

**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 2018-19 and 2019-20.

**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 past 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 modified<sup>1</sup>. In addition, genetically modified (GM) zebra fish (*Danio rerio*) and rice fish (*Oryzias latipes*) were found in aquarium fish markets.

4. In 2018-19 and 2019-20, we collected and tested 700 samples each year, covering a variety of fruits, vegetables, grains, ornamental flowers and aquarium fish. Among these, we have tested 504 locally grown papaya samples 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. As part of the survey we have also included 33 aquarium fish samples from the market which were claimed or

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<sup>1</sup> Please refer to the following website for the results of GMO surveys from 2008 to 2020:  
[http://www.afcd.gov.hk/english/conservation/con\\_gmo/gmo\\_edu/gmo\\_edu\\_survey.html](http://www.afcd.gov.hk/english/conservation/con_gmo/gmo_edu/gmo_edu_survey.html)

suspected to be fluorescent. Meanwhile, 24 wild-caught native rice fish (*Oryzias curvinotus*) were sampled to check if they carried the GM markers.

## Results

5. Summaries of the GMO test results for 2018-19 and 2019-20 are at **Annexes 1 and 2** respectively. Among the 1,400 samples collected, GMOs were found among locally grown papaya plants (360 samples), papaya fruits from markets (74 samples), seeds (2 samples) and aquarium fish (15 samples).

6. During the two-year survey, GM papaya made up 71% (360 out of 504) of the locally grown papaya plants sampled and 63% (74 out of 117) of the papaya fruits sampled from markets. The percentage of locally grown GM papaya is higher than that observed in the last three years from 2015 to 2018, i.e. 53-64%, whereas that of GM papaya fruits from the markets is slightly lower than that in the last three years i.e. 68-89%.

7. **Annex 3** shows the identities of the locally grown GM papaya samples and GM papaya fruit samples from markets. All of the 360 locally grown GM papaya samples in 2018-20 belong to GM strains that are engineered to be resistant to the *papaya ringspot virus* (PRSV). Among these, 307 samples were found to belong to the TW-lines<sup>2</sup> (85%), 40 samples were Huanong-1<sup>3</sup> (11%), 13 samples were hybrids of TW-lines and Huanong-1 (4%), and none of the samples was 55-1 (“CUH-CP551-8” or commonly called “Hawaiian Papaya”<sup>4</sup>).

8. As for the 74 GM papaya fruits from the markets sampled in 2018-19 and 2019-20, 44 samples were of the TW-lines (59%), 19 samples were 55-1 (26%) and 11 samples were Huanong-1 (15%).

9. In addition, two papaya seed samples collected at seed shops in 2018-19 were found to be GM positive and identified as Huanong-1.

10. Apart from papaya, no other products intended for food, feed or for processing were found to be GMO.

11. As for products for contained purposes, among the 33 aquarium fish samples collected from the market in 2018-20, 15 fish samples were found to be GM positive, including 14 zebra fish samples and one rice fish sample, with red fluorescent protein gene tested. Like in previous years, none of the native rice fish caught in the wild was found to be genetically modified.

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<sup>2</sup> 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.

<sup>3</sup> 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.

<sup>4</sup> 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](http://www.aphis.usda.gov/brs/aphisdocs2/96_05101p_com.pdf)

## **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. 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. Therefore, import of the two papaya seed samples of Huanong-1 were exempted in this case.

14. For GMOs intended for direct consumption as food, feed, or for processing (GMOs-FFP), including the GM 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 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. Promotional posters regarding importance of seed source and the Ordinance were distributed to AFCD's Organic Farm Section and Leisure and Cultural Services Department's Green Campaign Section to engage organic farmers and community farmers. In addition, letters together with relevant promotional pamphlets were distributed to 540 local traders on food or feed, or on its processing in July 2019, to enhance awareness on GMO and the Ordinance.

### ***GM flower***

16. GM flower usually exists in the form of cut flower intended for contained use, so prior approval for its import and use is not required. Letters together with relevant promotional pamphlets were distributed to 400 local horticulture-related traders in July 2019 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, and that measures should be taken to confine their GM fish in contained use. As advised by the GMO Expert Group, a notice card was also sent to these retailers to remind their customers to prevent the environmental release of these GMOs. On the other hand, letters together with relevant promotional pamphlets were distributed to 210 aquarium fish traders in July 2019, to raise awareness on GMO and the Ordinance. 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**  
**August 2020**

**Summary of GMO Test Results 2018/19**

	Number of tested samples	Surveyed species	Number of positive samples	Species of samples with positive result
<b>Fruits from markets</b>	76	Apple, <i>Cucumis</i> spp., Kiwifruit, Papaya, <i>Prunus</i> spp., Watermelon	34	Papaya
<b>Vegetables from markets</b>	66	Beetroot, <i>Capsicum</i> spp., Eggplant, Gourd, Maize, Potato, Soybean, Sugar cane, Tomato	0	
<b>Animal feeds</b>	12	Animal Feed (Mixed Seeds), Maize, Sunflower	0	
<b>Other foods from markets</b>	24	Flaxseed, Peanut, Soybean, Wheat	0	
<b>Seeds</b>	96	Alfalfa, Beetroot, <i>Brassica</i> spp., <i>Capsicum</i> spp., <i>Cucumis</i> spp., Eggplant, Gourd, Maize, Papaya, Rice, Sunflower, Watermelon	2	Papaya
<b>Locally grown crops</b>	391	Beetroot, <i>Brassica</i> spp., <i>Capsicum</i> spp., Cassava, Eggplant, Gourd, Maize, Papaya, Pineapple, Radish, Rice, Soybean, Sugar cane, Tomato, Watermelon	177	Papaya
<b>Ornamental flowers and aquarium fish</b>	35	Carnation, Rose, Fish collected from the wild, Zebra Fish	11	Zebra Fish
<b>Total</b>	700		224	Papaya, Zebra Fish

**Summary of GMO Test Results 2019/20**

	Number of tested samples	Surveyed species	Number of positive samples	Species of samples with positive result
<b>Fruits from markets</b>	78	Apple, <i>Cucumis</i> spp., Grape, Papaya, Pineapple, <i>Prunus</i> spp., Watermelon	40	Papaya
<b>Vegetables from markets</b>	65	Beetroot, <i>Capsicum</i> spp., Eggplant, Gourd, Maize, Potato, Radish, Soybean, Sugar cane, Tomato	0	
<b>Animal feeds</b>	11	Animal Feed (Mixed Seeds), Maize, Sunflower	0	
<b>Other foods from markets</b>	23	Flaxseed, Peanut, Soybean, Wheat	0	
<b>Seeds</b>	98	Alfalfa, Beetroot, <i>Brassica</i> spp., <i>Capsicum</i> spp., <i>Cucumis</i> spp., Eggplant, Gourd, Maize, Papaya, Radish, Rice, Sunflower, Tomato, Watermelon, Wheat	0	
<b>Locally grown crops</b>	387	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	183	Papaya
<b>Ornamental flowers and aquarium fish</b>	38	Carnation, Rose, <i>Cheirodon</i> spp., Fish collected from the wild, Rice Fish, Zebra Fish	4	Rice Fish, Zebra Fish
<b>Total</b>	700		227	Papaya, Rice Fish, Zebra Fish

**Test results for papaya sampled in 2018/19 and 2019/20****A) Locally grown papaya plants**

Year		2018-19	2019-20	Total
Samples collected		254	250	504
GM positive		177	183	360
Strains	TW-lines	160	147	307
	Huanong-1	14	26	40
	TW-lines x Huanong-1	3	10	13

**B) Papaya fruits from markets**

Year		2018-19	2019-20	Total
Samples collected		57	60	117
GM positive		34	40	74
Strains	TW-lines	23	21	44
	Huanong-1	1	10	11
	55-1	10	9	19