

SHOULD INDIA CULTIVATE GENETICALLY ENGINEERED RICE?

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Rice is the staple food of over half the world. Fear of shortages because of declining productivity in some parts of the world and the burgeoning world population has led to discussions that genetically engineered rice is the answer. Both public sector and private sector research institutions in India and elsewhere have launched projects to produce GE rice with various properties. Golden Rice is already well known, there are efforts to introduce resistance to fungal diseases, researchers are working to produce herbicide tolerant rice, similar to Monsanto's Roundup Ready corn and Mahyco, the company that gave us Bt cotton, is working, along with other research institutions, to produce a Bt rice. Other rice projects are attempting to change the quality of rice starch and disturbingly, a private company is producing rice containing the Bt cry9C gene, which is the gene used in Starlink corn, suspected of having allergenic properties and therefore banned for human use by the USDA!

The fundamental question is whether India should allow the cultivation of GE rice since it is a 'high risk' area, being a major Center of Origin and diversity for rice. Mexico, the country that is the Center of Origin and diversity for corn, has a clear-cut policy. It has imposed a ban on not just the cultivation of GE corn, but also research in GE corn. Mexico has taken this position in order to safeguard the natural gene pool of corn, another major staple food of the world. A Center of Origin is from where a particular crop originated thousands of years ago. Food crops, as we know, are not collected from the forests, they were developed (bred) by a careful process of selection and crossing, by tribal and farming communities from the wild plants found in nature. India is one of the centers where rice originated so lots of rice varieties and the plants related to rice (wild relatives) are also found here. This means that the greatest number of rice and related genes are found in India, particularly in the Jeypore tract of Orissa, and the swathe cutting across Jharkhand and Chattisgarh, as well as in the Northeastern tract.

Centers of Origin are considered high-risk areas for GE crops because if the foreign genes contained in the GE variety were to move into the natural gene pool, the results could be potentially catastrophic. Scientists promoting agbiotech argue that rice is a self-pollinating crop and will not accept outside pollen and genes. This is simply not true. Several studies exist showing cross-pollination happens in rice. Recent reports from China and Latin America are showing that gene flow between GE rice and other rice happens at rates that are high enough to cause concern. Experiments have also found that the herbicide tolerance gene can move to native varieties and create new, difficult to control, weeds. There are other studies that show that the introduction of foreign genes by the process of genetic engineering can cause a phenomenon called 'gene silencing' in the plant that is receiving the foreign gene. This means certain genes in the plant will become silent (non-functional) and not produce what they normally should. Gene silencing could

have very grave implications if it were to spread to the natural gene pool by careless scientists.

Genetic diversity is crucial for the long-term survival of any crop. When a crop variety somewhere becomes vulnerable either due to the onslaught of a disease it cannot fight, or because the soil has become water logged or alkaline, scientists need to breed another variety of the crop for that region. They do this by searching for suitable genes in related varieties and the natural gene pool. If these genes were to be unavailable, the vulnerable variety would perish, depriving people in that region of food. That is why it is important to maintain genetic diversity. If GE rice were to harm the native gene pool of rice by making certain genes non-functional or changing the normal functions of other genes, it would have terrible implications for the food security of the rice eating regions of the world.

Too little is understood about what happens when foreign genes are abruptly pushed into the genetic material of living organisms like plants. What little is known is largely negative. The Precautionary Principle is central to GE work, dictating that when faced with uncertainty, it is better to be cautious and not proceed. India must not cultivate GE rice until a solid body of research is done under Indian conditions to understand the implications of foreign genes shifting to rice diversity. Agbiotech proponents argue collecting this data could take several years. So be it. One cannot rush when the stakes are so high. In any case, several other lines of research are yielding more promising results than the GE route. The System of Rice Intensification (SRI) pioneered by Madagascar is showing spectacular results in various countries including India.