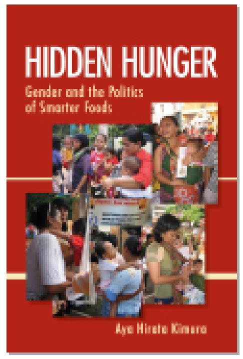
Hidden Hunger

Kimura, Aya Hirata



Published by Cornell University Press

7

CREATING NEEDS FOR GOLDEN RICE

This rice could save a million kids a year.

—On the cover of *Time,* July 31, 2000

"World Top Economists Say Biofortification One of Top Five Solutions to Global Challenges" was the triumphant headline of a 2008 press release by HarvestPlus, an organization promoting biofortification. At what was called the Copenhagen Consensus Conference, distinguished economists were invited to think about major challenges facing the world. Asked to prioritize global issues, they pinpointed HIV/AIDS, global warming, and terrorism and others along with malnutrition, which they indicated had one of the "most effective solutions" in biofortification.[1] Nonexistent fifteen years earlier, biofortification had come to enjoy widespread recognition among development practitioners by 2008.

Biofortification uses plant-breeding technologies to develop food crops that are rich in micronutrients. Conventional fortification adds minerals and vitamins to a particular food vehicle during processing, before purchase and consumption. In contrast, biofortification reconfigures the plant itself through biotechnology or conventional breeding so that it is more nutritious. An often-cited example of a biofortified crop is Golden Rice—rice with daffodil genes inserted into it so that its endosperm contains beta-carotene.[2]

Until the late twentieth century, biofortification was not among the common policy tools for combating micronutrient deficiencies. The conventional package of "micronutrient strategies" in many nutritional science textbooks and policy documents usually included food fortification, nutrition education, and vitamin supplement dissemination. Indeed, the birth of the concept of biofortification can be traced to the mid-1990s, and the term never appeared in earlier nutritional science or crop-breeding literature.[3] Within less than a decade, the concept of biofortification became well known among international organizations, food policy experts, and nutritionists, and it attracted significant support. How did biofortification achieve such prominence on the radar screen of mainstream development practitioners? What accounts for its success in building a technoscientific network, carving out a niche among the weapons in the global fight against hidden hunger?

To answer these questions, we need to situate the story in a broader global politics of development, technology, and profit making than in a purely technical assessment. Although often celebrated as a major scientific breakthrough, biofortification is impressive more because of its expansive network of supporters than because of its actual nutritional efficacy. Biofortification's support network includes international agricultural researchers, bilateral/multilateral donors, philanthropic organizations, as well as biotechnology researchers and the life sciences industry. Its proponents have also effectively mobilized a moralized discourse to make it a part of the much-awaited "gene revolution" that will bring biotechnology to developing countries. In this chapter I analyze the social power of this particular "solution" to global malnutrition as a performance on a historically situated stage that elegantly weaves diverse interests, deploys emotionally powerful imageries, and claims moral superiority.

Despite the discursive success of biofortification, and in particular, of Golden Rice, such products have not actually been used by the poor in the developing countries. Here I analyze the case of Golden Rice in Indonesia. Interrupting the unquestioned celebration of Golden Rice, I consider the limited viewpoint of nutritionism, which has rendered many social and cultural issues invisible. While Golden Rice proponents use the poor in the global South as their moral foundation, the poor and the malnourished have not had a say in defining the needs to be addressed through Golden Rice research other than their representation in nutritional status studies. Like the hypervisibility coupled with absence of women, the "poor" has been constructed as a generic category for a target population. The Indonesian case study points to the discursive power of Golden Rice and its limitations.

Breeding for Nutrition

The promoters of biofortification tend to present it as a novel undertaking that combines agriculture and nutrition. It is true that, generally, agricultural research and development after World War II emphasized crop yields and income increase rather than nutrition as research objectives. The Green Revolution was resolutely grounded in this way of thinking, so that productivity became the most valued standard for measuring the success of agricultural research (Mebrahtu, Pelletier, and Pinstrup-Andersen 1995). However, in the 1970s, agricultural researchers briefly developed nutritional objectives and sought to breed for better nutrition for the Third World poor. This early movement by scientists to raise the issue of nutritional quality had been triggered by a realization that the Green Revolution might have increased agricultural yields but, ironically, had not necessarily improved the nutritional situation (Dewey 1979; Fleuret and Fleuret 1980). One of the criticisms of the Green Revolution was that the quality of diet for the poor did not improve, or that it even actually deteriorated, due to the new agricultural practices (Miller 1977; Manning 1988).[4] For instance, critics contended that pesticide runoff killed fish, destroying a precious protein source for the poor (Cleaver 1972). The iron content of the Asian diet was reported to have decreased due to the Green Revolution, as it replaced many of the foods based on beans and peas with cereals (Haddad 1999).

In response, the Consultative Group on International Agricultural Research programs started to examine nutrition as a potential research objective. There was, according to one observer, a “significant evolution in the perception of the ways in which agriculture, and therefore agricultural research, could influence nutrition” (Omawale 1984, 273), and affiliated centers started nutritional programs.[5] A nutrition focus in this period, however, did not mean a focus on micronutrients, but more usually a focus on protein (Bressani 1984), reflecting the preoccupation with protein in the nutrition literature at the time. Projects aimed to increase the protein in certain crops, such as rice at the International Rice Research Institute (IRRI) (Flinn and Unnevehr 1984) and cassava and beans at the International Center for Tropical Agriculture (Pachico 1984). The International Maize and Wheat Improvement Center was most active in protein-focused research, even recruiting several nutritionists for the project in the late 1970s (Tripp 1984a; Tripp 1984b; Mebrahtu, Pelletier, and Pinstrup-Andersen 1995; Ryan 1984).

These programs on protein-rich crop development did not materialize, however. The nutritionally improved crops tended to create a trade-off between yield and nutrition. For instance, CIMMYT’s “quality protein maize” had a substantially lower yield (Mebrahtu, Pelletier, and Pinstrup-Andersen 1995), and protein-rich rice developed by IRRI similarly suffered from the trade-off between grain yield and protein content (Flinn and Unnevehr 1984). As a result of this productivity glitch, most of the protein projects were eventually abandoned (Tripp 1984a; Ryan 1984).

These breeding for nutrition programs also showed the difficulty of cross-disciplinary collaboration. As the agricultural community started to set their goal on nutrition, it turned out that the nutrition community could not agree on the nutritional needs of the Third World. More specifically, as the agricultural community started to take up protein as the key goal, there was growing criticism from within the field of nutrition about the protein fiasco. It was a frustrating time for the agricultural research community. Agricultural experts thought that they had been given a clear mandate from nutritional science to increase the protein content of crops, but the changing focus put agricultural scientists in disarray (Mebrahtu, Pelletier, and Pinstrup-Andersen 1995, 228). One scholar from the CGIAR summarized their frustration:

> At that time protein as the main nutrient that was deficient was at the height of its scientific popularity.... It was the protein problem that made the centers take the next step, and research on protein content, the limiting amino acids, and some biological testing was initiated. More than discouraging results in protein quantity and quality, nutrition opinion and criticism induced the next change: the object of increasing production was to increase the intake of energy, now the favorite dietary component. Results showed levels of protein intake to be in most instances adequate or above the needed levels, and the concept of protein quality was somehow lost. (Bressani 1984, 257)

Suffering from the compromised productivity and frustrated by the moving target of "nutrition needs," the nutrition-oriented breeding programs came to be widely acknowledged as a failure in the agricultural research community by the mid-1980s (Omawale 1984; Ryan 1984; Tripp 1990). The idea of breeding for enhanced nutrient content became stigmatized, and the agricultural research community moved back to the traditional productivist research agenda. They reasoned that if people could get large enough crops, their incomes would grow, and then they would be able to buy nutritious food (Ryan 1984, 219). As Per Pinstrup-Andersen has summarized, agricultural researchers at the CGIAR "concentrated on increasing crop yields, ensuring yield stability, reducing costs of production, and protecting the environment, while recognizing that nutritional benefits may accrue *indirectly* from increased crop production and so lower food prices" (Pinstrup-Andersen 2000, 352; my emphasis). The international agricultural community thought that their contribution to improved nutrition should be achieved primarily through higher agricultural yields.

Hampered by the trade-off between yield and nutrition and the difficulty of translating nutritional needs into a practical research agenda, the earlier breeding for nutrition efforts turned out to be short-lived. The nutrition goal was not seen as appropriate for the international agricultural research institutions, except for the general contribution to income growth of developing countries.

Linking Agriculture and Health

In the 1990s, the idea of breeding for nutrition resurfaced. USAID asked the International Food Policy Research Institute to explore possible contributions of agriculture to human nutrition. Subsequently, the IFPRI's Howarth Bouis became the central figure in the promotion of the biofortification concept. But the biofortification concept did not see an immediate acceptance. Given its history, biofortification initially seemed like a bad idea: a new incarnation of an old, failed dream. The IFPRI staff recalled that one of the challenges for biofortification was that the CGIAR scientists tended to assume the inevitability of a tradeoff between nutritional value and plant yield from their previous experiences (Bouis 1994). Hence, the upward mobility of the emergent concept of biofortification critically hinged on the prospect of success of the technology. Biofortification promoters needed to provide a compelling argument to the CGIAR that biofortification did not necessarily compromise yields in order to enroll them in its network (Bouis, Graham, and Welch 1999).

Pressured to demonstrate the feasibility of biofortification, the IFPRI looked for research centers that had been working on similar projects. It turned to the Plant, Soil, and Nutrition Laboratory run by the USDA‘s Agricultural Research Service (ARS) at Cornell University, and the Waite Agricultural Research Institute at the University of Adelaide in Australia. The Plant, Soil, and Nutrition Laboratory had been examining the linkages between minerals in soils and plant nutrients. Waite had conducted studies to improve plant nutrition by breeding for crops with improved mineral uptake from soils (Bouis 1994). The IFPRI hoped that the CGIAR's lack of enthusiasm for nutrition-related projects could be changed by these institutions, which could show some theoretical feasibility of biofortification (Bouis, Graham, and Welch 1999).

The IFPRI organized workshops bringing the CGIAR together with the Plant, Soil, and Nutrition Laboratory and Waite researchers. Researchers from these laboratories presented arguments that biofortification did not have to compromise breeders' traditional goals of yield increase so that they would not be repeating the same mistake they had made with protein-rich crops. They also pointed out the possibility that increasing the micronutrient stores in seeds might increase seedling vigor and viability, improving the performance of seedlings particularly in micronutrient-poor soils (Welch 2002). These presentations from the Plant, Soil, and Nutrition Laboratory and Waite were instrumental in changing the CGIAR's persistent pessimism about nutrient–rich plants. Biofortification promoters reported that the "attitudes towards the micronutrient-dense-seed plant breeding strategy among a core group of the CGIAR plant breeders changed dramatically" after these presentations (Bouis, Graham, and Welch 1999, 6).

Subsequently, the CGIAR embarked on an initiative to develop a five-year plan on biofortification, and at least three CGIAR centers (IRRI, CIMMYT, and the International Center for Tropical Agriculture) signed on (Bouis, Graham, and Welch 1999).

But the scientific persuasion was not the only factor that enhanced the perceived feasibility of biofortification. It was significantly improved by its association with Golden Rice. Indeed, it's now easy to think of it as a product of biofortification research. Currently, Golden Rice is managed by HarvestPlus, whose mission is biofortification, and biofortification researchers often mention Golden Rice as an example of biofortification. Serving as a proof of principle for the biofortification concept, Golden Rice has critically contributed to reducing doubts about the achievability of biofortification.

Yet the widespread association between Golden Rice and biofortification betrays the reality that they started as different programs. Golden Rice research had already started before the concept of biofortification was born. In addition, while the biofortification network was centered on the IFPRI and CGIAR, Golden Rice research had European roots: the project was headed by two researchers: Ingo Potrykus from the Swiss Federal Institute of Technology and Peter Beyer from the University of Freiburg.[6] Furthermore, original motivations were different. The biofortification network grew out of the mandate to shift agricultural research's focus to human nutrition. As such, it could use either conventional breeding techniques or biotechnology, as long as it contributed to improvement in human nutrition. In contrast, Golden Rice was started explicitly as a biotechnology project. One of the funders for the Golden Rice research was the Rockefeller Foundation, whose chief concern was biotechnology's slow adoption by developing countries. Continuing its legacy as the chief architect of the Green Revolution, the Rockefeller Foundation promoted the notion of the "Doubly Green Revolution."[7] They saw that the developing countries were lagging behind in their participation in the "gene revolution," which could be another and perhaps better (ecological, hence "doubly green") agricultural revolution in the global South. It was in this context that they saw Golden Rice as a way to build social acceptance for agricultural biotechnology in the Third World. Gary Toenniessen, who was the director of the food security program at Rockefeller, made this conceptual underpinning clear in 2001:

> [Golden Rice] did not start within a programme that was designed to solve Vitamin A deficiency. Beta-carotene enhanced rice goes back to the beginning of the Foundation's rice biotechnology programme, when the objectives were different. Back then, the Foundation was concerned that new biotechnologies that could contribute to crop

> genetic improvement were not being applied to any of the crops or any of the traits that were important in developing countries. In both the private sector and the public sector in industrialized countries, these technologies were being employed for crops important in their own countries that were financially more attractive. Therefore, we started a programme to build capacity in Asia to use these new biotechnologies. (Lehmann 2001)

In this view, Golden Rice was a beachhead that could be used to educate the global South about the merits and potentials of biotechnology. It was in this envisioned trajectory from Green Revolution to gene revolution that Golden Rice was to be utilized.

Despite these different origins, the Golden Rice network and the biofortification network eventually became connected. Golden Rice and biofortification institutionally merged when the management of Golden Rice was transferred from the Golden Rice Humanitarian Board to HarvestPlus in 2001 (International Center for Tropical Agriculture and IFPRI 2002). The task of conducting research for actual dissemination and promotion of Golden Rice in developing countries was now the responsibility of this new organization (IRRI, Rockefeller Foundation, and Syngenta 2001; Schnapp and Schiermeier 2001).

In addition to evidence of feasibility, the excitement about biofortification needs to be situated in the broader trend in international development. One important cultural aspect of biofortification is its hybrid nature, in which the agricultural and the nutritional are conceptually combined. In the 1990s, funding for international agriculture research had dwindled considerably. This was a dramatic change from the 1970s, when the Green Revolution was at its height and agriculture funding had increased by more than 14 percent. But between 1985 and 1996, it grew by less than 1 percent per year (Pardey, Alston, and Smith 1997). The CGIAR system had been particularly hard hit, resulting in significant budget cuts and staff lay-offs (Bagla 1998).[8]

In contrast to the shrinking resources for international agricultural research, the health sector had started to enjoy increased funding from international donors (Okie 2006, 1085). For instance, agriculture used to be one of the largest US foreign aid sectors, but it had been surpassed by the global health sector, whose budget had nearly doubled since 2001 (Tarnoff and Nowels 2004). The World Bank's new commitment in the health sector further accelerated its increasing prominence. The world's wealthiest philanthropic organization, the Bill and Melinda Gates Foundation, also made global health its primary focus.[9] The concept of biofortification was hence an exciting combination of agriculture and health.

Helped by these factors, biofortification succeeded in increasing its public profile and gaining institutional support. In 2002, the CGIAR embarked on a $90 million project called the Global Challenge Program on Biofortification, which aimed to breed micronutrient-dense rice, maize, wheat, beans, cassava, and sweet potatoes with iron, zinc, and vitamin A (Graham 2003). In 2004, HarvestPlus was established to promote biofortification with funding from the World Bank, USAID, DANIDA, the ADB, and the Bill and Melinda Gates. It is headed by Howarth Bouis, who retains his affiliation with the IFPRI and collaborates with the CGIAR institutions, such as the International Center for Tropical Agriculture and IRRI.[10]

By networking with other institutions and adopting Golden Rice as the proof of workability of the concept, biofortification has raised its profile and trustworthiness. In addition, its hybridity in addressing both agriculture and health issues has been useful in increasing its prominence in international development. Global health concerns enjoyed a significant increase in resources in the 1990s, which has been described by one observer as the "golden age of global health" (Okie 2006, 1085). With a renewed emphasis on agriculture in international development since the mid-2000s, biofortification is well positioned to take advantage of its hybrid nature.[11]

Linking the Global North to the Global South: GMO Politics

Besides the agricultural research community, biofortification also has had another set of cheerleaders. For biotechnology promoters who were trying to overcome resistance and opposition to genetically modified organisms (GMOs), the promise of biofortification and Golden Rice provided a useful rhetorical tool to claim wider spatial benefits and moral virtue for biotechnology. Biofortification and Golden Rice embody *benevolent biotechnology*—biotechnology that benefits people in the underdeveloped world by helping them to produce more food and more nutritious food. The discourse of benevolent biotechnology asserts that biotechnology's benefits need to be experienced globally, beyond the modern capital-intensive farms of the developed nations. Indeed, an increasingly prevalent claim made by biotechnology proponents has been that GM crops fulfill the needs of the poor in developing countries. As seen in Monsanto's public relations website, Biotech Knowledge Center, which argues that "biotechnology matters" because "we *can feed the world* for centuries to come and improve the quality of life for people worldwide" (Monsanto Biotechnology Knowledge Center 2001; my emphasis), proponents have argued that GM crops will increase food production and reduce global hunger. In an effort to legitimize such a claim, they have fiercely lobbied at the 2002 World Food Summit to add biotechnology as an option to the resolution on ending world hunger (Carroll 2002). The possible *nutritional* contribution of GM crops has also been used to reinforce arguments for biotechnology. As evident in the following claim made by the Biotechnology Industry Organization, which represented life sciences companies, biotechnology promoters have portrayed GM crops as having a mission to prevent malnutrition as well: "Agricultural biotechnology must be more seriously considered as a significant part of any program to address the *nutritional needs* of the developing world" (Feldbaum 2002; my emphasis).

Marked as a nutritional GM crop for the poor, Golden Rice perfectly fits with the gospel of benevolent biotechnology. With its beta-carotene content enhanced by the inserted daffodil gene, Golden Rice is tasked to tackle vitamin A deficiency in developing countries. Golden Rice's principal researcher and perhaps most vocal advocate, Ingo Potrykus, has painted a dramatic picture of the benevolent potential of Golden Rice in feeding the poor:

> As soon as a novel bio-fortified variety is deregulated and can be handed out to the farmer, the system demonstrates its unique potential, because from this point on, the technology is built into each and every seed and does not require any additional investment, for an unlimited period of time. Just consider the potential of a single Golden Rice seed: Put into soil it will grow to a plant which produces, at least, 1,000 seeds; a repetition will yield at least 1,000,000 seeds; next generation produces already 1,000,000,000 seeds and in the fourth generation we arrive at 1,000,000,000,000 seeds. These are 20,000 metric tons of rice and it takes only two years to produce them. From these 20,000 tons of rice 100,000 poor can survive for one year, and if they use Golden Rice they have an automatic vitamin A supplementation reducing their vitamin A-malnutrition, and this protection is cost-free and sustainable. All a farmer needs to benefit from the technology is one seed! (Potrykus 2004)

Echoing the tenets of benevolent biotechnology, Potrykus paints a utopian picture in which the desperate needs of the poor in the underdeveloped world are fulfilled by Golden Rice. Multiplying at little cost, Golden Rice seed is to deliver its promise of benevolent biotechnology to the poor.

The claim of benevolent biotechnology has also been used by proponents to imply that opposition to biotechnology is tantamount to an ideology that opposes the global South. Readers might recall incidents in 2002 when European nations, which sent African nations money but not GM grain, were accused of "killing people in Africa" because several African nations refused US food aid on the ground that it might contain genetically modified grains. President Bush said "European governments should join—not hinder—the great cause of ending hunger in Africa" (quoted in Clapp 2005, 474). Biotechnology promoters used the occasion to repeat a theme of benevolent biotechnology in which stricter biotechnology regulations were portrayed as harming the poor in developing countries. By asserting that being against biotechnology is being against the global South, pro-GMO groups placed themselves as morally superior to GMO skeptics.

But why does benevolence matter in contemporary biopolitics? What explains such intense moral investment in a biotechnology product? The biotechnology promoters' enthusiastic support for Golden Rice and biofortification as benevolent biotechnology must be understood within the context of a globalized struggle over the diffusion of GM crops in general. The conventional wisdom has been that the struggle over GM crops is principally a matter of a social divide between the United States and the European Union and a trade disagreement between the US state and the EU states. Social differences in US and European attitudes toward GM crops are well documented (Gaskell 2000), and GM crops and foods have been considered a major "irritant" in the EU-US trade relationship since the late 1990s.

After failing to force the European Union and other developed nations to accept GM crops, biotechnology proponents changed their tactics to cultivate markets in the global South (Stone 2002). The major proponents of GM crop products and technologies are placing pressure on developing countries to structure their regulatory systems to adopt the US "substantial equivalence" system, rather than the EU's "precautionary principle" system (Buttel 2003; Schurman and Kelso 2003). At the core of their lobbying is the realization that whether GM crops successfully diffuse globally depends on the Third World (Buttel 2003).[12]

Since the late 1990s, campaigns to promote GMOs to the developing countries have intensified. A good example is Monsanto, whose 2000 annual report made the global broadening of the GMO market one of six critical objectives for the company, singling out several developing nations as targets (Monsanto 2001). It has started to market GM crops in developing countries, notably Bt cotton to India and Indonesia. It is in this context that the actual benefits of GM crops to developing countries has become a fiercely contested issue (Stone 2002; Brooks 2005), and the claim of benevolent biotechnology has become salient for the pro-GMO groups. It comes down to a battle for the moral high ground over who cares more about the poor in the global South.

However, such a claim goes counter to the history of agricultural biotechnology, which has involved research in developed nations and transnational life sciences corporations, and marketing primarily to farmers in developed nations. By far, the biggest beneficiaries of GM crops are North American farmers who produce commodity crops such as soybeans, corn, cotton, and canola. About 45 percent of the total acreage in GM crops is in the United States (ISAAA 2010). Although some “developing countries,” notably Brazil and Argentina, have adopted GM crops, they are taken up mainly by large-scale commodity farms, not peasants who practice subsistence agriculture (GRAIN 2009; Binimelis, Pengue, and Monterroso 2009).[13] Most of the GM crops that are planted in developing countries are Bt cotton, corn with herbicide traits, and herbicide-tolerant soy for export and animal feed purposes (Wield, Chataway, and Bolo 2010; Binimelis, Pengue, and Monterroso 2009), so they are not feeding the hungry.[14] Therefore, the claim of benevolent biotechnology that conjures up antihunger effects of GMOs is a huge leap from reality. Golden Rice and biofortification conceal this gap by offering tangible evidence for the ability of GM crops to feed the poor in the less-developed world. As such, biofortification and Golden Rice have attracted enthusiastic support from promoters of GM crops.

Overall, then, biofortification’s social versatility can be summarized by two conceptual reconciliations. First, as the embodiment of benevolent biotechnology, biofortification purportedly reconciles the North-South gap in the “gene revolution.” Connecting the global North and the global South’s biofutures, which had previously been imagined separately, biofortification and Golden Rice have been useful in telling a story of hidden yet continuously unfolding benefits of biotechnology to be extended from the rich North to the poor South. Simultaneously, by embodying agriculture’s role in improving human nutrition, biofortification bridges two distinct fields in international development. Such hybridity has brought significant support from those in the international agricultural community, as it provides an opportunity for them to cross a traditional disciplinary boundary to participate in international health issues that enjoyed growth in resources and international prominence.

These two *conceptual* innovations mark biofortification’s social appeal, attracting diverse actors and institutions to its network and by linking different yet overlapping calculations and dreams. Indeed, it could be argued that the conceptual innovations are the biggest achievements of biofortification to date, as there has not been meaningful consumption of biofortified products by the poor in developing countries. Their usefulness as a discursive tool was the basis for the heightened profile and stature of biofortification and Golden Rice in the international development scene.

Golden Rice’s Slow Circulation

For a product of research in the not-so-lay-friendly field of molecular biotechnology, Golden Rice has enjoyed a great deal of publicity and popular interest.

After the first major publication on Golden Rice in *Science,* in 2000 (Ye et al. 2000), it immediately became global news. The *Washington Post*'s January 14 headline read, "Gene-Altered Rice May Help Fight Vitamin A Deficiency Globally" (Gugliotta 2000). *Time* magazine in July 2000 featured on its cover Potrykus, portraying Golden Rice as "grains of hope" that "could save a million kids a year." (Madeleine 2000). In these media portrayals, Golden Rice was a technological miracle, a scientific breakthrough. Despite such wide attention and praise, the actual deployment of the technology has been quite slow. It has been over a decade since Golden Rice was produced, but the widespread adoption in the Third World that was dreamt of by its pundits is nowhere to be seen. What has happened?

It is not that Golden Rice has not had institutional support. The Golden Rice Humanitarian Board established the Humanitarian Golden Rice Network that included sixteen institutions in Bangladesh, China, India, Indonesia, South Africa, the Philippines, Vietnam, and Indonesia (Potrykus 2004).[15] In 2001, Golden Rice research was transferred to IRRI to develop for practical use in developing countries (IRRI, Rockefeller Foundation, and Syngenta 2001; Schnapp and Schiermeier 2001). Yet the development of Golden Rice has taken much longer than anticipated. The original plan at IRRI was to complete field tests by mid-2003, complete food safety tests by 2006 (Chong 2003), and to have the rice available for commercial release in 2007 (Zimmermann and Qaim 2004). A report in 2003 predicted that plants suitable for field trials should be available within a few years (Rice Today 2003). However, Golden Rice development has lagged behind this original schedule (Paarlberg 2003), and no major developments have been reported to date. More recently, field trials were conducted in the Philippines, but many local groups are questioning its safety (Manila Times 2011).

This has set off a blame game. Golden Rice pundits prefer to argue that some technical glitches and bureaucratic obstacles are holding back the progress of a life-saving technology. Some suggest that a main bottleneck has been the difficulty of breeding with more popular varieties of rice. The original Golden Rice was Taipei 309, because this variety responds well to tissue culture. Yet Taipei 309 is a *japonica* rice, which is not the prevalent rice in Asian countries.[16] Another challenge for Golden Rice is meeting agronomic performance standards in addition to nutritional improvement. Researchers could come up with a wonderful Golden Rice, but what if farmers did not want it? A survey of farmer leaders in the Philippines showed that economic concerns were the most important criteria in decision making on Golden Rice (Chong 2003). Golden Rice has to meet both nutritional and agronomic expectations. The most salient assertion by Golden Rice pundits is that Golden Rice is suffering from excessive regulatory cautiousness. Central to this narrative is the anti-GMO movement that has made governments take an overly restrictive approach to biotechnology. Potrykus's comment below summarizes such a view.

> Considering that Golden Rice could substantially reduce blindness (500,000 per year) and death (2–3 million per year) 20 years are a very long time period, and I do not think that anyone should complain that this was "too fast"! If it were possible to shorten the time from science to the deregulated product, we could prevent blindness for hundreds of thousands of children! However, the next 5 years will have to be spent on the required "bio-safety assessments" to guarantee that there is no putative harm from Golden Rice for the environment and the consumer. Nothing speaks against a cautious approach, but present regulatory praxis follows an extreme interpretation of the "precautionary principle" with the understanding that not even the slightest hypothetical risks can be accepted or left untested, and at the same time all putative benefits are totally ignored.... Golden Rice could prevent blindness and death of hundreds of thousands of children but cannot do so, so far, because risk assessment notoriously is ignoring a risk-benefit analysis! (Potrykus 2004)

Although perhaps unusual in its directness, Potrykus's comment epitomizes proponents' assertion that Golden Rice's surprisingly slow development is due to the anti-GMO movement and resultant biotechnology regulations that are too rigid. Citing the "extreme interpretation" of the precautionary approach in biotechnology regulation that "ignores all the benefits," Potrykus blames regulators for Golden Rice's failure to reach the poor. Furthermore, he echoes the discourse of benevolent biotechnology in charging that a phobia of GMOs prohibits Third World people from receiving Golden Rice's benefits.

Departing from the above view that faults technical and social obstacles, however, we might scrutinize the original claim of Golden Rice's "success" in fulfilling the needs of the Third World poor. Going back to the Ye et al. article in *Science* that first announced the birth of the miracle rice to the world, it becomes clear what Golden Rice actually accomplished was to solve technical riddles that constitute only a small part in the chain leading to vitamin A sufficiency in the Third World.

It is instructive to step back from the assumption of its being a miracle seed and examine the original Golden Rice research to see how it was designed and operationalized. The original research began with the finding that although rice kernels do not have beta-carotene, they make a precursor to beta-carotene (geranylgeranyl diphosphate or GGPP). The research then was narrowed down to find a way to turn GGPP into beta-carotene using enzymes from daffodils. The research question became two technical problems. The first was how to get a daffodil gene into rice. In the early stage of the research, Peter Burkhardt in Potrykus's laboratory tried to use a gene gun, which is a standard way of introducing new genes into plants. But four genes for new enzymes did not get into plants properly. Xudong Ye succeeded with a different strategy by using the plant-infecting bacteria *Agrobacterium tumefaciens* as a vector (Gura 1999).

The second technical problem was which gene construct to use to transform GGPP to beta-carotene. The pathway from GGPP to beta-carotene is as follows: GGPP → phytoene → zeta-carotene → lecopene → beta-carotene. Each conversion needs a specific enzyme. The process of GGPP → phytoene needs phytoene synthase; phytoene → zeta-carotene needs phytoene desaturase; zeta-carotene lecopene alpha needs zeta-carotene desaturase; and the final lecopene → beta-carotene needs lycopene beta-cyclase. Therefore, the process needs four enzymes: phytoene synthase, phytoene desaturase, zeta-carotene desaturase, and lycopene beta-cyclase. The researchers reported in the *Science* article that the "best" line produced 1.6 mcg carotenoids/g of dry weight of rice (Ye et al. 2000). This was really what was reported as the miracle rice that could "save a million kids a year."

Notice the layers of translation from these combinations of enzymes to producing a "miracle rice." The Third World food problem had to be equated to micronutrient deficiencies, and in this case vitamin A deficiency was singled out. Vitamin A deficiency was then translated into the lack of vitamin A in diets, and then further translated into the need for beta-carotene, a precursor to vitamin A. The need for beta-carotene was then translated into a need for a gene that helps the conversion of a precursor to beta-carotene. It was in this successive operationalization that a Third World food need was to be successfully met by a gene from a daffodil.

Once outside the circumscribed definition of food "problem" and "solution," however, such a claim of success seems exaggerated, and even nutritionists have not been entirely convinced of Golden Rice's efficacy. Some have pointed out that carotene, which is the core of Golden Rice's "success," is only the beginning of the solution and is far from sufficient to improve an individual's vitamin A status. The first uncertainty is how much beta-carotene can be obtained from the carotene that is present in Golden Rice. In the original study, the best line produced 1.6 mcg carotenoids/g of dry weight of rice (Ye et al. 2000). However, only about 50 percent of this carotenoid was found to be beta-carotene. This was a disappointingly small amount.

Aside from beta-carotene content, there is the question of bioavailability. Bioavailability is defined as the amount of a nutrient that is potentially available for absorption from a meal and, once absorbed, utilizable for metabolic processes in the body. This is a question of how much beta-carotene from Golden Rice can be actually used by the human body. It has to be noted that beta-carotene is not the same as vitamin A. It is a precursor to vitamin A—meaning that it has to be split by an enzyme to become two molecules of vitamin A. Moreover, not all beta-carotene is utilized by the body. This issue of bioavailability is difficult to determine precisely, not only because it depends on each food, but also because it is not simply determined by total plant mass. Golden Rice needs to be ingested, absorbed, and utilized by the body, and each process is influenced by other meal components, processing, preparations, and even the individual person's biochemical and metabolic characteristics. Particularly problematic for carotene is its need for fat for digestion, absorption, and transport, because beta-carotene is fat soluble. When a diet is low in fat, there is an even bigger obstacle to bioavailability (Gillespie and Mason 1994). Michael Krawinkel, director of the Institute for Nutritional Science at the University of Giessen in Germany, argues that "in countries where the consumption of dietary fat is low, Golden Rice is unlikely to benefit health" (quoted in Schnapp and Schiermeier 2001, 503). Furthermore, New York University nutritionist Marion Nestle says that "many children exhibiting symptoms of vitamin A deficiency, however, suffer from generalized protein-energy malnutrition and intestinal infections that interfere with the absorption of β-carotene or its conversion to vitamin A" (2001, 289). Ultimately, the determination of bioavailability must be made through feeding trials in micronutrient deficient populations under natural living conditions. This complicates the claim of success by necessitating consideration of health conditions as well as different food cultures across and within a nation.

Golden Rice promoters portray the slow deployment of Golden Rice as a question in need of answer. Furthermore, they tend to attribute the gap between the utopian vision and the disappointing reality to a misdirected anti-GMO movement. However, their assumption of Golden Rice's success itself needs to be questioned. Only within nutritionism's narrow purview could the claim of it being a miracle rice make sense. Nutritionism has played a critical role in making the claim of success credible and possible. By focusing on the quantifiable nutrients as the most important aspect of food and the food problem, it has reduced the understanding of the needs of the poor to a particular nutrient. The triumphant narrative of the life-saving miracle rice is what has caught global attention, but the very basis of such a claim—nutritionism—was obfuscated, making it difficult to understand its slow circulation.

Out of Sync in Indonesia

It is perhaps apt here to go back to Indonesia to see how Golden Rice fared there, as Indonesia seems like an ideal beneficiary for Golden Rice. Much of its population depends on rice as a staple food, and awareness of vitamin A deficiency is relatively high among policymakers and even the general public as a result of long-standing educational campaigns and vitamin A capsule dissemination programs by the government. One might imagine that the highly celebrated Golden Rice would be eagerly awaited in a country like Indonesia.

Biofortification promoters surely did not miss Indonesia as a major potential beneficiary of Golden Rice, and they looked to it as a potential ally. The Golden Rice Humanitarian Board and the Golden Rice Network invited the Indonesian Agency for Agricultural Research and Development to be a partner, hoping that they would clear the path for Golden Rice in the country. Marketing efforts targeted at Indonesian researchers were also abundant. There were seminars sponsored by Golden Rice pundits, such as "Biofortification: Breeding for Micronutrient-Dense Rice to Complement Other Strategies for Reducing Malnutrition," which took place at the Ministry of Agriculture in June 2002, with Howarth Bouis from the IFPRI as the keynote speaker. He was again able to promote biofortification in 2004, when he spoke at the prestigious National Workshop on Food and Nutrition (Widyakarya Nasional Pangan dan Gizi).

From the general public's point of view, too, Golden Rice seems to be well-positioned to benefit from positive attitudes to nutrition-targeted applications. One available survey on Indonesian perceptions toward agricultural biotechnology conducted by the International Service for the Acquisition of Agri-biotech Applications found that agricultural biotechnology that is targeted at improving nutrition contents and other food qualities tends to receive a favorable response compared to other kinds of GM crops, and this preference is shared by diverse people, from farmer leaders to general consumers (ISAAA and University of Illinois 2002) (table 7.1).[17]

Nevertheless, Indonesian attitudes toward Golden Rice have been far from enthusiastic for complex reasons. Rather than simply the result of technical glitches or regulatory complications, as the common narrative might suggest, the Indonesian case points to an interconnected web of political and cultural

TABLE 7.1 Indonesian public's perception of different biotechnology applications, % respondents who said each application was "useful"

	MAKE MORE NUTRITIOUS AND QUALITY FOOD	PEST AND DISEASES OF CROPS	PRODUCTION OF MEDICINE OR VACCINES	MODIFYING GENES OF LAB ANIMALS	DETECTING AND TREATING DISEASES IN HUMAN
consumers	62	64	70	75	62
businessmen	61	45	14	22	76
extension workers	78	74	22	33	86
farmer leaders	73	53	25	43	69

Source: International Service for the Acquisition of Agri-biotech Applications (ISAAA) and University of Illinois at Urbana–Champaign 2002.

reasons that have limited the appeal of Golden Rice. To start with, Golden Rice became embroiled in the broader contention about genetically modified food in Indonesia. Beginning in early 2000, the Indonesian environmental and consumer-advocacy community began to raise the issue of the safety of GM crops. The first large controversy was with Monsanto's *Bacillus thuringiensis* (Bt) cotton. In 2001, Monsanto received permission for commercial harvest of Bt cotton in South Sulawesi. Environmental NGOs had suspected that Monsanto was planting GM crops through its local subsidiary, PT Monagro Kimia, without formal approval, but the official approval from the government ignited more concerted opposition. They mobilized quite effectively, establishing a coalition of 113 NGOs housed in the Indonesian Consumer Foundation (Yayasan Lembaga Konsumen Indonesia) and in the Coalition for Biosafety and Food Safety, a coalition of 72 NGOs (Jakarta Post 2001d). The NGO coalitions sued the government for issuing the approval without a proper environmental impact assessment. The situation became favorable to the NGOs when news reports started to surface that the harvest of Monsanto's Bt cotton failed although it had been marketed as having a spectacular yield. There was also a report of gene contamination in 2002 (Jakarta Post 2002), although this was not possible according to Monsanto. In addition, Monsanto was found guilty of bribing government officials in relation to the Bt cotton trial in Indonesia (Third World Network Malaysia 2005), to which Monsanto admitted wrongdoing and paid a $1.5 million fine (BBC News 2005). This series of events, particularly the corruption, tarnished the image of Monsanto as well as its cherished technology, genetically modified crops.

Golden Rice is not only constrained by the heated politics around genetically modified crops. While we might expect life sciences companies to be at the forefront of the public relations campaign in the Indonesian market, they have *not* promoted Golden Rice fervently. This is despite the fact that major global players in the life sciences industry—Monsanto and DuPont, for instance—have had a presence in the Indonesian seed market since the late 1980s. When I interviewed the local management of these companies, they recognized the public relations potential of Golden Rice, but they were not engaged in active promotion or lobbying on its behalf. They were more interested in crops that could produce immediate profits. Life sciences companies were pressured to focus on "profitability rather than penetration," as one of them put it. Golden Rice might help them to penetrate the Indonesian GMO market, but it was not likely to yield immediate profits. Following that logic, hybrid corn and soybeans were prioritized. Indeed, this profitability rather than penetration mentality seems to be the underlying dynamic behind Monsanto's eventual decision to pull out of the Bt cotton business in Indonesia after the initial field tests. Ironically, Golden

Rice is orphaned not only by humanitarian groups but also by its most likely protectors—global life sciences companies—in a situation where it is controversial and is seen as having a negative impact on products with a more immediate economic future. For them, Golden Rice was good only *discursively*—as a symbol to be deployed in their global media strategy and public relations campaign. But as a matter of real business strategy, they see little point in pushing for the *actual* use of Golden Rice in countries like Indonesia.

How about nutritional experts in Indonesia? From Indonesian nutritional experts' point of view, there is a mismatch between what they consider the country's needs and how those needs are conceived by Golden Rice researchers. First of all, nutritionists and nutrition-related NGOs understand the importance of vitamin A deficiency, but there is a sense that Indonesia has successfully controlled it by traditional distribution of vitamin A pills. The government has declared success in the campaign against VAD. Moreover, Golden Rice's ability to enhance vitamin A status depends on many variables, and many Indonesian researchers rightly point out that many things remain uncertain about the benefits of Golden Rice (Herman 2002). They have taken a cautious stand, saying that Golden Rice could be an important addition to micronutrient strategies but that more research is necessary and government regulations must be in place.

What about the Indonesian agricultural research community? In the global scene, agricultural researchers seem to be excited about their new health-driven mandate. Yet that does not describe the situation in Indonesia. If Golden Rice does not fit the priorities of Indonesian nutritional policy, it has the same problem in the field of agricultural biotechnology research. The priority of Indonesian agricultural research is more on abiotic and biotic stresses on plants than on nutrition. This focus on productivity and yield has historically been the case in Indonesia and remains so. For instance, according to Indonesia's Repelita VI, 1993–98, the ultimate goal of agricultural biotechnology research was to achieve and maintain self-sufficiency in food production, develop agroindustry, increase efficiency in using biotic and abiotic resources, and increase crop and animal production. The Agency for Agricultural Research and Development, which is the central biotechnology research institution in the country, has publicized a similar emphasis on productivity. The agency's 1999–2004 plan was for a broad research focus on yield increase and integrated plant management. Specifically for biotechnology research, the agency decided to focus on disease-resistant crops and germplasm conservation (Bidan Litbang Pertanian 2004). The strategic planning for the period of 2005–9 continued with similar priorities of high yield, biotic stress resistance, abiotic stress resistance, and fit with consumer tastes and preferences (69). Biotechnology research priorities for the same period shared similar objectives (75–76). Hence breeding for nutrition, as embodied by Golden Rice, has had little resonance with the overall direction of agricultural and biotechnological research in Indonesia.

This is not to say that nutrition-driven agricultural research has been nonexistent in Indonesia, but such projects are very few and have tended to come from international donors. For instance, one nutrition-based initiative was breeding for iron-rich rice. As a part of the global program coordinated by the ADB, MI, Danish International Development Agency or DANIDA, USAID, and IRRI, Indonesia was asked to participate along with several other developing countries, and the government agreed to allocate two Indonesian researchers (Hunt 2001b). They published results on screening for germplasm for high iron and zinc contents, the examination of their growth in field conditions, and a nutritional study (Somantri and Indrasari 2002; Somantri and Indrasari 2003; Somantri and Indrasari 2004). Nonetheless, this iron-rich rice project remained outside the mainstream of Indonesian agricultural research and was seen as one of many donor-driven projects.

Furthermore, although the Golden Rice promoters saw a major advantage of Golden Rice in the fact that it was rice—one of the main staple foods in Asia—this very fact seemed to be a sticking point from the Indonesian researchers' point of view. One nutrition expert at an NGO suggested: "Rice is our staple food. So anybody trying to manipulate rice should have strong support from policymakers. It will endanger the whole nation. I think people tend to be conservative when it comes to rice. Because it's rice."

Some researchers described rice as "a political commodity" and argue that anyone who tries to meddle with it takes a political risk. Rice was also described as a "way of life," suggesting that consumer resistance might be high. The fear of messing with rice is perhaps mysterious from a perspective limited by nutritionism, which sees rice (or any crop, for that matter) as a mere "vehicle" for nutrients. Yet if one thinks of food as a cultural as well as a nutritional entity, rice has perhaps one of the most tangled and complicated sets of meanings of any food in Indonesia. Rice features prominently in mythologies about the goddess Dewi Sri in many parts of Java, where rice is said to have sprouted from the dead body of the goddess, and it is seen as a gift from heaven or the underworld (Wessing 1990; Heringa 1997). In Bali, too, rice is seen as a gift from the gods, and rice production is a practice that needs not only human but also gods' hands (Howe 1991). According to anthropologists, rice is also intricately linked with ethnic and sexual identities (Colfer 1991).

Rice is also infused with political tension for the elites of the society. With its symbolic and cultural significance, throughout history rice has been a poignant medium for people to express their anger with a ruling regime such as by rice riots.[18] Given the rich symbolic value of rice in Indonesia, it is not a surprise that rice is deemed highly political and sensitive. Indeed, not long ago, Indonesia witnessed the potent symbolic power of rice in shaping politics when the Sukarno government's fall was closely tied to its failure to contain the skyrocketing rice price. That rice is a political commodity is well understood by Indonesian elites. Rice and political and regime stability are intricately linked.

Biotechnology proponents and news media have portrayed Golden Rice as achieving something grand—fulfilling the needs of the Third World and saving malnourished children. Golden Rice was used to showcase the broader utility of biotechnology for the Third World, as a technology to provide more nutritious food. Within this triumphant narrative, Golden Rice's slow circulation comes as a surprise and has been attributed to some unfortunate technical difficulties and misdirected social skepticism about biotechnology. Yet once one looks beyond nutritionism, this heroic biotechnology was too far removed from those it intended to impress with its benevolence. Golden Rice pundits' moral claims regarding the well-being of Indonesians seemed disingenuous to civil society groups, who saw the rice as a beachhead for GMO and its politics. In this case, Golden Rice was also out of sync with business and scientific interests.

In a discussion of the "microscopic view" of experts that has caused many modernist state projects to fail, Scott (1998) suggests looking for what "fell out" of that way of viewing, in order to understand the peculiarity of this vision. As in many other cases of nutritional fixes, the Golden Rice story shows how much has been rendered invisible by nutritionism. In the experts' dialogue and the celebratory remarks by biotechnology supporters of Golden Rice, food is implicitly medicalized and considered a mere amalgamation of nutrients. Of course, that Golden Rice was rice did matter, but only to the extent that it promised that a certain amount of the nutrient would be carried to the target population. What "falls out" from nutritionism's portrayal of food as a mere vehicle of nutrients is an understanding of food as a deeply cultural and politicized commodity. In ignoring the complicated layers of meaning of rice, Golden Rice stands awkwardly as a well-intentioned, yet inappropriate, "gift" from the international community.

Moral Politics of a Nutritional Fix

Golden Rice shares familiar themes with the stories of the quest for magical solutions that we have seen here. It is one of the latest examples in the long history of nutritional fixes. As such, the story of Golden Rice and biofortification provides an illuminating case to further explore the structure of nutritionism and nutritional fixes. Particularly, I want to pose the question of why nutritional fixes are so persistent, dodging and eluding opposition. If so much "falls out" from the circumscribed view enabled by nutritionism, what explains the persistence of nutritionism and nutritional fixes? Of course, there are various reasons why a nutritional fix is powerful. It is, first of all, elegant in its simple statements and appealing in its calculability. It is embedded in a broader scientific reductionism with a long history. It is also easy to see why bureaucratic institutions might find it helpful to have the focused representation of food problems afforded by nutritionism because it facilitates policy planning and implementation. Nutritional science, as we have seen, also has a disciplinary stake in being able to sell nutrition in the form of nutritional fixes. But this chapter has also highlighted another critical factor in nutritionism's tenacity: its moral claims.

Indeed, the intensity of moralistic claims around Golden Rice is a curious feature when compared to the standard talk about GMOs, which tends to be framed in terms of the necessity of basing decisions on science and rationality. When GMOs started to become a socially controversial issue, governments, scientific bodies, and the industry called for a "rational" discussion, and "risk assessment" was the language of choice, in which the benefits and costs of the technology were to be gauged in an ostensibly scientific manner.

The profusion of moral claims surrounding Golden Rice and biofortification attests to nutritional fixes often conjuring up a nutritional utopia where the world food problem is solved through amazing modern technology. An important actor in this grand narrative of nutritional utopia is the hungry to be fed, victims to be saved by nutritional fixes. As food historian Warren Belasco points out, the West's imaginaries of a cornucopian utopia is often accompanied by the representation of the developing world as a dystopia (Belasco 2006, 116, 168).[19] Ingrained in the West's historical understanding of the world food problem is the notion of "the poor" of the developing world as the hungry to be rescued and emancipated by the West, and it is for these imagined beneficiaries (and in honor of the West's benevolence) that nutritional fixes are celebrated. Continuing this historical pattern, victimization of the Third World poor is conspicuously present in the imaginary of biofortification/Golden Rice. Recall Potrykus's assertion that "a hundred thousand poor" in the developing world were to benefit from a "single" Golden Rice seed. In this comment, the conceptualized poor in the Third World underlines the moral claim of those promoting the product, as they are seen as waiting to be rescued by the amazing technology.

The nutritional utopia creates a situation in which criticism of the narrowness of nutritional fixes can be portrayed as an attack on the benevolent *intent* of the technology. This results in a decrease in the moral authority of the critics. Golden Rice has plenty of examples of such slighted moral competition. As we have seen, one important political corollary of the discourse of benevolent technology was to make being anti-GM equal to being anti–global South. Skeptics of Golden Rice and biotechnology were subject to strong moral condemnation. In the words of Potrykus, "Those opposing use of the rice in developing countries should be held responsible for the foreseeable unnecessary death and blindness of millions of poor every year" (quoted in Schnapp and Schiermeirer 2001, 503). And this attack was not limited to Potrykus, who has arguably been the most fervent crusader for Golden Rice. Where we began this chapter—at the Copenhagen Consensus Conference—economists deployed Golden Rice as a way to malign European trade policies on GM crops. In a report prepared for the Copenhagen Consensus Conference, Kim Anderson and L. Alan Winters (2008, 33) wrote, "This new technology [Golden Rice] has yet to be adopted, however, because the European Union and some other countries will not import food from countries that may contain GM crops even though there is no evidence that GM foods are a danger to human health. The cost of that trade barrier to developing countries has been very considerable." In this discourse, skeptics of a nutritional fix are worse than simply being against science and technology—they are also constructed as costing the lives and well-being of the poor in the developing countries.

Such claims of moral righteousness are enabled by the purported success of nutritional fixes to "solve" the food problem. Supporters of nutritional fixes assert that they offer a practical solution to hunger and malnutrition. By claiming that nutritional fixes actually get things done, supporters often gain high moral standing, and so they become hard to fault. In this process, the mechanism that enabled the claim of success—nutritionism—becomes hidden. This was evident in the case of Golden Rice. Its research was really about the conversion of a precursor to beta-carotene to beta-carotene, and Golden Rice had many limitations as to its effectiveness in tackling vitamin A deficiency. Hence Golden Rice's claim of success was founded on narrowly defined technical problems. Yet once success is claimed, anyone who attempts to scrutinize it becomes an unappealing nay-sayer, an unhelpful detractor. That success in meeting the needs of the poor is partial at best and only justifiable within the narrow purview of nutritionism becomes difficult to convey. Inasmuch as the nutritional trope tells the story of tragic victims to be saved by nutritional fixes, unpacking the underlying nutritionism behind success becomes tricky, since such a move is easily portrayed as against the beneficiary (the poor in the global South) and against morality (the mission to feed the hungry).

As we have seen in the Indonesian response to Golden Rice, however, a nutritional utopia conjured by nutritional fixes is founded on a fragile and limited basis, as it fails to address the cultural, symbolic, and political significance of food. As the story of Indonesia shows, actual responses by the presumed beneficiaries might be ambivalent or even hostile to the imposition of nutritional fixes. Nonetheless, curiously made difficult in food politics is any criticism of nutritionism and nutritional fixes, in part because of the distant, yet emotionally powerful imagery of the poor in the Third World. These poor constitute a part of the powerful mechanics of nutritionism by symbolizing the "victims in waiting." The success of nutritional fixes remains unquestioned as long as these "poor" in the Third World remain abstract, distant inhabitants of the nutritional dystopia.