The exemption of site directed nuclease (SDN) 1 and 2 genomes in India has seen an upward journey of R&D in agriculture. Scientists and researchers are encouraged to witness the transformation of their research from lab to field. Another success story will be witnessed in the coming years as the Agriculture Minister of India, Shri Narendra Singh Tomar has said that a drought-resistant rice variety developed through application of genome-edited technology is expected to be available for field evaluation by kharif 2024 and for commercial cultivation by farmers by 2026.

This is expected to be the first variety of agricultural crop developed using genome-edited technology to go for commercial release in the next four years in the country. If the product comes in the hand of farmers, it will be a historical moment for advancement of science in agriculture in India.

Scientists at the Indian Council for Agricultural Research said the technology has great promise and emphasis should be given to improving oilseed and pulse crop varieties resistant to diseases, insects or pests, and tolerant to drought, salinity and heat stresses. There are already several crops being developed using genome-edited technology that are in the pipeline for field trial across universities and institutes in India.

We are hopeful that the farmers and consumers will readily adopt gene editing for the benefits that it provides and make India self reliant and food secure in the coming years.

We have also covered news around several important developments on agriculture across India, globally and in the area of research in this newsletter. We hope you find it a good read!

Shivendra Bajaj
Executive Director
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News from India and Around the World

Better seeds and biotechnology can boost Africa's crop productivity, study finds

(Alliance for Science)

Though Africa has a quarter of the world's arable land, its crop productivity falls well below the world average, particularly in Sub-Saharan Africa (SSA). Much of that is due to poor quality seeds and constraints facing smallholder farmers, according to a new study that suggests crop biotechnology as a way to boost production and productivity among Africa's smallholders. Resource-stricken, fated to eke a living from diminutive landholdings and deprived of the rudiments of modern farming, smallholders face a menacing retinue of setbacks in their quest to feed the continent's ballooning population.

Abigail Dankwah Akoto: Will the genetically modified PBR cowpea be a game changer?

(My Joy Online)

Maruca pest is a key challenge that renders cowpea production unattractive. The larvae infest the flower buds, flowers, and the pod causing up to 80% yield loss in heavily infested areas. Currently, farmers spray their fields between eight to 10 times within the eight week growing cycle of the crop in order to get a good harvest. There is no known cowpea variety that is resistant to Maruca. Coupled with high cost of production, farmers are also at risk of other health implications due to their regular exposure to these pesticides. After nine years of research on a new cowpea variety engineered to be resistant to Maruca, devoted farmers like Mohammed and his colleagues do not still have access to this variety. The reality that this variety will help farmers increase yield and reduce pesticide application to two times per season (mainly for other insects that attack cowpea than Maruca), instead of the regular eight, has not done the magic in encouraging a hastened approval process. Their hopes of having a less tedious and cheaper cowpea production, is yet to see the light of day. To them this is injustice to cowpea farmers in Ghana, knowing that Nigerian cowpea farmers are already benefiting from the genetically modified podborer resistant (PBR) cowpea.

'It could have been avoided' — The background story of Sri Lanka's reckless experiment to go all organic and reject crop protection chemicals

(GLP)

Sri Lanka's tragic error was the stuff of a wild thought experiment: What would happen if a whole nation were to abandon the tools of modern agriculture and go back to the way farming was done more than a century ago? We no longer need to wonder about the result. We have the hard evidence of a humanitarian and economic crisis that has engulfed a nation of more than 21 million people. Those who are serious about agriculture know that organic farming won't work on a large scale. It simply cannot meet the needs of food production. It can thrive when it presents consumers with one choice among many in a diverse marketplace. By contrast, forcing every farmer in an entire country to adopt its primitive practices, such as the rejection of synthetic fertilizers and crop-protection devices, is an exercise in lunacy.

This Start-up's Modified Trees Grow Faster, Store More Carbon

(CNet)

It doesn't take a scientist to understand why trees are so crucial in the fight to curb climate change. They can absorb and store carbon dioxide, a key greenhouse gas. But a Bay Area startup thinks trees can do better. Living Carbon has developed a technique to genetically modify trees that can grow faster, and store more carbon. According to a white paper published in February, its modified poplar trees stored up to 53% more carbon than control trees. There are more than 600 Living Carbon trees currently planted in Oregon, and more projects developing on abandoned land mines in parts of Appalachia.

Researchers discover a way to make crops more resilient

(Ottawa City News)

A study from the University of Calgary is aimed at improving wheat crops' resilience, yield and nutrient value without the use of genetically modified organisms (GMOs). The weather has a heavy impact on crops — from changes in temperatures, hailstorms and drought — leading to some challenges in places like the Prairies. However, researchers say they've found ways where plants can use their own genes to fight these conditions. Marcus Samuel, a researcher in the Faculty of Science at the University of Calgary, said he has been working on improving agricultural crop resilience through two projects that address climate change and improve the quality of food for the growing population.

Ex-agriculture minister Sharad Pawar bats for GM crops to improve food security

(The Financial Express)

Former Agriculture Minister Sharad Pawar has made a strong pitch for use of genetically modified (GM) crops, saying ignoring advances in crop science could adversely affect the country's food security. Delivering the Annasaheb Shinde Centenary Memorial lecture, Pawar said even European nations, which were "vehemently opposed" to genetically engineered crops, have begun to change their views in the face of the food crisis presented by the Covid pandemic and the recent Ukraine-Russia war. "India lately became complacent and started neglecting the developments in science, particularly the new genetics and breeding," said Pawar, who served as the Union agriculture minister from 2004 to 2014. Speaking at the event, Road Transport Minister Nitin Gadkari called for changing cropping patterns to boost production of oilseeds and keeping in mind the demands of the global economy.

'20-years late' — Why we need to confront agricultural biotechnology innovation regulatory roadblocks

(GLP)

A recent study contracted by CropLife International found that the current time for a new GM trait to go from R&D to commercialization is 16.5 years. Which, realistically, means that farmers and society will not see the true impact of these technologies for nearly 20 years. The reality of this trend is not good for farmers or for food systems who need new solutions to address big problems. However, research has shown that there are actions we can take today to help shorten the timeframe. The largest roadblock in products reaching markets is regulatory approval. Between 2012 and 2022, time spent in the regulatory phase of the GM approval process increased by 140 percent. Let's look at the EU as an example of these bottlenecks: European law states that approvals for plant biotech traits should take no longer than two years; however, approval decisions routinely take up to six years. By simply adhering to the law, we could instantly shorten the approval process by four years without any additional cost or resources or affecting food safety.

GMO tech proposed amid declining maize yields

(Caj News Africa)

An expert has urged African governments to review their limits on growing and importing genetically modified (GM) maize. The advice comes as some countries, including the major exporters of the staple commodity, suffer declines in output. Wandile Sihlobo, the Chief Economist of the Agricultural Business Chamber (Agbiz), noted that other regions in the world were gradually embracing the genetically modified version of the crop. "The likes of the EU (European Union), which for roughly 25 years opposed genetically modified maize, is slowly opening up for imports," he stated.

Drought-resistant & genome edited rice variety likely to be released to farmers by 2026: Agriculture minister Narendra Singh Tomar

(The Financial Express)

A drought-resistant rice variety developed through application of genome-edited technology for the first time in the country, is expected to be available for field evaluation by kharif 2024 and for commercial cultivation by farmers by 2026, agriculture minister Narendra Singh Tomar has said. The environment ministry and Department of Biotechnology (DBT) have given the sanctions for the field evaluation of genome-edited rice variety during the kharif 2024 season to Indian Agricultural Research Institute, Delhi, Tomar stated in a written reply to Lok Sabha.

Europe's climate change-induced droughts endanger food security, spur calls to embrace biotechnology and other sustainable measures

(GLP)

The trend that we have observed in agricultural drought in Europe represents an additional element of uncertainty in the current agri-food context. The crisis resulting from the invasion of Ukraine ("the granary of Europe") has revealed the fragility of European and global production and supply systems, and the precariousness of food security in regions, such as the European continent, where It has been seen as someone else's problem. The gradual increase in the risk of agricultural drought makes this fragility increase even more. With this scenario, the need to adopt effective measures to adapt to climate change in the field of agriculture gains even more force. In this context, two axes stand out in particular. On the one hand, deepening in the efficient management of water in agriculture based on the use of new technologies, especially in irrigation and soil and crop monitoring. On the other, agricultural biotechnology, researching and innovating so that cultivated plants adapt efficiently to increasingly stressful conditions , maintaining or, if possible, increasing their productivity.

New Research

Scientists Add Second Copy of Gene to Increase Rice Yield by 40%

(Krishi Jagran)

By giving test plants a second copy of a specific gene, a group of scientists from various Chinese institutions and a German colleague was able to increase the production of rice by 40%. The group explains their efforts to increase rice yields to fulfill rising food demands in their research that was published in the journal Science in light of the ongoing increase in the world's population. Scientists all across the world are working to find new ways to increase food production while still using the same amount of arable land. In this new study, the researchers investigated how to increase rice yields by genetically manipulating DNA to induce specific plants to produce more rice grains.

Study targets corn disease resistance

(Agri View)

In the new study the researchers aim to understand quantitative resistance to multiple corn foliar diseases and seedling diseases by looking at the level of the gene to the whole plant. Jamann said she's interested in exploring how plants defend against vascular infection or how they keep pathogens from entering the xylem, the plant's water-transport system. "For example bacterial leaf streak is typically thought of as a nonvascular pathogen; usually the bacteria don't enter the xylem," she said. "But we have a few corn lines that allow bacteria in that way so we're trying to understand why that's the case." Researchers at North Carolina State University also are working on the research. They'll examine resistance to seedling diseases and use gene editing to make corn more resistant to foliar diseases of corn.

Scientists use gene-editing in cereal crops to boost yields without nitrogen fertilizer

(Capital Press)

Scientists have developed a gene-editing strategy that allows cereal crops to benefit from bacteria that pull nitrogen from thin air. The discovery has the potential to decrease farm input costs and water pollution by making wheat, corn, rice and other crops less dependent on synthetic fertilizers, according to researchers. "It'd be convenient to reduce the amount of nitrogen applied to the soil. It's

the most important expense farmers have," said Eduardo Blumwald, a plant biology professor at the University of California-Davis. Blumwald is one of several researchers who recently published a study on the modification, which is achieved with CRISPR gene-editing technology rather than by introducing foreign genetic material. Though the study involved rice, the gene-editing technique has broader applications in agriculture, he said. "You can do this, in principle, in any plant but we are focusing on cereals. We need food."

Opportunities for Orphan Crops: Expected Economic Benefits From Biotechnology
(Frontiers)
An enabling, evidence-based decision-making framework is critical to support agricultural biotechnology innovation, and to ensure farmers' access to genetically modified (GM) crops, including orphan crop varieties. A key element, and often a challenge in the decision-making process, involves the balancing of identified potential risks with expected economic benefits from GM crops. The latter is particularly challenging in the case of orphan crops, for which solid economic data is scarce. To address this challenge, the International Food Policy Research Institute (IFPRI) in collaboration with local economists analyzed the expected economic benefits to farmers and consumers from the adoption of GM crops in 5 sub-Saharan African countries. This paper focuses on case studies involving insect-resistant cowpea in Nigeria and Ghana; disease-resistant cassava in Uganda and Tanzania; and disease-resistant banana in Uganda. Estimations from these case studies show substantial economic benefits to farmers and consumers from the timely adoption and planting in farmers' fields of GM orphan crops.

Untapped potential of genome-edited crops explored in new research
(CIMMYT)
Analysis of evidence by scientists of the International Maize and Wheat Improvement Center (CIMMYT) and CGIAR concludes that the scientific risks of genome editing are similar to those of traditional breeding: all new varieties, however developed, need to be tested for agronomic performance in a range of environments. Social risks are mainly that these powerful technologies may be rendered inaccessible to less-commercial crops and farmers if intellectual property (IP) and regulatory policies make them expensive or difficult to use. Genome editing has demonstrated potential to contribute to food security, improved nutrition, and value addition for farmers and consumers.

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