**Golden Rice : Myth, not Miracle**

By Dr Vandana Shiva

***“You cannot solve a problem with the same mindset that has created it.”***

 ***Einstein***

**The Problem**

1 billion people in the world are victims of hunger. 2 billion are victims of diseases related to food that is nutritionally imbalanced and deficient.

**The Monoculture of the Mind promotes Diseases linked to Malnutrition**

The problem of hunger and malnutrition are rooted in an obsolete and destructive food and agriculture system that is blind to the need for diversity, quality and nutrition of food for a balanced diet. The reductionist mechanistic paradigm that I have called the **Monoculture of the Mind** promotes Monocultures, and only focuses on the yield of a few commodities. As a result of this Monoculture model, the human diet has been reduced from the diversity of nearly 8500 species providing a diversity of nutrients that the human body needs , to just 8 crops, largely producing carbohydrates. Not only are these monocultures of cardohydrate rich crops deficient in most essential micronutrients , through industrial breeding they are introducing new deficiencies that are leading to killer diseases .

Diets based primarily on carbohydrates like industrial rice are not just leading to micronutrient deficiencies ,they are leading to a diabetes epidemic. New industrial varieties of rice have a high gycemic index, aggravating the risk of diabetes.

According to the World Health Organisation ,

* 347 million people worldwide have diabetes
* In 2004, an estimated 3.4 million people died due to diabetes. More than 80% of diabetes deaths occur in low- and middle-income countries .
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* (http://www.who.int/mediacentre/factsheets/fs312/en/)

As the example of diabetes shows, imbalanced monoculture diets are killing people. The solution to diseases like diabetes require introducing more diversity in farming and food systems.

Industrially bred wheat’s are leading to gluten allergies. 15% of the population is now sensitive to gluten. Doctors estimate that 1 percent of the population has celiac disease, which is damage to the small intestine caused by a severe allergic reaction to wheat gluten. Gluten is a protein found in wheat and wheat products. But not all wheats are the same. We had to fight Monsanto when it engaged in Biopiracy of a traditional Indian wheat variety which did not lead to gluten allergies. Monsanto was forced to withdraw its Biopracy patent on wheat.

Industrially produced rice monocultures are one example of the monoculture thinking that has led to largescale micronutrient deficiencies , including deficiencies of iron, zinc,calcium, magnesium,vit A.

.Iron deficiency is the most prevalent nutritional deficiency worldwide. It is a major public health problem with adverse consequences particularly for women of reproductive age and for young children.

When there is not enough iron in the body, fewer red blood cells are produced. This reduces the capacity of the blood to transport oxygen. As a result, symptoms, ranging from fatigue and inability to concentrate, to impaired physical and cognitive development of children, can occur. Iron deficiency anaemia may also cause problems during pregnancy particularly in developing countries, where it can increase the risk of premature delivery, as well as the risk of maternal and foetal complications and death.

Zinc is a component of more than 300 enzymes in the human body. It is active in metabolism of protein and is required for synthesis of insulin and maintenance of immunity. Deficiency of Zinc results in growth failure and sexual infantilism in adolescents. It also causes loss of taste and delayed wound healing. Zinc deficiency in pregnant mothers leads to spontaneous abortion and congenital malformation. Zinc deficiency is also being identified as a major problem in mental illnesses.

 Vit A is required for normal vision, for maintaining the integrity and normal functioning of glandular and epithelial tissue, for skeletal growth, for maintenance of immunity, and for protection against certain cancers such as bronchial cancer. Deficiency of vitamin A causes Xerophthalmia which includes ocular (eye) manifestations such as night blindness, conjunctival xerosis, Bitot’s spot, Corneal Xerosis, and Keratomalacia. Deficiency of vitamin A also causes follicular hyperkeratosis, anorexia, growth retardation, respiratory and intestinal infections, and child mortality. Malnutrition and vitamin A deficiency are a major cause of blindness in children. The WHO states that severe vit A deficiency that causes blindness is declining.

**Golden Rice , a False Solution, that will worsen the malnutrition crisis**

 At a time when all scientific knowledge is making us aware that diversity is the answer to malnutrition, there is an intense propaganda machinery at work to spread the myth of Golden Rice as miracle cure for malnutrition. Those of us who promote more effective, tested, safe and sustainable solutions to malnutrition are being called “killers of children”. Mr Owen Paterson , the Secretary of Defra in UK has called those questioning Golden Rice “wicked”. <http://www.bbc.co.uk/news/uk-politics-24515938>.

Another Ambassador of the Myth of Golden Rice is Patrick Moore has accused those who point out that golden Rice is a ineffective as engaging in "crimes against humanity."  About Greenpeace he states "The organization's scientific blindness has led to the actual blindness of 8 million people, mostly children. [www.allowgoldenricenow.org](http://www.allowgoldenricenow.org/)<[http://www.allowgoldenricenow.org](http://www.allowgoldenricenow.org/)><[http://www.allowgoldenricenow.org](http://www.allowgoldenricenow.org/)>

But it is those promoting Golden Rice as a miracle who are blind. It is a myth that it will solve the problem of nutritional deficiencies. I have called it a Blind approach to Blindness prevention because it is blind to alternatives that are superior , not just for vit A deficiency, but all micronutrient deficiencies. By focussing on only one crop, rice , which by itself does not provide all the nutrients we need, while eclipsing the alternative of diverse crops providing diverse nutrients, including higher quantities of vit A than Golden Rice, the Golden Rice pushers are in fact worsening the crisis of hunger and malnutrition. Promoters of Golden Rice are blind to diversity , and hence are promoters of blindness, both metaphorically and nutritionally.

Golden rice is an example of using the same mindset of the Monoculture of the Mind to solve the malnutrition problem which created nutrient deficiencies in the first place. Golden rice will make the malnutrition crisis worse-it will kill more people through intensifying diabetes, and deficiencies of vit A, zinc, iron . Golden Rice is a killer of Biodiversity, and a killer of alternatives because it extends the food and agriculture model that is depriving people of the diversity that is vital to removing nutritional deficiencies .

**Golden Rice is 3500% less efficient than available alternatives**

The promoters of ,Golden rice admit that it produces only 35 micrograms per 100 mg of rice. <http://ajcn.nutrition.org/content/89/6/1776.long>

Biodiversity and ecological agriculture offers us alternatives that are 3500% richer in Vit A than Golden Rice. Golden Rice will actually decrease Vit A availability , compared to the alternatives.

Table 6.12 Gives sources rich in vit. A used commonly in Indian foods. Every culture has rich sources of vit A in its Biodiversity and food.

Sources rich in vit. A used commonly in Indian foods.

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| --- | --- | --- |
| **Source** | **Hindi name** | **Content (microgram/100g)** |
| Amaranth leaves | Chauli saag | 266-1,166 |
| Coriander leaves | Dhania | 1,166-1,333 |
| Cabbage | Bandh gobi | 217 |
| Curry leave | Curry patta | 1,333 |
| Drumstick leaves | Saijan patta | 1,283 |
| Fenugreek leaves | Methi-ka-saag | 450 |
| Radish leaves | Mooli-ka-saag | 750 |
| Mint | Pudhina | 300 |
| Spinach | Palak saag | 600 |
| Carrot | Gajar | 217-434 |
| Pumpkin (yellow) | Kaddu | 100-120 |
| Mango (ripe) | Aam | 500 |
| Jackfruit | Kathal | 54 |
| Orange | Santra | 35 |
| Tomato (ripe) | Tamatar | 32 |
| Milk (cow, buffalo) | Doodh | 50-60 |
| Butter | Makkhan | 720-1,200 |
| Egg (hen) | Anda | 300-400 |
| Liver (Goat, sheep) | Kalegi | 6,600–10,000 |
| Cod liver oil |  | 10,000–100,000 |

**Maximising “Health per Acre” and creating Gardens of Hope everywhere , is the real solution to malnutrition.**

The lower cost, accessible and safer alternative to genetically engineered rice is to increase biodiversity in agriculture. Further, since those who suffer from vitamin A deficiency suffer from other forms of malnutrition, a reductionist approach to one aspect of malnutrition, and that too an ineffective approach compared to alternatives , is a nutrition myth . **As the Navdanya Study “Health per Acre” shows, a biodiverse farming system in the Himalayan region of Uttarakhand produces 2540mg of Beta Carotene per Acre, compared to only 24mg per Acre in a monoculture of rice.**  Intensifying biodiversity thus has the potential to contribute to 10000% increase in Vit A availability. One acre of farmland converted from rice monocultures to biodiverse intense farming with nutrient rich foods can produce enough carotene to fulfil vitamin A requirements for 900 adults. On a national scale in India we can produce 164106 metric tons of retinol equivalent( I unit of beta carotene=0.167 unit of RE)more than produced by rice monocultures which would meet the daily requirement of vit A of 1.5 billion adults.

( Health per Acre, Navdanya**)**

A major deficiency of genetically engineered Golden rice to reduce Vit A deficiency is the eclipsing of alternatives offered by Biodiverse ecological agriculture agriculture. As Mr. Pinstrup Anderson, Head of the International Rice Research Institute has said that Vitamin A rice is necessary for the poor in Asia, because "we cannot reach very many of the malnourished in the world with pills". However, there are many alternatives to pills for Vitamin A supply. Vitamin A is provided by liver, egg yolk, chicken, meat, milk, butter. Beta-carotene, the vitamin A precursor is provided by coriander,curry leaves, dark green leafy vegetables, spinach, carrot, pumpkin, mango and drumstick.

Women farmers in Bengal use more than 100 plants for green leafy vegetables. Regions in India where biodiversity in fields and diversity in diets has not been destroyed by Green Revolution monocultures such as Arunachal Pradesh, Goa, Mizoram, Nagaland, Manipur,Sikkim, Tripura, Andaman and Nicobar Islands, Lakshwadweep have much lower occurrence of vit A deficiency than Green Revolution areas.

The Green Revolution led to massive genetic erosion in farmers fields and knowledge, erosion among farming communities, besides leading to large scale environmental pollution due to use of toxic agrichemicals and wasteful use of water. Genetically engineered rice as part of the second Green Revolution is repeating the mistakes of the Green Revolution, intensifying the deficiencies that are killing people, while adding new hazards in terms of ecological and health risks. A far more efficient route to removing vit. A deficiency than pushing Golden Rice is biodiversity conservation and propagation of plants naturally rich vit. A and other nutrients in agriculture and food.

The "selling" of Vitamin A rice as a miracle cure for blindness is based on blindness to alternatives for removing vitamin A deficiency and blindness to the unknown risks of producing Vitamin A through genetic engineering.

There are no real biosafety assessments of Golden Rice. But the debate about Golden rice is not just about its safety. Even assuming it is safe , it is still stupid to promote Golden Rice which is 3500% less efficient than alternatives.

Stupidity is trumping intelligence at the level of solving the problems of malnutriton because Golden rice is about superprofits from royalty collection in the long run.

 Inspite of all the talk of “Philanthrophy”, the 80 patents linked to Golden Rice, have not been given up.

Seed sovereignty and food sovereignty in women’s hands is the most effective way to get rid of deficiencies of Vit A and other micronutrients. The biotech industry, and Golden Rice promoters are deliberatey blind to this alternative because for them Goden Rice is a Trojan Horse to introduce GMOs, and GMOS are a Trojan horse to introduce Intellectual property Rights on seeds of rice.

The real solution to malnutrition and nutrient deficiences is the growing and eating of biodiversity. Biodiversity intensification increases “Health per Acre”, and makes diverse nutrients available where they are needed most. “Gardens of Hope” everywhere, in villages and cities, in backyards and rooftops, in schools and communities are the answer to Vit A and other nutrient deficiencies. By blocking these alternatives that increase nutrition and promote ,seed freedom and food democracy, Golden rice will make worsen the crisis of malnutrition.