



Agri Innovation Post

Agri-Biotech News & Views

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GM crops have been grown with great benefits for the past 25 years, notable amongst them being crops with insect resistance and herbicide tolerance traits. The next generation of GM crops will include nutritionally enhanced crops for food. Though considered a major advantage of the technology, they are challenging to deploy compared to Bt and HT crops. The foremost reason being the successful engineering of multi-step metabolic pathways to produce efficacious amount of product. Other challenges include difficulty in efficacy demonstration and field evaluation of such traits as per the regulatory process and public acceptance of GM products.

High oleic acid soybeans are already being grown by the farmers and another example of fortified crop is 'Golden rice' that can contribute towards the dietary requirement of vitamin A for populations that obtain 40-80% of their daily calories from rice. Other biofortified foods that are being developed, include iron and zinc fortified rice developed by HarvestPlus as well as rice with enhanced folate levels, that along with Golden rice can address the nutritional deficiencies.

Golden Rice network is a platform for deploying the technology to small holding farmers, India too is part of the Golden rice network long with Philippines, Bangladesh, Vietnam, China, Indonesia and Germany. Golden rice has been confirmed safe for use as food, in feed, and for processing by the government's regulatory authorities in Australia, Canada, New Zealand and USA and is undergoing regulatory review in Philippines and Bangladesh. The Golden rice regulatory data is freely available to all Golden rice licensee countries. It is estimated that delay in the introduction of Golden rice have cost Indian GDP a loss of about US\$1.7 billion. Biofortified foods produced from nutritionally enhanced next generation GM crops will be most beneficial for managing malnutrition in the developing nations including, India.

Dr. Shivendra Bajaj
Executive Director
Federation of Seed Industry of India-Alliance for Agri innovation

AgBiotech News

[Indian agriculture has reached a stage where more the govt intervenes, lower will be the growth:](#)

[NITI Aayog member Ramesh Chand](#)

[Indian Express]

NITI Aayog member Ramesh Chand says time has come to free farm sector from controls, shift from input subsidies and procurement to income support and deficiency payments, and create an enabling environment for greater corporate investments in agriculture.

[Panel to inspect Bt brinjal 'sowing' in Haryana farms](#)

[Indian Express]

The government has constituted a 12-member expert committee to carry out an on-the-spot inspection of brinjal fields in Haryana to verify whether unapproved varieties of genetically-modified Bt brinjal were being grown in the state. The move comes amidst reports that vast tracts of cropland had been sown with Bt brinjal, which is illegal to cultivate in India in the absence of go-ahead from Ministry of Environment and Forests. The committee, led by K Veluthambi, co-chairperson of the Genetic Engineering Appraisal Committee, the top regulatory authority on the use of genetically engineered organisms and products, has been asked to submit its report within six months.

[Inside India's genetic crop battlefield](#)

[LiveMint]

The government's dithering attitude on GM crops has often led to regulatory failure, and nothing captures this better than how India's first GM crop, Bt cotton, received clearance for commercial cultivation 17 years ago, catapulting India from being a net importer to among the top growers and exporters of cotton. The regulatory failure has not only created a deep distrust among the naysayers about GM technology but has also potentially exposed farmers and consumers to untested technology. By resisting genetic engineering technologies, India risks falling behind the rest of the world where scientists are deploying gene editing tools to improve yields, disease resistance and shelf life of crops.

[Explained: Modi's Bt cotton connection and why his govt needs to wake up on GMO](#)

[Financial express]

With Bt cotton, India gained about \$67 bn in forex from extra exports of cotton & cotton yarn, and savings in imports, over FY03-FY17, compared to business as usual. We found that Gujarat's 'agrarian miracle' of 8% average annual growth rate in agri-GDP during Narendra Modi's regime as CM from 2002-03 to 2013-14 was triggered and led by Bt cotton. And this was the famous Gujarat development model that also helped him become the PM of India. Today, Satyagraha is much in news because of the civil disobedience movement launched by supporters of Shetkari Sanghatana (SS), a farmers' organisation, to defy the controls by Government of India (GoI) on the planting of Herbicide Tolerant (HT) Bt cotton and Bt brinjal.

[Officials conducts raids, seize Bt cotton seeds from farmers](#)

[Financial Express]

Acting on a tip-off, officials of the agriculture department of the Wardha and the local police on Friday raided fields of some farmers in village Mouja Jaamni and confiscated at least 12 packets of the banned seed variety of herbicide tolerant (HT) Bt cotton. On Thursday, the Union government has sought an action taken report from the state over the incident of sowing of unauthorised HTBt cotton at Maharashtra's Akoli Jahangir village in Akola district. Richa Sharma, joint secretary, ministry of environment, has written to chief secretary Ajoy Mehta to order an investigation and verify facts on ground. Farmers' body Shetkari Sanghatana in Maharashtra said that it will continue to defy the government ban and hold ceremonies to sow unapproved variant of HTBt seeds across the state.

['Civil Disobedience': Group Says It Planted Unapproved GM Cotton Seeds](#)

[Business Standard]

A farm group said its members had planted a variety of genetically modified cotton seeds which have not been approved by the government, an offence that could result in five years imprisonment. It is the first-time farmers, who argue that they shouldn't be deprived of any new technology, have acknowledged planting the herbicide-tolerant cotton variety. Industry officials estimate the area planted with such seeds reached at least 10 percent of the 12.2 million hectares of Indian cotton acreage in 2018 and is expected to rise in 2019.

[India allows 100,000 tonnes corn imports at lower duty as prices jump](#)

[Reuters]

India allowed two state-run trading companies to import 100,000 tonnes of corn at a concessional 15 percent import tax, as prices of the animal feed jumped in the south Asian country because of drought. A major exporter of corn to southeast Asia until a few years ago, India has turned into an importer as output has fallen and demand increased from the country's poultry producers and corn starch manufacturers. The switch in India's position has brought cheer to rival suppliers such as Brazil, Argentina and the United States, which have now replaced New Delhi in the southeast Asian market.

['Golden Rice' now closer to reality](#)

[Hindu BusinessLine]

The safety evaluations have shown that Golden Rice is as safe and nutritious as conventional rice but comes with the added benefit of increased beta-carotene content in the grain, the Philippines-based IRPI claimed. Research has indicated that one cup of Golden Rice can provide up to 50 per cent of the daily requirement of an adult for vitamin A. Quoting a global research, Russell Reinke, Programme Lead, Healthier Rice, IRRI, stated that in Bangladesh over 20 per cent of pre-school and school age kids are afflicted with Vitamin A deficiency.

Ag Biotech News Around the World

[The first gene-edited soybean opens door to a slew of new CRISPR foods](#)

[GLP]

At the beginning of the year 2019, high oleic soybean oil took its place on the market shelves. It contains several times less saturated fatty acids and healthier oleic acid than oil from conventional soybeans. Calyno oil, as it's called, represents the first time a cultivated plant has been bred and commercialized by gene editing. Other gene-edited agricultural products, including tilapia, herbicide-resistant rice and seedless tomatoes are in the pipeline. The number of crop gene-editing projects underway around the world is astonishing. China leads the pack with 541 projects in gene editing research, followed by the USA with 387 and Japan with 81 projects. These will be pioneers for further crop improvement, especially for new cultivars bred to improve food security under the threat of global warming.

[U.S. patent agency to review Harvard, MIT's claim to CRISPR technology](#)

[Reuters]

The U.S. Patent and Trademark Office on Monday said it would review whether Harvard University and the Massachusetts Institute of Technology can claim rights to a gene-editing technology known as CRISPR, adding fuel to a rivalry between those institutions and the University of California. The proceeding could result in the cancellation of 13 U.S. patents already granted to the Broad Institute on various aspects of CRISPR technology.

[New CRISPR-based platform detects plant pests, identifies useful traits for crop breeding](#)

[GLP]

SHERLOCK technology is a new CRISPR-based platform that is rapid and portable and enables detection and quantitation of plant genes to support a variety of agricultural applications. Additional advantages, including the ability to process crude plant extracts with minimal nucleic acid sample preparation required are described in a research article published in The CRISPR Journal. SHERLOCK has the potential to be an important tool in agriculture for the rapid detection of pathogens or pests and in plant breeding.

[Grow Faster, Grow Stronger: Speed-Breeding Crops to Feed the Future](#)

[The New York Times]

Farmers and plant breeders are in a race against time. The world population is growing rapidly, requiring ever more food, but the amount of cultivable land is limited. Warmer temperatures have extended growth seasons in some areas — and brought drought and pests to others. Plant breeders are fast-tracking genetic improvements in food crops to keep pace with global warming and a growing human population. Most speed breeding can be set up with minimum skill, and, in countries where electricity and other resources may be lacking, it can be done using solar panels to power cheap LEDs. Speed breeding can also be combined with gene editing and genomic prediction. “One technology alone is not going to solve our problems,” Dr. Hickey said. “We’re going to need all the tools in the shed.”

[Bayer owns the global food supply? Seed company mergers haven’t inflated prices, stifled innovation, study shows](#)

[GLP]

An innovative seed industry is essential for sustainable growth in crop yields. However, recent mergers and takeovers in the global seed industry have attracted much debate in terms of their potential to stifle competition and innovation. A recent OECD study has collected new detailed information on the degree of concentration in markets for seed across a broad range of crops and countries. Detailed data show that concentration in seed markets varies strongly across crops and countries. There is no clear evidence of harmful effects of concentration on prices or on innovation. Because of divestitures, recent mergers did not lead to large increases in market concentration.

[Viewpoint: The 'assault on science' and human welfare by eco-activists who reject agricultural technology as 'corporate subterfuge'](#)

[GLP]

The public will support greener technologies (provided there are incentives) and sustainable innovations to combat climate change. They will not support the blanket precautionary removal of benefits and solutions because someone has a theory about how nature heals itself. Does the wider public want to pay 60% more for food? Will they accept to no longer have affordable meat and dairy products? Do they want to haul heavier, more expensive glass packaging? How much more are people willing to pay for green energy? The wider public does not understand the policy tools these activists have manipulated. The wider public is ignorant of the consequences soon to be imposed on their lifestyle by a small, vocal, self-entitled tribe of eco-fundamentalists. The wider public is just trying to get by and hopefully have a better tomorrow.

[Federal Office for the Environment Approves GM Barley Field Trial in Switzerland](#)

[Crop Biotech Update]

The Federal Office for the Environment (FOEN) of Switzerland has given permission to the University of Zurich to conduct field trials of **genetically modified (GM)** barley under strict conditions on June 12, 2019. The barley that will be tested has been modified with the **wheat** resistance gene Lr34. The researchers want to find out whether the **gene** can also protect **corn** and **barley**. The crop will be exposed to **barley leaf rust** and **powdery mildew** fungi to test resistance. The field trials will also test whether the genetic modifications have any effect on crop development and yield.

[Genetically Engineered Wheat Found in Unplanted Washington Field](#)

[Bloomberg]

Wheat plants genetically engineered to resist the Monsanto herbicide Roundup have been detected in a Washington state field, although there's no evidence to suggest the grain has entered the food supply, the U.S. Department of Agriculture said. The Animal and Plant Health Inspection Service said the discovery was made in an unplanted field, but didn't identify where in the state it was found. There is no evidence to suggest the grain has entered the food supply, the U.S. Department of Agriculture said.

[Efficient Assembly of Large Multiplex CRISPR/Cas9 Guide Arrays for Maize Genome Editing](#)

[Bio-101]

Genome editing in maize using CRISPR-Cas9 is an effective technique and researchers aim to target several genes at the same time. Genetic transformation of maize is expensive and requires a lot of work, thus, it would be beneficial for researchers to have vectors that target multiple genomic loci from one transformation event. Researchers from the University of Massachusetts Amherst, USA, developed the MoClo system, which is an elaboration of Golden Gate cloning and tailor-fit for assembling larger multiplexed Cas9 guide arrays.

[Trump Team Proposes Easing Rules on Genetically Engineered Crops](#)

[Bloomberg]

The Trump administration would exempt many new genetically engineered crops from regulation by the U.S. Department of Agriculture under a broad overhaul of biotechnology rules. The overhaul, which the department said would cut the cost of developing genetically engineered plants, would exempt crops with traits "similar in kind" to modifications that could be produced through traditional breeding techniques. Developers would be allowed to make a "self-determination" that their products are exempt from regulation.

[Long-term Adoption of GM Maize in Spain and Portugal Proves to Benefit Farmers and the Environment](#)

[Crop Biotech Update]

In a study that covers 21 years, starting from when GM maize was first planted in Spain in 1998 to 2018, 121,000 hectares of insect resistant maize were planted in Spain and Portugal. This is equivalent to 35% of total maize area in Spain, and 6% in Portugal. The study also stated how GM maize has helped farmers grow more maize for food and feed while using fewer resources. It was also documented that planting GM maize decreased the use of insecticides (by 37 percent) and fossil fuels during crop spraying.

[The challenges of delivering genetically modified crops with nutritional enhancement traits](#)

[Nature Plants]

Input traits have successfully been used and now form the basis of GM agriculture, output trait GM crops are still lagging behind after 20 years. This is despite the demonstrable benefits that some nutritionally enhanced crops would bring and the proven value of GM technologies

[Crispr gene-editing will change the way Americans eat](#)

[The Guardian]

The first Crispr-edited products will begin reaching the market this year, and researchers believe it's only a matter of time before US grocery shelves could be filled with gene-edited produce, grains and meat. Soon, soybeans will be bred to yield oil without dangerous trans fats. Lettuce will be grown to handle warmer, drier fields. Wheat to contain less gluten. And pigs bred to resist deadly viruses. Someday, maybe even strawberry plants whose delicate berries can be picked by machine instead of

by hand. The technology will be labeled and subject to stringent health and environment review in the EU, but not in the US, where produce could be radically changed

[Science of GMOs](#)

[UConn Today]

In an op-ed article in *UConn Today*, University of Connecticut Program Specialist Stacey Stearns writes about the benefits of GMOs, citing that while most people associate GMOs with food products, they actually began in the medical field with insulin, an important part of diabetes treatment.

[GMO crops could have slowed fall armyworm pest advance across China](#)

[GLP]

The fall armyworm is hungry, on the move and scaring farmers the world over. The crop-devouring pest has spread from the Americas to Africa and Asia, gorging on rice, corn, vegetables, cotton and more. Europe, Australia and Southeast Asia could be next. In its first three years in Africa alone, it inflicted \$13.3 billion of crop losses. A recent arrival in China, the fast-moving grub may infest the country's entire grain-producing farmland within a year. Crops genetically engineered to express genes from the soil bacterium *Bacillus thuringiensis* are protected, without the need for broad-spectrum chemicals that may harm beneficial insects.

[Do biofortified crops make economic sense?](#)

[GLP]

Economists have calculated that conservative adoption of Golden Rice would benefit the gross domestic product (GDP) of Asian countries by US\$6.4 billion (value in US\$ of 2005) annually through increased productivity enabled by reduced vitamin A deficiency-induced sickness, and improved eyesight, and ~US\$17.4 billion (value in US\$ of 2005) if Golden Rice adoption encouraged adoption of other nutritional traits in rice. Recently, HarvestPlus has exceeded target levels of iron and zinc in rice, which they were unable to achieve by conventional breeding, using GMO techniques. Genetic modification has also been used to introduce folate into rice endosperm. The delay to the introduction of Golden Rice in India has been calculated to have cost Indian GDP US\$199 million per annum for the decade from 2002, in total about US\$1.7 billion (value in US\$ of 2014).

New Research

[New insight into how plants breathe could lead to more water-efficient crops](#)

[GLP]

Scientists have discovered how plants create networks of air channels — the lungs of the leaf — to transport carbon dioxide (CO₂) to their cells. Botanists have known since the 19th century that leaves have pores — called stomata — and contain an intricate internal network of air channels. But until now it wasn't understood how those channels form in the right places in order to provide a steady flow of CO₂ to every plant cell. The new study, led by scientists at the University of Sheffield's Institute for Sustainable Food and published in *Nature Communications*, used genetic manipulation techniques to reveal that the more stomata a leaf has, the more airspace it forms.

[Knockout of *OsPRP1*, a gene encoding proline-rich protein, confers enhanced cold sensitivity in rice \(*Oryza sativa* L.\) at the seedling stage](#)

[3Biotech]

Proline-rich proteins (PRPs) play several important physiological and biochemical roles in growth and stress response of plants. A study published in *3 Biotech* reported that the knockout of rice PRP induced cold sensitivity in rice. The findings suggest that *OsPRP1* enhances cold tolerance by modulating antioxidants and maintaining cross talk through signaling pathways. Thus, *OsPRP1* gene can be used to enhance the cold tolerance trait in rice.

[Phylogenetic and population structural inference from genomic ancestry maintained in present-day common wheat Chinese landraces](#)

[The Plant journal]

Scientists from four research institutes in China have sequenced the whole genome of 3,800-year-old wheat seeds unearthed from Xinjiang Uygur Autonomous Region, decoding the food crop's spreading route into China. The results of the study are published in The Plant Journal. The scientists propose that the common wheat dispersed from the Qinghai-Tibet Plateau in west China to the Yangtze River valley in central and eastern China.

[A stress-responsive bZIP transcription factor *OsbZIP62* improves drought and oxidative tolerance in rice](#)

[BMC-Plant biology]

The expression of *OsbZIP62* was induced by drought, hydrogen peroxide, and abscisic acid (ABA). Overexpression of *OsbZIP62-VP64* (*OsbZIP62V*) led to improved tolerance to drought and oxidative stress exhibited by transgenic rice, while *osbzip62* mutants showed the opposite response. *OsbZIP62-GFP* was found to be localized to the nucleus, and the N-terminal sequence was required to activate the transcription of *OsbZIP62*. Furthermore, analysis showed that the expression of several stress-related genes was upregulated in *OsbZIP62V* plants. The findings imply that *OsbZIP62* is important in ABA signaling pathways and positively regulates rice drought tolerance by controlling the expression of stress-related genes, and this gene could be used to genetically engineer important crops with better drought tolerance.

Upcoming Events

July 2019

International Conference on Plant Transformation & Biotechnology (PTB)

Date: July 03 – 04, 2019

Venue: Vienna, Austria

Plant Genome Editing & Genome Engineering

Date: July 05 – 06, 2019

Venue: Vienna, Austria

13th International Conference on Agriculture and Plant Science

Date: July 12 – 13, 2019

Venue: Osaka, Japan

International Conference on Agricultural and Biological Science (ICABS)

Date: July 24 – 25, 2019

Venue: Sydney, Australia

6TH PLANT GENOMICS AND GENE EDITING CONGRESS: ASIA

Date: July 29-30, 2019

Venue: Kuala Lumpur, Malaysia

August 2019

International Agriculture & Horti Expo

Date: August 1-3, 2019

Venue: New Delhi, India

International Conference on Plant Tissue Culture and Plant Biotechnology

Date: August 1-2, 2019

Venue: Amsterdam, Netherlands

Milan International Conference on Agricultural, Biological and Environmental Sciences (MABES)

Date: August 5-7, 2019

Venue: Milan, Italy

International Conference on Agriculture and Food Security (AGROFOOD)

Date: August 8-9, 2019

Venue: Colombo, Sri Lanka

International Conference on Plant Science and Molecular Biology

Date: August 19-20, 2019

Venue: Osaka, Japan

The Seeds of Our Future: Innovating Global AgTech

Date: August 20-23, 2019

Venue: San Jose, USA

International Conference On Agriculture Biotechnology Science And Engineering (iCABSE)

Date: August 23-25, 2019

Venue: Ho Chi Minh, Vietnam

September 2019

International Sugar Cane Congress

Date: August 31- September 8, 2019

Venue: Cevil Redondo, Argentina

International Conference on Agriculture, Biological and Environmental Sciences (PABE)

Date: September 5-7, 2019

Venue: Paris, France

International EUCARPIA Meeting on Genetics and Breeding of Capsicum and Eggplant (CapsEgg)

Date: September 11-13, 2019

Venue: Avignon, France

CRISPR AgBio Congress

Date: September 25-26, 2019

Venue: London, UK

International Conference on Agro BigData and Decision Support Systems in Agriculture (BigDSSAgro)

Date: September 25-27, 2019

Venue: Viña del Mar, Chile

Nextgen Genomics, Biology, Bioinformatics and Technologies Conference (NGBT Conference)

Date: September 30 – October 2, 2019

Venue: Mumbai, India

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