

# THE STORY OF GOLDEN RICE

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One of the most promising developments in the controversial field of genetic engineering is the success obtained in breeding a nutritionally enriched rice variety now popularly being referred to as 'golden rice'. This golden rice is a genetically modified rice which contains genes that produce high levels of beta carotene and related compounds. Beta carotene is contained in yellow fruits like carrots (from which it gets its name) and mangoes and in vegetables like spinach. Beta carotene and other related compounds are converted in the human body to the crucially needed vitamin A.

Unfortunately, many in the developing world that do not have access to fruits and vegetables, suffer from chronic vitamin A deficiency which results in night blindness. Night blindness plagues millions of undernourished people in Asia, including India, crippling their lives. According to the WHO, vitamin A deficiency hits the poor in 96 countries of the world, resulting in over five lakh blind children every year. This blindness is irreversible, these children will never see.

The significance of this red-gold rice containing carotenoid genes obtained from the daffodil flower is the potential it offers to counter vitamin A deficiency and prevent the severely debilitating condition of night blindness. This promising rice variety contains enough precursors of vitamin A in one average portion of rice as to prevent night blindness through ordinary dietary intake.

The creators of golden rice are Ingo Potrykus of the Technical University, Zurich and Peter Beyer of the University Freiburg. The research effort spanning ten years and costing several million dollars was financed by the Rockefeller Institute. If this golden rice, currently still in the laboratory stage, is a success in the field, it would be a path breaking success, showing the way that GM technology should go. At present there is great resistance to genetically modified crops in the west, specially in Europe. Public ire is aimed at the gigantic Life Science corporations like Monsanto who have used this new technology exclusively for commercial agriculture, totally neglecting the food and hunger aspect. They have no agenda either, to work on crops that would help alleviate hunger. Yet they milk the slogan of GM technology ending world hunger, to promote their proprietary technologies and gain acceptance for essentially corporate oriented research..

When they have a GM variety, the corporations seek to control seed production by rigid intellectual property rights and the reprehensible 'terminator' or sterile seed technology. In the public mind GM technology (controlled as it is by MNCs) is geared to maximise corporate profits and establish monopolies in global agriculture. With these goals GM technology is rightly damned as an anti-poor, pro-corporate technology which will do nothing for small farmers nor for increasing food production. Golden rice and other projects like that can show how GM technology can be used for public good.

The story of golden rice is however not as straight forward as it might appear. It is not just that this particular rice variety must prove to be viable in the field, it must also be a safe product. Above all, it must be affordable and accessible to the poor who need it most. In the laboratory, after the research part was done and the rice had incorporated and expressed the pro-vitamin A genes to satisfaction, the question needed to be addressed about its marketing and promotion. At this point, the dark and inconvenient fact emerged that in the work of breeding this exciting golden coloured rice, the scientists at the Zurich

Institute and the University of Freiburg had actually infringed over 100 major and minor patents ! This points to the utterly ridiculous position in which this technology, touted as the answer to solving the problem of hunger in the world, finds itself. Any step taken in almost any direction with any crop is likely to infringe one or the other patent, held by the large corporations , for essentially basic processes involved in the science of genetic modification or genetic engineering. A very serious concern emerges at this stage . Is the stranglehold of the corporations over this technology so complete that no research is possible in future without paying expensive patent licensing fees ?

At this point, the story of golden rice takes a curious turn. There are two versions. One version says that Rockefeller Foundation which financed this research was clueless about the nature and number of patents this research was going to infringe. This it was purported was because the Rockefeller Foundation had such a weak legal wing (they are after all scientists and science administrators, not a law firm) , that they could not anticipate this piquant situation nor prepare a strategy to circumvent it. So, it is said , Rockefeller Foundation and the researchers found themselves in a situation where they had the rice they wanted but could not put it on the market until they had paid license fees for the several patented methods that they had used. License fees they could not afford.

The other version is more adventurous , with shades of bravado that will appeal to those in science who are disgusted with the greed of Monsanto and other corporations trying to corner GM technology. According to this version, Ingo Potrykus and his group were fully aware of what they were doing and went ahead with their research, knowingly infringing the patents. Their gamble, it is said, was simple. This rice variety, an obviously pro-poor piece of research, developed with the purpose of targeting one of the most widespread problems of malnutrition, would be a test case to see how far the Life Science corporations would go to defend their patents and block research aimed at helping the poor. If they did indeed block the commercialisation of the golden rice with its promise to help cure blindness in millions of the world's poor, they would be seen as greedy monsters, attracting universal condemnation and perhaps a permanent place in the dog house. In short, afraid of the anticipated public opprobrium, they would not dare block the golden rice.

The story as it so happens, has an unusual ending. There is a knight in shining armour (many suspect a wolf in sheeps clothing!) who has stepped forward to rescue golden rice from the clutches of greedy fingered corporations wanting to cash in on patents. Astra-Zeneca, one of the maligned Life Science corporations controlling GM technology (together with others like Monsanto and Novartis) has offered to buy all rights over golden rice. The inventors of golden rice have reached an agreement with Astra Zeneca and Greenovation and are working with other agencies across the world to make this rice available for humanitarian purposes in the developing world. Greenovation for its part is a Freiburg based biotechnology company that develops and out-licenses university research projects to the life science industry.

The deal is that Astra Zeneca will pay all the license fees owed to patent holders and make golden rice available to developing countries without demanding patent royalties. It will also assist in conducting appropriate nutritional and safety tests that will be needed and will work with regulatory agencies to get clearances. Rockefeller Foundation and Zeneca have invited several agencies throughout the world but specially in Asia to participate in making golden rice a success story that could help farmers in developing countries.

In turn, Zeneca has acquired the complete rights over this rice for commercialisation the developed world. It believes that there is a large market for golden rice among health

conscious western consumers. Its strategy is to market this rice in the affluent north as a nutritionally enhanced food with tremendous health benefits. Given the craze for nutraceuticals (the new generation food and health supplements) sweeping the markets of the industrial nations, this does not appear to be an unwise move. In any case, Zeneca expects to earn enough from western markets to more than offset costs incurred from paying patent license fees.

The way the story of golden rice has unfolded, has lessons for the future of genetically modified crops and GM technology per se. It shows for instance that if this technology would address the needs of resource poor farmers in developing countries and contribute to producing either more food or more nutritional food, the technology would be more acceptable. The targetting of vitamin A deficiency is the kind of goal GM technology should set itself. Goals that can not be reached by conventional breeding and those that will truly help in some way to alleviate poverty and malnutrition .

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