

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

Report on the Survey of GMOs 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 2013-14.

Background

2. The Agriculture, Fisheries and Conservation Department (AFCD) conducts regular surveys on GMOs in Hong Kong, covering various imported and locally grown crops available in local markets and farms as well as other sources. The surveys enable the Government to closely monitor the status of GMOs in Hong Kong and to serve as a complementary enforcement measure under the Ordinance.

3. Samples are collected according to the GMO survey plans, which are updated annually making reference to the list of GMOs commercialised or being under field trial overseas. The collected samples include crops of different sources and brands as well as other living organisms available from the markets and farms which may be GMOs. Surveys in the last few years have found that genetically modified (GM) papayas have been widely grown in the local environment. Besides, a small amount of agricultural products which were intended to be used as food, feed or for processing, including soybean, watermelon, radish, wheat and animal feed, were found to be genetically modified or contain GM ingredients. GM zebrafish and GM carnation were also found occasionally on sale in the markets.

4. In 2013-14, 976 samples were collected and tested, covering a variety of fruits, vegetables, grains, ornamental flowers and aquarium fish. In order to find out

the extent of planting of GM papaya in Hong Kong, we have further expanded our survey effort on locally grown papayas to include 503 papaya samples for testing in 2013-14. Papayas tested positive for genetic modifications were subject to further testing to identify their variety. The survey also included 20 fish samples which were claimed or seen to be fluorescent.

Results

5. A summary of the 2013-14 GMO test results is at Annex. Among the 503 samples of locally grown papayas, 245 (i.e. 49%) were found to be genetically modified. Among the locally grown papaya fruit samples from non-GM papaya trees, 22 samples were collected for testing. It was found that three of the samples carried seeds with GM materials (13.6%), suggesting limited extent of cross pollination of non-GM papayas with GM papaya plants. As for the imported papaya fruits, 20 samples out of a total of 42 (48%) were found to be genetically modified. Among the 75 seed samples purchased from local seed suppliers, two out of five papaya seed samples were found to be genetically modified.

6. With the exception of one locally grown papaya sample which had insufficient material for testing, further tests were carried out to identify the variety of the GM papaya samples. Out of the 244 locally grown GM papaya samples, 212 were found to belong to the TW-lines (two GM PRSV resistance varieties from Taiwan¹) (87%), 23 samples were Huanong-1 (9%), three samples were CUH-CP551-8 (“55-1” or more commonly called “Hawaiian Papaya”) (1%), and six were hybrids of the Taiwan PRSV resistance variety with the latter two varieties. As for the 20 imported GM papaya fruits, 12 were of the TW-lines (60%), five were 55-1 (25%) and three were Huanong-1 (15%). Among the GM papaya seed samples purchased from local seed suppliers, one belonged to the Taiwan PRSV resistance variety and another belonged to the 55-1 variety. We are also keeping track of the development of new GM varieties of papaya. So far, no new GM varieties have been commercialised. We will continue to keep an eye on the development of commercialised papaya and its availability in local markets.

7. Several fish species have been known to be modified with fluorescent genes by researchers primarily for laboratory uses², but some GM fluorescent fish were also

¹ United States Patent No.: US8232381-B2 by Yeh S.-D. et al. (Jul. 31, 2012) and United States Patent No.: US8258282-B2 by Yeh S.-D. et al. (Sep. 4, 2012). See also **Discussion Paper GMO 04/2015**.

² For examples:

produced commercially as aquarium fish, such as zebrafish (*Danio rerio*), tetra (*Gymnocorymbus ternetzi*), tiger barb (*Puntigrus tetrazona*)³, ricefish (*Oryzias latipes*)⁴, freshwater angelfish (*Pterophyllum spp.*)⁵, etc. In the aquarium fish market of Hong Kong, GM fluorescent fish were mostly zebrafish and ricefish was rarely seen, whereas other GM fluorescent fish species has not been encountered in our survey. The survey also found 13 zebrafish samples and one ricefish samples modified genetically with the insertion of a green or red fluorescent protein gene.

8. Under the Ordinance, the use of GM fluorescent fish for research purposes or in aquarium display may be considered as contained use and does not require prior approval for their import and use. On the other hand, it is an offence under the Ordinance to knowingly release the GM fluorescent fish into the environment like streams and rivers.

9. 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. Aquarium pet fish retailers that were found to sell GM fluorescent fish during our market survey have also been issued letters to remind them about the control of the Ordinance and the relevant import/export documentation requirements. They were also reminded to take measures to confine their GM fluorescent fish in contained use and to advise their customers of doing so to prevent the environmental release of these GMOs. In addition, in 2013-14 and 2014-15, we have distributed circular letters together with relevant promotional pamphlets to over 200 local shops participated in aquarium fish trade to remind them about the control of the Ordinance. Moreover, 5,900 copies of updated promotional pamphlets on control of the Ordinance and GM aquarium fish were also distributed to the public to educate them not to release GM aquarium fish. Besides, freshwater habitats are also closely monitored under AFCD's territory-wide biodiversity survey programme for presence of exotic fish, including the GM fluorescent fish. So far, no GM fish have been found in the local environment.

Gong, Z., Ju, B., and Wan, H. 2001. Green fluorescent protein (GFP) transgenic fish and their applications. *Genetica*. 111: 213-225.

Chen, H., Hu, J., Yang, J., Wang, Y., Xu, H., Jiang, Q., Gong, Y., Gu, Y., and Song, H. 2010. Generation of a fluorescent transgenic zebrafish for determination of environmental estrogen. *Aquat. Toxicol.* 96: 53-61.

³ GloFish®. By Yorktown Technologies (2014). Published online: <http://www.glofish.com/meet-glofish/glofish-gallery/>

⁴ 邵港科技 AZOO 水族網: 螢光魚 By 邵港科技股份有限公司 (2011). Published online: <http://www.azoo.com.tw/front/bin/cglist.phtml?Category=5490>

⁵ Taiwanese engineer first florescent pink angelfish. By Taipei Times (9, November, 2012). Published online: <http://www.taipeitimes.com/News/taiwan/archives/2012/11/09/2003547259>

Advice Sought

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

Agriculture, Fisheries and Conservation Department
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Summary of GMO Test Results 2013/14

	Number of Tested Samples	Surveyed Species	Number of Positive Samples	Species of Samples with Positive Result
Imported Fruits	62	Apple, Grape, Melon, Papaya, Plum, Watermelon	20	Papaya
Imported Vegetables	94	Avocado, Beetroot, Eggplant, Gourd, Maize, Capsicum, Potato, Tomato	0	
Other Imported Food & Feed	64	Animal Feed, Flaxseed, Peanut, Soybean	0	
Seeds	75	Alfalfa, Beetroot, Cabbage, Broccoli, Chinese White Cabbage, Flowering Chinese Cabbage, Chinese kale, Pumpkin, Maize, Melon, Papaya, Capsicum, Rice, Tomato, Watermelon	2	Papaya
Local produce	652	Beetroot, Cabbage, Chinese White Cabbage, Chinese kale, Flowering Chinese Cabbage, Mustard, Cassava, Eggplant, Maize, Papaya, Gourd, Capsicum, Sugar cane, Tomato	245	Papaya
Ornamental Flowers and Aquarium Fish	29	Carnation, Rose, Aquarium Rasbora, Ricefish, Zebrafish	14	Ricefish, Zebrafish
Total	976	Apple, Grape, Melon, Papaya, Plum, Watermelon, Avocado, Beetroot, Eggplant, Gourd, Maize, Capsicum, Potato, Tomato, Animal Feed, Flaxseed, Peanut, Soybean, Alfalfa, Cabbage, Broccoli, Chinese White Cabbage, Flowering Chinese Cabbage, Chinese Kale, Rice, Mustard, Cassava, Sugar Cane, Carnation, Rose, Aquarium Rasbora, Ricefish, Zebrafish	281	Papaya, Ricefish, Zebrafish