

# AgroSpectrum

Envisaging Future Updating Present

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**“AGRI in 2030”**

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## Taming the AI Bull

**T**his issue of AgroSpectrum will be an endeavour in foretelling what Indian agriculture will be like in 2030. While we don't exactly have a Crystal Ball, we have expert writers who will paint a pretty good picture of what is to come. When one considers the farm operations 10 years ahead from now, it is essential to understand the role Artificial Intelligence (AI) is likely to play in agriculture. Several market reports indicate an increasing upsurge in deployment of AI in agriculture the world over.

Markets & Markets has predicted that expenditure on AI technologies and solutions in agri will grow from \$1 billion in 2020 at a very high Compound Annual Growth Rate (CAGR) of 25.5 per cent, to \$4 billion by 2026. PricewaterhouseCoopers (PWC) has predicted that Internet of Things (IoT) enabled agricultural monitoring is the fastest-growing technology segment projected to reach \$4.5 billion by 2025. It is estimated that by 2050, the global population will increase by 2 billion, increasing the food demand by 60 to 70 per cent. Thus, the agriculture of the near future will have two important tasks, enhancing the quantity and quality. Such a giant leap in food grain production is possible only with the help of precise data of various agriculture related factors – from land to rainfall – and widespread mechanisation of farming activities. This is most essential in order to avoid wastage caused by failure of crops due to unseasonal rains or any other sudden unseasonal extreme changes in the weather. Climate change has already added and will continue to add severely to these weather-related challenges. But that would not be affordable when enormous quantities of food grains are needed.

Such challenges could be addressed effectively with technologies like AI and Machine Learning (ML). Besides the precise weather forecast, AI can aid in pest control, soil and crop health monitoring, and improving a host of other tasks, including water management, crop rotation, timely harvesting, optimum planting, and logistics of inputs and marketing of products.

Different companies have developed various AI-based applications to do soil analysis and identify the nutrient deficiencies in soil, guiding farmers on which fertilisers to be used for improving quality of the farm produce and soil restoration. AI, ML and the IoT together, will be helpful in minimising the impact of climate change and other factors. They can process data in real time creating a knowledge bank for farmers to improve agri efficiencies and yields. The Government of India had signed a MoU with IBM in 2019 to deploy AI in farming and IBM had started some pilot studies also. Despite the great benefits, when it comes to adopting AI in agriculture in India, one will have to be very cautious. It is not that we don't want more food grains, improved quality or our farmers to be equipped with more information and knowledge that will help them.

Till AI provides information to farmers on various parameters as per its great potential, it is fine. However, one of the applications of AI is agri-robots. Robots will work faster and with precision, but eventually, they might replace labourers. In India, about 60 per cent of the population is directly or indirectly dependent upon agriculture. Most of them are unskilled in other areas like industry. Robots will surely take away their only source of income. Sharad Pawar, in his capacity as minister of agriculture in 2007, had stressed the need for fewer people depending upon agriculture, as more number of people are dependent on fragmented pieces of land. Robots in agriculture will make this happen. But, the question remains, how will those dependent on agriculture earn their livelihood? Thus, introducing AI in agriculture will have to be a very cautious process. The government will have to carefully assess which areas of AI will be beneficial without affecting job generation. While AI-enabled tech and robots could become the next big game changer in agriculture, countless workers and families would have to face unemployment and penury. **AS**

**Dr. Milind Kokje,**

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**Subhas Bhattacharjee,** Director, North East Food Park informs about opportunities in agri-food processing in North-East region



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**Sanjeev Gupta,** Director, AFTPAI speaks about the status of food processing industry in India



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## Feedback

### Good information on organic certification

The article by K K Krishnamurthi on 'Challenges in certification process of organic products' published in April 2021 issue is very informative. It highlights grass root level problems of organic farming industry. Thanks AgroSpectrum for publishing this informative article.

**Kedar Panhalkar,** Pune

### Overall informative and useful issue

April 2021 issue has covered all the aspects of organic farming industry such as importance of soil condition in organic farming, inputs required for the growth of organic farming industry, certification process and global scenario of organic farming industry. Overall informative and useful issue on organic farming industry.

**Samali Mukherjee,** Nagpur

### Cover bee keeping industry

AgroSpectrum should publish one issue on bee keeping industry since it is agri-allied industry. It will be helpful for budding entrepreneurs and small scale farmers involved in bee keeping to know about the latest technologies and information of government schemes for this sector.

**Tanuj Hardikar,** Mumbai





## Tomar launches 'Madhukranti' portal for traceability of honey

Union Minister for Agriculture and Farmers' Welfare Narendra Singh Tomar launched "Madhukranti" and Honey Corners of NAFED New Delhi. 'Madhukranti' is an initiative of National Bee Board (NBB), Ministry of Agriculture and Farmers Welfare under National Beekeeping & Honey Mission (NBHM). This portal is being developed for online registration to achieve traceability source of honey and other beehive products on a digital platform. The technical and banking partner for development of this digital platform is Indian Bank. MoU between NBB and Indian Bank was signed for this project. Necessary functionalities are being developed on the portal to create a database of all stakeholders involved in honey and other hive products' production, sales and marketing chain. On-line registration of beekeepers is being launched in first phase, followed by registration of other stakeholders in honey trade. All sales transactions in honey trading in country shall be captured through a mobile app in second phase to achieve desired results in the area of honey source traceability.

## Ag Ministry ropes in Leads Connect Services for CCE project

Department of Agriculture, Cooperation & Farmers' Welfare, Ministry of Agriculture has appointed Leads Connect Services Private Limited, a Noida based Agri-tech Company, along with two other independent private agencies, to conduct the Crop Cutting Experiments (CCE) in 100 districts across India. This is a part of Government of India's flagship scheme, Pradhan Mantri Fasal Bima Yojana (PMFBY) under which the agency will be conducting large-scale pilot studies for technology-based Gram-Panchayat level yield estimates. Leads



Connect, with its cutting-edge technologies such as Remote Sensing and GIS, artificial intelligence (AI) and data analytics frameworks, will co-observe the CCEs conducted by state Government for PMFBY. In addition to this, Leads Connect will conduct few additional CCEs for wheat in various districts of Uttar Pradesh, Madhya Pradesh, and Rajasthan, covering Gram Panchayats in 25 districts across these states.

## Spices Board, UNDP ink MoU to enhance transparency in supply chain

Spices Board India, under the Ministry of Commerce and Industry and UNDP India's Accelerator Lab signed a Memorandum of Understanding (MoU), with the aim to build a blockchain based traceability interface for Indian spices to enhance transparency in supply chain and trade. This traceability interface is expected to enhance consumer confidence and facilitate sourcing of spices for exports as well as for local value addition and use. Upon successful demonstration, the Board would like to expand the reach of this interface to cover all major spices and regions of the country, and expects to have continuous partnership and support from the UNDP. Design of the Block chain interface is expected to be completed by May'21. The project will be piloted with over 3,000 farmers engaged in chilli and turmeric farming in select Districts of Andhra Pradesh.





## Centre, Microsoft India announce pilot project to develop farmers' interface

Union Ministry of Agriculture and Microsoft India has recently inked a Memorandum of Understanding (MoU) for a pilot project in 100 villages of 6 states. Microsoft has come forward to start a pilot project in selected 100 villages in 10 districts of 6 states (Uttar Pradesh, Madhya Pradesh, Gujarat, Haryana, Rajasthan and Andhra Pradesh) to develop a farmer interface for smart and well-organised agriculture, including post-harvest management and distribution. For this project, Microsoft has joined in with its local partner, CropData. In this regard, a MoU and tripartite agreement have been exchanged in the presence of Cabinet Minister Tomar and the two Ministers of State. This project will carry out various tasks for the betterment of farmers in the selected 100 villages, which will enhance their income. This project will reduce the input costs for farmers and make farming easy.

## India holds national dialogue on UN Food Systems Summit 2021

The United Nations Secretary-General has called for the first-ever UN Food Systems Summit to be held in September 2021 to strategise the actions for positive change in Agri-food systems in the World to realize the vision of the 2030 Agenda for Sustainable Development. The Summit will focus on levers and pathways to shape food systems nationally and globally to accelerate progress in the SDGs. The Summit 2021 is planned to be essentially participatory and consultative and needs the game changing ideas from the experiences through the National, Sub-national (State) and independent consultation



for the five Action Tracks related to safe and nutritious food, sustainable consumption patterns, nature-positive production, advance equitable livelihoods, and resilience to vulnerabilities, shocks and stress. The first National Level Dialogue on Agri-Food Systems-Advancing Equitable Livelihoods has been conducted on April 12, 2021. The day long deliberations were attended by farmers' organisations, farmer producer organisations, civil society organisations, research institutions & experts and the government agencies.

## APEDA organizes virtual BSM with Nepal

In a bid to strengthen the foot-print of India's agricultural and processed food products export to Nepal, APEDA organized a virtual Buyer Seller Meet (BSM) in association with Indian Embassy, Kathmandu. The BSM aims to discuss the strategic cooperation in the field of agriculture and allied sector. The BSM with Nepal is the seventeenth in the series of such virtual meets organized by APEDA in last few months. The focus of BSMs have been to engage

with all potential countries for providing a platform to connect exporters and importers in the agriculture and allied sectors. Since the COVID-19 pandemic, there was a shift of focus towards India and neighbouring trade partners creating new opportunities for alliance between various countries. Since the two countries enjoy a long-term association, India continued to ensure the food and nutrition supplies to Nepal during the COVID-19 difficult times.



## ReshaMandi raises \$1.7M in seed funding

ReshaMandi, an agritech startup digitizing India's silk supply chain, announced that it has raised \$1.7 million (Rs 12.25 crore) in seed funding. The round was led by Omnivore and Strive Ventures with participation from Axilor Ventures and Supply Chain Labs (Lumis). ReshaMandi is building a full-stack platform for organizing the silk supply chain, providing services including quality testing, technical advisory, high-quality inputs, and market linkages at each node of the silk supply chain. ReshaMandi's vision is to build traceability "from farm to fashion" by organizing the silk ecosystem comprising silkworm rearers, sericulture farmers, yarn reelers, fabric weavers, and retailers. For sericulture farmers, the startup provides farm & rearing advisory (via mobile app) and high-quality inputs to produce premium cocoons. It also provides an IoT system that is installed on farms to measure temperature, humidity, light and air quality in order to reduce silkworm mortality & improve percentage of produce.

## Agri-food industry contributes \$717B+ to Southeast Asian economy: Oxford Economics

Southeast Asia's agri-food remains critical to the region's economy and plays a pivotal role in its future economic development, having demonstrated its resilience in challenging circumstances in 2020. The sector can be a key driver of the region's economic recovery, but supply and demand risks, fiscal policy risks and a drawn-out pandemic could disrupt post COVID-19 recovery, according to a report by Oxford Economics. The Economic Impact of the Agri-Food Sector in South East Asia report highlighted that the agri-food sector's role in driving Southeast Asia's economic recovery, creating employment and putting food on the table at stable prices, is pivotal. The report investigated the sector's economic impact across four Southeast Asian countries – Indonesia, Thailand, the Philippines, and Vietnam. Reviewing five

years of economic activity, it presents key insights on where and how the sector adds value to these economies, its future trajectory, and challenges faced going forward.



## NCDC secures Rs 600 Cr loan from Deutsche Bank

The National Cooperative Development Corporation (NCDC) has secured Rs 600 crore loan from Deutsche Bank, Germany's largest bank, for onward lending to cooperatives in the country. An agreement was inked between NCDC and the German Bank in presence of the Union Agriculture Minister, Narendra Singh Tomar in New Delhi. Farmer Producer Organizations being set up in the country would be able to access easier credit and market through the NCDC agreements with ICC and Deutsche Bank. This will help small and marginal farmers. This is for the first time that one of the largest European banks in the world is lending to the NCDC, thus reflecting the confidence of the global financial institution in the Indian development finance institution, particularly at a time when global economic turmoil created by the COVID-19 crisis has made lending a challenging proposition.



## ADAMA expects record-high Q1 sales with 13% growth

ADAMA Ltd. has provided an estimate regarding its financial performance for the first quarter of 2021. ADAMA is expecting to report record-high first quarter sales, with estimated top-line growth of more than 13 per cent (6 per cent in RMB terms), driven by continued robust volume growth in almost all key regions. The company is expecting to record strong growth in Asia Pacific, both in China and beyond. In China, ADAMA saw significant growth in the quarter both from its branded, formulated portfolio, which was driven by higher cereal demand due to an increase in field crop planted areas and an early start to the Q2 season, as well as from its sales of raw materials and intermediates. Sales in the country were further bolstered by the inclusion of the company's recent acquisition of Jiangsu Huifeng's domestic commercial crop protection business.

## Centre procures wheat from 6 lakh+ farmers from 11 states at MSP

Shudhanshu Pandey, Secretary, Department of Food & Public Distribution, has recently updated on the status of Wheat Procurement in Rabi Marketing Season 2021-22. In his address, the Secretary said that the Government of India is committed to purchase the wheat at MSP and to ensure that payments are made directly into the accounts of the farmers. He further added that until now, 6, 60,593 farmers from 11 states have benefited. Pandey informed that the Rabi season 2021-22 has already started in the States of MP and Rajasthan from March 15 in Haryana & Delhi from April 1, in Punjab from April 10, and in Bihar, from April 20, 2021. He briefed that during the current RMS (2021-22), so far, Government has procured 64.7 LMT of wheat worth Rs 12,800 crore at MSP of Rs 1,975 per quintal, against an estimated target of 427 LMT this year.



## HURL gets Rs 813.24 Cr interest free loan for projects completion

Union Minister for Chemicals and Fertilizers D. V. Sadananda Gowda has handed over the cheque of Rs 813.24 crore out of total amount of Rs 1257.82 crore to Arun Kumar Gupta, MD, Hindustan Urvarak & Rasayan Ltd (HURL) in respect of Interest Free Loan to HURL for the revival of Gorakhpur, Sindri & Barauni projects. HURL operates environment-friendly and energy-efficient Natural Gas based new Fertiliser Complexes, spurring economic growth in eastern India. The operationalization of above three plants, will reduce the import dependency on urea by 38.1 LMT per annum and it will save huge forex to the Exchequer. The capacity of each plant would be 12.7 LMT per annum. HURL projects



will create huge opportunities of direct and indirect employment. The Gorakhpur, Barurani & Sindri projects have achieved 89 per cent, 85.1 per cent and 86.1 per cent progress as on February 28, 2021. Once these projects are commissioned, it would increase company's domestic capacity, and further self-reliance in urea production.

## Govt launches e-marketplace platform e-SANTA

Piyush Goyal, Union Commerce and Industry Minister, has virtually inaugurated e-SANTA, an electronic marketplace providing a platform to connect aqua farmers and the buyers. It will enable the farmers to get a better price and the exporters to directly purchase quality products from the farmers enhancing traceability, a key factor in international trade. The term e-SANTA was coined for the web portal, meaning Electronic Solution for Augmenting NaCSA farmers' Trade in Aquaculture. National Centre for Sustainable



Aquaculture (NaCSA) is an extension arm of Marine Products Export Development Authority (MPEDA), Government of India, Ministry of Commerce & Industry. e-SANTA is a digital bridge to end the market divide and will act as an alternative marketing tool between farmers and buyers by eliminating middlemen.

It will revolutionize traditional aquafarming by providing cashless, contactless and paperless electronic trade platform between farmers and exporters.

## Aquaconnect, Alliance jointly launches an insurance program for shrimp farmers

The aquaculture tech pioneer Aquaconnect has partnered with India's leading insurance service providers Alliance Insurance Brokers (Alliance) for an insurance program for shrimp farmers. After loan benefit, this is the next step towards the company's vision to strengthen the financial inclusion of shrimp farmers. This partnership will benefit 1.5 lakh shrimp farmers across India. Under this partnership, Aquaconnect will provide risk management services to the insurance partners, which include farm data collection, ground validation by aquaculture officers and AquaCRED dashboard support. The partnership aims at making comprehensive insurance available for shrimp farmers to mitigate weather and disease-

related challenges. In addition to this, farmers will also get an Aquaconnect farm advisory app and options to buy high-quality inputs (feed, healthcare products & farm equipment) from the Aquaconnect platform.



## Nandu's forays into fish, seafood retail

Bengaluru-based Nandu's has announced its expansion into fish and seafood retail. The company has added fish and seafood to its category of offerings, across all its sales channels. Currently, Nandu's caters to its ever-growing consumer base through 50+ outlets across Bengaluru as well as their own e-commerce website, app, call centre and online marketplaces. Company mentioned that there is an immense market opportunity in the fish and seafood retail sector. Buying fish is an underserved retail experience in India. With our foray into this segment, Nandu's vision is to become India's favourite neighbourhood meat and fish brand, across online and offline retail channels. Having seen phenomenal growth, of close to 200 per cent, in FY20-21, we are now open to private investments as we plan to launch operations in strategic markets, such as Hyderabad, Chennai, Mumbai, Pune, Delhi, and Kerala, in the coming years. The pan-India target is 600 Nandu's stores by 2025.





## NDDB unveils Dairy Surveyor app for dairy cooperatives

In line with the Government of India's vision of Digital India, National Dairy Development Board (NDDB) has developed "Dairy Surveyor" - a GIS-enabled android application for the benefit of dairy cooperatives and producers-owned organizations. Dairy Surveyor application will provide a robust locational database that can be used by the policymakers to formulate or review effective policies & programmes related to the dairy sector. It can capture "real-time" location-based information to strengthen decision-making. The app is capable of geotagging and mapping infrastructure, real-time tracking of field projects, monitoring milk procurement and sale-related activities. It will bring in transparency and also help in saving time, effort and cost. NDDB is constantly working to ensure information sharing and get a diverse set of experts on digital platforms to delve on developments in the dairy sector.

## Parag Milk to raise funds from Sixth Sense Ventures, IFC

Parag Milk Foods has announced that it plans to raise a total of Rs 316 crore by preferential allotment of equity shares, foreign currency convertible bonds (FCCBs) and other instruments from IFC and Sixth Sense Venture Advisors and promoters. IFC and Sixth Sense Venture Advisors will invest Rs 155 crore and Rs 50 crore, respectively. Promoter and family will further invest Rs 111 crore, maintaining the promoter stake at 46 per cent, Parag Milk Foods mentioned in a regulatory filing. The company mentioned that the fundraise is subject to shareholder's approval in the ensuing extraordinary general meeting scheduled on April 26, 2021, as well as regulatory approvals. International Finance Corporation (IFC) is proposing an investment of up to Rs 155 crore by way of subscription to the preferential issue of equity shares and subscription of FCCBs in addition to a proposed subscription to NCDs of Rs 150 crore committed in December.

## NMPB, DAHD to conduct research on Ayurvedic drugs for veterinary use

A Memorandum of Understanding (MoU) was signed between the National Medicinal Plants Board (NMPB), Ministry of AYUSH and Department of Animal Husbandry and Dairying (DAHD), for research on new formulations in quality drugs for veterinary science through medicinal herbs. The initiative involves capacity building in related areas through training, exploring marketing possibilities for herbal veterinary medicines on a sustainable basis and providing for services including cultivation, preservation and conservation of medicinal plants. The DAHD will create awareness with support of NDDB among dairy farmers and agro-farmers about utilization and importance of herbal veterinary medicine and cultivation of medicinal herbs, develop course curriculum for Ayurveda



and its allied subjects in veterinary medicine, identify list of priority livestock and poultry diseases of economic importance with respect to research activity or application of veterinary Ayurveda and allied streams, support farmers for undertaking cultivation and conservation of medicinal plants.

## Gramophone introduces Vyapar to connect farmers with market

Indore-based agritech startup Gramophone has introduced a trading module 'Vyapar' to its farm management platform. It will help farmers connect with buyers and sell their produce directly. Gramophone currently operates mainly in Madhya Pradesh and Rajasthan, where over seven lakh farmers are using the farm management platform for crop advisory and purchase of inputs. The Gramophone platform provides customised crop advisory to farmers right from sowing of the crop to the harvest through its mobile app and also through the call centre, Khan said. Farmers are provided agronomy advice and updates on weather, market price and also on pests and diseases.



Gramophone currently works with companies such as Godrej Agrovet and Dhanuka on the crop protection side and with seed companies such as Rasi and Nunheims among others. Now, by adding the Vyapar module to its platform, Gramophone is enabling farmers to market their produce.

### FarmERP secures 2nd place in Asia AgriTech Challenge



Pune based agritech company FarmERP, has secured second place in the Asia AgriTech Challenge, organised by the Value Chain Capacity Network. The Regional Value Chain Capacity Building Network

(VCB-N) provides professional advisory services and capacity building on Value Chain and Market System Development (VC&MSD) in Asia and the Pacific Region (APR). The Asia AgriTech Challenge coordinated by the VCB-N is a global honour that targets advancing innovations in the utilization of ICT along the value chains and gives fruitful developments in a platform to exhibit their products. The Asia AgriTech Challenge furnishes a stage to connect with like-minded individuals with openness to cutting-edge agri-tech advancements. FarmERP, has secured second place in the 'IT Innovation in support of VC supply-demand arrangements/marketing' category. Along with this, they have also been awarded a cash prize of \$2000.

## CropIn expands its network in Europe

CropIn, a leading AI and data-led Agtech organization, has recently announced the opening of its first international office in Amsterdam. As part of its expansion plans, CropIn is looking forward to setting up its team in Amsterdam, it will also be establishing Customer Success, Sales and Data Science verticals. The business expansion plan includes fostering channel partnerships with local companies with an aim to cater to existing customer segments while focusing on offering solutions to new segments like Telecom, Farm Machinery and Plantation. CropIn's AI capabilities will be boosted by continued strengthening of their machine learning based predictive analytics platform, SmartRisk. As the industry pioneer, CropIn aims to empower farmers and agribusinesses with real-time data for better decision-making and improved farm productivity. Through the Amsterdam office, CropIn comes one step closer to its aim of impacting a large number of farmers.



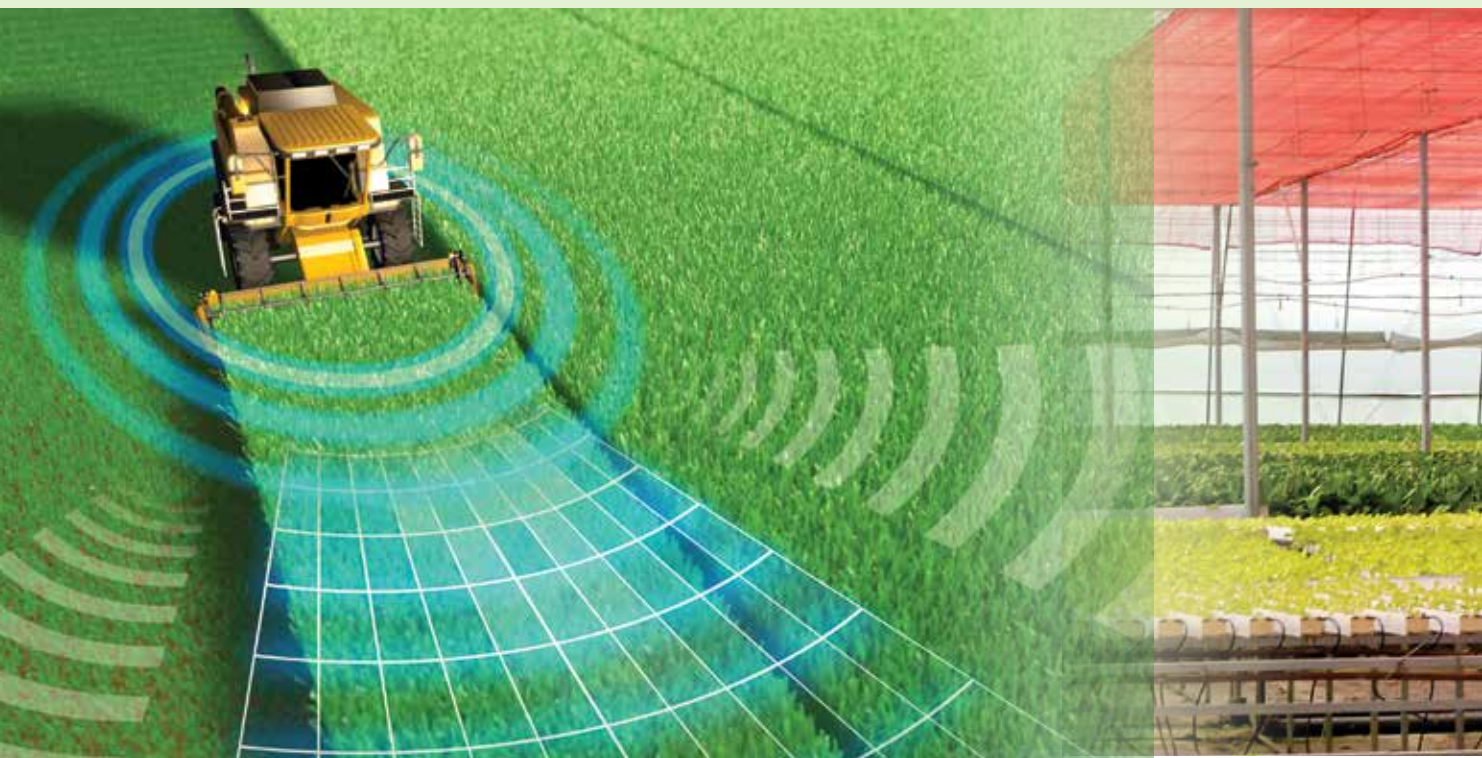
# Next frontiers of knowledge to define Agriculture of the future

**A**griculture is an important sector of the Indian economy. Covering 11.24 per cent of the world's arable land area and 4 per cent of the world's renewable water resources, India produces sufficient food, feed and fibre to sustain about 18 per cent (1.38 billion) of the world's population (as of 2020). Over the last few decades (1980/81-2019/20), the sector has registered an average annual growth of 3.2 per cent – almost double the population growth of 1.7 per cent per annum during the same period. As a result, it has turned India from a food deficit country to one with a net trade surplus of 3.7 per cent of agri-gross domestic product (GDP) in 2018-19. Agriculture contributes about 16.5 per cent to the country's overall GDP, and employs nearly 42.3 per cent of the country's workforce (2019/-20), with an average holding size of just

1.08 hectares (2015/16).

According to the working group report by NITI Aayog, 2018, India will have sufficient supply of food grains towards 2032/33 and beyond. However, there will be a marginal deficit of around 5-7 million tonnes of pulses and coarse cereals. In addition, given that the indirect demand of coarse grains as feed for the growing livestock and poultry sector is likely to increase at a rapid pace, chronic shortage of feed and fodder is also expected. Moreover, in the case of oilseeds, the situation looks grim as the country is going to face a massive deficit of around 40 million tonnes. In other commodities such as milk, meat, fruits and vegetables, there appears to be a reasonable balance between demand and supply in the years to come.

Agriculture in India has witnessed an





impressive growth trajectory, taking the country from a food deficit one during the 1960s to a marginally food surplus one. With food grain production at 292 MMT in 2019/20, India has not only emerged as the largest exporter of rice, but also a net exporter of agriculture produce. This breakthrough transformation has been the result of rapid development and adoption of modern technologies, investment, infrastructure (including irrigation, markets and roads) and institutions (land, water, mechanisation, extension services and agricultural credit). Notwithstanding the economic success, the sector today is at a crossroads with numerous opportunities as well as concerns.

On the one hand, the sector has grown and diversified, while, on the other, its contribution to the overall GDP has declined to 16.5 per cent even as it still employs almost 42.3 per cent of the total workforce. Moreover, despite India having achieved food sufficiency in agricultural production, there are still 176 million people living under the poverty level and over 194.4 million are undernourished. Furthermore, a growing population and the pressure of urbanisation is squeezing agricultural land for cultivation and affecting the quality of soil and air as well as quantity of water.

In order to meet these emerging challenges and to formulate food and agricultural policies,

Dr Ashok Gulati, Infosys Chair Professor for Agriculture, Indian Council for Research on International Economic Relations (ICRIER) and Ritika Juneja, Consultant, ICRIER in a paper presented on 'Transforming Indian Agriculture' at the 'INDIAN AGRICULTURE TOWARDS 2030' pointed out that it is important to focus on the role of 3 Is - Innovations, Incentives and Institutions that could help to produce more, diversified and nutritious food economically, and in an environmentally and financially sustainable way. Some of these potential innovations are already on the table, ready to be scaled up for higher efficiency, while others are unfolding.

**Innovations:** The major innovations in production technologies that can significantly impact overall productivity and production in India include - Climate resilient seeds and Protected and sustainable agriculture.

**Incentives:** Policies play a key role in shaping the incentive structure for farmers. These incentives not only contribute to economic development but also encourage farmers to adopt new technology and augment production. Direct income/cash transfer and Incentive for water and energy conservation are among the innovative policy examples.

**Institutions:** Representing the 'rules of the game', institutions enable a given system to function. For innovations in technologies



### Science, technology and innovation

Science, technology and innovation (STI), targeted to solve both generic and location-specific challenges, are key drivers for transforming agri-food systems. These can transform sustenance based, low return livelihoods to profitable and respectable occupations for smallholder farmers, while motivating, attracting and empowering youth and women in agriculture. A paradigm shift is needed to: i) increase productivity, profitability, inclusiveness and efficiency of human engagement, ii) achieve complete nutrition security, iii) address the challenges of climate change, iv) adopt environment-friendly sustainable practices, and v) establish efficient farmer-market linkages.

To achieve the desired goals, the effective pathways include: i) scaling innovations by combining Indigenous Technical Knowledge (ITK), conventional methods, and adopting NextGen cutting edge technologies evolved nationally or internationally, ii) enduring STI through a Gold Class education system, and iii) leveraging strong public-private partnerships. There is a need for an increased investments in R&D, the urgent need for an enabling policy environment for scaling innovations, and clear transformative action points.

Source: [www.fao.org](http://www.fao.org)

and incentives to be effective, a sector needs a supportive and enabling institutional environment. These institutions govern the access of key inputs and help in the development of a profitable and sustainable agriculture. The government plays an important role in setting up formal institutions, including agriculture-related laws and regulations, international trade agreements, food quality standards, and land and water property rights. Innovation in institutions are required for farmers to have better access and manage agricultural land, water, extension services and mechanisation at different stages of crop development and in a manner that is efficient, transparent, inclusive and sustainable.

Last but not the least, the national network of agricultural extension plays a critical role in enabling a system of sharing knowledge, information, technology, policy and farm management practices all along the value chain, in order to enable farmers to realise a remunerative income on a sustainable basis. As smallholders already face numerous and widely varying challenges, it is essential that they have access to timely, reliable, and relevant information and advice. This requires an efficient agricultural extension system that goes beyond the theoretical scope of technology transfer, into the space of practical application and impact evaluation. Geo-tagging of farms, digitalisation of agri-value chains, big data analytics, Internet of Things, artificial intelligence and Machine Learning in agriculture are the next frontiers of knowledge to drive agriculture into a new trajectory. Extension work has to be ready to take

### Pandemics, Preparedness and Bio-Security

The experiencing of COVID-19 pandemic taught the humanity at large its vulnerability to life and living, direct and indirect impacts on nation's biosecurity and socio economy of. Despite all the interlinked challenges of security and safety of food, environment, health and biodiversity, India's focus is towards sustainably increasing agricultural productivity, farm incomes, food security and sectoral development by building resilience at multiple levels. The diversified Indian agroecosystems and sectors are replete with history of pests and pandemics. Research cum-developmental organizational set up and industries dealing with health system of human, livestock, poultry and fish have all the paraphernalia needed for an effective preparedness and management of pests and pandemics.

Source: [www.fao.org](http://www.fao.org)

all these technologies from start-ups and pilots to farmers' fields for scaling up.

As we are approaching 2030, AgroSpectrum, as a leading B2B media platform in the agricultural space, spoke to the leading industry leaders from fertilisers, agrochemicals, farm mechanisation, precision farming, agritech, poultry, dairy, and covering their views on "Agriculture & Allied sectors in 2030" in the coming pages. [AS](#)

## EXPERTS SPEAK ON PRECISION FARMING

# AI-driven Precision Farming is the future



**SANJAY BORKAR,**  
Co-Founder & CEO,  
FarmERP

*A glance into the future is, indeed, possible by examining the current trends and tech innovations that are flooding the market. All industries are, in one or another, deploying Artificial Intelligence (AI) and Machine Learning (ML)-based tools and services. Agriculture and specifically, Precision Farming is no exception. Such advancements can be a huge asset for the Indian farmers as well. The predicted food demand is increasing by 70 per cent by the year 2025, forcing agriculture and its stakeholders to adopt new and advanced technologies to meet the increasing needs of food production.*

**T**he way emerging innovations are revolutionising the partnerships between customers and market operators has been extensively debated over the last few years. So far, the majority of the enthusiasm about agriculture's technological potential has been focused on improved production, land conservation, and effective agricultural input utilisation.

Using smart technology to develop areas

such as climate-smart agriculture, demand forecasting, and end-product management has the potential to create massive social, economic, and environmental benefits. According to the Food and Agricultural Organization's (FAO) estimates, global food demand will increase by 70 per cent by 2025, necessitating an increase in overall food output.

Farmers must now gather and analyse a plethora of information from different sensors to become more effective in the processing and communication of relevant information. Precision farming, in particular, is emerging as an innovative solution for farmers to maintain their farms to satisfy not only food requirements but also scarcity challenges.

## Evolution and recent advances

Farmers have been on the fence of precision farming for a long time. During the 1980s, there was a revolution in precision farming, with renewed interest in the variability of soil fertility, moisture, and hydraulic properties.

As a result of significant efforts to address nutritional and product protection, labour welfare, economic accountability, and environmental footprint, smart farm management systems and precision farming have



gained widespread popularity.

In recent years, greater access to big data and advanced analytics along with the emergence of smart, GPS-navigated, and increasingly accurate agricultural technologies has helped push many farm management systems onward.

It is predicted that precision agriculture and automation will be the norm, even among smallholders, across the 'sowing to harvesting' value chain. The entry of 5G in 2021 has made Internet of Things (IoT) much faster and smoother, with the Global IoT market reaching \$9 trillion, powering 36 billion IoT devices in total. By 2020, technology is expected to become semi or fully autonomous, with its application based on advanced analysis done by AI and machine learning (ML) drones, terrestrial robots, IoT-enabled sensors, AI and ML -based advisory, which means that farms can be operated by one person, thus greatly boosting labour productivity.

### Projected trends in Precision Farming

Automation of farm activities with smart machines and Remote Sensing of detailed farm parameters that allow these machines to act with precision for desired outcomes are the two components that will shape the future of precision technologies in India.

### 1. Sensors and Actuators of Internet of Things

Farms will become 'alive' this decade, sensing and interacting temperature, nutrients, moisture, and crop health as living breathing systems, and we will be able to build digital twins of farms, significantly improving our ability to model the effect of interventions before evaluating them in the real world. 5G networks, brought in 2021 and 7G by the end of the decade, will improve the effectiveness of IoT by allowing for ultra-fast cross-exchanges between phones, sensors, and satellites, as well as hyper-accurate early detection crop monitoring. This sensing, when combined with VRTs on-farm robots, will allow each plant in each region of the field to be handled individually. In scaled agriculture, this has never been seen before. Large and medium farmers, who dominate 30 per cent of agricultural land, can use these technologies to grow estate and cash crops. Rental models and farmer groups would eventually enable costs and sensing to be spread through larger

areas managed by smallholders, making Indian agriculture "alive" and measurable in real-time.

### 2. AI and Agriculture

For the farmer, the essence of farm work may also shift. By 2030, AI will have progressed beyond the existing Artificial Narrow Intelligence in agriculture, which aims to mimic human intelligence within programmatically specified realms. Agriculture would see the implementation of general intelligence and, to a lesser degree, Super Intelligence, where computers are used to make decisions. Computers would be able to self-guide and match human intelligence. This will allow true and deep farm automation, transforming farm robotics from basic command-driven machines to intelligent self-directing and self-correcting farmworkers.

### 3. Unmanned Aerial and Terrestrial Robots

In large commercial crop and animal value chains, autonomous and semi-autonomous agricultural robots can replace labour-intensive human activities and drudgery. Although this will continue to be a popular use, fleet operators and big farmers will increasingly demand autonomous robots for tasks such as weeding, spraying, and harvesting, which require a lot of manual labour and have a high rate of human error. Variable-rate technology (VRT) will be applied to existing systems first. Tractors (for land preparation) are increasingly finding their way through the workplace.

Robot prototyping to improve their functionality, payload, and ease of use taking care after the target would be to make a broader spectrum of end effectors possible. Another is to ensure that the robot population is diverse enough on the market to solve the wide range of agro-climatic areas in India, topography, and the crops that are grown. One of the most intriguing applications is the use of VRT on robots that allows for precise agrochemical spraying.

The most promising agricultural technology, from remote sensing to drones and robotics, are rapidly progressing into the future. Precision farming and farm management systems, in the sense of smart solutions, provide a wide range of agricultural methods for both today's and tomorrow's farmers. AS

## EXPERT SPEAKS ON FERTILISER

“We are looking at total fertiliser sale of ~880 LMT by 2030-31... an almost 44% rise over 2020-21”



**MANOJ MISHRA,**  
CMD, National  
Fertilizers Limited  
(NFL)

*With the sale of fertiliser setting new records in 2020-21, the industry is poised to increase its production level in the coming years. This would amount to an almost 44 per cent increase in total fertiliser consumption over 2020-21 and for the first time, urea may comprise less than 50 per cent of total fertiliser sale. However, fertiliser consumption and its composition after 10 years later would depend upon various factors such as agroclimatic conditions, change in food habits (cereals may comprise a lower share of consumption), technological development in the introduction of efficient fertiliser grades, etc. In an email interview with AgroSpectrum Manoj Mishra, CMD, National Fertilizers Limited (NFL) shared his views about the fertiliser industry by 2030. Edited excerpts -*

### How do you see the Indian fertiliser sector shaping up by 2030?

The robust growth in fertiliser consumption as observed during the previous years has led to

record foodgrain output, providing food security to the nation. The population of the country will keep on increasing in the next decade, so the nation will need to feed more mouths. There is going to be higher relative prosperity with the economy crossing the \$ 5 trillion mark. The per capita income will surge more than double, from the present ~\$ 2000 to ~\$ 5000, resulting in a drastic change in food habits. The emerging fertiliser scenario in the next decade would also depend upon how the overall policy environment shall be created by the government for supporting higher fertiliser consumption for ensuring food security and for attracting investment in the sector.

### Growth in fertiliser consumption over previous 6 years (Based on mFMS)

To understand future fertiliser consumption 10 years ahead, we need to look at the previous few years' trends.

Fertilizer	2020-21 sale [lakh MT]	2014-15 sale [lakh MT]	CAGR [%]
Urea	350.98	308.81	2.2%
DAP	104.96	75.90	5.6%
Complexes	121.83	86.42	5.9%
MOP	34.42	27.87	3.6%
<b>Total</b>	<b>612.19</b>	<b>499.00</b>	<b>3.5%</b>

While the sale of Diammonium phosphate fertilizer (DAP) and Muriate of Potash (MOP) have seen higher peaks earlier (almost a decade back), sale of Urea and Complex scaled record highs during 2020-21, and riding on it, the overall fertiliser sales, too, reached its peak during the year. However, growth in fertiliser consumption does not follow any linear or consistent pattern. During the previous 10 years, fertiliser consumption actually declined for three years but had seven years of positive growth.

## Projected fertiliser consumption in 2030-31

Statistically, if one were to arrive at the 2030-31 fertiliser consumption, solely based on the previous 6 years' Compound Annual Growth Rate (CAGR) for each fertiliser, then we are looking at total fertiliser sale of a mammoth ~880 LMT, comprising of Urea (~435 LMT), DAP (~180 LMT), Nitrogen, Phosphorus, and Potassium (NPKs) (~216 LMT) and MOP (~49 LMT). This would amount to an almost 44 per cent increase in total fertiliser consumption over 2020-21 and for the first time, urea may comprise less than 50 per cent of the total fertiliser sale!

However, fertiliser consumption and its composition, after 10 years would depend upon various factors like agroclimatic conditions, change in food habits (cereals may comprise a lower share of consumption), technological development in the introduction of efficient fertiliser grades, etc. Also, the present fertiliser subsidy regime, where subsidised fertilisers are made available to farmers; could be replaced by DBT to farmers, and the fertiliser industry could be decontrolled to a large extent, which will also have some impact.

## Urea Imports & new capacities

Five new urea plants are likely to go on stream in 2021-22, namely, Ramagundam, Gorakhpur, Barauni, Sindri and Matix producing ~65 LMT urea. With this development, the country's dependence on import, which was close to 100 LMT (or 28 per cent) in 2020-21, will come down drastically in the immediate future. But, with a projected increase in urea consumption, urea imports will soon start increasing subsequently and, in fact, can go up beyond 100 lakh MT by 2030-31. Actually, this demand-supply gap will provide an opportunity for the government to plan new urea units in the north and also south India, as these regions' consumption will far outweigh production capacity. With a slew of government fertiliser companies (having 9 urea units collectively) going up for sale under the new disinvestment policy of the government and also some weak companies, which may go under, will provide an exciting opportunity for consolidation to existing players.

## Phosphatic Fertiliser scenario

Both DAP and NPKs have shown a robust

CAGR of over 5 per cent in the previous 6 years. During 2020-21, the ratio of domestic production and imports of DAP+NPKs was in the ratio of 2:1 of a total 214 LMT. For DAP, imports were higher at 60 per cent as compared to NPKs, where just 15 per cent was imported. Domestic players are more focused on NPKs where margins are better and face less competition from imports. The higher growth of phosphatic fertilisers than that of urea despite being 3 to 4 times costlier, has effectively demolished the myth of fertiliser demand being too price sensitive. Consumption of DAP+NPK is likely to touch a level of 400 lakh MT in 2030-31 from the level of 226 LMT in 2020-21. To cater to this huge jump in demand, it would be interesting to see whether the existing players will expand their capacity indigenously or would go for strategic tie-ups with the major suppliers of raw material as the dependence of the industry on imports of raw materials and intermediates (like rock phosphate, Sulphur, Phosphoric Acid, Ammonia, etc.) will continue to be acute. Government should encourage and provide diplomatic support to the companies to set up JV's abroad as well as for tying up raw material linkages. Large and growing domestic appetite for phosphatic fertilisers is also likely to attract some of large foreign suppliers to invest in India.

The above analysis does not cover the Single Super Phosphate (SSP), considered as poor man's fertilizer, which has seen a huge growth of 16 per cent (49.34 LMT) in production in the year 2020-21 over the previous year (42.53 LMT) and has actually shown continuous growth during the previous decade.

## MOP scenario

Our dependence on imports for MOP is 100 per cent. There are no known indigenous sources of MOP at present. While for the previous 6 years, the CAGR is 3.6 per cent, the MOP sale has seen higher numbers even a decade back than the 34 LMT sale seen in 2020-21. So, from a long-term perspective, there has hardly been any growth in MOP consumption previously and, therefore, it is difficult to envisage its growth in future too. The factors affecting the growth in MOP could be (a) its complete dependence on imports in an oligopolistic market (only 4-5 major suppliers), (b) almost a monopolistic hold of one player on its import in the country leaving little space for

other players to get the material at a reasonable price, (c) more than 75 per cent Indian soils being categorized as moderate to high in respect of the availability of 'K' content and (d) of course, its relatively higher price in comparison to urea.

### **Can the current supply chain endure the burden of our country's ever-growing demand for food? If not, what should be done?**

The current supply chain for procuring and distributing food and meeting its demand is primarily with the private sector; with the exception of MSP procurement and PDS distribution, which is handled by government agencies. No doubt, there are gross inefficiencies in the existing supply chain resulting in huge wastages. There is a crying need for more investments in creating, strengthening and modernising segments of supply chain from cold storage, food processing, warehousing to layers of distribution to finally making the product available to the end consumer. With the three agricultural reforms laws, when implemented fully in the course of few years, will allow more private players entry and also bring investments in various stages of supply chain. These farm reforms have opened doors to private sector for making investments in Artificial Intelligence-based Agri-tech applications (disruptive technology) to unleash value in agriculture.

### **Will the fertiliser industry be affected by the increasing push given to Organic farming by the government?**

The impetus for organic farming is overstated and over-stretched. After all, what is the size of organic farming or organic fertilisers/manures in India or globally? They do not contain major nutrients in ample quantity as required by the crops. While organic farm products do have a niche value and will always command a premium in the market, it cannot become products of mass consumption due to higher price. It cannot achieve the scale and hence poses no threat to the fertiliser industry.

Various forms of organic fertilisers/manures containing different micronutrients can be useful as a soil conditioner to make soil healthy, but they just cannot fulfil the major nutrient requirement of crops. And hence the question is not of 'either/or' for use of organic or chemical

fertilisers. Both are necessary and useful. We should stop creating an illusion of organic farming being able to meet the entire food requirements of the country, now or in future.

### **The entire world is going digital, where does India's fertiliser sector stand when it comes to digitisation?**

Digitalization has a huge role in bringing speed of the transaction as well as the ease of doing activities. The FMS (Fertiliser Monitoring System) introduced many years back, with its newer avatars is an excellent example of digitalization through which all the production, import, dispatch & sale data for the entire fertiliser industry is available to everyone easily. Similarly, the present DBT system adopted for capturing sale of fertilisers and disbursal of subsidy is also a great leap in digitization.

Further digitalization of the fertiliser sector could create opportunities for new avenues of value-added revenue stream. But digitalisation as such may not be quite helpful in enhancing growth.

### **Do you think that the present trend of importing cheap water-soluble fertilisers from European countries will continue in future as well?**

The 'Water Soluble Fertiliser' (WSF), as a segment has shown immense growth during the previous few years. Most of the WSFs are imported, despite the fact that they can be manufactured domestically. But with a huge subsidy for bulk chemical fertilisers, WSF cannot compete against it on the price front despite its higher efficiency. Due to the meagre size of the segment (just 3 LMT in 2020-21, by some estimates), probably it is not attracting much attention from major players. Only after full decontrol of the entire fertiliser sector and ensuring free and fair market play in the industry, all types of fertilisers, like customised fertilisers, organic fertilisers, WSF, value-added fertilisers will find their right scale and use based on their respective efficiencies and cost.

In order to promote WSF, the government needs to first promote drip irrigation. Adopting drip irrigation shall help in solving the water scarcity problem of most states, and promote balanced fertilisation and higher yields. **AS**

**Nitin Konde**

## EXPERT SPEAKS ON AGROCHEMICAL

# The decade ahead has many opportunities for Agrochemical industry



**RAJESH AGGARWAL,**  
Managing Director,  
Insecticides India  
Limited

*The Indian agrochemical industry is a global market leader when it comes to generic products. Around 22 pesticide active ingredients are about to get out of their patent period in the next few years. Such off-patent molecules will create a huge opportunity for their own commercial development and provide quality agrochemicals at a reasonable affordable price to Indian farmers.*

If there is one sector that has shown continued signs of growth and resilience to the all-pervasive pandemic caused by COVID-19 virus, it is the famed Indian agriculture. It hit us in the middle of the Rabi harvest season last year and yet, rising over the effects of lockdown, contributed about 20 per cent to the gross domestic product (GDP) of 2020-21. The milestone came after a lull of 17 years and marked an increase of more than 2 per cent since 2019-2020. Even during the lockdown when sectors driving the economy till then were reporting in the negative, agriculture, along with its allied activities, marked a growth of 3.4 per cent during 2020-21, according to the first

advance estimate of the latest Economic Survey. So much so that the Ministry of Finance termed agriculture as the 'green shoots' of economy, marking its revival from the devastating impact of COVID-19 and the lockdown it induced. In this new decade, it is important to assess the status of agriculture in India to determine what it needs to meet the growing demand of the coming decade.

## Food security amid rising consumer demand

According to fourth advance estimates, India produced a total of 296.65 million tonnes of food grain in 2019-20, which was higher by 11.44 million tonnes than 2018-19. This rise in production of food grain has been a welcome trend since the past few years, and is likely to continue with better irrigation, quality input materials and marketing of grains. However, there are a few challenges that stare at the industry. The first is the exponentially growing population of the country that directly threatens to neutralise the benefits of this huge produce. It is estimated that while India may achieve projected GDP of \$ 9 trillion by 2030, there will be a sharp rise in its demographic dividend and working population. Urban areas are expected to become the mainstay by 2030 – the urban population is estimated to be 600 million by 2030 – accounting for about 75 per cent of the GDP. However, the high-density population spread and fast-paced economic growth will only increase the country's susceptibility to climate change, which will no doubt leave an adverse impact on the state of agriculture in India.

The Indian agriculture sector that is already reeling under declining soil fertility and small average farm sizes affecting productivity, faces the burdens of overdependence on southwest monsoon and infestations from pests and diseases. There are about 30,000 species of weeds, 3,000 species of worms, and 10,000



species of plant-eating insects that affect agriculture and according to the Federation of Indian Chambers of Commerce & Industry (FICCI), India loses about 20 per cent of crops to pests, weeds and diseases. The locust attack last year, the worst in the past three decades, is a glaring example and has reportedly destroyed nearly 1.7 hectares in western states like Rajasthan and Gujarat. Unless measures are taken to address these areas of concern, Indian agriculture will struggle to meet the increasing need for food security and provide adequate nutrition to the people.

### Charting the way to 2030

As per a working group report of NITI Aayog titled 'Demand and supply projections towards 2033', India is likely to have a sufficient supply of food grains towards 2032-33 and beyond. However, in case of pulses and coarse cereals, a marginal deficit of around 5-7 million tonnes is likely. Besides, India may face a shortage of around 40 million tonnes in the case of oilseeds though commodities such as milk, fruits, vegetables, and meat seems to continue to strike a balance between demand and supply. This calls for creating enabling conditions for the farming community.

### Better irrigation coverage

In 2017-18, India's irrigation cover was 48.7 per cent of the total cultivated area while the value of its agriculture output was \$524.7 billion. Irrigation is an important parameter as availability of water is a critical factor for increased cropping intensity, i.e., the number of crops grown on the same field during an agricultural year, which, needless to say, can heighten the productivity of the land manifold.

### Incentive for environment-friendly measures

Sustainable measures such as water and energy conservation and stopping stubble burning can have a far-reaching impact on India's bid to sustainable agriculture. While the Central and state governments have introduced incentives for farmers to save water and promote the use of solar technology, introduction of the Pradhan Mantri Krishi Sinchai Yojana has furthered the cause by incentivising farmers. It also played an important role in popularising



micro-irrigation to ensure 'per drop, more crop' while some state governments, like that of Punjab, have introduced the 'paani bachao, paisa kamao' (save water, earn money) scheme. The scheme allows a monetary incentive of Rs 4 per unit for each unit saved based on the readings in meters installed on farmers' pumps, directly credited into their bank accounts.

### Judicious and wider use of agrochemicals

Despite being a top exporter, India's consumption of agrochemical remains very low and unevenly distributed across the states, mainly due to lack of adequate knowledge among the farmers for their judicious use. India consumes only 0.29 kg of agrochemicals per hectare as compared to 13.06 kg/ha in China, 11.85 kg/ha in Japan, and 1.30 kg/ha in Pakistan. However, farmers must be educated about crop and soil types to avoid any imbalance. Though many initiatives and efforts are being taken by the government and the industry for the same and regular awareness programmes are being organised in different capacities.

### Fostering growth of agrochemical industry

The Indian agrochemical industry is a global market leader when it comes to generic products. Therefore, the decade ahead has a many opportunities as around 22 pesticide active ingredients are about to get out of their patent period. The market size of these products is expected to cross \$ 4.1 billion by 2026.

For the Indian manufacturers, such off-patent molecules will create a huge opportunity for their own commercial development and provide quality agrochemicals at a reasonable affordable price to farmers. Make in India and research capabilities that are bound to grow in this decade will be another important aspect to keep an eye on in the crop protection sector. AS

## EXPERT SPEAKS ON MECHANISATION

# “India is tractorised, but not mechanised”



### HEMANT SIKKA,

President, Farm  
Equipment Division,  
Mahindra & Mahindra

*The Mahindra Group is a \$19.4 billion federation of companies that enables people to rise through innovative mobility solutions, driving rural prosperity, enhancing urban living, nurturing new businesses and fostering communities. Mahindra has been India's topmost tractor brand and the world's largest tractor manufacturer by volume. With a presence in over 40 countries, Mahindra has leveraged on its quality, as the only tractor brand in the world, to win both the Deming Award and the Japanese Quality Medal. It holds a leadership position in utility vehicles, information technology, financial services and vacation ownership in India and is the world's largest tractor company by volume. It also has a strong presence in renewable energy, agribusiness, logistics and real estate development. Headquartered in India, Mahindra employs over 2, 56,000 people across 100 countries. Hemant Sikka, President, Farm Equipment Division, Mahindra & Mahindra shares his views on the future of farm mechanisation industry in India with AgroSpectrum. Edited excerpts;*

### How did COVID-19 impact the farm mechanisation industry in India?

The pandemic has triggered increased adoption of mechanisation on farms due to factors like labour migration, which has resulted in very good growth in farm machinery sales in FY'21.

In terms of tractors, for the first time ever, in FY'21 the tractor industry has touched the highest-ever volume of 9-lakhs. This is in spite of the industry having lost April and May last year in terms of production due to lockdowns. So, in spite of working only for 10 months, the industry has grown by 27 per cent.

At Mahindra, we clocked over 3.54 lakhs tractors of domestic and exports sales combined. This growth has been on account of several positive factors in the rural economy leading to growth of the domestic tractor industry and farm mechanisation. Successive bumper Rabi and Kharif crop harvest, coupled with timely procurement of crops, have ensured seamless circulation of money in the rural economy.

Government spending on Agriculture & Rural Development, via the Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA) outlay was increased substantially. While we've seen bumper and record crops output, the



price realisation for the farmer has also been very good. Between June and September, the monsoons were also higher than the Long Period Average (LPA) by 9 per cent. It is noteworthy that this year we have had the 3rd highest cumulative rainfall in 25 years, with good temporal and spatial distribution. It was also the first time since 1960 that we had back-to-back, above average monsoons. Good Monsoons have also led to high reservoir levels. As a result, the Rabi sowing is also very good.

### **What are your growth strategies and plans for the upcoming years?**

While we have a strong tractor portfolio, we are building technology skill sets beyond it. The company is working on introducing a range of farm machinery, with the idea of taking technologies used in large land holding farms around the world and making them affordable and accessible to small land holding farmers. A step in this direction are alliances and acquisitions in Agri Technology and startups in the last few years.

Based on these acquisitions and partnerships, Mahindra has launched new agri machinery such

as potato planters and rice transplanters. Beyond hardware, Mahindra has also rolled out Krish-e Centres in nearly half a dozen states so far. With the tag line – ‘Expert Takneek. Naye Upay. Parinaam Dikhave’ – Krish-e is a new business vertical that provides technology-driven services which are progressive, affordable and accessible to farmers. Krish-e aims to increase farmer income through digitally enabled services, across the complete crop cycle.

These include agronomy advisory, access to advanced farm equipment rentals and new-age precision farming solutions, all focused on bringing down overall farming costs and improving crop output and consequently the farmer’s income.

### **How would you envisage the future of the farm mechanisation industry in India by 2030?**

Farm Mechanisation has been identified as a key tool to increase agri production globally. Several studies suggest a direct correlation between increased yield and farm mechanisation, which also leads to several other economic and social benefits for farmers.

While India is amongst the largest tractor markets in the world, it is also highly organised. However, India has a low level of mechanisation compared to developed countries. While a tractor is a prime mover, the agriculture machinery value chain involves mechanisation right from land preparation to sowing to harvesting and post-harvest. At every step in the production lifecycle, the use of farm equipment enhances the efficiencies, not only in reducing labour time and post-harvest losses, but also helping cut down on production costs over the long term.

While there is some level of mechanisation (beyond using tractors), it is skewed towards land preparation. For many other operations, simple implements are used or the work is done by manual labour. Also this level of mechanisation varies greatly by region. From a global perspective the tractor industry is worth around \$60 billion, and the farm machinery industry is worth an additional \$100 billion. In contrast, the Indian tractor industry is at around \$6 billion and the farm machinery industry is at just \$1 billion. Looking at these numbers it is clear that India is tractorised, but not mechanised.

Looking at India from a broader lens, over 85 per cent of Indian farmers are small and marginal ones, having less than two hectares of land, but they own just 47.3 per cent of the total crop area. These small farmers are simply unable to afford these mechanisation technologies due to cost and low income issues. As a result, there is a low overall rate of mechanisation in Indian farms.

While farm mechanisation in India has made strong strides in recent years, there is still a long way to go. Countries like the United States and European nations are completely mechanised, while places like China and Japan have also seen higher penetration of farm machinery. In comparison, the Indian agricultural sector still lags behind and requires an increase in farm mechanisation. And, we at Mahindra, have one of the widest range of farm machinery offerings and are working towards the introduction of newer ones, based on the expertise from our Global Centres of Excellence (CoE). We will soon launch new rice planer technology in collaboration with Mitsubishi of Japan.

Mahindra's Global CoE are located in Japan (Rice Agri Machinery Value chain & Light Weight Tractors), Finland (Harvesters & Forest Machinery) and Turkey (Farm Implements).

## What is Mahindra's involvement in Artificial Intelligence, Machine learning, and data analytics deployment in the agriculture industry?

Digital and Data drive farming is definitely the future, and at Mahindra, we have introduced Krish-e in Oct 2020, a new business vertical. It provides technology-driven services which are progressive, affordable and accessible to farmers. It aims to increase farmer income through digitally enabled services, across the complete crop cycle. This is through agronomy advisory, access to advanced farm equipment rentals and new-age precision farming solutions, all focused on bringing down overall farming costs and improving crop output and consequently the farmer's income. It is an innovative new business vertical conceived with the idea of ushering in a new digital age of farming in India. It aims to transform the lives of farmers, by helping them to adopt better more effective farming techniques powered by Artificial intelligence (AI), IoT and digital solutions that are affordable and accessible, paving the way for increased productivity and profitability. Through Krish-e, we are engaging with our farmers more deeply and creating stronger relationships. To enable this, M&M has made strategic investments across the globe including in Resson – a Canadian predictive analytics company, Gamaya – a Swiss hyperspectral image analytics company and Carnot – an Indian AI-enabled Agri IoT Company.

Krish-e centres are being rolled-out across the country in a phased manner. We rolled-out Krish-e stores in nearly half a dozen states so far and are rolling out Krish-e centres in Karnataka as well. Krish-e Precision Farming solutions use a variety of sensors and cameras on the farm, on drones, on satellites and on farm equipment to collect soil, crop and machine data. AI algorithms transform this data into user friendly and insight rich field maps, enabling farmers and agronomists to run variable rate farming operations, using intelligent machines. Such operations are already helping potato, grape and sugarcane farmers reduce their costs of cultivation and improve their yields. Through Krish-e, we are working to create a nation of Champion Farmers. [AS](#)

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## EXPERT SPEAKS ON MECHANISATION

“The deployment of AI, ML, data analytics etc. will become a huge game changer in the future”



**MRITYUNJAYA SINGH,**  
MD, CLAAS

*Many Indian farmers still follow the old school method of farming relying more on manual labour than mechanisation. A remarkably lower-earning per capita compared to the world average is a primary reason. They also tend to a small acreage and low yields. There is also a huge disparity in the level of adoption of farm technology in the country. Some states like Punjab, Haryana, Andhra Pradesh, Telangana, Tamil Nadu, Karnataka etc. have led the way in the usage of combine harvesters. In the East, Odisha and West Bengal are catching up quickly. To shed some more light on the subject, Mrityunjay Singh, Managing Director, CLAAS shared his views on the future of farm mechanisation industry in India. Edited excerpts -*

### **What are the post-pandemic impacts on the farm mechanisation industry?**

As we know, the challenges due to the pandemic have had a significant impact on livelihoods and the economy. Job loss in many sectors is another concern. However, last year we saw a good growth in demand for tractors, combine harvesters and other farm equipment, largely driven by a good monsoon but also indirectly by a shortage of manpower in rural farms due to flight of farm labour.

It is estimated that India's agriculture sector accounts only for around 15 per cent of the country's economy but about 45 per cent of total employment. Clearly there is a very low level of productivity in the Agriculture sector. Challenges

posed by unforeseen events like the pandemic will encourage more farmers to move towards higher mechanisation and better productivity levels. This would also mean that the workforce earlier engaged in farms will now find more productive employment in Industry and the Service sector.

### **What are your plans for the upcoming years?**

The use of combine harvesters to harvest rice, wheat and to some extent soybean has spread across India in recent decades. However, mechanisation levels in harvesting other crops have to do a lot of catching up. CLAAS is well known for providing harvesting solutions that

can address multiple crops like paddy, wheat, maize, soybean, pulses, sunflower, etc.

Maize is a good example of a future growth market. The use of combine harvesters in maize is today very low at about 10 per cent or less. The area under maize is increasing and the government recognises the need for better harvesting solutions to increase farmer productivity. CLAAS has specially designed maize harvesting solutions for Indian farms.

We have always believed in being a pioneer in introducing new technology and processes for the benefit of the farming community. Over the last few years, CLAAS has been playing a leading role in the mechanisation of silage production for cattle feed. Though India is the world leader in milk production, productivity of our cattle is very low. One of the main reasons for this is the high cost, and poor availability, of good quality feed. Good quality silage is produced by proper harvesting and chopping of fodder quality maize and then diligently following prescribed storage instructions to ensure optimum quality of the final product. The tractor-drawn CLAAS JAGUAR 25 forage harvester is ideally suited for small dairy farmers for their own use or for renting it out to other farms in the vicinity for maize foraging. Professional silage contractors who operate on a larger scale choose the CLAAS JAGUAR 850 self-propelled forage harvester. The JAGUAR is the world market leader in forage harvesters.

The burning of paddy stubble is a major reason for worsening air quality in the North, particularly in NCR. Farmers in the North do not see economic value for paddy straw. So burning paddy straw became a quick and easy way of disposing of it and getting the field ready for the next crop. The Government is working on several initiatives to create demand for paddy straw – co-gen plants by public power utilities, production of Ethanol and Compressed Biogas are a few of the major steps. This demand generation will gradually create a value for paddy straw and discourage farmers from burning.

From a mechanisation perspective, to handle such a large volume of paddy straw in a short time span, there is a need for professional baling equipment. Balers are tractor powered machines that help in quickly picking up, compressing and bundling the paddy straw that may then be transported easily to the points of consumption.



### How would you envisage the future of the farm mechanisation industry?

Although there is a wide scope for farming process mechanisation in the country, unreasonably high focus on 'tractorisation' has led to tractors being the most common sight on Indian farms, at the expense of specialist machines such as combine harvesters, balers, forage harvesters, paddy transplanters, etc. These machines play a significant role in the sector but are often ignored.

There is also a huge disparity in the level of adoption of farm technology in the country. Some states like Punjab, Haryana, Andhra Pradesh, Telangana, Tamil Nadu, Karnataka etc. have led the way in usage of combine harvesters. In the East, Odisha and West Bengal are catching up quickly. However, even a big producer state like Rajasthan is still lagging behind in adoption of mechanised harvesting for crops like pulses, mustard, cluster beans etc. The North Eastern states also have a growing need for mechanisation but adoption is low because of challenges like low purchasing power, lack of retail finance availability etc.

However, it was driven by the government initiatives like Customer Hiring Centers and promotion of the concept of 'collective good' with



FPOs & FPCs, in the next few years, we will see a widespread adoption of mechanisation both geographically and also across different stages of the crop production process. Crop residue management and harvesting maize for silage are also areas where there will be a much higher adoption of professional farm equipment as explained earlier.

### What inputs are required for the growth of the farm mechanisation industry?

Indian farmers have a remarkably lower earning per capita compared to the world average because of the small farm sizes and low yield per hectare of their farmland. However, this can be addressed by encouraging mechanisation of the farming processes which would, in turn, reduce the cost of input and improve productivity, thereby increasing the overall profitability of the farmers. The government has introduced the concept of Custom Hiring Centres (CHCs), opened in public-private partnership mode. The main objective of CHCs is to provide various farm machinery / equipment to small and marginal farmers on a pay-per-use model, to make technology adoption affordable. The concept of 'collective good' for members of FPOs and FPCs

will also make it easy to provide as well as adopt efficient mechanised processes.

Availability of finance for machines other than tractors is still to improve. Financial institutions are reluctant to provide much needed credit to deserving farmers. While the situation is improving, there is still a long way to go.

We also have a huge shortage of skilled manpower to embrace the new farm technologies. While the government has been taking initiatives in equipping our manpower with relevant skills, there is a growing demand-supply mismatch where the private sector also needs to play a more active role.

### Artificial Intelligence (AI), Machine Learning (ML), data analytics are gaining popularity in the agriculture industry, how can this technology become a game changer in the farm mechanisation industry?

Farmers' access to markets, price transparency, the right time to sow seeds, optimal level of inputs like fertilisers, crop insurance support etc. are just some of the areas where technology like AI, ML and data analytics can play a very significant role in agriculture. Several startups today are investing in creative solutions to support the Indian farmer.

Agriculture data can be collected by deployment of drones, use of sensors, photos using mobiles, IoT devices, satellite images etc. Combine harvesters for example can also provide very useful localised information on crop yields by mapping harvesting data to support precision farming. This can then be analysed to provide meaningful information and real-time advisory to the farmer to improve his decision making on the level of fertiliser needed, pesticide use etc.

The Indian farmer has a very high dependence on monsoons. High quality predictive analysis using technology can greatly help farmers anticipate significant weather changes in advance so that he can take corrective measures. Timely deployment of harvesters can greatly benefit farmers by minimizing crop loss due to unforeseen events like cyclones etc. In short, the deployment of AI, ML, data analytics etc. will become a huge game changer in the future and the Indian farmer will definitely benefit from this. *AS*

**Nitin Konde**

## EXPERT SPEAKS ON STORAGE

# Tech-driven farmgate warehouses will be the norm



**PRASANNA RAO,**  
CEO & Co-Founder,  
Arya Collateral

*Farm yields have been very encouraging in the recent past thanks to numerous favourable conditions including governmental policies and awareness amongst farmers. However, the problem of wastages continues to hit the nation hard. Experts have been suggesting the setting up of small warehouses at the farmgate to ensure sale of produce and minimise wastage. Despite a 30 per cent shortage in overall warehousing capacity in the country, the average utilisation in private warehouses is still only about 50-60 per cent. Farmers and Farmer Producer Organizations (FPOs) are not aware of the structures in their vicinity. This is how technology will become a crucial cog in the wheel of future warehousing.*

Cereals are still, by far, the world's most important sources of food and research reveals that an extra billion tonnes of cereals will be needed by 2030. However, in today's world, approximately 24-30 per cent of all food produced is wasted or lost between the farm and the fork. These inefficiencies in our global food system have serious impact on nutrition, health and the environment. Controlling food loss will play a key role in efficiently addressing the food needs of the world. A confluence of efforts at enhancing production and better post-harvest management that would lead to meeting the food needs effectively.

By 2030, the boundaries that separate rural India will blur with better connectivity and access. Most Indian villages will be connected with paved roads and reliable electricity supply. One billion Indians are expected to have access to

the internet, and nearly half of them will access it in regional languages. Their smartphones will connect farmers to better inputs, engagement and even marketplaces. For the Indian farmer, we are looking at a shift to market-driven food production in a highly digital ecosystem compared to traditional agri value chains. As crop choices and production planning will see a stronger shift to advanced mechanisation and precision farming, Artificial Intelligence (AI), Internet of Things (IoT) and innovation will drive the agri warehousing industry.

### Digital, modular and flexible

The future of warehousing is clearly more digital, modular and flexible, bringing in traceability to each farmer's grain and transparency with regard to the quality of the produce.

Reducing food wastage will become a priority



and scientific warehousing will allow for more efficient processing of food commodities. The future of agri-warehousing thus will be at the farmgate to minimise food losses and manage demand and supply anomalies efficiently and effectively. With the constraints on capital investment, warehousing structures that are flexible, portable yet effective while being cost-efficient will be key.

There will be a significant shift to organic and sustainable processes and to improve the ecological impact of storage. Structures that do away with the need for application of chemicals, fumigation etc. for maintaining shelf life of produce will be imperative. For instance, Arya Collateral Warehousing's work on flexible hermetic storage solutions provides for versatile structures for quality upkeep, without any chemical intervention right at the farmgate. Furthermore, tech-enabled self-monitoring and self-correcting structures that would use IoT to assess and control parameters such as moisture, temperature, pest growth on a real-time basis will be the need of the hour.

The future is modular storage, closer to farm gates with one crucial difference - Size! Today, commodities are produced, harvested, bagged and then finally stored. Before processing, commodities must once again move from bag to bulk. With newer bulk storage technologies, we will save on time, gunny bags, quality assessment and most crucial, negligible loss to grain.

### **Digital consolidation of the distributed warehousing infrastructure**

Despite a 30 per cent shortage in overall warehousing capacity in the country, the average utilisation in private warehouses is still only about 50-60 per cent. This points to a discovery problem. Farmers and FPOs are not aware of the structures in their vicinity. Technology will play a very important role in increasing the visibility of infrastructure across the country. An end-to-end discovery and fulfilment platform is imperative. Digital consolidation of the distributed warehousing infrastructure with the service assurance of professional players is the path to the future. Players like Arya will add the missing layer of trust through implementation of Service Level Agreements and service guarantees for greater assurance.

Integrated with AI, low-cost mechanisation

for storage, and real-time tracking of warehouse facilities will enable the optimal utilisation of our storage facilities to capacity. Traceability will be easy, and transparency will be available for commodities in storage or in transit, as they travel through the value chain from aggregation to processing.

### **Innovation for transparent and traceable Agri Value Chains**

Digitisation of foodgrains, digitisation of commodity inventory, transaction systems and processes integrated with real-time data, real-time monitoring of supply and demand embedded in AI is the highlight of the future. Integrated image, spectral and sensor analytics for on-field quality assaying and tech-enabled margin calls and repayment processes are already a part of our current storage solutions.

Economic and environmental priorities, the better quality of food and organic varieties will drive the need for a better quality of produce and innovative infrastructure designed for safety and logistical competence. The journey towards that has already begun. Arya's credit decisioning is Tech-led and AI determines quality assurance and pricing. Innovation and technological developments will, thus, play a key role in reducing gaps in warehousing and post-harvest agri commodity management.

### **The Mandi of the Future - Digital Marketplaces**

The future vision of warehousing in India is that of a comprehensive technology-enabled transaction point, complete with facilities of aggregation, quality assurance, storage, transportation, finance and sale. Warehouse shall be the new mandi, the hub for all activities and market interactions. A farmer gets his commodity digitised and builds an electronic balance at the storage facility assessing quality and availing financing, if necessary, almost immediately. The farmer will be able to grade his produce, store his produce, avail of a loan and when appropriate decide to sell his produce with a reach to an ecosystem of buyers across the country. Decision making such as, whether to sell or not, when to sell, finding market linkages and access to service providers and advisories, for farmers and farmer producer organisations would all be possible at this hub alongside the digital platforms. **AS**

## EXPERT SPEAKS ON DAIRY

# Tech to trigger White Revolution 4.0 in Indian dairy sector



**RAVISHANKAR  
G SHIROOM,**  
Co-founder and  
Director, Stellapps

*Indian dairy is an exemplary example to the world on its growth journey from being a milk deficient country to becoming the global leader in milk production. This is all thanks to the great work done, not just by Dr Verghese Kurien, the father of India's white revolution, but also of successive generations of dairy leaders who took his legacy to greater heights. The contributions of major dairy cooperatives like Amul, Nandini, Sudha, Aavin etc, along with initiatives by the National Dairy Development Board (NDDB) has empowered dairy farmers across the country. Private dairy companies have also made a significant contribution to the Indian dairy sector and broadened consumer choice in dairy products.*

**I**ndia contributes 22 per cent of the total milk produced in the world, yet, lacks in farm productivity, milk quality and farmer profitability in several parts of the country.

A Food Safety and Standards Authority of India (FSSAI) study has revealed that one in three Indians are drinking milk that falls short in one or more quality parameters. When Regional Comprehensive Economic Partnership (RCEP) was introduced in India, there was a pushback from several sections of the Indian dairy sector. What we can infer from this is that even though the Indian dairy sector is the largest in the world in terms of milk production, number of bovine animals and farmers; to benefit from such deals, we need to effectively resolve the challenges at home.

An ambitious vision for 2030, would be to make India a true global leader in all aspects of dairying. The white revolution led by Dr Kurien, solved the production problem. We need a second white revolution to fix the challenges in productivity, quality and farmer profitability. But unlike the first, this one will be powered by technology - white revolution 4.0.

With the rapid expansion of dairy digitisation and future tech innovations, India will be able to solve the compelling challenges in its dairy value chain at scale. Future tech like Internet of Things (IoT), Artificial Intelligence (AI), cloud technology, big data analytics and computer vision are revolutionising how things work and will play a major role in shaping the future. The food and beverage industry was slow to pick up on the digitisation trend but had warmed up to it even before the pandemic. The pandemic served to impress the necessity for digital technology for the continuation of Business As Usual. Hence, the near future is likely to witness the digitisation of legacy systems and higher automation to enable remote real-time monitoring and operations. Dairy 4.0 is expected to have deep penetration into the dairy value chain starting right from the farm. Several innovative use cases for technology exist that can effectively and efficiently solve pressing challenges in the dairy industry affordably.

## Connected Farms & Smart Milk Collection Centers

Poor farm productivity, lack of timely access to financial and extension services are key challenges faced by smallholder farmers in several parts of India. Effectively resolving these issues will significantly boost their profitability and help them advance as dairy entrepreneurs. From 'Fitbit' for cows that track animal activity data to accurately detect heat and illness to computer vision powered body imaging to detect mastitis and lameness, the use cases are vast and can boost the profitability of farmers by increasing productivity, milk quality and enabling premium market linkage. Digitising animal health data and democratizing it through blockchain technology can help veterinarians react quickly to any livestock epidemic outbreak. Facial recognition for cattle holds much promise to increase cattle insurance penetration and cover more farmers from risks. Stellapps had developed mooON, cattle health monitoring and herd management solution and mooID cattle facial recognition solution to enable effective farm management and extension of cattle insurance respectively.

Empowering smallholder farmers with technology will help connect several small and marginal farms to virtually aggregate into a mega farm to reach economies of scale. Access to the right information and the right services at the right time is key to the economic empowerment of farmers. Necessary services can be easily provided to farmers through platforms that leverage ecosystem partnerships with veterinary services, cattle nutrition providers, pharmaceuticals and financial institutions at a milk collection centre hooked to the cloud. Farmers can choose from a virtual marketplace replete with product and service options and pay by simply pouring milk at a smart collection centre.

## Financial Inclusion through data-led FinTech solutions

The advent of FinTech has revolutionized not just the financial industry but how we carry out financial transactions every day. Though the uptake of digital services has exponentially increased in recent years in urban centres, this trend has not hit our villages. But FinTech can quickly turn the tables for use of digital

financial services in rural areas. For example, by automating milk payments to farmers and enabling direct farmer payments, not only are we creating cost and money savings for the dairy companies but also plugging leakages and ensuring transparent payments for farmers. The quick adoption of Stellapps mooPay FinTech services and the positive feedback from farmers for its digital payments, credit and cash-out services have bolstered our belief in the power of FinTech to deeply impact farmers.

We can create better creditworthiness assessment models by capturing previously unrecorded income transactions for farmers. Quick and reliable farmer credit scores will incentivise financial institutions to lend to farmers. Increased access to formal credit will help the farmer invest in her farm size and mechanisation and thus pave the way for their transition to dairy entrepreneurs. We have seen this at play when Stellapps' mooScore, an alternative credit score based on milk pouring data was introduced. More than 15 financial institutions have partnered with mooPay and have been extending credit to farmers based on their mooScores.

## Tracing milk back to healthy cows

Imagine being able to scan a QR code of a 2030 version of a QR code and being able to trace milk back to healthy cows it was milked from. Traceability is an important aspect for the emerging pool of health and quality-conscious consumers.

Technology plays a vital role in ensuring food safety by integrating various nodes of the supply chain and enabling real-time monitoring. Digitisation of cattle health records can help alert milk collection centre agents of possible antibiotic contamination and ensure food safety. IoT technology is already being used to automate milk collection, monitor milk transport and chilling in real-time at scale by most dairy processing companies and it is expected to be the norm by 2030.

Stellapps is touching 11.5 million litres of milk every day and impacting 2.6 million farmers, 1 million cattle in about 35,000 Indian villages through its solutions. This scale is proof of the potential of technology to bring significant value to each stakeholder in the dairy sector especially the smallholder farmer. **AS**

## EXPERT SPEAKS ON DAIRY

# “Digitisation of Indian dairy shall play paramount role in coming future”



**RAHUL KUMAR,**  
CEO, Lactalis India

*India is one of the largest producers of milk across the globe. As per the National Dairy Development Board, India's milk production has been growing by 35.61 per cent during the last six years to 198.4 million metric tonnes (MT) in 2019-20. In an email interview with AgroSpectrum Rahul Kumar, CEO, Lactalis India shared his views about the future of the Indian Dairy sector. Edited excerpts –*

### How do you see the dairy sector 2030 ?

Indian dairy sector has been the sunrise sector for several decades. We are the largest producer of milk across the globe for the last three decades and have been growing 5-6 per cent Year-on-Year. We have doubled the milk production in the last 15 years. Looking at the future, the Indian dairy sector will grow at the same pace owing to increased local demand as well as the immense possibility of exports. By 2030, India will manage to produce 400-500 million MT of milk with a quantum jump from the present production of 195 million MT. However, this would need a complete change in approach if the Indian dairy industry has to cross the milestone.

### Do you think that the current supply chain is good enough to bear the burden of growing population ?

In any agricultural produce, the supply chain

plays a very important role even in the dairy sector. Milk requires a very efficient supply chain due to its perishable nature. India has achieved good success in handling milk from 10 crores dairy farmers producing 55-60 crore litre milk per day, still, we have to travel a long distance as we need to reach a minimum target of 80 per cent of processed milk in the coming future. Cold chain and processing units are keys that require huge investment, awareness and emphasis on quality.

### How we can overcome the hurdles ?

These hurdles can only be removed by dairy companies ensuring support to dairy farmers. This needs awareness, training and close working with milk producers. Problems such as milk with antibiotics, aflatoxins can be only be resolved with training and awareness and providing premium prices to good quality milk, which is not in place presently. Tremendous efforts are needed to propagate silage, appropriate feed during various stages of cattle milk cycle, better farm practices starting from proper shed design, water availability, cow comfort, vaccinations, balanced rations etc. must be ensured to make Indian dairying more efficient, more remunerative for farmers and ensuring global quality.

### where does India's dairy sector stands when it comes to digitisation ?

Digitisation of Indian dairy shall play paramount role in coming future. Firstly, it will enable the farmers to tag animals with Radio-frequency identification (RFID) chips to identify them with precise details of their breed and genetic potential. Proper identification with details in the central database would lead to scientific breeding via proper artificial insemination to improve breed and tap the full genetic potential. The management of ration, disease and yield can only be done by proper use of IT. Digitisation would help tremendously to improve efficiency of dairy and yield per cattle which is must looking to limited resources we have in India. **AS**

**Nitin Konde**

## EXPERT SPEAKS ON POULTRY

## Organised players to boost poultry sector



**VIGHNESH  
SOUNDARAJAN,**  
Executive Director,  
Suguna Foods

*Behavioral change by consumers has paved the way for more startups and organised players to enter poultry industry, providing consumers a wide array of brands to choose from.*

India is one of the world's largest producers of eggs and broiler meat. With the advancement in technology and improved techniques in poultry farming, the poultry industry has seen a visible transformation over the last two decades with the entry of a large number of integrated players. The sector has witnessed major investments in poultry breeding, hatching, rearing, and processing activities.

### Growth drivers

With the pandemic impacting the sector adversely, there has been a good opportunity and growth in pre-cleaned, chilled and frozen poultry produce market. Consumers are slowly shifting their focus to processed meat instead of directly procuring meat from live birds. The promise from brands on hygiene and good quality had taken precedence among customers as they chose to buy meat online during the pandemic induced lockdown, with time definite deliveries. The cooking methodology in processed food is easy as the meat procured is pre-cleaned and ready to be cooked. While globally, this has been the norm, in our country this segment is now picking up. Additionally, most of the brands were open to delivering the meat at the consumer's doorstep and this behavioral change by consumers is likely to stay for long, if not forever. This has paved the way for more startups and organised players to

enter this segment, providing consumers a wide array of brands to choose from.

### Dietary requirement

Nutritionists and health care specialists recommend a minimum of 180 eggs and 10 kg chicken per annum for a healthy adult human. This clearly gives a plethora of opportunity for the sector. Consumers across regions have realised the importance of poultry meat and the need for protein rich foods to be added in their daily diet. In the past, broiler chicken was considered a delicacy. But in recent years, with the increasing income levels, poultry meat has become a part of the staple diet. There has been continuous demand for poultry, in comparison with fish and mutton, as the former is priced relatively lower and is available all year round.

### Facing challenges

There are few challenges that have to be addressed to bridge the demand scale. For instance, there is a lack of infrastructure for storage and transportation. With the broiler industry growing at 15 per cent per annum, there is a huge demand for broiler feed. Grain supply should be revamped to meet the demand. The waste disposal from the poultry market needs to be improved by introducing new waste management practices. There are very few trained professionals in the poultry sector. Some of the veterinary institutions can start special courses on poultry management to develop the interest among youngsters. This will encourage more people to understand the poultry farming methodologies and explore avenues that would be very beneficial.

In the days to come, government authorities must intervene and have separate markets for each of the livestock. There is also a need to implement certification methods at 'butcher, processor and retailer level to ensure hygiene as consumers have become more informed and particular about the whole process involved.

Poultry industry has witnessed a lot of ups and downs and has overcome the same every year. With the economy showing positive signs of revival and consumption increasing, there is a lot of positivity and we expect the industry to bounce back and show a good growth in 2021. **AS**

## EXPERT SPEAKS ON POULTRY

# “Egg production will get further democratised and decentralised”



**ABHISHEK NEGI,**

Co-founder, Eggoz

*Providing high-quality and freshly produced eggs through innovative technology and operational excellence is the raison d'être of Eggoz. The company has chalked out this path by collaborating with small farmers across India. The aim is to supply fresh eggs to every household, local shop, and markets and address the rampant malnutrition problem in our country. The company strives to play a pivotal role in achieving Nutritional Security of Rural India. In an email interview with AgroSpectrum, Abhishek Negi, Co-founder, Eggoz shared his views about the projected status of poultry industry in India by 2030. Edited excerpts;*

## How do you see the Indian poultry sector shaping up by 2030?

Indian population is projected to grow to 1.5 billion by 2030 as per UN, which means in the next 9 years the poultry sector will have to grow much faster to fulfil demand of protein and poultry products like meat and eggs. As a country, we are already lagging behind in egg production and protein availability.

By 2030, egg production will get further democratised and decentralised – leading to the rise of micro entrepreneurs and localised supply chains. With more consumer awareness, traceability and quality standardisation of poultry products will become common demand and may also be enforced by authorities.

By 2030, we will also see further developments in production of plant-based

protein, which may be more resource efficient, provided the economics are sound. We are already observing ethical and plant-based meat/dairy companies grow significantly in the west.

## Do you think that the current supply chain is good enough to keep enduring the burden of our country's ever growing population?

Not at all. Even in 2021, close to 70 per cent of the egg production is concentrated in South and West India. While at the same time, more than 65 per cent of the demand is concentrated in Central, North to East India. Surplus production is supplied to demand centres. This long distance supply is non cold, non-traceable and eggs being supplied are typically 15-20 days old by the time they hit retail in consumption centres.



To solve this we need to localize egg production and supply chain. This would help in:

- Fresh produce for consumers,
- Easier traceability,
- Low wastage and pilferage in transportation and handling, and
- Higher yield for local farmers and boost to the local agri- economy.
- There must be more investment in egg processing centres and cold storages.

### **Poultry sector is still considered as the most unorganised sector. What steps would you recommend?**

Poultry sector is largely a commodity business. As of 2019, 97 per cent of eggs were consumed in unpackaged format in India.

The sector needs more investment in building frontend, farm to consumer brands. Brand building will help companies earn better margins, create impact with higher income for farmers, stakeholders and to generate employment.

The sector is in dire need of technology intervention and consumer centric approach to drive product innovation and better service.

### **What steps should be taken to increase the egg production line, as on that front, India is still lagging behind compared to its foreign counterparts?**

The minimum viable egg farm size in India is 10,000 birds that typically requires an investment of Rs 80-90 lakh. This is due to the elevated design of the farm that helps in ventilation for bird litter being collected daily. In most cases, the litter mountains are not cleared for the entire flock cycle which is 18-20 months, which leads to harmful greenhouse gases like ammonia. Because of this fact, the business has also been majorly run by big farmers and businessmen.

Imagine a way we can bring commercial egg farmers to small and marginal farmers who can rear a flock of 500-5000 birds. Indian agriculture is largely dependent on small and marginal farmers who currently cannot do egg farming due to the present capex heavy farm design. When executed at scale, small egg farming would bring about another white revolution in India and contribute significantly to egg production as well as farmer income.

At Eggoz, we have developed the Pragati farming model where farmers can start smart farms of 250 to 5000 birds. Eggoz provides 100 per cent purchase guarantee, supply of feed and inputs' as well as regular veterinarian support.

### **Since the entire world is going digital, where does India's poultry sector stand when it comes to digitisation? In the near future, do you think by adding digital connect, the business will further enhance the growth of India's poultry sector?**

Technology intervention in the poultry sector has been minimal. There is a huge scope of digitisation of the entire value chain right from bird management to supply chain.

Digitisation of the value chain will also help in providing traceability of produce and a much more efficient supply chain.

Data will help provide better conditions for the birds as well as provide predictive insights to mitigate livestock related risks. Data will also help build trust worthy traceable value chains that will develop consumer trust and superior experience. At Eggoz, we have developed technology platforms for end to end flock management, IoT connect and supply chain. [AS](#)

**Nitin Konde**

## EXPERT SPEAKS ON AGRITECH

# The Next Decade of Indian Agritech



**JINESH SHAH,**  
Managing Partner,  
Omnivore

*Affordable precision farming technologies will play a pivotal role in building sustainability in agriculture. Farmers can reap the benefits of actionable insights from rich data on weather, nutrients, moisture, and crop health.*

**W**e are living through an inflexion point in India's agricultural technology (agritech) sector. From less than 50 companies in 2013, India is now home to more than 1,000 agritech startups working to transform the sector. This is also reflected in the investment landscape, where capital inflows into the sector between 2010 and 2019 stood at \$1.9 billion, of which \$1.7 billion came between 2014 and 2019. The COVID-19 pandemic has actually accelerated the adoption of agritech by Indian farmers and agribusiness intermediaries, shifting them from informal markets to the digital ecosystem. When traditional markets fell apart during the lockdowns, farmers, traders, and rural retailers turned to agritech startups for solutions. Not only did they receive critical support, but they also experienced a better way of doing business in the long term. It is certainly an exciting time to be in this dynamic sector, as it holds tremendous opportunities in the coming years.

Ten years ago, the sector was little more than

a twinkle in the sky. Investing in agritech was considered lunacy. Then, in 2015, the business-to-consumer (B2C) startup sector glutted itself with funding and competing business models. Investors refocused on business-to-business (B2B) opportunities, especially those related to small and medium enterprises (SMEs), and agritech came under the scanner. Initially, most of the VC investments in agritech were focused on farm-to-consumer brands, B2B Agri marketplaces, and rural fintech for farmers.

In the last few years, rapid advancement in underlying technologies like mobile internet and rural smartphone penetration has provided the digital backbone to scale both business-to-farmer (B2F) and business-to-business-to-farmer (B2B2F) models. An increasing number of farmers are now able to use digital platforms to improve their yields, lower their operating costs, and ensure their produce gets the right market value. These trends have helped catalyse a supportive agritech ecosystem with participation from accelerators, strategic corporates, and VCs at every stage. In 2020, we explored what agritech will look like in a decade. Our report, 'Future of Indian Agriculture & Food Systems: Vision 2030' details our findings, their implications, likely scenarios, and a bold vision for the sector. Here, drawing from our detailed work, we have analysed emerging areas among agritech innovations and the factors supporting them.

## A growing digital ecosystem

Smallholder farmers are critically important for the global food supply and India is home to 130 million of them. Increasingly, we are seeing startups focused on solving challenges faced by this segment, including farmer profitability, resilience, and sustainability. B2B Agri marketplaces and farmer platforms are two clear areas where we can expect to see more growth and innovation in the next few years.

B2B Agri marketplaces existed alongside traditional systems in the pre-pandemic years. Then, as the lockdowns froze the latter, farmers,



traders, and retailers adapted to the situation and switched to digital platforms from the safety of their homes. This was greatly aided by the advent of low-cost data solutions in the country boosting smartphone penetration in rural India. In the coming years, we will see more digital marketplaces across various agricultural sub-sectors including khet-to-kirana, agri-inputs, and even the sale of livestock.

Startups working on full-stack farmer platforms are bringing together agronomy services, input supply, fintech solutions, and market linkages under the same umbrella. This is helping develop multidimensional engagement with farmers, which in turn creates rich data to improve the predictive powers of machine learning models.

### Government-supported interventions

Governmental support in this behemoth sector plays an important role to usher in capital. This year, the Union Budget 2021 steered our attention to the white spaces in Indian agriculture that require interventions. The government announced increased credit flows to animal husbandry, dairy, and fisheries, including building modern fishing harbors and fish landing centers. While the budget highlighted only three sub-sectors of agriculture, it underlined the importance of looking beyond horticulture and cereals. Consolidation of fragmented landholdings has been a challenging area for the government. However, it is what the future holds for achieving economies of scale for smallholders. Between 2010 and 2020, India built its foundational digital identity via the India Stack. The next ten years will focus on building upon that to create a robust AgriStack with a multi-layered agricultural information system. This will be one of the most impactful interventions in the future that will catalyse the overall efficacy of other innovations in agriculture.

### Consumer-driven trends

The pandemic has sharply driven up the consumer demand for traceable and nutritious produce. This has led to an increase in demand for 'farm-to-consumer' (F2C) brands that can assure quality and provide legitimate traceability back to the source. Lockdowns have proven to be a strong catalyst as more people are shifting to online ordering. This has created ample scope for F2C brands to disrupt traditional distribution channels.

### Managing the impact of climate change

Agriculture is one of the main perpetrators of climate change and also deeply suffers from its ill effects. Degradation of soil fertility, depleting water tables, increased risk of pests, and pathogens from monocropping, are only a few of the dire challenges farmers are grappling with. However, we are witnessing a steady rise of startups with sustainability at the core of their business.

Affordable precision farming technologies will play a pivotal role in building sustainability in agriculture. Farmers can reap the benefits of actionable insights from rich data on weather, nutrients, moisture, and crop health. This will take the guesswork out of farming and ensure optimal use of resources, including the reduction of agrochemicals and water.

Farm automation for smallholder farmers, albeit a nascent area, for now, will grow steadily. Autonomous and semi-autonomous farm robotics will solve the problem of dwindling labour force, helping to lower the resource footprint for farmers and reduce the overall drudgery of farm work.

By 2025, India will need to produce an estimated 300 million tonnes of food to feed its population which would require a whopping 45 million tonnes of fertiliser! Fortunately, collective efforts by various stakeholders in climate change management are paving the way to create resilient, high yielding varieties of crops while significantly reducing input requirements.

Finally, as we are moving to a more animal protein-intensive future, the aim will be to do so with humaneness and environmental sustainability in mind. To achieve that we will be seeing more interventions in animal breeding, sustainable smart feed and care, and developments in alternative proteins.

### Feeding 10 billion

The narrative of Indian farmers desiring a better life for their progeny away from agriculture, needs to be altered. For that to happen, agriculture must become a steady and profitable trade for India's 130 million farmers and their families. Agritech entrepreneurs will be part of that solution, leveraging innovation, technology, and persistence to reinvent agriculture and food systems. **AS**

## EXPERT SPEAKS ON SPACE TECH

“Space tech will help ensure that we improve the productivity and profitability of Indian agriculture.”



**MARK KAHN,**  
Managing Partner,  
Omnivore

*Omnivore pioneered agritech investing in India, backing over 30 startups since 2011, and currently manages Rs 9.35 billion (approximately \$132 million) across two funds. Recently Omnivore has invested in hyperspectral imaging startup Pixxel and has high hopes for its hyperspectral technology. Edited excerpts-*

### **What is the status of agritech in India? What more are we looking for in agritech by 2030?**

In 2020, the pandemic forced Indian agriculture to go digital. This shift from informal and analogue systems to formal and digital ones will accelerate even further in 2021. However, with rising awareness of the risks created by climate change, we expect to see more climate-centric and sustainability-focused startups, including in the field of space tech.

### **Why do we need more space tech startups like Pixxel to solve issues in India's agricultural scenario?**

Technology-led interventions are necessary to enhance agricultural productivity and improve farmer incomes without further degrading the environment. Satellite imagery and remote sensing data are invaluable tools for forecasting agricultural output, regulating crop inputs, and even calculating how much carbon farmers are

sequestering. Multispectral, synthetic aperture radar (SAR), and hyperspectral satellites can create rich datasets, yielding deep insights to make farming more profitable, resilient, and sustainable.

### **Will the use of space tech have far-reaching implications ?**

Insights created by space tech will help ensure that we improve the productivity and profitability of Indian agriculture. Likewise, space tech will play a critical role in timely prediction of natural calamities, droughts, and monitoring adverse environmental processes such as deforestation and desertification.

### **What does the investment trajectory look like for space tech in India?**

India ranks fifth on the global Climate Vulnerability Index. We are already dealing with the adverse effects of climate change in the form of rising temperatures, frequent extreme weather events, and fluctuating precipitation. Current farming practices in India are exacerbating the situation by consuming 85 per cent of our freshwater resources while accounting for 20 per cent of our greenhouse gas emissions. To combat such challenges swiftly and efficiently, agritech interventions are crucial. Space tech startups like Pixxel can identify key interventions to transform Indian agriculture while also monitoring potential risks for farmers. The coming years will definitely see more investments in this versatile technology.

### **What could be the potential business models that will benefit Indian farmers, majority of whom are smallholders?**

While most farmers, except the very largest, will not be direct users of the space tech services, nodal institutions such as FPO's, cooperative societies, farmer platforms, agribusinesses, and government organizations will play an important role in information dissemination. They can purchase imagery and data, sharing the same with their farmer customers. **AS**

**Dipti Barve**  
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## AFC India appoints Ravindra Boratkar as Addl Director

Ravindra Boratkar, Managing Director of MM Activ Sci-Tech Communications Pvt Ltd; Publisher, MMA publications; and Chairperson, Agrovision Foundation, has been appointed as Additional Director on the Board of Directors of Agriculture Finance Corporation (AFC) India Ltd, formerly known as Agriculture Finance Corporation Ltd, a deemed government organisation fully owned by NABARD, other commercial banks & Exim Bank of India. AFC is a premier national developmental Consultancy organisation and an institution dedicated to rural prosperity. The Board of Directors of the AFC India Ltd, in a meeting held on April 15, 2021, appointed Boratkar as Additional Director. The board's decision of



his appointment was communicated to him through a letter by B. Ganeshan, MD, AFC India Ltd. Boratkar is the Publisher of AgroSpectrum, NuFFooDS Spectrum and BioSpectrum (India & Singapore), B2B monthly magazines and web portals devoted to Agriculture, Nutraceuticals and Food Processing and Biopharma, Life

Sciences and Medtech. He is also President of an important economic think tank Maharashtra Economic Development Council (MEDC). His other positions include Director, Cian Agriculture and Infrastructure Ltd; Chairperson, PURTI Cooperative; Trustee, Bhavsar Foundation; and Founder Member, Indian Federation of Green Energy.

## Centre appoints TAFE CMD as PSEB Chairperson

TAFE Chairman & MD, Mallika Srinivasan, has been appointed as the Chairperson of the Public Enterprises Selection Board (PESB), Department of Personnel & Training under the Ministry of Personnel, Public Grievances & Pension, Government of India. The public sector plays a crucial role in every sphere of economic activity and in the strong economic growth of our nation. It is the largest employer in the country. This is for the first time that a private sector specialist has been appointed as the head of PESB, responsible for appointment of top management posts in the Central Public Sector Enterprises (CPSEs). The Appointments Committee of the Cabinet has approved her appointment as the Chairperson of PESB for a period of 3 years from the date of assumption of charge, or until the attainment of the age of 65 years.



## Dr B.S. Gotyal bags International Award



For his outstanding contribution in the Jute Pest Management, Dr B.S. Gotyal, Senior Scientist, ICAR-Central Research Institute for Jute and Allied Fibres, Barrackpore, Kolkata has been bestowed with the prestigious 'Early Career Entomologist

Award' from the Royal Entomological Society, London, United Kingdom. The Award carries a Citation and £ 1250 GBP Award money. Ph.D. holder from Division of Entomology, ICAR-Indian Agricultural Research Institute, New Delhi, Dr Gotyal has been engaged in Host Plant Resistance (HPR) in Jute for the last 12 years. Dr Gotyal has extensively worked and contributed significantly by successfully identifying the sources and mechanism of resistance against Jute Hairy Caterpillar in the Wild Species of Jute *Corchorus aestuans*. The identification of Jute Germplasm as a resistant source truly unfolds the practical utility of wild accession of *C. aestuans* (WCIN 179) in developing resistant varieties due to its crossability with cultivated Jute varieties.

## IVRI transfers CSF & Sheep Pox Vac tech to Hester

The Indian Council of Agricultural Research (ICAR)-Indian Veterinary Research Institute (IVRI), Izatnagar, Bareilly, Uttar Pradesh transferred the Technology - CSF & Sheep Pox Vaccines to Hester Biosciences through Agrinnovate India Limited in a ceremony. The Classical Swine Fever (CSF) is an important disease of pigs that causes 100 per cent mortality. In India, the disease is controlled by a lapinized CSF vaccine (Weybridge Strain, U.K.) produced by killing large numbers of rabbits. To avoid this, the ICAR-IVRI earlier developed a Cell Culture CSF Vaccine using the Lapinized Vaccine Virus from foreign strain. The Sheep Pox Vaccine uses



indigenous Sheep Pox Virus Strain [SPPV Srin 38/00] and is adapted to grow in the Vero cell line which makes the Vaccine production to be easily scalable. The Vaccine is innocuous, safe, potent, and immunogenic [efficacious] for sheep aged more than six months of age.



## ICAR-IISR receives patent for Microbial Encapsulation Technology

The ICAR-Indian Institute of Spices Research, Kozhikode, Kerala has been granted the Patent (No. 361021) for Microbial Encapsulation Technology. It is a novel method of storing and delivering the PGPR / microbes through Biocapsules. The Institute has successfully developed, field-tested and commercialized Encapsulation Technology (Biocapsules) for the smart delivery of agriculturally important microorganisms. The technology was developed by a team including Dr M. Anandaraj, Dr R. Dinesh and Dr Y.K. Bini. The technology involves Encapsulation of the microorganisms of interest in a Gelatin Capsule for delivery to the agricultural crops for the enhanced soil nutrient solubilization, growth and yield. The recently patented product is used for cultivation of spices, vegetable and other crops. This technique can be used for delivering all kinds of agriculturally important micro-organisms, viz., N fixers, nutrient solubilizers / mobilizers, Plant Growth Promoting Rhizobacteria (PGPR), Trichoderma, Burkholderia, etc.

## IIT Kgp develops betel leaf oil extraction tech

Extraction of essential oil from fresh and cured betel leaves is of high interest for industrial applications including medicines, cosmetics chewable mouth fresher which has a very large market in the world.

However, the extraction processes suffer from low economic viability and wastage in the value chain of betel leaves. Prof.

Proshanta Guha and his research group from IIT Kharagpur's Agricultural and Food Engineering Department have addressed this challenge by developing a novel betel leaf oil extraction technology that can improve the overall process efficiency. The extractor is capable of saving 44 per cent of the time and 30 per cent of the energy requirement while increasing the oil yield by more than 16 per cent, as compared to the current process and apparatus popularly used. The extractor was envisaged to be affordable to the betel leaf growers since the cost of fabrication of the extractor was calculated to be Rs 10,000 and Rs 20,000 for 10L and 20L sizes, respectively.





## BVT gets patent for 'Computer-controlled honeybee dispenser system'

Bee Vectoring Technologies International Inc. has announced that the Company has been granted a US patent for the latest version of its honeybee hive dispenser system. The new system is computer-controlled and enables metered, uniform delivery of plant protection products to crops using commercial honeybees.

This is the first patent on its honeybee dispenser system, and represents the first patent in a fifth overall area of technology of the Company. The system is part of BVT's growth strategy to service 2.88 million (1) commercial bee hives in the US and 91 million (2) worldwide. Leveraging both honeybee and bumblebee systems extends the Company's reach to 100 per cent of the bee vectoring market opportunity for flowering crops, including high volume crops such as almonds, sunflowers and apples, and high value crops such as blueberries, melons, strawberries and raspberries.

## Bayer, AIM to collaborate in promoting agri-tech innovations

Atal Innovation Mission (AIM), NITI Aayog has collaborated with Bayer, a global enterprise with core competencies in the fields of healthcare and nutrition, to work towards the mission's innovation and entrepreneurship initiatives across the country. A Statement of Intent (SoI)



of a strategic partnership between AIM and Bayer was signed and exchanged to formalise the collaboration. The SoI will span the promotion of science education, advancing digital solutions and agri-tech to strengthen supply chains as well as healthcare projects. Additionally, Bayer will collaborate with AIM to support their current and future programs and foster innovation and entrepreneurship across the agriculture and healthcare sectors. The collaboration with Bayer is a long term strategic one for Atal Innovation Mission as their areas of specialisation Agriculture, Healthcare and Lifesciences are areas of national importance, especially more so in the times of the Pandemic. The partnership will be holistic in nature spurring and supporting knowledge and innovation at school, university and startups leveraging Bayer's domain expertise, global reach and facilities.

## Skymet launches skAIgeo to provide geospatial proprietary farm-level data

The leading agri risk-monitoring company, Skymet, has launched a digital platform 'skAIgeo' (Skymet's new geospatial avatar) to provide its 10 years of geospatial proprietary farm-level data repository to the public free of cost. This digital platform paves the way for farmers to enhance crop yield and decrease crop risks. skAIgeo formulate a predictive and prescriptive business intelligence solution for banking sector that leverages Agri-alternate data for effective credit risk assessment and loan recovery. skAIgeo helps the insurance sector to customise policies or programs after evaluation of crop risk assessment using different indices. The platform aims to tap into the geospatial business valued at Rs 30,000 crore, targeting 1 million farmers this year and work towards the financial inclusion of rural India. The launch is in sync with the Prime Minister's announcement of liberalising regulations on geospatial data and maps of the country.



## ICAR holds virtual symposium on 'Advances in Plant Biotechnology & Genome Editing'

The ICAR-Indian Institute of Agricultural Biotechnology, Ranchi, Jharkhand in association with the prestigious Plant Tissue Culture Association (India) organised a virtually International Symposium on 'Advances in Plant Biotechnology and Genome Editing (APBGE - 2021)' from April 8 to 10, 2021. The Symposium was aimed at advanced biotechnological applications, including CRISPR/Cas based Genome Editing Technology for developing agricultural and horticultural crops with improved abiotic and biotic stress tolerance and higher yield and quality. Dr Trilochan Mohapatra, Secretary (DARE) & Director General (ICAR) encouraged the researchers for understanding the limiting processes of plant sciences using a system biology approach. Accentuating the importance of hardy plant species, he urged to utilise them for identifying the novel genes for various traits. Dr Mohapatra stressed continuing the support to Centres of Excellence and capacity building in traditional and advanced Biotechnological approaches.

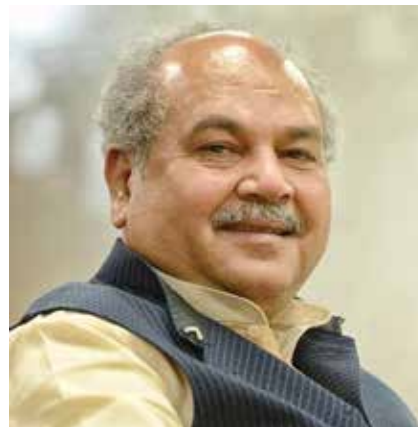
## PAU to commercialise Bt cotton in partnership with IFSA Seeds

The Punjab Agricultural University (PAU) entered into agreement with Sri Ganganagar based seed company, IFSA Seeds (P) LTD for the commercialisation of Bt cotton variety



PAU Bt 1. The Memorandum of Agreement (MoA) was signed by Dr Navtej Singh Bains, Director of Research, PAU and Sukhwinder Bishnoi of IFSA Seeds (P) LTD. PAU Bt 1 is the first Bt cotton variety of India developed in public sector with inbuilt resistance against bollworms. Highlighting the salient characteristics of the

variety PAU Bt 1, Dr Paramjit Singh, Director-cum-Principal Cotton Breeder, PAU Regional Research Station, Bathinda informed that its average seed cotton yield is 2,812 kg/ha. It has bigger boll size of 4.3 g and ginning out turn is 41.4 per cent. It exhibited superior fibre properties with 28.2 mm 2.5 per cent span length, 28.6 g/tex bundle strength and 4.5 µg/inch micronaire value.



## Tomar inaugurates web education channel Agri-diksha

Narendra Singh Tomar, Union Minister of Agriculture & Farmers' Welfare has virtually inaugurated the "Virtual Classroom" & "Agri-Diksha Web Education Channel" recently. The Union Minister also released the "Exploration Centre & Drone Remote Sensing Laboratory" and "Manual on Drone Remote Sensing" during the occasion. The academicians and scientists of the Pusa Institute along with Krishi Vigyan Kendra, State Agricultural Universities and Education Division of the Council had taken special efforts for developing "Agri-Diksha Web Education Channel" and "Exploration Centre & Drone Remote Sensing Laboratory". The Union Minister stated that digital platforms help to connect with a wide array of people at a given time. He also emphasized that the two programmes will be a milestone in uplifting the livelihood standards of the agri-students and farmers to a large extent.

## IIT Madras, AARDO hold e-training program on farm tech

Indian Institute of Technology- Madras is partnering with African-Asian Rural Development Organization (AARDO) to organize an e-training program on technologies for rural areas and their livelihoods (farm and non-farm) with a focus on creating access to value chains and markets. It also aimed at creating awareness towards replacing traditional/ obsolete technologies with environmentally friendly and climate-resilient technologies. The training program, which held from March 22, 2021 to April 1, 2021 was organised by Team SIDDHI, the technology and Sustainable Development platform of IIT Madras with an emphasis on social relevance and global



impact. Select technologies, solutions and approaches developed by IIT Madras in collaboration with its partner institutions were showcased during the program. The course is being held for the benefit of middle and senior-level executives from government departments, ministries, and agriculture engineers and scientists engaged in policy formulation, implementation, planning and appraisals.



## PAU inks licensing pact with Generation Seeds for chilli hybrid

The Punjab Agricultural University (PAU) has entered into agreement with Generation Seeds Private Limited, a Patiala-based seed company, for licensing of chilli hybrid CH-52. The memorandum of agreement (MoA) was signed by Dr Navtej Singh Bains, Director Research, PAU and Paramjit Chandi, Generation Seeds on behalf of their respective organisations. This is the 266th MoA and 62 PAU technologies have been commercialised so far through the Technology Marketing and IPR Cell under the Directorate of Research, PAU. This hybrid will revolutionise chilli production, specially, under low tunnel cultivation. Salient characteristics of the variety are such as the fruits of CH-52 are long (9.8 cm), deep green in colour and pungent (0.9 per cent capsaicin). The hybrid is moderately resistant to leaf curl virus, fruit rot and root knot nematodes. The hybrid is suitable for cultivation under low tunnel and gives an average yield of 106 q/acre.

## Research shows feeding cattle seaweed reduces greenhouse gas emission

According to new findings from researchers at the University of California, Davis, a bit of seaweed in cattle feed could reduce methane emissions from beef cattle by as much as 82 per cent. Ermias Kebreab, professor and Sesnon Endowed Chair of the Department of Animal Science and director of the World Food Center conducted the study along with his PhD graduate student Breanna Roque. Kebreab and Roque are building on their earlier work with dairy cattle, which was the world's first experiment reported that used seaweed in cattle. Since cattle are the top agricultural source of greenhouse gases, many have suggested people eat less meat to help address climate change. In the new study, Kebreab and Roque tested whether those reductions were sustainable over time by feeding cows a touch of seaweed every day for five months, from the time they were young on the range through their later days on the feedlot.





## Tradecorp opens its first office in Pune

The new Tradecorp office will be located at Wakad in Pune. This location has been chosen with a strategic view, as Pune in Maharashtra is one of the main points for business in agriculture, in a mid-point for transportation along the country and an open door for great nutrition market due to the size and variety of crops that surround the area. The opening of the new India office will accelerate every process in the country, from product registration to a closer and more efficient customer service. The Tradecorp India team was founded in 2015, without a physical place and lots of effort over these 5 years, they have achieved a total integration in the country, bringing expert solutions and more than 35 years of experience to every corner. Tradecorp manufactures and distributes specialty fertiliser and crop nutrition products for agriculture.

## NFL clocks record high fertiliser sales of 59.36 LMT in 2020-21

National Fertilizers Limited (NFL) has, once again, recorded highest-ever total fertiliser sale of 59.36 Lakh MT in 2020-21 beating its previous best of 57.04 Lakh MT achieved during 2019-20. This includes sale of company's own urea, imported urea and other P&K fertilizers. On the production front, the company produced 37.99 Lakh MT of urea in its plants recording a capacity utilisation of 117.6 per cent despite severe restrictions of COVID-19 and other despatch related challenges due to farmers' agitation in Punjab. In the plants, Panipat unit has set a new production record of urea and Bentonite Sulphur and Vijaipur unit produced highest ever volume of bio fertilizers. The company registered steep growth in sale of seeds and agrochemicals. While sale of seeds grew by 35 per cent than corresponding period last year (CPLY) at 1, 85,550 quintals, the agrochemicals segment indicated a growth of 95 per cent than the previous year.



## Azelis India acquires distribution assets of Spectrum Chemicals

Azelis, an innovation service provider in the specialty chemicals and food ingredients distribution industry, has signed an agreement to acquire the distribution assets of the Indian companies Spectrum Chemicals and Nortons Exim Private Limited (Spectrum). Both companies are owned by the Mehta family and specialize in the distribution of specialty chemicals for home care, the road sector, agrochemical and other applications. Spectrum has offices in Mumbai and New

Delhi. Parindu Mehta, the current owner of Spectrum, will remain with Azelis. Spectrum will provide Azelis with better access to other regions of India, enabling Azelis to gain additional cross-selling opportunities in related markets and attract new mandates. The deal is also expected to facilitate growth opportunities in India in both agrochemicals and road marking. There is a plan to set up an agrochemicals lab at Azelis' premises soon, in addition to the three labs Azelis already runs in India.



## Sonalika continues domestic growth streak with 41.6% rise in FY'21

After consistently achieving records of excellence month after month in FY'21, Sonalika Tractors has recorded its highest-ever annual sales of 1, 39,526 tractors in FY'21 and among the leading market share gainers in the industry. The company has registered a phenomenal domestic growth rate of 41.6 per cent over FY'20 volumes, which is the highest in industry and beaten industry growth (estimated 26.7 per cent) by a significant margin. Alongside, Sonalika has recorded its highest-



ever annual rotavator sales of 50,000 units in FY'21, recording double the volumes registered in FY'20. Overall, Sonalika Tractors has sold 13,093 tractors in March'21, registering a whopping 135 per cent growth over March'20. This success is credited to the committed team along with our distributors, dealers, financiers and loyal customers who stayed connected and performed in the markets under adverse conditions without much travel or physical connect, company stated.

### IFFCO to maintain old selling price during Kharif 2021



On the issue of price revision of complex fertilizers by IFFCO, Union Minister (C&F) D.V. Sadananda Gowda had a discussion with senior officials of the Department of Fertilisers and IFFCO representative on April 8 and the company was suitably advised to ensure that the existing stock of DAP and complex fertilizers are sold on the old prices to the farmers. The same was confirmed by IFFCO that they will be selling nearly 11.26 LMT available stock of DAP/Complex fertilizers on the older rates. A

meeting was again convened under the chairpersonship of Secretary (Fertilisers) on April 9 wherein the availability scenario was reviewed specifically with regard to P&K fertilizers. The companies have been advised to continue the movement of fertilizers so as to achieve the desired level of pre-positioning before the peak phase of the Kharif season. The manufacturers and the importers have given assurance with regard to achieving the target indigenous production and imports of fertilizers.

## FSII hails Govt's decision of increasing cotton seed price

Federation of Seed Industry of India (FSII) has welcomed the government's decision to increase cotton seed price by 5 per cent. FSII represented to the Government of India that the cotton seed business was becoming unviable for the industry and research investments in developing new hybrids has dwindled significantly. If this is not corrected immediately it will adversely affect cotton yields and farmers profitability. The textile industry has aggressive plans to grow their industry in this decade. Cotton

production has to go to 5.7 crore bales by 2027 from the current level of 3.7 crore bales. It is not possible unless we upgrade the technology in seed. Cotton yield and production has stagnated due to declining investment in breeding and lack of new technology introduction. India's pre-eminent position in global cotton markets is in danger of being lost. India is losing competitiveness with plateauing yield, declining farmer profits & export volume, allowing other countries to gain share in the international market.



## ICAR-NRCM, IIP to develop innovative packaging technologies

The ICAR-National Research Centre on Meat (NCRM) and the Indian Institute of Packaging (IIP) have entered into a MoU for facilitating collaborative research and training. Dr S.B. Barbuddhe, Director, ICAR-NRC on Meat, Hyderabad and Dr Tanweer Alam, Director, IIP, Mumbai signed the MoU. Both the institutions resolved to submit joint research proposals, undertake students' research programmes and organize capacity building programmes

to develop innovative packaging technologies and propagate scientific packaging practices in the Meat sector. NCRM is working on intelligent packaging systems, biodegradable packaging and retort processing to provide packaging solutions to stakeholders. They agreed to facilitate use of each other's infrastructure and facilities to scientists, faculty, research scholars and students; to undertake research based on the location-specific problems on mutual agreement.



## NCML, ASCI to conduct skill enhancement training in Agri sector



Private-sector agriculture post-harvest management company, National Collateral Management Limited (NCML) has announced that it has signed an agreement with the Agriculture Skill Council of India (ASCI) to provide skill training in the agriculture sector. As per the agreement, the process involves three parts -- training courses, prior learning and special projects. NCML will recognise prior learning for about 8-9 different skills which are matching the qualification part of ASCI and will recognise about 920 people in the country across 19 cities in India. The need for skill development in the agriculture warehouse has been recognised by the government and the agriculture industry. This partnership will increase the benefit to the agriculture warehousing industry, which will play a more significant role in shaping and evolving the vocational training curriculum and programme in the country.

## FCI identifies 7 locations for Spoke model silos

Food Corporation of India (FCI) inspects the condition of their godown periodically and takes corrective action such as repair and renovation to ensure the storage worthiness of godowns. However, details of the part capacity in some of the godowns which requires major renovation or have been categorised as 'End of life Godown'. Central Warehousing Corporation (CWC) does not have any dilapidated warehouse. However, unstorage worthy capacity of 41300 MT at CWC Godowns are earmarked for major repairs. Under the proposed Hub & Spoke model silos at 7 locations with capacity of 3,375 LMT have been identified. In order to upgrade and modernize the storage facilities, Government of India has chalked out an Action Plan for construction of steel silos on PPP

(Public Private Partnership) mode in the country. Silos with capacity of 30.75 LMT are at various locations have been awarded. Out of which a capacity of 8.25 LMT is complete and remaining is under various stages of development.



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