

The Golden Rice War in the Philippines: a Ban on Golden Rice Research Is Not a Wise Move Following the Judicial Ban on Bt Eggplant Field-Testing

Huan Lou

Vitamin A deficiency (“VAD”)¹ plagues children and pregnant women in the Philippines, particularly those who belong to inferior socio-economic classes.² This type of deficiency, together with other nutrient deficiency problems, may cause clinical symptoms, such as xerophthalmia,³ which can lead to blindness and contributes significantly to morbidity and mortality.⁴ To tackle VAD, the Filipino government authorized the International Rice Research Institute (“IRRI”), along with a local research body, PhilRice,⁵ to experiment with golden rice, a type of genetically engineered rice rich in beta-carotene (“β-carotene”),⁶ which humans can convert into vitamin A. However, the golden rice project has drawn significant opposition from groups opposed to Genetically Modified Organisms (“GMOs”).⁷ On August 9, 2013, just a few weeks before crops would be submitted to the regulatory agency for biosafety evaluations, a group of at least 300 anti-GMO activists forced

1. VAD relates to “any state in which vitamin A is subnormal”, including xerophthalmia and much wider implications. Joint WHO/UNICEF/USAID/Helen Keller Int’l/IVACG Meeting, Jakarta, Indon., Oct. 13–17, 1980, *Control of Vitamin A Deficiency And Xerophthalmia*, 672 WHO Technical Report Series 6 (1982) [hereinafter *Vitamin A Report*].

2. PEDRO MRA ET AL., FOOD AND NUTRITION RESEARCH INST., THE PHILIPPINES VITAMIN A SUPPLEMENTATION PROGRAM: INDICATIVE IMPACT, POLICY, AND PROGRAM IMPLICATIONS, DRAFT 2 (2002).

3. Xerophthalmia “cover[s] all the ocular manifestations of vitamin A deficiency, including not only the structural changes affecting the conjunctiva, cornea, and occasionally the retina, but also the biophysical disorders of retinal rod and cone function that are attributable to vitamin A deficiency.” *Vitamin A Report*, *supra* note 1, at 6 (internal cross-reference omitted). Xerophthalmia denotes “an advanced degree of vitamin A depletion which constitutes a potential threat to sight.” *Id.*

4. Florentino S. Solon et al., *Vitamin A Deficiency in the Philippines: A Study of Xerophthalmia in Cebu*, 31 AM. J. CLIN. NUTR. 360, 360 (1978).

5. Matt McGrath, ‘Golden Rice’ GM Trial Vandalised in the Philippines, BBC NEWS (Aug. 9, 2013, 8:05 AM), <http://www.bbc.co.uk/news/science-environment-23632042>.

6. Xudong Ye et al., *Engineering the Provitamin A (β-carotene) Biosynthetic Pathway into (Carotenoid-free) Rice Endosperm*, 287 SCI. 303, 303 (2000).

7. See, e.g., *Worldwide Initiatives Against GMOs* (updated and clarified), Third World Network (Oct. 25, 2013), <http://www.biosafety-info.net/bioart.php?bid=29&ac=st>.

their way into a 1,000-square-meter⁸ IRRI testing field and uprooted all the golden rice in Camarines Sur, Philippines.⁹

Though genetic engineering represents a very cost-effective method of agricultural production,¹⁰ the Filipino government became hostile towards GMOs due to the pressure from various environmentally focused non-governmental organizations (“NGOs”)¹¹ and religious groups. Finally, the Filipino government caved under NGO pressures and announced that the government no longer supported genetic engineering trials.¹² Thereafter, on May 17, 2013, the Filipino Court of Appeals issued a controversial decision that imposed a nationwide ban on *Bacillus thuringiensis* (“Bt”) eggplant field-testing.¹³ The Court of Appeals’ ruling has put Filipino golden rice research in real jeopardy because it may serve as a precedent for courts elsewhere when they address the legality of golden rice research.¹⁴

Part I of the note provides background information regarding golden rice, including its nutritional value, economic value, and influence on human health and local environments. Part II discusses the Bt eggplant field-test ban, its influence on golden rice research, and why the judicial ban violates the Sanitary and Phytosanitary Measures (“SPS”). Part III explores political, social, and economic support for a ban on GMO research, finding that international trade in golden rice, allegedly “biased” research institutes, and golden rice’s impact on the nation’s rice exports do not justify halting the golden rice field-testing program.

8. Shiena M. Barrameda, *300 Militants Destroy GMO Rice Samples in DA Office*, INQUIRER.NET (Aug. 9, 2013, 09:39 PM), <http://newsinfo.inquirer.net/462521/300-militants-destroy-gmo-rice-samples-in-da-office>.

9. Charlotte Ashton, *GM Rice Approval 'Edging Closer'*, BBC NEWS (Aug. 6, 2013, 05:33 AM), <http://www.bbc.co.uk/news/science-environment-23581877> (“Scientists in the Philippines are weeks from submitting a genetically modified variety of rice to the authorities for biosafety evaluations.”).

10. See Norman Borlaug & Jimmy Carter, Opinion, *Food for Thought*, WALL ST. J., Oct. 14, 2005, at A10.

11. CFACT Eds., *Who Paid for the Golden Rice Eco-Attack?*, THE COMM. FOR A CONSTRUCTIVE TOMORROW (Aug. 21, 2013), <http://www.cfact.org/2013/08/21/who-paid-for-the-golden-rice-eco-attack/> (reporting that Peasant Movement of the Philippines, incited by Greenpeace and Friends of the Earth and Food First, is directly responsible for the attack on the golden rice trial field).

12. *Worldwide Initiatives Against GMOs*, *supra* note 7.

13. D.J. Yap & Tetch Torres-Tupas, *CA Stops Field Testing of GMO Eggplants*, INQUIRER.NET (May 24, 2013 04:30PM), <http://newsinfo.inquirer.net/414651/ca-stops-field-testing-of-gmo-eggplants>.

14. David Ropeik, *Filipino Ruling on Bt Eggplant*, Guest Blog, SCI. AM. (June 3, 2013), <http://blogs.scientificamerican.com/guest-blog/2013/06/03/filipino-ruling-on-bt-eggplant/>.

I. GMOS, THE PHILIPPINES AND INTERNATIONAL SANITARY REGULATIONS

A. THE NUTRITIONAL AND ECONOMIC VALUE OF GOLDEN RICE

In 2008, VAD affected 15.2% of Filipino children between the ages six months and five years, down from nearly 40% of children between the ages of six months and five years in 2003.¹⁵ Still, VAD remains a public health concern, as more than 1.7 million children and 500,000 pregnant and lactating women still suffer from deficient or low plasma retinol levels.¹⁶ The government has attempted to address VAD by offering moderate health and social services, such as a high-dose vitamin A supplementation program for children ages one to five.¹⁷ However, these programs have struggled to reach many of the people who reside in rural areas and need vitamin A supplements.¹⁸ Furthermore, many Filipinos lack access to basic eye care, increasing the risk of VAD-related blindness.¹⁹

Golden rice is a groundbreaking GMO²⁰ that has attracted significant attention from the scientific community as a viable solution to the VAD problem in the Philippines. Golden rice is particularly valuable because it produces and accumulates β -carotene in the edible part of the grain.²¹ When it is consumed, the β -carotene is either converted into vitamin A or stored in the fatty tissues of the body until vitamin A is

15. Golden Rice Humanitarian Board, *Frequently Asked Questions*, GOLDEN RICE PROJECT, http://www.goldenrice.org/Content3-Why/why3_FAQ.php (last visited Sep. 8, 2014).

16. *Id.*

17. MRA, *supra* note 2, at 15 (concluding that the high-dose vitamin A supplementation program may be effective in reducing VAD during the first four-month period).

18. *Why is Golden Rice Needed in the Philippines Since Vitamin A Deficiency is Already Decreasing?*, IIRRI, http://www.irri.org/index.php?option=com_k2&view=item&id=12352&lang=en (Mar. 22, 2013 09:05 AM).

19. Todd Watson, *GM Rice Field Destroyed by Activists in the Philippines*, INVESTVINE (Aug. 10, 2013), <http://investvine.com/gm-rice-field-destroyed-by-activists-in-the-philippines/>.

20. An organism is genetically modified if “the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination.” Directive 2001/18/EC of the European Parliament and of the Council of 12 March 2001 on the Deliberate Release into the Environment of Genetically Modified Organisms and Repealing Council Directive 90/220/EEC, art. 2, 2001 O.J. (L 106) 1, 4–5.

21. *Biofortified Rice As a Contribution to the Alleviation of Life-Threatening Micronutrient Deficiencies in Developing Countries*, GOLDEN RICE PROJECT, <http://www.goldenrice.org/> (last visited Oct. 4, 2014).

needed.²² Recent studies in the American Journal of Clinical Nutrition found that “just fifty grams of golden rice can provide sixty percent of the recommended daily intake of vitamin A.”²³ Based on data collected in 2005, golden rice 2, the second generation of golden rice, accumulates even more β -carotene than the first generation of golden rice.²⁴ As a result, eating seventy-five grams of golden rice 2 per day can provide the recommended daily intake of vitamin A.²⁵ This new research rebuts some scientists’ accusation that “an adult would have to consume [2.272 kg] of rice per day” to meet the recommended daily intake of 750 micrograms of vitamin A.²⁶

Golden rice also holds significant economic value for the Filipino people, farmers, and the government of the Philippines. Golden rice provides a simple and less expensive alternative to vitamin supplements for rice consuming populations.²⁷ Impoverished, rice-eating consumers will not need to invest extra money in fruits and vegetables in order to obtain vitamin A. Instead, they can buy golden rice, which provides both grain and vitamin A, for approximately the same price as traditional rice. Additionally, due to licensing agreements among the patent holders, farmers will not have to pay extra money for the new trait.²⁸ In fact, the Rockefeller Foundation, which sponsors the Rice Technology Network,²⁹ and Syngenta, a large biotech company, offer a royalty-free license for the humanitarian use of golden rice.³⁰ Under the license, the seed will

22. Golden Rice Humanitarian Board, *supra* note 15.

23. See Guangwen Tang et al., *Golden Rice Is an Effective Source of Vitamin A*, 89 AM. J. CLINICAL NUTRITION 1776, 1781 (2009); see also Amy Harmon, *Golden Rice: Lifesaver?*, N.Y. TIMES, Aug. 25, 2013, at SR1, available at http://www.nytimes.com/2013/08/25/sunday-review/golden-rice-lifesaver.html?pagewanted=all&_r=0; Bjørn Lomborg, *A Golden Rice Opportunity*, PROJECT SYNDICATE (Feb. 13, 2013), <http://www.project-syndicate.org/commentary/the-costs-of-opposing-gm-foods-by-bj-rn-lomborg>.

24. Jacqueline A. Paine et al., *Improving the Nutritional Value of Golden Rice Through Increased Pro-vitamin A Content*, 23 NAT. BIOTECHNOLOGY 482, 482 (2005).

25. *Id.*

26. See *id.*; Vandana Shiva, *Golden Rice Hoax - When Public Relations Replaces Science*, NORFOLK GENETIC INFORMATION NETWORK (Oct. 26, 2000), <http://members.tripod.com/~ngin/11.htm>.

27. See Lauren F. Friedman, *A Miracle Rice Could Save Millions of Lives*, BUSINESS INSIDER (Jul. 15, 2014, 10:31 AM), <http://www.businessinsider.com/what-is-golden-rice-2014-6>.

28. Jorge E. Mayer et al., THE GOLDEN RICE PROJECT 2, http://www.goldenrice.org/PDFs/The_Golden_Rice_Project_Mayer_et_al_2006.pdf (last visited Oct. 25, 2013) (“[S]eed will be made available to subsistence farmers, free of charge.”).

29. See Sean D. Murphy, *Biotechnology and Int'l Law*, 42 HARV. INT'L L.J. 47, 110 (2001).

30. Humanitarian use, for the purpose of the Golden Rice Project, is defined as “an annual farm income in the range of US \$10,000 per farmer, while a higher income would

become the farmers' property and the farmers will be able to use part of their harvest for the next sowing, without restrictions or novel agronomic inputs.³¹ Finally, by treating VAD with golden rice rather than through its vitamin A supplement program, the Filipino government can save a significant amount of money.³²

Golden rice represents yet another success story for agricultural scientists devoted to using GMOs as a solution for hunger, malnutrition, and environmental problems. The impact of GMO research is simply breathtaking. Since the first genetically modified plant was born in St. Louis, Missouri,³³ the commercial cultivation of genetically modified crops has grown exponentially. Over the last fifty years, the Green Revolution, a movement GMOs played a significant role in, has saved more than one billion people from hunger, starvation, and even death.³⁴ The amount of land planted with genetically modified crops increased by 10% in 2010 to 366 million acres³⁵ and "[r]ates of growth are much higher in developing countries (up 17%) than in developed countries (only up 5%)."³⁶ Because the world will need to produce 50% more food by 2055 and the agricultural land base continues to shrink, the use of genetically modified crops is likely to increase in the future.³⁷

B. GMO APPROVAL PROCEDURES IN THE PHILIPPINES

In the Philippines, a GMO must go through an intensive regulatory approval process before it can be released to the public for cultivation and human consumption. During the regulatory process, the proposed GMO must be approved by several Filipino regulatory bodies, including the National Committee on Biosafety of the Philippines ("NCBP") and the Department of Agriculture's ("DA") Bureau of Plant Industry ("BPI").³⁸ The NCBP reviews proposals on biotechnology applications

require a commercial license from Syngenta." Mayer et al., *supra* note 28, at 3.

31. *Id.* at 2–3.

32. Lomborg, *supra* note 23 ("Supplementation programs costs \$4,300 for every life they save in India, whereas fortification programs cost about \$2,700 for each life saved But golden rice would cost just \$100 for every life saved from vitamin A deficiency.").

33. A genetically modified plant was produced in 1982, using a chimeric bacterial gene in a tobacco plant. See Robert T. Fraley et al., *Expression of Bacterial Genes in Plant Cells*, 80 PROC. NAT'L. ACAD. SCI. USA 4803, 4803–07 (1983).

34. Borlaug & Carter, *supra* note 10.

35. See *Genetically Modified Crops*, THE ECONOMIST, Feb. 24, 2011, at 106, available at <http://www.economist.com/node/18231380>.

36. *Id.*

37. See Borlaug & Carter, *supra* note 10.

38. EVELYN MAE TECSON MENDOZA ET AL., NAT'L ACAD. SCI. & TECH. (PHIL.),

before submitting them to the final decision maker. The BPI creates a Scientific and Technical Review Panel (“STRP”) and a Biotech Core Team (“BCT”) for each GMO approval process. The STRP and BCT assist the BPI in processing the risk assessments and regulatory work associated with the GMO approval process.³⁹

A researcher who intends to work with GMOs in a contained facility, such as a laboratory or greenhouse,⁴⁰ must prepare a biosafety proposal that complies with the NCBP guidelines and submit it to the corresponding Institutional Biosafety Committee (“IBC”).⁴¹ The STRP, which is composed of scientists for each GMO application, reviews the GMO test application and completes all the paper and desktop review, but delegates the actual laboratory, greenhouse, or field-tests to NCBP-certified labs.⁴² The NCBP bases its field-test evaluation on five factors: (1) the project proposal; (2) the IBC assessment; (3) the comments and recommendations of the STRP; (4) public comments; and (5) other documents and information deemed relevant by the NCBP.⁴³ However, the BPI has the final say when deciding whether or not to approve a new GMO.⁴⁴ When the STRP and the BCT cannot reach an agreement on an application, the Biotech Advisory Team (“BAT”), a specialized panel composed of representatives from government biotech agencies, assists the Secretary of Agriculture in making a decision.⁴⁵

It is important to note, however, that Greenpeace, a powerful global campaigning organization, alleges that all of the BAT’s members are

BIOSAFETY REGULATIONS IN THE PHILIPPINES: A REVIEW OF THE FIRST FIFTEEN YEARS, PREPARING FOR THE NEXT FIFTEEN, A REPORT FOR THE NATIONAL COMMITTEE ON BIOSAFETY OF THE PHILIPPINES, 14–15 (2009).

39. See generally GREENPEACE, TIES THAT BIND: REGULATORY CAPTURE IN THE COUNTRY’S GMO APPROVAL PROCESS, GREENPEACE 4–7 (2007) [hereinafter TIES THAT BIND], available at <http://www.greenpeace.org/seasia/ph/press/reports/ties-that-bind-regulatory-cap/>.

40. In a field test or outdoor development, genetically modified organisms (GMOs) are kept within outdoor enclosures which use physical barriers (such as fences) and operating procedures (such as preventing plants from flowering) in order to keep the genetically modified plant or animal secure within its enclosure. *Field Test and Outdoor Developments of Genetically Modified Organisms*, EPA (N.Z.), <http://www.epa.govt.nz/new-organisms/popular-no-topics/Pages/GM-field-tests-in-NZ.aspx> (last visited Oct. 4, 2014). Such activities are classed as being in containment within approved facilities. *Id.* The first step in development is laboratory work, followed by clean house tests, limited and confined field tests, and finally full field tests. This process gradually generates more and more information. See Greenpeace Se. Asia (Phil.) v. Env’tl. Mgmt. Bureau of the Dep’t of Env’tl. & Natural Res., CA-G.R. No. 00013, 19 (Ct. App. Spec. 13th Div., May 17, 2013) (Phil.) (testimony of Dr. Carino).

41. See MENDOZA ET AL., *supra* note 38, at 16–17.

42. TIES THAT BIND, *supra* note 39, at 5.

43. MENDOZA ET AL., *supra* note 38, at 17.

44. *Cf. id.* at 15.

45. TIES THAT BIND, *supra* note 39, at 6.

pro-GMO.⁴⁶ Additionally, the two main research institutes supporting golden rice, International Rice Research Institute (“IRRI”) and PhilRice, receive funds from the United States Agency for International Development (“USAID”), the Syngenta Foundation, HarvestPlus, the Rockefeller Foundation, and the Bill & Melinda Gates Foundation.⁴⁷ On February 16, 2012, the first five field trial sites for golden rice were granted to PhilRice by the BPI.⁴⁸ The field trial site grant was a critical step toward the final approval of golden rice for human consumption, animal feed, and massive cultivation. After the field-test sites were granted, Greenpeace publicly alleged that some “independent” biotech groups – such as the International Service for the Acquisition of Agri-biotech Applications (“ISAAA”), which is connected to IRRI – are associated or partnered with American multinational companies and act as conduits between multi-national companies, the Filipino government, and government research institutes.⁴⁹ For example, Dr. Gerard Barry, a former Monsanto director, now leads the Golden Rice project at IRRI of the Philippines and serves as the Golden Rice Network coordinator.⁵⁰ Admittedly, some Filipino research institutes do have connections with American companies, but it remains unclear how the connection impacts the GMO regulatory process. Although Greenpeace did not provide any evidence demonstrating that research institutes’ connections with American companies have improperly impacted the golden rice research and regulatory process, that view was heavily implied by Greenpeace’s allegations.⁵¹

46. *Id.*

47. Golden Rice Humanitarian Board, *supra* note 15 (“How is the project funded . . . ? Funds have . . . been provided by USAID, the Syngenta Foundation, HarvestPlus, and the Bill & Melinda Gates Foundation.”); *cf. Our Funding*, IRRI.ORG, <http://irri.org/about-us/our-funding> (last visited Oct. 14, 2014) (showing the statement does not truly reflect the funding sources because the IRRI sources come from a very diversified donation pool); *International Partners*, PHILRICE, <http://www.philrice.gov.ph/?page=partners&page2=inter> (providing that the Bill & Melinda Gates Foundation also funds PhilRice); *PhilRice program awarded \$100,000*, ABS-CBN NEWS (Feb. 28, 2003, 1:12 AM), <http://www.abs-cbnnews.com/nation/regions/02/27/13/philrice-program-awarded-100000> (reporting that PhilRice receives funds from the Arab Gulf Programme for Development).

48. See Bureau of Plant Indus., Dep’t of Agric. (Phil.), *Approval Registry for Filed Testing of Regulated Articles, Annex IV, 5*, http://biotech.da.gov.ph/Approval_Registry.php (Feb. 11, 2013).

49. *Accord TIES THAT BIND*, *supra* note 39, at 6-7.

50. *Gerard Barry*, IRRI, <http://irri.org/about-us/our-people/specialists/former/gerard-barry?tmpl=component&print=1&page=> (last visited Oct. 4, 2014) (staff profile).

51. See *generally TIES THAT BIND*, *supra* note 39, at 8.

C. THE JUDICIAL BAN ON BT EGGPLANT RESEARCH AND ITS
INFLUENCE ON GOLDEN RICE

In addition to the control exerted by agencies, the judicial branch of the Philippines may also intervene in the GMO approval process. On May 17, 2013, the Philippine Court of Appeals ordered the GMO regulatory agencies to “permanently cease and desist from further conducting Bt talong field trials.”⁵² The court adopted the “precautionary principle”⁵³ because “there is no full scientific certainty yet as to the effects of the Bt talong field trials to the environment and health of people.”⁵⁴ *Stare decisis* binds lower courts to this decision,⁵⁵ making it likely that other courts will stop golden rice field trials if the trials are challenged in court because, at the field-testing stage, scientists and researchers have not determined that the rice is absolutely safe. The concern about golden rice’s future is not merely hypothetical. The recent raid on the golden rice trial fields clearly demonstrated that golden rice is the next target for anti-GMO activists. Indeed, Greenpeace, the winner in the Bt eggplant case, is already protesting that “the next ‘golden rice’ guinea pigs might be Filipino children.”⁵⁶

D. SPS REGULATIONS

The WTO may view the judicial ban on Bt eggplant as an SPS issue if an adversely affected WTO member, such as the United States, initiates an investigation regarding the ban. Before addressing relevant SPS rules, it is useful to understand the relationship between two WTO agreements – the General Agreement on Tariffs and Trade (“GATT”)

52. Yap & Torres-Tupas, *supra* note 13, at 2. Talong means eggplant. *See generally id.*

53. The precautionary principle applies “[w]hen there is a lack of full scientific certainty in establishing a causal link between human activity and environmental effect, the court shall apply the precautionary principles in resolving the case before it.” Rules of Procedure for Environmental Cases, A.M. No. 09-6-8-SC at Part V (Apr. 13, 2010), available at http://www.lawphil.net/courts/supreme/am/am_09-6-8-sc_2010.html. The court may consider the following factors to decide if the precautionary principles shall be applied: “(1) threats to human life or health; (2) inequity to present or future generations; or (3) prejudice to the environment without legal consideration of the environmental rights of those affected.” *Id.*

54. Yap & Torres-Tupas, *supra* note 13, at 1.

55. The Filipino legal system is a mixture of Spanish civil law and Anglo-American common law. *See generally* Cesar Lapuz Villanueva, Comparative Study of the Judicial Role and Its Effect on the Theory on Judicial Precedents in the Philippine Hybrid Legal System, 65 PHIL. L. J. 42 (1990-91). This “hybrid” system includes the doctrine of *stare decisis*. *Id.*

56. Lomborg, *supra* note 23, at 3.

and the SPS. The GATT aims to promote an international free trade environment by eliminating trade discrimination and avoiding national protectionism.⁵⁷ But the GATT allows nations to adopt sanitary and phytosanitary measures to control trade, so long as the measures comply with specific requirements set forth in the SPS, which elaborates on the rules of application contained in Section XX(b) of the 1994 GATT.⁵⁸ The primary goal of the SPS is to prevent unnecessary negative effects on international trade caused by unwarranted domestic sanitary or phytosanitary measures and protectionism.⁵⁹ Additionally, the SPS reaffirms nations' autonomous right to protect human, animal, or plant life and health within their territories.⁶⁰

A GATT member nation can adopt an SPS measure to preserve its human, animal, or plant life only within the GATT-SPS scheme.⁶¹ An SPS measure is “any measure applied to protect human or animal life or health . . . from risks⁶² arising from additives, contaminants, toxins or disease-causing organisms in foods”⁶³ SPS measures include “all relevant laws, decrees, regulations, requirements and procedures including . . . provisions on relevant statistical methods, sampling procedures and methods of risk assessment”⁶⁴

If a governmental ban on Bt eggplant research – or any other GMO research for that matter – qualifies as an SPS measure, it is subject to SPS Articles 2.2, 5.1, and 5.7. The manner in which these three sections interrelate remains unclear and, therefore, the burden of proof, a closely related issue, remains puzzling. Section 2.2 requires members to ensure that any SPS measure is based on scientific principles.⁶⁵ Section 5.1 specifies which scientific principles can be used in cases where sufficient scientific evidence exists, while Article 5.7 creates an exception to

57. 3 WTO — TECHNICAL BARRIERS AND SPS MEASURES 5 (Rudiger Wolfrum et al. eds., 2007).

58. *See id.* at 99 (commenting that the SPS does not require a GATT violation as a necessary element to sustain a SPS violation). The SPS would prevail over the GATT, if there were a conflict between the two. *See e.g., id.* at 368.

59. Simonetta Zarrilli, U.N. Conference on Trade & Dev., International Trade in GMOs and GM Products: National and Multilateral Legal Frameworks, 35 UNCTAD/ITCD/TAB/30 (2005).

60. *See generally* Agreement on the Application of Sanitary and Phytosanitary Measures preamble, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1A, 1867 U.N.T.S. 493 [hereinafter SPS].

61. *Id.* at 494.

62. Risks mean “the likelihood and magnitude of the adverse effect occurring under real-world exposure scenarios.” Lakshman D. Guruswamy, *Sustainable Agriculture: Do GMOs Imperil Biosafety?*, 9 IND. J. GLOBAL LEGAL STUD. 461, 484 (2002).

63. SPS, *supra* note 60, at 501.

64. *Id.* at 1.

65. *See id.* at 500.

Article 5.1 when there is not sufficient scientific evidence in the tested area.⁶⁶ Some scholars argue that a violation of Article 5.1 or Article 5.7 automatically implies a violation of Article 2.2.⁶⁷ Another group of scholars believes that the application of Article 5.7 excludes the application of Article 2.2 because the provision states “except as provided for in paragraph 7 of Article 5.”⁶⁸ The WTO Appellate Body⁶⁹ has held that the initial burden of proof lies with the claimant, which must establish a prima facie case⁷⁰ that the measure is inconsistent with Article 2.2 by proving that the measure lacks sufficient scientific evidence with regard to a certain risk of a certain product.⁷¹ The panel in *Japan- Agricultural Products II* treated Article 5.7 as a general rule and allocates the burden of proof to the claimant.⁷² However, if Article 5.7 acts as an affirmative defense and as an exception to Article 2.2, the defendant would bear the burden of proof. The appellate body in *Japan-Apple* stated that Article 5.7 is an exception to Articles 2.2 and 5.1 and, as a result, the defendant should bear the burden of proof.⁷³ Because WTO Appellate Body rulings only bind the particular case at hand, the appellate body’s decision in *Japan-Apple* does not preempt the panel’s holding in *Japan- Agricultural Products II*.⁷⁴ Nonetheless, “in practice the Member establishing the SPS measure will be forced to submit evidence of a risk and of a risk assessment to which the measure bears a rational relationship.”⁷⁵ Because a party using a SPS measure is often a defendant who is sued to defend the legitimacy of its SPS measure, the *Japan-Apple* decision has been widely followed.

Section 5.1 requires the SPS measure be based on a risk assessment.

66. See *id.* at 502; see also Wolfrum, *supra* note 577, at 458 (showing the relationship between article 5.6 and article 2.2).

67. Cf. Wolfrum, *supra* note 57, at 439.

68. JOACHIM AHMAN, TRADE, HEALTH, AND THE BURDEN OF PROOF IN WTO LAW 208 (2011).

69. WTO Appellate Body rulings apply only to the parties at issue, but the Appellate Body “has recognized that prior decisions are important, since the precedents create legitimate expectations among WTO members.” Johannes S.A. Claus III, Note, *The European Union’s Efforts to Sidestep the WTO Through Its Ban on GMOs: A Response to Sarah Lively’s Paper, “The ABCs and NTBs of GMOs,”* 24 NW. J. INT’L L. & BUS. 173, 187 (2003).

70. See Appellate Body Report, *Japan — Measures Affecting the Importation of Apples*, ¶ 153, WT/DS245/AB/R (Nov. 26, 2003) [hereinafter *Japan-Apples Appellate Report*].

71. *Id.* ¶160.

72. Panel Report, *Japan — Measures Affecting Agricultural Products*, ¶ 8.58, WT/DS76/R (Oct. 27, 1998) [hereinafter *Japan-Agricultural Products II Panel Report*]; see also Wolfrum, *supra* note 57, at 463.

73. *Japan-Apples Appellate Report*, *supra* note 70, ¶¶ 143–60.

74. See Claus, *supra* note 69, at 187.

75. Wolfrum, *supra* note 57, at 445.

Though “no minimum magnitude or threshold level of risk is required before a risk assessment can be considered to comply with Art. 5.1, . . . an unquantifiable or theoretical amount of risk stemming from the possibility of unknown factors, is not enough.”⁷⁶ In other words, the defendant state must prove there is a “probability” of risk⁷⁷ in order to justify an SPS measure under Article 5.1. The risk assessment of substances present in a product is often referred to as an evaluation of potential effects.⁷⁸ The relevant substance may include an “additive” that is “intentionally added for a technological purpose to a [genetically modified] plant that is eaten or being used as an input into processed foods.”⁷⁹ Potential effects evaluation is comprised of two stages: identification of specific adverse effect and evaluation of the probability of occurrence.⁸⁰

Section 5.7 allows for the adoption of provisional measures without a risk assessment when insufficient scientific information exists about the relationship between the SPS measure and the tested object.⁸¹ Scientific evidence is deemed insufficient if “the body of available scientific evidence does not allow, in quantitative or qualitative terms, the performance of an adequate assessment of risks as required under Article 5.1.”⁸² Section 5.7 is a narrow, qualified exception⁸³ that recognizes that occasionally Member States “need to act promptly to eliminate suspected risks without waiting for conclusive scientific evidence confirming the existence and extent of a risk.”⁸⁴ This provision, as interpreted by the WTO Appellate Body, reflects the precautionary principle,⁸⁵ a

76. *See id.* at 446.

77. MARK A. POLLACK & GREGORY C. SHAFFER, *WHEN COOPERATION FAILS* 350 n. 77 (2009) (“It is not sufficient that a risk assessment conclude there is [only] a possibility of the risk at issue.”).

78. AHMAN, *supra* note 68, at 172.

79. Eur. Communities, Panel Rep., *Measures Affecting the Approval and Marketing of Biotech Products*, ¶ 7.2837, WT/DS 291R, 292R, 293R (Sept. 29, 2006) [hereinafter *Biotech Products Panel Report*].

80. Eur. Communities, Panel Rep., *EC Measures Concerning Meat and Meat Products (Hormones) Complaint by the United States*, ¶ 8.98, WT/DS26/AB/R/USA (Aug. 18, 1997) [hereinafter *EC Hormones Panel Report*].

81. *See* Appellate Body Report, *Japan- Measures Affecting Agricultural Products II*, ¶ 79, WT/DS76/AB/R (Feb. 22, 1999) [hereinafter *Japan-Agricultural Products Appellate Report*].

82. *Japan-Apples Appellate Report*, *supra* note 70, ¶ 179.

83. *See id.* ¶ 80.

84. Wolfrum, *supra* note 57, at 458.

85. Appellate Body Report, *EC Measures Concerning Meat and Meat Products (Hormones)*, 88, WT/DS26/AB/R, WT/DS48/AB/R (Jan. 16, 1998) [hereinafter *EC Hormones Appellate Report*]; *see also* POLLACK & SHAFFER, *supra* note 77, at 196 (stating in dicta that since a U.S.-E.C. panel commented that the E.C. risk assessment

mechanism favorable to the defending party, but one that has not been widely accepted by WTO Member States.⁸⁶ However, in spite of the potential application of this principle, reasons exist to believe that Article 5.7 may be a difficult authority for a defending party to rely upon. First, each of the four of the requirements outlined in Article 5.7 must be fulfilled in order for the rule to be applied.⁸⁷ Second, defending parties may be more hesitant to use Article 5.7 due to the split opinions on which party should bear the burden of proof.⁸⁸

II. THE JUDICIAL BAN ON GMO RESEARCH VIOLATES SPS ARTICLES 2.2, 5.1 AND 5.7

Judicial restraints on Bt eggplant research have a significant domino effect. Experience has shown that most field studies on GMOs, including golden rice, can be blocked through reliance on the precautionary principle. This section is devoted to outlining how the Bt eggplant ban and other similar restrictions on GMO research conflict with the SPS.

A. A BAN ON GOLDEN RICE RESEARCH IS INCONSISTENT WITH THE SPS, DOES NOT BENEFIT THE LOCAL COMMUNITY, AND IS ECONOMICALLY UNDESIRABLE

1. A GMO Field Research Ban Qualifies as an SPS Measure and is Subject to SPS Regulations

The SPS definition of a qualifying measure takes into account its purpose, legal form, and effect.⁸⁹ The Filipino Court of Appeals enjoined all Bt eggplant field research in May 2013, citing the Filipino constitutional right to a “balanced and healthful ecology.”⁹⁰ The panel viewed Bt eggplant field research as a willful disturbance of the ecological balance, issuing its decision to protect human health from risks associated with foods being tested.⁹¹ Additionally, the pesticide-

identified certain “uncertainty or constraints,” there could be grounds for upholding a Member State’s safeguard under Article 5.7).

86. *EC Hormones Appellate Report*, *supra* note 85, ¶¶ 122–23.

87. The four requirements are: 1) insufficiency of scientific evidence; 2) measures based on available pertinent information; 3) the party is seeking additional information; and 4) the party reviews the measure within a reasonable period. SPS, *supra* note 60, art. 5.7; *see also* JEREMY STREATFIELD & SIMON LACEY, *NEW REFLECTIONS ON INTERNATIONAL TRADE* 273 (2007).

88. AHMAN, *supra* note 68, at 224.

89. Wolfrum, *supra* note 57, at 379.

90. Greenpeace Se. Asia (Phil.), CA-G.R. No. 00013, at 22–23.

91. *Id.*

generating genes in Bt eggplants fall under the definition of an “additive” under the SPS⁹² because they are intentionally added to crops consumed by humans. Consequently, the court’s ruling is an attempt to restrict additives and falls squarely under the purpose requirements of SPS Annex A1(b).⁹³ Since this decision has the force of law,⁹⁴ the Filipino court’s decision should be characterized as an SPS measure.

In the future, other Filipino courts may issue decisions to proscribe GMO field research using similar reasoning. In addition, executive actions against golden rice research, such as additional inspections or permit guidance, could be deemed SPS measures even though these discretionary executive acts are not laws strictly speaking.⁹⁵ Consequently, national governments must carefully scrutinize their actions regarding GMO research and assess possible consequences under the SPS.

A qualified measure is subject to SPS regulations if it directly or indirectly affects international trade.⁹⁶ Based on past GATT and WTO practices, “affecting” has been given “a broad play” and does not require showing “a quantifiable impact” on international trade.⁹⁷ SPS rules have been applied to an SPS measure when the act might adversely modify trade conditions, even though the relevant SPS measure may not directly govern the sale or purchase of goods.⁹⁸ In this case, a sweeping ban on GMO field research effectively halts the introduction of new GMOs to the Philippines because the NCBP must monitor the field research before any type of GMO can be released.⁹⁹ The field research ban not only eliminates the possibility of domestic development of GMOs, but also means that newly imported GMOs cannot be released into the Filipino market without regulatory approval, which, in turn, requires supporting data from field tests. As a result, the research ban negatively affects international trade and should be subject to SPS rules. Prohibition of golden rice field testing would also likely be subject to SPS rules because it impacts international commerce in GMOs.

92. See *supra* Part IV para 4.

93. See generally *id.*

94. See *id.* (“[S]anitary or phytosanitary measures include all relevant laws, decrees, regulations, requirements and procedures including, inter alia, end product criteria . . .”).

95. Use of term “inter alia” suggests that the nature of a SPS measure is open to interpretation. Wolfrum, *supra* note 57, at 384.

96. SPS, *supra* note 60, art. 1.1.

97. Wolfrum, *supra* note 57, at 377.

98. *Italian Discrimination Against Imported Agricultural Machinery*, Oct. 23, 1958, GATT B.I.S.D. 7S/60, ¶ 12.

99. Cf. MENDOZA ET AL., *supra* note 38, at 19 (noting that the NCBP monitored nine GMO field tests through 2003).

a. The Field Research Ban Violates SPS Article 5.1

SPS Article 5.1 requires any measure be based on an assessment of risks to humans that is appropriate to the circumstances.¹⁰⁰ The complainant would bear the burden of proof to establish that there is no appropriate risk assessment of GMO field research or that the field test ban¹⁰¹ is not based on such an assessment.¹⁰² Consider Bt eggplant research ban as an example. The Filipino Court of Appeals' decision lacked scientific findings on a specific adverse effect caused by the eggplant field test and its likelihood. The majority opinion placed excessive weight on a single scientist's assertion that further efforts should be made to ensure eggplant's safety "beyond the parameters of science."¹⁰³ The court decided against the defendants — all Filipino biosafety agencies — simply because they could not guarantee the safety of the Bt eggplants.¹⁰⁴ This holding misunderstood the issue under dispute because it mischaracterized the field test's safeguarding function as ensuring the safety of Bt eggplants themselves. The opinion did not identify any specific adverse effects caused by the test and failed to discuss probability. As a result, an effective argument for challenging the ban could emphasize that no risk assessment took place.

Moreover, a potential challenger would have ample scientific evidence to prove that the Bt field tests met the safety requirement established by Filipino regulators. The field test, as a data generating and collecting process, is regulated by stringent procedures.¹⁰⁵ The testimony of Filipino regulatory agencies implied that the eggplant test followed approved laboratory and greenhouse protocol, which examined the function and safety of the Bt genes.¹⁰⁶ These regulatory frameworks ensure that confined facility trials and field tests are "based on the need to protect human health and the environment from the possible adverse effects of the products of modern technology."¹⁰⁷ After the eggplants passed two preliminary tests, the NCBP was required to consider the IBC's assessment and the STRP's recommendation, both of which were supported by prudent review of scientific reports from research institutes

100. SPS, *supra* note 60, art. 5.1.

101. This Note uses the terms "field research" and "field test" interchangeably.

102. *See generally* Wolfrum, *supra* note 57, at 445.

103. Greenpeace Se. Asia (Phil.), CA-G.R. No. 00013, at 22.

104. *See id.* at 17 (testimony of Dr. Carino, noting that Bt eggplant safety can only be reasonably guaranteed by the completion of field tests).

105. *See* MENDOZA ET AL., *supra* note 38, at 15–16.

106. *See generally id.*

107. *Id.* at 30 (quoting the Cartagena Protocol on Biosafety to the Convention on Biological Diversity, 29 Jan. 2000, 2226 U.N.T.S. 208).

before making an independent decision on the field test proposal.¹⁰⁸ At the final stage, the BPI reviewed the NCBP's field test evaluation again before issuing ultimate permission for testing to take place.¹⁰⁹ Consequently, GMO field testing in the Philippines is subject to numerous procedural safeguards designed to ensure public safety.

This procedure employed numerous scientifically prudent risk assessment techniques, including multifaceted scientific reviews conducted by various qualified institutes and agencies. This process recognizes the fact that the international community has generated sufficient background information to permit relaxation of information and notification requirements for field testing on certain GMOs.¹¹⁰ The fact that Bt eggplants were even subject to field testing in the Philippines, given that the World Health Organization ("WHO") and the European Union concluded that the modified eggplants do not impose more risks than conventional crops,¹¹¹ speaks to the stringency of the Filipino GMO approval process.

As discussed previously, the Filipino court failed to perform a risk analysis of the eggplant field testing program, focusing instead on the possible dangers of the crop if it were widely exposed to the environment. Available evidence indicates that the court interfered with a well-designed and stringent GMO review process that would have adequately protected the Filipino people. Consequently, a complaint regarding the Filipino ban on Bt eggplant field testing would establish a *prima facie* case under the SPS for overturning the ban. With the initial burden of proof met, focus would then shift to the Philippines.¹¹² The Philippines would then be required to submit evidence of an identifiable risk caused by the field test and further prove that the ban bears a rational relationship to a risk assessment. In its decision, the Filipino court stated that Bt eggplant field trials imposed a *scientifically plausible* threat to humans and the environment.¹¹³ The mere assertion of an amorphous or theoretical risk does not meet the Appellate Body definition of a risk assessment, which requires an identifiable or ascertainable threat.¹¹⁴ As a result, the Filipino Court of Appeals' decision failed to provide sufficient reasoning to establish a rational relationship between the risk assessment and ban.

108. *See generally id.* at 17.

109. *See generally id.* at 15, 17.

110. *See* Guruswamy, *supra* note 62, at 482.

111. DIRECTORATE-GEN. FOR RESEARCH & INNOVATION, EUR. COMM'N, A DECADE OF EU-FUNDED GMP RESEARCH (2001–2010) 56–57 (2010).

112. Wolfrum, *supra* note 57, at 445.

113. Greenpeace Se. Asia (Phil.), CA-G.R. No. 00013, at 20.

114. *See EC Hormones Appellate Report*, *supra* note 85, at 200.

b. The GMO Field Research Ban is Inconsistent with SPS Article 5.7, if Applicable

i. Applicability of Article 5.7

The Philippines may attempt to rely on the Article 5.7 exemption to extricate itself from its possible violation of Article 5.1. Because Article 2.2 clearly states that the scientific evidence requirement applies to all SPS measures, except measures provided for by Article 5.7, it is more logical to classify Article 5.7 as an exception or affirmative defense to Article 2.2.¹¹⁵ Common law principles establish that the claimant bears the initial burden of proof, but a defendant who intends to use an affirmative defense must assume the burden of proof regarding the elements of the affirmative defense.¹¹⁶ Because Article 5.7 would require the Philippines to argue that it cannot create an Article 5.1 risk assessment of the GMO field test ban due to a lack of scientific evidence, the Philippines would be responsible for proving that there is not enough scientific evidence to support an Article 5.1 risk assessment.

It is important to examine whether the Philippines can successfully argue that there is insufficient scientific evidence to conduct a risk assessment of Bt eggplant field tests, since the applicability of Article 5.7 is addressed on a case-by-case basis. Three situations exist where the insufficiency of scientific evidence can support an affirmative defense under Article 5.7.¹¹⁷ First, if no research¹¹⁸ concerning the risk of Bt eggplant field-testing exists, a viable defense may be present. Defendants BPI and DA testified before the Court of Appeals that the confined field tests of the eggplant complied with biosafety regulations and were granted biosafety permits from the BPI. According to Filipino regulations, the Bt field test permit could only be granted after the eggplants had undergone successful testing in confined facilities.¹¹⁹ Understanding this, golden rice was granted approval for multi-location field testing on February 16, 2012.¹²⁰ According to Filipino biosafety

115. SPS, *supra* note 60, art. 2.2.

116. DAVID WEISSBRODT ET AL., *THE COMMON LAW PROCESS OF TORTS* 11 (2d ed. 2012) (“The plaintiff generally has the burden of proving the material facts underlying all the essential elements of her cause of action. The defendant usually has the burden of proving all the material facts underlying the essential elements of her cause of action.”).

117. AHMAN, *supra* note 68, at 211.

118. *Id.*

119. *Cf.* MENDOZA ET AL., *supra* note 38, at 16 (outlining IBC requirements for confined facility research).

120. BUREAU OF PLANT INDUS., DEPT. OF AGRIC. (Phil.), *supra* note 49, at 5.

regulations, such a permit could only be granted after the crops had successfully undergone laboratory and greenhouse tests.¹²¹ These confined facility tests make it unlikely that the Philippines could claim that there was *no* scientific evidence regarding Bt eggplants and golden rice field tests. The confined facility tests on Bt eggplants and golden rice should have provided research that could be used to analyze the potential risk of the field-tests. As a result, the Philippines cannot rely on this first Article 5.7 justification.

Second, the Philippines can invoke Article 5.7 if the existing research is not sufficient to perform a risk assessment.¹²² So far, the Philippines has not produced evidence demonstrating that there is insufficient evidence to perform a risk assessment. The Court of Appeals accepted the allegation that the Filipino biosafety regulations were not sufficient because not all stakeholders – including governmental officers from all sectors, not just scientists – participated in the field test approval procedure.¹²³ But this argument does not explain how, from a scientific view, the previous tests fail to provide enough information to approve the Bt eggplant field-test program. Instead, the argument relies on the public's ungrounded fear of Bt eggplants, which is not enough to establish the elements required by Article 5.7. On the contrary, there is evidence that supports the credibility and sufficiency of Filipino biosafety regulation. For instance, the Filipino biosafety regulations were drafted with reference to regulations in technologically advanced countries, such as Japan, Australia, United Kingdom, and the United States;¹²⁴ the regulations are a product of domestic research;¹²⁵ and each GMO field-test application must undergo stringent and subject-specific approval procedures.¹²⁶

Third, Article 5.7 can be triggered if subsequent scientific developments render the previous research insufficient for a proper risk assessment.¹²⁷ In order to qualify the ban under this prong of Article 5.7, the Philippines must submit later scientific research demonstrating that the Bt eggplant field tests impose a specific risk or risks to humans or the environment. The Philippines cannot meet the burden of proof with the sole reliance on the lack of full public disclosure of field test information and full public participation in the field tests because that argument

121. See MENDOZA ET AL., *supra* note 38, at 16–17.

122. AHMAN, *supra* note 68, at 211.

123. See Greenpeace Se. Asia (Phil.), CA-G.R. No. 00013, at 14.

124. MENDOZA ET AL., *supra* note 38, at 13.

125. *Id.* at 12.

126. See *id.* at 16–17 (procedure of submission and review).

127. AHMAN, *supra* note 68, at 211.

provides no scientific evidence.¹²⁸

ii. The Precautionary Principle

The Filipino court based its Bt eggplant decision on the precautionary principle, which is highly controversial.¹²⁹ There is no consensus definition of the precautionary principle.¹³⁰ Generally, under the precautionary principle, a Member State can adopt any measure where there are threats of serious or irreversible damage, despite the lack of full scientific certainty.¹³¹ The principle does not specify the range of acceptable threats or risks, and, as a result, irrational fear of unknown risks may trigger the principle. The principle does not require the identification of a specific risk in a risk assessment. Instead, the principle can be triggered by simply pointing out uncertainties or limitations¹³² in the risk assessment. Because the precautionary principle allows a member nation to implement SPS measures based upon vague allegations of uncertainty, it is not a predictable or consistent decision-making tool that can be used by WTO dispute panels.¹³³ Consequently, the WTO should not allow member countries to shield their SPS measures with the precautionary principle, especially since the precautionary principle could be used as a cloak for protectionism.

iii. The Bt Eggplant Research Ban Does Not Meet All of the Legal Requirements of Article 5.7 SPS Measures

However, the precautionary principle will not save the Filipino GMO field research ban if the ban fails to conform with the following Article 5.7 requirements. As discussed above, it seems unlikely that the Philippines will be able to establish that there is insufficient scientific

128. Greenpeace Se. Asia (Phil.), CA-G.R. No. 00013, at 21. (“The universe of our healthful and balanced econology certainly go beyond the specific crops.”).

129. See generally Wolfrum, *supra* note 57, at 459.

130. See Guruswamy, *supra* note 62, at 483 (commenting that the precautionary principle is ambiguous, and that critics disagree on aspects of its application).

131. The 1992 Rio Declaration on Environment and Development, June 16 1992, princ. 15, 31 I.L.M. 874, 879 (1992).

132. See POLLACK & SHAFER, *supra* note 77, at 196 (“[W]ere there EU-level risk assessment to identify certain ‘uncertainties or constraints’ in its evaluation, there could be grounds for upholding an EU member-state’s safeguard measure as being ‘based’ on an EU risk assessment . . .”).

133. See Guruswamy, *supra* note 62, at 484 (“As presently formulated, the PP offers no intelligible decision-making principle. At most then, the PP may serve as a general aspiration or goal for a regulatory system, perhaps appropriate for the preambles of international treaties and domestic statutes, but certainly not as a legally binding regulatory structure.”).

evidence to conduct a risk assessment of Bt eggplant field testing. Even if the Philippines fulfills its burden of proof regarding insufficient evidence, it will not be able to comply with the rest of the terms of Article 5.7. According to Article 5.7, the Philippines is obliged to seek additional information, perform a more objective risk assessment, and review the Bt eggplant field test ban within a reasonable period of time. In reality, the Filipino judicial branch has permanently halted the Bt eggplant field test program.¹³⁴ Nothing in the judgment indicates that the Philippines would reconsider the ban within a reasonable time period.¹³⁵ If the Philippines chooses to rely on Article 5.7, it must make a reasonable agenda demanding thorough research on the GMO field test approval procedures and relevant biosafety regulations, then set a specific date or period to review the ban. Unless the Philippines creates a reasonable review agenda, it will not be able to rely on Article 5.7.

In conclusion, a prospective complainant would have a very strong case when challenging the Filipino judicial ban on Bt eggplant field research. The Bt eggplant field-test prohibition probably violates SPS Article 5.1 because it is not based on a risk assessment. Meanwhile, Article 5.7 is unlikely to save the ban because it is likely inapplicable. Even though the WTO dispute panel recognized the controversial precautionary principle, the Philippines would have to show that it is seeking additional information and that it will reconsider the judicial ban within a reasonable time. So far, the Philippines have no such schedule and the Bt eggplant field-testing prohibition is apparently permanent.

III. THE SOCIAL AND ECONOMIC BENEFITS OF GOLDEN RICE OUTWEIGH THE SPECULATIVE SOCIAL HARM

A. GOLDEN RICE IS NOT THE MAIN DRIVE OF SOCIAL INJUSTICE IN THE PHILIPPINES

The risk assessment is a key component of the domestic food safety evaluation, but is not the only factor taken into consideration when crafting the domestic agriculture policy of a nation.¹³⁶ Some anti-GMO developing countries allege they face the dilemma of either experiencing a food shortage or accepting poisonous food aid from other countries,¹³⁷

134. Greenpeace Se. Asia (Phil.), CA-G.R. No. 00013, at 24.

135. *Id.*

136. Guruswamy, *supra* note 62, at 481 (“Risk analysis does not offer a final and determinative answer whether GMOs advance SA.”).

137. See *GM Crops in Africa: Better Dead Than GM-fed?*, ECONOMIST, Sept. 21, 2002, at 94, available at <http://www.economist.com/node/1337197> (“Zambia’s president, Levy Mwanawasa, calls the stuff ‘poison’ and refuses to import it, despite a warning from

some of which contains genetically modified foods. Aside from the endless GMO safety debate,¹³⁸ many anti-GMO groups believe hunger stems from poverty, rather than food scarcity. They assert that international trade in genetically modified foods exacerbates economic disparities between developing and developed countries and therefore weakens developing countries' ability to purchase food.¹³⁹ These groups believe that the trade in genetically modified crops is unethical because it is inconsistent with social justice.¹⁴⁰ They blame biotechnology for allowing developed-world researchers to collect germplasm¹⁴¹ developed by poor farmers and use it to develop patented crop varieties,¹⁴² which can then be sold back to poor farmers. They argue that biotechnology will result in fewer and larger farms, causing poor farmers to lose their land.¹⁴³ Specifically with regard to golden rice, observers have

the UN World Food Programme . . . that relief supplies [in Zambia] could run out in two weeks.”).

138. There is no conclusion on whether GM foods are absolutely safe for human health and environment. See Debra M. Strauss, *Genetically Modified Organisms in Food: Genetically Modified Organisms in Food: A Model of Labeling and Monitoring with Positive Implications for International Trade*, 40 INT'L LAW 95, 108 (2006) (“[P]ublications on GM food toxicity are scarce, there are few animal studies, and peer-reviewed publications of clinical studies on the human health effects of GM food are needed . . . [T]he GM crop is regarded as safe as its conventional counterpart . . . Substantial equivalence . . . has never been properly defined or provided with a legal standard.”).

139. Carmen G. Gonzalez, *Trade Liberalization, Food Scarcity, and the Environment: The Neoliberal Threat to Sustainable Rural Development*, 14 TRANSNAT'L L. & CONTEMP. PROBS. 419, 422 (2004) (“The most food insecure countries . . . are vulnerable to world market price fluctuations and to the declining terms of trade for agricultural commodities relative to manufactured goods.”).

140. Paul B. Thompson, *Ethics, Hunger, and the Case for Genetically Modified (GM) Crops*, in ETHICS, HUNGER AND GLOBALIZATION: IN SEARCH OF APPROPRIATE POLICIES 215, 222 (Per Pinstrup-Andersen & Peter Sandoe eds., 2007) (“The Green Revolution was criticized for tending to benefit relatively better-off farmers at the expense of poorer ones.”).

141. Germplasm, a synonym of genetic resource, is “a seed, plant, or plant part that is useful in crop breeding, research, or conservation because of its genetic attributes.” See JOHN DODDS ET AL., *Plants, Germplasm, Genebanks, and Intellectual Property: Principles, Options, and Management*, IPHANDBOOK OF BEST PRACTICES, <http://www.iphandbook.org/handbook/ch04/p06/> (last visited Oct. 6, 2014). But genetic resources have a dual nature: They are “on the one hand, physical property in the form of germplasm and, on the other hand, IP in the form of modified genetic information constituting inventions, trade secrets, and new plant varieties.” *id.*

142. Thompson, *supra* note 140, at 222 (“The third critique accuses developed-world agricultural researchers of ‘biopiracy,’ when they collect germplasm developed by poor farmers and use it to develop certified or patented crop varieties.”).

143. *Id.* (“The ‘technological treadmill’ identified by agricultural economist Willard Cochrane suggests that yield-enhancing agricultural technologies generally produce temporary benefits for early adopters at the expense of late adopters, who can eventually lose their farms entirely, fueling the trend toward fewer and larger farms.”).

speculated that royalty-free licenses could be used to build confidence in the licensing system, under the guise of humanitarian assistance, and serve as a pre-cursor to future licensing agreements that may be less advantageous to poor farmers.¹⁴⁴ In this manner, golden rice research could open the door for large agricultural companies to force their terms on the Filipino farmers who become reliant on golden rice seeds.

Importantly, however, biotechnology brings substantial and identifiable benefits to developing countries that may outweigh the unjustified belief that GMO trade drives up food prices and exacerbates the hunger that already plagues many developing states. As mentioned in Part I, golden rice's value is widely recognized. A recent study commissioned by the WHO notes that golden rice provides "the potential for increased agricultural productivity or improved nutritional values . . . reduced agricultural chemical usage and enhanced farm income, and improved crop sustainability and food security."¹⁴⁵

It is true that global food prices did skyrocket by 83 percent over the thirty-six months prior to February 2008.¹⁴⁶ But the price increase may well be caused by reasons other than GMO trade.¹⁴⁷ The demand for better food and nutrition is rising rapidly in some of the more populous developing countries, such as China and India, where household incomes have increased dramatically.¹⁴⁸ This rise in demand drives up the price of food.¹⁴⁹ Moreover, an enormous amount of food grains and fiber are devoted to biofuel uses in some developed countries. As of January 2008, industry capacity of ethanol production from biofuel stood at 7.8 billion gallons per year.¹⁵⁰ When food is used to produce biofuel, it means that less food is available for human consumption, creating more scarcity and

144. Murphy, *supra* note 29, at 111. ("In some situations, the motivation of the biotechnology company is more complex. According to the executive director of the ISAAA, the rationale 'is that appropriate regulations, seed distribution systems, and trust and confidence have to be built both for humanitarian reasons and as a pre-cursor [sic] for licensing arrangements and the building of various forms of alliances and joint ventures.'").

145. Strauss, *supra* note 138, at 108 ("Overall, global food prices had increased by a whopping 83 percent over the 36 months leading up to February 2008.").

146. Shalendra D. Sharma, *The Other Global Crisis*, 64 *Int'l J. (Can.)* 501, 501 (2009).

147. *See id.* at 503–06 (attributing the price increase to a number of factors, including a sharp drop in available food supply, an increase in biofuel subsidies, rising demand in developing countries, a single-currency system in the international food market, a sharp rise in oil and natural gas prices, grain export restrictions, erratic weather, trade policies, and seasonal lags).

148. Sharma, *supra* note 146, at 503.

149. *Id.* at 504.

150. RENEWABLE FUELS ASS'N, *CHANGING THE CLIMATE: ETHANOL INDUSTRY OUTLOOK 2008 2* (2008).

driving up prices even further.¹⁵¹ Therefore, the skyrocketing food prices in 2008 can be attributed to multiple factors, none of which are related to GMO trade. On the contrary, increasing the productivity of small farms through the use of GMOs would help reduce domestic food prices and stimulate the global economy as it recovers from the 2007 U.S. housing bubble and ensuing recession.¹⁵² Simply put, prohibiting GMO trade will not keep food prices from increasing and, even worse, will block one of the ways farmers could improve their circumstances.

With respect to the potential for licensing agreements to cause injustice, the original golden rice license holder, Syngenta, arranged for intellectual property controlled by other agricultural companies to be licensed free of charge for the sole purpose of the Golden Rice Project.¹⁵³ In addition to granting free licenses to poor Philippine farmers, the Humanitarian Board of the Golden Rice Project plans to continue granting licenses to the National Agricultural Research Centers and other public research institutions.¹⁵⁴ Golden rice opponents' fear that small farmers could be deprived of rice seeds due to license fees is eliminated by the aforementioned royalty-free license arrangements. Perhaps the royalty-free deployment is the first step in Syngenta's broader plan to enter the Southeastern Asian market, but there is nothing wrong with a large company showing its willingness to conduct business in a new market by making a friendly gesture. The institutions owning the patents stated that they would not "create any new dependencies."¹⁵⁵ So far, there is no good reason to worry about large companies taking advantage of poor Filipino farmers provided the licensors keep their promise.

151. See Sharma, *supra* note 146, at 503–04.

152. See INT'L FOOD POLICY RESEARCH INST., ENDING HUNGER IN AFRICA: ONLY THE SMALL FARMER CAN DO IT 5 (2002) ("Each 1-percent increase in agricultural productivity in Africa has been shown to reduce poverty by 0.6 percent. Stated differently, a 1-percent increase in yields can help 6 million more people raise their incomes above US\$1 per day.").

153. Golden Rice Humanitarian Board, *supra* note 15 ("Will Golden Rice be more expensive than regular rice? No. The technology involved in developing Golden Rice is free because its inventors, and Syngenta, which has been given the exclusive rights to the Golden Rice technology by the inventors, have released all intellectual property rights to the public sector through the Golden Rice Network. The price of Golden Rice, both its seeds and polished rice, is expected to be comparable with regular rice.")

154. *Id.* ("How will the technology reach developing countries? The technology will be provided to international and national research organisations in developing countries under licence. . . . The Humanitarian Board will continue to grant licenses, as they judge appropriate, to the National Agricultural Research Centres and other public sector research institutions[] in developing countries.")

155. *Id.* ("Who was the recipient of the *Golden Rice* donation . . . ? The licences [sic] remain free, do not create any new dependencies, and are necessary to maintain good stewardship of the technology.")

B. THE INSTITUTIONAL PROBLEM

The Filipino public may have reason to doubt GMO test results because a large portion of scientific experiments are conducted by institutions closely connected to multi-national companies.¹⁵⁶ For instance, the golden rice field tests and confined facility tests are conducted by IRRI, whose director used to work for Monsanto.¹⁵⁷ However, it is not logical to claim a conflict of interest simply because a former employee of a large company is now testing golden rice. The anti-GMO activists assume that a former employee would serve the interest of the former employer after the termination of the employment. This practical concern might have some merits, but the influence from prior employers can be overcome by various regulations. The Filipino government has implemented sufficient safeguards – such as the STRP, NCBP, IBC, and BCT, all of which consist of specialized scientists in various areas – to ensure an objective GMO application process. Such a complicated and multi-stepped review system should be able to offset a slightly biased opinion from one research facility.

Additionally, Greenpeace alleges that the BAT is dominated by pro-GMO scientists.¹⁵⁸ But the BAT's influence is very limited because the BAT only comes into play when the STRP and the BCT hold inconsistent opinions about a GMO application. Moreover, the BAT only makes recommendations to the DA's secretary, who also gives heavy weight to NCBP's opinion on both confined tests and field tests.¹⁵⁹ As a result, the BAT's ability to improperly influence the GMO approval process seems somewhat limited.

Even if we accept the allegation that IRRI and the BAT receive support from or lean toward multi-national companies, there is still no direct evidence that the golden rice field testing itself has been tainted. The minor influence the IRRI and BAT relationships with multi-national companies might have on the research is not substantial enough to call off the golden rice field testing program, nor does it justify the vandals' misbehavior. However, it is possible that the bias in the regulatory system may someday become substantial enough to contaminate the golden rice research. If anti-GMO activists continue to use mass media to exaggerate the "undue influence" of multi-national companies on the GMO approval process, it could create unwarranted hysteria¹⁶⁰ and

156. *See id.*

157. *See Gerard Barry, supra* note 50.

158. *See TIES THAT BIND, supra* note 39, at 8–9.

159. *See MENDOZA ET AL., supra* note 38, at 15 (describing the power and responsibility of NCBP as the lead national body as mandated by EO 430 (1990)).

160. Claus, *supra* note 69, at 190 ("It seems that the European government leaders

hinder the progress of golden rice research. Thus, it may be in the best interests of the developers of golden rice and other GMOs to clean up conflict of interest problem in order to sustain a healthy GMO research and development system.

C. GOLDEN RICE CULTIVATION WOULD NOT HARM TRADITIONAL RICE EXPORTS

The Philippines regulates GMOs based on not only scientific risk assessments, but also economic concerns, such as protection of local agriculture from foreign competition¹⁶¹ and GMO's impact on Filipino food exportation. Golden rice opponents suspect that the new genes will accidentally transfer to indigenous rice by cross-pollination.¹⁶² This alleged genetic contamination to natural rice could cast a shadow over rice exports, which are primarily composed of organic black rice and aromatic long grain rice. If importers detect unnatural genes from golden rice, this genetic contamination could substantially reduce the Philippines' rice exportation.¹⁶³

However, scientists point out that the outcrossing rate of rice is very low, as many cultivated species of rice are essentially self-pollinating.¹⁶⁴ Moreover, rice pollen is only viable for three to five minutes,¹⁶⁵ which further reduces the chance of cross-pollination. Additionally, golden rice researchers can stagger the flowering dates of golden rice plants or place them far away from local rice varieties to reduce the chance of crossbreeding.¹⁶⁶ It is also important to consider that any negative economic impact caused by golden rice may be offset by the savings the

have abdicated their duty to educate their citizens (or failed to educate themselves) about the benefits and risks of GMOs, rather than regulating in reaction to 'unwarranted public hysteria.'").

161. Guruswamy, *supra* note 62, at 481.

162. Paul Elias, *Biotech Rice Still Years Off*, ABC NEWS (June 25, 2011), <http://abcnews.go.com/Technology/story?id=98465> ("Once the plants are released into the environment, cross-pollination with traditional rice could have unpredictable long-term impacts on the food billions of people eat every day.").

163. Philippines Targets Over 200 Tons Rice Exports in 2013, ORYZA (Jul. 24, 2013), <http://oryza.com/content/philippines-targets-over-200-tons-rice-exports-2013> (showing that 100 tons of rice were sold during the first seven months of 2013 and expecting that sales would reach 200 tons for the entire year of 2013).

164. Golden Rice Humanitarian Board, *supra* note 15. ("Is gene flow an issue with Golden Rice . . . ? [M]any other studies have demonstrated that the chance of outcrossing from cultivated rice species is very low, as these varieties are essentially self-pollinating.").

165. *Id.*

166. *Id.* ("Where this might be an issue, the likelihood of outcrossing can be reduced significantly by appropriate measures, such as staggered flowering dates and by observing recommended distances to other rice fields.").

Filipino government can realize by using golden rice to replace its vitamin A supplement programs.¹⁶⁷

It is also possible that a GMO research ban may cause some countries to adopt retaliatory measures in order to offset their losses. Though retaliation is not allowed under the GATT, in reality, a retaliatory measure could still cause some irrecoverable damages to the Filipino economy before the measure is removed. As a result, it seems likely that banning golden rice research could cause significant economic damage, while allowing the research to go forward could provide the Filipino economy with substantial benefits.

Conclusion

Golden rice has a high nutritional value, which can provide a radical, practical, and economical solution to the VAD issue in the Philippines. Filipino governmental agencies from various sectors are working diligently within a comprehensive framework to investigate the influence exerted by golden rice on human health and the local environment.

The recent judicial decision on the research of Bt eggplants casts a shadow on golden rice research and sets up a negative precedent for GMO research related disputes. However, the Filipino Court of Appeals' holding on Bt eggplants is not logically coherent and is inconsistent with the SPS.

Moreover, golden rice is not likely to give rise to social injustice based on the licensing agreements between Filipino research institutions and patent owners. Additionally, golden rice research has not negatively impacted the traditional rice trade in the Philippines since the beginning of the research and it is unlikely that the proliferation of golden rice would significantly impact traditional rice exports in the future.

In conclusion, the Philippines has little legal, ethical, or economic reason to stop golden rice field research, a GMO field research ban probably violates SPS regulations, and the nutrient and economic values of golden rice outweigh the alleged social injustice or economic downside. Therefore, it would be unwise for the Philippines to follow the lead of the Court of Appeals' decision banning Bt eggplant field-research. Instead, the Filipino government should renew its support for golden rice and proceed through the field-testing process.

167. See *Vitamin A Supplementation*, HELEN KELLER INT'L, <http://www.hki.org/preventing-blindness/vitamin-a-supplementation/> (last visited Sept. 20, 2014) ("Vitamin A supplementation is . . . costing just \$1.00 per child per year.").