

**Genetically Modified Organisms
(Control of Release) Ordinance Cap. 607**

Expert Group

**Report on the Survey of
Genetically Modified Organisms in Hong Kong**

Purpose

This paper reports to Members on the findings of the survey conducted on genetically modified organisms (GMOs) in local markets and farms during 2016-17 and 2017-18.

Background

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

3. Surveys in the last few years have found that a substantial proportion of papaya fruits sold as food in the market and locally grown papaya plants are genetically modified. Furthermore, a small amount of agricultural products which were intended to be used as food, feed or for processing, or for contained purposes, including soybean, watermelon, radish, wheat, animal feed, and carnation, were found to be genetically modified¹. In addition, genetically modified (GM) zebra fish

¹ Please refer to the following website for the results of GMO surveys from 2008 to 2017:
http://www.afcd.gov.hk/english/conservation/con_gmo/gmo_edu/gmo_edu_survey.html

(*Danio rerio*) and rice fish (*Oryzias latipes*) were found in aquarium fish markets.

4. In 2016-17 and 2017-18, we collected and tested 521 and 992 samples, respectively, covering a variety of fruits, vegetables, grains, ornamental flowers and aquarium fish. Among these, we have included 705 locally grown papaya samples for testing in these two years in order to find out the extent of planting of GM papaya in Hong Kong. Papayas tested positive for genetic modifications were further tested to identify their varieties. Among the survey conducted in these two years, we have also included 42 aquarium fish samples from the market which were claimed or suspected to be fluorescent. Meanwhile, 40 wild-caught native rice fish (*Oryzias curvinotus*) were sampled to check if they carry the GM markers.

Results

5. Summaries of the GMO test results for 2016-17 and 2017-18 are at **Annexes 1 and 2**. Among the 1,513 samples collected, GMOs were found among the locally grown papaya plants (388 samples), papaya fruits from markets (88 samples), other food products from markets (2 samples), animal feeds (4 samples), seeds (1 sample), ornamental flowers and aquarium fish (26 samples).

6. During the two-year surveys, GM papaya made up 55% (388 out of 705) of the locally grown papaya plants sampled and 81% (88 out of 108) of the papaya fruits sampled from markets. The percentage of locally grown GM papaya is similar to its range observed in the last three years from 2013 to 2016, i.e. 49-64%, whereas that of GM papaya fruits from the markets has been slightly higher than the last three years i.e. 48-68%.

7. **Annex 3** shows the identities of the locally grown GM papaya samples and GM papaya fruit samples from markets. All of the 388 locally grown GM papaya samples in 2016-17 and 2017-18 belong to GM strains that are engineered to be resistant to the *papaya ringspot virus* (PRSV). Among these, 349 samples were found to belong to the TW-lines² (90%), 31 samples were Huanong-1³ (8%) and

² The TW-lines include two GM varieties, i.e. the transformation events 16-0-1 (U.S. Patent No. US8258282-B2 by Yeh S.-D. et al.) and 18-2-4 (U.S. Patent No.: US8232381-B2 by Yeh S.-D. 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. *J Agric Food Chem.* 57:7205-7212.

eight samples were 55-1 (“CUH-CP551-8” or commonly called “Hawaiian Papaya”⁴) (2%).

8. As for the 88 GM papaya fruits from the markets sampled in 2016-17 and 2017-18, 54 samples were of the TW-lines (61%), 32 samples were 55-1 (36%) and two samples were Huanong-1 (2%).

9. In addition, one papaya seed sample collected at a seed shop in 2017-2018 was found to be GM positive and belonging to the TW-lines.

10. Apart from papaya, other products intended for food, feed or for processing including two soybean samples and four animal feed samples were found to be GMO in 2017-2018.

11. As for products for contained purposes, one carnation sample was tested as GM positive in 2017-2018. On the other hand, among the 42 aquarium fish samples collected from the market, 25 fish samples were found to be GM positive, including 21 zebra fish samples with red fluorescent protein gene and four rice fish samples with green fluorescent protein gene. As in previous years, none of the native rice fish caught in the wild was found to be genetically modified.

Control measures and follow up actions

GM papaya and GMOs-FFP

12. The Genetically Modified Organisms (Control of Release) (Exemption) Notice, Cap. 607B (the Notice), exempts all varieties of GM 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 GM papaya found in the present surveys.

13. Yet, the Notice only exempts GM papaya of 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. The

⁴ USDA/APHIS. 1996. USDA/APHIS petition 96-051-01P for the determination of nonregulated status for transgenic sunset' papaya lines 55-1 and 63-1: environmental assessment and finding of no significant impact. http://www.aphis.usda.gov/brs/aphisdocs2/96_05101p_com.pdf

seed shop selling GM papaya seed of TW-lines was reminded about the Ordinance. The seed shopkeeper did not realise that the imported papaya seeds were GM and destroyed all the remaining stock immediately. A follow-up inspection was conducted afterwards to confirm that the product was no longer sold.

14. For GMOs intended for direct consumption as food, feed, or for processing (GMOs-FFP), including the GM papaya, GM soybean and GM animal feed 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 the contact points for further information.

15. When collecting crop samples at local farms, we had distributed relevant promotional pamphlets on the Ordinance to farmers to raise awareness on GMO and the Ordinance. Retailers found to sell GMOs-FFP were issued letters accordingly to remind them of the relevant import/export documentation requirements. In addition, letters together with relevant promotional pamphlets were distributed to 600 local FFP traders in December 2017, to enhance awareness on GMO and the Ordinance.

GM flower

16. GM carnation usually exists in the form of cut flower intended for contained use, so prior approval for its import and use is not required. The flower shop selling GM carnation was reminded about the Ordinance and recommended to display a label indicating that the plant was genetically modified. Meanwhile, letters together with relevant promotional pamphlets were distributed to 500 local horticulture-related traders in June 2017 to enhance awareness on GMO and the Ordinance.

GM aquarium fish

17. GM fluorescent fish being kept in contained setting for research purposes or aquarium display also does not require prior approval for their import and use. Nevertheless, it is an offence under the Ordinance to knowingly release the GM fluorescent fish into the environment, such as streams. AFCD regularly inspects aquarium fish shops selling GM fluorescent fish to see if appropriate measures are taken to prevent the fish from escaping to the environment. Under regular monitoring on freshwater habitats, GM rice fish and GM zebra fish have not been found in the countryside of Hong Kong.

18. Aquarium fish retailers found to sell GM fluorescent fish during market survey were also issued letters to remind them about the controls of the Ordinance and the relevant import/export documentation requirements. They were reminded to take measures to confine their GM fish in contained use and to advise their customers of doing so to prevent the environmental release of these GMOs. In addition, letters together with relevant promotional pamphlets were distributed to 180 aquarium fish traders in December 2017, to raise awareness on GMO and the Ordinance. Moreover, promotional pamphlets on the controls of the Ordinance and GM aquarium fish were also distributed in country park visitor centres and the Hong Kong Wetland Park, to remind the public not to release GM aquarium fish to the environment.

Advice Sought

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

Agriculture, Fisheries and Conservation Department
April 2018

Summary of GMO Test Results 2016/17

	Number of tested samples	Surveyed species	Number of positive samples	Species of samples with positive result
Fruits from markets	79	Apple, <i>Cucumis</i> spp., Kiwifruit, Papaya, <i>Prunus</i> spp., Watermelon	58	Papaya
Vegetables from markets	59	Beetroot, <i>Capsicum</i> spp., Eggplant, Gourd, Maize, Potato, Soybean, Sugar cane, Tomato	0	
Animal feeds	10	Animal Feed (Mixed Seeds), Maize, Sunflower	0	
Other foods from markets	23	Flaxseed, Peanut, Soybean, Wheat	0	
Seeds	58	Alfalfa, Beetroot, <i>Brassica</i> spp., <i>Capsicum</i> spp., <i>Cucumis</i> spp., Eggplant, Gourd, Maize, Papaya, Rice, Sunflower, Watermelon	0	
Locally grown crops	237	Beetroot, <i>Brassica</i> spp., <i>Capsicum</i> spp., Cassava, Eggplant, Gourd, Maize, Papaya, Pineapple, Radish, Rice, Soybean, Sugar cane, Tomato, Watermelon	86	Papaya
Ornamental flowers and aquarium fish	55	Carnation, Rose, Fish collected from the wild, Rice Fish, Zebra Fish	17	Rice Fish, Zebra Fish
Total	521		161	Papaya, Rice Fish, Zebra Fish

Summary of GMO Test Results 2017/18

	Number of tested samples	Surveyed species	Number of positive samples	Species of samples with positive result
Fruits from markets	64	Apple, <i>Cucumis</i> spp., Grape, Papaya, Pineapple, <i>Prunus</i> spp., Watermelon	30	Papaya
Vegetables from markets	61	Beetroot, <i>Capsicum</i> spp., Eggplant, Gourd, Maize, Potato, Radish, Soybean, Sugar cane, Tomato	0	
Animal feeds	12	Animal Feed (Mixed Seeds), Maize, Sunflower	4	Animal Feed (Mixed Seeds)
Other foods from markets	24	Flaxseed, Peanut, Soybean, Wheat	2	Soybean
Seeds	82	Alfalfa, Beetroot, <i>Brassica</i> spp., <i>Capsicum</i> spp., <i>Cucumis</i> spp., Eggplant, Gourd, Maize, Papaya, Radish, Rice, Sunflower, Tomato, Watermelon, Wheat	1	Papaya
Locally grown crops	716	Beetroot, <i>Brassica</i> spp., <i>Capsicum</i> spp., Cassava, <i>Cucumis</i> spp., Eggplant, Gourd, Maize, Papaya, Peanut, Pineapple, Radish, Rice, Soybean, Sugar cane, Tomato, Watermelon	302	Papaya
Ornamental flowers and aquarium fish	33	Carnation, Rose, <i>Cheirodon</i> spp., Fish collected from the wild, Rice Fish, Zebra Fish	9	Carnation, Rice Fish, Zebra Fish
Total	992		348	Animal Feed (Mixed Seeds), Carnation, Papaya, Rice Fish, Soybean, Zebra Fish

Test results for papaya sampled in 2016/17 and 2017/18**A) Locally grown papaya plants**

Year		2016-17	2017-18	Total
Samples collected		135	570	705
GM positive		86	302	388
Strains	TW-lines	68	281	349
	Huanong-1	13	18	31
	55-1	5	3	8

B) Papaya fruits from markets

Year		2016-17	2017-18	Total
Samples collected		65	43	108
GM positive		58	30	88
Strains	TW-lines	34	20	54
	Huanong-1	1	1	2
	55-1	23	9	32