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Discussion Paper GMO 01/2025

Genetically Modified Organisms (Control of Release) Expert Group

Report on the Survey of Genetically Modified Organisms in Hong Kong

Purpose

This paper briefs Members about the findings of the survey for genetically modified organisms (GMOs) from local markets and farms during 2022-2023 and 2023-24.

Background

2. The Agriculture, Fisheries and Conservation Department (AFCD) conducts regular surveys on GMOs in Hong Kong, covering various crops and other living organisms available in local markets and farms, which could possibly be genetically modified. Samples are collected according to the GMO survey plan, which is updated annually based on the latest available information on GMOs being commercialised or under trial production in the field overseas. The surveys enable the Government to closely monitor the status of GMOs in Hong Kong and to complement the enforcement measure under the Genetically Modified Organisms (Control of Release) Ordinance, Cap. 607 (the Ordinance).

3. Surveys in the past years have found that a substantial proportion of papaya fruits sold as food in markets and locally grown papaya plants are genetically modified. Furthermore, a small amount of agricultural products intended to be used as food or feed, or for processing or contained use purposes, including soybean, watermelon, radish, wheat, animal feed, and carnation, was found to be genetically modified[1]. In addition, genetically modified zebra fish (*Danio rerio*), Japanese rice fish (*Oryzias latipes*) and tetra fish (*Tetragonopterus* spp.) were found in aquarium fish markets.

4. In 2022-23 and 2023-24, we collected and tested 800 samples in total, covering a variety of fruits, vegetables, grains, ornamental flowers and aquarium fish.

[1] Please refer to the following website for the results of GMO surveys from 2008 to 2023: http://www.afcd.gov.hk/english/conservation/con_gmo/gmo_edu/gmo_edu_survey.html

Among these, we have tested 274 locally grown papaya samples with a view to identifying the prevalence of genetically modified papaya in Hong Kong. Papayas tested positive in genetic modifications were further tested to identify their varieties. As part of the survey, we have also included 24 aquarium fish samples obtained from the markets which were claimed or suspected to be fluorescent. Meanwhile, 16 wild-caught native rice fish (*Oryzias curvinotus*) were sampled to check if they carried markers of genetic modification.

Results

5. Result summaries of GMO surveys for 2022-23 and 2023-2024 are at **Appendices 1 and 2** respectively. Among the 800 samples collected, 174 samples from locally grown papaya plants, 37 samples from papaya fruits from markets and 7 samples of aquarium fish were found to be genetically modified. Apart from papaya, no other products intended for food, feed or for processing were found to contain GMO.

6. Results indicated genetic modification was found in 64% (174 out of 274) of locally grown papaya plants sampled, and 54% (37 out of 69) of the papaya fruits sampled from markets. The percentage of locally grown genetically modified papaya plants is comparable to that of the last two years, i.e. 66%, whereas the percentage of genetically modified papaya fruits from markets is higher than that in the last two years, i.e. 38%.

7. **Appendix 3** shows the identities of the locally grown genetically modified papaya plant samples and genetically modified papaya fruit samples from markets. All of the 174 locally grown genetically modified papaya plant samples in 2022-24 belong to lines that are engineered to be resistant to papaya ringspot virus (PRSV). Among these, 146 samples were found to belong to the TW-lines[2] (84%), 22 samples were Huanong-1[3] (13%), 5 samples were hybrids of TW-line s and Huanong-1 (3%), and 1 sample was hybrids of TW-lines and 55-1 (0.6%).

8. As for the 37 genetically modified papaya fruits from markets sampled in 2022-2024, 31 samples were of the TW-lines (84%), 1 sample was Huanong-1 (3%) and 5 samples were ("CUH-CP551-8" or commonly called "Hawaiian Papaya"[4]) (14%).

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[2] The TW-lines include two GM varieties, i.e. the transformation events 16-0-1 (U.S. Patent No. US-8258282-B2 by Yeh et al.) and 18-2-4 (U.S. Patent No.: US-8232381-B2 by Yeh et al.). These two GM varieties are resulted from the same vector plasmid and carry very similar transgene insert, but they differ in their insertion position and the sequence of the transgene insert margins.

[3] Guo, J., Yang, L., Liu, X., Guan, X., Jiang, L. and Zhang, D. (2009). Characterization of the Exogenous Insert and Development of Event-specific PCR Detection Methods for Genetically Modified Huanong No. 1 Papaya. *Journal of Agricultural and Food Chemistry, 57*(16), 7205-7212. https://doi.org/10.1021/jf901198x

[4] United Sates Department of Agriculture. (1996). *USDA/APHIS Petition 96-051-01P for the Determination of Nonregulated Status for Transgenic 'Sunset' Papaya Lines 55-1 and 63-1:*

9. As for products for contained use purposes, among the 24 aquarium fish samples collected from the markets in 2022-24, 7 fish samples were tested positive in genetic modification, including 6 zebra fish samples and 1 tetra fish sample, with red and green fluorescent protein gene tested. Like in previous years, none of the native rice fish caught in the wild was found to be genetically modified.

Genetically modified papaya* and *GMOs-FFP

10. The Genetically Modified Organisms (Control of Release) (Exemption) Notice (Cap. 607B) (the Notice) exempts all varieties of genetically modified papaya from the application of Section 5 of the Ordinance, which provides that a person must not knowingly cause a GMO to be released into the environment or maintain the life of a GMO that is in a state of being released into the environment. Therefore, it is not an offence under the Ordinance that a person grows or maintains in the field the genetically modified papaya found in the present surveys.

11. The Notice also exempts genetically modified papaya of lines 55-1 and Huanong-1 from the application of the Section 7 of the Ordinance, which provides that a person must not knowingly import a GMO that is intended for release into the environment. Therefore, import of seeds of papaya of lines 55-1 and Huanong-1 were exempted; whereas no genetically modified papaya seed sampled in the surveys was tested positive.

12. For GMOs intended for direct consumption as food, feed, or for processing (GMOs-FFP), including the genetically modified papaya being sold as food in markets found in the present surveys, the Ordinance does not require prior approval for their import or use. However, when shipments of GMOs-FFP are being imported, they have to be accompanied with prescribed documents to enable easy identification of the GMOs and to provide contact points for reference.

13. To enhance awareness of the agricultural sector on GMOs and the Ordinance, when collecting crop samples at local farms, we had distributed relevant promotional pamphlets on the Ordinance to farmers; circular letters together with QR codes linked to relevant promotional materials were also distributed to more than 40 local traders of agricultural products and seeds in 2024.

14. We had also issued letters to retailers selling GMOs-FFP, to remind them of the relevant import documentation requirements under Cap. 607; circular letters were distributed to more than 370 local traders on food or feed, or on its processing in 2024. In addition, to further explain the relationship between GMOs and biodiversity conservation as well as to introduce the Ordinance to the general public, social media

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Environmental Assessment and Finding of No Significant Impact. http://www.aphis.usda.gov/brs/aphisdocs2/96_05101p_com.pdf

posts titled 'Knowing GMO' (GMO知多啲)[5,6] were launched in Mr. B Nature Classroom Facebook and Instagram pages in 2024 and 2025.

Genetically modified flower

15. Genetically modified flower usually exists in the form of cut flower intended for contained use, so prior approval for its import and use is not required. Circular letters were distributed to 300 local horticulture-related traders in 2024 to enhance their awareness on GMOs and the Ordinance.

Genetically modified aquarium fish

16. Genetically modified fluorescent fish being kept in contained or enclosed settings, such as those kept within laboratories for research purposes or aquarium display, also do not require prior approval for their import and use. Nevertheless, it is an offence under the Ordinance to knowingly release the genetically modified fluorescent fish into the environment, such as streams and ponds. AFCD regularly inspects aquarium fish shops selling genetically modified fluorescent fish to see if appropriate measures are taken to prevent the fish from escaping to the environment. In regular monitoring in freshwater habitats, genetically modified tetra fish and zebra fish have not been found so far during regular monitoring surveys in freshwater habitats in Hong Kong.

17. Aquarium fish retailers identified during market surveys to be selling genetically modified fluorescent fish were also issued letters, to remind them about the controls of the Ordinance and the relevant import documentation requirements, and that measures should be taken to confine their genetically modified fish in contained use. Circular letters were distributed to more than 130 aquarium fish traders and over 40 research institutes and laboratories in 2024, to raise awareness on GMOs and the Ordinance. Promotional pamphlets on the controls of the Ordinance and genetically modified aquarium fish were also distributed in country park visitor centres and the Hong Kong Wetland Park, to remind the public not to release aquarium fish to the environment.

Advice Sought

18. Members are invited to note the survey results and provide views and

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[5] Mr. B Nature Classroom. (2024, December 3). *#GMO 知多啲【大自然的拼圖：基因多樣性】* [Image attached in Appendix 4] [Facebook post]. Facebook. https://www.facebook.com/hkbf.hk/posts/pfbid0UFhENP1XB6jEzybCxwRvdmzunv4ATP8GCzdDs77YXBFgRQDPx1FUZvj1ccffRUJ7l

[6] Mr. B Nature Classroom. (2025, April 25). *#GMO 知多啲【什麼是基因改造生物？】* [Image attached in Appendix 4] [Facebook post]. Facebook. https://www.facebook.com/hkbf.hk/posts/pfbid0jQy9hZ4ShCT79bPLt2bm6is1WJC2xBBADsvm12UtVnC1VxEX2aQ6e3jmUqD1YtX1l

comments.

Agriculture, Fisheries and Conservation Department
May 2025

Appendix 1

Summary of GMO Test Results in 2022/23

	Number of tested samples	Surveyed species	Number of positive samples	Species of samples with positive result
Fruits from markets	46	Apple, *Cucumis* spp., Grape, Papaya, Pineapple, *Prunus* spp., Watermelon	23	Papaya
Vegetables from markets	38	Beetroot, *Capsicum* spp., Eggplant, Gourd, Maize, Potato, Radish, Soybean, Tomato	0	
Animal feeds	6	Animal Feed (Mixed Seeds), Maize, Sunflower	0	
Other foods from markets	12	Flaxseed, Peanut, Soybean	0	
Seeds	52	Alfalfa, Beetroot, *Brassica* spp., *Capsicum* spp., *Cucumis* spp., Eggplant, Gourd, Maize, Papaya, Petunia, Radish, Sunflower, Tomato, Watermelon, Wheat	0	
Locally grown crops	219	Beetroot, *Brassica* spp., *Capsicum* spp., Cassava, Cotton, *Cucumis* spp., Eggplant, Gourd, Maize, Papaya, Peanut, Pineapple, Potato, Radish, Rice, Soybean, Sugarcane, Tomato	83	Papaya
Ornamental flowers	4	Carnation, Rose	0	
Aquarium fish	19	Rice Fish (wild), Rice Fish (from shops), Tetra Fish, Zebra Fish	3	Zebra Fish
Total	396		109	Papaya, Zebra Fish

Appendix 2

Summary of GMO Test Results in 2023/24

	Number of tested samples	Surveyed species	Number of positive samples	Species of samples with positive result
Fruits from markets	51	Apple, *Cucumis* spp., Grape, Papaya, Pineapple, *Prunus* spp., Watermelon	14	Papaya
Vegetables from markets	41	Beetroot, *Capsicum* spp., Eggplant, Gourd, Maize, Potato, Radish, Soybean, Sugarcane, Tomato	0	
Animal feeds	7	Animal Feed (Mixed Seeds), Maize, Sunflower, Wheat	0	
Other foods from markets	15	Flaxseed, Peanut, Soybean	0	
Seeds	54	Alfalfa, Beetroot, *Brassica* spp., *Capsicum* spp., *Cucumis* spp., Eggplant, Gourd, Maize, Papaya, Petunia, Radish, Sunflower, Tomato, Watermelon, Wheat	0	
Locally grown crops	209	Beetroot, *Brassica* spp., *Capsicum* spp., Cassava, *Cucumis* spp., Eggplant, Gourd, Maize, Papaya, Peanut, Pineapple, Potato, Radish, Rice, Sugarcane, Tomato, Watermelon	91	Papaya
Ornamental flowers	6	Carnation, Petunia, Rose	0	
Aquarium fish	21	Rice Fish (wild), Rice Fish (from shops), Tetra Fish, Zebra Fish	4	Tetra Fish, Zebra Fish
Total	404		109	Papaya, Tetra Fish, Zebra Fish

Appendix 3

Test Results for Papaya Sampled in 2022/23 and 2023/24

A) Locally Grown Papaya Plants

Year		2022-23	2023-24	Total
Samples collected		139	135	274
GM positive		83	91	174
Strains	TW-lines	70	76	146
	Huanong-1	11	11	22
	TW-lines x Huanong-1	2	3	5
	TW-lines x 55-1	0	1	1

B) Papaya Fruits from Markets

Year		2022-23	2023-24	Total
Samples collected		33	36	69
GM positive		23	14	37
Strains	TW-lines	19	12	31
	Huanong-1	1	0	1
	55-1	3	2	5

Appendix 4

Social Media Posts titled 'Knowing GMO' (GMO 知多啲)

A) Facebook Post by Mr. B Nature Classroom on 3 December 2024

B) **Facebook Post by Mr. B Nature Classroom on 25 April 2025**