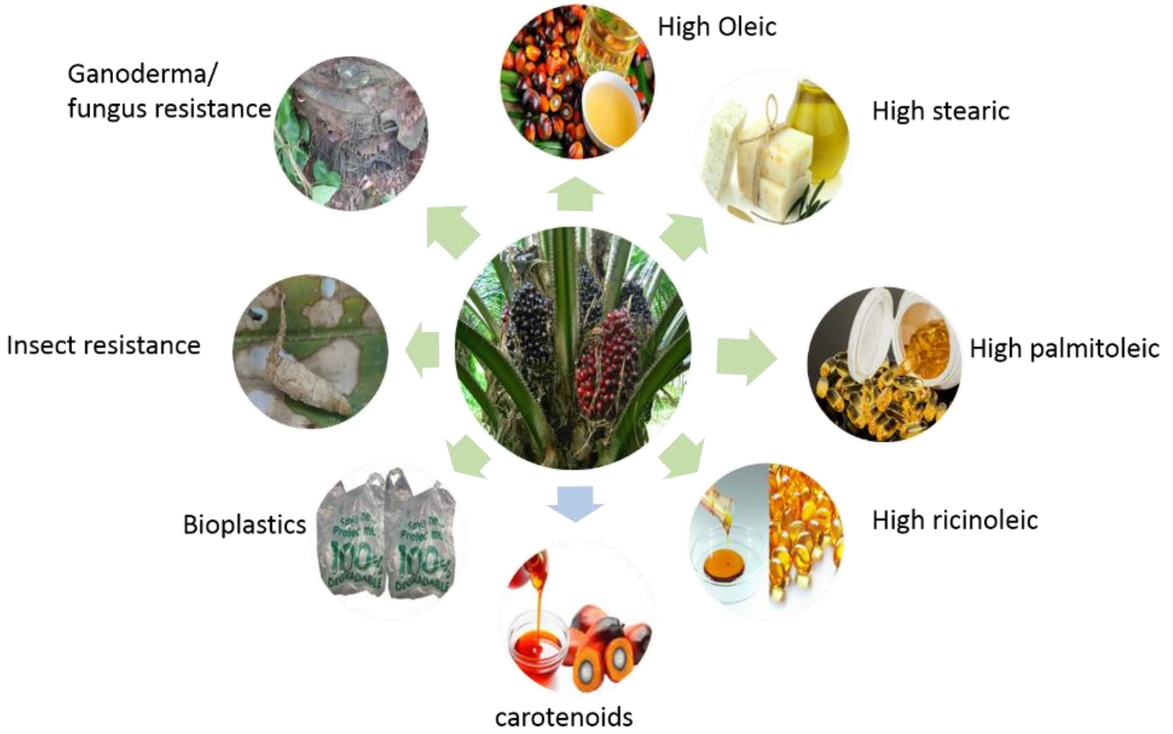
OIL PALM GENETIC ENGINEERING AND GENOME EDITING

Method
- Particle bombardment; *Agrobacterium*-mediated; Polyethylene glycol (PEG)-mediated protoplast; Microinjection

Explant
- Callus; Protoplast; Immature embryo

Promoters and Markers
- **Promoter**: CAMV35S, Ubiquitin, Oil palm constitutive , Mesocarp/ root specific
- **Marker**: Bar, Hygromycin, PMI, GUS, GFP, RFP

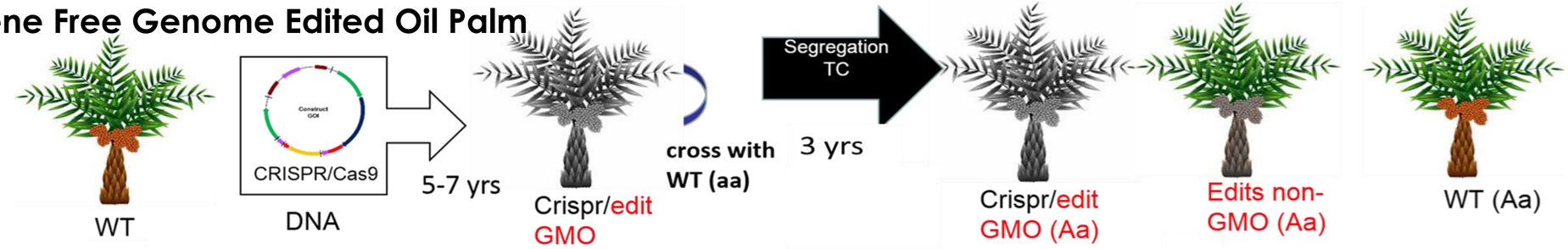
CRISPR Cas9 Editing
- Single and multiplex editings
- CRISPR-Cas9 vector based
- CRISPR-Cas9-RNP based



General Process for Transgene Free Genome Edited Oil Palm

Conventional Breeding Techniques
Requires multiple generations (~10-15 years) to achieve stable traits.

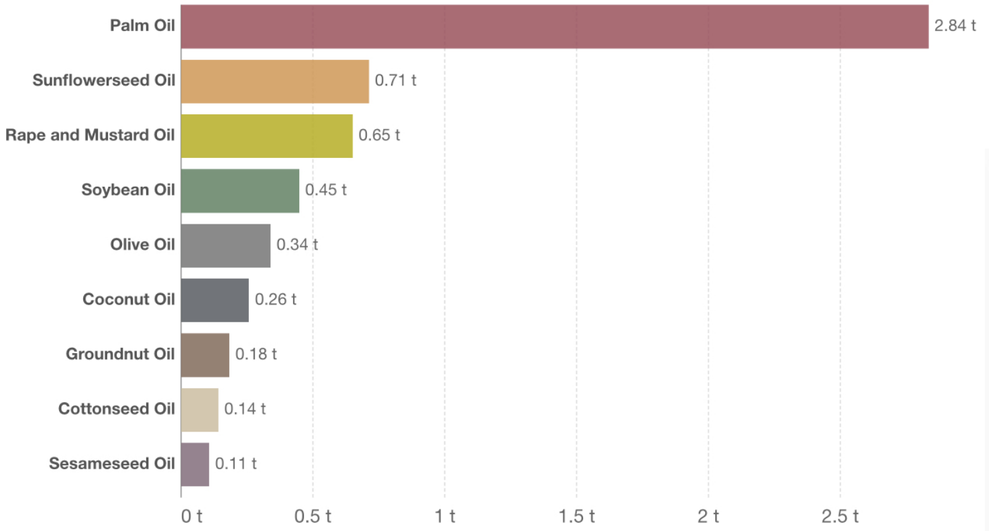
Genome Editing (CRISPR/Cas9)
Faster (~5-7 years) as genetic changes occur within a single generation.



Oil yield by crop type, 2018

Our World in Data

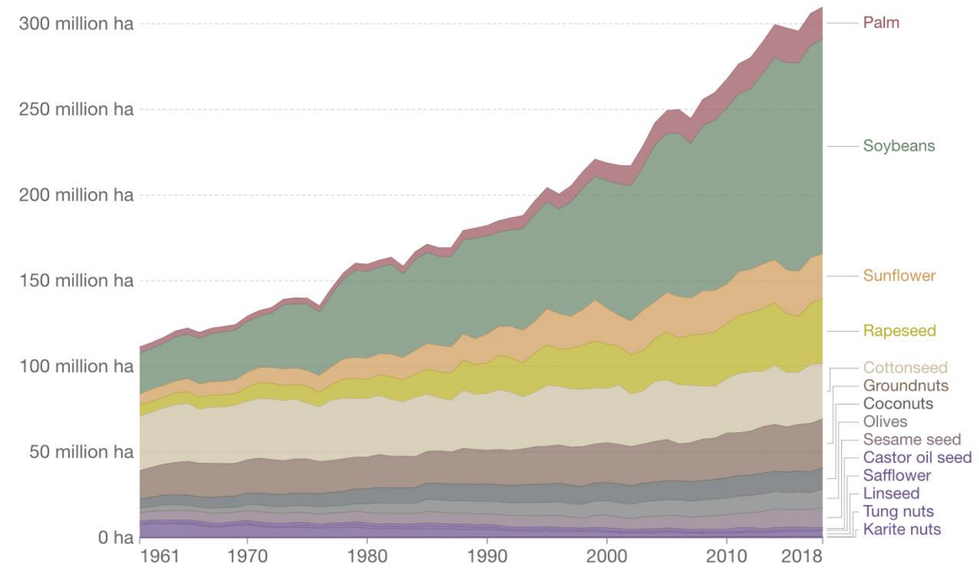
Global oil yields are measured as the average amount of vegetable oil produced per hectare of land. This is different from the total yield of the crop since only a fraction is available as vegetable oil.



Source: Calculated by Our World in Data based on data from the UN Food and Agriculture Organization (FAO)
OurWorldInData.org/crop-yields • CC BY

Land use for vegetable oil crops, World

Our World in Data

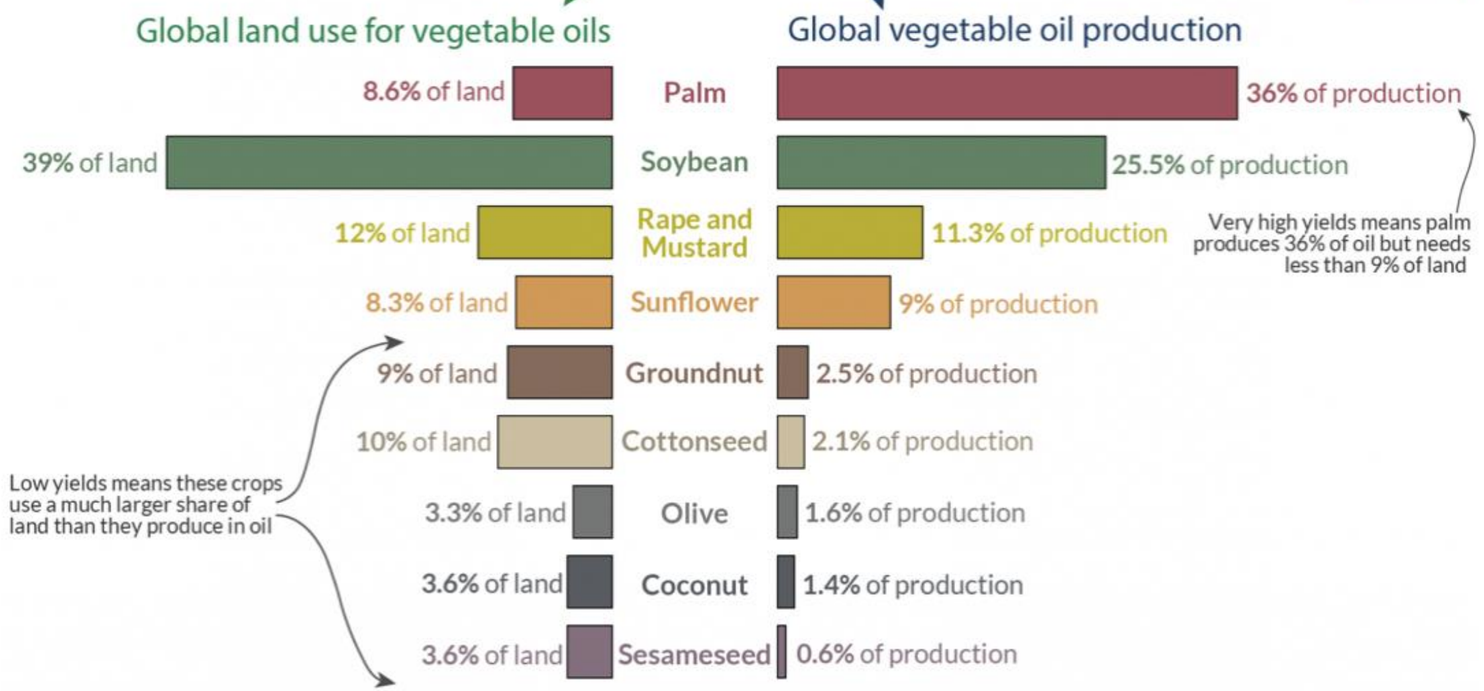


Source: UN Food and Agriculture Organization (FAO)

CC BY

Share of vegetable oil land use and production by crop

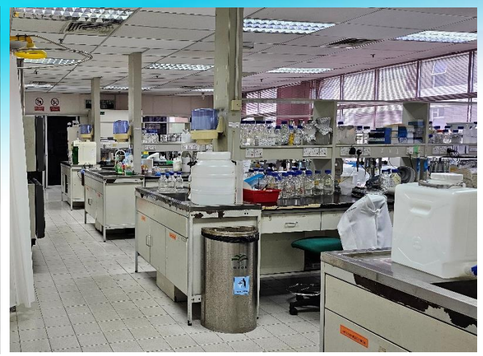
Our World in Data



Data source: Calculated by the authors based on production and land use data from the UN Food and Agriculture Organization (FAO) for the year 2018.
OurWorldinData.org – Research and data to make progress against the world's largest problems.

MPOB:

Developing a national ecosystem for oil palm LMO research




Molecular Analysis Laboratory

- Gene isolation and vector construction
- Molecular analysis for confirmation of transgenic palms

Gene Modification Laboratory

- Genetic transformation
- Tissue culture
- Selection and regeneration of putative transformants

Biosafety Nursery

- Maintain of putative transgenic oil palm plantlets
- Leave sampling for molecular and protein analyses

Biosafety Screenhouse

- On soil growth of transgenic oil palms
- Vegetative measurement (VM)
- Control pollination and bunch analysis
- Containment studies

MPOB:
Capital Development for Oil Palm LMO Biosafety Handling

- National Biosafety Board Approval for research activities
- Standard Operating Procedures for routine activities
- Emergency Response Plan for potential emergency events
- Biosafety refresher training (theory and practical)
- Regular inspections by IBC and JBK

KETUA PENGARAH
Jabatan Biokeselamatan
Aras 4, Blok P11, Kompleks F
Lebuh Perdana Timur, Presint 1
Pusat Pentadbiran Kerajaan Persekutuan
62000 PUTRAJAYA
MALAYSIA

Rujukan Kami : JBK (S) 000-3/1/87 (6)
Tarikh : 1 April 2022

Pengerusi
Jawatankuasa Keinstitusian Biokeselamatan (IBC)
Malaysian Palm Oil Board (MPOB)
No. 6, Persiaran Institusi, Bandar Baru Bangi
43000 Kajang
SELANGOR
(u.p. : **Encik Mohd Khairuldin bin Ibrahim**)

Tuan,

PENGAKUTERIMAAN PERMOHONAN PEMBERITAHUAN DI BAWAH SUBSEKSYEN 25(1) AKTA BIOKESELAMATAN 2007 [AKTA 678]

Saya dengan hormatnya merujuk kepada perkara di atas dan borang permohonan pemberitahuan daripada pihak tuan adalah dirujuk.

2. Dimaklumkan bahawa Jabatan Biokeselamatan telah menyemak dan mengakuterima permohonan pemberitahuan pihak tuan bagi penyelidikan bertajuk ***Development of CRISPR/Cas9 technology for genome editing of oil palm*** oleh YBrs. Dr. Abdul Masani Mat Yunus selaku penyelidik utama.

3. Pihak tuan dingatkan bahawa pengakuterimaan ini adalah **untuk tujuan aktiviti kegunaan terkawal sahaja** dan isnya tertakluk kepada apa-apa perintah yang dibuat oleh Lembaga Biokeselamatan Kebangsaan (LBK) di bawah subseksyen 30(3). Sebarang aktiviti pelepasan adalah **dilarang** dan perlu mendapat kelulusan Lembaga Biokeselamatan Kebangsaan terlebih dahulu selaras subseksyen 12(1) Akta Biokeselamatan 2007.

4. Untuk perhatian semasa penilaian dilakukan ke atas permohonan ini Jabatan boleh menghendaki supaya pihak tuan memberikan maklumat tambahan selaras dengan subseksyen 27(1) dan 29(2) Akta Biokeselamatan 2007. Kegagalan berbuat demikian akan mengakibatkan pengakuan penerimaan yang dikeluarkan ditarik balik. Pengakuterimaan ini tidak sama sekali mengecualikan pihak tuan daripada mematuhi undang-undang bertulis lain yang mengawal selia organisma hidup yang diubah suai dan pengimportannya.

5. Perhatian dan kerjasama pihak tuan berhubung perkara ini amatlah dihargai dan didahului dengan ucapan terima kasih.

Sekian.

"WAWASAN KEMAKMURAN BERSAMA 2030"

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan amanah,

(DR. AZAHA BINTI MOHAMED)

KETUA PENGARAH
Jabatan Biokeselamatan
Kementerian Sumber Asli dan Alam Sekitar
Aras 1, Podium 2, Wisma Sumber Asli
No. 25, Persiaran Perdana
Pusat Pentadbiran Kerajaan Persekutuan
62574 PUTRAJAYA
MALAYSIA

Rujukan Kami : JBK(S) 602-1/2/41(14)
Tarikh : 12 Feb 2014

Ketua
Unit Bioteknologi Fungsional,
Lembaga Minyak Sawit Malaysia (MPOB),
No. 6, Persiaran Institusi,
Bandar Baru Bangi,
43000 Kajang, Selangor
(u.p. : **Dr. Ahmad Parveez Ghulam Kadir**)

Tuan,

PEMBERITAHUAN BAGI PROJEK PENYELIDIKAN BERTAJUK *PRODUCTION OF HIGH OLEIC TRANSGENIC OIL PALM*

Saya dengan segala hormatnya merujuk kepada perkara tersebut di atas.

2. Sukacita dimaklumkan bahawa Lembaga Biokeselamatan Kebangsaan yang bermesyuarat pada **11 Februari 2014** telah meluluskan aktiviti kegunaan terkawal *Production of High Oleic Transgenic Oil Palm* dengan syarat seperti di **LAMPIRAN A**. Kelulusan ini adalah selaras dengan peruntukan subseksyen 30(3) Akta Biokeselamatan 2007.

3. Sehubungan itu, pihak tuan hendaklah mematuhi syarat yang dikenakan untuk aktiviti yang diluluskan di atas. Di samping itu, pihak tuan boleh pada bila-bila masa dikehendaki untuk membekalkan apa-apa maklumat, butiran atau dokumen selanjutnya sebagaimana yang difikirkan patut oleh Lembaga Biokeselamatan Kebangsaan.

Sekian, terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menurut perintah,

(LETCHUMANAN KAMATHA)
Ketua Pengarah Biokeselamatan
Jabatan Biokeselamatan

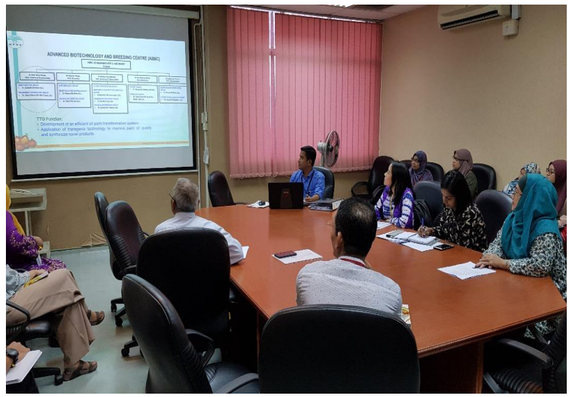
s.k. : Ketua
Unit Bioteknologi Fungsional,
Lembaga Minyak Sawit Malaysia (MPOB),
No. 6, Persiaran Institusi,
Bandar Baru Bangi,
43000 Kajang, Selangor
(u.p. : **Dr. Omar Abd Rasid**)

Biosafety laboratories and nursery inspection by IBC and JBK.



Transgenic Technology Laboratories and Nursery: Regular Inspections (Yearly) by MPOB IBC.


Pathology Laboratory: Inspection by MPOB IBC.





Transgenic Technology Laboratories: Inspection by Jabatan Biokeselamatan (JBK).

10 X 30 meters

100 X 120 meters

Biosafety screenhouse inspection by IBC and JBK.

PUBLIC AWARENESS, ENGAGEMENT AND ACCEPTANCE

This is to inform the public that the National Biosafety Board (NBB) is currently assessing an application for approval submitted by **Bayer Co. (Malaysia) Sdn. Bhd. (7563M)** to release genetically modified **KWS20-1 sugar beet (*Beta vulgaris* L. ssp. *vulgaris* var. *altissima*)** for the purpose of supply or offer to supply for sale/placing in the market with the Reference Number of NBB: **JBK(S) 600-2/1/37**.

NBB welcomes written submissions of opinions/comments from the public regarding the application. More information on the application can be obtained from **www.biosafety.gov.my** under **eParticipation>Public Consultation.** Please quote the NBB Reference number for all correspondence.

Submissions must be addressed to:
The Director General, Department of Biosafety, Level 4, Block F11, Complex F, Lebuh Perdana Timur, Precinct 1, Federal Government Administrative Centre, 62000 Putrajaya, MALAYSIA.
E-mail: dob@biosafety.gov.my / Fax: 03-80917371

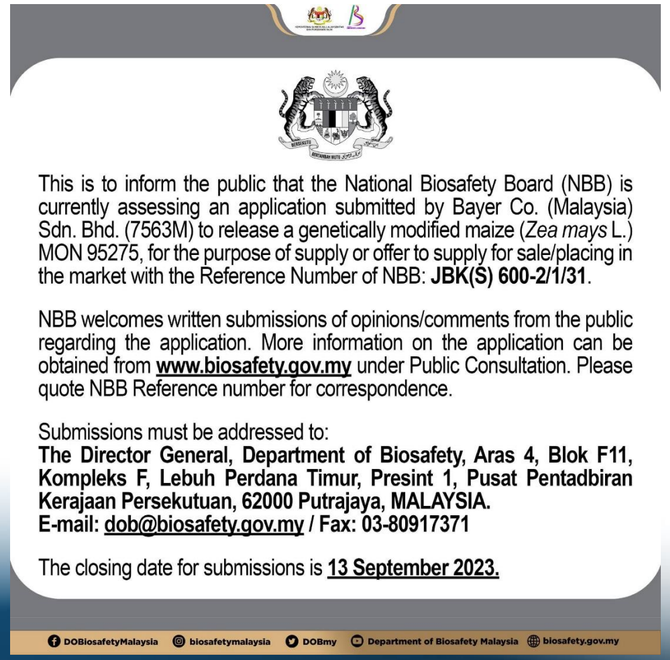
The closing date for submissions is **30 July 2025**.

Orang ramai adalah dimaklumkan bahawa Lembaga Biokeselamatan Kebangsaan (LBK) pada ketika ini sedang membuat penilaian ke atas permohonan untuk mendapatkan kelulusan yang dipohon oleh **Bayer Co. (Malaysia) Sdn. Bhd. (7563M)** untuk melepaskan **bit gula (*sugar beet*) (*Beta vulgaris* L. ssp. *vulgaris* var. *altissima*) KWS20-1** yang **diubahsuai secara genetik** bagi tujuan pembekalan atau tawaran untuk membekalkan/menjual di pasaran dengan Nombor Rujukan LBK: **JBK(S) 600-2/1/37**.

LBK mengalu-alukan pandangan/komen bertulis daripada orang ramai berhubung dengan permohonan tersebut. Maklumat lanjut tentang permohonan boleh didapati daripada **www.biosafety.gov.my** di bawah **ePenyertaan>Konsultasi Awam**. Sila nyatakan Nombor Rujukan LBK apabila berhubung dalam semua urusan surat-menyurat.

Segala pandangan/komen hendaklah dialamatkan ke:
Ketua Pengarah, Jabatan Biokeselamatan, Aras 4, Blok F11, Kompleks F, Lebuh Perdana Timur, Presint 1, Pusat Pentadbiran Kerajaan Persekutuan, 62000 Putrajaya, MALAYSIA.
E-mel: dob@biosafety.gov.my / Faks: 03-80917371

Tarikh tutup serahan adalah pada **30 Julai 2025**.



This is to inform the public that the National Biosafety Board (NBB) is currently assessing an application submitted by Bayer Co. (Malaysia) Sdn. Bhd. (7563M) to release a genetically modified maize (*Zea mays* L.) MON 95275, for the purpose of supply or offer to supply for sale/placing in the market with the Reference Number of NBB: **JBK(S) 600-2/1/31**.

NBB welcomes written submissions of opinions/comments from the public regarding the application. More information on the application can be obtained from **www.biosafety.gov.my** under Public Consultation. Please quote NBB Reference number for correspondence.

Submissions must be addressed to:
The Director General, Department of Biosafety, Aras 4, Blok F11, Kompleks F, Lebuh Perdana Timur, Presint 1, Pusat Pentadbiran Kerajaan Persekutuan, 62000 Putrajaya, MALAYSIA.
E-mail: dob@biosafety.gov.my / Fax: 03-80917371

The closing date for submissions is **13 September 2023.**

DOBiosafetyMalaysia biosafetymalaysia DOBmy Department of Biosafety Malaysia biosafety.gov.my

Awareness of GMO

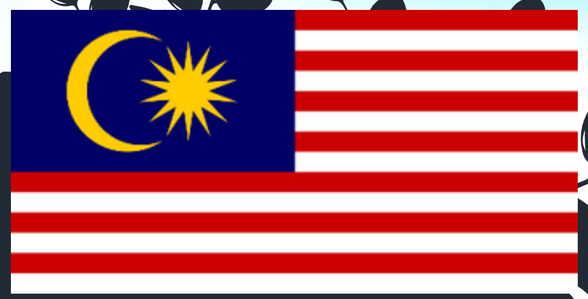
Relatively common among educated and stakeholder groups, especially in urban regions like Klang Valley.

Public engagement

Provide information, receive feedback on public perceptions and gain public trust through the transparency of the process.

Perceived benefits

Food security and innovation are acknowledged—but often tempered by concerns over **health safety**, **ethical or religious compatibility**, and **regulatory transparency**.



Way forward for Malaysia

01 Malaysia has established a robust regulatory framework and monitoring systems, reflects its commitment to food safety and biodiversity protection.

02 Continuous investment in scientific capability, public awareness, and policy clarity to strengthen preparedness for future GMO food safety and innovations.

03 Focus on genome edited food for better public acceptance.

04 Balance the scientific innovation with public concern and environmental protection.

THANK YOU

parveez@mpob.gov.my