

## Genetically Engineered Pro-vitamin A 'Golden Rice'

### Reality

vs.

### Fiction

"[...] the public relations' uses of Golden Rice have gone too far. The industry's advertisements and the media in general seem to forget that it is a research product that needs considerable further development before it will be available to farmers and consumers."

*Gordon Conway, President of the Rockefeller Foundation (the major funder of the "Golden Rice" project).<sup>i</sup>*

According to its developers, 'Golden Rice' will not be available for local planting until 2005 at the earliest.<sup>ii</sup> Other scientists point out that proper research and testing would probably take much longer.

There are no published studies about human health, socio-economic and environmental impacts. It is also uncertain whether the traits engineered in the 'Golden Rice' would be 'stable', or whether they could be 'silenced' by local environmental conditions.

"It should be stressed that the time scale for commercialisation of transgenic crops<sup>iii</sup> is as lengthy as any other variety; the tomato puree first sold in the UK in 1996 was developed from an academic project dating back to the early 1980s,"

*Jim M. Dunwell, School of Plant Sciences, The University of Reading, UK<sup>iv</sup>*

An adult woman would have to eat daily 3.7 kilos (dry weight) of 'Golden Rice' in order to get her daily amount of vitamin A from the rice. This is more than twelve times the normal intake of 300 grams of rice a day, and amounts to some 9 kilograms of cooked rice.<sup>v</sup>

No detailed compositional analysis of the 'Golden Rice' has been published. In a similar genetic engineering experiment Monsanto increased the level of pro-vitamin A in oilseed rape and it found that the engineered oilseed rape had higher levels of pro-vitamin A but had also a significantly decreased level of vitamin E, and an altered fatty acid composition.<sup>vi</sup>

"GM food scientists have already developed a yellow rice, or "golden" rice, that is rich in vitamin A and iron and helps prevent anemia and blindness, especially in children."

*article published on CNN.com<sup>vii</sup>*

"This rice could save a million kids a year"  
*headline on the cover of Time magazine<sup>viii</sup>*

" [...] 'golden rice', which has been modified to include certain vitamins and is already saving the sight of thousands of children in the poorest parts of Asia."

*Invitation from The United States Congress to a Special Congressional Forum, "Can Biotechnology Solve World Hunger."<sup>ix</sup>*

"If we could get more of this golden rice, which is a genetically modified strain of rice, especially rich in vitamin A, out to the developing world, it could save 40,000 lives a day, people that are malnourished and dying,"

*Former U.S. President Bill Clinton.<sup>x</sup>*

"The levels of expression of pro-vitamin A that the inventors were aiming at, and have achieved, are sufficient to provide the minimum level of pro-vitamin A to prevent the development of irreversible blindness affecting 500.000 children annually, and to significantly alleviate Vitamin A deficiency affecting 124.000.000 children in 26 countries."

"One month delay = 50,000 blind children month."  
*Dr. Adrian Dubock, executive from Zeneca (now Syngenta), the company which would market the rice -- and plans to commercialise it in rich countries.<sup>xi</sup>*

# Reality

vs.

# Fiction

"Nutrition science, however, suggests that golden rice alone will not greatly diminish vitamin A deficiency and associated blindness. [...] People whose diets lack [fats and proteins] or who have intestinal diarrheal diseases -- common in developing countries -- cannot obtain vitamin A from golden rice."

*Marion Nestle, PhD, MPH, Professor and Chair, Department of Nutrition & Food Studies, New York University*<sup>xii</sup>

"There is also no agreement on the conversion ratios, and we have no data yet on the bioavailability and the stability during storage."

*Ingo Potrykus, one of the inventors of the 'Golden Rice', confirming that there is no evidence showing to what extent the human body could utilize the pro-vitamin A of 'Golden Rice' and convert it into vitamin A.*<sup>xiii</sup>

Natural foodstuffs can be very efficient in alleviating vitamin A deficiency.

"About half a teaspoonful of [crude] red palm oil a day will meet a child's vitamin A requirements and is affordable for almost everyone"<sup>xv</sup>

"For populations that rely upon rice as their primary or sole food source, this ['Golden Rice'] nutritional enhancement can deliver an enormous improvement in public health."

*Dr. Stanley Wallach of the American College of Nutrition*<sup>xvii</sup>

"Nestle executive vice-president Michael Garrett told [...] that the new "golden" rice, genetically modified to be rich in vitamin A, would address a common deficiency in developing countries that caused blindness and death."

*article published in The Age (Australia)*<sup>xviii</sup>

"Should the opponents eventually succeed in preventing "Golden Rice" to reach the poor in developing countries, it will be them who will have to take responsibility for the foreseeable yet avoidable death or blindness of millions of poor, underprivileged people, year after year in the foreseeable future."

*Ingo Potrykus and Peter Beyer, inventors of the 'Golden Rice'*<sup>xix</sup>

Genetically engineered rice does not address the underlying causes of Vitamin A Deficiency (VAD), which are mainly poverty and lack of access to a more diverse diet. Cheap and effective means of combating VAD currently exist.<sup>xvi</sup>

**Greenpeace calls for action** to solve VAD with measures such as supplementation (i.e. pills), food fortification and improved use of and access to natural sources of pro-vitamin A (such as red palm oil). More investments are also needed for the only long-term solution: to work on the root causes of poverty and to ensure access to a diverse and healthy diet.

A diet rich in Vitamin A and other micro-nutrients is a luxury for millions of poor, not because such foods are not available in their countries, but because they cannot afford them and/or have no access to them. This is a problem that 'Golden Rice' would not solve.

For more information: "The False Promise of Genetically Engineered rice," available at: <http://www.greenpeace.org/~geneng/>

## References

i Letter to Greenpeace UK, January 22, 2001 by Gordon Conway, Rockefeller Foundation.

ii Press release of 01/22/01 issued by the International Rice Research Institute (IRRI), the Rockefeller Foundation and Syngenta: "International Rice Research Institute Begins Testing 'Golden Rice'"

iii JM Dunwell (1996) Time-scale for transgenic product development. Field Crops Research 45: 135-142

iv Jim M. Dunwell (1999) Transgenic Crops: The next generation, or an example of 2020 Vision, Annals of Botany 84 269-277

v See fact sheet "Vitamin A: Natural sources vs. 'Golden Rice'"

vi Christine K. Shewmaker, Juli A. Sheehy, Maureen Daley, Susan Colburn and Dang Yang KE (1999) Seed specific overexpression of phytoene synthase: increase in carotenoids and other metabolic effects, The Plant Journal, 20 (4), 401 - 412

vii "Are biotech crops sowing seeds of dispute?" January 24, 2001, By Troy Goodman.CNN.com Health and Food Writer

viii TIME magazine, July 31, 2000, vol. 156 No 5

ix From The United States Congress, "Can Biotechnology Solve World Hunger" invitation to the Senate Agriculture Committee/Congressional Hunger Center, Special Congressional Forum, June 29, 2000.

x The Independent (London) "G8 meeting: Clinton attacks Europe for moving too slowly over 'safe' GM food", July 24, 2000

xi Executive summary of a presentation by Dr. Adrian C. Dubock, of Zeneca Plant Science (now Syngenta) at a conference on sustainable agriculture organised by Friends of the Earth, Oxfam, Dag Hammarskjöld Foundation and supported by the European Commission on "Sustainable Agriculture in the New Millenium: The Impact of Biotechnology on Developing Countries," May 28-31, 2000, Brussels.

xii New York Times, Letter to the editor - Science Times - December 19, 2000, "Gene-Altered Food", by Marion Nestle

xiii Ingo Potrykus The reality of Golden Rice, Dec 19 2000, archived at <http://agbioview.listbot.com> - Message #932

xiv See "Red Palm Oil – an example of a natural food rich in beta-carotene," Greenpeace factsheet available on request.

xv Preventing micronutrient malnutrition: A guide to food-based approaches - A manual for policy makers and programme planners (1997). International Life Sciences Institute, Washington D.C. <http://www.fao.org/DOCREP/x0244e/x0244e00.htm#TopOfPage>

xvi According to the World Health Organisation (WHO), "[the elimination of VAD] is therefore a test case of political will, and managerial capacity to implement known technologies and known solutions.", from "Vitamin A Deficiency", available at [http://www.who.int/vaccines-diseases/diseases/vitamin\\_a.htm](http://www.who.int/vaccines-diseases/diseases/vitamin_a.htm)

xvii The Daily Oklahoman, "Biotechnology: Fighting Disease & Malnutrition," October 11, 2000

xviii "GM food the answer, says giant company", The Age (Australia) by Claire Miller, Sep. 14, 2000

xix Frankfurter Allgemeine Zeitung, "We can save millions of lives", by Ingo Potrykus and Peter Beyer, 22 Jan 2001