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## EXPERT VIEW

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# SCIENCE: ONLY SAVIOUR OF INDIAN FARMING

Just like the Green Revolution of the 1960s saved India from being a basket case and turned it into a bread basket, modern plant genetics and genetic engineering will be a major part of the solution to tackle hunger in the country. India, already reeling under the effects of climate change (El Niño included), will have little option other than modern science to come to its rescue.

India's natural resources are fast dwindling and combined with climbing temperatures, drought and a growing population, the country should really call upon science to tackle these challenges to agricultural productivity. The biggest challenge is to grow more without further destroying the environment. If India were to opt for any other romantic or illusory options in agriculture, the country will have to pay a steep prize for the folly.

More than 20 years ago, Pamela Ronald of the University of California, Davis, chanced upon a plant disease battling gene Xa21 located on the chromosome 11 of the rice crop. A rice variety transformed with Xa21 gene using refined breeding method has created a scientific miracle in terms of warding off diseases.

In 2006, Ronald in collaboration with David Mackill and Kenong Xu of the International Rice Research Institute, isolated a rice gene dubbed Sub1 responsible for resisting submergence in flooding waters. Sub1 gene, isolated from an ancient variety of rice, allows rice plants to survive up to two weeks in flooded waters as opposed to normal rice that can withstand flood waters for a mere three-four days.

This feat of genetic engineering was a manna from heaven for rice farmers in flood-prone Bangladesh and in some parts of India as well. Now, 3.5 million rice farmers are growing Sub1 rice in Asia. This is a fine example of how even poor rice farmers of Asia take to scientific innovations if one can demonstrate their utility in a convincing way.

Scientists like Ronald are hailed as heroes by some and derided by others. These days modern science in agriculture garners more misgivings than Krugerrands. That's because like in all times of scientific development, there have always been a group of people who fear science and don't like it, and they will do everything to oppose or stall scientific development.

There is a bunch of well-known anti-science and anti-technology groups in India who try to drag the Indian farmers down their own path of ancient agricultural practices and campaign for the use of outdated heirloom seeds, and many other so-called agro-ecological or natural methods with proven record of reduced productivity.

Unfortunately, many political parties at the state level have fallen for these campaign tactics, and have formulated policies to take their farmers back to pre-Green Revolution times. A sure recipe for an impending disaster.

When "Golden Rice" engineered to provide vitamin A to prevent starvation and blindness was introduced, opponents ripped the test plants and completely destroyed it. For over 10 years, India has its own version of golden rice ready, but the authorities do not have the courage to bring it to commerce because of the fear psychosis instilled by the anti-technology lobby. India is home to the world's largest population of vitamin A-deficient (VAD) people, most of whom are pregnant women and children. It is really criminal to keep golden rice from such needy and deserving population just because some Luddites don't like it. Golden rice can be an eminent part of a mix of solutions to tackle VAD in the country, but to no avail.

Scientists believe that public at large can be less fearful if scientists present arguments grounded in science. But the street-level campaigning usually trumps any reasoned argument. People must know that almost anything we eat is genetically modified, albeit using a variety of different methods of genetic modification.

Agriculture is full of domesticated plants and animals, which means they are all genetically modified. We should all be grateful to science for the bountiful harvest that we all see on our dinner plates every day. In the mainstream scientific community, modern genetic methods are considered no more risky than conventional methods. It is only in the Luddite community they seem to have baseless doubts about the safety and utility of modern science in agriculture.

Scientists must help navigate the fine contours of genetics, food and sound health. Ronald, a modern biotechnologist is married to Raoul Adamchak, an organic farmer. Together they are devoted to a holistic brand of sustainable agriculture by marrying modern science with the ecologically-based sustainable agriculture.

They published a book, *Tomorrow's Table: Organic Farming, Genetics, and the Future of Food*, in which they have chronicled how to combine ecological sensitive way with modern genetics to make sustainable agriculture a reality in future. India must resist voices that oppose modern science and carve a path that is scientifically and economically viable system of agriculture to face the future. India has a strong army of agricultural scientists who delivered on Green Revolution, and they will also deliver on modern science provided they are given unstinted support by the government.

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