



A team at the Boyce Thompson Institute (BTI) has identified genes that enables peaches and their wild relatives to tolerate harsher climate. According to the scientists the findings can help domesticated peach adapt to climate change. The study was co-led by Boyce Thompson Institute faculty member Zhangjun Fei. He examined the genomes of peach's wild relatives and landraces varieties that have adapted over a long time to specific local conditions from seven regions in China. They identified genes responsible for peach's tolerance to multiple environmental factors, including cold, drought and ultraviolet (UV-B) radiation levels at high altitudes.

As per the study many of the domesticated peach's adaptation genes have been lost as humans bred the plant to focus on flavor, sweetness and other traits but did not focus on climate resilience. The wild peaches on the other hand adapted to this trait over years.

The researchers gathered 263 peach wild relatives and landraces from the National Peach Germplasm Repository of China and Tibetan Plateau. After conducting genome-wide environmental association studies on the samples, the team identified more than 2,700 spots in the genome that are linked to 51 environmental factors affecting the local climates of those regions. They further found that the peach when grew under a stressful condition like drought, its fruit got sweeter. Therefore, a direct linkage between drought and the sugar content of peach.

In the peach trees from Tibetan Plateau, they found it tolerant to the intense UV-B radiation of high-altitude region. The variant increased the production of the purple-colored flavonoid anthocyanin in the plant's new shoots, protecting them from UV-B radiation damage.

In conclusion, according to the researchers, the genetic information found by them could help people breed peach trees that grow in harsher environments, expanding peach's geographic range to new regions.

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

### [From locusts to fires, agriculture faces growing threats: UN](#)

(Phys.org)

The increasing frequency and severity of natural disasters ranging from massive fires to locust invasions is putting food production systems at risk, the UN warned. The annual occurrences of extreme events has tripled since the 1970s and "their economic impact is relentlessly increasing", the UN Food and Agriculture Organization said in a report. "At no other point in history have agri-food systems confronted such an array of new and unprecedented threats, including megafires, extreme weather, unusually large desert locust swarms, and emerging biological threats like the COVID-19 pandemic," the FAO said.

### [Mango Production likely to jump 4.24% in 2020-21](#)

(Mint)

The agriculture ministry said that the Mango production in the country is estimated to increase by 4.24% to 21.12 million tonnes in the crop year 2020-21 ending June. The ministry said the output of mango stood at 20.26 million tonne during the 2019-20 crop year (July-June). The arrival of mangoes from southern and western India has started, while the season in Uttar Pradesh will begin from mid-June onwards.

### [Biden's USDA chief is exploring making a carbon bank for farmers](#)

(Mint)

The Biden administration has begun an intense examination of how to structure a carbon market that would encourage broad participation by US farmers, including whether to guarantee a minimum price for credits given for reducing emissions, Agriculture Secretary Tom Vilsack said. The agriculture secretary said that the private carbon banks that have already been set up clearly aren't yet attracting enough interest among farmer.

### [EU says it agrees post-Brexit WTO agriculture quotas with U.S.](#)

(The Economic Times)

The European Union and the United States have concluded negotiations to adjust the EU's World Trade Organization agricultural quotas following Britain's exit from the bloc, the European Commission said. The agreement, covering billions of euros of trade, including beef, poultry, rice, dairy produce, fruit, vegetables and wine, was the result of two years of negotiations. The idea is to keep

the previous import quota volumes unchanged and to share them between the European Union and Britain.

### [A high growth plan for Indian agriculture](#)

(The Indian Express)

The centrality of agriculture in India goes much beyond its immediate employment contribution, where it engages close to 42 per cent of the country's workforce. The sector not only feeds the large and growing Indian population but with its close interlinkage with poverty, it is best positioned to alleviate problems of malnutrition and hunger. In addition, agriculture supplies inputs for other industries and is critical for triggering a multiplier effect in the economy, where a financially empowered farming community triggers a demand-led growth, particularly for manufactured products and services. There is no doubt that the sector needs to grow not just for those employed in it but also for the economy as a whole.

### [How Agriculture Companies Will Benefit from Blockchain Technology?](#)

(Krishijagran)

What function does blockchain play in agriculture? How can agricultural firms use blockchain technologies to enhance food protection, traceability, and transparency? The response is right there in the question. Since a blockchain is a public ledger that acts like a decentralized database, it can mainly provide its members with insight into the data stored as well as the right to amend the ledger as events occur. This means that any member of the blockchain has the same details, eliminating the possibility of disagreement and allowing for straightforward transactions.

### [Turkey goes zero waste in agriculture](#)

(Daily Sabah)

The Zero Waste project initiated by first lady Emine Erdoğan in 2017 is continuing in full speed as Turkey now aims to free its agriculture from waste. The country now aims to recycle every byproduct that agricultural activities cause, from the moment the seed is planted to harvest. The authorities encourage the recycling of stems, hay, cobs and plastic waste produced in the agricultural processes, as first steps are being taken.

### [Regenerative Agriculture Gains Traction in Southeast Asia](#)

(Triple Pundit)

In Thailand, very few farms incorporate organic or regenerative agriculture practices, so the use of chemicals remains the norm. To remedy that situation, Harmless Harvest, a maker of coconut-based products, decided to join forces with partners to launch the Regenerative Coconuts Agriculture Project (ReCAP). The organizations say this is the first of its kind project in Thailand and has the goal to transform coconut agricultural practices and fight climate change through expansion of regenerative farming techniques.

### [IGNOU launches certificate programme in gender, agriculture and sustainable development](#)

(The Indian Express)

The Indira Gandhi National Open University (IGNOU) launched a certificate programme in gender, agriculture and sustainable development through open and distance mode. According to IGNOU, the programme will address key issues on women's participation in agriculture and farming. "Women and men are affected differently by economic change and development, and thus an active public policy is needed to intervene to close gender gaps. In this context, agriculture needs to look towards sustainability in its planning and policy process and the women's contribution to sustainable agricultural development."

### [Dir Agriculture Flags Off Group Of 40 Farmers for Exposure Tour Within UT](#)

(Crosstown news)

A group of 40 farmers, including women farmers was flagged off for one day exposure visit within Jammu. Director Agriculture Production & Farmers Welfare Jammu, Inder Jeet flagged off the farmers from Krishi Bhawan. The exposure visit has been organized by Department of Agriculture, Subdivision Marh under Pradhan Mantri Krishi Sinchayee Yojana- Per Drop More Crop (PMKSY- PDMC). Interacting

with the farmers on the occasion, the Director Agriculture Jammu underlined that objective of such programmes is to make the farmers aware of latest technological interventions in the field of agriculture to achieve the target of doubling the farmers' income by 2022. The farmers were advised to replicate the new technology in their respective areas that they will learn during the visit and further share it with other fellow farmers.

### [Narrow policies for Japanese agriculture won't bear much fruit](#)

(East Asia Forum)

Japanese Prime Minister Yoshihide Suga's speech at the 204th session of the Diet in January 2021 reaffirmed his pledge to boost exports in the agricultural, forestry and fisheries sectors, transforming them into growth industries. Yet his statement failed to reference the Basic Plan for Food, Agriculture and Rural Areas, a five-year policy plan based on the 1999 Basic Law on Food, Agriculture and Rural Areas, updated in March 2020, that sets out the government's policy direction across a range of areas. Suga neglected to focus on major related goals contained within the plan such as improved food self-sufficiency, sustainable agricultural development and the promotion of rural areas.

### [Korea supports agriculture in Uganda](#)

(Hortidaily)

The Government of the Republic of Korea through Korea International Cooperation Agency (KOICA) has earmarked USD 8 million for capacity building towards the Ugandan seed value chain for key horticultural crops. The objective of the project being to increase farm income through improved productivity and quality of horticultural crops, the grants will be channelled to government through the National Agricultural Research Organisation (NARO) and its affiliate institutions to work on improving seed-related research capacity, increasing production and quality of the target crops, and establishing a system of quality seeds dissemination through leading farmers. Such target crops which have been discussed with careful consideration of consumption and income generation include: Tomato, Chili, Onion and Nakati (a local vegetable).

### [Canada invests \\$148m in sustainable agriculture practices](#)

(Foodbev)

The government of Canada has announced an investment of CAD 185 million (\$148 million approx.) over the next ten years into developing and implementing farming practices to tackle climate change. The new Agricultural Climate Solutions (ACS) programme aims to establish a Canada-wide network of regional collaborations led by farmers, with support from scientists and other sectoral stakeholders. Together, they will co-develop and share management practices that best store carbon and mitigate climate change including shelterbelts, nutrient management, cover crops, intercropping and conversion of marginal land to permanent cover. As a result, the work will help protect biodiversity, as well as improve water and soil quality, in an effort to build climate resiliency across Canada.

### [A climate-resilient rainfed agriculture](#)

(The Indian Express)

India has been witnessing variable monsoon for the past few years. The last year was marked by surplus rain in June, deficit rain in July, and surplus rain in August and September, as reported by the Ministry of Earth Sciences. This inconsistency in the monsoon rainfall pattern is an indication that extreme weather events might become the norm, rather than the exception, in the coming years. The Global Climate Risk Index 2020, released recently, puts India seventh in the list of countries worst hit by extreme events. This doesn't augur well for the farming community, especially small and marginal farmers, and the agricultural yield in general.

### ['Agriculture budget' exercise begins in Rajasthan](#)

(The Hindu)

The exercise for presenting a separate "agriculture budget", with the emphasis on welfare measures for farmers, has started in Rajasthan in accordance with the announcement made by Chief Minister Ashok Gehlot in the 2021-22 State Budget. The new document will provide for innovations for the benefit of cultivators. Agriculture Minister Lalchand Kataria said in the State Assembly that while the agriculture budget would fulfil the dreams of farmers, the steps for providing new facilities in the farm

sector would be accompanied by sufficient financial provisions. Organic farming would also be promoted in a big way, he said.

### [Practical implications on how computer vision is transforming agriculture](#)

(Tech Genyz)

A significant part of the world economy relies on agriculture. One of the major issues faced by farmers and governments in their ability to monitor vast tracts of land. It's essential to regularly study forests and farmland to check for diseases, water supply issues, pest infestations, and weather-related problems. The problem of getting visual information on crops and fields spread out on large areas can be solved with the help of a combination of drone technology and computer vision.

### [Govt to rope in start-ups to solve issues in Telangana's agriculture sector](#)

(The Indian Express)

THE State government in-principle has decided to utilise the services of the start-ups to overcome the present problems in the agriculture sector such as Minimum Support Price (MSP) and others. As many as six start-ups made a presentation on the agriculture sector to Chief Secretary Somesh Kumar at the BRKR Bhavan. The State government has decided to utilise the services of the start-ups, as the total cropped area increased to 2.11 crore acres from 1.31 crore acres.

### [SMART develops analytical tools to enable next-generation agriculture](#)

(MIT)

According to United Nations estimates, the global population is expected to grow by 2 billion within the next 30 years, giving rise to an expected increase in demand for food and agricultural products. Today, biotic and abiotic environmental stresses such as plant pathogens, sudden fluctuations in temperature, drought, soil salinity, and toxic metal pollution — made worse by climate change — impair crop productivity and lead to significant losses in agriculture yield worldwide. New work from the Singapore-MIT Alliance for Research and Technology (SMART), MIT's research enterprise in Singapore, and Temasek Life Sciences Laboratory (TLL) highlights the potential of recently developed analytical tools that can provide tissue-cell or organelle-specific information on living plants in real-time and can be used on any plant species.

### [Smart agriculture essential in addressing rising food insecurities](#)

(Hortidaily)

The growing population and their ever-declining age present various challenges, with food security constituting a major issue. As more people require more food, the declining median age, that is already at 19.7, the youngest in the world, means that a smaller percentage of the population will be at a productive stage of their lives, hence fewer people will be working than mouths will need to be fed. In terms of food security, local farming plays a key role. But although 70-80% of the local population of the working age are smallholder farmers, agriculture in the region is far from being sufficient, and the continent currently spends more than \$35 billion on food imports per year. Today, agriculture is by far the most important economic sector in the continent, providing work for over 2 thirds of the population, contributing between 30 to 60 percent of GDP, and about 30 percent of the value of exports in each country.

### [South Australia prepares to welcome 1,200 South Pacific fruit pickers](#)

(The Guardian)

About 1,200 South Pacific fruit pickers are expected to arrive in South Australia to help fill critical shortages of seasonal agriculture workers. The SA government's attempts to encourage unemployed locals to take up fruit picking jobs failed to attract enough workers. A regional Covid-19 quarantine facility has been set up to house the foreign workers at Paringa, about 270km east of Adelaide. "The state government has made a significant push to encourage unemployed locals to take up fruit picking this year but unfortunately not enough people have rallied to the call and foreign workers are now a critical need," primary industries and regional development minister David Basham said.

### [Farming on IoT](#)

(CDO Trends)

Craig Brewin is a farmer in the south-east region of South Australia and works on several blocks, one of which is a leased property around 100 kilometers from the main farm. He recently installed four solar-powered sensors on his Maranoa Downs property and attached them to a number of his water tanks. The sensors power up with the sun, send data up into space via satellite, and Brewin checks what is happening with his tanks via an app on his phone.

### [The pandemic disrupts Australia's agriculture industry, exposing its shaky labor foundation.](#)

(The New York Times)

The pandemic has exposed the unstable foundation of Australia's agriculture industry, a \$54 billion-a-year goliath that has long been underpinned by the work of young, transient foreigners. Border closures and other measures to keep the coronavirus out of the country have left Australia with a deficit of 26,000 farmworkers, according to the nation's top agriculture association. As a result, tens of millions of dollars in crops have gone to waste from coast to coast. "We've never faced a worker shortage like this in my 40 years," said Peter Hall, who owns an orchard in southeastern Australia. "I suspect for each lot of crop, we'll just not get there in time."

### [Grape expectations: novel superfood seaweed farm launched in Singapore](#)

(The Fish Site)

Taiwan's Council of Agriculture (COA) said it had reached an agreement to export 6,000 kilograms of pineapples to Australia in May. The council's Department of International Affairs made the announcement after Deputy Agriculture Minister Chen Junne-jih and his Australian counterpart, David Hazlehurst, held a virtual meeting earlier in the day to discuss agricultural cooperation. According to the COA, Taiwan sent a small trial shipment of decrowned pineapples to Australia in March 2020, after Canberra approved imports of the fruit. During the meeting on Wednesday, the two sides finalized plans to ship 6,000 kg of Taiwanese pineapples by sea to Australia in May, as well as a smaller quantity by air, the COA said.

### [New ebook digs deep on soil information](#)

(Farm Weekly)

Western Australian growers and agriculture industry representatives can access the latest information about soil fertility and soilborne diseases in a new digital publication Soil Quality: 5 Soil Biology. The Grains Research and Development Corporation (GRDC) and SoilsWest - a research partnership between The University of Western Australia (UWA) and the Department of Primary Industries and Regional Development (DPIRD) - worked together to publish the free ebook. Soil Quality: 5 Soil Biology is the fifth in a series of ebooks produced by SoilsWest, which focuses on soil quality for WA and includes current knowledge on best practice soil techniques in an easy-to-navigate format.

### [NTU Singapore team develops plant communication tool](#)

(The Engineer)

According to the study, published in Nature Electronics, the electrode achieves two things when attached to the plant's surface: picking up electrical signals to monitor how the plant responds to its environment; and transmitting electrical signals to the plant, causing it to close its leaves. The NTU researchers believe that this ability to measure electrical signals of plants could create opportunities in robotics – such as plant-based robots and more sensitive grippers that pick up fragile objects – as well as in agriculture, allowing farmers to detect disease in crops and maximise crop yield.

### [S'pore high-tech farms seek to export not just produce but their technology too](#)

(The Straits Times)

Farming in Singapore is going high-tech, and some companies are setting their sights beyond just selling their produce. A Local vegetable company launched a new micro-farming system that combines aquaculture, vertical vegetable farming and customisable spaces for storage or farm stays, which it wants to export around the world. Such novel solutions that agri-food tech companies develop here not only address Singapore's food security challenges but could help other countries as well, said Minister for Trade and Industry Chan Chun Sing. He added that having a portfolio of different agri-tech technologies that address various challenges - such as systems that make more efficient use of water or energy, or those that allow alternative crops such as potatoes to be grown - would allow

Singapore to use them to scale up local production when needed, even if they are not implemented during normal times.

### [Munching Maggots Help Singapore Startup Secure Lucrative Biomaterial](#)

(Successful Farming)

In a quiet, mainly residential district of Singapore, trays of writhing black soldier fly larvae munch their way through hundreds of kilograms of food waste a day. The protein-rich maggots can be sold for pet food or fertiliser, but a startup that says it is Singapore's first urban insect farm - they are bred to extract biomaterials that can be used in pharmaceuticals and electronics.

### [From Singapore to Hong Kong, how urban farming can help tackle food waste — but is it enough?](#)

(CNA)

As an urban farmer, Andrew Tsui values his relationship with food. And he frets that many humans of Hong Kong and Singapore, the two cities he grew up in, do not. The problem, according to the 43-year-old, is the “instant-noodle city lifestyle”. “If we need something today ... we can either use our smartphone (or) go downstairs. There’s always a convenience store,” he said. “Food becomes a lifeless thing that’s being put on the shelf. “And the moment we kind of productise food, it’s the start of the broken relationship.” It is this “consumer mindset”, for one thing, that leads to over 3,600 tonnes of food — the weight of about 250 double-decker buses — being thrown into Hong Kong’s landfills every day.

## New Research

### [Cactus Pear Could Be the Sustainable Food and Fuel Crop of the Future](#)

(Technology Networks)

Could cactus pear become a major crop like soybeans and corn in the near future, and help provide a biofuel source, as well as a sustainable food and forage crop? According to a recently published study, researchers from the University believe the plant, with its high heat tolerance and low water use, may be able to provide fuel and food in places that previously haven’t been able to grow much in the way of sustainable crops. Global climate change models predict that long-term drought events will increase in duration and intensity, resulting in both higher temperatures and lower levels of available water. Many crops, such as rice, corn and soybeans, have an upper temperature limit, and other traditional crops, such as alfalfa, require more water than what might be available in the future.

### [Purdue team predicts next-generation microbiome research promises agricultural advances](#)

(Purdue University)

For thousands of years, humans have altered — often negatively and inadvertently — microbial communities in a quest to improve agricultural crops. In recent years, knowledge about the roles microbes play in these systems has grown rapidly but is not yet to the point at which farmers and society have reaped benefits. That’s primed to change, according to a group of Purdue University scientists who authored a review of agricultural microbiome work for the journal Nature Plants published this week. This is the first review of agricultural microbiome research that comprehensively combines knowledge about plant, soil and insect microbiome work to develop an integrated portrait of the complex interactions that will come into play as scientists attempt to harness microbes to improve crops.

### [Agricultural biodiversity: Different perceptions in science and practice](#)

(Science Daily)

To minimize negative impacts of agriculture on biodiversity and related ecosystem services, 'biodiversity-friendly' management is needed. Why scientific results are rarely translated into agricultural practice could be explained by their different perceptions of agricultural biodiversity, according to the results of a recent survey of European scientists and farmers.

### [IIT-Delhi, Hebrew University of Jerusalem partner to promote interdisciplinary research](#)

(Mint)

The Indian Institute of Technology in Delhi (IIT-Delhi) and Hebrew University of Jerusalem, Israel (HUJI) Thursday partnered to foster interdisciplinary education and research in areas like biomedical science, and computer science. IIT Delhi Director V.Ramgopal Rao said his institution is putting emphasis on international collaborations and both the institutions have agreed to seed fund researchers in their respective institutions to collaborate with each other.

### [Guava roots can help fight diabetes: Research](#)

(Telangana Today)

The government approved a pact between India and Fiji for co-operation in the field of agriculture and allied sectors. The Union Cabinet, chaired by Prime Minister Narendra Modi, approved the signing of a Memorandum of Understanding (MoU) between the Ministry of Agriculture of Indian government and Ministry of Agriculture of the Republic of Fiji in this regard. The MoU between India and Fiji provides for cooperation in various areas including promotion of joint ventures between private sectors of both countries. The agreement also provides for exchange of research personnel, scientific experts, specialists, and technical trainees; technology transfer; development of infrastructure for agriculture development; development of human resources through training of officers and farmers by conducting seminars and workshops.

### [Conservation of Plant Diversity in Agroforestry Systems in a Biodiversity Hotspot Region of Northeast India](#)

(Springer)

In Assam, a north-eastern state of India, most of the traditional agroforestry systems are still practised. The plant species composition of three agroforestry systems namely homegardens tea gardens and agrisilvicultural systems, were assessed using quadrat method. A total of 516 plant species belonging to 241 genera under 91 families were recorded, which consisted of 134 trees, 143 shrubs (67 shrub species and 76 species of saplings) and 239 herbs (93 herb species, 33 climber species and 113 species of seedlings). It can be concluded that the agroforestry systems, specially the homegardens harbour rich plant diversity and act as miniature versions of natural forests by conserving rare, threatened and data-deficient plant species. The results suggest that the agroforestry systems with some management interventions need to be promoted as conservation models in areas with high pressure on tropical forests.

### [Atmospheric opacity has a nonlinear effect on global crop yields](#)

(Nature)

Agricultural impacts of air pollution, climate change and geoengineering remain uncertain due to potentially offsetting changes in the quantity and quality of sunlight. By leveraging year-to-year variation in growing-season cloud optical thickness, I provide nonlinear empirical estimates of how increased atmospheric opacity alters sunlight across the Earth's surface and how this affects maize and soy yields in the United States, Europe, Brazil and China. I find that the response of yields to changes in sunlight from cloud scattering and absorption is consistently concave across crops and regions. An additional day of optimal cloud cover, relative to a clear-sky day, increases maize and soy yields by 0.4%. Changes in sunlight due to changes in clouds have decreased the global average maize and soy yields by 1% and 0.1% due to air pollution and may further decrease yields by 1.8% and 0.4% due to climate change.

### [Urbanization can benefit agricultural production with large-scale farming in China](#)

(Nature)

Urbanization has often been considered a threat to food security since it is likely to reduce the availability of croplands. Using spatial statistics and scenario analysis, we show that an increase in China's urbanization level from 56% in 2015 to 80% in 2050 would actually release 5.8 million hectares of rural land for agricultural production—equivalent to 4.1% of China's total cropland area in 2015. Even considering the relatively lower land fertility of these new croplands, crop production in 2050 would still be 3.1–4.2% higher than in 2015. In addition, cropland fragmentation could be reduced with rural land release and a decrease in rural population, benefiting large-scale farming and environmental protection. To ensure this, it is necessary to adopt an integrated urban–rural development model, with reclamation of lands previously used as residential lots. These insights into



the urbanization and food security debate have important policy implications for global regions undergoing rapid urbanization.

### [Emerging strategies for precision microbiome management in diverse agroecosystems](#)

(Nature)

Substantial efforts to characterize the structural and functional diversity of soil, plant and insect-associated microbial communities have illuminated the complex interacting domains of crop-associated microbiomes that contribute to agroecosystem health. As a result, plant-associated microorganisms have emerged as an untapped resource for combating challenges to agricultural sustainability. However, despite growing interest in maximizing microbial functions for crop production, resource efficiency and stress resistance, research has struggled to harness the beneficial properties of agricultural microbiomes to improve crop performance. Here, we introduce the historical arc of agricultural microbiome research, highlighting current progress and emerging strategies for intentional microbiome manipulation to enhance crop performance and sustainability. We synthesize current practices and limitations to managing agricultural microbiomes and identify key knowledge gaps in our understanding of microbe-assisted crop production. Finally, we propose research priorities that embrace a holistic view of crop microbiomes for achieving precision microbiome management that is tailored, predictive and integrative in diverse agricultural systems.

### [Gene Discovery to Help Peaches Adapt to Climate Change](#)

(ISAAA)

A research team led by the Boyce Thompson Institute (BTI) has identified genes that could enable peaches and their wild relatives to tolerate stressful conditions and adapt to climate change. The research team examined the genomes of 263 wild relatives and landraces of peach from seven regions in China. Of these, 218 came from the National Peach Germplasm Repository of China and 45 from the Tibetan Plateau. They conducted genome-wide environmental association studies on the samples and identified more than 2,700 spots in the genome that are linked to 51 environmental factors affecting the local climates of those regions. Genes responsible for peach's tolerance to multiple environmental factors, such as cold, drought, and ultraviolet (UV-B) radiation levels at high altitudes were identified.

### [Discovery Ends Long-Standing Photosynthesis Controversy](#)

(ISAAA)

Scientists from the Queen Mary University of London have identified the location in plant cells of a key enzyme involved in photosynthesis. The findings overturn the conventional belief about where the enzyme resides in plant cells and suggest a likely role in regulating energy processes as plants adapt from dark to light conditions. During photosynthesis, carbon is converted into energy stores through 'electron transport', involving an enzyme called ferredoxin: NADP(H) oxidoreductase, or FNR. Plants switch rapidly between two types of electron transport – linear electron flow (LEF) and cyclic electron flow (CEF) in response to environmental conditions. The FNR transfer between membrane structures in the chloroplast, where photosynthesis takes place, has been linked to this switch. The belief is that FNR carries out its function in the soluble compartment of the chloroplast, but evidence suggests that the activity of FNR increases when it is attached to an internal membrane.

### [Classic milpa maize intercrop can help feed communities forgotten by development](#)

(CIMMYT)

The traditional milpa intercrop — in which maize is grown together with beans, squash, or other vegetable crops — can furnish a vital supply of food and nutrients for marginalized, resource-poor communities in the Americas, according to a study published in Nature Scientific Reports. One hectare of a milpa comprising maize, common beans, and potatoes can provide the annual carbohydrate needs of more than 13 adults, enough protein for nearly 10 adults, and adequate supplies of many vitamins and minerals, according to the study. The research was based on data from nearly 1,000 households across 59 villages of the Western Highlands of Guatemala and is the first to relate milpa intercropping diversity with nutritional capacity, using multiple plots and crop combinations.

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