Seed Connect **Edition 37**

A monthly newsletter of Federation of Seed Industry of India December 2021

Plant grafting is a technique where the root of one plant is attached to the shoot of another. This technique has been used in agriculture for thousands of years to improve crop growth and eradicate diseases in plants such as apples and citrus fruits. This technique wasn't thought by researchers to work for a major group of plants - the monocotyledons or monocots. Monocots includes all grasses such as wheat, corn, garlic, oats and other high-value crops such as bananas and date palms. These plants lack a tissue called vascular cambium which helps grafts heal and fuse in many other plants.

However, recently, researchers from University of Cambridge have found an approach that allows monocots to be grafted. They extracted a form of embryonic plant tissue from inside a monocot plant seed and applied it to the potential graft site between two monocot specimens belonging to the same species – wheat, for instance.

The tissue increased growth and fused the two plant halves together. The research team used fluorescent dyes to verify that the root and shoots had fused and could transport liquids and nutrients up and down the stem.

According to the researchers the method appeared to work on a wide range of monocot plant families, including important crops such as pineapple, banana, onion, tequila agave, oil palm and date palm. The team's preliminary studies in the lab also suggest that the grafting can work between species. They grafted a wheat shoot to disease-resistant oat roots. They believe that this may protect the wheat from soil-borne disease, although it is still unclear whether this protection would be feasible in the real world.

Researchers say that the technique could be especially useful for combating disease in vulnerable species like the Cavendish banana, which forms the vast majority of the world's supply. The Cavendish is only reproducible by cloning, meaning the crop is highly genetically uniform and so vulnerable to diseases like Panama disease, which is caused by a soil-borne fungus. By grafting more disease-resistant stems (or rootstocks) with the banana plant, the Cavendish could avoid Panama disease. They further informed that the procedure may not be feasible for grasses like wheat and oat, as the process would have to be repeated millions

of times for a single harvest. But for large plants that live for many years and generate high-value produce, like date palm or tequila agave, the method could prove to be cost-effective.

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

Indian Govt Seeks Ideas To Promote Tech Investments In Agriculture And Infrastructure

(Inc 42)

Preparing for the upcoming Union Budget 2022, Prime Minister Narendra Modi chaired a roundtable with the Indian startup community led by venture capital and private funds representatives earlier this week. The roundtable was attended by several VC funds active in India including Prasanth Prakash, partner, Accel Partners, Rajan Anandan, managing director Sequoia India Capital, Siddarth Pai, founding partner, 3one4 Capital founding and a host of other VCs. The meeting highlighted the latest government-initiated reforms such as the impact of initiatives like PM GatiShakti, an infrastructure project worth INR 100 Lakh Cr, compliance reforms and what's more that can be done to boost the startup ecosystem in the country.

IITMIC and Samunnati Foundation collaborate to jointly incubate Indian agritech start-ups

(The Hindu Business Line)

IIT Madras Incubation Cell (IITMIC) and Samunnati Foundation will collaborate to jointly incubate and support Indian agritech start-ups, scale up their businesses and encourage sustainable agriculture. This will encourage innovative technologies in agriculture and allied areas in India. The two organisations have signed a MoU to promote agritech start-ups to improve farmer incomes, reduce waste and encourage sustainable agriculture. Through this partnership, the organisations will provide incubation support/facilities to entrepreneurial ventures, prepare position papers and propose policy recommendations.

India replaces Brazil as top food supplier to Arab League countries

(Hindustan Times)

India has become the top food exporter to the 22-nation League of Arab States for the first time in 15 years, replacing Brazil. A Reuters report from Sao Paulo said India accounted for 8.25% of the total agribusiness products imported by the 22 Arab League members last year, higher than Brazil's 8.15%, ending a 15-year advantage for Brazil, according to data provided by the Arab-Brazil Chamber of Commerce to Reuters. "The Arab world is among Brazil's most important trade partners, but its

distance from those markets took its toll as the [Covid-19] pandemic rattled global logistics," the report said.

'Agriculture helps expedite India's economic recovery'

(Sunday Guardian)

Agriculture has seen steady growth in India's economy during recent years. The Gross Value added (GVA) of agriculture rose by 4.5% in its second quarter of financial year 2021-22, continuing its upward run and making it the lead contributor in India's growth. A report of the Agriculture ministry has said that there has been an increase of 6.1 % in sowing of rabi crops compared to last year. Professor Shailendra Kumar Yadav, Director, School of agriculture, Indira Gandhi National Open University (IGNOU), said, "The primary cause of the rise in the agriculture sector is because of the push in scientific efforts and transformation done through different interventions."

India suspends futures trading of CPO, soybean oil, other agricultural commodities

(SP Global)

The Securities and Exchange Board of India has directed local stock exchanges to suspend trading of seven agricultural commodities, including crude palm oil and soybean oil, with immediate effect for one year. The commodities impacted were crude palm oil, soybean and its derivatives, paddy (non-basmati), wheat, chana, or chickpeas, mustard seeds and its derivatives, and moong, or green gram, according to SEBI. Traders will be allowed to square off their positions, but new trades cannot be executed. "The decision to ban trading in these futures contracts are expected to help cool prices, especially of edible oils and the oil complex," an official with India's Ministry of Consumer Affairs, Food and Public Distribution said.

Data revolution in Indian agriculture

(The Times of India)

The Indian agriculture sector is valued at 370 Billion USD and generates close to 49% of the total employment in the country. Even with these glowing statistics, it took almost 65 years after independence for this industry to embark on the path of digital transformation. The last ten years have proven to be a complete game-changer, with the digitization process happening at a much rapid rate as compared to other arenas operating in the subcontinent. Since the launch of the 'India Digital Ecosystem for Agriculture ' (IDEA) program by the government, the entire outlook towards the agriculture system has switched from being opaque to transparent. The emergence of several new-age start-ups is further contributing to establishing a culture of traceability and transparency. Most of these companies are attracting investments worth 2 billion USD, thereby reinstating the fact that this trend is here to stay.

Strengthening the technology ecosystem for agriculture in India

(India Today)

Fasal is an agri startup that has helped farmer Sangarmesh Talikotti to install sensors and cameras in his 2.5-acre tomato farm. The startup's Bengaluru-based artificial intelligence-driven platform regularly relays information to Talikotti's smartphone on quantum of irrigation needs, risk of pest attack and use of pesticides. Data collected through readings is converted through 'Internet of Things' (IoT) into precise actionable intelligence. On the other hand, AgNext is a Chandigarh-based startup that uses computer-based vision for effective post-harvest quality inspection of crops to substitute visual inspection. Startups such as Ninjacart, Crofarm and KrishiHub are procuring fruits/vegetables directly from farmers and selling to retailers. They use myriad technologies to keep their target farmers abreast of quantum of demand and current prices coupled with optimised logistics and online payments.

The case for agrivoltaics in India

(PV Magazine)

Agrivoltaics could become an important new renewable energy segment in India if a proper policy framework is put into place, according to a new report from the Institute for Energy Economics and Financial Analysis (IEEFA). For the agrivoltaics sector to thrive, measures to safeguard farming communities and agricultural production should be a key part of the policy and regulatory reforms

that the sector needs, says report author and IEEFA guest contributor Dr. Charles Worringham. Agrivoltaics refers to the combination of farming with solar generation in ways that maintain agricultural productivity. About 60% of India's land area is farmed, so agrivoltaics are theoretically better placed in India than in most other countries.

Top 6 Innovations in Technology That Can Improve The Effectiveness of Agriculture Industry
(Krishi Jagran)
The Indian agriculture industry has performed quite well during the pressing times of Covid 19 pandemic, in fact, it would not be unfair to say that the Indian agriculture industry was the saviour of the Indian economy during the pandemic. However, like any other field, the Indian Agri industry needs to evolve and keep up with the times so listed below are six of the latest innovations in the field of agriculture that farmers can take advantage of in the coming days.

Loan program takes aim at challenges facing America's food supply chain
(CBS19 News)
The U.S. Department of Agriculture has launched a program to back private investment in processing and food supply infrastructure. Secretary Tom Vilsack recently announced the USDA is deploying $100 million under the Food Supply Chain Guaranteed Loan Program to make nearly $1 billion in loan guarantees available. These funds will help strengthen the food supply chain for Americans across the country. The money is coming from the American Rescue Plan Act and is part of federal efforts to address food system challenges that have existed for decades and were exacerbated by the COVID-19 pandemic.

Africa's Most Populous Country Set To Boost Agriculture
(New Business Ethiopia)
With the objective of impacting the lives of millions of people in Africa's most populous country, the African Development Bank's Board of Directors approved a $210 million loan to the Government of Nigeria. The loan will co-finance Phase 1 of the Nigeria Special Agro-Industrial Processing Zone Program. The program will help to unlock Nigeria's agriculture sector potential. It will promote industrialization through the development of strategic crops and livestock. African Development Bank financing for this program represents one of the Bank's most ambitious operations in terms of scale and scope to date. It is made up of an African Development Bank loan of $160 million and an Africa Growing Together Fund loan of $50 million. Phase 1 of the project will target seven Nigerian states and the country's Federal Capital Territory.

Contract farming in Africa in talks, again
(TBS News)
After almost a decade of only forming task forces and holding inter-ministerial meetings on the prospects of contract farming in Africa, the foreign ministry now seems to take the lead in a fresh drive to make it a reality and reach land lease agreements with at least two African countries. The agriculture ministry and the foreign ministry have agreed to initially select two from African countries where Bangladeshi peacekeepers are deployed. Bangladeshi peacekeepers are currently deployed in eight countries including DR Congo, Lebanon, South Sudan, Sudan (Darfur), Western Sahara, Mali, Central African Republic. Farming in Africa can prove to be instrumental in not only achieving food security, but also generating employment opportunities for 40-50 lakh people, at a time when Bangladesh has seen a decline in manpower exports to the Middle East.

Three steps stakeholders can take to advance digital agriculture in Africa
(Farmers Review Africa)
A study by Boston Consulting Group that assesses the use of digital technology in agriculture in fourteen geographies across sub-Saharan Africa and South Asia, identifies three insights that many governments and private and social sector players fail to fully appreciate and provides ways forward for these stakeholders. The use of digital technologies in agriculture has the potential to transform Africa's food systems to deliver better livelihoods for farmers, high quality and more consistent ingredients for processors and healthy and sustainable diets for consumers. Yet few digital agriculture solutions have reached scale.

5 Key Issues in Agriculture in 2021

(The World Bank)

Like the previous year, news in agriculture and food in 2021 was dominated by deteriorating food security. Approximately 30 percent of the world's population lacked access to adequate food in 2020 and into 2021. The World Bank took action to fight food insecurity around the world, providing immediate aid to vulnerable households and more long-term support to farmers in the form of seeds, fertilizer, and other agricultural inputs. COVID-19 also pushed more people into poverty and made the poor poorer around the world. This, along with supply chain interruptions and rising prices had a major impact on hunger.

Zimbabwe's climate migration is a sign of what's to come

(MIT Technology Review)

In Zimbabwe, farmers who have tried to stay put and adapt by harvesting rainwater or changing what they grow have found their efforts woefully inadequate in the face of new weather extremes. Droughts have already forced tens of thousands from the country's lowlands to the Eastern Highlands. But their desperate moves are creating new competition for water in the region, and tensions may soon boil over.

Digital Transformation in Africa Requires Homegrown Solutions

(Harvard Business Review)

Africa's digital transformation is underway, and it's creating opportunities for transformational change across all economic sectors. While sub-Saharan Africa is still behind the rest of the world in terms of internet penetration, the gap is quickly closing: Since the early 2000s, the population of internet users in Africa grown has tenfold, as compared to a threefold increase in the rest of the world, according to the International Monetary Fund. From financial services to power and agriculture, digital technology is being leveraged to deliver greater access and usher in the "future of everything" on the continent.

UK, Australia sign deal forecast to create £10 billion extra trade

(CNA)

Britain and Australia signed a deal projected to eventually boost bilateral trade by over £10 billion, eliminating tariffs, opening up sectors like agriculture and allowing freer movement for service-sector professionals. Analysis drawn up by Britain and independently vetted said it would boost the economy by £2.3 billion (US$3.07 billion) per year and unlock £10.4 billion of imports and exports by 2035. Total goods and services trade between Britain and Australia was worth £14.5 billion in the year to June 2021, with Australia ranked Britain's 21st-largest trade partner and accounting for 1.2 per cent of total British trade.

Why a data exchange could be "critical" to growing Australian agri-food exports

(IT News)

The potential benefits of data-driven agriculture are significant. As far back as 2016 the Australian Farm Institute's report The Implications of Digital Agriculture and Big Data for Australian Agriculture found the use of digital agriculture to implement more intensive and data-driven farm management could produce gains of between 10 percent to 15 percent in cropping systems alone. Benefits such as these are in the sights of CSIRO's Digital Agriculture initiative through projects such as its grain industry forecasting platform Graincast, or its partnership with the commercial organisation Ceres Tag to improve the management of animals and land in the grazing sector. Data can also play a vital role in establishing the provenance of agricultural products, including their biosecurity and sustainability credentials, and ensuring this knowledge is carried from paddock to plate. But to date the uptake of data-driven practices across the Australian agricultural sector has been patchy at best.

New Research

New models needed for food system transformation

(Phys.org)

According to a paper titled "Enacting theories of change for food systems transformation under climate change," published in Global Food Security, food systems are responsible for a third of global greenhouse gas emissions from human activity, and agricultural yields are at risk due to climate change impacts. And yet, there is not a clear picture of the different elements of the agricultural research and food production ecosystem. To help address this, the paper's authors implemented a survey of 262 attendees of the 2019 Global Science Conference on Climate-Smart Agriculture (CSA) in Bali, Indonesia, across researchers, funders and end-users, to assess the key leverage points needed to address to radically shift the food system to a new place.

'Near impossible' plant-growing technique could revolutionise farming
(New Scientist)
A new technique for grafting plants could increase production and eliminate diseases for some of the world's most imperilled crops, such as bananas and date palms. Plant grafting, where the root of one plant is attached to the shoot of another, has been used in agriculture for thousands of years to improve crop growth and eradicate diseases, in plants such as apples and citrus fruits. But this technique wasn't thought to work for a major group of plants: the monocotyledons (or monocots). This group includes all grasses like wheat and oats, as well as other high-value crops like bananas and date palms. These plants lack a tissue called vascular cambium, which helps grafts heal and fuse in many other plants. Now, Julian Hibberd at the University of Cambridge and his colleagues have found an approach that allows monocots to be grafted. They extracted a form of embryonic plant tissue from inside a monocot plant seed and applied it to the potential graft site between two monocot specimens belonging to the same species – wheat, for instance. The tissue stimulated growth and fused the two plant halves together. The research team used fluorescent dyes to verify that the root and shoots had fused and could transport liquids and nutrients up and down the stem.

New generation of on-farm experiments can transform agriculture
(FE News)
A new study, which reports on experiments involving more than 30,000 farms across eight countries, was carried out by an international team including Professor MacMillan and UK colleagues at the University of Gloucestershire and the independent agricultural consultants ADAS. The experiments follow the principles of On-Farm Experimentation (OFE), a newly defined approach to answer farmers' questions on working farms. Published in Nature Food, the paper sets out the principles of OFE, making the case that they can transform farming by massively boosting the impact of agricultural research. The principles include taking a farmer-centred approach, experimenting on real farms rather than research sites, and being data-driven.

CSIR-SARI introduces new varieties of Frafra potato to farmers in Northern Ghana
(Potato Pro)
The Savannah Agriculture Research Institute of the Council for Scientific and Industrial Research [CSIR – SARI] has introduced new varieties of the 'Frafra' potato crop to farmers in the Talensi and Nabdam districts of the Upper East Region, Northern Ghana. Frafra Potato (Solenostemon rotundifolius Poir. not a regular potato, nor a sweet potato) is a potato-like crop commonly cultivated in Northern Ghana for food and is popular for its nice aroma when cooked. Since the year 2018, the CSIR – SARI has worked to develop improved varieties of the crop to help farmers produce it in larger quantities due to its potential to help solve the problem of food insecurity in some parts of the north. The Frafra Potato is commonly called Pee'ha or Pee'sah in the Frafra and Kusasi areas of the Upper East Region. The size of the Frafra Potato is not like that of regular potatoes. They are just about the size of the fingers of an average adult human or slightly bigger than that.

Two significant studies point the way forward for agriculture in Tanzania
(The Citizen)
Evidence generated by the two studies will play a pivotal part in informing planning and decision making to improve systems for accelerating agriculture's efficiency and performance in Tanzania, said Mr Vianey Rweyendela, AGRA Country Manager. The ASR 2017/2018 – 2020/2021 notes that the agricultural sector made notable performance during the review period. Dr Mushi said that there is improved provision and utilization of farm inputs and services, crop production is generally increasing

for both food and cash crops with set targets for 2020 nearly or fully met. He added that the country's regulatory, institutional, and programmatic framework for agriculture is strong, well-aligned with the national vision and direction. However, significant challenges remain, such as inadequate availability of resources to effectively implement ASDP II, low productivity levels, failure to reach performance targets in agricultural trade, among others. Mr Selemani Omari, the lead consultant for AgPER said that the total agricultural budget allocations between 2017/18 and 2019/20 were higher than Sh585.2 billion for FY 2015/16. He noted that despite the increased allocation, the government expenditure on agriculture has remained low at 2.9 percent of the government budget and the country is yet to meet the CAADP target of allocating at least 10 per cent of the government budget to agriculture.

***