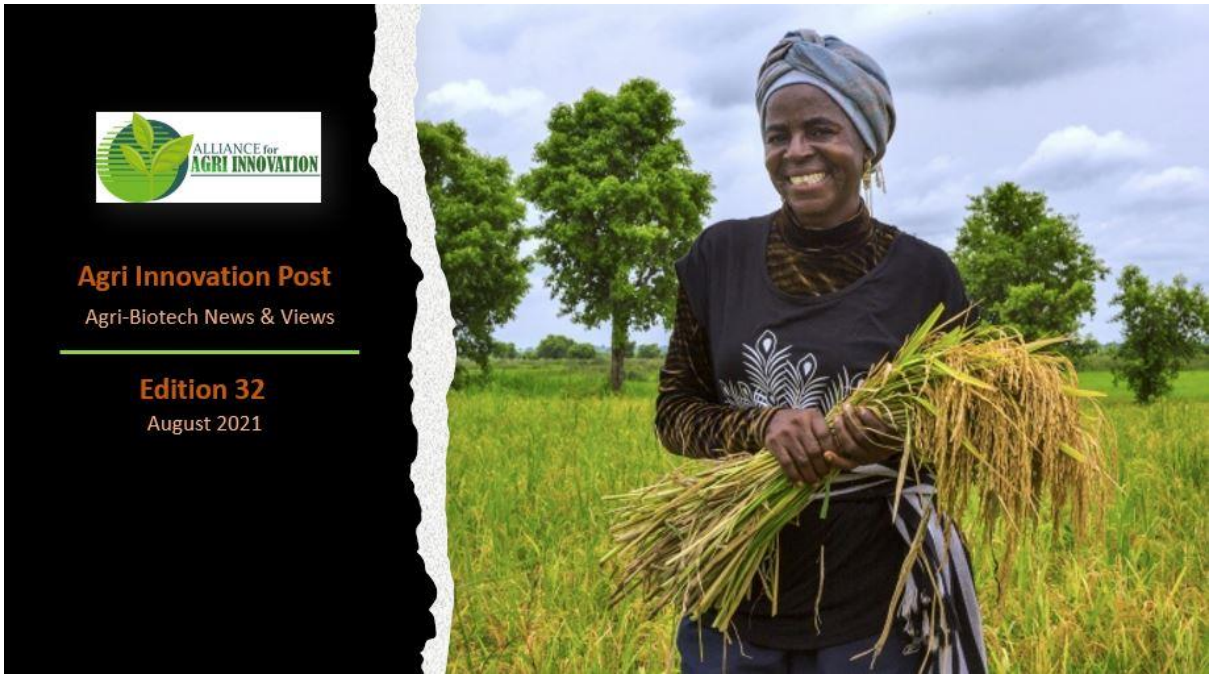


After the commercialization of Sub-Saharan Africa's first genetically modified (GM) food crop, insect-resistant cowpea, Nigeria is moving toward the environmental release of an improved GM rice.

Scientists in Africa have developed Nitrogen Efficient Water Efficient Salt Tolerant (NEWEST) rice variety to increase rice production in the continent. This rice variety is also called Nitrogen Use Efficient (NUE12), which allows the plant to make use of limited nitrogen in the soil, resist drought and withstand salty soil.

The NEWEST rice has undergone confined field trials at the National Cereal Research Institute, Badeggi, Niger State. A dossier is now being prepared to be sent to National Biosafety Management Agency (NBMA) for permission for a National Performance Trial. The project is being carried out by the African Agricultural Technology Foundation (AATF), NCRI, Agricultural Research Council of Nigeria (ARCN) and their counterparts in other African Countries.

According to the scientists, the motivation to work on this project came after witnessing the depletion of nitrogen resource every year in Africa. They believe that the crop will give farmers the security in a way that when they plant in a land that has no nitrogen, or in a land where they are unable to have access to fertilizer on time, their crop will still give them something that will help them maintain their livelihood.

As per the scientist, this project will greatly enhance the rice revolution which is taking place currently in the country.

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

Shivendra Bajaj
Executive Director
Federation of Seed Industry of India-Alliance for Agri Innovation

News from India and Around the World

Learning to Love G.M.O.s

(NY Times)

On a cold December day in Norwich, England, Cathie Martin met me at a laboratory inside the John Innes Centre, where she works. A plant biologist, Martin has spent almost two decades studying tomatoes, and I had travelled to see her because of a particular one she created: a lustrous, dark purple variety that is unusually high in antioxidants, with twice the amount found in blueberries.

Animal gene editing moves ahead in Russia; Biotech eliminates flavorless produce; Edible cholera vaccine coming soon?

(GLP)

Russia wants to produce allergen-free milk using animal gene editing. How much progress have they made? If you're bored with flavorless fruits and vegetables, genetic engineering might have solved your problem. A rice-based cholera vaccine could save a lot of lives and lead the way to more edible immunizations against deadly diseases.

GMO research: Lack of law complicates it

(The Independent)

For years Ugandan scientists have been trying to figure out how various crops can be made to respond to numerous challenges – drought, pests and diseases. Dr. Godfrey Asea is one of them. A maize breeder, with his team at the National Crop Resources Institute, Namulonge, he has been researching on genetically modified maize commonly referred to as GM maize for more than 10 years. Asea's team and scientists from six African countries have developed hybrid GM maize they say is tolerant to drought. The scientists from Uganda, Kenya, Tanzania, Ethiopia, Mozambique and South Africa are supported by the Nairobi, Kenya–based African Agricultural Technology Foundation's Water Efficient Maize for Africa (WEMA) Project. They also introduced Bacillus Thuringiensis (BT), a naturally occurring soil bacterium that protects crops against pests to the 'new' maize to create resistance to two main pests: stem borer and fall armyworm.

Nigeria moves forward with nitrogen-efficient GMO rice

(GLP)

Still basking in the euphoria of commercializing sub-Saharan Africa's first genetically modified (GM) food crop — insect-resistant cowpea —Nigeria has begun moving toward the environmental release of an improved GM rice. Nigerian scientists and their counterparts in other African countries are currently meeting in Abuja to begin compiling a dossier for a national performance trial on the high-yielding nitrogen-efficient, water-efficient, salt-tolerant (NEWEST) rice. The completed dossier will be sent to the National Biosafety Management Agency (NBMA), which regulates the country's GM products. The scientists said the improved rice variety will be a game-changer for Nigeria and Africa because it will increase rice production in the continent. Through the use of biotechnology, NEWEST rice is able to resist drought, withstand salty soil and make use of limited nitrogen in the soil, thus

reducing the need for fertilizer. NEWEST rice has already undergone confined field trials at the National Cereal Research Institute (NCRI) at Badeggi in Niger State and is now ready for the next step, which is the national performance trial, said Dr. Kayode Sanni, the rice project manager for the African Agricultural Technology Foundation (AATF). The NEWEST rice project is a collaboration of AATF, NCRI, the Agricultural Research Council of Nigeria (ARCN) and other partners.

Major plant breeding investments continue

(Farm Progress)

"Moneyball" was a popular movie released in 2011 that revealed how baseball teams relied on numbers and analytics to decide which players to keep. You could make the case that a decade later, corn breeding is following a similar path at an increasing rate. Beck's, Atlanta, Ind., and Computomics, Tubingen, Germany, recently expanded a collaboration that Beck's plant breeders say will help them deliver high-yielding, region-specific products faster. "Plant breeding is a numbers game," says Tom Koch, Beck's breeding manager. "We aren't looking for needles in a haystack. We're building a database, testing virtual hybrids, then testing the top performers." Computomics uses machine learning to predict how products will perform, partly based on historical evidence. The company says its technology is nothing short of disruptive, which means faster development of better hybrids for farmers.

Modern-day agricultural heroes: Celebrating pioneers in crop ag

(AgDaily)

The benefits from public and private investment in agricultural research are immense and have transformed the world's food security by developing and applying science to increase the productivity and advancements of agriculture. The way that many agricultural pioneers — scientists who have made major discoveries in crop farming — have impacted society and the course of history is astounding. Before I started researching this article, I didn't know who discovered chlorophyll or plant metabolism, who invented fertilizer, or who the architects of the "Green Revolution" were, dramatically improving crop breeding methodologies during the 20th century. Less than 100 years ago, commercial exploitation of hybrid vigor in a self-pollinated crop such as rice would have been considered impossible. Today, hybrid wheat, rice, and other species occupies millions of hectares worldwide. The advances made by agricultural scientists continue to this day with recombinant DNA technology and breeding strategies to address the changing climate and ever-increasing world population. We dive in to show you some of the agricultural industry's biggest game-changers over the past two centuries. They may not be household names, but these agricultural pioneers deserve our gratitude and respect.

UF/IFAS Launches a New Generation of Plant Breeders In The Fight Against Hunger

(SouthEast Produce Weekly)

Working in labs and fields across Florida, a new generation of students will start earning a Ph.D. in plant breeding from the University of Florida – the first program of its kind in Florida and one of a few in the nation. The UF/IFAS College of Agricultural and Life Sciences has received approval from the Florida Board of Governors to start the program. Seven students are in the first cohort to begin in August. Coursework will be available in person in Gainesville and online for students conducting their dissertation research off-campus at one of the UF/IFAS research and education centers throughout the state. The ability to conduct their entire program where their crop is grown and bred, from vanilla in Homestead to peanuts in the Panhandle, will be a great benefit to students.

WIU researcher sees pennycress not as a weed, but a benefit to the land where it grows

(The Pantagraph)

Pennycress, a common weed found across the northern U.S., is known to grow on disturbed soil. For many, it's nothing more than a weed, but to Western Illinois University Agriculture Professor and Alternative Crop Researcher Dr. Winthrop Phippen, it's the future. Starting this fall, Phippen's work will be coming to flower when Illinois farmers will first start using land that usually sits empty. The crop will be planted for oil cultivation as well as for livestock feed, but Phippen says it will also be beneficial for the soil and for the environment in general. The crop blooms in April, meaning that it

can be harvested before a soybean crop is planted. Growing best in disturbed soil, it has benefits for the land it is planted on as well.

GM crop approvals will boost PH health, agri productivity
(The Manila Times)
After years of delays brought about by intense and on occasion even violent resistance by misguided activists, two new varieties of staple food crops have finally been approved for widespread cultivation in the Philippines. Golden Rice, a variety of rice engineered to contain a high amount of vitamin A, was approved for commercial cultivation by the Department of Agriculture on July 21. The eggplant variety Bt talong (the "Bt" stands for Bacillus thuringiensis, a type of soil bacteria), which was modified to be resistant to the destructive eggplant fruit and shoot borer (EFSB) pest, was approved on July 24. Bt talong has been cultivated commercially for several years in Bangladesh and is being tested in India. The DA approval of Golden Rice will make the Philippines the first country to commercially plant the fortified variety.

RNA tweak: Engineering rice and potato plants boosts yields by 50%
(GLP)
Manipulating RNA can allow plants to yield dramatically more crops, as well as increasing drought tolerance, announced a group of scientists from the University of Chicago, Peking University and Guizhou University. In initial tests, adding a gene encoding for a protein called FTO to both rice and potato plants increased their yield by 50% in field tests. The plants grew significantly larger, produced longer root systems and were better able to tolerate drought stress. Analysis also showed that the plants had increased their rate of photosynthesis. “The change really is dramatic,” said University of Chicago Prof. Chuan He, who together with Prof. Guifang Jia at Peking University led the research. “What’s more, it worked with almost every type of plant we tried it with so far, and it’s a very simple modification to make.”

Tools to improve plant breeding
(Florida News Times)
For nearly eight years working in the fields of peanut breeding and genetics, Dr. Josh Klevenger, a faculty researcher at the Hudson Alpha Biotechnology Institute, improved crops for more robust and sustainable agriculture. I have been passionate about doing it. This resulted in Walid Korani, Ph.D., Computational Biologist of Hudson Alpha. In collaboration with, a computational tool called Khufu was created to quickly and accurately identify and analyze such complex genomic variants. “I wanted to bridge the gap between science and nature by more quickly introducing beneficial traits to cultivated crops that farmers could plant on their lands,” explained Klevenger. To do this, Hudson Alpha’s team has better computational tools to help identify genetic factors for selecting beneficial traits and to introduce these traits into existing crop lines. Developed a new rapid breeding practice. To map a trait to a gene, the DNA sequence of the plant under study must be aligned with the reference genome. When focusing on complex plant genomes, it is difficult for software to map short DNA reads to the reference genome to pinpoint molecular markers such as single nucleotide polymorphisms (SNPs) that correlate with the observed traits.

NY Times Publishes Solid GMO Story; Anti-Biotech Groups Blow A Gasket
(American Council on Science and Health)
For years, the New York Times attacked crop biotechnology on the grounds that it was a corporate ploy hatched by Monsanto to take over the food supply. GMOs, the argument went, were designed to hook farmers on Monsanto's patented seeds and pesticides while failing to deliver higher crop yields. In one memorable instance, Times reporter Eric Lipton accused high-profile scientists of helping Big Ag paint its products in a more positive light. Things may be changing, though. The paper recently published an excellent essay, Learning to Love G.M.O.s, by University of California, Berkeley, journalism professor Jennifer Kahn. Kahn offered a balanced analysis of the years-long debate over genetically engineered crops, appropriately summarizing the science while considering the reasonable questions consumers had about these misunderstood plants.

Carbon-preserving regenerative agriculture inextricably linked to CRISPR and gene edited crops

(GLP)

As governments and industries work toward a net-zero future, the food system remains a stubborn source of one-third of total global emissions. While some new technologies are finally nudging carbon outputs in the right direction, one underutilized technology stands out as a climate game-changer — genetically engineered crops. In 2018, greenhouse gas emissions from the global food system totalled 16 billion tons CO2 equivalents per year (GtCO2e/yr), and of global food system emissions, a quarter (about 4 GtCO2e/yr) comes from conversions of natural ecosystems to farmland. Our research shows that modifying key crops in the US with just one new genetically engineered trait could increase yields by 15%, thereby decreasing global food system emissions from land conversion by 5%, or 214 million tons CO2 equivalents per year (MtCO2e/yr). With the addition of two more genetically engineered (GE) crop traits, that yield increase could quadruple to 60%, causing dramatic emissions reductions on a global scale.

Should we genetically edit the food we eat? We asked two experts

(The Conversation)

Oil from soybeans gene-edited to produce a “high oleic” oil with no trans fats and less saturated fat is already on sale in the United States. Other products including low-acrylamide potatoes and non-browning mushrooms are expected to be launched in the near future. The work I do might lead to similar products. I’m a molecular and synthetic plant biologist at the Earlham Institute. My lab works to understand how plants control when and why genes are expressed as well as how they make certain chemicals. We aim to identify variants of genes that help plants to grow and to find and produce natural products like pheromones that are useful in agriculture or anti-cancer compounds used in chemotherapies. We also work to improve plant biotechnologies and have contributed to proof-of-concept studies demonstrating that genome editing can be used to develop useful traits in barley, brassica and potatoes by deleting just a few letters of DNA.

New Research

As UK veers from EU anti-biotech regulations and opens doors to gene editing, landmark study on broccoli and other brassicas highlights innovation

(Eurekalert)

Field trials investigating healthy compounds in agronomically important brassica crops have underlined the “immense potential” of gene editing technology, say researchers. The trials are the first field application of the technology in the UK since the reclassification of gene-edited crops as genetically modified organisms by the Court of Justice of the European Union (CJEU) in 2018. The results come as the UK Government is determining whether to allow gene-editing approaches for the purpose of food production, following a DEFRA-led public consultation. “Our results demonstrate the immense potential for gene-editing to facilitate crop improvement by translating discoveries in fundamental biological processes,” said Professor Lars Østergaard, a group leader at the John Innes Centre and one of the authors of the study.

Chinese scientists advance potato breeding technique

(Fresh Plaza)

In a ground-breaking achievement, Chinese scientists have developed a generation of "pure and fertile potato lines" with genome editing technologies. The experiment led by researcher with the Agricultural Genomics Institute at Shenzhen (AGIS) Huang Sanwen, used genome design to transform potato breeding from a slow, non-accumulative mode into a fast-iterative one. Due to the complexity of its genome, the potato’s genetic improvement and the breeding process are very slow. To address the challenges of potato cultivation, Huang and his team initiated the "Upotato Plan" in 2015, aiming to replace vegetative reproduction with hybrid seeds via genome design and improve potato breeding speed and reproduction efficiency.

Modified yeast inhibits fungal growth in plants

(UC Riverside)

About 70-80% of crop losses due to microbial diseases are caused by fungi. Fungicides are key weapons in agriculture’s arsenal, but they pose environmental risks. Over time, fungi also develop a

resistance to fungicides, leading growers on an endless quest for new and improved ways to combat fungal diseases. The latest development takes advantage of a natural plant defense against fungus. In a paper published in Biotechnology and Bioengineering, engineers and plant pathologists at UC Riverside describe a way to engineer a protein that blocks fungi from breaking down cell walls, as well as a way to produce this protein in quantity for external application as a natural fungicide. The work could lead to a new way of controlling plant disease that reduces reliance on conventional fungicides. To gain entrance into plant tissues, fungi produce enzymes that use catalytic reactions to break down tough cell walls. Among these are polygalacturonases, or PGs, but plants are not helpless against this attack. Plants produce proteins called PG-inhibiting proteins, or PGIPs, that slow catalysis.

Monitoring stress in potatoes can lead to healthier spuds

(Israel21c)

Plant stress can be caused by drought, extreme temperature and high levels of light. If farmers could get early warning signs of plant stress, they could take measures to protect their produce, such as more water, shade and cooling. That's the goal proposed by new research published in Plant Physiology by Matanel Hipsch of the Hebrew University of Jerusalem's department of plant sciences. Hipsch, under the direction of Dr. Shilo Rosenwasser, connected molecular biosensors to potatoes to monitor them for real-time stress signals. Why focus on the humble potato? It's a major food crop that comprises 40 percent of Israel's exports and is crucial for worldwide food security. Potatoes provide essential nutrients including dietary fiber, vitamins, minerals, protein and antioxidants.

First Breeding of Sugar Cane Using CRISPR/Cas9

(Technology Networks)

Sugarcane is one of the most productive plants on Earth, providing 80 percent of the sugar and 30 percent of the bioethanol produced worldwide. Its size and efficient use of water and light give it tremendous potential for the production of renewable value-added bioproducts and biofuels. But the highly complex sugarcane genome poses challenges for conventional breeding, requiring more than a decade of trials for the development of an improved cultivar. Two recently published innovations by University of Florida researchers at the Department of Energy's Center for Advanced Bioenergy and Bioproducts Innovation (CABBI) demonstrated the first successful precision breeding of sugarcane by using CRISPR/Cas9 genome editing -- a far more targeted and efficient way to develop new varieties.

How Information Beyond the Genetic Sequence Is Encoded in Plant Sperm and Passed Down the Generations

(Scitech Daily)

Hereditary information is passed from parent to offspring in the genetic code, DNA, and epigenetically through chemically induced modifications around the DNA. New research from the John Innes Centre has uncovered a mechanism that adjusts these modifications, altering the way information beyond the genetic code is passed down the generations. DNA methylation, one example of these epigenetic modifications, happens when a methyl group or chemical cap is added to the DNA, switching a gene, or genes, on or off. As germline (eggs and sperm) cells develop some of the methyl markers are reset, affecting the information passed onto the next generation. How this process worked during plant reproduction has until now, been unclear. The exciting research, published in Science, reveals the molecular mechanism of DNA methylation reprogramming in the male germline of plants.

Genome of salt-secreting mangrove species decoded by Department of Biotechnology

(The Financial Express)

Scientists have reported for the first time a reference-grade whole genome sequence of a highly salt-tolerant and salt-secreting true-mangrove species, avicennia marina, the Department of Biotechnology said on Saturday. The genomic resources generated will pave the way for researchers to study the potential of the identified genes for developing drought and salinity tolerant varieties of important crop species of the coastal region that is significant for India with 7,500 kilometres of coastline and two major island systems, it added. Mangroves are a unique group of species found in marshy intertidal estuarine regions and survive a high degree of salinity through several adaptive mechanisms. They are a critical resource for the coastal region and are of great ecological and

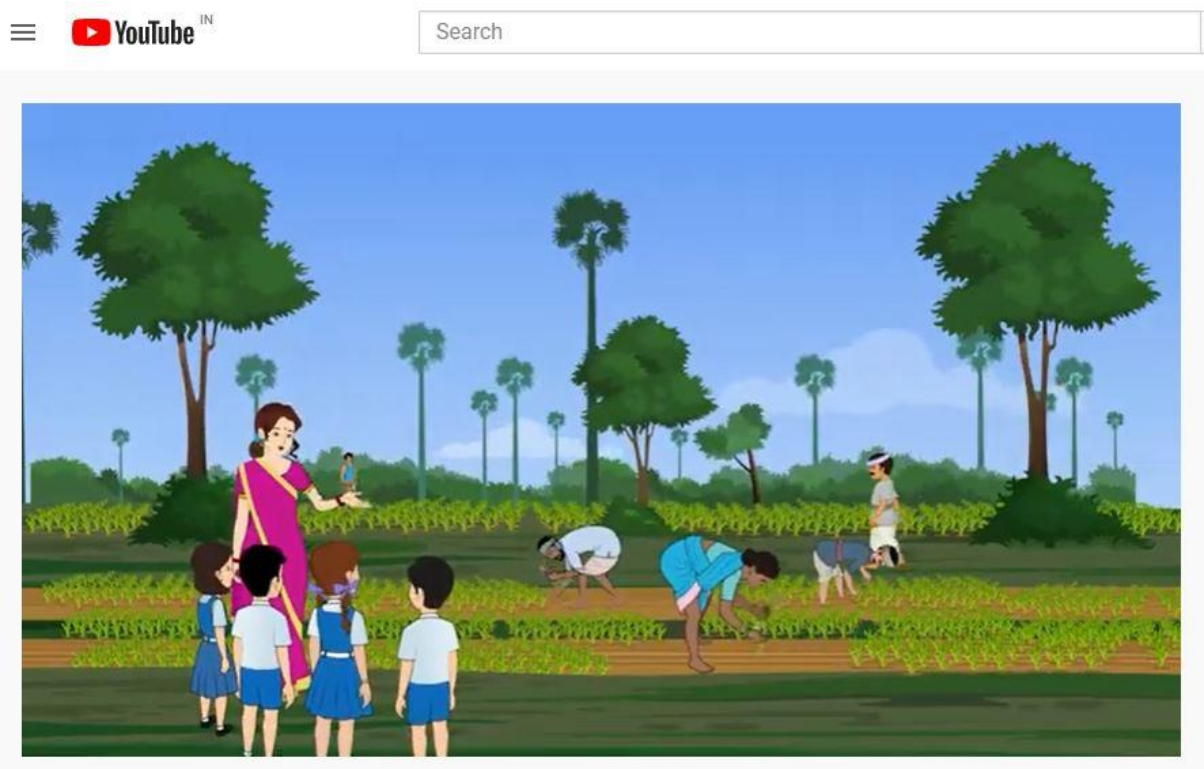
economic value. They also form a link between marine and terrestrial ecosystems, protect shorelines, provide habitat for a diverse array of terrestrial organisms.

Will tomatoes be the next big commercial crop for vertical farms?

(Urban Ag News)

University of California researchers Robert Jinkerson and Martha Orozco-Cárdenas are using CRISPR-Cas9 gene-editing technology to develop short tomato plants that have the potential to be grown in vertical farms and on the International Space Station. Orozco-Cárdenas initially used CRISPR technology to reduce the size of normal tomato plants, including the number of leaves and stems, without significantly reducing the size and yield of the fruit. "The tomatoes originally were under investigation by my collaborator Dr. Orozco-Cárdenas, who is director of the UC-Riverside Plant Transformation Research Center," Jinkerson said. "I was touring her research facility and saw tomato plants that were fruiting in vitro. The plants were incredibly small. I thought these tomatoes would have a lot of different applications, particularly for NASA. We also determined that the tomatoes could be well suited for vertical farming. It started out as a basic science project investigating gene function and we expanded it to look toward other applications where genes could be mutated to control plant architecture for vertical farming and for space flight applications.

Watch our new video on - Safety of GM Food for Human Health



Link - https://www.youtube.com/watch?v=ACMDT9SuJME

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