



An International team of researchers from 41 organisations led by Prof. Rajeev Varshney, (former) Research Program Director at International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has mapped the genetic variation in chickpea varieties. This extensive study will help in improving the quality of crop in coming days by making it more resilient to climate change.

The team has charted out chickpea's pangenome by sequencing the genomes of 3,366 chickpea lines from 60 countries. The team has done genome sequencing of 3,171 cultivated accessions and 195 wild accessions of chickpea that are conserved in multiple genebanks. The team has further identified 29,870 genes that include 1,582 previously unreported novel genes.

As part of the study, a comparison of the genetic variation in cultivated chickpea with that of its wild progenitor helped the researchers identify genes responsible for lowering crop performance.

Furthermore, the study identified blocks of genes in landraces (domesticated varieties developed by farmers) that can significantly enhance performance of the crop by improving traits like yield, climate resilience and seed characteristics. Called haplotypes, these blocks of genes are what crop breeders strive to bring into cultivars. Using historical data of all chickpea varieties released between 1948 and 2012, the research sheds light on the deployment of these haplotypes in the varieties.

According to the researchers, they examined 129 varieties released in the past. Though a few superior haplotypes were detected in some of these varieties, they found that most varieties lacked many beneficial haplotypes. They arrived at 56 promising lines that can bring these haplotypes into breeding programmes to develop enhanced varieties.

Genomic resources are crucial for accelerating the rate of genetic gains in crop improvement programs. It is hoped that the knowledge and resources made available through this study will help breeders across the world revolutionise chickpea breeding without eroding its genetic diversity.

To take the study's findings to the farm, the authors proposed three breeding approaches based on genomic prediction that aim at improving 16 traits and enhance chickpea productivity. They demonstrated that the approaches work by applying them for enhancement of 100-seed weight, a critical yield trait, and predicting an increase ranging between 12 and 23%.

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



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

## News from India and Around the World

### ['Technology is key to develop farm sector, meet food demand'](#)

(The Hind Business Line)

With the food spend of an average Indian household expected to increase to 35.4 per cent by 2025, technology will be the key enabler to meet the demand and ensure affordability, according to a study by Deloitte. The study — Future of Food: Innovation in managing demand and supply disruptions — says technology-led disruption is improving the entire agri and food value chain, using minimum inputs and maximising output.

### [India records close to 15% rise in export of agricultural, processed food products in April-October](#)

(ET Now News)

In a major boost to export prospects of agricultural produce, India registered a significant surge in export of agricultural and processed food products in the April-October period of the current Financial Year, 2021-22, in comparison to the corresponding seven-month period of last fiscal, 2020-21. According to the quick estimates released by the Directorate General of Commercial Intelligence and Statistics (DGCI&S), the overall export of Agricultural and Processed Food Products Export Development Authority (APEDA) products witnessed 14.7 per cent growth in terms of USD during April-October 2021 over the same period of the previous year.

### [Climate change: ICMR for shift away from coal, change in cattle rearing practices](#)

(The Hindu)

Senior scientists at the Indian Council of Medical Research have recommended that India shift from “traditional animal husbandry practices” and “urgently wean away from coal as its main source of energy”. This is to combat the challenges of climate change that is posing a global threat, the scientists

argued in a policy brief that accompanies the 2021 Global Lancet Countdown report focusing on: i) premature mortality due to ambient air pollution by sector ii) emissions from agricultural production and consumption and iii) detection, preparedness and response to health emergencies.

### [FPOs of marginalised farmers to change country's agri scenario: Tomar](#)

(Business Standard)

Asserting that the Centre is working on reducing farming cost and increasing growers' income, Union Minister Narendra Singh Tomar said that new Farmer Producer Organisations (FPOs) of marginalised cultivators will change the agriculture scenario in the country. More than 11 crore farmers have so far received a total of Rs 1.60 lakh crore assistance under the Prime Minister Kisan Samman Nidhi scheme, he said. "As a result of this programme, over 10,000 new FPOs of marginalised farmers have come up, and they will change the scenario of agriculture in India," the minister said after inaugurating a programme organised as part of 'Azadi Ka Amrit Mahotsav' in College of Fisheries.

### ['India made gains in food production'](#)

(The Times of India)

Agriculture scientists and experts said that India has made significant gain towards increasing food and crop output to feed a population of 1.3 billion people. To feed the entire population, India has boosted food production threefold and horticulture and fish output tenfold each. Professor Trilochan Mohapatra, Director-General of ICAR said that agronomy was a vital aspect of agriculture. We now have a surplus of agricultural produce. Agricultural exports have surged by more than 40% when compared to last year.

### [Can agriculture in India play a key role in limiting Climate change? A study defines how.](#)

(The Indian Wire)

According to a recent report by CFA Institute along with Climate Bonds Initiative, agriculture is particularly vulnerable to climate change as well as the best player to bet on, in our race against the warming world. The global temperature rise, in due course, reduce yields of desirable crops while simultaneously triggering a rise in weed and pest proliferation. Even the much-experienced alterations in rainfall patterns can increase the chances of temporary crop failures and long-run productivity declines. Nearly more than half of the economically active population in developing countries in the first decade of 21st century i.e., 2.5 billion people relied completely on agriculture for their livelihoods and subsistence.

### [US crops trader ADM invests in digital agriculture platform](#)

(Financial Times)

Archer Daniels Midland, one of the world's largest grain traders and processors, has invested in a digital start-up set up to give farmers more power in agricultural markets long dominated by large companies. ADM has invested in Farmers Business Network as part of a \$300m capital raising round. Founded in 2014, California-based FBN's platform has been dubbed a "Google for farmers", providing its 33,000 members new distribution outlets for their crops and alternative options to purchase seeds and chemicals. The investment comes five weeks after ADM and its rival Cargill sold their own farmer facing digital joint venture GrainBridge, to software company Bushel.

### [No DAP shortage now in Haryana: Agriculture Minister](#)

(Tribune India)

Agriculture and Farmers' Welfare Minister JP Dalal has assured that there would be no more shortage of DAP in the state and the growers would not have to face any difficulty while sowing the rabi crops. He said this during a videoconference with Union Minister of Health and Family Welfare and Chemical and Fertilizers Mansukh Mandaviya. He expressed gratitude to the Union Minister for meeting the immediate demand of DAP arising due to untimely rains in some parts of Haryana. With this immediate assistance provided to the state by the Centre, there was no more shortage of the fertiliser, Dalal added. He further said DAP was imported to India. During the pandemic, it was a tough time for DAP production, distribution and shipping, which further led to its shortage in the country.

### [Scientists Advocate for the Application of Artificial Intelligence in Agriculture in Hyderabad](#)

**(Krishi Jagran)**

Prof Raj Khosla of Kansas State University in the United States, who stressed that digital intelligence in farming was the need of the hour, said that a public-private partnership was essential for digital agriculture and that all farm operations could be digitised using GPS technology because precision input usage would increase farm productivity.

Prof Khosla stressed the importance of artificial intelligence-enabled digital tools for increasing farm income and productivity during a lecture on 'Future of Farming: Big Data, Analytics, and Precision Agriculture' during the plenary session at Prof Jayashankar Telangana State Agriculture University (PJTSAU). Prof Khosla also stressed the importance of artificial intelligence-enabled digital tools for increasing farm income and productivity during a lecture on 'Future of Farming: Big Data, Analytics, and Precision Agriculture' during the same session.

### [\*\*Agricultural price commission for increasing foodgrain procurement\*\*](#)

**(The Hindu)**

The Karnataka Agricultural Price Commission (KAPC) has recommended to the State Government to seek permission from the Centre for increasing the procurement of quantity of foodgrains under the MSP for distribution at subsidised prices under the public distribution system (PDS). The State needs about 20 lakh tonnes of rice for distribution under PDS for its beneficiaries at the rate of 3 kg per beneficiary. Currently, the Centre has fixed the cap for procurement at five lakh tonnes only, the KAPC said in a report. KAPC chairman Hanumanagouda Belagurki submitted the report for the year 2021-22 on the ground reality of crop produce, pricing and marketing in the State to Chief Minister Basavaraj Bommai.

### [\*\*New Government Project Promotes Indigenous Food, Agriculture\*\*](#)

**(US News)**

The USDA Office of Tribal Relations announced this week that it will partner with several Native-led organizations on projects to raise awareness of Indigenous perspectives about food and agriculture. "The United States government hasn't always incorporated Indigenous views and values into our work. And that's particularly true within the food and agricultural space," said Heather Dawn Thompson, director of the Office of Tribal Relations and a member of the Cheyenne River Sioux tribe. "We're taking this moment to rethink how the United States Department of Agriculture interacts with and thinks about Indigenous foods and Indigenous farming and ranching techniques," said Thompson. Two regional seed processing centers will be created through the Minnesota-based Native American Food Sovereignty Alliance, Minnesota Public Radio News reported.

### [\*\*87% of US Agriculture Businesses Are Currently Using AI\*\*](#)

**(Inside Big Data)**

87% of US agriculture businesses are currently using AI technologies, up from 74% at this time last year, according to new research recently released. 91% of agriculture industry executives also feel ethical standards in the development and use of emerging technologies can represent a competitive advantage for businesses. These figures suggest that the sector is in step with other major industries when it comes to innovation and embracing technological advances. Of the eight sectors canvassed, agriculture was second only to the insurance and exhibitions industries, which placed joint first with 88% of executives reporting they used AI within their organizations. The ag sector's spending on training also grew, with nine in ten (90%) offering training on AI technologies, up from 87% in 2020 and compared to an industry average of 83%.

### [\*\*Vietnam and Japan strengthen agricultural cooperation\*\*](#)

**(Fareastnagriculture)**

The scientific conference with the theme "Vietnamese and Kyushu Agriculture: Issues and future development" was the first scientific conference on agriculture between Vietnam and Japan. The Consulate General of Vietnam in Fukuoka in collaboration with the Ministry of agriculture and rural development of Vietnam (MARD) and Kyushu University, Japan held the workshop to further strengthen agricultural ties between the nation. Speaking at the opening of the workshop, Vietnam's deputy minister of agriculture and rural development Nguyen Hoang Hiep said that Vietnam attaches

great importance to the role of science and technology and highly values the contributions of universities and research centres in Kyushu, especially Kyushu University, to Vietnam's agricultural sector.

### [Addressing Food Insecurity and Boosting the Resilience of Food Systems in West Africa](#)

(The World Bank)

Some four million people across West Africa stand to benefit from a new multi-phase regional program that will complement and enhance ongoing efforts to reduce food insecurity and improve the resilience of food systems. The new Food Systems Resilience Program (FSRP) was approved by the World Bank's Board of Executive Directors for a total amount of \$570 million in International Development Association (IDA) financing. The first phase of the program which amounts to \$330 million brings together four countries —Burkina Faso, Mali, Niger, and Togo— and three regional organizations —the Economic Community of West African States (ECOWAS), the Permanent Interstate Committee for Drought Control in the Sahel (CILSS), and the West and Central Africa Council for Agriculture Research and Development (CORAF)— to implement a broad program that will simultaneously increase agricultural productivity through climate-smart agriculture, promote intraregional value chains and trade, and build regional capacity to manage agricultural risk.

### [AfDB approves \\$150m to support agriculture in Africa](#)

(Punch)

The African Development Bank Group has approved a \$150m facility for ETC Group Limited to address the working capital requirements for the company and its agriculture value chain development in a boost for smallholder farmers. The AfDB said the investment would take the form of a trade and agri-finance package, comprising a \$75m soft commodity finance facility to support the group's pre and post-shipment working capital requirements, with a particular focus on export-oriented activities. According to a statement, it includes a \$75m agriculture value-chain programme to increase agriculture production and productivity, by providing improved agricultural inputs and agronomic advisory services to local farmers.

### [Agriculture And Technology Can Speed Up Africa's Economic Growth, But There Are Hurdles](#)

(Ventures Africa)

Africa's economy depends heavily on agriculture. The sector contributes 23 per cent of the continent's GDP and 49 per cent of employment in the continent. In our interview with Enock Chikava of the Bill and Melinda Gates Foundation, we mentioned how smallholder farmers dominate the continent's agricultural sector. Smallholder farming is important but contributes only a little to economic development. Productivity is still a problem for the agricultural sector. Output is mostly in its raw form and requires more production for it to be valuable. Many developed countries that started with agriculture, for this reason, morphed into manufacturing. For instance, Britain's economy was mostly agricultural before the second industrial revolution developed its manufacturing sector. The same happened in China, where manufacturing is now central to its economy. Without manufacturing, it could not have risen to its place as the second-largest economy in the world.

### [How Sri Lanka's flip to organic farming has now caused row with China over fertiliser crisis](#)

(The Print)

A fresh crisis seems to be brewing between Sri Lanka and China after the Chinese Embassy in the island nation Saturday declared that the state-owned People's Bank of Sri Lanka has been blacklisted over its failure to make a payment for imported fertilisers. Following a court order, the Sri Lankan bank withheld the payment to China's Qingdao Seawin Biotech Group Co Ltd after fertiliser samples were allegedly found to host harmful bacteria. At the heart of this controversy is Sri Lanka's sudden decision this April to make a complete shift to organic fertilisers, ban imports of chemical fertilisers, and use domestic bio-fertilisers. Among other things, the decision was believed to be a means to cushion Sri Lanka's dwindling foreign reserves, which have taken a hit in light of the pandemic. It was expected to save the government around \$400 million. The decision led to protests by farmers, who complained they didn't have time to make a switch, and soaring food prices.

## [Onions from Pakistan to enter Chinese market; first agriculture deal in phase 2 cooperation under CPEC](#)

(Global Times)

China and Pakistan have inked an agreement that would open the Chinese market for Pakistani onion, marking the first deal since the two neighbors embarked on the second development phase of the China-Pakistan Economic Corridor (CPEC) that focuses on cooperation in industrial and agricultural sectors. The agreement will facilitate the access of onion products from Pakistan in the Chinese market, and the cooperation will further help Pakistan to improve the domestic production capacity of onions.

## **New Research**

### [AB-Inbev bets on new barley variants to boost African beer-making capacity](#)

(Reuters)

South African Breweries (SAB), part of Anheuser Busch InBev, is betting new drought-resistant barley varieties will help it maintain record annual production in its major domestic beer market and meet demand elsewhere on the continent, officials said. The world's largest brewer is betting hi-tech natural cultivars and enhanced farming techniques in Africa will eliminate barley and malt shortages dampening expansion plans. "No barley, no beer. So, absolutely critical to have a sustainable supply chain of barley," said Josh Hammann, Africa director for agriculture development and sustainability at AB InBev in Africa.

### [China To Make Protein For Livestock From Carbon Monoxide](#)

(Successful Farming)

Chinese researchers say they have found a way to produce an animal feed protein from carbon monoxide in what is being hailed as a breakthrough that could help reduce the country's reliance on huge volumes of imported soybeans. China is by far the world's top buyer of soybeans, bringing in around 100 million tonnes a year to turn into protein-rich feed for its huge livestock sector. A portion of those beans could one day be replaced by synthetically made protein, however.

### [Largest Plant Genome Sequencing Effort Yields A Pan-Genome For Chickpea, Sets It Up For A Breeding Revolution](#)

(ICRISAT)

An international team of researchers from 41 organizations has assembled chickpea's (chana) pan-genome by sequencing the genomes of 3,366 chickpea lines from 60 countries. Led by the ICRISAT, the team identified 29,870 genes that includes 1,582 previously unreported novel genes. The research is the largest effort of its kind for any plant, putting chickpea in a small group of crops with such an extensive genome map. "By employing whole genome sequencing, we have been able to affirm the history of chickpea's origin in the Fertile Crescent and identify two paths of diffusion or migration of chickpea to rest of the world. One path indicates diffusion to South Asia and East Africa, and the other suggests diffusion to the Mediterranean region (probably through Turkey) as well as to the Black Sea and Central Asia (up to Afghanistan)," said Prof. Rajeev Varshney, a Research Program Director at ICRISAT and leader of the study that was published on 10 November in Nature.

### [Indian council of agricultural research looks at new rice to beat climate change](#)

(The Times of India)

A hardy rice variety, *Jaddu Batta* from Karnataka's Shimoga district with exceptional tolerance to prolonged submergence under water offers hope for developing a fool proof climate resistant crop that may help food security. With extreme weather events already registering an increase and problems of salinity, flooding and irregular rise in temperatures having disastrous effects on crops, scientists face a challenge in developing suitable climate resistant crop varieties.

### [NASA Research Launches a New Generation of Indoor Farming](#)

(NASA)

The United Nations predicts Earth will have to feed another 2.3 billion people by 2050, mostly concentrated in urban centers far from farmland. Conventional agriculture may not be able to meet

that demand, but luckily NASA has been working for decades to tackle food production both on Earth and in space. Feeding astronauts during long-term space exploration means stretching resources to grow plants in space – including minimizing water use and energy consumption and eliminating soil. NASA initially pioneered these techniques on the ground by building the country's first vertical farm. Inside a decommissioned hypobaric chamber left over from testing the Mercury space capsule, technologists stacked rows of hydroponic trays like bookshelves against the walls. Then systems for lighting, ventilation, and circulating water were added using off-the-shelf parts. Various crops were planted on the stacked trays to test how well they would grow in water and without the benefit of sunlight or open air. This innovative approach to farming created a foundation for the industry of controlled environment agriculture, or CEA.

### **Value in the weed: Profit potential of green and leafy bathua**

**(Down to Earth)**

Bathua is known for its rich fibre content and medicinal properties. In Ayurveda, it is prescribed for conditions such as cough, diarrhoea, fever and poor appetite. A 2014 study published in the Journal of Pharmacognosy and Phytochemistry shows that the methanol extract of the plant has anti-bacterial properties and can inhibit growth of *Staphylococcus epidermidis*, *Bacillus subtilis*, *Staphylococcus aureus* and *Escherichia coli*. Some people even dry the leaves and store them to add to their diet throughout the year. Modern chefs are now also using bathua in salads and Italian raviolis.

### **Phosphorus for Sustainable Development Goal target of doubling smallholder productivity**

**(Nature)**

Phosphorus (P) is an essential nutrient for life. In many tropical countries, P-fixing soils and very low historical P input limit uptake of P in crops and thus yields. This presents a serious obstacle for achieving the Sustainable Development Goal (SDG) target 2.3 of doubling productivity in smallholder farms. We calculated the geographic distribution of P limitation ( $1 - \text{actual/potential P uptake}$ ) and the P input required to achieve this SDG target by 2030 in comparison to the Shared Socioeconomic Pathway (SSP2) scenario for five world regions where smallholder farms dominate. To achieve target 2.3, these regions require 39% more P application (126 Tg) between 2015 and 2030. While P limitation is most widespread in sub-Saharan Africa, it is the only region on track to achieving the doubling of productivity in the SSP2 scenario (increase by a factor of 1.8). Achieving the target requires a strong increase in P input, while protecting soils and waterways from excessive P runoff.

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