

Volume 1 = Issue 4 = June 2020 = ₹150

52 pages including cover

A "Game Changer" for Agro sector



"Al-powered indoor agriculture is tempting a whole new breed of farmers"
Kunal Prasad, Co-founder, CropIn Technology Solutions Pvt Ltd - 24 Govt announces Rs 1 lakh crore agri infrastructure fund for farm-gate infrastructure - 14

Smart farming to revolutionize agro-industry – 22

Experts suggest large scale implementation of micro irrigation for better results - 38

An MACTIV Sci-Tech Communications

BioSpectrum

CONTENT MARKETING

IT'S NOT ABOUT CONTENT ... IT'S ABOUT GREAT CONTENT!

A Vast Array of Custom Publishing Opportunities!



✓ INFOGRAPHICS

✓ WHITEPAPERS

✓ CASE STUDIES

Indigenous Medical Devi & Diagnostic Industry growing at 6 crosses Rs 36,000 cm

BioS

And the set of the set

ORIGINAL WEB CONTENT
 SPECIAL PROJECTS

✓ CUSTOM E-NEWSLETTERS

✓ CORPORATE COLLATERAL

✓ CUSTOM PRINT PUBLICATIONS

LANDING PAGES

We'll provide the expertise & resources to meet your goals!

www.biospectrumindia.com

Digitally Reinventing Laboratory Supply Chain

Email: ankit.kankar@mmactiv.com | Mobile: +91 9579069369





WEBINARS

Lead Generation | Thought Leadership | Brand Awareness

Every AgroSpectrum India webinar is a full-service, turnkey marketing solution that generates leads, enhances your brand and identifies your company as a thought leader.

When we create a AgroSpectrum India webinar, we fuse your message with the current interests and needs of our audience (your targets!). And when all is said and done, you'll have an online event that's on target, expertly marketed, flawlessly produced and delivers a strong return on investment.

Average Webinar Registrants

WEBINARS ARE ACCESSIBLE VIA DESKTOP AND VARIOUS MOBILE DEVICES.

Traditional Webinars Rs. 3.00,000

Live, hour-long educational sessions that feature some of the most renowned experts in printing. Sponsorship provides a unique opportunity to align your brand with our editorial content.

Webinar Express Rs. 2.00,000

Short, pre-recorded webinars available to busy professionals on-demand. Work with an editor to put your presentation together or provide your own content.

NOTEWORTHY *extras:*

Highlight Reel Rs. 1.00.000

Work with our team to create a short video featuring the highlights of your event. This video will be posted on our site as content and used to encourage registrants who have not viewed the webinar to check out the full-length session!

Whitepaper Spotlight

Give us a resource to feature on the event console and in post-event emails.

Webinar Recording

Use these video files as content on your own site! Included in all webinar packages.

Samples: biospectrumasia.com/webinars

www.agrospectrumindia.com

Write Email: ankit.kankar@mmactiv.com +91 - 9579069369

AgroSpectrum Updating Present www.agrospectrumindia.com

Volume 01 | Issue 04 | June 2020

Publisher & Managing Editor

Ravindra Boratkar

Advisor

Dr C. D. Mayee Former Chairman, ASRB-ICAR

Chief Editor Milind Kokje milind.kokje@mmactiv.com

Advisor - Content

Vijay Thombre

Executive Editor

Narayan Kulkarni

Assistant Editors

Dipti Barve / Dr Manbeena Chawla

MM Activ Sci-Tech Communications

Alok Srivastava (National Business Head-Ad Sales & Marketing)

1st Floor, CIDCO Convention Center, Sector 30A, Vashi, Navi Mumbai, Maharashtra-400703.

402, Govind Apartments, Shankar Nagar Square, Nagpur 440010. Tel. No: +91-712-2555 249

'NITON, Block 'C', I Floor, No.11/6, Palace Road, Bangalore-560 052.

Pooja Lalingkar (Sr. Executive - Ad Sales & Marketing)

Mobile: +91-9619597528 | E-mail: pooja.lalingkar@mmactiv.com

Ankit Kankar (Manager- Product & Marketing Communication)

#08-08, High Street Centre, 1 North Bridge Road, Singapore - 179094

Tel: +65-63369142 | Fax:+65-63369145 | E-mail: saradha.mani@mmactiv.com

103-104, Rohit House 3, Tolstoy Marg, Connaught Place, New Delhi - 110001.

Tel.: +91-80-41131912/13 | Mobile: +91-9845128747

Tel. No: +91 11 4354 2737 | Mobile: +91-9579069369

E-mail: alok.srivastava@mmactiv.com

E-mail: ankit.kankar@mmactiv.com

Correspondent: India

Kalyani Sharma

South Region:

West Region:

North Region:

Nagpur: Manisha Boratkar **Correspondent: APAC**

Hithaishi C. Bhaskar

Social Media Editor

Ankit Kankar ankit.kankar@mmactiv.com

CFO & Special Correspondent

Manasee Kurlekar

Operation & Production

Asmita Thakar asmita.thakar@mmactiv.com

Design

MEDIA VISION

Circulation, Subscription and Media Enquiry

Sudam Walekar sudam.walekar@mmactiv.com



Sci-Tech Communications

AgroSpectrumidia.com

TOP STORIES



QR Code

seed federation to host virtual congress in June

International



Aqua Tech startup aquaconnect receives world changing ideas 2020 awards

Scan the QR Code



Scan the

QR Code

Boragen join hands with dole to develop boron based treatment for banana disease

Neogen launches enhanced genomic test for commercial cattle

Scan the QR Code

www.agrospectrumindia.com

Product & Marketing: Ankit Kankar email: ankit.kankar@mmactiv.com

Printed and published by

INTERNATIONAL: Singapore MM Activ Singapore Pte. Ltd.

Saradha Mani, General Manager

Ravindra Boratkar on behalf of MM Activ Sci-Tech Communications Pvt Ltd

Printed at Spectrum Offset, D-101, 1st Floor, Satyam Estate, Behind CDSS, Erandwane, Pune-411038. Maharashtra. Tel : +91 20 2543 6556. TIN No: 09565712431

Published from Ashirwad, 36/A/2, S.No. 270, Pallod Farms, Near Bank of Baroda, Baner Road, Pune- 411045. Tel. No: +91 20 2729 1769

www.agrospectrumindia.com

Disclaimer:

- Views expressed in the published articles are personal opinions of the contributors. Agro Spectrum does not necessarily claim to support these views.
- Readers are advised to make proper enquires before entering into any commitment in relations to advertisements appearing in this publication. The Printer, Publisher, Editor and Owner of the magazine will not be liable for any consequences.

Contents and advertisements in Agro Spectrum are purely for information purposes and the Publisher & Editor of Agro Spectrum give no warranty and accept no responsibility for the accuracy or completeness of information provided therein. Readers must undertake research and take professional advice before acting on any information provided in Agro Spectrum.



An incomplete reform?

Mid the disruptions in supply chain and restrictions on marketing caused by closure of markets following lockdown due to COVID-19 pandemic has arrived the much-needed stimulus package for the farm sector. In one of her recent series of press meets, Finance Minister Nirmala Sitharaman unfolded the details of the package. Its nature is more about basic changes in the system than the immediate financial help to the farmers.

In one sense it is good that the package attempts to address the major gaps in the agriculture sector, particularly supply chain, that have come to fore in a bold way due to the unprecedented lockdown situation. Though the lockdown is easing now in stages in many safe areas its effects are going to remain for some more time now and will need measures to tackle it. Such measures for immediate relief to farmers seems to be still lacking.

It appears to be a huge package worth Rs 1.5 trillion. But the biggest element of it worth Rs 1 trillion is a fund for entrepreneurs to set up facilities for procuring, storing and marketing of agriculture produce. It will finance setting up cold chains, postharvest management infrastructure and storage centres. This is coupled with governance and administrative reforms for direct marketing of farm produce by farmers. Both these announcements coming together is important because farmers would not benefit from the reforms alone without improving the storage facility infrastructure to expand it on a large scale.

The underlying principle of the package as described by the minister as to empower farmers by giving them resources rather than going for entitlements is no doubt a noble one. But it raises two questions. Even if the post-harvest infrastructure projects are planned fast and the government starts releasing funds for them, still how much time will they take to complete? Thus, is this a priority now when farmers who are trapped in lockdown situation need immediate aid in some different and direct form? Several leaders and experts had opined that immediate support like loan waivers, transfers and compensation for unsold produce should be given. That is the need in the current situation. Still, whenever the infrastructure will be developed no doubt it will help the farmers to a certain extent. One of the problems the farmers face is holding their produce till they get good price. Such a problem may be solved and the farmers will be able to hold the sell till they get desired price.

Still, the more important question is whether the farmers will be able to exploit the market administrative reforms of direct marketing to their benefit, eliminating the middlemen? The reform through amending Essential Commodities Act will allow farmers to sell their produce to anyone outside the Agricultural Produce Market Committee (APMC), and will lift ban on inter-state trade and allow contract farming. While looking into these changes it must be understood that marketing in itself is a complex process involving various activities and costs. Agri-commodity marketing is even more complex, particularly with the large number of sellers (farmers) interested in selling their produces. There are several issues involved in it right from transportation to disputes between parties. Governments and farmers organisations will have to find out solutions for these issues to make these reforms successful. All the marketing related issues can be summed up, according to experts, in one issue - will the cost of direct marketing be less for farmers than the middlemen? That will decide whether the farmers will be able to take advantage of this reform of direct marketing or not. Thus, all concerned will have to work on setting up a direct marketing system and evolve a process that will keep the marketing cost strictly under control. Announcing reforms will have to be followed up by various other effective measures considering all the issues involved. Only then their actual objective could be met. AS

> Milind Kokje, Chief Editor milind.kokje@mmactiv.com

CONTENT

COVER STORY

Technology – A'Game-Changer for agro sector

Despite government promoting farm mechanisation to boost the various aspect of agriculture such as production, cultivation, farmers' income, still the Indian cultivators lagging behind in the race as compared to their many international counterparts. However, despite of all the efforts, overall farm mechanisation in India has been lower at 40-45 per cent compared to other countries such as the USA with 95 per cent, Brazil having 75 per cent and China 57 per cent. The Indian agricultural machinery market was valued at Rs 498.04 billion in 2018 and is expected to reach Rs 901.41 billion by 2024, expanding at a CAGR of 10.70 per cent.



Govt announces Rs 1 lakh crore agri infrastructure fund for farm-gate infrastructure



Post COVID challenges in farm mechanisation industry

Webinar - Impact of COVID-19 on irrigated agriculture and road ahead

Emerging technologies stimulating the APAC agriculture



Smart farming to revolutionize agro-industry



Agri-tech to drive efficiencies in supply chain in India

Amith Agwarwal, Co-founder & CEO, www.agribazaar.com

"AI-powered indoor agriculture is tempting a whole new breed of farmers"

> Kunal Prasad Co-founder, CropIn Technology Solutions Pvt Ltd,





Dairy farm mechanization through digitization

Ravishankar G Shiroor, Co-founder, Stellapps Technologies

Farm mechanisation 2.0: Are we there yet? Ramakrishnan M, VP - Sales & Marketing, Intello Labs





"The concept of market promotion will see a big modification and the focus might shift to digital promotion"

Raman Mittal. Executive Director, Sonalika Group

Improvement of plant architecture for sustainable agriculture

Dr Shivendra Bajaj, Executive Director. Federation of Seed Industry of India (FSII)



Economy of farm mechanization -3 D's of inclusive and sustainable growth

Ashwin Wankhade, Advanced Marketing Manager, John Deere India Pvt Ltd

		=
Academic News	45	
People News	46	
Agri-Inputs news	47	
Supplier News	49	
		=



Dr Ratna Kumria, Director-Biotechnology, Alliance for Agri Innovation (AAI)

REGULARS

Editorial	.05
Your Views	.08
Policy News	.09
Technology News	.11
 Livestock News	.13



TOP VIDEO

8



Scan the QR Code ≻

Ashwin Pandva

Secretary General, the International Commission on Irrigation & Drainage (ICID) talks on impact of covid 19 on irrigated agriculture



Kaushal

Jaiswal

Managing

Director, Rivulis

Irrigation India Pvt Ltd talks

on reasons of

low adoption of

micro irrigation



Scan the QR Code ≻





Scan the QR Code ≻

Avinash Surve

Director, Vidarbha Irrigation Development Corporation (VIDC) talks on pipe irrigation network



Indian seed industry undergoing transformation, needs support



Feedback

Quality content on Agriculture industry

AgroSpectrum is publishing appropriate and quality content on agriculture industry. I appreciate the efforts of AgroSpectrum team for bringing out complete overview of seed industry.

- Ram Kaundinya, President, Federation of Seed Industry of India, New Delhi

Informative article on GM cotton seeds

Thanks for publishing an informative article on Bt cotton seeds. It helps for farming community and seed industry about the latest policies of government and its impacts on the agriculture sector. Looking forward more articles on recent activities of agri- business and government policies on agri-inputs.

- Vaibhav Pednekar, Nashik

Useful article on 'Seed Bill'

Article published in May 2020 issue, 'New seed bill-Impact on farmers and seed industry' by M Prabhakar Rao is really useful. AgroSpectrum should cover more illustrative articles on government policies related to agriculture sector. - Punam Waghmare, Pune

Coverage of issues in Seed Industry

AgroSpectrum has covered almost every aspect of seed industry in the May 2020 issue. Challenges and issues related to seed industry have been covered very effectively in the issue. Looking forward to many more articles on various challenges of agriculture sector. - Manas Khargaonkar, Nagpur

Govt integrates 117 more mandis with e-NAM platform

Agriculture Minister Narendra Singh Tomar launched integration of 117 additional wholesale mandis with the electronic National Agriculture Market (eNAM) platform, taking the total number of online mandis to 962 across the country. The additional mandis integrated with eNAM platform include Gujarat (17), Haryana (26), J&K (1), Kerala (5), Maharashtra (54), Odisha (15), Punjab (17), Rajasthan (25), Tamil Nadu (13) and West Bengal (1), an official statement said. The target is to integrate 1,000 mandis before May 15. More mandis are being integrated in the current COVID-19 situation as the e-NAM platform provides a distant bidding facility for wholesale produce in APMC mandis

Centre launches "The Saras Collection" to support SHGs

Amid the 3.0 nationwide lockdown, the Union Minister for Rural Development and Panchayati Raj and Agriculture and Farmers' Welfare, Narendra Singh Tomar, launched "The Saras Collection" on the Government e-Marketplace (GeM) portal at Krishi Bhavan in New Delhi. A unique initiative of GeM and the Deen Daval Antvodava Yojana-National Rural Livelihoods Mission (DAY-NRLM), Ministry of Rural Development, the Saras Collection showcases daily utility products made by rural self-help groups (SHGs) and aims to provide SHGs in rural areas with market access to Central and State Government buyers. Under this initiative, the SHG sellers will be able to list their products in 5 product categories, namely handicrafts, handloom and textiles, office accessories, grocery and pantry, and personal care & hygiene. The on-boarding of the SHGs under the initiative has been initially piloted in the states of Bihar, Chhattisgarh, Jharkhand, Karnataka, Kerala, Himachal Pradesh, Maharashtra, Odisha, Rajasthan, Uttar Pradesh and West Bengal.



without physical presence of buyer/trader near the auction site for bidding. The electronic platform also provides an e-payment facility through which traders can pay farmers after the trade is executed from anywhere, be it home or office, without going to banks, thus avoiding crowd.

MoFPI interacts with promoters of cold chain projects

Union Minister of Food Processing Industries Harsimrat Kaur Badal, held video conference with the promoters of the completed Integrated Cold Chain Projects supported by the Ministry of Food Processing Industries in the state of Maharashtra. Minister of State for FPI, Rameshwar Teli was also present in the meeting. The promoters of 38 cold chain projects participated in the Video Conference. The promoters interacted with the Union Minister of Food Processing Industries and shared their experience gained/ problems faced in completing the projects. Further, the promoters shared the challenges faced in running the cold chain projects during the lockdown period. The promoters shared that higher number of working hours are required as businesses are operating with 1/3rd or half of labour Force. This has increased the cost of production rendering product as less competitive.





AP extends free power to farm sector during Kharif season

Andhra Pradesh government will supply free power for nine hours to 81 per cent of feeders of the farm sector during the Kharif season and will increase it to 100 per cent for the next Rabi season. This was revealed in a review meeting, chaired by State Chief Minister YS Jagan Mohan Reddy. Due to issues relating to COIVD-19 pandemic and its impact on the state power sector, the issue of supply of free electricity to farmers for nine hours has been restricted to 81 per cent. In the previous Kharif season, power was supplied to only 58 per cent of the feeders during the day time. Now, the state is ready to provide the power for 9 hours to 81 per cent of the feeders, State Power Secretary N Srikanth, informed.



Agriculture sector to grow at 3% in FY21: Niti Aayog

Agriculture would come to the rescue of Indian economy and it will grow by 3 per cent this year despite all adverse conditions and thus would add at least 0.5 per cent to India's GDP growth in 2020-21, said Ramesh Chand, Member Niti Aayog in Delhi. The gross value added (GVA) in the sector was assumed to have grown 3.7 per cent in FY20, according to the second advance estimate of the economic growth announced by the government. Chand hinted at increasing sales of fertilisers and seeds in April. As compared to April last year, the sale of fertiliser in the country is 5 per cent more so far. If the sale of total fertiliser last April was 12.86 lakh tonnes, that was around 13.5 lakh tonnes till April 28 this year. Similarly, the sale of seeds sold through Krishi Vigyan Kendras during the first four months of the year was 20 per cent more than the corresponding period last year, Chand said.



Centre sets up 'Rice Export Promotion Forum'

The centre has set up a new body – Rice Export Promotion Forum (REPF) to give further impetus to rice exports, under the aegis of the Agricultural and Processed Foods Export Promotion Development Authority (APEDA). India, the second largest producer of rice in the world and the only agri-commodity from India that maintained its competitiveness in the overseas market. As per reports, rice, both basmati and non-basmati variety, is the largest commodity in India's agri export basket which shipments stood at \$7.77 billion in 2018-19, with basmati exports at \$4.72 billion and non-basmati at \$3.05 billion. However, the final export figures for 2019-20 are yet to be released by APEDA. The REPF will make concerted efforts to identify, document particulars and reach out to stakeholders across the entire production/ supply chain of export of rice for increasing these exports significantly to the global market, through various interventions.



Corteva, PowerPollen inks commercial agreement for pollination technology

Corteva Agriscience and PowerPollen, an Iowa-based agri tech company that developed the first and only scalable pollination technology for commodity crops, recently announced a commercial agreement expanding the use of pollinationon-demand technology, enabling increased flexibility and productivity for Corteva's commercial corn seed production. As part of the agreement, Corteva will license the on-demand pollination technology and gain access to PowerPollen's prescriptive pollination expertise and algorithms that inform producers of the optimal pollination timing to increase seed yield, purity and quality. PowerPollen will be responsible for collecting, preserving and applying pollen leveraging its patented technology, which uses custom designed tools and preservation methods built to scale for commercial operations. Preserving and applying pollen at the optimal time to enable the production of a hybrid provides flexibility and efficiencies never before achieved in production agriculture. Corteva is the ideal collaborator to help us accelerate our commercialization strategy stated PowerPollen.

Summit Agro USA introduces hybrid fungicide

Summit Agro USA announces the introduction of the first hybrid fungicide for US agriculture - REGEV. This next generation disease control product combines the benefits of a botanical product with the advantages of a conventional fungicide. The hybrid nature of new REGEV means reducing the chemical load in treated crops, which differentiates it from conventional options. In addition, the multiple modes of action with REGEV presents a very low probability for the development of resistance or cross resistance in plant pathogens.



Syngenta unveils 'TYMIRIUM' technology brand

Syngenta has recently unveiled the TYMIRIUM technology platform brand. It is a novel nematicide and fungicide technology under development for both seed- and soil-applied uses. TYMIRIUM technology is a great example of Syngenta investing in innovation to provide farmers with tools that help them maximize their yield in a sustainable way. Based on the active ingredient cyclobutrifluram, TYMIRIUM technology provides long-lasting protection against a broad spectrum of nematode pests and diseases across all major

crops and geographies. Nematodes not only attack crops but also open a path to further fungal infection. TYMIRIUM technology offers excellent control of both nematodes and soil-borne diseases, especially Fusarium species. By protecting the root mass, TYMIRIUM technology plays a critical part in enabling no-tillage and conservation-tillage practices. The company is investing significantly in soil health at Syngenta, and the development of the TYMIRIUM technology is a major step forward in this space.



Nath Bio-Genes India acquires 'Fusion Cotton seeds technology' from GTL

Nath Bio-Genes India has ambitious plans for export of value added seeds embedded with Fusion Technology. The company has therefore decided to acquire exclusive rights from GTL for commercialization of Fusion Bt. Cotton seeds to Sudan, Uzbekistan, Myanmar and Philippines. Based on the report of ZADN & Associates, the company announced the acquisition of the said portfolio of Fusion cotton seeds from GTL on exclusive basis for total consideration of Rs 1194.90 lakh. In addition to the rights on products, the acquisition of GTL also includes taking over of its world class laboratory conducting genetic research along with the staff and other paraphernalia. With this acquisition, the company becomes a completely integrated seed company with over 25000 germplasms, top agri scientists of the country plus seed development rights across Myanmar, the Philippines, Sudan and Uzbekistan.

Nuseed, Barenbrug collaborates for sorghum & sunflower germplasm

Nuseed Ptv Ltd (Nuseed Australia) and Barenbrug Australia Ptv Ltd announced they have entered into a formal agreement for Barenbrug Australia to license Nuseed Australia's sorghum and sunflower germplasm portfolio and carry out R&D, plant breeding, and commercialisation services. This announcement demonstrates Nuseed Australia's prioritization and focus on its market-leading position in the Australian canola and Monola markets and its ongoing Australian research and development commitments as the global commercialization partner for CSIRO and GRDC for Nuseed Omega-3 canola. The collaboration aligns strongly with Barenbrug's strategic objective of being a key player in summer crop in Australia, which includes a long-term focus and continued R&D investment. Globally Nuseed will continue to provide industry-leading sorghum and sunflower hybrids to other regions through global germplasm, R&D programmes, sales and service in North America, South America, and Europe.

Corteva Agriscience launches highperformance corn and soybean seeds

Corteva Agriscience announced the launch of Brevant seeds, a bold, high-performance corn and soybean brand available exclusively at retail locations in the Midwest and Eastern Corn Belt. Brevant (pronounced brah-VAHNT) is built on a century of agricultural experience, science and support from Corteva. The new brand will expand retail's access to Corteva Agriscience genetics, traits and technology. Brevant brand seed will be available to order this summer for 2021 planting. Brevant seeds will offer more than 200 corn hybrids and soybean varieties. Brevant brand corn and soybean portfolios will feature the latest trait technology solutions and a complete line of BMR silage corn, including its proprietary line of Unified corn silage and TMF hybrids backed by Brevant's highly trained Silage Technology Managers. Brevant is dedicated to helping retail reach their seed growth potential and customers can expect a higher level of focus and support.



Brooke India provides veterinary services

Brooke India (BI), an International NGO dedicated to the service of the working equine and the socially backward and marginalised equine owning community immediately responded to the critical situation due to COVID-19. The special COVID-19 passes were initially obtained by staff of BI's 10 PEWU units, namely Ghazipur, Lakhimpur, Pilibhit, Kausambhi, Udham Singh Nagar, Vadodara, Bahraich, Pratapgarh, and Ballia & Beed. These passes enabled smooth movement of the field staff, as a result, they were able to handle cases of severe colic, abortion, eye injury and other emergency conditions. Similarly, BI trained Animal Health Providers linked with the Community-Based Organisations were also issued special passes in Agra, Saharanpur, Shamli, Muzaffarnagar, & Kausambhi for providing first aid. Till date, BI and Partner PEWUs have treated more than 250 emergency cases. Colic, lameness and wound were found to be the most commonly reported cases.

AP to set up 'Aqua Authority' to monitor hatcheries

Andhra Pradesh government will soon set up an Aquaculture Authority to monitor the hatcheries from seed to marketing. It will also assure Minimum Support Price (MSP) for farmers and asked the farmers not to sell aqua products in distress. The state has the largest number of hatcheries in the country. But with 80 per cent of brooders (mother prawns) imported from the US, production has been hit due to the lockdown. In this regard, the state government has already written to the Union Ministry of Commerce and Fisheries to permit the cargo for aqua production and sale. The state government will stand by the aqua farmers and make sure that they need not resort to distress sales. As of now, exports of the aqua produce have begun in various ports across the state, soon the cargo services will be made fully functional mentioned the statement by state government.

SpiceJet transports 225 tonnes of shrimp from Visakhapatnam

SpiceJet is transporting record quantities of shrimps from Visakhapatnam and supporting the government's 'Marine Krishi Udaan' initiative. SpiceJet launched dedicated freighter flights on February 25 to ferry shrimps. The airline has transported 225 tonnes of shrimp from Visakhapatnam during the lockdown phase till May 8, carrying 138 tonnes on Vishakhapatnam-Surat route and 87 tonnes on Vishakhapatnam- Kolkata route. Overall, SpiceJet has transported 600 tonnes of cargo to and from Visakhapatnam during the lockdown period, which includes medical and essential supplies. The airliner has transported 6,650 tonnes of medical and essential supplies within and outside India during the lockdown period. Altogether, SpiceJet has transported over 20 lakh kg of fresh farm and shrimp produce during the lockdown period. This includes 1,070 tonnes of fresh farm produce.



Govt announces Rs 1 lakh crore agri infrastructure fund for farm-gate infrastructure

n a move to strengthen infrastructure in agriculture, Union Finance Minister Nirmala Sitharaman announced on May 15, setting up of Rs 1 lakh crore agri infrastructure fund for farm-gate infrastructure.

"Financing facility of Rs 1,00,000 crore will be provided for funding agriculture infrastructure projects at farm-gate and aggregation points. Impetus for development of farm-gate and aggregation point, affordable and financially viable post-harvest management infrastructure," said the minister.

She also announced Rs 10,000 crore scheme for formalisation of Micro Food Enterprises (MFE). The scheme will be launched to help two lakh MFEs by adopting cluster-based approach such as mango in Uttar Pradesh, kesar in Jammu & Kashmir, bamboo shoots in North-East, chilli in Andhra Pradesh, tapioca in Tamil Nadu. This fund would help in reaching untapped export markets in view of improved health consciousness.

Observing the lack of adequate cold chain and post-harvest management infrastructure in the vicinity of farm gate causes gaps in value chains, the minister said that the fund will be created immediately.

The Finance Minister said that the government procured farm produces worth Rs 74,300 crore (as per Minimum Support Price) to improve liquidity for farmers.

She also said that funds transfer worth Rs 18,700 crore has been done under PM KISAN Samman Yojna in the past two months and PM Kisan Bima Yojna claims totalling Rs 6,400 crore cleared in last 2 months.

The existing micro food enterprises, farmer producer organisation, self-help groups (SHGs) and cooperatives will be supported. The scheme is expected to improve health and safety standards, integration with retail markets among others.

The minister also said that an Animal Husbandry Infrastructure Development Fund of Rs 15,000 crore will be set up, with an aim to



support private investment in dairy processing, value addition and cattle feed infrastructure. Incentives will be given for establishing plants for the export of niche products.

Nirmala Sitharaman announced Rs 20,000 crore for aqua culture, infrastructure for fisheries to help raise fish production, exports. It is aimed at doubling the income of fishers, fish farmers and fish workers by 2024.

Pradhan Mantri Matsya Sampada Yojana (PMMSY) will be implemented during a period of five years from fiscal 2020-21 to fiscal 2024-25. PMMSY will help in improving the infrastructure and also boost investment in fisheries sector.

Rs 500 crore allocated for beekeeping initiatives to benefit two lakh beekeepers in rural areas, said Nirmala Sitharaman. The government will implement a scheme for infrastructure development related to Integrated Beekeeping Development Centres, Collection, Marketing and Storage Centres, Post-Harvest & value Addition facilities etc. The scheme will also include implementation of standards and developing a traceability system, capacity building with thrust on women, development of quality nucleus stock and bee breeders. This will lead to an increase in income for two lakh beekeepers and quality honey to consumers.

Industry hails the announcements

Commenting on the third tranche of economic package announced by the Finance Minister in recent, Dr Sangita Reddy, President, Federation

of Indian Chambers of Commerce and Industry (FICCI) said, "The government has recognised the important role being played by Farmer Producer Organisations (FPOs) and by giving these a major push, we can expect much stronger market linkages being provided to farmers as FPOs are in tune with the market realities and what is being demanded at any given point of time. Additionally, the thrust laid on dairy sector is also welcome as every 1 lakh litre of additional dairy capacity created leads to generation of as many as 6000 jobs."

Dr Reddy also added that, the Essential Commodities Act had outlived its utility and by bringing a change in this the government has ensured that investments in the agri-value chain will get a boost. Additionally, the announcement on introducing a central law to free up inter and intra-state trade of agri-products will help farmers in getting a better price for their produce and we hope that all states will adopt this in right earnest.

Sharing his views Ajay Kakra, Leader – food and agriculture, PwC India said "The initiative boost credit of 2 lakh crore to increase coverage of 2.5 lakh farmers under KCC will surely increase the credit umbrella and help increase their liquidity issue given the acute cash crunch during COVID situation. Additional emergency Working Capital Fund of Rs 30000 crore from National Bank for Agriculture and Rural Development (NABARD) can come very handy to farmers for managing post-harvest operations for Rabi or pre-season operations for Kharif season during the COVID situation when the entire food supply chain is looking forward towards increasing liquidity."

"The Finance Minister has used the opportunity to push some long term measures that will improve productivity, increase farmer realisations, benefit FPOs, attract investments in post-harvest infrastructure and enhance competitiveness of the food and agribusiness value chain. The announcements will also give a boost to the make in India campaign for the food processing sector" said Anand Ramanathan, Partner, Deloitte.

Welcoming the announcement Amith Agarwal, Co-Founder & CEO, AgriBazaar said "The Finance Minister's announcement of Rs 1 lakh crore agriinfrastructure fund for farm-gate infrastructure will significantly contribute towards mitigating post-harvest losses and wastage by giving a fillip to scientific storage facilities and also, help the small farmers earn additional income by way of value

Measures to strengthen Infrastructure Logistics and Capacity Building for Agriculture, Fisheries and Food Processing Sectors

- 1. Rs 1 lakh crore Agri Infrastructure Fund for farm-gate infrastructure for farmers
- 2. Rs 10,000 crore scheme for Formalisation of Micro Food Enterprises (MFE
- 3. Rs 20,000 crore for fisherman through Pradhan Mantri Matsya Sampada Yojana
- 4. National Animal Disease Control Programme- Rs 13,343 crore
- 5. Animal Husbandry Infrastructure Development Fund - Rs 15,000 crore
- 6. Promotion of Herbal Cultivation: Outlay of Rs 4,000 crore
- 7. Beekeeping initiatives Rs 500 crore
- 8. From 'TOP' to TOTAL Rs 500 crore

Measures for Governance and Administrative Reforms for Agriculture Sector

- 1. Amendments to Essential Commodities Act to enable better price realisation for farmers
- 2. Agriculture Marketing Reforms to provide marketing choices to farmers
- 3. Agriculture Produce Pricing and Quality Assurance

added agri-produce. The long-term investments will help India build quality, world-class agriassets and infrastructure that will benefit small farmers in the long time."

"Steps taken by the government to empower the marine and agriculture sectors is appreciated. In order to go 'local to global', the stimulus and capital funds should be used for bringing in value addition for fishery and agricultural products to gain advantage in international markets and boost exports. However, with regards to price assurance for farmers, there is a need for an assured demand for consumption," said Sanjay Kumar, CEO & MD, Elior India. AS

> Dipti Barve dipti.barve@mmactiv.com



Technology – A 'Game-Changer' for agro sector

Despite government promoting farm mechanisation to boost the various aspect of agriculture such as production, cultivation, farmers' income, still the Indian cultivators lagging behind in the race as compared to their many international counterparts. However, despite of all the efforts, overall farm mechanisation in India has been lower at 40-45 per cent compared to other countries such as the USA with 95 per cent, Brazil having 75 per cent and China 57 per cent. The Indian agricultural machinery market was valued at Rs 498.04 billion in 2018 and is expected to reach Rs 901.41 billion by 2024, expanding at a CAGR of 10.70 per cent.



he concept of farm mechanisation is not new and it has been actively promoted through various other schemes and programmes of the Ministry of Agriculture and Farmers Welfare programmes such as Rashtriya Krishi Vikas Yojana (RKVY), National Food Security Mission (NFSM), National Horticulture Mission (NHM), National Mission on Oilseeds and Oil Palm (NMOOP) etc. But still this technological advancement is not incorporated by many farmers in their fields.

Speaking on the concern, Mrityunjaya Singh, Managing Director, CLAAS Agricultural Machinery Private Limited, said, "Indian farmers have a continuing lower earning per capita compared to the world average, mainly because of the low yield per hectare resulting in low farm operating efficiency. However, this can be addressed by encouraging mechanisation of the farming processes, which would in turn, would optimize the cost of inputs and improve productivity. This will be to farmers' benefit of improved profitability."

Emergence of Agritech

Agritech is clearly the next big thing in digital. As per NASSCOM (National Association of Software and Service Companies) -a trade association of Indian Information Technology and Business Process Outsourcing industry, the global agritech investment in 2017 was \$3.2 billion and in the same period India got about \$320 million funding for 50+ startups. India is among the top five countries globally in term of agritech deals. There are agritech startups across the entire farm to fork value chain - agri inputs, remote sensing, agri advisory, market linkage, farming as a service and IoT enabled technologies.

For example, today one can buy seeds and fertilisers online, rent farm implements, get weather and disease forecasts, receive mobile based agri advisory, check prices at local and remote mandis and sell his produce online. All of this is happening and more, albeit the adoption is yet to reach critical mass in most cases.

"In terms of remote sensing, the cost of satellite imagery has plummeted - this is going to create a whole new set of use cases – for example, one could combine remote sensing with image analytics to identify farm diseases and advise the farmer to take necessary steps. Accurate weather advisory coupled with pest models can provide yield forecasts and early warning signals for diseases," stated Himanshu Goyal, Indian Business Leader-The Weather Company, an IBM Business.

Even the area of crop insurance will get disrupted through remote sensing as the need for manual inputs like crop cutting experiments will give rise to remote assessment of farm yields.

Technology to enhance every layer of Agro Business

Though agriculture is the main source of livelihood for a majority of the Indian population, it still stands as a technologically backward sector. Despite its importance to the economy, little has been done to revive the sector. We live in a world where technology is at the heart of our everyday lives. Similar to transformations in other sectors, technology should be used to shape farming practices. Technology can transform Indian agriculture by addressing challenges related to quality, quantity, skill and knowledge.

"Currently farmers choose crops on the basis of the trends of the last season. Technology can assist them in making right growing choices by carefully analysing demand, pricing and fluctuations in weather conditions. This will create a better balance between supply and mand. Technology enabled farming tools can be a boon for small farms. Large machinery used in developed countries has very little applicability in most of our small farms," said Dr C. Aswath, Principal Scientist and Head, Floriculture and Medicinal Plants division, Indian Institute of Horticultural Research.

Apart from the very nascent stage of farming from sowing the seeds, technology also strengthen famer to receive maximum profit at the time of distribution. With e-commerce platform, farmers get directly connected to the buyers and hence omitting a chance for the middlemen to march away with their share.

"In the traditional model, middlemen walk away with a large chunk of a farmer's income. Origin of e-marketplaces that can connect buyers and farmers directly have dis-intermediate the chain and are currently offering better incomes to farmers. We have collection centres at the farm level, fulfilment centres for aggregation and distribution centres to deliver products to retail stores. Overall, supply chain wastage due to our operations is 3 per cent. Farmers gain 15-20 per cent more at NinjaCart, than if they had sold to the mandi or through middlemen," stated Thirukumaran Nagarajan, Co-founder and CEO, NinjaCart. The new age Indian farmer is getting well versed with not only modern technology but with the new mode of communication systems as well. Recent example of that could be easily seen on some social media platforms such as Facebook and Whatsapp. A Facebook group for organic farmers in India with a member strength of 22,000 has become an engaging platform for farmers to seek help or advice from other farmers. Whatsapp groups are now used extensively by farmers to exchange knowledge and collaborate with peers. From ordering seeds online to seeking inputs on social media, there is rapid adoption of information technology by Indian farmers.

Sub-Mission agriculture mechanisation

Realising the gap in the agro sector which can be filled by mechanisation, the government floated a sub-mission called the 'Agriculture Mechanisation' with the sole purpose of promoting farm mechanisation on a massive scale across the country.

Under the scheme, assistance is provided to state governments to impart training and demonstration of agricultural machinery. Assistance is also provided to farmers for procurement of various agricultural machineries and equipment and for setting up of Custom Hiring Centre. Under the scheme, total funds allocated during 2014-15 to 2018- 19 was Rs 3377.07 crore and during 2018-19 it was Rs 1027.46 crore. During the last four years, the government has given massive thrust to promoting latest agricultural machineries, like laser leveller, happy seeder technology, combine harvesters and small equipment like power weeders.

Apart from government's initiative, there are many companies who are stepping forward to impart adequate knowledge on farm equipment to young budding farmers who want to make it large in this field. "Even outside the government supported programmes, the rural youth is showing interest in turning entrepreneurs. Our concept of CLAAS DOST Center, a joint initiative of CLAAS and its dealers, is an initiative aimed at empowering such entrepreneurs by providing them with high quality machines combine harvesters, balers, rice trans planters, forage harvesters, etc. on soft commercial terms. This concept is gaining popularity as we keep on adding more CLAAS DOST Centers across the country," said Mrityunjay Singh of CLAAS.

Reaping technologies to boost agro sector

Startups have become a one key that is fitting in every sector. Similarly, agro sector has also





been moved by various startups who with their innovative and creative ideas are transmuting the game. Agritech startups are evolving to make agriculture attain better stance in the economy, and during this course, farmers hold a chance to come out of the existential crisis that is most prevalent among today's rural farmers. These startups are helping the farmers to earn better revenue in their existing business.

Such agritech startups are set to play a dominant role in disseminating information to farmers and maximising their profits in the near future, experts predict. However, growth in this sector will be spurred only with a strong financial inclusion policy, faster data penetration and more government support in terms of funding, industry officials said. Still, there is potential, as reflected in the mushrooming of agritech startups.

These startups are basically catching up on the issues which have become tough nuts to crack for the farmers. These emerging companies with their R&D unit are ultimately connecting the farmers with the solution to these problems with the help of technologies. For instance, as per the media report, Indian farmers usually suffer around Rs 90,000 crore losses in post-harvest annually, the primary causes of which are poor storage and transportation facilities.

This issue gave birth to an innovation that is amalgamation of technology and deep research, Whirlybird, a Maharashtra-based startup, works on curbing post-harvest losses. It provides farm management solutions and soil and meteorological sensing as well as real-time and customised farmer advisory services. Many startups in the remote agri-service business were perhaps inspired by the government's DigiGaon campaign launched by Prime Minister Narendra Modi, which aims to digitally connect every village and educate every rural citizen about the significance of Digital India.

Eyes from the skies

India is still new to the drone technology. It does understand drone's importance. The state governments along with startups and private firms are collaborating with the farmers in helping them through various schemes such as the agri-scheme put forth by the Maharashtra government. The Tamil Nadu government also tracing similar steps has collaborated with students of Anna University to manufacture custom drones to spray pesticides to combat the fall army menace which will first try out in Peramblur district.

The use of agriculture drones can take care of a lot of problems that currently plague the sector, including crop health monitoring, crop treatment and crop scouting. The importance of these unmanned aerial vehicles (UAVs) has been recognised by both governments and startups. On the one hand, the central government has launched



an online platform called Digital Sky Platform for the registration of drones and their operators and on the other, there are 35 drone startups in the country that are working to raise the technological capabilities and reduce the prices of agriculture drones, aka agri-drones.

"Imagine a drone that, in addition to mapping the cropping area, will also be able to process answers. For example: identify where the weeds are, which type they are, identify pests and diseases and localise the application of agrochemicals. Worldwide, drones are completely changing the entire process of cultivating and harvesting. As per industry estimates, the use of drones can provide a 15 to 20 per cent increase in farm productivity in India," explained Dr Chandan Kumar, scientist (Livestock Production and Management), Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya, Gwalior.

Besides these, drones can also be helpful in determining the usage of sensors by monitoring the terrain and crop health of a specific area. Similarly, drones equipped with 3D mapping can provide useful and accurate data on soil fertility and its minerals to help the farmer decide the crop rotation and the type, quantity, and quality of fertilizer to be used in the farms. The accurate and adequate data obtained from these drones help farmers make better decisions, necessary investment and therefore obtaining a higher and better yield of crops resulting in higher investment returns.

Hurdles in farm mechanisation

Implementation of farm mechanisation across the length and breadth of the country wouldn't going to be an easy task to perform because there are plenty of hurdles that are holding the running horses.

"The biggest roadblock we face is of the lower average farm size holding in India, which is just a hectare per farmer. This restricts the usage of new advanced technologies on account of less purchasing power. The return on investment is negatively affected as the output is limited," Mrityunjay Singh said.

A major challenge in the adoption of mechanisation in Indian farms is the small landholdings. Although, with change in perceptions, farmers are now willing to adopt mechanised farming processes but they are apprehensive of cost burden of low utilisation of machines due to small size of their land. The government has done well in aggressively promoting the spread of Custom Hiring Centers (CHC) that help small farmers by providing machinery on a pay-per-use basis. This eliminates the need for small farmers to invest in expensive machinery, make high technology accessible and, at the same time, enables the CHC operator to consolidate a number of small farmers' jobs so as to reach his own target of financial returns from the business.

Another prominent issue that put the mechanisation on the back foot is the overdependence of Indian agriculture on monsoons due to just over 50 per cent of irrigated land is putting the livelihood of millions of farmers at risk. Just one year of insufficient rain can lead to a significant drop in agricultural production in the country.

Apart from that, the availability of finance for technologically advanced machines is not up to the mark. Financial institutions are reluctant to provide much-needed credit to deserving farmers just because they find it safer to finance low-cost equipment like tractors, etc. Lastly, there is an ever-widening supply and demand gap of skilled manpower to operate and maintain high-efficiency machines with advanced technology. There is a stark deficiency of an ecosystem to create such skilled manpower.

Farm mechanisation is need of an hour to bolster the growth of the Indian agriculture sector. With the support of the government and agro companies, the current picture in this direction looks vibrant but there are still some hurdles to cross before achieving the success mark. The brighter side is the young farmers are showing keen interest in adopting new technologies into their work this means that India's future is strapping up to satisfy the requirement of country's growing population. AS

Nitin Konde



In the traditional model, middlemen walk away with a large chunk of a farmer's income. Origin of e-marketplaces that can connect buyers and farmers directly have dis-intermediate the chain and are currently offering better incomes to farmers. We have collection centres at the farm level, fulfilment centres

for aggregation and distribution centres to deliver products to retail stores. Overall, supply chain wastage due to our operations is 3 per cent. Farmers gain 15-20 per cent more at NinjaCart, than if they had sold to the mandi or through middlemen."

- Thirukumaran Nagarajan, Co-founder and CEO, NinjaCart



Indian farmers have a continuing lower earni capita compared to th

continuing lower earning per capita compared to the world average, mainly because of the low yield per hectare resulting in low farm operating efficiency. However, this can be addressed by encouraging mechanisation of the farming processes, which would in turn, would optimize

the cost of inputs and improve productivity. This will be to farmers' benefit of improved profitability." - Mrityunjaya Singh, Managing Director, CLAAS Agricultural Machinery Private Limited



In terms of remote sensing, the cost of satellite imagery has plummeted - this is going to create a whole new set of use cases – for example, one could combine remote sensing with image analytics to identify farm diseases and advise the farmer to take necessary steps. Accurate weather advisory coupled with pest models can

provide yield forecasts and early warning signals for diseases."

- Himanshu Goyal, Indian Business Leader-The Weather Company, an IBM Business



Currently farmers choose crops on the basis of the trends of the last season. Technology can assist them in making right growing choices by carefully analysing demand, pricing and fluctuations in weather conditions. This will create a better balance between supply and mand. Technology enabled farming tools can be a boon for

small farms. Large machinery used in developed countries has very little applicability in most of our small farms."

- Dr C. Aswath, Principal Scientist and Head, Floriculture and Medicinal Plants division, Indian Institute of Horticultural Research



Worldwide, drones are completely changing the entire process of cultivating and harvesting. As per industry estimates, the use of drones can provide a 15 to 20 per cent increase in farm productivity in India."

- Dr Chandan Kumar, scientist (Livestock Production and Management), Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya, Gwalior

Smart farming to revolutionize agro-industry

In India, precision farming is gradually catching up by FPOs and contract farming companies. It is anticipated to grow at CAGR of over 10 per cent to reach \$ 99 million on account of increasing awareness related to the applications of precision agriculture. With increasing demand for obtaining data related to the condition of crops, local weather predictions and soil agritech companies are hopeful about increase in adoption of technology in upcoming years.

Precision farming, an integrated crop management system is at the nascent stage in India due to lack of awareness about technology among farmers, cost of the technology and unavailability of large size farms. More than 58 per cent of operational holdings in the country have size less than one hectare. Only states like Punjab, Rajasthan, Haryana and Gujarat have more than 20 per cent of agricultural lands have an operational holding size of more than four hactres. Commercial as well as horticultural crops also show a wider scope for precision farming in the cooperative farms.

Precision agriculture market finds application in yield monitoring, crop scouting, field mapping, weather forecasting and tracking, among others. Among these, the yield monitoring segment grabbed the highest market share in 2019 and field mapping segment is expected to witness extensive adoption through 2025.

Future of precision farming

Precision farming is an integrated crop management system which uses remote sensing (RS), GPS, and geographical information system (GIS) to monitor the crop field at ground level. The disparities in crop or soil properties within a field are recorded and mapped. Then management decisions are taken as a result of continuous assessment of the spatial variability within that field.

According to the report by ResearchAndMarkets.com, Indian precision agriculture market was valued at over \$ 57 million in 2019 and is anticipated to grow at CAGR of over 10 per cent to reach \$ 99 million on account of increasing awareness related to the applications of precision agriculture and surging need to ensure maximum yield from limited sized farms. In India south region accounted for the highest share of more than one-third of the market in 2019 on account of high penetration of internet and larger smartphone user base in the region. South Indian states, such as Andhra Pradesh, Telangana, and Tamil Nadu, are increasingly adopting various precision agricultural methods to boost crop yields.

Additionally, application of advanced analytics, increasing adoption of Internet of Things (IoT) in agriculture sector coupled with an increase in supportive government initiatives for the adoption of modern agriculture technologies is further driving the market for the Indian precision agriculture market. Moreover, increasing demand for obtaining data related to the condition of crops, local weather predictions and soil is further anticipated to boost the demand for precision agriculture in the coming years. However, high cost and lack of awareness about technologies and advantages are acting as major challenges for precision agriculture market in India.

Companies like Trimble, Tata Kisan Kendra (TKK), Fasal, CropIn, and FarmERP are working to introduce this concept to Indian farmers. TKK, which is an initiative launched by Tata Chemicals Limited (TCL), has the vision to propel rustic India from the ancient farm practices into the modern age of satellites and IT. TCL's extension services are conveyed to farmers by the TKKs, using remote-sensing to assess soil conditions, examine crop health, pest invasions, and crop yield prediction.

Leading players operating in the **Indian Precision Agriculture Market**

- John Deere India Private Limited
- Satsure Analytics India Private Limited
- Aibono Smart Farming Private Limited
- Cropin Technology Solutions Private Limited
- Mahindra & Mahindra
- Jain Irrigation Systems Limited
- Intello Labs Private Limited
- Fasal Agro Business Private Limited
- Exabit Systems Private Limited

Source: ResearchAndMarkets.com

FDI in Precision Farming

Indian agritech companies are raising series of funds for expansion of the business. Many investor companies from Europe and US are showing interest in investing in precision farming. Singapore-based strategic investor Technogen invested in FarmERP, to help its users mitigate climate risks in agriculture and sustainability. Agritech firm Fasal has recently raised \$1.6 million (Rs 11 crore) in its seed round of funding led by impact investor Omnivore and early-stage venture capital firm Wavemaker Partners. Recently CropIn Technologies has partnered with government to streamline the CCE (Crop Cutting Experiment) process and make it more accurate and scalable.

Next-gen agriculture.

Digital solutions act as a channel between buyers and the farmers by providing a platform to communicate the needs and understand the sources well. For farmers, digital farming solutions are like the mentors; they provide actionable insights by analysing data accurately and form a knowledge repository for the farmers to make them future-ready.

Sajay Borkar, CEO, FarmERP opines about the current status of precision farming, "Precision farming is at the nascent stage in India. Since the number of large farm lands is less compared to small farm lands in India, adoption rate is low in our country. Adoption of the precision farming technology will take time in small lands as the initial cost of the technology is too high for individual farmer. Currently we are providing precision farming services to FPOs



Precision farming is at the nascent stage in India. Since the number of large farm lands is less compared to small farm lands in India, adoption rate is low in our country. Adoption of the precision farming technology will take time in small lands as the initial cost of the technology is too high for individual farmer."

-Sajay Borkar, CEO, FarmERP

(Farmer Producer Organisation) and contract farming companies. But when the adoption of precision farming will increase, it will definitely lower the cost of the technology. Small holder farmers can facilitate this technology at their farms in competitive rates".

Increasing awareness about digital technology

Borkar also added that though the agriculture input supply chain is disrupted all over world because of COVID-19 pandemic, with the help of technology we can meet both the ends i.e. producer to consumer. If we have technology in place in agriculture then disruptions will be less compared to traditional farming. The precision farming gives access to data required for the farming activities.

"Today we are receiving enquiries for the demos and information about precision farming from many FPOs and farm companies since the pandemic has channelized the process of finding out alternate options for traditional farming. Precision farming has grown approximately 5 to 10 per cent in last few years. There is long way to go for adoption of the technology at grass route level. With growing awareness about the technology in farming community, financial support from government bodies like National Bank for Agriculture and Rural Development (NABARD) will help in increasing the adoption rate of the technology", Borkar added.

The successful development and implementation of precision agricultural technologies in full-scale is still a far off possibility in the future for the Indian agricultural sector. The booming IT sector and extensive Agri-IT research will pave the way for such smart farming concepts to revolutionize the agro-industry in India. AS

Dipti Barve dipti.barve@mmactiv.com

24 Q&A

"AI-powered indoor agriculture is tempting a whole new breed of farmers"



KUNAL PRASAD, Co-founder, CropIn Technology Solutions Pvt Ltd.

Founded in August 2010, Cropin Technology Solutions is a Farm Management-Monitoring-Traceability and Analytics business based in Bengaluru. Cropin provides SaaS based service to Agribusinesses globally, enabling clients to analyse, interpret and gain real time insight on standing crop and project spanning over large geographies enabling them to take corrective measure on time. MI & AI. Currently it is operating in 52 countries with over 2.1 million farmers helping them "grow more from less". 2020 is expected to be the year full of challenges for the agritech sector with greater government and investor interest. Agritech start-ups are using AI, robotics, drones and IoT to solve agriculture challenges in India. Kunal Prasad, Co-founder & COO of SaaS based agritech company CropIn Technology Solutions Pvt Ltd shared his views on many issues including challenges in the digital farming solutions market in India. Edited excerpts-

How SaaS based solutions will impact the global AI Market?

Software as a Service (SaaS) products are the perfect solutions that are adaptive in nature and are curated based on the need using the latest technology in the market. By using SaaS products in AI applications, there is a substantial increase in the productivity where the solution is applied. The market will grow hence, owing to the capabilities of the SaaS products to adapt and cater to the increasing demand.

Though the concept of SaaS has been in practice since the 1960s, it has undoubtedly become a game changer in the last few years. Several companies of different sizes, regions and specializations are starting to see the potential in

SaaS to make their business more profitable, to say the least. With an effective platform in place, user-experience is more fluid and less complex, internal resources are being better managed, and the possibilities of business expansion are multifarious. SaaS provides enterprises with a competitive edge on factors including scalability, compliance, cost efficiency, and security, along with modernized marketing and enhanced mobile functionality. Along these lines, it comes as no surprise that agriculture is among many other industries that are adopting technology into their systems and have begun to leverage cloud computing to drive communications and collaboration to a greater degree. Therefore, it is only fair that we nod in agreement with Philip

Some of the regions where SaaS products can be the game changers in global AI markets are:

Agri-lending - By using predictive and prescriptive algorithm based solutions like SmartRisk, agri-lending can be revolutionised. The farmers can be assigned a credit value or a score based on their historical performances and yield analysis. This will provide financial institutions and banks a much-needed parameter to assess a farmer's credit value and determine if the loan should be approved or not. On the other hand, the farmers also benefits from such a system as it is easier for them to procure loans based on their historical performances.

Agri-Insurance: AI can help agri-insurance companies to have better risk assessment of crop loss due to natural calamities by analysing historical data of the farm's performance. This also helps the farmers claim the loss incurred through faster and a smoother process, without having to worry about just compensations. This system saw success when CropIn partnered with the Pradhan Mantri Fasal Bima Yojana (PMFBY) where Crop Cutting Experiments (CCE) was done. Indoor farming - Nowadays, new techsavvy agripreneurs and progressive farmers have started to move towards indoor farming. It is a technique of growing crops or plants, typically on a large scale, entirely in a packed environment. This way of farming often implements growing methods like hydroponics and leverages artificial lights to provide plants with the nutrients and light levels required for growth. AI-powered indoor agriculture is tempting a whole new breed of farmers now.

What are the challenges in the digital farming solutions market in India?

A lot of farmers and even agribusinesses view technological upgrades or interventions with scepticism. The notion behind this is that they do not want to break the pattern and the belief that traditional methods have garnered, not taking into consideration the increase in efficiency that the new technology can bring in. If companies introduce new technology without modifying the established patterns of work, the technology is less productive, and so are the field extension teams. If the field staff does not adapt to technology-driven processes then their companies can't win as a team.

Another challenge is mobility and literacy. Though mobile communication and broadband connectivity are at its best yet, there are limitations in its penetration of broadband in rural areas, and there is much to improve with regards to rural literacy. Technology keeps on changing and we as a company need to be on the top of it. To stay updated with the latest advancement in technology is a time-sensitive and cost-intensive process.

These challenges subsequently affect Agritech companies' reach of expansion in working directly with the farmers. CropIn has been proactively addressing the above issues, which has enabled us to tackle the barriers better than ever before.

In addition, the other challenges of farming sector are:

- 1. Farming companies are burdened by limited traceability and operational visibility along the crop cycle. Traceability and operational visibility along the crop cycle is a challenge for farm management companies.
- 2. Agri input companies constantly grapple with low visibility on marketing initiatives, inefficient operations and field force management, as well as lack a centralized database of farmers' information.
- 3. Financial lending institutions face issues in credit risk assessment due to lack of historical performance and risk profile of their clients, information asymmetry due to lack of alternative data source to verify the data, and high cost of operations as the lending personnel have to physically check on every farmer loan.

What is the role of digital technology in the agri-supply chain?

The interconnectedness that the supply chain brings in has the consumers order agricultural products from their homes comfortably. Digital technology also has empowered farms with warehouse management capabilities. Food traceability now is a reality in agriculture, thanks to digital technologies. The current, technologically-driven world presents ample opportunities and efficiencies to agriculture, beginning with the supply chain. Producers and consumers have never had as much access <u>Q&A</u>

to information, communication and products that they have today. From streamlining communication to speeding up physical processes, digital solutions continue to evolve and agriculture continues to grow as a vibrant, thriving industry.

How will digital farming solutions bridge the gap between farmers and buyer company?

Digital solutions act as a channel between buyers and the farmers by providing a platform to communicate the needs and understand the sources well. For farmers, digital farming solutions are like the mentors; they provide actionable insights by analysing data accurately and form a knowledge repository for the farmers to make them future-ready. The buyers nowadays are curious to know the source of the food they have and are consciously making decisions of whether to consume the food or not, based on this information. Traceability gives the quality of produce and the producer (farmer) a sense of credibility in the minds of the buyer, and this means more business for the farmer. Digital technologies also have made it possible for the farmer and the buyer to have a direct business relationship, cutting out the middleman.

How will digital farming solutions contribute in increasing farmers' income amid lockdown?

These are difficult times and farmers are one of the most affected in these times. CropIn understands this and has made various advancements in its solutions by introducing new features. Usage of digital farming solutions will ensure less inaccuracies in data collection, ensure productivity is not compromised due to lack of manpower, act as a knowledge repository that farmers can refer to, and take timely action in times of unexpected agriculture based distress. CropIn is sending climate smart advisories to farmers and engage with them through bulk SMS to be aware of the difficulties they are facing. Through AcreSquare, a farmer engagement platform by CropIn, educational videos and training content is being published and sent to the farmers. CropIn also has turned to account management online, to provide goods and monetary assistance to farmers. The company also is tracking farmer health. CropIn's solutions



Digital solutions act as a channel between buyers and the farmers by providing a platform to communicate the needs and understand the sources well. For farmers, digital farming solutions are like the mentors; they provide actionable insights by analysing data accurately and form a knowledge repository for the farmers to make them future-ready. The buvers nowadays are curious to know the source of the food they have and are consciously making decisions of whether to consume the food or not, based on this information. Traceability gives the quality of produce and the producer (farmer) a sense of credibility in the minds of the buyer, and this means more business for the farmer. Digital technologies also have made it possible for the farmer and the buyer to have a direct business relationship, cutting out the middleman."

impact farmers indirectly through clients who manage large scales of land and farmers under them and we have little direct contact with the farmers. CropIn has empowered women farmers with technology and knowledge about good agricultural practises. We believe that during these difficult times, efficient methods of farming will save resources and give the right results.

Recently government has partnered with CropIn Technologies to streamline the CCE process. How will it leverage the claim and payment process?

The CCE is a great assessment method to accurately estimate the yield of a crop or region during a given cultivation cycle. It also is great for insurance claims for farmers and makes it easier for them to get it processed. CCE can be leveraged to disburse payments for farmers insurance claims seamlessly. The method ensures faster TAT in claim settlements. By improving CCE method itself through technology, the lead time can be reduced and risk of human errors in yield index and claim settlements. The data gathered from CCE is useful to multiple stakeholders in the agricultural value chain. While governments use it for planning agricultural policies and programs for the future, the information helps financial institutions with all the inputs they need before offering loans or insurance coverage if there is a poor harvest or crop failure.

> Dipti Barve dipti.barve@mmactiv.com

Farm mechanisation 2.0: Are we there yet?



RAMAKRISHNAN M, VP – Sales & Marketing, Intello Labs

The answer is just about. With better machines, Farming-as-a-Service and automationbased technologies, the scope of farm mechanisation has definitely moved ahead, but we're still playing catch up to the western world.

iven we are an agrarian economy, technology in agriculture is not novel. In fact, it's been thriving since the Green Revolution introduced the quintessential farm vehicle and biggest step towards mechanisation - tractors. As a matter of fact, as per PricewaterhouseCoopers (PwC) and Federation of Indian Chamber of Commerce and Industry (FICCI), today we are the largest tractor industry accounting for 1/3rd of global production.

Yet the entire farming sector still faces colossal challenges. The yield is low, the labour is scarce, and the pressure on land is enormous, to name a few. These shortcomings have brought swelling recognition that innovation in farming has become critical, more than ever before. Fortuitously, Indian agriculture and allied sectors are waking up to this fact and are on the verge of adopting new technologies.

Next leg of mechanisation

Custom Hiring Centres

The high cost of equipment ownership has always been a key impediment to the adoption of farm machinery. It is why government-run custom hiring centres (CHC) are one of the essential drivers fuelling mechanisation in farming.

CHCs allow collective buying and leasing

of both basic and big-ticket purchases. They rent not only minimum needed equipment like cultivators, rotavators, and seed drills but also high-end agriculture gear like those aiding in-situ management of crop residue, at a fraction of the cost. Presently, the total number of CHCs have crossed 38,000. Together, they rent out 2.5 lakh pieces of farm equipment annually. According to Press Information Bureau, the nodal agency for communicating to media on behalf of Government of India, 2300 Custom Hiring Centres were established in 2019-20, distributing 1,44,113 machineries.

Farming-as-a-Service

Low investment appetite coupled with small and fragmented landholdings is another cause for poor offtake of farm machines in India. Unwittingly, it has helped Farming-as-a-Service (FaaS) gain momentum. These 'Uber' for farm equipment companies, like EM3 AgriServices and Trringo, bridge the gap between the need for specialist equipment and the capital necessary to attain it. They link owners of farming paraphernalia with those who need mechanisation services to create a win-win situation. The renter gains additional revenue, and the rentee gets to use tractors and other quality mechanical implements on a payper-use basis.



UDP Machines

With the rise in pollution due to excessive use of chemical fertiliser and nutritional losses, Urea Deep Placement (UDP) machines have caused a momentous spurt in farm mechanisation.

UDP tools, like Distinct Horizon's Vriddhi, can be integrated with tractors and powertillers, to place fertilisers deep into the soil. The mechanisation reduces dependence on chemical inputs by 30 to 40 per cent, lowers adverse environmental impact and increases crop yield.

Post-Harvest Automation

Packaging, handling, transporting and storing of post-harvest produce is a constant pain point in the agriculture industry. Though still in the initial stages, Artificial Intelligence (AI)enabled machinery is partly solving this issue for packhouses and steering packaging towards higher productivity and improved accuracy.

Some of the largest apple businesses in India have already commenced investing heavily in sorting, grading, and packaging automation because the technology is programmed to act as intelligently as humans. Putting the lens on the current scenario, one engendered by COVID-19, it's clear that the pandemic acted like a catalyst for farm mechanisation. Punjab and Haryana governments rolled out strategies and facilitated the supply of advanced machinery like paddy transplanters and Direct Sowing Rice machines.

The augmentation of farm mechanisation is in the hope to offer a soupçon of aid to over 2 million farmers who are now left with a severely limited labour force due to distorted migration.

New era of farming

Farm mechanisation is poised at an inflection

point in India. But have a glimpse at the latest technologies used in the western world and it's apparent that we still have a ways to go.

Hands-free farming

The UK has planted, maintained and harvested barley, without a single human stepping on to the farmland, under the Hands-Free Hectare project. The crop was cultivated using completely autonomous machinery without an operator in the driving seat or agronomists on the ground. They successfully repeated the project with a wheat crop and now plan to grow three different crops across 35 hectares.

Robots

The US has moved on to robots like FarmBot that give a grower the power to manage farming from anywhere. Its drag-and-drop interface allows mapping of crops and building a sequence of farming actions that the automated hardware then performs. The FarmBot effectively fills the labour gap because a single machine acts as the seed injector, precision watering nozzle, soil sensor, weeder and more.

Tortuga Agtech's strawberry harvesting robot is another powerful example of farm mechanisation. It has surpassed one of the biggest design challenges in agritech - damage to fruit or vegetable while picking. The robot can not only identify and evaluate if a fruit is ripe enough to be picked but also harvest them without any bruising.

Future farms of India

When compared to its global competitors in the agri-space, the level of farm mechanisation in India is qualitatively low, but we are on the right track. Tracking mechanisation through farm power availability per unit area demonstrates it has improved. It's the speed, however, that's a tad slow.

The government allocated Rs 600 crore for farm mechanisation and policies that offer rebates and incentives to Farmer Producer Organisations (FPOs) will be instrumental in greater penetration of farm mechanisation in the coming year.

Blend these officially chalked out plans with the agritech ecosystem, which is nearly 500+ start-ups strong, steadily India is progressing towards truly smart farms.AS

Improvement of plant architecture for sustainable agriculture

Though traditionally domestication of plants took thousands of years of selection and breeding, the domesticated crops continue to be improved today using tools provided by modern technologies. One such tool is gene editing that can enable specific changes in a plant to obtain the required plant architecture and maturity.

he beauty and usefulness of a plant is not only in its flower and fruit but also in its structure. A plant's height, branches and growing habit, whether a shrub or a vine gives it distinctiveness and is called plant architecture. It is an outcome of balance between the genetic nature of the plant and its environment. Adverse changes in temperature, soil nutrition and wind velocity create an imbalance that impacts plant growth and architecture. Hence, it is a good indicator of crop health and yield. Plant architecture is important in farming, forestry and landscaping. It determines the branch pattern that can capture sunlight for growth vis a vis the energy spent on establishing the branch canopy. The architecture is also critical for planting density of crops as well as the combination of plants that can flourish together.

Farmers have been breeding for desired plant architecture for thousands of years e.g. maize, wheat, millets, tomato, watermelons, banana etc. This has allowed them to grow manageable crops in their farms for food and profit, what is termed as domestication of crops. Though traditionally domestication of plants took thousands of years of selection and breeding, the domesticated crops continue to be improved today using tools provided by modern technologies. One such tool is gene editing, which can enable specific changes in a plant to obtain the required plant architecture and maturity, in a short time, as long as we have in-depth knowledge of the changes involved.

Technology can ease the lives of farmers and ensure their profitability. Invariably, discussions around technology raise concerns on genetically modified organisms, pesticides, organic versus non-organic and sustainable agriculture. Most concerns and disadvantages around the abovementioned technologies can be addressed by gene editing, the technology that allows plant breeders to make small precise changes in an economical and efficient manner.

Breeders today have easy access to region wise crop data as well as genome sequences of major crops, enabling them to know their target genes for improvement. The key genes responsible for plant's architecture that were modified during plant domestication, can be identified. Most crop traits can also be enhanced using our knowledge of their wild relatives or other crops in the same plant family. Editing the genes of varieties of choice to generate trait specific change allows us to get the same result as natural selection or cross breeding done over multiple generations, in a very short time. The edited plant is indistinguishable from a naturally selected or bred variant.

Recent efforts of scientists to use gene editing to improve the plant architecture has made plants suitable for urban agriculture. This has been successfully attempted by Cold Spring Harbour Labs and Boyce Thompson Institute with tomato and an orphan crop groundcherry, both were made compact, fast growing with most of the plant's energy being utilized for fruit maturity. The knowhow was translated from tomato, to the orphan crop, groundcherry obtaining similar results. The plants can also be grown in vertical hydroponics set up in environmental controlled containers that utilize 95 per cent less water and nutrient resources for a quick harvest. Such changes can also be made in wild relatives of crop plants that are tolerant to severe conditions like drought and salt to obtain climate resilient crops for the future. These success stories open the path for improvement of many other plants for better growth, yield or architecture as in case of ornamentals. AS

Dr Shivendra Bajaj, Executive Director, Federation of Seed Industry of India (FSII) and Dr Ratna Kumria, Director-Biotechnology, Alliance for Agri Innovation (AAI)

Agri-tech to drive efficiencies in supply chain in India



AMITH AGWARWAL, Co-founder & CEO, www.agribazaar.com

An increasing number of agritech start-ups are deploying artificial intelligence (AI) and machine learning (ML) techniques, combined with on the ground automated sensing using internet of things devices. Their success is reflected in the increasing investments in the sector. In 2019, food tech and agritech start-ups raised \$19.8 billion in venture funding across 1,858 deals across the globe.

ne of the greatest challenges facing India's agriculture sector is supply chain inefficiencies. The agri-supply chain is fraught with problems such as the absence of scale, low level of processing or value addition and inadequacy of marketing infrastructure. These complexities are compounded by the presence of intermediaries at multiple levels of the supply chain. They erode into the earnings of the harvests. Further, storage losses for agri produce accounts for approximately 10 per cent of the entire production. As a result, a large number of farmers continue to live below the poverty line in our country.

Agri-tech can play a key role to deliver efficiency especially through an aggregation model. We have seen the power of e-commerce in the retail industry. By selling their products directly on e-retail platforms, small business owners have been able to broaden their markets. Similarly, e-mandi platforms in agriculture can alter the fortunes of every smallholder farmowner. The integration of technology can lead to greater transparency by reducing the asymmetry of information, better reach & price discovery and lesser wastage across the supply chain.



Taking cognisance of the effectiveness and efficiencies of online supply chains, the government has recently announced special provisions for the sector.

• The Artmanirbhar Bharat Abhiyaan provides

a capital outlay of Rs 1 lakh crore for the development of farm-gate and aggregation point, affordable and financially viable postharvest management infrastructure.

- Further, the Finance Minister has indicated that a new law will be framed to give farmers the option to choose the market where they want to sell their produce by removing interstate trade barriers and providing e-trading of agriculture produce.
- In pursuit of these objectives, an increasing number of agritech start-ups are deploying artificial intelligence (AI) and machine learning (ML) techniques, combined with on the ground automated sensing using internet of things devices. Their success is reflected in the increasing investments in the sector. In 2019, food tech and agritech start-ups raised \$19.8 billion in venture funding across 1,858 deals across the globe.

Here are some ways in which technologies are enabling better agri-supply chain efficiencies:

Digitisation helps in enhancing farm productivity through better crop advisory

Agritech companies provide crop advisory data on soil health based on past analysis and predict weather conditions using AI and drone technology. Thus, the farmer is aware of which crop to grow, when to sow and when to harvest them. With due weather forecasting, damage to produce due to natural reasons like heavy rainfall, etc. can be minimised.

• E-trading provides the purchasers with the benefit of crop traceability

In a physical mandi, the crop traceability is absent, while in an online platform, every delivery to the buyer can be traced to the original farmer/producer. Any future requirement based on quality, production, or consumer needs can be ascertained in this manner. The feature also helps large Indian and global institutional buyers to connect with the smallholder farmers directly, through an aggregation model.

Tailored agri-inputs can maximise yield output

Low crop yield, which is one of the biggest challenges facing Indian agriculture, can be significantly improved through agri-tech. By relaying information on the cropping patterns, farmland history and farming practices to agri-input companies, tailor-made research and development efforts to develop seeds, agrinutrients and other pre & post-harvest inputs can be conducted. This will help the farmer use the best insights to deliver maximum yield from his farm.

• Online trading can help Indian farmers in accelerating financial inclusion

Financial inclusion and mainstreaming of the Indian farmer are other crucial benefits of agri-tech. When a farmer's records are uploaded digitally, he gets better access to agri-loans and services, based on his credit history. Further, tools like warehouse collateral agri-financing (where his harvests are used for mortgage purposes) also improve his credibility. For example, www.agribazaar.com provides finance to both its buyers and sellers (farmers) in the platform through various tie-ups with financial institutions as the KYC is already done. Thus, agri-tech is financially empowering farmers and saving then from the clutches of moneylenders.

The COVID-19 crisis has demonstrated the relevance and resilience of e-agri-supply chains. Physical mandis run by the Agricultural Produce Market Committee (APMC) were closed following the lockdown. This closure did affect the agrisupply chain initially. However, the disruption was swiftly minimised as the government allowed the purchase of agriculture produce on e-Nam portals and private agri-trading platforms.

Agri e-tailers, such as www.agribazaar.com, handheld farmers through these vulnerable times. They connected the farmers with critical stakeholders while enabling them to practice the 'do gaj ki doori' stipulation or physical distancing. The innovation and quick scalability demonstrated by such agritech start-ups enabled efficient last-mile linkages across the agri-ecosystem even amid the pandemic. Consequently, there was no food shortage during the lockdown period, and at the same time, the spread of the pandemic was curbed. In parallel, the farm-to-factory connectivity measures ensured minimal wastage across the supply chain and fair price discovery for harvests.

These above steps will enable the creation of world-class agri-assets and foster more significant agritech innovation. Over the long term, they will empower the smallholder farming community, improve sectoral efficiencies in a self-reliant manner and catapult India's journey as the food bowl to the world.AS

Dairy farm mechanization through digitization



RAVISHANKAR G SHIROOR, Co-founder, Stellapps Technologies

The road to farm mechanization for smallholder farmers starts with addressing the 'profitability' problem. Digitization plays a key role in not only enabling farm mechanization and aids the creation of a conducive ecosystem that enables farmers to prosper. From improving farm economics, milk yield, milk quality, financial inclusion of farmers... the benefits are multifold.

t is interesting to note that India is not only the largest producer of milk but has also the largest number of bovine animals and the highest number of dairy farmers. There are 76 million dairy farmers and 300 million bovine animals in India. The average Indian dairy farmer is a smallholder with one to two cattle. Farm mechanization as it is seen in the traditional sense i.e. the use of milking machines, farm automation equipment etc. may not be feasible for a smallholder Indian farmer. Thus, we need to rethink how smallholder dairy farms can be mechanized to ensure feasibility, increased productivity and profitability.

Village as a farm

The lack of economies of scale for a smallholder farmer with an average of two bovines would mean higher cost of production and lower profitability. Low profitability keeps the farmer trapped in a vicious circle where he/she lacks the opportunity to grow as a dairy entrepreneur. Delivering services to a fragmented group of smallholder farmers also become costly for banks, veterinarians, feed providers etc. The lack of access to credit further ensnares the smallholder farmer. Unless we create a conducive ecosystem for the farmer to move up the economic ladder and grow entrepreneurially, they may not be able to benefit from the technological advancements in dairy mechanization.

Technologies like the Internet of Things (IoT), artificial intelligence, blockchain, predictive analytics have transformed the way industries do business. From increased efficiency to revolutionising the way businesses connected with their customers, technology has become an integral part of operations. While several industries have been quick to reap the benefits offered by technology, the agricultural sector is just warming up to the immense potential that could be tapped from technology adoption at scale. Digitising dairy supply chain with such modern technologies can help virtually aggregate smallholder farms at the village level.

Physically, village-level milk collection centers of cooperative and private dairies act as a point of aggregation of smallholder dairy farmers. Farmers religiously visit the collection centers to

pour milk twice a day. By upgrading a village-level milk collection centers with technology, they can function as smart service points for distribution of credit, livestock insurance, veterinary services, feed fodder provision and other extension services. Stellapps has succeeded in bringing farmers, dairy companies and service providers onto the Stellapps smartMoo platform and integrated fragmented smallholder farmers to operate like a big farm. Thus, enabling the village to become one big farm and gain the economies of scale.

Profitability' problem

To illustrate the profitability problem for a smallholder dairy farmer, let us consider the case of Gita. Gita is a dairy farmer from Uttar Pradesh who has two cows, only one of which is currently lactating. Gita sells the 4 liters of surplus milk she gets from her cow to the village milk collection center. She does not have proper information about feeding and relies on her observation to understand when her cow is going into heat. The lack of access to proper nourishment and artificial insemination at the right time leads to lower yield and lesser milk days for Gita's cow. For Gita this means lesser income and lesser income means her hopes to purchase another cow or invest in milking machines is quashed. The lack of access to credit also prevents Gita from availing a loan to invest in dairving.

Farmers empowered by technology benefit from a smart integrated ecosystem that links them to key services and information. Let us say Gita decides to pour her milk to a dairy company that has employed Stellapps' smartMoo suite of applications. Gita is issued a farmer ID card on enrollment and her details are captured through the automated milk procurement unit, a smartAMCU, which resembles a tablet. Her milk pouring data is captured by the smartAMCU. She also receives an SMS alert on her phone when she pours milk at the collection center informing her of the fat, SNF and quantity of the milk poured and the amount to be paid to her. The payment amount is directly credited to her bank account. Gita can now purchase affordable feed from the milk collection center and pay for it by pouring milk to the dairy.

Gita's two cows now have special 'fitbits' called mooON, a cow pedometer that tracks the activity of the cow. Gita receives real-time updates when her cows go into heat or when the fall sick through the mooON mobile application on her phone. The local veterinarian is directly alerted through the mooON when Gita's cows go into heat. This enables artificial insemination at the right time which in turn reduces the intercalving period. Gita also receives nutrition alerts and a ton of other information through the app. Thus, Gita is now aware of the best practices to follow. Her cows are healthy, receive artificial information at the right time and have improved yield and produce better quality of milk.

As Gita is now taking better care of her cows and pouring more milk to the dairy regularly, her farmer creditworthiness score, mooScore, improves. She automatically qualifies for a cattle loan and cattle maintenance loan due to the improved mooScore. Gita takes the affordable loan enabled by mooPay and builds a shed and purchases two more cows. Her cows are insured, and she is protected against the risk. The premium for the insurance and the repayment of the loan are deducted directly from the dairy's milk payables to Gita. So, Gita repays her loan diligently by pouring milk to the dairy. As she has more cows now, she pours more milk to the dairy and earns more income. With her surplus income and another mooPay loan, she now buys more cows and a milking machine. She is now a prosperous farmer with a mechanized farm.

The road to farm mechanization for smallholder dairy farmers is not a one-step one. It involves addressing all the key challenges faced by the average Indian dairy farmer - low yield per animal, high cost of production, lack of access to credit, lack of access to the right information, affordable feed and veterinary care at the right time. These issues can be tackled through the adoption of digitization. The resulting increase in income for dairy farmers sets them on the track to becoming dairy entrepreneurs who can invest in farm mechanization. Thus, breaking the vicious circle. The economies of scale generated by considering the village as a farm and aggregating services at the collection center level are visible when we consider Gita's case.

Hence, digitization plays a key role in not only enabling farm mechanization and aids the creation of a conducive ecosystem that enables farmers to prosper. From improving farm economics, milk yield, milk quality, financial inclusion of farmers... the benefits are multifold.AS

"The concept of market promotion will see a big modification and the focus might shift to digital promotion"



RAMAN MITTAL, Executive Director, Sonalika Group

Sonalika Tractors is one such company which over the years and with their quality products and after sales services, has emerged as one of the leading tractor manufacturing brand of the country. Company is on a transformative journey to emerge as a Mega Agri Brand with a vision of Leading Agri Evolution. The firm caters to the global demands of agri mechanisation through its integrated tractor manufacturing plant in Hoshiarpur, Punjab. These heavy duty products have enabled the brand to stand firm as one of the leading tractor exporters from India while satisfying over 10 lakh farmers across 120 countries. In an interview with AgroSpectrum, Raman Mittal, Executive Director, Sonalika Group, Delhi talks about company's apparition to become world leader in tractor manufacturing by sprawling its nexus across the globe. Edited excerpts

Over the years, Indian agriculture has seen lot of transformation in terms of production, techniques involved, selection of crops, harvesting methods, how you analyze this change and how it can be beneficial for the future?

If we divide the country into North and South geographically, then wheat and paddy put together in northern areas have around 50 per cent mechanisation in the harvesting sector. There is a room of another 50 per cent. In the southern areas, you have more of paddy-growing belts. In those areas, the mechanisation is 75 per cent and there is an opportunity for the rest 25 per cent. In case of maize, it is less than 10 per cent. So there is a huge potential. Similar is the case of pulses and lentils. I am only talking about these four crops and only harvesting machines. There is a lot of scope for other ancillaries as well.

Last year, Sonalika entered China's market through a joint venture. How is the partnership shaping up?

International Tractors (ITL), the flagship firm of Sonalika Group has joined hands with Shandong Luyu Heavy Industry Co. located at Laizhou Shahe Industrial Park of Shandong province, to expand its product line and offer ITL's range of tractors in the Chinese market. The joint venture is also accumulating the engines

Q&A

for the wheel loader application for captive consumption and other wheel loader construction machinery manufacturers in Beijing.

China market has huge potential for our range of tractors and with our association with Shandong Luyu , we are confident of offering farmers in China with best in class technology at competitive price point. Joint Venture Company would invest \$10 million to create a capacity of 50,000 engine & tractor assembly facility in phase-1 & later on further investments will be planned according to the future expansion.

Despite the current inimical situation, the company has managed to achieve its goal of more than 1 lakh annual sales in the financial year 2020. This is your third consecutive time you have achieved this target. Can you elaborate on that?

Our tractors have been globally accepted and appreciated by customers for their technology and consistent performance. The achievement is a true sign of acceptability of an Indian company across 120 countries. By achieving such goals, we are proving that our hard work is well appreciated by our customers and our consumer centric approach has been instrumental in this consistent performance of positively influencing over 1 lakh families for 3 consecutive years. The company has marked its presence not only in India but also across the world with the presence in more than 100 countries. The brand's most demanded categories of tractors across the world are Sikander series, MM series, and DI/RX series

How do you analyse the present situation when most of the businesses have taken a big hit ?

I cannot deny that there has been an impact on business due to the prevailing situation. We have responded to the challenge being people-centric. We have rolled out various initiatives, like setting up Isolation Centres in hospitals across Delhi and Hoshiarpur (Punjab) to support healthcare facilities, extended warranty renewal periods for our tractors, availability of service and parts, ongoing education on social distancing and matters of health and hygiene, food relief and amenities for communities in far flung areas. agriculture operations for the benefit of farming community, considering it's now the peak crop season. With the latest announcements, the entire Agri value chain has been covered under exemptions. Sonalika as an integral part of this Agri ecosystem, has been continuing to provide farmers with technology solutions to meet their varied farming needs. Together we shall emerge as stronger and better to recover fast from the prevailing situation.

When do you foresee the revival of demand for harvesters?

Going by the current situation, there is no clarity. Two factors will drive the demand normalisation of current situation by July and normal monsoon.

Recently, company launched an option of standby tractors for the farmers. Can you elaborate on that?

Looking at the current scenario of the coronavirus pandemic, we want to ensure that the farmers do not face any difficulties during this harvest season. Being farmer centric is our core value and we understand that a standby tractor for the farmer at this crucial time will be of immense support to meet any kind of eventualities. The standby tractor is available at different locations offered by our dealers on first come first basis.

What are the lessons learnt from this pandemic?

Firstly, the whole concept of physical exhibitions will completely change because of the pandemic. Also, the concept of market promotion will see a big modification and the focus might shift to digital promotion. With workforce operating from home, the corporates will also think on optimum utilisation of real estate space.

What are your new products in the line up?

As we enter the new financial year, we are ready with 4 Next-Gen Series tractors – Tiger, Sikander DLX, Mahabali, and Chhatrapati. In continuation of our belief in constant product innovations, these new tractors are 1st of their kind in India which will offer customisation addressing the local needs of farmers. AS

Government has been supportive on

Post COVID challenges in farm mechanisation industry

The COVID-19 lockdown has made adverse impact on the sales of farm equipment which is the one of the major inputs required for agriculture activity. The financial reports of the farm equipment companies show a decline in sales of tractors. Many farm equipment companies are hoping for growth in sales in the upcoming months looking at good rabi harvest and recent announcement of stimulus package Rs 1 lakh crore for agriculture sector by the central government. AgroSpectrum explores the challenges of farm mechanisation industry amidst lockdown.

The COVID-19 has started affecting the farm mechanisation industry all over the world. The recent financial report of major farm equipment company CNH industrial has shown that its consolidated revenues for the first quarter of 2020, ended on March 31 were \$5.5 billion, down 15 per cent of the first quarter of 2019. India's largest tractor manufacturing company, Mahindra & Mahindra's domestic sales has declined 83 per cent in April 2020. All these reports reflect the impact of COVID-19 lock down on farm mechanisation industry, which is struggling to increase the sales as per the changing market situations.

Hemant Sikka, President - Farm Equipment Sector, Mahindra & Mahindra said that the extension of the national lockdown impacted the business, with dealers partially open for just a few days. Going forward, several positive factors including a good rabi output, opening of procurement centres by the government, indication of good crop prices, reservoir levels etc., augur well for tractor demand.

Focusing on the current scenario of farm equipment market, Sikka said "The rate of improvement will depend on how quickly the on-ground sales operations, including the start of Non-Banking Financial Companies (NBFCs) are normalised, following the relaxation of the lockdown. However, enquiry levels are going up, with 65 per cent of our markets opened, this will go up to 80 per cent within a week.

Some of the small-scale farm equipment companies are facing the issues like lack of manpower due to migration of skilled labour, difficulty to access to the market and transportation challenges because of the restrictions laid by government in lock down period.

Milind Soman, Director, T&U Systems Automobiles Pvt Ltd, said "If government support farmers through the ways like farm mechanisation banks and group farming, it will definitely change the picture of farm equipment sector. The government should encourage and support small manufacturing companies for future growth."

Soman added that as regards to the small businesses involved in farm mechanisation, the government should encourage local manufacturing units and give support. Currently the sector is reeling under tremendous pressure and most of them are closing their businesses, one small unit creates a manpower or Job opportunity for at least 15 persons. This really helps the local economy of the region.

The problems faced are drop in turnover over the last two years. It is already creating trouble from banks and the worst is yet to be faced. The issue is they are all stuck on their financial problems and don't have additional liquidity to survive. The recent packages offered by banks are too tedious and most of them don't qualify. The banks demand for 150 per cent collateral apart from operational assets. This never matches the actual requirement and the businesses fail.

There is an opportunity for creating Jobs. The business people don't mind paying if they get results so banks should arrange a person from there side and appoint as their representative with the unit to monitor financial discipline and get the business growing .

Soman also suggested that looking at current lock down situation, it's high time that the farming community should look at consolidation and group farming activities. The government needs to formalise a policy to allow private equities in farming and change in land leasing act in agriculture. It can make group farming more lucrative. Government should ease the norms of financing in group activities.

Farm mechanisation bank

Government can create a farm mechanisation bank or Invite private parties to invest and create the support system for mechanisation. This will enable self-reliance by the farming community on mechanisation and also the sales of produce should be allowed with an open market economy.

Many of the farm equipment companies are facing issues due to closure of essential suppliers and ancillaries amidst the lock down. Companies are expecting government to allow opening of ancillaries. Mrityunjaya Singh, Managing Director, CLAAS Agricultural Machinery Pvt Ltd, said, "We restarted operations on March 27. Currently, the capacity utilisation is around 30 per cent. The biggest challenge is closure of essential suppliers and ancillaries. The pandemic has hit not only the demand but supply also, as the entire supply chain has been disrupted. We are sustaining on the inventory. But it becomes difficult if the government doesn't allow opening up of the ancillaries."

Singh further added that COVID-19 has hit 20 per cent of our annual revenue as of now. Our financial year is from October to September. Given that there would be normal monsoons and that COVID-19 remains under certain level of control, the impact will not be above 20 per cent.

Going by the current situation, there is no clarity about increase in demand of farm equipment. But normalisation of current situation by July and normal monsoon may drive the demand for harvesters. Annually, 6,000 harvesters and 1,500 combine harvesters are sold in the country. We anticipate 20 per cent degrowth. Around 70 per cent of the CLAAS's dealers across the country are supplying parts to farmers. Its helpline acted like a call centre where the field staff was operating through phone and guiding the operators to fix the machines besides



The rate of improvement will depend on how quickly the on-ground sales operations, including the start of Non-Banking Financial Companies (NBFCs) are normalised, following the relaxation of the lockdown."

> - Hemant Sikka, President - Farm Equipment Sector, Mahindra & Mahindra



It's high time that the farming community should look at consolidation and group farming activities. The government needs to formalise a policy to allow private equities in farming and change in land leasing act in agriculture. It can make group farming more lucrative. Government should

ease the norms of financing in group activities." - Milind Soman,

Director, T&U Systems Automobiles



Going by the current situation, there is no clarity about increase in demand of farm equipment. But normalisation of current situation by July and normal monsoon may drive the demand for harvesters. Annually, 6,000 harvesters and 1,500 combine harvesters are sold in the country. We

anticipate 20 per cent degrowth." - Mrityunjaya Singh, Managing Director, CLAAS Agricultural Machinery

assisting the farmers. Considering the current lock down situation, farm mechanisation industry is expecting support from government by opening ancillaries and suppliers to keep the supply chain moving. Recent announcement of stimulus package of Rs 1 lakh crore for agriculture sector by the government has raised the hopes of farmers. National Bank for Agriculture and Rural Development (NABARD) funding of Rs 20,500 crore for agricultural operations for pre-monsoon and kharif and Kisan Credit Card will play an important role in improving financial condition of farmers.AS

> Dipti Barve dipti.barve@mmactiv.com

Webinar - Impact of COVID-19 on irrigated agriculture and road ahead

Experts suggest large scale implementation of micro irrigation for better results

here have been reports that we are going to face a huge water crisis and it is important to stabilize the condition of irrigated agriculture by finding better alternatives to overcome the upcoming crisis.

AgroVision Foundation and AgroSpectrum have organised a webinar on "Impact of COVID-19 on irrigated agriculture and road ahead" on May 15, 2020. The webinar was intended to understand the expert's perspective on the evolving situation and booster steps required. Experts from the industry suggested for large scale implementation of micro irrigation for better results.

Moderating the webinar Dr C D Mayee, Chairman, Advisory Council, AgroVision stressed on the significance of irrigation in agriculture and technologies in irrigation like micro- irrigation and drip irrigation. While talking about the impact of COVID-19 on the irrigation of Indian agriculture, Dr Ashwin Pandya, Secretory General, the International Commission on Irrigation & Drainage (ICID) said, "In India winter irrigation was largely completed when the COVID-19 started spreading all over the world. Due to unavailability of labours, in irrigated agriculture the time gap between two crops has been reduced. This has disrupted the hydrological cycle. Kharif sowing is largely affected in northern India because of low output of rabi season."

He further said "we are not having adequate storage of water, so that we are able to shift the time cycle little bit away from hydrological cycle. Our irrigation network is in need of upgradation and maintenance. We should have a systematic way to carry out irrigation operations. For better irrigation we should adopt the irrigation technologies like micro-irrigation and drip irrigation and also usage of sprinklers."

While answering to a question on skilled labours returning to villages, Dr Pandya said, "Skilled labour - mason, artisans can make use of their skills in upgrading the irrigation in agriculture. It will provide them employment opportunities in villages".

Micro irrigation

B P Chavan, CEO, Business development, Kothari Agritech focused on the current scenario of microirrigation in India. Chavan said "Out of 63 million hectre irrigation area in India only 12 million hectre area is covered under micro irrigation. Today maximum microirrigation is done in groundwater and not in surface water. Though government is trying to develop the distribution systems of close piping network, most of the farmers are still not getting benefit of it due to cropping pattern and low finance."

Chavan informed that in order to increase the micro irrigation in agriculture, government should encourage farm ponds and solar farms. Awareness sessions on micro irrigation should be arranged by government for the farmers for understanding the importance of micro irrigation.

While talking about the reason behind the low implementation of micro irrigation, Kaushal Jaiswal, Managing Director, Rivulis Irrigation India Pvt Ltd said, "The initial cost of micro irrigation is not affordable for farmers. Secondly, many of the farmers are not well aware of scientific model of the micro irrigation which leads to reluctance to adopt the technology. Government should provide cost effective and less complicated micro irrigation to farmers through packages like Kisan Credit Card, NABARD funding schemes for agri-inputs."

When asked about hydroponic farming as an option for irrigation as it uses 95 per cent less water, Jaiswal said that hydroponic farming will not work for the food grain crops as it is an effective and useful option for the countries which has limited land for farming. It will not solve the agriculture irrigation problems in rural sector of India.

Jalshakti department- integration of irrigation

Recently government has issued SoPs (Standard Operation Procedures) for irrigation. While informing about various measures planned by the government, Gajendra Verma, Director General, Irrigation Association of India said, "Government has established Jalshakti department to implement better irrigation systems. Robust policy related to irrigation is in making process. NABARD is providing funding to farmers for agriinputs. More mechanisation, smart technologies like drones technology will definitely change the picture of farming in India."

While discussing on the latest irrigation technologies, experts informed about the smart technologies for better irrigation. Jaiswal stressed on the need of irrigation in time and quantity. Jaiswal said, "Many of the farmers are confused about when to irrigate the farm and how much to irrigate. Farmers should use the technology which guides about the quantity and time of irrigation through mobile app." Jaiswal informed about the Rivulis irrigation technology which uses remote sensing, hyper local weather forecast to alert the farmers about irrigation. Trials of this technology are in process at Central Institute for Cotton Research (CICR), Nagpur. Farmers can use it through smart mobile app.

Integrated pipe irrigation network

Talking about pipe irrigation network in India, Avinash Surve, Director, Vidarbha Irrigation Development Corporation (VIDC) highlighted the problems and remedies in pipe irrigation network.

Surve said that after the land acquisition bill passed in 2013, the process of land acquisition for pipe irrigation network has become more critical as the government has to pay heavy amount to land owners for using the land for pipe irrigation network. Despite this, government has started pipe irrigation network in Maharashtra successfully. Rather one step ahead, government has started integrated pipe irrigation network with micro irrigation in dryland areas."

Surve further said "if we distribute the water to farm ponds, the farmers can use it through micro or drip irrigation method. We need to upgrade our distribution system for better irrigation."

While summing up the webinar Dr Pandya said "We should look at irrigation as an economic activity since it is a part of economic cycle of every country. Implementation of micro irrigation at large level and better water pricing policy will definitely improve the irrigation scenario in India." AS

> Dipti Barve dipti.barve@mmactiv.com



Our irrigation network is in need of upgradation and maintenance. We should have a systematic way to carry out irrigation operations. For better irrigation

way to carry out irrigation operations. For better irrigation we should adopt the irrigation technologies like micro-irrigation and drip irrigation and also usage of sprinklers."

- Dr Ashwin Pandya,

Secretory General, the International Commission on Irrigation & Drainage (ICID)



Out of 63 million hectre irrigation area in India only 12 million hectre area is covered under micro irrigation. Today maximum micro irrigation is done in groundwater and not in surface water. Though government is trying to develop the distribution systems of close piping network, most of the farmers are still not getting benefit

of it due to cropping pattern and low finance." - B P Chavan, CEO, Business development, Kothari Agritech



The initial cost of micro irrigation is not affordable for farmers. Secondly, many of the farmers are not well aware of scientific model of the micro irrigation which leads to reluctance to adopt the technology. Government should provide cost effective and less complicated micro irrigation to farmers

through packages like Kisan Credit Card, NABARD funding schemes for agri-inputs."

- Kaushal Jaiswal, Managing Director, Rivulis Irrigation India



Many of the farmers are confused about when to irrigate the farm and how much to irrigate. Farmers should use the technology which guides about the quantity and time of irrigation through mobile app."

- Gajendra Verma, Director General, Irrigation Association of India



If we distribute the water to farm ponds, the farmers can use it through micro or drip irrigation method. We need to upgrade our distribution system for better irrigation."

- Avinash Surve,

Director, Vidarbha Irrigation Development Corporation (VIDC)

Economy of farm mechanization – 3 D's of inclusive and sustainable growth



ASHWIN WANKHADE, Advanced Marketing Manager, John Deere India Pvt Ltd

New technology and innovations along with continuous improvements on farm machinery will provide new layer of opportunities to meet specific crop and application requirements. It boosts productivity and reduce operational cost significantly, enhancing overall margin for growers.

arm mechanisation has played a significant role in shaping agriculture in India to meet the needs of growing population and ever-changing dietary needs of population. It came along together with some great bio-technology inventions and mechanization interventions in the country, redefining the way crops are planted, nurtured and harvested.

Today farming is looked as business rather than traditional means of subsistence. The land which was predominantly getting cultivated by animal power has now turned into the world's largest consumer and manufacturer of tractors. Though India tried to meet pace with developed countries in terms advancement of farm mechanization but there is still a significant lag and differences in level. Developed countries has more than 90 per cent of mechanization, while India is below 50 per cent.

There were definite tail winds towards farm mechanization growth in India. On a demand

side, most important trigger was food demand of growing population and declining rural labors. Agri mechanisation helped a lot through not only plugging the grain production gap but also being surplus on certain items enabling exports. On supply side, policy interventions played very important role. Better irrigation facilities, agri universitys' research and extension programs, credit growth in rural sector and emergence of quality and reliable local manufacturing capability turned out additional stimulators of this growth.

Recent government interventions to drive farm mechanisation like "Doubling Farm income 2022", sub schemes on ag-mechanisation from National Mission on Agriculture Extension & Technology, Custom Hiring Centers (CHC) has also started showing results.

Though we have progressed nicely on overall production, but there is a significant improvement needed on yield and overall profitability of the farmer. There is a long road



Diversity Dividend- Specific Crop based Socio-Economic clusters

ahead to achieve excellence in sustainably grown agricultural productivity and income for all stakeholders in value chain. Historically farm mechanisation level and power availability has shown linear relationship with farm productivity and income. Agriculture mechanisation growth need to be inclusive and sustainable as more than half of the population is depending on it for livelihood. This contrasts with developed countries, where services or manufacturing are major contributors of GDP and employment.

Perspectives are gathered below under 3 D's of inclusive and sustainable growth for farm mechanisation. They are diversity dividend, driving technology interventions and delivering value across value chain. It also supports views to accomplish high level of mechanisation like developed countries and making farming operations/ decisions more informed and efficient.

Diversity dividend

To improve economy of farm mechanisation in India, it is necessary to understand diversity in the country which brings a challenge to achieve higher level mechanisation and adoption of advanced technologies. But it also offers a great opportunity to achieve mechanisation which is more inclusive and integrated and has lot of social value. Fragmented and small land holding will continue to trigger growth for smaller to medium power machines and associated implements. As small farms are becoming non-viable, parallelly land consolidation is also getting momentum through contract farming or corporate farming. It has a great potential to bring efficiency in overall operation with increased profitability and finally helping to get fair share of margin to growers.

This will in turn grow demand for higher power machines and new technology usage potential. Key policy intervention will be decentralisation of manufacturing facilities of agricultural machineries to drive inclusive growth across states.

Another aspect of growth of farm mechanisation is allowing gradual decline in dependency on farm labors which will finally pave path of rapid mechanisation. It is also driven by more employment in service and manufacturing industry. We have seen high labor migration to cities in last few decades and has been a great tail wind for mechanisation. However, COVID-19 aftermath may see reverse trend in coming years for certain states.

To balance farm mechanisation growth along with sustainable work environment for rural labors, another diversity dividend which can help is different crops and dietary pattern in India. In developed countries one crop value chain often helps in high end mechanisation of larger fields compare to India where it becomes often difficult due to variety of crops and intercropping practices. There is a great potential to develop crop-based clusters across country which will enhance developing relevant industries in that locality. It starts with seeds, fertilisers, chemicals, storage and processing industries. Nashik



district in Maharashtra is a great example of such success story where rallying around one crop (Grapes) has helped to boost profits of farmers, farm mechanisation and development of allied industry in the area creating thousands of jobs for rural communities and migrants.

Another significant trend which will help further is evolving dietary pattern, more driven by urban population. There is increasing demand for food with high fiber, protein, dairy products, vegetables & fruits and organic products in urban places. It gives an opportunity to form clusters around major cities to cater these needs. It brings great potential to create jobs in dairy, packaging, forage and fruit processing which will further reduce employment dependency on agriculture and will help to improve economy of farm mechanisation.

Ultimate objectives of government policies should be to make these cluster self-sustainable to ease subsidy pressures which will finally help to improve economy of farm mechanisation. It will augment efforts of thousands of Farmer Producer Organisations (FPO) and Farmer Producer Companies (FPC) which are already getting momentum for similar cause and platforms leverage like eNAM (National Agriculture Market) will be a key to success.

Driving technology intervention

Evolution of mechanisation is very gradual in India which started initially with mechanisation of operations requiring high power and low control to medium power and control. Future of mechanisation is reaching to ultimate potential of mechanising operations which requiring now high controls and making it semi or completely automated. This is reflected in high mechanisation in applications like tillage and harvesting while certain operations like spraying are still manual. In last few years, we have seen a major change in weather pattern which are resulting to shorter window for farm operations giving demand for faster and efficient farm machineries.

It is often a combination of powerful, reliable and efficient prime mover with matching implement meeting requirements of specific farm operation. To make traditional machines equipped for these modern farming demands, technology intervention is inevitable. There is a need to significantly increase farming income and this can be accomplished only through new technology intervention and innovations suitable for Indian farming needs.

There is already policy in place to target doubling farming income by 2022. It is very apt and timely, seeing high stress among farmers due to lower margins. Farming on small land holding is no more viable. New precision agri technologies give the ray of hope to integrate agronomy, mechanisation and post-harvest operations to improve farming economy. Doubling the farm income is possible by two way, by reducing the cost or increasing the revenue. New technology provides significant advantages in reducing input cost by efficient usage of seeds, fertilisers, chemicals, nutrients and irrigation water which many times goes up to 60-70 per cent of total cost.

High technology prime movers and attachments which provide efficient and reliable farm operations not only save on tillage cost but help a lot in optimal usage of inputs. Another opportunity area is leveraging new technologies to boost yields by using new seed technologies, efficient and effective pest/disease control and machines harvesting reducing labor cost, grain losses during harvesting, transport and storage. It is the highest potential that new technologies can offer to improve economy of farm mechanisation and Agri machinery manufacturers like John Deere has successfully delivered and demonstrated such precision agri technologies which is driving significant value to customers.

Another boost for farming economy will be digital revolution which is happening in India.

With over 500 million smartphone subscribers and most of them in rural India, every nugget of information and knowledge is available on a click. New technologies on farm machinery along with internet connectivity has opened another level of potential to make farming decisions more scientific, timely and statistics driven. Next level of mechanisation drivers will be big data and IoT which will provide technology platforms to enable better decision making and analytics of farmers crop and machine data. It enhances efficiency in operation, savings on input and operational cost. It also helps in fetching better prices for farm produce bringing together all levers of controls at a grower level.

In last few years, this revolution is very well complimented by growth of start-ups in the country. With unprecedented support of government, many start ups are exploring technologies in agricultural sector. Increase in farming income, digital revolution (social media) and broader awareness on new technology advances has created a significant platform for growth of agri-tech start up in India. There is an increased focus on Crop pest/ disease management, improving supply chain/ distribution network, Farmer advisory and agri equipment hiring.

Once fundamental and basic infrastructure is added, new technologies got the biggest potential to take economy of not only farm mechanisation but overall agriculture to a next level. With extraordinary talent, frugal mindset and agile development, country has the potential to develop new technologies and innovation suitable for Indian farming conditions of small farms, diverse cropping, soil systems and weather patterns. Driving inclusive innovation will ask for technology and innovations coming of this country to serve local needs and has the ability to help millions in other countries. It will create a reverse trend when developing and developed world are looking to India for affordable technologies for their markets further boosting exports and local manufacturing in India bringing inclusive growth across sectors boosting employment and reducing dependence on agriculture.

Delivering value across value chain

Ultimate objective of every policy intervention, technology incubations and extension/

promotion activities in farm mechanisation is to create sustainable ecosystem. Many times, these objectives don't get accomplished fully or there is a failure of even some brilliant initiatives or ideas. One major reason is the lack of value creation for one or more of the stakeholders or dissatisfaction which breaks the chain.

From government perspective, value expected is both social and economic. When we look at the execution process, it is purely economic from stakeholder's perspective and value creation must be realised to meet his expectations which ultimately decides success or failure of complete value chain operation.

Good example to mention is vegetable value chain from grower to consumer and there is a transporter, trader/distributor and retailer is involved in the process. Unless and until there is a fair distribution of margin, any one stakeholder will not be under stress. It will improve the cashflow in the system which helps economic growth. Another example is custom hiring of tractors and implements. It is very important that overall ecosystem becomes self-sustainable without depending on subsidies and still creating good value for farmer, contractor, agent and manufacturer. Assistance of technologies can help to determine such value structure and assess the performance of ecosystem against objective of creation of economic and social value.

It is important to leverage geographical, crop and consumer diversity to lay a solid foundation for integrated and inclusive growth of farm mechanisation in India. New technology and innovations along with continuous improvements on farm machinery will provide new layer of opportunities to meet specific crop and application requirements.

It is also important to assess and ensure, economic value is created and delivered to each stakeholder to stimulate growth of the economy including manufacturers and technology incubators who will be investing heavily initially and will be seeking long term growth potential as a return. Ideal scenario would be development of self-sustained growth of small farmers with purchase power to invest for technologies which will generate margins for growth. This needs to thrive in state supported allied and self-sustained businesses in crop specific clusters to drive integrated, inclusive and sustainable socioeconomic growth. AS

Emerging technologies stimulating the APAC agriculture

A revolutionary era of digital transformation is flaunting a burgeoning growth in the farming industry via assessing value proposition of novel Agri technologies. Nextgen farming technologies are boosting precision farming with enhanced connectivity and active supply chain strategies. Tech-influenced agriculture practices are become imperative to farmers for a sustainable agriculture system to achieve shared prosperity. Countries are focussing on wide implementation of strategic Agritech recommendations to become a self-sustained society. Modern technologies are ripe for Agri innovations to improve efficiency of farm resources ensuring enhanced profitability with reduced ecological impact and smaller carbon footprint.

sia-Pacific is a pivotal component in the global food chain, accounting for 19 per cent of total global food and agriculture exports and 31 per cent of total food and agriculture imports. Asian agriculture sector is looking forward to fostering sustainable technologies owing to the increased concerns over exponential population growth, urbanisation, rising global protein demand, land and resource scarcity, biodiversity conservation and global warming.

Meanwhile, agriculture industry is grappling with increasing production costs, supply chain challenges, crippling labour shortages (ageing farmers, rural to urban migration), land management inefficiencies and disconnected consumers demanding transparency to the origin of their food.

Asia-Pacific Economic Cooperation (APEC) is

making agriculture a substantial economy, with the objectives to respond to the issues at food security and safety challenges, strengthen food safety standards, promoting the development of next-generation sustainable biofuels, enhancing agriculture's ability to adjust and mitigate the impact of climate change and strengthening technological cooperation in the strategic planning.

Disruptive technologies' transforming asian agriculture

Asian agribusiness and Agritech companies are leaping for growth and scope to accommodate the opportunities at increasing food demand, rising organisational capabilities, changing national policies, and consolidation throughout the valuesupply chains.

The agricultural landscape is experiencing



a shift through tech-enablement using sophisticated Internet of Things (IoT) technologies such as robots, digital sensors, aerial imaging drones, and technology. Thereby, precision agriculture and robotic systems will improvise farms Global Positioning Systems (GPS) - used to find the exact location of things or Geographic Information Systems (GIS) - used to record information on to maps land and resource management practices for a profitable, efficient, safe, and environmentally friendly advanced farming. Emerging technology innovations are promoting and emphasising on several novel farming systems to achieve sustainable agriculture objectives.

Urban vertical farming

Indoor vertical farming is a Smart Urban Farming model with complex and futuristic design by being more productive and less space consuming. These "Plant Factories with Artificial Light (PFALs)" which are essentially 'enclosed environment-controlled greenhouses', potentially yields 390 times more than a traditional farm of the same acreage. The unique hydroponic or aeroponic growing methods composes of vertically stacked shelves under energyefficient LED lights replicating sunlight. The procedure limits the requirement of soil for plants cultivation as the crops are just grown in nutrient-dense solutions and by systematic spraying with nutritional water. The successful indoor crop cultivation with reliable harvests is independent of natural harsh weather events or seasonal change.

Vertical farming provides high-quality produce sustainably, as the method significantly reduces the amount of ground area requirement and labour efforts in maintenance, unlike the traditional farming methods. The process uses 95 per cent less water and promotes pesticides or herbicides free environmentally friendly farming.

The model is gaining popularity in countries with exponential urban population such as China, Japan, Singapore, South Korea and Taiwan. These will increase the Food and Agriculture Organization estimate of 20 per cent of food produced in urban areas. As the products are locally grown and not imported, fruits and vegetables stay fresher for longer, devoid of shipment expenses. However, setting up vertical farming require strong financial resources and an affordable electricity. Governments can support the development of these farms by offering power subsidies or other tax incentives.

Urban farming can also adopt 'Hydroponics seawater greenhouse technology' using mineral nutrient solutions combined with solar energy. This system is sustainable, doesn't rely on fossil fuels or electricity and again doesn't require farming land.

IoT enabled farm automation

APAC agriculture industry is experiencing an increasing adoption of revolutionised 'smart farming' technology. The incorporation of farming operations technologies and Big Data analytics via precision agriculture can mitigate farmers' economic investment challenges and effectively improve production per acre.

The farm equipment industry has evolved with new territory of smart connected services with novel functionality, high reliability and evaluating parameters. A comprehensive precision agriculture ecosystem consists of tractor original- equipment manufacturers (OEMs), seeds and fertilizer manufacturers, technology companies, hardware and software companies. The tools from these sectors integrate operations, collect and transit real-time data from farm equipment to a farmer's dashboard. The innovative technological step will also allow farmers to automate their existing equipment's to maximise its capacity and efficiency.

The autonomous machineries are synchronised to monitor automated seed dispensing, precision planting, precision fertilizer application, crop health monitoring, integrated pest management, smart irrigation, water quality monitoring, harvesting, ecological monitoring, smart logistics and warehousing using advanced navigational services.

Precision agriculture through data analytics and digitization

Precision agriculture is an emerging concept capturing quantitative evidence and thus rule out farmers' dependency on intuition, assumptions and weather prognostics. A calculative datadriven farm management tools achieve a profitable and sustainable agriculture goals. Thus, an AI enabled agricultural farm connected to IoT or sensor technology sanctions farmer a provision to study agricultural practices

<u>45</u>

in a virtual environment before actual field implementation. The Asia Pacific precision farming market is anticipated to rise with a CAGR of 20 per cent over the forecast period of 2019-2026. Emerging precision farming economies like India, China, Japan, South Korea, Australia and New Zealand are expected to witness considerable growth during the estimated period. Currently, Australia is leading precision farming market in the Asia Pacific region supported by its government and local precision agriculture technology manufacturers.

The use of digital solutions and advanced data analytics improves crop resilience and yield. Remote sensors, satellites, and UAVs can gather information 24 hours a day. Satellite imagery continuously collecting information about the temperature, humidity, plant health, soil condition, climate forecast, natural calamities deliver farmers a real-time actionable insights on several aspects from multiple perspectives. Remote sensors enable algorithms to interpret field environment as statistical data which is not achievable through traditional methods. The Artificial intelligence (AI) tools assist farmer in achieving a better harvest goal through appropriate strategic decision making.

Drones and robotics assist in remote and automated crop monitoring. The data-driven crop analytics and climate resilient advisory benefits farmers in yield estimation, smart crop advisory, crop scouting solutions, Geo-mapping, proximity marketing, finance modules, and even crop-wise financial reports directly on to their smart phone or other communication gadgets.

Although, it's quite evident that utilization of futuristic technologies and innovations will enable the optimization of input parameters associated with current agricultural practices. Though high initial investment and implementation issues are the major factors hindering the precision farming market, it also attracts agriculture technology providers by encouraging mergers, acquisitions, partnerships and joint ventures than any other sectors. Precision agriculture machineries uses advanced technology such as Global Navigation Satellite Systems (GNSS) which provide significant cost-effectiveness 'only' when employed on larger farms and when fully integrated. Though individual tools are affordable, integrating them into cohesive management platforms



can significantly be expensive. Execution of precision farming can also be slightly tedious as it involves abundance data collection, analysis, and interpretation of a particular farm over the years. Thus precision agriculture is slowly and steadily making inroads into APAC's development, but is yet to make a remarkable marking in emerging economies.

Supply chain tracing with blockchain system

Blockchain is a unique decentralized highly secured digital transaction and self-executing smart system which ensures transparency and traceability at supply chains. Blockchain is a distributed recordkeeping ledger technology which can record and update the status of crops from planting to harvest to storage to delivery.

The structure of blockchain ensures secure and highly accurate tracing of agriculture products belonging to a specific farmer in realtime during transit. Blockchain can also be used for resource management across the entire supply chain when paired with IoT technologies, such as sensors and Radio-frequency identification (RFID) tags. The system can track other sensors and equipment or can maintain machinery records. Blockchain technologies can prevent price extortion and delayed payments while simultaneously eliminating middlemen and lowering transaction fees, leading to fairer pricing and helping smallholder farmers capture a larger part of their crop value. Utilizing blockchain, a company's online commodity exchange connects farmers and buyers to a

larger pool of customers locally, regionally, and globally. Both can view prior trade history, view what local cash prices are doing, as well as analyse the depth behind the bid and offer. This unique intelligence enables users to set a target price with confidence. However many countries are yet to implement this disruptive technology thus leaving this potential system untapped though it can strengthen food and agriculture entrepreneurship in Asia.

Data gathering drones

Bees which are now disappearing due to increased unfavourable environmental conditions were playing a large economic role as pollinators helping sustain agricultural production. Recent technology has appointed Drones in a hopeful experimentation, supplementing the traditional pollination efforts from bees.

Other duties in which drone technology can be deployed are;

- Soil and field analysis: Drone produce precise 3-D maps for early soil analysis and thus can assist in planning seed planting
- **Planting:** Novel drone-planting systems can shoot pods with seeds and nutrients into the soil and thus decreasing planting costs by 85 per cent.
- **Crop spraying:** Drones can be assigned for aerial spraying of fertilizers by evenly covering the entire cultivation area. The process is five times faster with drones than traditional machinery with real-time scanning to ensure accuracy in spraying.
- Crop monitoring: Drone can capture timely

developmental stages of crops enabling better crop management and minimising production inefficiencies

- **Irrigation:** Sensor drones can identify dry areas in the field which is in need of attention and manages irrigation and nitrogen levels
- **Health assessment:** Drone can carry visible and near-infrared light scanning devices to track adverse variation in plants which indicate their health and thus alert farmers on the possible disease.

Drones are also implemented in automated crop harvesting, aerial photography and even potentially in future as delivery drones.

CRISPR and genetic editing

Agronomy and Agro-biotechnology are revolutionary tools to increase productivity in the agriculture sector with lesser environmental impact. Gene-editing has contributed to Agritech industry by creating genetically modified seeds, samplings and microbiome which enables crops to exhibit immunity towards disease/pests and encouraging yield potential. Scientists have also engineered crops that require less water and yet more productive.

Clustered, regularly interspaced, short palindromic repeat (CRISPR) technology is a new approach to genome editing that allows greater selectivity and reduces the element of chance in plant genetic engineering. The technique not only can create breeds with improved yields and resistance to adverse conditions, but can also be used to propagate crops with essential vitamins, nutrients, and minerals.



Nanofertilizers for precise dosages of nutrients and agro-fertilizers

The new precision agriculture revolution is driven by nanotechnology. Advanced precision farming delivers nanoparticles and advanced biosensors to plants through 'Nanoencapsulated' conventional fertilizers, pesticides, and herbicides which release nutrients and agrochemicals in a slow and sustained manner, resulting in precise dosage and nurturing of the plants. In the conventional traditional methods roughly 60 per cent of applied fertilizers are lost to the environment, causing pollution. Nanofertilization method also imparts greater plant protection and diseases treatment. Biosensors used in the process can detect pesticides in crops, leading to more-informed decisions.

Role of agri-startups, entrepreneurs and government organisations

Multiple agriculture tech startups are emerging in the past decade owing to rising interest in AI and robotics in agriculture sector. Entrepreneurs offer smart farming guidelines using digital Agritech devices to make it a profitable affair to both farmers and Agri-startup companies. It is essential to achieve scale, efficiency, and agility across changing value chains and markets.

The Agritech startup industry exhibit competence in delivering agricultural innovation by ensuring increased efficiency with potential yield. These entrepreneurs educate and assist farmers through disruptive digital solution learning. Additionally, guiding them on productivity, investors, market connectivity, digital platforms to sell and produce, financial services systems (credit and savings), crop insurance and other innovative services.

Agri-startups also play a major role in orienting stakeholders towards agriculture and precision technology investment. The technology innovators shares their innovation and business plans with leaders of public and private institutions, allied companies, incubators, researchers, business community, policymakers, financial institutions and so on. Various industrial stakeholders and academic participants strive hard to improve the quality of futuristic technologies to impact the future of the agricultural sector.

Governments in general, face the growing threat of climate change, natural resources shortages, unexpected climatic disasters, and population pressure. Hence there is an increased need to foster the technologies and improve the ecosystem by government and regulatory bodies. Government should also take a leading position and key role in fostering collaboration among agriculture, research centres, universities, and innovative startups who can work together to address concerns and create solutions. Several emerging agro technologies under the drive and challenges can inculcate measures to improve collaboration efforts. The progress must be enabled through judicious incentives and smart regulation.

The rapid development of data infrastructure, profusion of digital technologies, and precision agriculture devices which has the potential to deliver farm-level, geospatial analytics need assistance form governments, service providers, policymakers, public agencies, and private service providers in the agriculture sector.

Entrepreneurs have also experienced resistance by farmers in adopting new farming techniques and practices. There is also a lack of motivation due to incur high costs in running pilot tests and lack of financing to raise capital funds. Farmers need to be educated to persuade effective results from innovations. Next generation farmer should be a technically skilled food grower with complete knowledge on plant biology. AS

> Hithaishi C Bhaskar hithaishi.cb@mmactiv.com



Tanimura & Antle introduces 'Harvest Select' boxes for retailers

California based company Tanimura & Antle has introduced HarvestSelect, a box of fresh produce, to retailers for their consumer pickup and delivery programmes. Each box contains at least eight fruit and vegetable products and a recipe card, and has its own Universal Product Code for quick scanning, according to a news release. A Produce Traceability Initiative-compliant sticker includes packing dates and where the items were grown. Tanimura & Antle first made the boxes for its employees and donations to community groups and plans to sell to foodservice operators and wholesalers participating in the U.S. Department of Agriculture's Buy Fresh program, known as the Farmers to Families food box program. The retail partners began requesting the option to carry these convenient packs in stores to help provide additional lift to the produce category and offer consumers a convenient and valuable produce option, stated the release.

Haryana to register FPO's warehouses on e-NAM platform

The Haryana government is determined to integrate packhouses /warehouses on the e-NAM platform of the Government of India. e-NAM (National Agriculture Market) is an electronic trading portal that forms a network of APMC mandis to create a single market for agricultural commodities. The government has decided to integrate pack houses with e-NAM, under which three pack houses of FPOs from the state will be registered. These pack houses are set up under the Crop Cluster Development Programme (CCDP) of the state government. According to Arjun Singh Saini, the government of Haryana has registered 125 FPOs on the e-NAM portal to carry out online trading of horticultural items.

Adani Agri Logistics dispatches 30,000 tonnes food grains

Adani Agri Logistics Limited (AALL), a part of the Adani Ports and Special Economic Zones Ltd, has facilitated the dispatch of 30,000 tonnes of foodgrains during the lockdown. This is equivalent to feeding over 60 lakh people across different states in India like Tamil Nadu, Karnataka, Maharashtra, Bengal, etc. The company used seven trains owned and operated by it for the transportation of foodgrains from production centres in northern India to consumption centres. Further, in close coordination with the government of Madhya Pradesh, the AALL has also started the wheat procurement process with adequate safety and precautionary measures in its MP units with effect from April 15, 2020. The AALL, which operates a network of food grain storage silos across 14 locations in India, has worked as a lifeline for lakhs of families depending on the supplies. With a collective storage capacity of 875,000 tonnes per annum, this storage infrastructure caters to nearly 1.5 crore people.



Ninjacart launches 'Harvest the Farms' to connect farmers with consumers

Ninjacart - India's leading fresh produce supply chain company has launched an initiative called 'Harvest the Farms' to help the farmers. Millions of tonnes of vegetables are rotting in the farms - unharvested and through this initiative, farmers who are struggling to find buyers for their produce can now directly sell to the consumers through



Ninjacart. Ninjacart's well-connected fresh food supply chain across the country can distribute the produce at a very marginal cost from farm to consumers. 'Harvest The Farms' has been launched in partnership with local grocery stores and will be available in Zomato, Swiggy and Dunzo in Bangalore, Mumbai, Delhi-NCR, Ahmedabad, Chennai and Pune. Customers can simply head to the Zomato Market, Swiggy Grocery section or Dunzo Fruits and Vegetable section, search for the

nearest Ninjacart powered stores, select the fresh vegetables and fruits on offer and place their order. To enable this, Ninjacart has partnered with local grocery stores to bring the benefit to consumers

Godrej Agrovet ties up with Zomato and Swiggy for smooth supply

Godrej Agrovet Limited (GAVL), a diversified agribusiness company, has announced partnership with food delivery applications Zomato and Swiggy. This move comes as a response to ensure uninterrupted supply of essentials to customers amidst the ongoing COVID-19 outbreak. Under this partnership, Creamline Dairy, subsidiary of Godrej Agrovet, will deliver essential food items under their brand Godrej Jersey which includes – milk, ghee, curd, paneer and buttermilk. Delivery through these applications is operational in Chennai and Visakhapatnam. Their services in Hyderabad will commence once the restriction on food delivery through Swiggy and Zomato is lifted in Telangana. These applications enable quicker delivery anytime during the day. Similarly, to meet the growing demand for frozen snacks, Godrej Tyson Foods Limited too has partnered with Swiggy in Mumbai, Kolkata and Guwahati to deliver a wide range of frozen snacking products including nuggets, patties, kebabs, tikkas and cold-cuts under the brand Godrej Yummiez.



Loadshare Networks raises Rs 100 Cr in Series-B funding

Logistics platform Loadshare Networks has raised Rs 100 crore in Series-B funding from investors led by Beenext, with participation from the CDC Group of Britain and existing investors like Matrix Partners India, Stellaris Venture Partners and Alteria Capital. The startup will utilise the funds to expand its network and make a foray into new sectors like pharmaceuticals, fast-moving consumer goods (FMCG) and groceries, the company said in a statement. Over the past two years, Bengalurubased Loadshare has increased its regional footprint beyond the north-east, where it first started operations, to over 400 towns across 18 states now with a focus on the eastern states. The CDC Group of Britain has co-invested in Loadshare alongside Stellaris Venture Partners, which has been an early investor in the startup launched in 2017.

AGRO

Workshops, National Expo & Conference

NOVEMBER 27-30, 2020

NAGPUR

India's Premier Agri Summit

Announci

Highlights of Agrovision 2019

- Participation of over 400 organizations
- Over 30 Workshops conducted
- Workshops conducted by over
 60 experts

Conferences on

- Dairy Development & Milk Processing in Vidarbha
- 'Opportunities for MSME in Agriculture
 & Food Processing'

Bookings Open

 New Delhi
 Kusum
 : +91 99580 36410
 | +91 11 2331 9387
 | Mail : kusum.barsiwal@mmactiv.com

 Nagpur
 : Vinay Javeri
 : +91 97647 96709
 | +91 71 2255 5249
 | Mail : vinay.javeri@mmactiv.com

 Pune
 : Dipak Chavan
 : +91 99232 02884
 | +91 20 2729 1769
 | Mail : dipak.chavan@mmactiv.com









Strategic Media Partner

#AGROVISION2020

www.agrovisionindia.in

(C) 8383853534



Comprehensive Ecosystem Coverage Spiraling Growth

