

GM Rice and its Potential

Good evening, ladies and gentlemen, I've been invited to your meeting to inform you about the genetically modified rice and how it might help solve some of the dietary problems in the third world. My name is James..... and I am an independent dietary expert working for WHO, or the World Health Organization. Now I have organised my talk in the following way. I will start with an explanation of how genetically modified rice, or golden rice, was created, then I will turn to the reasons that led to its production, afterwards, I will speak about a controversy that has broken out over the issue, and I will also mention some of the causes of Vitamin A deficiency, finally I will suggest possible solutions to the problems involved. Feel free to ask any questions as we go along. And don't worry, there'll be plenty of time after the presentation to deal with questions at the end.

Now let's start with creation of golden rice. Golden rice is a variety of rice, or *Oryza sativa* in Latin, which is produced through genetic modification to biosynthesize the precursors of beta-carotene or pro-vitamin A in the edible parts of rice. Now you may ask why it's necessary to produce genetically modified rice. Well, golden rice was developed in the year 2000 as a fortified food to be used in areas where there is a shortage of dietary vitamin A. Now in 2005, a new variety called Golden Rice 2 was announced, this produces up to 23 times more beta-carotene than the original variety. Neither variety is currently available for human consumption. Here in the picture, you can compare all three types of rice. Normal rice is here – on the bottom right. Golden rice can be seen on the left and Golden Rice 2 is just at the top right end.

The research that led to golden rice was conducted with the goal of helping children who suffer from Vitamin A deficiency (VAD). Now I'd like you to look at this map, which shows the important vitamin A deficiency areas in the world. These are in red on the map. The rest you can see just from the legend here.

Now at the beginning of the 21st century, 124 million people, in 118 countries in Africa and South East Asia, were estimated to be affected by VAD. Now VAD is also responsible for 1-2 million deaths, 500,000 that's half a million cases of blindness and millions of cases of xerophthalmia annually. Now children and pregnant women are at highest risk. Some countries have vitamin A supplementation programs. Vitamin A here is supplemented orally and by injection in areas where the diet is deficient in Vitamin A. However, as many children in countries where there is a dietary deficiency in Vitamin A rely on rice as a staple food, the genetic modification of rice to make a provitamin A increase is seen as a simple and less expensive alternative to vitamin supplements or an increase in the consumption of green vegetables or animal products. Now it can be considered as the genetically engineered equivalent of the fluoridized water or iodized, sorry, fluoridated water or iodized salt.

Well, so far we have spoken about positive aspects of GM rice. Although it was developed as a humanitarian tool, it has met with significant opposition from environmental and anti-globalization groups. Now let's have a look at some of their arguments now. The growing globalisation of agriculture is a trend that worries a lot of people. They are concerned that golden rice is a kind of Trojan horse that will "open the door" to the more widespread use of genetically modified organisms.

Another argument against GMOs is that the problem is not particular deficiencies in the crops themselves, but the problem is with poverty and the loss of biodiversity in food crops. Now

these problems are aggravated by the corporate control of agriculture based on genetically modified foods.

Now similarly other groups have argued that a varied diet containing vitamin A rich foods like sweet potato, leafy green vegetables and fruit would provide children with sufficient vitamin A. While this is true, others also contend that a varied diet is beyond the means of the many of the poor, which they say is why they subsist on a diet of rice.

Now this conciliatory tone brings me to the end of my presentation. Let me just run over the key points again. First I looked at the creation of golden rice and explained why it had been produced. Then I presented a few of the arguments against GM rice pronounced by some environmentalists and antiglobalisation groups and finally presented some causes of the third world dietary crisis resulting in vitamin A deficiency. Now to conclude, I would like to turn your attention to the theoretical analyses of the potential nutritional benefits of golden rice which show that consumption of golden rice would not eliminate the problems of blindness and increased mortality, but should be seen as a complement to other methods of Vitamin A supplementation such as varied diet, injections or oral supplementation.

OK, that's all. Thank you very much for your attention. Now I'd be happy to take any of your questions now.