



India has come a long way from food deficit to food surplus nation and plans to move forward as the food bowl for the region. India is able to provide adequate, safe, and nutritious food for our population but crisis like extreme weather, pandemic, conflicts and climate change still remain major hurdles in overcoming food and nutritional inequality. The current food production systems will not be able to produce enough food for our growing population and are also not sustainable. Though the per capita food supply has increased by more than 30 percent since 1961, the use of nitrogen fertiliser has increased by 800 percent and water use by 100 percent. This has led to freshwater pollution, soil degradation, and biodiversity loss. Agriculture is also responsible for 16–27 percent of global greenhouse gas (GHG) emissions. Inadequate agricultural infrastructure according to FAO leads to food waste that is equivalent to approximately 4.4 billion tons of carbon dioxide emission annually. Climate-smart agriculture (CSA) is the way forward, its an integrated approach of climate-friendly practices for livestock and crop production. It helps reduces greenhouse gas emissions and increases carbon sequestration. CSA is a system powered by technology, digitization, and data, and provides a comprehensive, environment-friendly approach to farming. Using digitization, data and technology, farmers can select the right crops and seeds, the right time for sowing and harvesting, the optimal use of water resources and adoption of the right farming practices. Using real-time data from satellite imagery and on-field IoT devices, farmers can monitor soil conditions, water availability and weather conditions. Digitization can also contribute to creation of carbon-credit, net-zero carbon farming models and incentivize farmers to adopt climate-smart practices. CSA's proven solutions can be effective by leveraging digitization and AI at scale for more efficient, productive, and sustainable farming. The government of India recognizes the importance of digitizing the agricultural sector. India hopes to implement widespread digitization of the industry by 2025 and in this regard, government has launched

Digital Agricultural Mission 2021–2025 in September 2021. NITI Aayog estimates digitization of the agriculture industry in terms of just AI can be around US\$2.6 billion. In case digitization is implemented and short-term goals are achieved, the market size of this industry is expected to reach 111,916b INR in 2026 in comparison to 55,994b INR in 2020, with an estimated CAGR of 12%. India has taken its first steps to using digitization in support of CSA and sustainability. With widespread adoption and acceptance of CSA and digitization, India will embark on road to better return on investment for the farmers and long-term sustainability.



Shivendra Bajaj

Executive Director

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News from India and Around the World

Scientists Identify Wheat Genetically Resistant to Fungus Causing Snow

Mold <https://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=19880>

Scientists from six research institutions in Russia led by RUDN University have identified wheat genotypes resistant to the dangerous fungal pathogen *Microdochium nivale* that infects plants before the snow melts and reduces yields. *M. nivale* infects crops, causing snow mold. After the snow melts, a web-like mold of the fungus appears on the leaves of winter crops. The leaves die off, and if the lesion is too great, then the whole plant dies, along with the root. To prevent the death of crops and at the same time not use chemical treatments, varieties resistant to the fungus are needed.

Agronomists Find Wheat Varieties Resistant to Enzyme Depletion
<https://www.newswise.com/articles/agronomists-have-found-varieties-of-wheat-that-are-resistant-to-depletion>

Enzyme-mycotic seed depletion (EMSD) is a leading cause of loss in grain crops, destroying up to 60% of the crop. The development of EMSD is associated with adverse weather conditions when an increase in enzyme activity breaks down grain biopolymers into simple sugars and amino acids. Maintaining humidity helps plants deal with EMSD but developing EMSD resistant crops is a more efficient way.

Climate Smart Agriculture for sustainability and food security
<https://www.orfonline.org/expert-speak/climate-smart-agriculture-for-sustainability-and-food-security/>

To meet the challenges of growing demand and food insecurity, we need to improve productivity through sustainable agriculture. Climate smart agriculture (CSA) is an approach that helps guide actions to transform agrifood systems towards green and climate resilient practices to achieve the Sustainable Development Goals and the Paris Agreement.

Wheat Harvest Expected to Rise in 2023 as Record Prices Encourages More Sowing
<https://krishijagran.com/agriculture-world/wheat-harvest-expected-to-rise-in-2023-as-record-prices-encourages-more-sowing/>

High domestic pricing and restored soil moisture are projected to help farmers surpass last year's planting in 2023, but an extreme heat wave this year may reduce production. Increased wheat production might persuade India, the second-largest producer of grain in the world, to reconsider easing a May export ban on the main grain, brushing aside concerns about chronically high retail inflation. Farmers are growing wheat on fallow land in the west, where farmers have historically grown pulse and oilseeds, despite the fact that the wheat area has practically plateaued in the traditional grain belts of Punjab, Haryana, and Uttar Pradesh.

Two high-yielding varieties of wheat introduced in Himachal
<https://theprint.in/india/two-high-yielding-varieties-of-wheat-introduced-in-himachal/1242272/>

The Himachal Pradesh Agriculture Department has introduced two high-yielding varieties of wheat — DBW 222 and DBW 187 — to boost foodgrains production in the state.

Climate change, the biggest threat to global food security
<https://timesofindia.indiatimes.com/blogs/voices/climate-change-the-biggest-threat-to-global->

[food-security/](#)

Recently, UN Deputy Secretary-General Amina Mohammed warned that the world is facing an unprecedented hunger crisis as global hunger is on the rise, reversing decades of progress. The United Nations called out climate change, extreme weather events, conflicts and economic downturns are the key factors driving growing food insecurity. The past month has seen a heatwave in Europe that has caused record-breaking temperatures, heat-related deaths and raging wildfires from Portugal to the Balkans. The UK recorded an unprecedented 40.2° Celsius at Heathrow Airport and a red heat warning for the first time ever. It has been a similar situation in the US with unprecedented levels of heat across many areas of the country and some of the most severe wildfires in the US in recent history.

Plants Yield Better When Grown Among Genetically Similar Plants

<https://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=19911>

Swiss scientists from the University of Zurich and Agroscope were able to identify genes that promote cooperation and higher yields of plant populations when monoculturally grown. The findings can help breeders develop plants with increased productivity using conventional breeding methods.

ITPGRFA: Decisions on key issues deferred at meet of treaty on plant genetic resources

<https://www.trendradars.com/digg/in/article-25235-itpgrfa-decisions-on-key-issues-deferred-at-meet-of-treaty-on-plant-genetic-resources>

The 9th session of the Governing Body meeting (GB9) of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) ended September 24, 2022, after six days of discussion but no decisions. Decisions on crucial issues such as the multilateral system (MLS) of access and benefit sharing (ABS) and digital sequence information (DSI) have been deferred to later. It was decided that the final decision on how to enhance the MLS of ABS would be taken at the treaty's 11th Governing Body (GB11) meeting three years from now.

A Glimpse of the Centre of Excellence for Vegetables, an Indo-Israel Agriculture Project

<https://krishijagran.com/blog/a-glimpse-of-the-centre-of-excellence-for-vegetables-karnal-an-indo-israel-agriculture-project/>

The Centre of Excellence for Vegetables, an Indo-Israel Agricultural Project in Gharaunda, Haryana, is paving the way for the future of horticulture and perhaps agriculture as a whole, in India with its demonstration of the soilless seedling production system, naturally ventilated poly houses, micro irrigation, fertilization system, good agriculture practices, and organic farming at first of its kind, the

Indo Israel Village of Excellence.

ICRISATs new gaming app to help small farmers adopt climatesmart practices

<https://newsmeter.in/tech-startups/icrisats-new-gaming-app-to-help-small-farmers-adopt-climate-smart-practices-704554>

The International Crops Research Institute for the SemiArid Tropics (ICRISAT) has developed a mobile gaming app MRIDA that helps smallholder farmers strategize climatesmart agricultural management practices to increase soil carbon, which in turn increases yield and resilience.

ACRE Unique Initiative for Cotton farmers of India

<https://krishijagran.com/agriculture-world/regenerative-agriculture-acre-unique-initiative-for-indian-cotton-farmers/>

The Alliance of Cotton & Textile Stakeholders on Regenerative Agriculture (ACRE) has been established by Solidaridad Asia, the Centre for Responsible Business (CRB), and regenagri to advance regenerative cotton farming practises in India.

[ICRISAT, PJTSAU join hands to boost groundnut production ...](#)

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and Professor Jayashankar Telangana State Agricultural University(PJTSAU), in view of boosting groundnut production, have joined forces to conduct 80 demonstration trials across the state. The capacity building programme was conducted at Regional Agriculture Research Station (RARS) Palem in Nagarkurnool district.

[A healing touch needed to climate-proof India's agri sector](#)

The agriculture sector of India is the lifeline of the country, and its importance to the economy cannot be overemphasised as it contributes 17 per cent to the national GDP. It has not only proved to be one of the most resilient sectors during the pandemic, registering a growth of 3.6 per cent in 2020-21 and 3.9 per cent in 2021-2022, but also played a significant role in the revival of the economy.

Understanding cryptic role fungi play in ecosystems

<https://theprint.in/science/understanding-cryptic-role-fungi-play-in-ecosystems/1251028/>

They can be found in a variety of settings, including soils, rainforest leaf tissues, and deep oceans. According to a new review published in the Annual Review of Ecology, Evolution, and Systematics, understanding how fungi migrate over a range of spatial scales is vital for understanding ecosystems

and has consequences for agriculture and human health.

Urban farming flourishing in Jammu

<http://risingkashmir.com/urban-farming-flourishing-in-jammu-d4dd4f1a-13b6-4b94-864c-53625c8bcfe8>

Urban farming has been gaining momentum in the Jammu region for the last couple of years. According to JC Raina, agronomist (Vegetable Improvement Scheme), the Directorate of Agriculture Jammu sold a record 1,200 bags of plants of exotic varieties last year only from its nursery situated at Talab Tillo, Jammu. "This year the number of bags sold to individuals (for household farming) and farmers has increased manifolds," Raina told Rising Kashmir.

How Is India Managing the Digitization of Agriculture?

<https://www.indiablooms.com/finance-details/17365/how-is-india-managing-the-digitization-of-agriculture.html>

Agriculture has played a crucial role for Indians. The country's climate facilitates the cultivation of different crops with top-quality soil. This has made India the powerhouse of food production in the world. India's traditional cultivation methods were time-consuming and inefficient. The Green Revolution in the 1960s brought about the much-required boost in efficiency and crop production. But currently, a new concept is taking the agriculture industry to new heights in terms of quality, yield, and productivity. The concept is based on the digitization of agriculture.

High Density Planting System Increases Cotton Yield By 30 to 50 percent

<https://krishijagran.com/commodity-news/high-density-planting-system-increases-cotton-yield-by-30-to-50-percent/>

Telangana Farmers have successfully completed an experiment with the high-density planting system (HDPS), which promises to increase cotton yields by 30 to 50 percent to overcome stagnation and improve yields. Telangana Farmers have successfully completed an experiment with the high-density planting system (HDPS), which promises to increase cotton yields by 30 to 50 percent to overcome stagnation and improve yields.

Microbial business thrives as farmers realise need to feed soil to feed crops

<https://thefederal.com/farm-matters/microbial-business-thrives-as-farmers-realise-the-need-to-feed-soil-to-feed-crops/>

Food safety concerns, a worry about chemical residues, plateauing yields from chemical-based agriculture, the rising cost of cultivation, soil degradation and climate change concerns are spurring interest in microbials. The huge regulatory cost and the time period of six to 10 years for obtaining approvals for new crop protection molecules are also a trigger, she said. The efficacy of biopesticides may not compare with that of chemical agents, but they do the work with a smaller carbon footprint.

Centre to promote use of heat-resistant wheat varieties

<https://agrospectrumindia.com/2022/12/13/centre-to-promote-use-of-heat-resistant-wheat-varieties.html>

The government aims to promote the use of heat-resistant varieties amongst the farmers through public and private partnership and providing seed directly to the farmers. To promote the use of these varieties, the Indian Institute of Wheat and Barely Research (IIWBR), Karnal under ICAR has signed 250 Memorandum of Agreements (MoAs) for DBW 187 and 191 MoAs for DBW 222 with private companies for seed production. The institute has distributed more than 2500 quintal seeds of DBW 187 and 1,250 quintal seeds of DBW 222 during the crop season, 2021-22.

World's First Rice Seeds Grown and Harvested in Orbit in Chinese Spaceflight Returns to Earth

<https://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=19934>

On December 4, 2022, the Chinese spaceflight Shenzhou-14 returned to Earth after six months in space. The third batch of space science experiment samples also arrived with the return capsule delivered to Beijing, including the world's first rice seedlings harvested in space. Together with the rice seedlings, experimental seeds of *Arabidopsis thaliana*, or thale cress, also grew vigorously in the space station. The two plants were cultivated in space for 120 days and completed the entire growth process from seed to seed. The experimental seeds of rice and thale cress were brought into space in late July. The experiment was officially launched on July 29, 2022, with the nutrient injection and concluded on November 25, for a total of 120 days. During the process, thale cress and rice seeds sprouted, grew, flowered, and bore seeds.

Introduction Of New Varieties of Crops Will Boost The Income Of Farmers: Director Agriculture

<https://indiaeducationdiary.in/introduction-of-new-varieties-of-crops-will-boost-the-income-of-farmers-director-agriculture/>

The Director Agriculture Kashmir Chowdhury Mohammad Iqbal said that we have to introduce new crops and varieties to our menu because this will boost income of farmers and will help us to explore the unique agro-climatic conditions of the region. These views were expressed by Director Agriculture

Kashmir during his visit to Banday Bagh and other areas of district Budgam.

How Odisha is revalorising minor millets

<https://www.downtoearth.org.in/blog/agriculture/how-odisha-is-revalorising-minor-millets-86581>

Minor millets like little, kodo and foxtail were once the major staple and central to Indian tribal culture, especially in rainfed areas. But over the years, penetration of high-yield commercial crops and lack of marketing support has diminished the demand of millets. In recent years, Odisha has taken strides to empower tribal farmers to revalorise and create an enabling ecosystem to assert the value of these ancient grains that have been part of the human food system since time immemorial.

“Digital Agriculture Mission Played Crucial Role in Improving Farmers Standard of Living”: Prahlad Singh Patel,

MoS-FPI

<https://krishijagran.com/agriculture-world/digital-agriculture-mission-played-crucial-role-in-improving-farmers-standard-of-living-prahlad-singh-patel-mos-fpi/>

Government, with the interests of farmers in mind, has created a new concept from seed to market, in which the Digital Agriculture Mission has proven to be a miracle. According to the Union Minister, this mission has played an important role in improving the farmers' living conditions and standard of living.

Farmers must make the best of ‘farm to home’ concept <https://agriculturepost.com/opinion/farmers-must-make-the-best-of-farm-to-home-concept/>

The ‘Farm to home’ concept is gaining popularity across the world as it can connect consumers directly with the producers. This helps consumers to raise their concerns about the purity and safety of the food they procure. They can be aware of the conditions and locations, where the vegetables, fruits, grains, and even dairy products they consume daily are grown in. Besides the huge demand for such products, people in urban areas want to contribute to the empowerment of rural communities. This complements the ‘Vocal for Local’ initiative that is put forward by the Government.

11 Most Profitable Cash Crops for Small Farmers

<https://krishijagran.com/agripedia/11-most-profitable-cash-crops-for-small-farmers/>

Growing cash crops is a sure-fire way to get the most out of your crops on small farmland. The good news is that cash crops are also relatively easy to grow and maintain and are sold to a market where the demand is already high.

Why Government Is Promoting Millet As The Food Of The Future

<https://www.indiatimes.com/explainers/news/why-government-is-promoting-millet-as-the-food-of-the-future-587989.html>

Millet has a glorious history of being among the earliest crops grown by humans, Modi stated in his address to the opening ceremony of the International Year of Millets 2023, which was held at the headquarters of the Food and Agriculture Organization (FAO) in Rome, Italy. In the past, they were an important source of food. However, the urgent requirement is to provide them with a food option for the future.

Research

News

Root Structure Mapped Out to Identify Components of Drought Stress Tolerance in Rice

<https://www.frontiersin.org/articles/10.3389/fpls.2022.1008954/full>

An international team of scientists were able to identify candidate [genes](#) for further genetic research on the improvement of root phenotypes to respond to drought stress by examining the phenotypic and genetic correlations among rice root anatomical, morphological, and agronomic phenotypes. The team used more than 200 rice accessions from Southeast Asia for their study to identify root morphological and anatomical phenotypes related to rice productivity under stress. Data showed that drought stress is a result of the slight increases in the basal metaxylem and stele diameter of rice nodal roots. The scientists also found that biomass was consistently positively related to crown root number, but negatively to stele diameter.

New Height-Reducing Gene Can Help Wheat Grow in Drier Soil

<https://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=19913>

Scientists from the John Innes Centre and CSIRO Australia discovered *Rht13*, a height-reducing gene in wheat. This new finding may allow farmers to plant wheat seeds deeper into the soil without the adverse effects on seed emergence that is common when using existing wheat varieties. Conventional wheat varieties that were produced during the Green Revolution put more energy into grain production causing lower plant heights. But these plants are unable to survive when planted deep in the soil where more moisture can be found because the dwarf plants fail to reach the top.

UC San Diego Team Identifies CO2 Sensor in Plants that Controls Water Loss

<https://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=19932>

Scientists at the University of California San Diego (UC San Diego) have recently made a breakthrough

in identifying the long-sought carbon dioxide (CO₂) sensor in Arabidopsis plants and unraveled its functioning parts. Researchers have discovered more than 50 years ago that plants can sense CO₂, but have not identified the sensor or explained how it works within plants.

Ethiopian Sorghum Varieties Hold Traits for Drought Tolerance

<https://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=19935>

By planting different accessions from the Ethiopian sorghum landrace, scientists from the Addis Ababa University, Ethiopian Institute of Agricultural Research, and the Swedish University of Agricultural Sciences have initially identified novel sources of germplasm that can be used for breeding drought tolerant sorghum.

ICAR, SAUs develop high-yielding short duration Basmati rice varieties

<https://agrospectrumindia.com/2022/12/13/icar-saus-develop-high-yielding-short-duration-basmati-rice-varieties.html>

The cultivation of Short Duration Varieties (SDVs) provide extended window between Kharif harvesting of paddy and wheat sowing for Rabi, thereby giving sufficient time to the rice farmers for in-situ management and removal of excess paddy straw. The varietal trait for height is inherent in self-pollinated crop like paddy. The dwarf varieties have less production of straw as compared to the tall varieties.

DREB Mechanism Found to Mediate Resistance to Multiple Stress Factors in Banana

<https://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=19945>

A team from the Chinese Academy of Tropical Sciences identified the gene *MaDREB1F* to hold a mechanism to confer cold and drought stress resistance in banana. The findings add to substantial implications for engineering tropical crops with cold- and drought-tolerance traits. Seedlings of the banana cultivar *Brazil* were planted inside a greenhouse to conduct the study to determine how *MaDREB1F* encodes a dehydration responsive element binding (DREB) protein transcription factor with nuclear localization and transcriptional activity.

