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Current status and challenges of GMOs development and GMO detection methods in Vietnam

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Outline

- * National legislation and GMO Regulations**
- * GMOs approval**
- * Research on GMO crops/events**
- * GMF Testing Laboratories in Vietnam**
- * Challenges**

NATIONAL LEGISLATION

- *Law 55/2010 on Food Safety**
- *Law 32/2018 on Biodiversity**
- *Law 72/2020 on Environment Protection**
- *Ratification of The Cartagena Protocol on Biosafety and the Convention on Biological Diversity**

GMO REGULATION

- ***Decree 38/2012/NĐ-CP; Decree 15/2018/NĐ-CP details implementation of Food Safety Law***
- ***Decree 69/2010/NĐ-CP details implementation of biosafety of GMO and derived products***
- ***Decree 108/2020/NĐ-CP details additional implementation to Decree 69/2010.***

GMO REGULATION

Activities	Responsibilities: Ministry in Charge (in collaboration of MARD, MOST, MONRE, MOIT, MOH)
Research	Ministry of Science and Technology (MOST)
Environment Risk Assessment, Food and Feed Safety Assessment, Labeling	Ministry of Agriculture and Rural Development (MARD)
Approval for Environment Release, Management of GMO database, Sharing information	Ministry of Environment and Natural Resources (MONRE)
Production, commercialization, monitoring	Ministries in charge, Local Authorities

Approved GM events for food and feed

MAIZE:

- | | | |
|-----------------------|----------------------|---------------------|
| 1. MZIR098 | 8. DAS-5912-7 | 15. MON89034 |
| 2. MON87419 | 9. 5307 | 16. NK603 |
| 3. DP004141 | 10. MIR604 | 17. T25 |
| 4. MON87411 | 11. TC1507 | 18. MON810 |
| 5. DAS-40278-9 | 12. GA21 | 19. MON87427 |
| 6. SYHT0H2 | 13. BT11 | 20. MON87460 |
| 7. 7272 | 14. MIR162 | 21. MON88017 |

Approved GM events for food and feed

SOYBEAN:

1. DAS81419-2
2. MON87751
3. MON89788 (Monsanto)
4. FG72
5. DAS-68416-4
6. DAS-44406-4
7. CV127
8. DP305423-1
9. GTS40-3-2
10. MON87708
11. MON87705
12. MON87701
13. A2704-12
14. A5547-127
15. MON89788 (Dekalb)
16. MON87769

Approved GM events for food and feed

COTTON:

1. GHB119
2. MON88701
3. COT102
4. LL Cotton25
5. GHB614
6. T304-40
7. MON88913
8. MON15985

ALFALFA

1. KK179
2. J101
3. J163

SUGAR BEET

- H7-1

CANOLA

1. MS8
2. RF3
3. RT73
4. MON88302

Approved GM Varieties for Environmental release

MAIZE

1. NK66BT
2. NK66BT/GT
3. NK66GT
4. NK4300BT/GT
5. NK67BT/GT
6. NK7328BT/GT
7. C919S
8. C919R

MAIZE

9. DK8868S
10. CP501S
11. DK9955S
12. DK9955R
13. DK6818S
14. DK6818R
15. DS6919S
16. DS6919R

GM related research in Vietnam only in pipelines

- **Golden rice in Rice Research Institute in the South of VN**
- **Maize: Bt, EPSPS transform plants**
- **Soybean: Bt and drought tolerance**
- **Cotton: Bt and drought tolerance**
- **Papaya: PRSV resistance**
- **Forest trees: improve plant height and quality**

Genome editing related research in Vietnam only in pipeline

- Gene editing using CRISPR/Cas9 for research on:
 1. **Papaya** tolerant to Papaya Ringspot virus;
 2. **Rice** with high yield and fragrant, resistant to Bacterial Blight;
 3. **Soybean** multi-tolerant to biotic and abiotic stresses;
 4. **Tomato** have higher quality.
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GMF Testing Laboratories in Vietnam

No	Laboratories	Methods	Taxon	GM Event
1	<p>GMO Detection Department Agricultural Genetics Institute Ministry of Agricultural and Rural Development.</p> <p>In 2017 become National Reference Laboratory for GMO testing</p>	<p>GMO screening, Qualitative (PCR, RT PCR) and Quantitative (RT PCR)</p>	<p>Lec, Hmg, Adh, PLD,</p>	<p>Screening: CaMV35S, TNOS, ctp2-cp4-epsps, FMV, Cry1Ab/Ac, Bar, Pat, PNOS, nptII.</p> <p>15 Maize events: MON89034, NK603, Bt11, GA21, TC1507, MIR162, T25, MON87427, MON87460, MON88017, MON810, 5307, MIR604, MDAS40278-9 and DAS59122-7.</p> <p>11 Soya events: GTS 40-3-2, MON87701, MON87705, MON87708, MON89788, A5547-127 ; A2704-12, CV127, DAS44406-6 ; DAS68416-4 and MON87769</p> <p>1 Rice event: LLrice 62</p> <p>1 Papaya : PRSV</p>

GMF Testing Laboratories in Vietnam

No	Laboratories	Methods	Taxon	GM Event
2	Microbiology and GMO Testing Laboratory Quality Assurance and Testing Centre 3 (QUATEST 3) – in Hochiminh city Directorate for Standard, Metrology and Quality (STAMEQ) Ministry of Science and Technology	GMO screening, Qualitative (PCR, RT PCR)	Lec, hmg	GTS 4032, Mon810 Maize, Bt11 Maize, Mon863 Maize, GA21 Maize, NK603 Maize, MON 89788 Soybean, Cry1A(c) Rice
3	Microbiology and GMO Testing Laboratory Quality Assurance and Testing Centre 2 (QUATEST 2) – in Danang city	GMO screening, Qualitative (PCR)	Lec, hmg	CaMV35S, TNOS
4	Microbiology and GMO Testing Laboratory Quality Assurance and Testing Centre1 (QUATEST 1) – in Hanoi city	GMO screening, Qualitative (PCR)	Lec, hmg	CaMV35S, TNOS, GTS4032,

GMF Testing Laboratories in Vietnam

No	Laboratories	Methods	Taxon	GM Event
5	Microbiology and GMO Testing Laboratory Ministry of Health	GMO screening, Qualitative (PCR, RT PCR)	Lec, hmg	GTS 4032, Mon810 Maize, Bt11, CaMV35S, TNOS
6-15	GMO Testing Laboratory NGOs and private laboratories.	GMO screening, Qualitative (PCR)	Lec, hmg	CaMV35S, TNOS

CHALLENGES:

- How to detect the combined trait (stack) GM in food samples?
- What is the difference in detection methods between a product of mixture from some GM events and a product from stack GM event?
- Unauthorized GMOs present in the food samples?
- How to evaluating and detect the innovative genome editing products?
- Regulation for genome editing plant/animal/microorganism?

THANK YOU FOR YOUR ATTENTION!

