Genome-edited Foods: Facts & Fiction
Report from Japan
Consumers Union of Japan
https://www.nishoren.org/en/

7 May 2025

1) Genome-edited Tomatoes:

Genome-edited GABA tomatoes have been reported as mini-tomatoes and medium-sized tomatoes (both claimed to be "high GABA"), but only mini-tomatoes (Sicilian Rouge High Gaba) are on the market as fruit/vegetables and as processed products in the form of puree and dried tomatoes.

These products have been submitted as “food with functional claims” due to their high concentration of GABA, and are being marketed as health food products. However, food with functional claims is just a notification system and is accepted as long as all the documents are in order. There is no independent verification by a government body or anyone else.

Genome-edited tomatoes are sold through the online store of the sales company and over-the-counter in some supermarkets in the Kanto/Tokyo region. The tomatoes were also sold in supermarkets in the Kyushu region, where they are grown, but sales have been discontinued due to opposition from civil society and other factors.

The GABA tomato has been confirmed to be approved in the Philippines, but sales there or in the US (or any other countries) have not been confirmed.

2) Genome-edited Maize:

According to the notification to the Consumer Affairs Agency, the US product has not yet been placed on the market. Genome-edited maize should not be sold in Japan, as the MAFF and Consumer Affairs websites state that its use or its sale is “time undecided” or “market launch undecided.”

https://www.caa.go.jp/policies/policy/standards_evaluation/bio/genome_edited_food/list

CUJ got the following response to an open letter of enquiry to Corteva AgriScience. They indicated that it has been grown in the US for research and pre-commercialisation trials, but has not been commercially distributed or marketed at this time (2023).

https://nishoren.net/new-information/18591
https://nishoren.net/wp/wp-content/uploads/2023/05/e42c5d32418287663bb1e6fedb7a34cf.pdf

CUJ also asked domestic corn starch manufacturers. Only one company responded that they “do not use” genome-edited maize, and most said they could not respond because they did not have the information.

https://nishoren.net/new-information/18654

3) Genome-edited Fish

Several types of fast-growing fish have been developed in Japan, including Medaka Rice Fish and Red Sea Bream.

We submitted this comment to the UN Convention on Biological Diversity online forum on risk assessment in collaboration with the Japan Citizens' Network for Sustainable Food and Agriculture (FA-Net):

We respectfully wish to submit the following comment to the Open-ended Online Forum on Risk Assessment (2025-2026) - Week 1: 21 to 28 April Regarding Living Modified Fish.

General Comments Regarding Genome-edited LM Fish

Thank you for this opportunity to comment on the Risk Assessment of Living Modified (LM) fish. We strongly believe that genome editing, including deletion editing, in which part of a gene is deleted by genome editing, should be brought under the control of the Convention on Biological Diversity and the Cartagena Protocol, and regulations should be strengthened based on international standards.

Genome editing is associated with several problems that require Risk Assessment. Abnormalities can occur in brain function, reproductive behavior, and immune responses. Activity is also weakened, fear is enhanced, diurnal rhythms are altered, and color perception is reduced. In addition, the genome editing technology itself leads to off-targets that disrupt other genes as well as causing large-scale chromosome damage at locations where the DNA is altered. Risk Assessment is essential to avoid the many problems and hazards involved in such a powerful technology.

For example, living genome-edited fish whose genes have been partially disrupted by CRISPR/Cas9 are produced, bred and sold by Regional Fish Institute Ltd. in Japan. These living genome-edited fish are raised in land-based aquaculture facilities run by a venture company with no rules for open and peer-reviewed information. It is difficult to say that sufficient measures have been taken to prevent environmental leakage from the tanks.

The possibility cannot be ruled out that living genome-edited fish in captivity could be released into the environment if the breeding facilities are damaged by some accident or natural disaster. We suspect that the company’s facilities in Noto, central Japan were damaged by the 2024 earthquake, and have asked what happened to the genome-edited LM fish in question, but neither the company nor the government will provide answers to the public.

International regulations on genome-edited LM fish should be established by the Convention of Biological Diversity as soon as possible, based on the precautionary principle, in order to identify such risks and prevent irreversible environmental impacts in advance. Strict biosafety regulations are needed with regard to all living genetically modified fish, bearing in mind that they are bred, raised and sold and disposed of not only for research and ornamental purposes such as aquariums, but also for food use.

Genetically Modified Medaka Rice Fish (Oryzias latipes)

In 2006, unapproved living GM medaka rice fish was smuggled to Japan from Taiwan. The LM fish were sold illegally in pet shops to enthusiasts to be kept as ornamental fish. This transgenically modified, ‘glowing’ living organism was originally produced by the National University of Taiwan so that it would glow in such a way that specific genes would be more easily-viewable under the microscope. Such living GM fish are banned in the EU.

Source:
https://www.env.go.jp/press/6802.html

In 2023, living GM medaka rice fish bred by enthusiasts for research purposes were found to have been illegally removed from a lab room. In this case, they had released some of the living GM medaka rice fish they had bred into the environment by disposing of alive fish in a nearby river. Living GM medaka rice fish were bred and transferred in Tokyo, Japan without obtaining approval under the Law Concerning the Conservation of Biological Diversity through the Regulation of the Use of Living Modified Organisms and Other Measures. The case in which such living GM medaka rice fish was sold in Tokyo was referred by the Tokyo Metropolitan Police Department to the Ministry of the Environment regarding the arrest of persons involved with the living GM medaka rice fish in violation of the Cartagena Act.

Cases of such artificially bred LM ornamental fish has been found in natural waters within western Japan's Shiga Prefecture, near Kyoto, according to media reports. These genetically modified fish are considered a "third type of invasive species," following foreign and domestic invasive species, and pose a significant threat to the genetic integrity of native fish. A joint research group from Lake Biwa Museum and the Ryukoku University Center for Biodiversity Science is urging people not to release ornamental rice fish into natural water bodies.

Sources:
https://www.env.go.jp/press/press_01252.html
https://www.mext.go.jp/b_menu/houdou/mext_01197.html
https://mainichi.jp/english/articles/20240815/p2a/00m/0sc/020000c

Genetically Modified Red Sea Bream (Pagrus major)

The living GM red sea bream has had the myostatin gene, which suppresses muscle development, knocked out by genome-editing by researchers at Kyoto University, Japan. The increase of skeletal muscle mass and reduced body length was achieved by genome editing with CRISPR/Cas9.
However, genome-editing technology itself leads to off-targets that disrupt other genes as well as causing large-scale chromosome damage at locations where the DNA is spliced. These can result in great hindrances to life activities. With regards to the living GM red sea bream case, Testbiotech, the German group of scientists, noted that the reduced body length and abnormal positioning of vertebrae make it a skeletal anomaly possibly constituting "torture fish breeding" with its concomitant animal welfare issues.

Sources:
https://www.testbiotech.org/en/news/crispr-fish-suspected-torture-breeding/
https://www.sciencedirect.com/science/article/abs/pii/S0044848617324705

Farmdo Group, which sells agricultural products directly in Gunma Prefecture and Tokyo, purchased some 400 living genome-edited red sea bream juveniles from Regional Fish Institute, Ltd. in 2023 with the aim of cultivating and selling them. Many of them died while growing, leaving only about 20 remaining. However, the company plans to purchase about 600 more fish and sell them at its food stations and other direct sales outlets. No explanation why the LM fish died has been provided.

Other Genetically Modified Fish

In December 2022, Regional Fish began selling genome-edited puffer fish online. At the same time, Miyazu City, Kyoto Prefecture, where the fish farms are located, decided to use the genome-edited pufferfish as a return gift for hometown tax payments. Protests against Miyazu City have spread, with consumer groups and others criticizing the use of fish whose safety has not been confirmed.

NTT Aqua has signed a comprehensive partnership agreement with the Okinawan company Akajin, which has its own filtration technology, and plans to expand this Okinawan onshore aquaculture system nationwide. The two companies have been conducting research on the cultivation of the leopard coralgrouper (Plectropomus leopardus) and redspotted grouper (Epinephelus akaara). Tilapa (Oreochromis niloticus) has also been genome-edited to increase the edible parts by modifying a part of the tilapia myostatin gene, which suppresses skeletal muscle hypertrophy.

Source:
https://www.caa.go.jp/policies/council/fssc/meeting_materials/assets/fscc_cms105_250425_01.pdf

Living GM flatfish was engineered to be abnormally fat by disrupting the anorexigenic leptin gene, to suppress appetite. However, the leptin gene is so important to the living animal that disrupting it can cause a range of other problems.

Sources:
https://www5d.biglobe.ne.jp/~cbic/english/2021/journal2102.html
https://www5d.biglobe.ne.jp/~cbic/english/2025/journal2501.html

Overseas Developments

Attempts to export living genome-edited fish and fish breeding systems to Thailand, Indonesia and Cambodia have been reported. Japan External Trade Organization (JETRO) is involved in several projects together with Regional Fish Institute, Ltd. Any cross-border movement of LM fish must be strictly guided by the rules of the Cartagena Protocol. We are concerned that the commercial entities involved do not take such rules seriously.

Sources:
https://www.jetro.go.jp/ext_images/_News/announcement/2023/52933042979ca942/JPN_Fish1.pdf
https://www.jetro.go.jp/ext_images/_News/announcement/2022/0e80b8da931addc9/JPN_Others3.pdf

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Notes:

Regulatory status in Japan (2022):
https://www.jstage.jst.go.jp/article/foodsafetyfscj/10/4/10_D-21-00016/_html/-char/en

Global regulatory trends of genome editing technology in agriculture and food (2024):
https://www.jstage.jst.go.jp/article/jsbbs/74/1/74_23046/_html/-char/ja