



An international team of researchers led by Prof. Rajeev K. Varshney, (former) Research Program Director at International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), have identified a gene – CaTIFY4b – in chickpea that can increase yield under rainfed conditions. The research is published in the Plant Biotechnology Journal.

The researchers performed fine mapping and cloning of the “QTL-hotspot” region for identification of candidate gene(s) that can enhance seed yield under rainfed conditions. After dedicated efforts of several colleagues and collaborators for the last 17 years, the researchers were successful to identify CaTIFY4b gene and the underlying physiological and molecular mechanisms regulating drought tolerance in chickpea. The authors say that breeding the beneficial gene variant into the plants could enhance seed weight, transpiration efficiency, root architecture and canopy development, enabling high yield performance under rainfed field conditions.

The researchers started this project in the year 2005 based on the germplasm and physiology information generated by crop physiology and crop breeding teams at ICRISAT. Together with several students and colleagues, the team developed large scale molecular markers, used them for the development of genetic maps, and identified the “QTL-hotspot” regulating drought tolerance in chickpea.

According to the researchers, this project has not only generated basic information at the gene level, but also delivered several drought tolerant and high-yielding varieties to small-holder farmers. This project was an outcome of the dedication of large number of colleagues (several PhD students, post-docs and scientists) at ICRISAT and collaborators from several organizations in India, Australia, UK, Italy, Japan, USA, Ethiopia, Kenya and Tanzania.

Funding for this project was provided by The Bill & Melinda Gates Foundation, Ministry of Agriculture & Farmers Welfare, ICAR- Indian Council of Agricultural Research, Department of Biotechnology, and Department of Science and Technology of Government of India, Indo-German Science & Technology Centre, and CGIAR Generation Challenge Programme (GCP), among others.

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**  
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## News from India and Around the World

### [Punjab budget: Bhagwant Mann govt allocates ₹11,560 crore for agriculture sector. Big announcements](#)

(Hindustan Times)

The Government of Punjab presented its first budget after coming to power in the state. During his budget speech, finance minister Harpal Singh Cheema announced a budgetary allocation of ₹11,560 crores for the agriculture sector. The Punjab government's budget announcements for the development of agricultural sector include budgetary allocations for solving the stubble burning issue, free power to agriculture tubewells etc.

### [Center, States together engaged in holistic development of northeast including Nagaland: Agriculture Minister Tomar](#)

(The Print)

Union Agriculture Minister Narendra Singh Tomar said that the Center and States are together engaged in the holistic development of the Northeast including Nagaland. The Minister visited the Central Institute of Horticulture in Nagaland and inaugurated a farmer's workshop and exhibition. Prime Minister wants that there should be holistic and balanced development and the benefits of the government's schemes should reach the eligible people including farmers right down to the grassroots level, which will improve their standard of living.

### [Why India's heatwave holds lessons for the world](#)

(Scroll.in)

This year, scorching temperatures swept across India just as crops planted in the winter were ripening for harvest. The agriculture ministry estimates that around 20% of the wheat crop was damaged. But it wasn't just wheat that was affected. In Maharashtra, horticulture crops such as guava and mango wilted, said Pushkaraj Tayde, secretary of the Centre for Agriculture and Rural Development, a non-profit organisation based in Jalna. "Chilli production has also gone down and some sugarcane fields caught fire during the last week of April because of the heatwave," he said.

### [Israel deepens strategic partnership with India in agriculture & water](#)

(The Economic Times)

Ambassador Eynat Shlein, Head of MASHAV- Israel's Agency for International Development Cooperation, Ministry of Foreign Affairs of the State of Israel, visited India with an aim to further strengthen Israel-India strategic partnership and development cooperation in the fields of agriculture and water. Shlein said, "India is a strong, strategic partner of Israel. The two most significant pillars of our growing relations are cooperation in agriculture and water, which was the focus during my visit to India. These two fields are so important that out of the 6 resident experts that Mashav posted around the world, 2 are based in India."

### [IIT Madras discusses challenges faced by rural India to start non-farming works](#)

**(India Today)**

Indian Institute of Technology Madras Researchers have identified the barriers to entry of rural communities into non-farming occupations. The researchers studied problems associated with the Indian rural economy. In particular, they analysed the reasons that farmers do not adopt non-farming jobs even when agriculture does not provide them with a reliable means of sustenance. The researchers found that lack of education and skill, credit constraints, and poor access to social capital were the predominant entry barriers into the non-farming sector. They also showed that farm income and land assets have a negative influence on diversification, and household size has a positive impact on the participation of the rural community in non-farming activities. The researchers called for Regional Rural Banks to allow micro-financing and composite finance services to remove the financial barriers to rural job diversification.

### [Why we need data in farming to create a sustainable food future for India](#)

**(Your Story)**

The Sri Lanka Army will take part in a farming drive aimed at cultivating over 1,500 acres of barren or abandoned state land to multiply food production and avert any shortage in the future, according to a media report. The army established its Green Agriculture Steering Committee (GASC) to supplement and promote the food security programme in Sri Lanka which is facing its worst economic crisis since independence from Britain in 1948. The troops will first prepare the ground by weeding, tilling and preparing beds for the cultivation of selected seed varieties in consultation with agricultural experts, newsfirst.lk reported. All Security Force Headquarters and formations across the country are currently screening possibilities for adding their weight to the task at a regional level.

### [Higher margins could push farm exports to FY22 level despite ban: experts](#)

**(Business Standard)**

India reached a new milestone of almost \$50 billion of agriculture exports in 2021-22, with wheat, sugar, coffee, dairy products and rice showing stupendous growth over the previous year. However, with curbs now being imposed on exports of several items that led the FY22 surge, there are doubts in some quarters about the country's ability to maintain the same pace of overseas farm shipments in FY23. For the record, actual agriculture exports in FY22 were \$47.41 billion, up almost 19 per cent over FY21. This was by far among the highest ever agriculture exports by India, but the big question is whether or not the same pace can be maintained in FY23.

### [India's Rice Planting Down 46% From Last Year, Likely To Pick Up](#)

**(Successful Farming)**

The area planted with cotton totalled 3.18 million hectares, down from 3.73 million hectares a year earlier. Monsoon rains have been sparse over cotton-growing areas in Gujarat and Maharashtra states in the west. Farmers have a relatively short window to complete cotton sowing and that's why rains need to pick up to help growers plant the crop. The sowing of soybeans, the main summer oilseed crop, stood at 278,000 million hectares, compared with 1.25 million hectares at the same time in 2021.

The area planted with protein-rice pulse rose to 202,000 hectares against 132,000 hectares last year. But pulse acreage could drop in the next few weeks as some farmers might switch to more lucrative cotton and soybean, said Nitin Kalantri, a trader based in Maharashtra.

### [What India needs to do to reduce its fertiliser bill](#)

**(The Indian Express)**

No country has as much area under farming as India. At 169.3 million hectares (mh) in 2019, its land used for crop cultivation was higher than that of the US (160.4 mh), China (135.7 mh), Russia (123.4 mh) or Brazil (63.5 mh). With its perennial Himalayan rivers and average annual rainfall of nearly 1,200 mm – against Russia's 475 mm, China's 650 mm and the US's 750 mm – India has no dearth of land, water and sunshine to sustain vibrant agriculture. Which it has for 3,000 years and more. But there's one resource in which the country is short and heavily import-dependent – mineral fertilisers. In 2021-22, India imported 10.16 million tonnes (mt) of urea, 5.86 mt of di-ammonium phosphate (DAP) and 2.91 mt of muriate of potash (MOP). In value terms, imports of all fertilisers touched an all-time high of \$12.77 billion last fiscal.

## [India is Seeking a New Standard for Agriculture Subsidies](#)

(Krishi Jagran)

According to official sources, India has asked the World Trade Organization (WTO) to revise the almost three-decade-old external reference prices of agricultural commodities that are used by the WTO to determine current domestic farm subsidies granted by developing countries. "These problems would be raised at every chance by India and other like-minded nations at the WTO," one of the officials said. These countries mostly include the G-33 and other African states. For the first time, India has managed to bring together so many nations to submit a "harmonized document" on agriculture, putting up their united ideas.

## [How to turn farmers from price takers to price makers](#)

(Mastercard)

Digital technology is already transforming agriculture in many parts of the world, helping create healthier crops and better yields. Those technologies include more precise weather data and remote sensors that deliver targeted water and fertilizer. Now, digitization in developing markets is enabling farmers to command better prices and access the credit they need to grow, giving Prabhu, Saravanan and their neighbors a chance to move beyond subsistence. "Incomes are stifled for hundreds of millions of smallholder farmers living in digitally excluded communities," says Tara Nathan, the Mastercard executive who develops digital solutions for social impact. "We've found many of these farmers are price takers and not price makers. We're digitizing value chains to be more transparent, empowering the farmers."

## [Choosing sustainability over organic farming to ensure food security and ecological balance](#)

(The Times of India)

Organic farming works reasonably well as a niche segment within an industrialised agricultural system. Producers save money by eliminating chemical inputs, and higher selling prices compensate for the lower yields from organic produce. However, when it comes to feeding a growing population with a limited number of people practising agriculture, one cannot ignore the role of synthetic fertilisers in reducing labour and pest infestations while increasing yields. Apart from a minor population of privileged consumers willing to pay a slightly higher price for products labelled as 'organic', the long-term benefits of organic farming are relatively limited when it comes to sustaining the enormous agricultural needs of a country like India.

## **New Research**

### [Genetic variation in CaTIFY4b contributes to drought adaptation in chickpea](#)

(Plant Biotechnology Journal)

Chickpea production is vulnerable to drought stress. Identifying the genetic components underlying drought adaptation is crucial for enhancing chickpea productivity. Here, we present the fine mapping and characterization of 'QTL-hotspot', a genomic region controlling chickpea growth with positive consequences on crop production under drought. We report that a non-synonymous substitution in the transcription factor CaTIFY4b regulates seed weight and organ size in chickpea.

### [Estimating Local Agricultural GDP across the World](#)

(World Bank)

Economic statistics are frequently produced at an administrative level such as the sub-national division. However, these measures may not adequately capture the local variation in the economic activities that is useful for analyzing local economic development patterns and the exposure to natural disasters. Agriculture GDP is a critical indicator for measurement of the primary sector, on which 60 percent of the world's population depends for their livelihoods. Through a data fusion method based on cross-entropy optimization, this paper disaggregates national and subnational administrative statistics of Agricultural GDP into a global gridded dataset at approximately 10 x 10 kilometres using satellite-derived indicators of the components that make up agricultural GDP, namely crop, livestock, fishery, hunting and timber production. The paper examines the exposure of areas with at least one

extreme drought during 2000 to 2009 to agricultural GDP, where nearly 1.2 billion people live. The findings show an estimated US\$432 billion of agricultural GDP circa 2010.

### [Long-term evidence for ecological intensification as a pathway to sustainable agriculture](#)

(Nature)

Ecological intensification (EI) could help return agriculture into a 'safe operating space' for humanity. Using a novel application of meta-analysis to data from 30 long-term experiments from Europe and Africa (comprising 25,565 yield records), we investigated how field-scale EI practices interact with each other, and with N fertilizer and tillage, in their effects on long-term crop yields. Here we confirmed that EI practices (specifically, increasing crop diversity and adding fertility crops and organic matter) have generally positive effects on the yield of staple crops. However, we show that EI practices have a largely substitutive interaction with N fertilizer, so that EI practices substantially increase yield at low N fertilizer doses but have minimal or no effect on yield at high N fertilizer doses. EI practices had comparable effects across different tillage intensities and reducing tillage did not strongly affect yields.

### [ICAR Research Outlines Strategies for Preventing Heat Waves and Safeguarding Crops](#)

(Krishi Jagran)

Variety selection based on when the crop is sown is an important component in crop protection in the event of an abnormal temperature rise, such as the recent heat in March and April. According to a report prepared by scientists from the Indian Council for Agricultural Research (ICAR), mulching straw in orchards can help save fruit crops, and bathing cows and buffaloes are one of the simple practices that farmers can adopt to combat the adverse effects of climate change. ICAR has identified 151 risk-prone clusters in 25 districts across Bihar, Madhya Pradesh, Uttar Pradesh, Maharashtra, Haryana, and Punjab as part of the National Climate Resilience Program for Agricultural Innovation (NICRA).

### [How One Entomologist is Exploring Insect Pests in Midwestern Agroecosystems](#)

(Entomology Today)

Instead of focusing on individual insect pests, I will begin researching soil-dwelling beneficial organisms like entomopathogenic nematodes (EPNs) and ground beetles present in field crops of the north central region and understand how agricultural practices like tillage or cover crops influence their distribution and ability to infect/predate pest populations. EPNs are naturally occurring obligate parasites of insects that occur in all soils (except for Antarctica) and can survive environmental extremes, even in the absence of insect hosts. I first learned about EPNs through a North Central Region SARE grant, where I isolated species from corn fields infested with AGB and evaluated their ability to infect and kill grubs in the greenhouse and field. This summer, I will conduct similar research and first identify the naturally occurring EPNs present in a corn-soybean rotation with and without tillage in eastern South Dakota. This will let us know whether crop rotation or tillage influences the presence and persistence of EPN species. I will then assess isolated EPNs' abilities to tolerate extreme cold and heat and desiccation and to infect hosts like corn rootworm larvae and waxworms, which are highly susceptible to EPN infection. The ultimate goal of this work is to establish local populations of the most resilient EPNs across entire fields that will persist for years after the initial application. This will increase the chances that insect larvae in the soil encounter and become infected by EPNs.

### [Pollination—Day or Night](#)

(NIFA USDA)

University of Arkansas research showed night-time pollinators have similar pollinating potential to those active in the daytime. The study, supported by capacity funding, was among the first to examine nocturnal pollination in agriculture and the first recorded study on night pollinators for apples. The effort provided vital scientific data on night pollinators, which have not been widely studied. The researchers found nocturnal pollinators, including moths, contributed to apple pollination in both years of the experiment. The research is the first to demonstrate that nocturnal pollinators can provide comparable pollination levels to daytime pollinators in any cultivated crop. It also suggests that nocturnal pollinators may provide an important source of stabilization in apple production as pollinator populations experience declines.

## [A climate-smart remodelling of South Asia's rice-wheat cropping is urgent](#)

(CIMMYT)

A climate change hotspot region that features both small-scale and intensive farming, South Asia epitomizes the crushing pressure on land and water resources from global agriculture to feed a populous, warming world. Continuous irrigated rice and wheat cropping across northern India, for example, is depleting and degrading soils, draining a major aquifer, and producing a steady draft of greenhouse gases. Through decades-long Asian and global partnerships, the International Maize and Wheat Improvement Center (CIMMYT) has helped to study and promote resource-conserving, climate-smart solutions for South Asian agriculture. Innovations include more precise and efficient use of water and fertilizer, as well as conservation agriculture, which blends reduced or zero-tillage, use of crop residues or mulches as soil covers, and more diverse intercrops and rotations. Partners are recently exploring regenerative agriculture approaches — a suite of integrated farming and grazing practices to rebuild the organic matter and biodiversity of soils.

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