

GMOs in Asia : What's happening and who's fighting back?



Genetically modified Golden Rice. Photo: IRRI

The world is witnessing a renewed push in favour of genetically modified seeds and crops. As they have been done in the past, biotech firms and agribusiness are pitching new biotech plants as a silver bullet for humanity's woes, from food and nutritional insecurity, to climate change and the loss of biodiversity. In this desperate need for solutions, the corporate sector hopes that their new GMOs (genetically modified organisms) can gain public support and easily dodge biosafety regulations. This is resulting in the persistent change of laws, regulations and standards governing GMOs across Asian countries. Gene-edited products, a new generation of GMO technology, are particularly gaining ground and receiving commercial licenses. This causes great concern among consumers, farming communities and activists.

As of 2019, genetically modified crops were being cultivated in approximately 190 million hectares across the world, covering four main crops – soya bean (50%), maize (30%), cotton (13%) and canola (5%). Most of these plants are not meant for human consumption, but rather as animal feed and in the last two decades, maize has increasingly been utilised for ethanol production.¹ Despite the declining number of GMO approvals, commercialization of GM crops has continued steadily, in some countries the process of commercialisation has even hastened.²

¹ Crystal Turnbull, Morten Lillemo and Trine A.K. Hvoslef-Eide, "Global Regulation of Genetically Modified Crops Amid the Gene Edited Crop Boom – A Review, *Frontiers in Plant Sciences*, 24 February 2021, <https://www.frontiersin.org/articles/10.3389/fpls.2021.630396/full>

² Jason Zhang, "2020 Overview of Global GMO Development", *AgNews*, 25 February 2021, <https://news.agropages.com/News/NewsDetail--38175.htm>

In recent years, corporations have also been working on the development of GMOs with new traits, also known as transgenic, aimed mainly against pests, herbicides and frost. Other transgenics still in the works include bruising-resistant and low acrylamide (found in starchy foods) types.³

Parallel to this, biotech corporations have been successful in the fast track push of their novel GMOs, branded as new plant breeding techniques. Since some of these new plant breeding techniques, like gene editing, do not require the insertion of an external gene, the biotech industry and some government agencies argue that these gene-edited products should not be treated and regulated as GMOs. As a result, in several Asian countries, gene-edited products are being approved and commercialised for public consumption and new policies are being drafted to make gene-edited products available.

As was also the case in the European Union, Asia-Pacific countries have been debating whether to treat gene-edited organisms as GMOs or not. New Zealand for example explicitly stated that gene-edited crops must be regulated in the same restrictive manner as GMOs.⁴ However, India in March 2022 brought in a new regulation excluding gene editing from GMO regulations.⁵

In this report, we highlight the state of GMOs and people's resistance to them in seven Asia Pacific countries: Japan, Philippines, China, India, Bangladesh, Vietnam and Australia.

What is Gene Editing ?

Gene editing or genome editing covers a wide range of genetic engineering techniques used to edit parts of the genome of almost any living organism. This new biotechnology is gaining popularity and support for being considered a faster, cheaper and comparatively easy technique for genetic alteration. Most gene editing involves creating a new product by cutting or deleting very small segments of DNA, and does not necessarily involve transgenics – introducing 'foreign' genes from another species.

Because of this, gene editing is being claimed as non-transgenic, whereby it wouldn't need to go through biosafety regulations. However considerable research proves that genome editing technologies and applications, clearly fall within the definition of a modified organism, whether they involve inserting, deleting or editing sequences of genomes.

Of the several techniques being used in gene editing, the most popular one is known as CRISPR. CRISPR commonly uses a type of DNA cutter called "Cas9", which explains why it is often referred to as the CRISPR-Cas9 gene editing system.

¹ Eva Sirinathsinghji, "Why genome edited organisms are not excluded from the Cartagena Protocol on Biosafety", Biosafety Briefing, Third World Network, Penang, December 2020, <http://www.genewatch.org/uploads/f03c6d66a9b354535738483c1c3d49e4/genome-edited-biobrief-dec2020-sirinathsinghji.pdf>

³ Jason Zhang, "2020 Overview of Global GMO Development", AgNews, 18 March 2019, <http://news.agropages.com/News/NewsDetail---29745-e.htm>

⁴ Emma Kovak and Robert Paarlberg, "CRISPR and the Climate: How Gene Editing Can Help Cut Emissions", Foreign Affairs, 17 November 2021, <https://www.foreignaffairs.com/articles/world/2021-11-17/crispr-and-climate>

⁵ The European Union's Court of Justice ruling in July 2018 set a precedent by calling gene-edited crops, GMO crops. But despite this ruling, the European Commission wants to change the law so that agribusiness can market these new GMOs without authorisation, traceability or labelling. Under pressure from the GM industry lobby, the European Commission supported this view and announced that it would create separate legislation and call them "plants produced by certain new genomic techniques". See "EU GMO rules are under attack- and with them our food, our health and our environment", The GREENS/EFA in the European Parliament, 14 October 2021, <https://www.greens-efa.eu/dossier/eu-gmo-rules-are-under-attack/#:~:text=In%20a%20dangerous%20new%20move,GMO%20authorisation%2C%20traceability%20or%20labelling>

Japan

Japan is one of the world's largest per-capita importers of GM food and feed. It has approved over 322 genetically modified products for food including 141 GM crops for commercial planting. The corn, soybeans and canola that Japan imports (16 million metric tons, 3.2 million tons, 2.4 million tons respectively) are predominately genetically modified. Japan also imports a large quantity of processed foods that contain GM-derived oils, sugars, yeasts, enzymes, and other ingredients.⁶ The US is the top exporter of GM products to Japan, but other major suppliers include Canada, Brazil, and Argentina.

In recent years, Japan has been pulling out all the stops to allow gene-edited products. In December 2020, Japan approved gene-edited nutritionally enhanced Sicilian Rouge High GABA tomatoes, containing high levels of Gamma-Amino Butyric Acid (GABA), an amino acid believed to aid relaxation and help lower blood pressure. In September 2021, it became the first gene-edited food to go on sale in Japan, developed by the joint venture of the University of Tsukuba and the start-up Sanatech Seeds Ltd.⁷ The University of Tsukuba developed the GABA Tomatoes, through the CRISPR-Cas9 technology, through public funding and handed over the research to the venture capital "Sanatech Seeds" which is none other than Pioneer EcoScience Co. Ltd., a subsidiary of the US multinational, Pioneer (Dupont-Pioneer), and now a part of US agricultural company Corteva.⁸

Japan has also developed tiger pufferfish using gene editing, where the function of genes that govern the fish's appetite is disabled to increase its feed intake and weight compared to natural fish species. There are several other gene-edited food products in the pipeline, like potatoes, wheat, barley, and grapes.

The Japanese government is encouragingly promoting them and even further relaxing the rules governing GMOs to ensure gene-edited crops reach every Japanese plate. In 2019, an expert panel under the Ministry of Health, Labour and Welfare announced that gene-edited food would be allowed for sale in Japan.

There is so much misinformation and propaganda about gene-edited foods that even some schools and local municipalities are backing them. Public opinion unfortunately depends largely on the mainstream media and the latter does not provide enough information on the dangers of the products. Taking advantage of this, Pioneer EcoScience and Sanatech Seed have designed a new marketing method and are selling their GABA tomatoes online directly to consumers. They're calling this "Prosumer" because they believe that understanding the end user of the product is key to marketing gene edit products.⁹

Concern is brewing however, and pushback against these new GMOs has come forth from the Consumers Union of Japan (CUJ). As a consumers' group, CUJ has a long history in opposing the introduction of GMOs in Japan and launched the No! GMO Campaign in 1996. Members of CUJ have, time and again, expressed their disapproval for GMOs and gene-edited food. They have demanded for both safety assessment and mandatory labelling of such foods. In their view, the approvals given to gene-edit foods are too hasty'. "Unexpected things may happen. A wrong gene may be cut off mistakenly [or] unintended

⁶ "Japan: Agricultural Biotechnology Annual Report 2020", Foreign Agricultural Services, United States Department of Agriculture (USDA), 30 March 2020, <https://www.fas.usda.gov/data/japan-agricultural-biotechnology-annual-5>

⁷ "First Genome Edited Tomato with Increased GABA in the World", SantechSeeds, 11 December 2022, <https://sanatech-seed.com/en/20201211-1-2/>

⁸ Global Seed Watch, International News, European Seed e-Magazine, November 2021, <https://european-seed.com/docs/books/volume-8/issue-4/inc/html/36.html?page=36>

⁹ Tatsuo Takeshita, "Gene Edited 'Sicilian Rouge High Gaba' Tomato: Marketing Approach & Consumer Panel Reception in Japan", CEO Pioneer EcoScience Ltd. / Sanatech Seed, 9 September 2021, <https://www.savorthestates.org/wp-content/uploads/2021/09/Sanatech-Seed-Slides-Japan-tomatoes.pdf>

crossing may occur,” said the civic group co-leader Hiroko Yoshimori.¹⁰ Several consumer cooperatives conducted public opinion surveys with their members on gene editing and a great majority were against it.

The CUJ protest against the lax rules governing genome-edit foods. {IMAGE}

In 2019, Japan’s Investigative Panel on Newly-Developed Foods, decided that "genome-edit foods shouldn’t require regulation", yet authorities refrained from allowing these new biotech crops from being certified as organic.

Faced with the Japanese government’s aggressive move in approving GM crops, an initiative called OK Seed Project was launched in 2020 by farmers, academics and concerned citizens. The campaign is about voluntarily labelling seeds and food products as "non-gene-edited". Although the government has banned the labelling of genetically modified products, farmers still have the freedom to voluntarily label them as unedited (native species) at the seed stage, allowing both farmers and consumers to know and choose their GM-free food. The OK Seed mark not only calls out the use of gene-edit seeds but also protects local varieties.¹¹ The initiative also works as popular education tool about the new generation of GMOs and their possible impacts on human health and ecosystems.

The Philippines

The Philippines remains a poster child of biotech companies and the only Asian country with the largest number of commercial planting of GMOs. Since GM corn was approved for commercial use in 2002, the Philippines has approved 129 GM crops; 42 of these since October 2020, with 30 of them for direct use as food, feed or processing and 12 for commercial planting.^{12 13}

The Philippines is the first country in Asia to give commercial clearance to the GM biofortified Golden Rice, infused with beta-carotene, the precursor of Vitamin A, and touted to address malnutrition and Vitamin A deficiency. On 21 July 2021, the Philippines’ Bureau of Plant Industry (BPI) issued a biosafety permit for its commercial propagation, making it the first GM rice variety ever released for commercial planting, posing a great threat to the hundreds of thousands of indigenous rice varieties developed by farmers in the region.

This rice GMO was developed by the International Rice Research Institute (IRRI) and supported by the Bill and Melinda Gates Foundation, the Rockefeller Foundation, USAID, and the Philippine Department of Agriculture - Biotechnology Program Office.¹⁴ Recently, the researchers working on Golden Rice have also developed a variety of this GM rice using gene editing technology inserting other traits like drought and pest resistance.

Proclaimed for long as the solution for Vitamin A deficiency (VAD) that causes immunity deficiency syndrome and blindness among children, the International Rice Research Institute (IRRI) has now

¹⁰ Pearly Neo, “Japan GM food safety update: Transgenic soy, rapeseed have no impact on biodiversity even after 15 years-government body”, FOOD navigator-asia.com, 15 February 2021, <https://www.foodnavigator-asia.com/Article/2021/02/15/Japan-GM-food-safety-update-Transgenic-soy-rapeseed-have-no-impact-on-biodiversity-even-after-15-years-government-study>

¹¹ “OK Seed Mark has been launched”, OK Seed Project, 20 July 2021, <https://okseed.jp/en/>

¹² “GM Crop Events approved in Philippines”, International Service for the Acquisition of Agri-biotech Applications (ISAAA), <https://www.isaaa.org/gmapprovaldatabase/approvedeventsin/default.asp?CountryID=PH>

¹³ Joan Conrow, “Filipino farmers reap economic benefits from GMO corn, study finds”, Alliance for Science, 2 July 2021, <https://allianceforscience.cornell.edu/blog/2021/07/filipino-farmers-reap-economic-benefits-from-gmo-corn-study-finds/>

¹⁴ “Philippines: Agricultural Biotechnology Annual Report 2021”, Foreign Agricultural Services, United States Department of Agriculture (USDA), 29 October 2021, https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Agricultural%20Biotechnology%20Annual_Manila_Philippines_10-20-2021.pdf

reformed its claim on Golden Rice and no longer says that it will fix or prevent blindness from Vitamin A deficiency but just that it will "help".¹⁵

The hasty commercialisation of Golden Rice in the Philippines left several unanswered questions. Firstly, what quantity of daily consumption of golden rice would be required to improve the Vitamin A level in children who are vitamin A deficient? Secondly, the promoters and regulators are silent on the issue of the deteriorating level of beta-carotene when Golden Rice is stored after harvest. Another issue is that Vitamin A is a fat-soluble enzyme, so will it be effective for children from low-income families whose diet is extremely low in lipid?

IRRI and the Philippines Department of Agriculture claim that Golden Rice has already received food safety approvals in Australia, New Zealand, US and Canada. But the clearance from Food Standards Australia and New Zealand (FSANZ) is not for commercialisation or use in the country. Similarly, the clearance given by the United States Food and Drug Administration (FDA) is not intended for cultivation, marketing, human or animal food use in the US. In the case of Canada, the so-called "clearance by the regulatory agency" is just an opinion from Health Canada on the food use of Golden Rice, given that raw commodities or food products derived from Golden Rice may unintentionally enter Canada. The technical summary of the case points out that if IRRI, in the future, has an interest in marketing Golden Rice in Canada, compliance with the Food and Drug Regulations regarding the addition of vitamins to foods would be required.

Farmer networks, such as MASIPAG, KMP (Kilusang Magbubukid ng Pilipinas) and others, questioned the decision of the BPI and highlighted the lack of transparency, lack of public consultation and lack of independent and comprehensive risk and impact assessments in the approval of the commercial planting of Golden Rice. These farmers' groups have traditionally opposed GMOs in the Philippines because of the growing evidence of the adverse effects of GM food and crops on health and the environment. These include the emergence of superweeds, as well as the shifting of dominant insect pests, and the contamination of non-GM crops. Increasing prices of GM seeds and the dramatic decline of farmers' income, driving them deeper into indebtedness, are other major concerns against GMOs. For farmers, sustaining and preserving traditional knowledge, multiplying their own seeds and controlling their lands and resources remain at the core of their struggle against GMOs and against corporate control of Philippine agriculture.

A few days after the BPI issued a biosafety permit for Golden Rice, it also approved a commercial permit for Bt eggplant (Bt talong). Other genetically modified products being developed include Ringspot Virus-Resistant papaya and Multiple Virus Resistant tomato.¹⁶

China

Given the popular rejection of GM foods and bad press, since 2010 China has held a restrained GMO policy. This helps understand why China's domestically developed GM rice and corn were never released for commercial planting.¹⁷ China's GMO clearance operates at 2 levels: the GMO is first given a production safety certificate, meaning that Research and Development (R&D) activities for the GM crop have been completed, and then the applicant is cleared to apply for its commercialization from the

¹⁵ Pearly Neo, "Science says yes: Experts defend nutritional benefits of Golden Rice in wake of anti-GM protests", FOOD navigator-asia.com, 9 September 2020, <https://www.foodnavigator-asia.com/Article/2020/09/09/Science-says-yes-Experts-defend-nutritional-benefits-of-Golden-Rice-in-wake-of-anti-GM-protests>

¹⁶ "Philippines: Agricultural Biotechnology Annual Report 2021", Foreign Agricultural Services, United States Department of Agriculture (USDA), 29 October 2021, https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Agricultural%20Biotechnology%20Annual_Manila_Philippines_10-20-2021.pdf

¹⁷ Justin Cremer, "China moves toward commercialization of GMO corn and soy", Alliance for Science, 23 January 2020, <https://allianceforscience.cornell.edu/blog/2020/01/china-moves-toward-commercialization-of-gmo-corn-and-soy/>

government. In early 2020, GM soybean passed the safety evaluation but was also not cleared for commercialisation. However, this national restriction does not stop Chinese companies like Beijing Dabeinong Biotechnology Co. Ltd from seeking planting licenses for their GM soybean in other countries like Brazil and Uruguay. Argentina was the first country to authorize the commercial planting of GM soya. What's more, although GM soya and corn are not allowed to be grown domestically, it is still being imported on a large scale for use in animal feed to support the expanding meat and poultry industries. Currently, only GM cotton and GM papaya are approved to be grown commercially in China.

Currently being a net importer of food, the Chinese government's primary concern has been to increase food security, fearing that any food shortage could turn into political instability and be easily exploited by antagonist nations. In his address in December 2013, President Xi Jinping emphasised the importance of bold research in biotechnology, prudently adding, however, caution in regards to commercialisation at the domestic level.¹⁸ To this end, in 2016, the Chinese Ministry of Agriculture revealed a roadmap for the commercialization of GM crops: in the chronology cash crops 'not for food use' figure at the earliest dates, followed by crops destined for feed and industrial use, then food crops, and, finally, staple food crops (rice, wheat, and soybeans).

In March 2021, a new Five-Year Plan that focuses on self-reliance and food security includes points on GM crops.¹⁹ With the new Five-Year Plan, Chinese policy towards genetically modified crops has taken a sharp turn. The government is now more openly promoting GMOs and deregulating to push their expansion. This could be directly linked to the increased global expansion of the Chinese seed industry, especially after state-owned ChemChina bought Syngenta in 2017 for US\$43 billion. Since then its annual revenue has kept surging, reaching US\$6 billion in 2020 from US\$600 million in 2016.²⁰ In 2022, safety certificates for production and planting were granted to four GM corn varieties resistant to herbicide and pests as well as three herbicide-resistant GM soybean varieties that were pilot tested in 2021, paving the way for commercial cultivation.²¹

This dovetails with China currently being the world leader in gene-edit crops patents. Around 75% of these agricultural patents are from China.²² According to Rabobank, Chinese research institutes have already published more research on market-oriented gene-edited crops than any other country. A more generous approval policy or a relatively open policy is expected in the coming years for the release of gene-edited crops, given China's large-scale investment.²³

But the controversy that GMOs create in Chinese society remains a thorn on the government's side, perhaps explaining the government's restricted approach to their domestic commercialization. Chinese social media has become a battleground where people defy and resist GMOs, especially regarding concerns over food safety and consumers' rights. Initially starting with rumours and scandals, discussions on social media evolved into anti-GMO messages and discussions designed to appeal to the morality and

¹⁸ "China-Peoples Republic of: Agricultural Biotechnology Annual Report", China Moving Towards Commercialization of Its Own Biotechnology Crops, Foreign Agricultural Services, United States Department of Agriculture (USDA), 16 December 2016, https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=Agricultural%20Biotechnology%20Annual_Report_China%20-%20Peoples%20Republic%20of_12-16-2016.pdf

¹⁹ Adam Minter, "Will China Make Its Peace With GMOs?", 25 November 2021, <https://www.bloomberg.com/opinion/articles/2021-11-25/will-china-makes-its-peace-with-gmos>

²⁰ Eamon Barrett, "Once wary of GMOs, China is now leading in gene-edited seeds", FORTUNE, 19 October 2021, <https://fortune.com/2021/10/19/syngenta-ceo-erik-fyrwald-gmo-china-fortune-global-500-summit/>

²¹ Joseph Maina, "China pushes ahead with GMO crops to safeguard food security", 21 January 2022, Alliance for Science, <https://allianceforscience.cornell.edu/blog/2022/01/china-pushes-ahead-with-gmo-crops-to-safeguard-food-security/>

²² Eamon Barrett, "Once wary of GMOs, China is now leading in gene-edited seeds", FORTUNE, 19 October 2021, <https://fortune.com/2021/10/19/syngenta-ceo-erik-fyrwald-gmo-china-fortune-global-500-summit/>

²³ Reuters, "China drafts new rules to allow gene edited crops", Beijing, 25 January 2022, reproduced by the Indian Express, <https://indianexpress.com/article/technology/science/china-new-rules-gene-edited-crops-7740355/>

patriotism of Chinese society, connecting GMOs to food safety issues and the right to not consume GMOs.²⁴

India

Officially, Bt Cotton is the only genetically modified crop allowed in India. And twenty years after its approval for commercial cultivation in 2002, more than one thousand Bt cotton seed varieties - belonging to dozens of seed companies- are now sold in the Indian market, with the local Indian varieties nowhere to be found.²⁵

However, within a few years of introduction, Monsanto which brought this technology to India, accepted the failure of its first and second-generation insecticidal Bt cotton varieties. The targeted pest, pink bollworm, developed resistance to the toxins produced by these traits.²⁶ Failure of GM cotton to control pests was responsible for the rise of suicides among cotton farmers, devastated by increased costs of seeds, increased chemical inputs and inadequate access to agronomic information.²⁷

But this didn't discourage India from more GMO ventures. It attempted to commercialise Bt eggplant (brinjal, aubergine) in 2009. The clearance for Bt eggplant was met with tremendous resistance by the public, forcing the government to organise month-long public hearings across India's major cities. A moratorium on the release of Bt eggplant was finally imposed in 2010. In its 2012 report, the Parliamentary Committee on Agriculture concluded that "GM crops are just not the right solution" for India and raised various other concerns over the potential and actual impacts of GM crops to the country's food, farming, health and environment.²⁸

But the promoters of Bt eggplant in India are not taking no for an answer and, after Bangladesh commercially released it in 2013, are trying again to seek its approval.

The attempt to commercially release GM mustard followed. In May 2017, the Genetic Engineering Approval Committee recommended the approval of this herbicide-tolerant crop, resistant to Bayer's glufosinate, which is more toxic than glyphosate.²⁹ Farmers, activists, environmentalists and seeds savers came together to launch a nationwide campaign, *Sarson Satyagraha* (Civil Disobedience against GM Mustard), to resist its commercial release. With more than 12000 accessions of rapeseed mustard varieties and local landraces in India, GM Mustard posed a major threat to this rich biodiversity. Several attempts were made by the developers to seek commercial release but till today, GM mustard has not been approved for commercial cultivation.

Despite moratorium decisions on GM crops and parliament recommendations for stopping all open field trials, permissions are still granted for open field trials of numerous food and non-food GM crops across the country. The inability of regulatory agencies to properly monitor the field trials has given way to the

²⁴ Zhihua Xiao and William A Kerr, "Biotechnology in China – regulation, investment, and delayed commercialization", *GM Crops Food*, 2022;13(1):86-96. doi:10.1080/21645698.2022.2068336, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9090284/>

²⁵ K. R. Kranthi, "Bt Cotton Q&A: Questions and Answers, Indian Society for Cotton Improvement (ISCI), Mumbai, 2012, http://www.cicr.org.in/pdf/Bt_Cotton_Q&A_Kranthi%202012.pdf

²⁶ Bt. Cotton in India: Current Scenario", *Cotton Statistics & News*, Issue No. 16, 17 July 2018, the Cotton Association of India, https://www.caionline.in/download_publication/562

²⁷ Andrew Paul Gutierrez, Luigi Ponti, Hans R Herren, Johann Baumgärtner, and Peter E Kenmore, "Deconstructing Indian cotton: weather, yields, and suicides", *Environmental Sciences Europe*, 17 June 2015; <https://enveurope.springeropen.com/articles/10.1186/s12302-015-0043-8>

²⁸ Manish Shukla, Khair Tuwair Al-Busaidi, Mala Trivedi and Rajesh K. Tiwari, "Status of research, regulations and challenges for genetically modified crops in India" *GM Crops & Food*. 2018; 9(4): 173-188, published online 22 October 2018, <https://doi.org/10.1080/21645698.2018.1529518>

²⁹ Glufosinate is a broad spectrum herbicide that causes nerve damage and birth defects and is toxic to most organisms. It is also a neurotoxin of mammals that doesn't easily break down in the environment.

contamination and illegal planting of GM crops. As reported by the Department of Biotechnology Committee, some of the illegal plantings, like the case of herbicide-tolerant cotton, were massive and have spread over 15% of the total cotton growing area in the country.³⁰ There is a direct risk of this becoming the unregulated use of the highly toxic glyphosate herbicide, leading to the spread and rise of super weeds, as well as to the contamination of soil and water.

M&M Recall

A blatant case of GMO contamination was reported in June 2021, when the European Commission's Rapid Alert System for Food and Feed flagged that 500 tonnes of rice from India recently converted to rice flour by a French company, Westhove, was contaminated with GM content. This resulted in the recall of food products by big companies across the globe, including candy giant Mars Wrigley, which put out a mass recall of several batches of M&M Crispy.³¹ For the Coalition for GM-Free India, although "India does not allow GM rice cultivation, there are various GM rice varieties at confined field trials". They allege that these trials as well as the illegal cultivation of HT cotton, Bt eggplant and GM soybean lead to "contamination or leaks", which end up in farms and food.³²

But GMO are being pushed through all fronts in India. In 2018, a study found large-scale illegal presence and sale of GM imported foods in the country, which included infant food, edible oil and packaged snacks. In April 2018, India food authorities approved a draft regulation that prescribed mandatory labelling for "all food products having 5% or more GM ingredients". This is the first time the Indian government laid down guidelines for labelling GM food. However, labelling food with 5% GM ingredients was an underhanded and illegal attempt to introduce GM food in India through the back door. A new draft of this regulation in November 2021 tightens the labelling requirement to 1% or more GM ingredients to be labelled as such.³³ But again, this draft regulation effectively de-regulates GM foods and facilitates what the US has been demanding India for years: to have unrestricted access and easy entry of GM foods in India, breaching environmental regulations and diluting food labelling requirements as directed by India's Supreme Court.³⁴

The weakening of GMO regulations in India also opened the door to new breeding techniques, such as CRISPR, exempting these products from the GMO 1989 rules. Genome-edited plants will now be treated as any other plants. A move that has been opposed by farmers' groups and broad civil society coalitions. The Alliance for Sustainable and Holistic Agriculture (ASHA) and the Coalition for GM-Free India argue that there are enough cases that show that the small intended changes induced by gene editing can still result in large and dangerous consequences, such as the unexpected toxicity and allergenicity of gene-edited plants.³⁵

Bangladesh

³⁰ Vibha Varshney, "Committee confirms use of illegal cotton seeds", Down to Earth, New Delhi, 11 July 2018; <https://www.downtoearth.org.in/news/agriculture/committee-confirms-use-of-illegal-cotton-seeds-61099>

³¹ Priscilla Jebaraj, "EU food recall linked to GM rice exports from India", The Hindu, New Delhi, 19 October 2021, <https://www.thehindu.com/news/national/eu-food-recall-linked-to-gm-rice-exports-from-india/article37078352.ece>

³² "Letter to GEAC to investigate reported GM rice from India", IndiaGMInfo, 12 November 2021, <http://indiagminfo.org/letter-to-geac-to-investigate-reported-gm-rice-from-india/>

³³ "Food Safety and Standards (Genetically Modified or Engineered Foods) Regulations, 2021", Food Safety and Standards Authority of India Notification, New Delhi, 15 November 2021, https://fssai.gov.in/upload/uploadfiles/files/Draft_Notification_GM_Food_17_11_2021.pdf

³⁴ G.S. Mudur, "Legal notice seeks genetically modified food draft withdrawal", The Telegraph, New Delhi, 6 February 2022, <https://www.telegraphindia.com/india/legal-notice-seeks-genetically-modified-food-draft-withdrawal/cid/1850761>

³⁵ Claire Robinson, "India deregulates some gene-edited plants", GM Watch, 2 April 2022, <https://gmwatch.org/en/106-news/latest-news/20011-india-deregulates-some-gene-edited-plants>

The GM eggplant rejected in India in early 2010 was later adopted and commercialised in Bangladesh. The crop initially developed by Mahyco India, was provided to the Bangladesh Agricultural Research Institute (BARI) through a public-private partnership between Mahyco, Cornell University, Sathguru Management Consultants, BARI and USAID.³⁶ BARI then bred it into nine local eggplant varieties, with only four varieties approved for commercial release in October 2013.

The GM eggplant faced strong pushback from civil society, farmers, environmentalists and seed savers groups. For the development of the Bt eggplant, Mahyco and Monsanto were said to be given intellectual property rights over nine indigenous eggplant varieties. All this without informing farmers or the general public.³⁷ Through these genetically engineered processes and patents, Bangladeshi farmers were set to lose control over their indigenous eggplant varieties.³⁸

In the first season of commercial cultivation in 2014, several farmers who planted the transgenic eggplant demanded compensation for the huge losses they incurred because of poor yield and crop failure.³⁹ Field research and an intensive survey of Bt eggplant cultivation by the Bangladesh research group UBINIG (Policy Research for Development Alternative) confirmed that this GMO crop was a big disappointment for farmers'. In their survey, UBINIG found that approval conditions by the National Biosafety Committee were not met in the process of approving this Bt eggplant. One such condition was to label the Bt eggplant. The farmers who received the seeds never knew they was genetically modified and that they required biosafety measures. The seed was given as a “new eggplant variety” that did not require pesticide spraying. With no competent public authority in place, the extent of the environmental and health impacts of this widely distributed seed might never be known.⁴⁰

Besides Bt eggplant, the pro-GM lobby continues to push for the commercial clearance of Golden Rice. During his visit to Bangladesh in 2019, the Director-General of the International Rice Research Institute (IRRI), Matthew Morell, promoted Golden Rice by mentioning the approval for this crop from regulatory agencies in the USA, Australia, New Zealand and Canada. This statement was misleading, meant to influence its commercial clearance. Neither IRRI nor Bangladesh authorities pushing for Golden Rice have informed the public that the food regulators of these 4 countries, despite their safety approval, have questioned the vitamin A contained in Golden Rice, claiming that it is too low to warrant a nutrient content claim.⁴¹

So far, people in Bangladesh, especially farmers, civil society groups, environmentalists and consumers have managed to hold the commercialisation of Golden Rice at bay, keeping up their pressure on the government. Farmers have continuously stated that there are abundantly more effective alternative sources for Vitamin A, easily available in locally produced fruits, vegetables and leafy vegetables. Solving the problem of night-blindness or Vitamin A deficiency is not a technological issue, it has to do more with poverty and a balanced food intake. The company patenting Golden Rice -aka “Vitamin A

³⁶ Agricultural Biotechnology Support Project II: Supporting agricultural development through biotechnology, Cornell University, 2013, <http://absp2.cornell.edu/>

³⁷ Farida Akhter, “BT BRINJAL COMMERCIALISATION: Alarming alliance of four M's”, UBINIG, Dhaka, 4 October 2014, <https://ubinig.org/index.php/home/showAerticle/61/english/Farida-Akhter/BT-BRINJAL-COMMERCIALISATION:-Alarming-alliance-of-four-M%E2%80%99s>

³⁸ “Bt Brinjal: Non-compliance of approval terms!”, Coalition Against Bt Brinjal, UBINIG, Dhaka, 30 May 2014, <http://www.ubinig.org/index.php/home/showAerticle/58/english>

³⁹ “Director of Bangladesh research institute gets ‘furious’ when asked about Bt brinjal health effects”, GMWatch, 8 September 2014, <https://gmwatch.org/en/news/archive/2014/15637-director-of-bangladesh-research-institute-gets-furious-when-asked-about-gm-bt-brinjal-health-effects>

⁴⁰ Farida Akhter and Afsar Jafri, “GOLDEN RICE IN PHILIPPINES: Hurried approval raises questions”, New Age, Dhaka, 29 July 2021, https://www.newagebd.net/article/144822/hurried-approval-raises-questions?fbclid=IwAR05HCro7Rrv1ZTJ3S0kgnAqJTMu0-p_9FGFtpwdxXyGM1Esbj9nssOAng

⁴¹ Emran Hossain, “Approval for GM rice in Bangladesh soon”, New Age, Dhaka, 19 May 2019, <https://www.newagebd.net/article/72906/approval-for-gm-rice-in-bangladesh-soon>

rice”- is not going to solve anything, rather it will make the country more vulnerable by making people dependent on multinational companies.⁴²

But while all eyes are on GMOs, genome editing advances stealthily: A blast-resistant wheat variety using CRISPR-Cas9 and first-generation gene-edited rice are some of the novel GMOs in the pipeline.⁴³

⁴⁴ In contrast to classic GMOs, there is no organised opposition to the use of gene editing technologies and no specific regulations or policies in place for gene editing in Bangladesh. Awareness and knowledge of gene editing among people and policymakers is relatively low. Debates and discussions among the scientific community in Bangladesh indicate that Bangladesh will soon come out with a policy on gene editing that will most probably be similar to India’s, i.e. deregulating gene-edited crops and exempting them from strict biosafety regulations.⁴⁵

Vietnam

Vietnam’s government is fully embracing GMO and had the ambitious plan to have 30-50% of the nation’s farmland covered with them by 2020.⁴⁶ Vietnam’s Ministry of Agriculture and Rural Development started field trials of seven GM corn varieties in 2010 from three agribiotech corporations, Monsanto, Syngenta and Pioneer. By 2016, 21 transgenic maize and soybean varieties were grown in Vietnam.⁴⁷ But many Vietnamese opposed the spread of GMOs in the country, especially given that US-based multinational Monsanto had been the main manufacturer of Agent Orange, used by the US military in the country during the Vietnam War. Anti GM activists claim that with the commercial planting of Monsanto’s GM corn, history will repeat itself, since this plant comes along with the toxic weed killer Roundup (or glyphosate). Vietnamese believe that the chemical Agent Orange is still present in the water, soil and the genes of new borns, 40 years after it was sprayed during the Vietnam War. Yet the company that produced this chemical has returned to grow transgenic crops, even as it still refuses to compensate Vietnamese victims.

Due to these popular sentiments against GMOs, Vietnam delayed their review and approval for many years. In what some consider a devious manoeuvre, in 2016, Vietnam made it mandatory for imported genetically modified food products to be labelled, leaving it up to the consumers to look out for GM foods when buying fresh, dry and frozen food products, and animal feed.⁴⁸ Things evolved even further in September 2019, when the ministry of agriculture approved five GM crops for feed.⁴⁹ ⁵⁰ According to a

⁴² Farida Akhter, “When Bt brinjal is a failure, why Golden rice?”, New Age, Dhaka, 11 February 2019, <https://www.newagebd.net/article/64429/when-bt-brinjal-is-a-failure-why-golden-rice>

⁴³ “Bangladesh: Agricultural Biotechnology Annual Report 2021”, Foreign Agricultural Services, United States Department of Agriculture (USDA), 6 December 2021, https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Agricultural%20Biotechnology%20Annual_Dhaka_Bangladesh_10-20-2021

⁴⁴ Reaz Ahmad, “Rice science’s graduation to gene-editing technology”, Dhaka Tribune, Dhaka, 18 December 2021, <https://www.dhakatribune.com/bangladesh/2021/12/18/rice-sciences-graduation-to-gene-editing-technology>

⁴⁵ Webinar on “Genome Editing in Agriculture: Status in Bangladesh and Way Forward”, organised by Organized by the Bangladesh Academy of Sciences (BAS), South Asia Biosafety Program (SABP), Agriculture & Food Systems Institute (AFSI), and Biotech Consortium India Limited (BCIL), 1 June 2022, <https://foodsystems.org/event/ge-ag-bangladesh-2022/>

⁴⁶ An Dien, “It’s official: Vietnam licenses genetically modified organisms”, Thanh Nien News, Ho Chi Minh City, 21 August 2014, <http://www.thanhniennews.com/politics/its-official-vietnam-licenses-genetically-modified-organisms-30220.html>

⁴⁷ “When did GMO food appear on the Vietnamese dining table?” VietNam Net, 23 August 2018, <http://english.vietnamnet.vn/fms/science-it/207309/when-did-gmo-food-appear-on-the-vietnamese-dining-table-.html>

⁴⁸ “When did GMO food appear on the Vietnamese dining table?” VietNam Net, 23 August 2018, <http://english.vietnamnet.vn/fms/science-it/207309/when-did-gmo-food-appear-on-the-vietnamese-dining-table-.html>

⁴⁹ “Vietnam Approves Five Biotech Events”, Foreign Agricultural Services, United States Department of Agriculture (USDA), 27 September 2019, https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Vietnam%20Approves%20Five%20Biotech%20Events_Hanoi_Vietnam_09-24-2019

⁵⁰ “Vietnam: Agricultural Biotechnology Annual Report 2021”, Foreign Agricultural Services, United States Department of Agriculture (USDA), 18 October 2021,

survey around 111 out of 323 food samples from 17 traditional markets and supermarkets in the Ho Chi Minh City including corn, soybeans, potatoes, rice, tomatoes and peas, are transgenic food.⁵¹

Vietnam has started research in gene editing, and is developing a gene-edited variety of their local rice to be resistant to leaf blight bacteria.⁵² The country's biotechnology institute is also using the CRISPR/Cas9 technique to develop soybean seeds.⁵³ However, gene editing is not yet regulated under any law and attempts are being made to treat gene-edited products as non-GM and to be promoted as plant variety improvements.⁵⁴

Australia

Australia is one of the earliest adopters of GMO technologies in the Asia- Pacific. By 2018, Australia had close to 774,000 hectares of GMO crops. Three GM crops dominate Australia's fields: Bt and HT cotton (accounts for more than 99.5% of production); HT canola (representing 30% of total canola plantings); and safflower. Other GM crops undergoing experimental field plantings include banana, barley, ryegrass, mustard, sugarcane and wheat. In the past, there have also been trials of rice, clover, maize, poppy, papaya, pineapple and grapevines.⁵⁵

As discussed above, Food Standards Australia New Zealand (FSANZ) approved the food derived from GMO rice (Golden Rice) on 19 December 2017.⁵⁶ The approval was contested by civil society groups in Australia and New Zealand, and in an open letter to the Minister of Food Regulation, they challenged the soundness of FSANZ decision and appealed to review its approval. FSANZ safety assumptions were based on data provided by IRRI and corporate proponents, while ignoring crucial scientific data on the perils of GMOs to human health.⁵⁷ But, in 2020, without breaking its stride, FSANZ approved several other GM crops from BASF (soybean), Monsanto (corn) and J.R. Simplot (potato).⁵⁸ In May 2022, FSANZ also approved the sale and use of food derived from genetically modified drought and herbicide tolerant wheat, developed by Bioceres Crop Solutions of Argentina.⁵⁹

The history of GMO promotion in Australia shows that since the beginning GM regulation was always a pro-industry deal. Before the gene technology regulator was set up, Australians were concerned about the inability to choose GM-free food, since imported GM foods were not labelled, yet GMOs were embraced and promoted by research institutions, universities, public bodies, and of course by the government agency responsible for scientific research. In 2003, when licences were issued for the commercial release

https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Agricultural%20Biotechnology%20Annual_Hanoi_Vietnam_10-20-2021.pdf

⁵¹ "When did GMO food appear on the Vietnamese dining table?" VietNam Net, 23 August 2018, <http://english.vietnamnet.vn/fms/science-it/207309/when-did-gmo-food-appear-on-the-vietnamese-dining-table-.html>

⁵² "BLB-resistant Vietnamese Rice Developed Using CRISPR-Cas9", Crop Biotech Update, International Service for the Acquisition of Agri-biotech Applications (ISAAA), 15 September 2021, <https://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=19014>

⁵³ "Creating directed mutation through CRISPR/Cas9 gene editing system to improve soybean seed quality", Vietnam academy of science and technology, 29 March 2021, <https://vast.gov.vn/web/vietnam-academy-of-science-and-technology/tin-chi-tiet/-/chi-tiet/creating-directed-mutation-through-crispr-cas9-gene-editing-system-to-improve-soybean-seed-quality-15806-871.html>

⁵⁴ "Regulatory Status of Genome Editing in Vietnam", Apaari, 18 November 2019, <https://www.slideshare.net/apaari/regulatory-status-of-genome-editing-in-vietnam-194605553>

⁵⁵ "Factsheet: Genetically modified (GM) crops in Australia", Office of the Gene Technology Regulator website, Department of Health, Australian Government, November 2021; <https://www.oqtr.gov.au/resources/publications/genetically-modified-gm-crops-australia>

⁵⁶ "Food derived from Provitamin A Rice Line GR2E", Approval report – Application A1138, 20 December 2017, Food Standards Australia New Zealand (FSANZ) website, <https://www.foodstandards.gov.au/code/applications/Documents/A1138%20Approval%20Report.pdf>

⁵⁷ "An Open Letter on GM golden rice in Australia", MADGE Australia Inc., 2 February 2018, <https://www.madge.org.au/open-letter-gm-golden-rice-australia>

⁵⁸ Jason Zhang, "2020 Overview of Global GMO Development", AgNews, 25 February 2021, <https://news.agropages.com/News/NewsDetail--38175.htm>

⁵⁹ "Food derived from drought-tolerant wheat line IND-00412-7", Approval report – Application A1232, Food Standards Australia New Zealand (FSANZ) website, 6 May 2022, <https://www.foodstandards.gov.au/code/applications/Documents/A1232%20Approval%20Report.pdf>

of GM canola, all state and territory governments, except Queensland and the Northern Territory, declared themselves GMO-free zones based on trade and marketing concerns because they were major producers of non-GM canola.⁶⁰ It was the time when some Australian states also adopted moratoriums on commercial cultivation of GM crops in response to the growing public opposition and resistance. However, a GM moratorium only applies to the cultivation of GM food crops and not to the sale of processed foods made of genetically modified products.

But with time, GMO moratoriums started falling through the cracks. Slowly, one after another, states decided to end their respective moratorium on commercial cultivation and allowed planting in their territory. By 1 July 2021, the bans on GM crops were lifted from Australian mainland. Tasmania, the Australian Capital Territory and Kangaroo Island in South Australia are the only regions in the country that still have a moratorium on growing GM crops.⁶¹

To ensure the lifting of bans, the GM industry has carried out a fierce campaign, using an army of lobbyists and funded researchers and agronomists to flood the media, highlighting the benefits of GM crops and food. Australia's top science institution, CSIRO, played a key role to help the GM industry and to confront the anti-GM lobby.⁶² A few scientists were discouraged and intimidated from airing their concerns, questions or criticism against GM technologies. Dr Maarten Stapper, an eminent research scientist at CSIRO was sacked after 23 years of service for urging a precautionary approach on GM products.⁶³

Currently in Australia and New Zealand, imported processed foods having GM content of over 1% must receive prior approval and be labelled, whereas food products derived from an animal which has been fed GM feed are not regarded as GM foods and are not required to be labelled. As per FSANZ, GM labelling is not about safety but is about helping consumers to make an informed choice about the food they buy.⁶⁴

In an effort to promote biotechnologies and new breeding techniques across the world, in 2016 Australia released a joint statement with Argentina, Brazil, Canada, Paraguay and the US, advocating the removal of global barriers to the trade of agricultural biotechnology.⁶⁵ In line with this, in 2019, Australia undertook a major review of its gene technology regulations to provide clarity in the regulation of new biotechnologies. Ultimately, it decided that all plants and foods developed using new GM techniques would enter the food system with no safety testing, assessment, labelling or post-market monitoring.

Not giving up, during the Australian 2022 federal election, a civil society group initiated email campaign requesting Australians to ask their local MPs, Senators or Candidates about the life and death impacts of gene-edited organisms to foods, farms, health and environment.⁶⁶ They criticised that the definition of a

⁶⁰ Rosalie McCauley, Michael Davies, and Anita Wytjé, "The Step-wise Approach to Adoption of Genetically Modified (GM) Canola in Western Australia", Department of Agriculture and Food of Western Australia, AgBioForum, 15(1), 2012, <https://agbioforum.org/wp-content/uploads/2021/02/AgBioForum-15-1-61.pdf>

⁶¹ Louise Camenzuli, Kirsty Davis, Ivan Bricic, "NSW lifts ban on genetically modified crops", CORRS CHAMBERS WESTGARTH, 29 June 2021, <https://www.corrs.com.au/insights/nsw-lifts-ban-on-genetically-modified-crops#:~:text=This%20means%20that%20on%201.moratorium%20on%20growing%20GM%20crops.>

⁶² Australia's National Science Agency, CSIRO, is an Australian Government statutory authority constituted and operating under the provisions of the Science and Industry Research Act 1949. CSIRO's primary functions under the Act are to carry out scientific research to benefit Australian industry and the community, and to solve the greatest challenges through innovative science and technology.

⁶³ Kath Wilson, "Done deals and revolving doors: the story of GM in Australia", Chain Reaction #121, July 2014, www.foe.org.au, <https://researchbank.swinburne.edu.au/file/ecc06f93-3f37-4c4d-b68b-a6e0525c282b/1/PDF%20%28Published%20version%29.pdf>

⁶⁴ "Genetically modified (GM) food labelling", Food Standards Australia New Zealand (FSANZ) website, August 2019, updated on 20 May 2020, <https://www.foodstandards.gov.au/consumer/gmfood/labelling/Pages/default.aspx>

⁶⁵ "Current regulatory status", Synthetic Gene Drives in Australia: Implications of Emerging Technologies, Discussion Paper, Australian Academy of Science, May 2017, <https://www.science.org.au/support/analysis/reports/synthetic-gene-drives-australia-implications-emerging-technologies/current>

⁶⁶ "Vote no to gene editing", a Campaign by Gene Ethics Ltd., <https://senatevotenotomitobill.good.do/votenotogenediting/votenotogenediting/>

genetically modified crops in the Gene Technology Act and Regulations was intentionally made broad in anticipation of technologies such as gene editing.⁶⁷

People's resistance and GMO regulation: The only alternative

In Asia the promotion and expansion of genetically modified plants and foods are being pushed hard not only by agribusiness but by public-funded institutions. Asian governments are cleverly embellishing these new GMOs in abstract language like 'new breeding techniques', 'nature equivalent', 'similar as conventional', 'natural' or 'nature friendly', so that these products can be exempt from key regulatory safeguards.

It is worth asking to what extent new GM techniques will be developed by public research institutions for the use and profitability of the corporate sector? To what extent will agribusiness receive government backing, at the expense of public interests? The stiff opposition to GMOs and mobilisation from a large sector of consumers and farmers in Asia is a direct response to this.

As it has happened in the past, with the promotion of the Green Revolution, the corporate interests behind GMOs and their novel versions are being disguised as panaceas for humanity's ills: hunger, climate change, poverty, malnutrition and more. This distraction of course suits all that elite financially benefitting on one hand from the corporate capture of our societies, and on the other from the undermining of community-controlled food systems.

Gene editing will become a proxy for usurping and bio-pirating the traditional seed heritage of farmers, and the stakes are high in Asian countries, where the majority are still dependent on their traditional seeds for sustenance. There is a growing body of scientific evidence on the unpredictable effects of gene editing techniques. When gene editing makes changes in a plant's genome, there's no going back. Therefore, the weakening of biosafety regulations or no regulations of certain gene editing products is a major threat not only to agroecology and sustainable farming but to the environment at large.

⁶⁷ "Review of Tasmania's Genetically Modified Organisms (GMO) Moratorium-Final Report", Department of Primary Industries, Parks, Water and Environment, Tasmanian Government, August 2019, <https://nre.tas.gov.au/Documents/GMO%20Final%20Report.pdf>