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## AGRIBUSINESS **AGRI INFRASTRUCTURE**

















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#### From the Editor's Desk AGRI INFRASTRUCTURE CAN UNLOCK THE TRUE POTENTIAL OF AGRIBUSINESS

griculture is now more of an enterprise than a mere vocation and its area of operation has extended beyond the conventional confines of farming. From seeds, fertilizers, crop protection to credit, agricultural activities in the upstream segment is diversified and is an important business segment. The post production scenario which has now moved beyond the commodities era into value addition and processing, has created a strong presence in the Indian economy.



Better income prospects and a marked enthusiasm in income spending has propelled the growth of retail segment in India. Of the overall retail industry, food and grocery accounts for the largest share in revenue in India. Besides, India is the world's second-largest producer of food, thus offering a strong raw material base for the food industry. Similarly, the input segment offers immense scope in the agri business segment.

A sound and adequate infrastructure becomes pertinent for agribusiness to thrive and develop. Unfortunately it is this area where India lags behind. Despite the presence of a bountiful natural raw material base, the country suffers from inadequate storage capacity, cold stores and even proper links between farm and market.

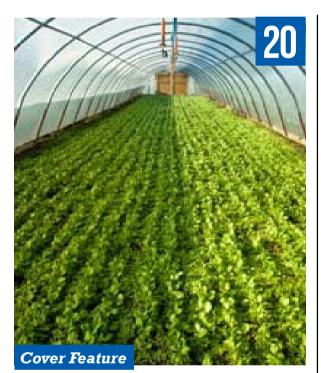
Agricultural warehousing accounts for fifteen percent of the warehousing market in India. However, there exists a gap between the demand and existing capacity. The widening gap has attracted many private players to invest in this space. Agri-commodity warehousing firms have witnessed strong growth in their businesses adding just more than warehousing services. Apart from stocking a range of commodities and issuing receipts against them, modern commodity warehouses provide allied services such as procurement, maintenance, collateral management and financing. These new services have provided firms with more revenue lines and higher margins, attracting private equity investors to the space.In addition to dry storage capacity, there is an acute shortage for cold chains in India. This is a severe handicap considering our post harvest losses. Cold Chain, a chain of logistics activities that ensure market connectivity of perishable produce from harvest to consumers, is still in a nascent stage in India despite its immense potential in an agriculturally significant nation like India.Indian needs more investments in cold storage, considering the heavy losses the country incurs by way of wastage of fruits and vegetables.

Infrastructure associated with agriculture needs to evolve and develop to help the farm segment to withstand the pressures and demands of the new and evolving agri sector. Agri infrastructure, however, is still in its nascent stage and holding back the true potential of Indian agri business.

Aniana Nair

## C O N T E N T S

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#### AGRIBUSINESS AND AGRI INFRASTRUCTURE COMPLEMENTING EACH OTHER



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#### **Agriculture Exports for Better Agricultural Incomes**

National Agricultural Export Policy aims at bolstering India's global agri trades

hile India cruises ahead in agriculture front breaking many records, the country is still unaware of how to turn its surpluses into productive assets. Over production and glut have constantly turned the

price dynamics upside down. With farmers bearing the brunt of fall in prices and surviving heavy losses, agriculture continues to remain unpredictable and capricious.

The glut, a regular feature of years of good production, remains as persistent as its inevitability. With farmers resigned to this phenomenon, loan waivers have taken the place of its solution. The problem of surplus has now become a regular occurrence, with India constantly displaying good production years. Unfortunately, this blessing has turned into a curse for Indian farmers with a lack of adequate storage infrastructure, processing facilties and absence of a stable export policy. Exports could be a good conduit for trading the agricultural excesses in exchange for forex.India is currently ranked ninth amongst the major exporters globally as per WTO trade data for 2015. India's share in global exports of agriculture products has increased from 1% a few years ago, to 2.2 % in 2016. With the emphasis on doubling farm income by 2022, it becomes imperative for the government to adopt strategies that can change the status quo and make the agriculture of India more global and export oriented. This would be a real game changer in the case of marketing perishables which in the absence of proper infrastructure rot and disintegrate.

The draft agriculture export policy, conceived by the Ministry of Commerce and Industries recommends a stable trade policy regime apart from reforms in the APMC Act, streamlining of Mandi fee and liberalisation of land leasing norms. There is an increasing need for the Government of India to establish a stable and predictable Agri Export Policy which aims at reinvigorating the entire value chain from export oriented farm production and processing to transportation, infrastructure and market access. The proposed Agri Export Policy is framed with a focus on agri export oriented production, export promotion, better farmer realization and synchronization within Gol.

The National Agriculture Export Policy is formulated to increase the share of agricultural exports from present ~US\$ 30 + Billion to ~US\$ 60 + Billion by 2022. The policy also aims to boost high value and value added agricultural exports, focusing on perishables; promote novel indigenous, organic, ethnic traditional and non-traditional categories; provide an institutional mechanism for tackling market access barriers and deal with sanitary and phytosanitary issues; become one of the top 10 exporting countries of agricultural products and strive to double India's share in world agri exports and focus on export centric clusters for integrated Commodity Focus Value Chain and Infrastructure Development.

The agri ministry has suggested to work towards ease of logistics, storage hubs, establishing traceability systems, and market intelligence for imports, promotion of crops where imports are large and superfoods, and brand promotion in global markets. India has immense potential in agri exports especially since our county has a more diverse food and non-food agriculture base. India's export basket is a diversified mix led by marine products (US\$ 5.8 Bn), meat (US\$ 4 Bn) and rice (US\$ 6 Bn) which together constitute ~52% of its total agri exports.India's domestic policies largely aimed at food security and price stabilization at times are also perceived as impeding trade, innovation and perversely food security itself. However, lack of consistent policies in the areas of farm production, support prices and R&D to inland transportation, exit point infrastructure and export restrictions have the potential to result in uncertainty among the stakeholders and loss of opportunity. India has remained at the lower end of the global agri export value chain given that majority of its exports are low value, semi-processed and marketed in bulk.

A National Agri Export Policy thus would invariably bring competitiveness in Indian agriculture and a rapid adoption of good agricultural practices that would inevitability improve the income structures of the farmers.

#### **Pulses through PDS?**

Excess pulses stocks has prompted the government to distribute them through PDS

ulses – the reservoir of proteins – is dear to Indian diet, considering the majority of population's inclination towards vegetarian lifestyle. So it comes as a relief to many families, if the government decides positively on its proposal to distribute the pulses through public distribution system at subsidized rates for several welfare schemes.

Until recently, pulses hardly formed an important choice of crops for the farmers or our agricultural policy. Minmum Support Prices or subsidies always supported the cereals. Farmers were more inclined to raise crops that secured them government support and earned them good returns. Pulses were sidelined despite their nutritional value. Years of negligence resulted in dependence on imports to meet local demands. The pulses not only cost the exchequer dearly but also the prices were influenced by the global market forces. However, things have changed and now India is slowly but steadily increasing its area under pulses. The country has been able to produce record productions of pulses in consecutive years. In 2017-18, pulse output grew to a record 24.5 million tonnes, and as farm gate prices fell sharply the Centre stepped in to procure pulses at minimum support prices from farmers. In 2017-18, central agencies had procured over 4.5 million tonnes of pulses, the highest ever.

Despite being a major producer of food grains, India is still weighed down by the inadequate distribution of nutritional food across the population. The nutiritional indices are far from encouraging. Nearly every third child in India is undernourished: Underweight (35.7%), or stunted (38.4%), and 21% of children under-five years are wasted as per National Family Health Survey (NFHS-4) 2015-16. Also, protein energy malnutrition (PEM) is a major public health problem in India. This brings forth an important inadequacy in our public food distribution system. With a robust and functional PDS in space, distribution of nutritious pulses is a viable option. Pulses play an important part in human nutrition as they provide high protein and fibre. A significant source of vitamins and minerals, such as iron, zinc, folate, and magnesium, pulses should ideally be part of a healthy and balanced diet. With more than half of the population under 25 years of age, it becomes imperative to provide healthy and nutritious food.

So the Centre'sapproval of the proposal to sell pulses at discounted rates to state governments, under the public distribution system (PDS) and the mid-day meal scheme for school children is a welcome move. The government is expecting to clear the 3.5 million tonnes of stock procured during the past one year and improve nutritional indicators for poor households with this first-of-its-kind move. Central agencies, consequent to this approval would sell tur, chana, moong, masoor and urad at a discounted price of Rs 15 per kg over prevailing wholesale prices. The sale will continue for the next one year and will be a one-time measure to clear the stock of about Rs 5,237 crore.

Hailed as a significant decision benefitting the weaker sections of the society for whom the pulses remain unreachable due to high prices, the decision can impact the health status of the malnourished and undernourished. However, for the action to be effective, our PDS must be strengthened and procurement effective. PDS still has many loopholes which need to be addressed and infrastructure for the storage of the procured stock must be bolstered. India needs a productive population and proper policies can direct the towards this.

#### **Army Worms Attack India**

Fall army worm, the invasive pest infests Indian farms

ests are potential threats to agriculture. The magnitude of threat increases if it is an invasive pest and an introduced one. Karnataka and parts of Tamil Nadu and Telangana are bracing for a major catastrophe with a new pest gorging ravenously on the standing crop.

The 'fall armyworm', cited by global agencies as an international food-security threat, has been spotted in Karnataka's maize pockets for the first time, prompting a nationwide alert. The pest has spread to Tamil Nadu and has entered Telangana. Feared as a threat to food security of millions, FAO, has warned in June that 300 million Africans could face hunger because of it. The pest was first detected two years ago in Africa and has since spread to more than 30 countries, devastating corn potentially worth \$5 billion. What makes the pest dangerous is the rate at which the pest multiplies and its capacity to fly over long distances (100 km per night) and ravage crops all year round given the region's favourable tropical and sub-tropical climate, which means there are always crops and weeds around that Fall Armyworm can feed on. Fall Armyworm can eat maize and some 80 other crops, including rice, vegetables, groundnuts and cotton.

The pest attack reported from India is the first incidence in Asia and hence reason to fear. India alone produces over 20 million tonnes of maize. The small scale farmers would be the most affected in Asia, as they cultivate about 80 percent of the region's farmlands, rice and maize being the most produced and consumed cereals. Over 200 million hectares of maize and rice are cultivated annually in Asia. China is the secondlargest maize-producing country in the world, and over 90 percent of the world's rice is produced and consumed in the Asia-Pacific region.Native to the Americas, Fall Armyworm has already spread across Africa where it was first detected in early 2016. By early 2018, all but 10 (mostly in the north of the continent) African states and territories have reported infestations and the pest has affected millions of hectares of maize and sorghum.

The mode of arrival to India has not yet been ascertained with speculations such as "humanaided transport" and "Natural migration"being cited as reasons. The country is under vigil considering the voraciousness of the pest and its host range. At this point, it becomes increasingly important to derive a management strategy. The nature of spread of the pathogen warrants management than eradication. Due to the speed at which the pest is multiplying and spreading, India will have to act quick and with most precision. Outright eradication is impossible and a permanent measure to eradicate them is non existent.

An accurate survey of crop loss and yield is critical to any crop pest management system. FAO recommends implementation of the Fall Armyworm Monitoring and Early Warning System (FAMEWS) to monitor, analyse and produce early warnings, including risk to food security. The farmers across the country needs to be sensitized and made aware of the potential threat to the crops with suitable technical advisories regarding management options. Considering the magnitude of the problem it becomes extremely necessary to carry out a continent wide programme including nations that have yet not been affected but holds the potential for the same. Bringing together experts at a global level to share knowledge and experience on the pest management, developing tools to build early warning, monitoring and response mechanisms; and supporting countries to mitigate pest damage, develop action plans and policies, and train extension workers and farmers are some important measures.

If proper monitoring and warning systems aren't enabled, this can turn into a global catastrophe and risk world food security. We need a global preparedness team to siphon off the required expertise and garner and disseminate technical help in the case of a catastrophe.

#### **GM Food Floods**

Indian market sells GM foods

hile GM foods continue to be anathema for Indian market, a recent finding has found the presence of GM content in products sold in India. One

third of the sampled food contained GM content pointing to the need for regulations on the manufacture, import, and sale of such foods.

Centre for Science and Environment (CSE) tested 65 products from markets in Delhi, Gujarat, and Punjab. Of these 30 were made in India and 35 imported. All but two of the 21 that tested positive for GM content were imported and most of them were imported into India by third-party importers and not by the brand owners.The food products that tested GM positive include infant food for children with allergies , edible oils, corn and pancake syrup, popcorn, cereals and snacks.

Interestingly, genetically modified processed food cannot be sold or traded in India without government approval. Section 22 of the Food Safety and Standards Act, 2006, prohibits the manufacture, distribution, sale or import of GM food unless regulated.As high as 80% of the packaged foods that were found to be GM positive were imported from abroad. While many of the imported foods are American, they are rarely imported from the US by the third-party importers who usually prefer to import the same products from West Asia or South-East Asia. So far cotton is the only genetically modified crop cultivated in India. The country has been reluctant to introduce genetic modification in any crop afterwards. GM Brinjal and GM mustard projects were shelved.

Unfortunately, the stringent regulation in cultivation has not been followed in import of food materials. The importers have very well taken advantage of the lacuna in regulation of GM foods flooding our markets. Despite the mandatory requirement of labelling the packaged foods sold in the market with the description of ingredients, most of the companies have not divulged the details of the GM content. Of the 21 products that tested positive for GM, the labels of 13 did not mention they had GM content; three products made false claims that no GM ingredient had been used.

This has compelled the Food Safety and Standards Authority of India (FSSAI) to take an action and is in the process of formulating regulations for the production, import and sale of GM foods. FSSAI said that these regulations will focus on procedures for safety assessment and approval of foods, including imported foods derived from genetic-modification processes based on internationally well-established and accepted scientific principles, procedures and best practices before they are allowed for food purposes. A draft Food Safety and Standards (Labelling and Display) Regulations is also on the anvil that states that a company needs to make a declaration on the label in case it's food product has 5 per cent or more of ingredients which are genetically engineered or genetically modified.

India's retail space has seen an unprecedented demand for packaged and processed food. Of the overall retail industry, food and grocery accounts for the largest share in revenue in India. The Indian food and grocery market is the world's sixth largest, with retail contributing 70 per cent of the sales. The demand for imported food products being on the rise, the Indian market has seen recently several new products. The lack of regulatory mechanism has warranted a situation where products imported are not checked for GM content. India should quickly and sternly develop and implement regulatory framework in this area. A growing Indian market cannot nurse a lax attitude in this regard. Otherwise, the market will be inundated with unregulated products.

#### Urea from RFCL likely by year-end

• Gas Transport Agreement (GTA) made with Gujarat State Petronet Ltd., (GSPL) for the supply of gas from Mallavaram field Project to provide direct employment to 440 persons and indirectly to over 1,000 persons in Ramagundam. Work is fast apace at the Ramagundam Fertilizers and Chemicals Limited (RFCL) which is coming up in place of Fertilizer Corporation of India (FCI) plant in Ramagundam as part of the revival of the fertilizer plant. It is likely to start production of fertilizers from December 31 this year. Union Minister of State for Fertilizers and Chemicals Indrajit Singh had informed the Rajya Sabha that the gas-based RFCL would start production of fertilizers to meet the demand of the farmers by December 31 this year. Ever since, the government had announced the revival of the FCI



into the gas-based RFCL, the pace of work had been intensified after the conduct of environmental public hearing in the year 2015. The authorities removed all the old structures of the FCI and have replaced it with the new state-of-the-art machinery to produce less pollution and produce quality urea and ammonia. They were using the Italian technology for the production of urea and technology from Denmark for ammonia production.

#### 

## Dhanuka Agritech Ltd. organizes "Krishak Goshthi" to promote PM's vision of Doubling Farmer's Income by 2022

• Dhanuka Agritech Limited, India's leading agrochemicals company, organized a 'KrishakGoshthi' in Indira Gandhi Agriculture University Auditorium, Raipur, Chhattisgarh. The meet highlighted various approaches for doubling farmer's income to support the Prime Minister's vision of achieving this target by 2022. Sri Brijmohan Agrawal, Minister of Water Resources Department, Agriculture & Bio Technology, Animal Husbandry, Fisheries, Ayacut, Endowment Chhattisgarh was the chief guest. He encouraged farmers to use modern farming techniques for



increasing their crop yield. Shri Satya Bhushan Jain, Working President, International Vasish Federation; Shri S.K Patil, Vice Chancellor Indira Gandhi Agriculture University, Raipur and Shri M.S Kerketta, Agriculture Director, Agriculture Department, Raipur were also present at the event as notable guests. More than 600 farmers from various parts of Chhattisgarh took part in the event and benefited from the ideas shared. Numerous government officials, scientists from state's Krishi Vigyan Kendra, agriculture universities and official from agriculture department along with local authorities were present. DhanukaAgritech also felicitated farmers for improving crop yield through modern technologies and also provided farmers with safety kits.

#### McLeod Russel to trim plantations, outsource tea from small growers



• Following in the footsteps of HLL and Tata Tea, the world's largest tea producer McLeod Russel is looking to trim its plantation portfolio. The lost production will be replaced by leaves outsourced from small tea growers. The Rs 2,055-crore turnover (consolidated) company, in a joint venture with group entity Eveready Industries, has also launched a parallel effort to enhance the packet tea business from barely 4 million kgs. "We want to be asset-light and focus more on the branded-tea sector," Aditya Khaitan, Vice-Chairman and MD, McLeod Russel, told newspersons after the company's AGM. Till March 2018, McLeod was producing 67 mkg of tea from 52 gardens (it produces an additional 30 mkg in Africa and Vietnam). This was topped by 20 mkg of tea outsourced from small growers. In June, the company inked agreements to sell 12 gardens, producing 14 mkg. While the sale is yet to be implemented, Khaitan said the production loss would be compensated by raising outsourcing. The contribution of outsourced teas in total sales will jump from roughly 27 per cent to 46 per cent. That's not all. McLeod is looking to sell more gardens. "It is getting difficult to improve the profitability of certain gardens. We are in the process of identifying such assets," Khaitan said. The move should help McLeod to make its balance-sheet cleaner. The sale of 12 gardens, if approved, will help the company to pare its debt from Rs 1,000 crore to Rs 200-300 crore.

## Bayer-led global alliance ties up with Big Basket to boost farmers' income in India

• A global alliance led by Bayer and IFC had announced partnership with e-commerce firm Big Basket to help small farmers in India raise their income by providing them knowledge to use inputs efficiently and timely as well as access to markets to sell produce. In April this year, Germany-based agro-chemical major Bayer, International Finance Corporation, Netafim and



Swiss Re Corporate Solutions launched the 'Better Life Farming' alliance to provide innovative solutions for smallholder farmers in developing economies. The global alliance has now roped in local partners -- YaraFertilisers, DeHaat and Big Basket -- in India to scale up its operations. 'Better Life Farming' project started in India in 2016 and the alliance is targeting to reach 6,500 small and marginal farmers by 2019 from around 2,000 farmers this year and 250 farmers in 2017. The alliance is working with farmers in Uttar Pradesh and Jharkhand who are growing green chillies and tomatoes. It plans to work for corn farmers as well. A senior Bayer official highlighted that farmers were able to double their yields and triple their farm incomes during the pilot project. He explained that this project will run on a business model and not as CSR activities. The alliance plans to rope in partner working in the field of credit and insurance, the official said.

#### IFFCO ventures into food processing space

♦ Fertiliser major IFFCO announced a joint venture with Spain's Congelados De Navarra to set up a food processing plant at Ludhiana in Punjab with an investment of Rs 325 crore. With this joint venture, the co-operative IFFCO is entering the food processing sector. Congelados De Navarra is a \$220-million company that has pioneered individually quick frozen (IQF) technology. It is into processing of vegetables, fruits, herbs and ready-made pre-cooked dishes. "We have formed a JV with Congelados De Navarra to set up a plant in Ludhiana. We have already identified 40-acres of land for this purpose," IFFCO's MD US Awasthi informed. IFFCO will have a 30 per cent stake In the JV, while its Spanish partner will hold the remaining 70 per cent stake, he added. "The joint venture company will invest €40 million (about Rs 325 crore) to set up a greenfield food processing unit. The foundation stone will be laid in December and work will be completed in 18 months," Awasthi said. The proposed plant will source potatoes, peas and cauliflower from farmers and then process them for sale in the domestic and export markets. IFFCO's MD said it was a logical step for the co-operative to get into the food processing business for the benefit of farmers. This will help meet the government's goal of doubling farmers' income by 2022, he added. IFFCO said this new facility would generate 400 direct and 5,000 indirect local jobs in Punjab.

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#### Lower sales push Kaveri Seeds Q1 topline down to Rs 581.89 cr

• Kaveri Seeds Ltd saw a slight decline in net sales to Rs 581.89 crore in the first quarter of FY19 on reduced volumes in cottonseeds. Its sales had stood at Rs 590.56 crore in the comparable quarter last year. However, after adding 'other income' of Rs 16.83 crore, the total income stood at Rs 598.72 crore. The total income in the comparable quarter last year after adding 'other income' of Rs 4.28 crore was put at Rs 594.84 crore. "Fear of pink bollworm (pest) as well as delayed rainfall in some markets have had an impact. "Sowing happened much later this year than last year in Central and South India. The northern cotton market has been stable overall, while Punjab saw a de-growth that was compensated with growth in Haryana," the company said in a filing to the BSE. Lower cotton acreage, and the Centre reducing prices by Rs 60 per packet, resulted in a topline decrease of Rs 35 crore and bottomline decrease of Rs 12-13 crore. "This impact was moderated by higher non-cotton profitability. Cotton volumes declined by about 9 per cent in the first quarter and this was offset by a significant growth of 25 per cent in non-cotton business, especially hybrid rice and sunflower," it said.

#### NCML to set up terminal market, processed food hub near Amaravati

• The National Collateral Management Services Limited (NCML), a leading agriculture post-harvest management company, signed a Memorandum of Understanding (MoU) with the Andhra Pradesh Economic Development Board (APEDB) to invest in cold storage chain and related infrastructure at Amaravati in Andhra Pradesh. NCML plans to invest Rs 100 crore in the cold chain and storage infrastructure. The MoU signed by Sanjay Kaul, MD & CEO, NCML and Krishna Kishore, CEO, Economic Development Board, Andhra Pradesh is aimed at setting up a 'Terminal market and Processed Foods Distribution Hub' near Amaravati. The project is expected to generate more than 1,000 jobs, besides augmenting the cold chain infrastructure in the State. The proposed hub will be an integrated facility for storage, handling and distribution of fruits and vegetables, dairy products, frozen foods (meat, seafood), processed foods amongst other perishables.

#### Centre's Rs 575-cr plan to douse stubble fire

To keep Delhi environment clean and pollution free during winter, the Centre would provide Rs 575.18 crore to Punjab, Haryana and Uttar Pradesh to buy 55.622 stubble machines to farmers of these States. The move is expected to go a long way in tackling air pollution as stubble burning is identified as one of the key problem areas, especially during the post-harvest season of October-November. The Centre's decision could take care of in situ stubble burning on 64.21 lakh hectare. The Centre will provide funds to buy state-ofthe-art machines, including happy seeder, paddy straw chopper/cutter, mulcher, RMB plough, shrub cutter, zero till drill, super straw management system on combine harvesters, rotary slasher and rotavator. Through this Centrally-sponsored scheme, the Government will assist individual farmers, cooperative societies, farmer producer organisations (FPOs), Self HelpGroups



(SHGs), private entrepreneurs and registered groups of women farmers. Sources in the Agriculture Ministry said Punjab would be given over Rs 269 crore to buy 37,500 agro machines to control in situ crop residue burning of 36.60 lakh hectare in 22 districts. Besides, the Punjab Government has also decided to provide subsidy worth Rs 395 crore from its own sources, in the current fiscal, for the purchase of 28,641 agro-machines to farmers for the management of paddy residue. Subsidy ranging from 50 per cent to 80 per cent is being provided to the farmers under the scheme. This will be part of the Rs 665 crore subsidy announced by the Amarinder Singh Government for 2018-19 and 2019-20.

#### Centre to procure more coarse grains

Responding to a query Union Agriculture Minister Radha Mohan Singh informed the Rajya Sabha that the government was planning to ensure the procurement of more coarse grains. Coarse grains is a sub-group of kharif crops, including barley, jowar and bajra. Also, there has been a constant increase in the MSP from 2012-13 to 2018-19 for various crops. The minister said the government had increased the minimum support price for kharif crops by 1.5 times their cost of production.

#### Agriculture Export Policy to be in line with WTO norms

• The proposed National Agriculture Export Policy — aimed at doubling the country's farm exports to \$60 billion by 2022, placing India among top 10 agriculture exporters in the world and promoting stability in export rules — is being vetted at the inter-ministerial level and will soon be placed before the Union Cabinet for approval. With India moving out of the income bracket of per capital gross national income of less than \$1000, it is not allowed by the WTO to give export sops. The thrust of the policy, formulated



in line with the vision to double farmers' income, is to boost high value and valueadded agricultural exports and focusing on perishables. "India's export of value-added products is very low and there is huge scope of improvement," the source said. The share of India's high-value and value-added agriculture produce in its agriculture export basket is less than 15 per cent compared to 25 per cent in the US and 49 per cent in China. The draft policy talks about a financial package for development and research on value-added cashew products such as cashew, apple, jams and pastes, flavoured cashew, biscuits etc. Improving India's reliability as a global supplier of farm products is also one of the deliverables of the policy. "The idea is not to allow frequent use of export restrictions such as imposition of Minimum Export Price, export duty or export ban, to tarnish India's image as a reliable exporter," the source said.

#### MNREGA to raise farmers' income

• With an eye on the polls and under pressure of farmers' unions, the Centre is considering a proposal to link the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) with agriculture. Besides increasing farmers' income, the move will also help meet the demand of shortage of farm labourers during pre-sowing and post- harvest phases across the country and create jobs in the rural sector and. Officials said the Prime Minster recently constituted a committee consisting of Chief Ministers of seven States — Madhya Pradesh, Andhra Pradesh, Bihar, Uttar Pradesh, Gujarat, West Bengal and Sikkim — to examine the feasibility of the proposal. The PM expressed concern over low corporate investment in agriculture sector and wanted States to formulate policies that promote corporate investment in areas such as warehousing, transportation, value addition and food processing. After hiking the minimum support prices of 14 kharif crops, including paddy, the Narendra Modi Government is hoping that linking MGNREGA with the agriculture will help increase farmers' income, as promised by the Centre..



#### FSSAI: In the process of framing GM food regulations

• The Food Safety and Standards Authority of India (FSSAI) said it is in the process of framing regulations for Gentically-Modified (GM) Foods. It was reacting to a study released by Centre for Science and Environment stating that genetically-modified processed foods were being widely sold in the country illegally and that there was a lack of regulations. FSSAI said that these regulations will focus on procedures for safety assessment and approval of foods, including imported foods derived from genetic-modification processes based on internationally well-established and accepted scientific principles, procedures and best practices before they are allowed for food purposes. "These draft regulations will, after formal approval of FSSAI's Scientific Panel, Scientific Committee and the authority, be notified in the Gazette to elicit comments of various stakeholders, which will be duly considered and finalised with the approval of the government," the food safety regulator added. FSSAI further pointed out that it is the process of finalising the draft Food Safety and Standards (Labelling and Display) Regulations that states that a company needs to make a declaration on the label in case it's food product has 5 per cent or more of ingredients which are genetically engineered or genetically modified.

#### Central govt okays sale of pulses to states at discounted rates

• The Centre has approved a proposal to sell pulses at discounted rates to state governments, under the public distribution system (PDS) and the mid-day meal scheme for school children. The government is expecting to clear the 3.5 million tonnes of stock procured during the past one year and improve nutritional indicators for poor households with this first-ofits-kind move. Central agencies will sell tur, chana, moong, masoor and urad at a discount of Rs 15 per kg over prevailing wholesale prices. The sale will continue for the next one year and will be a one-time measure to clear the stock for about Rs 5,237 crore, the cabinet said. The government's decision on pulses follows consecutive years of record production of pulses. In 2017-18, pulse output grew to a record 24.5 million tonnes, and as farm gate prices fell sharply the Centre stepped in to procure pulses at minimum support prices from farmers.



#### Poor rains likely to hit Gujarat cotton crop

• Cotton farmers of Gujarat are expecting a lower yield and crop failure due to insufficient rains in the state thus far. The state has similar acreage of cotton this year as it was last year but at the crucial growing period many cotton growing areas, mainly in Saurashtra and North Gujarat are still dry and do not have enough irrigation facilities. According to farmers and cotton industry experts, it will be harmful for standing cotton crop if the state does not have good spell of monsoon instantly. According to the state agriculture department's latest data, as on August 6, 2018, cotton sowing has been done on 2.65 million hectares which was 2.64 million hectares in corresponding period last year. "Cotton crop needs immediate rain. It is a growing period and if rain does not come within a week, cotton may face big loss. This year, farmers had begun sowing late due to delay in monsoon. The flood situation has already damaged cotton in some parts of Saurashtra and South Gujarat. Yield of the crop will not be as expected in Gujarat this year in present scenario," said Ramesh Bhorania, farmers and agriculture expert from Naranka village of Rajkot.

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#### Himachal plans natural farming

• Himachal Pradesh took a major initiative to work out action plan for spread of zero budget natural farming (ZBNF) in the hill state, with Governor, Acharya Devvrat playing the main motivator and originator of the concept, Padma Shi SubhashPalekar giving tips. More than 400 participants, including officials from agriculture and animal husbandry departments, and farmers from across the state deliberated on the need and strategies at the day-long conference organised here by agriculture department for the purpose. The farmers were of the view that an awareness campaign be started across the state for adoption of zero budget natural farming, which is done without any fertilizer and pesticides and is a healthy option as its depends only on the desi cows. "Himachal has taken a right step to implement natural farming in the state at right time to save farm community as well as people at large," said Palekar. He assured to provide his assistance in this regard and said that other line departments like animal husbandry, horticulture should also associate with it. Palekar detailed about ZBNF and said that chemical farming was mere a technology and not a natural process whereas natural farming was science and it needs no external support. He said that the only thing which required was to follow it.

State to provide support price to farmers

Ø Agriculture Minister Banteidor Lyngdoh criticised informed that the state government is preparing to introduce the Minimum Support Price in the state which will address the problems of farmers. He added that there is a need to support the farmers as the market for agricultural produce is very poor and there is a need to identify such crops that will be covered under MSP. Lyngdoh also said along with MSP, the state government is also making way for the Agricultural Policy. "The agricultural prices dipped as the farmers are being harassed by middlemen and big-time dealers," he added. He urged the farmers to be united so that they can fight against the frequent harassment by the middlemen.

## APEDA accreditation set to give fillip to organic farming

• About 800 farmers are engaged in organic farming in small chunks of lands Telangana Government's plans to give a fillip to organic farming in the State received a big boost with the Agricultural and Processed Food Products Export Development Authority (APEDA) giving accreditation to Telangana State Seed and Organic Certification Authority (TSSOCA) for inspection and



certification of organic farms, produce and products. In the absence of certification agency in the State, the organic farmers, though they are in small numbers, have been facing problems in getting their produce certified, in spite of increasing demand for organic food products in the State and outside. According to officials, organic farming is being carried out in about 1,570 acres in the State. The producers, however, have been catering to the demand from some exclusive outlets involved in the sale of such products with their own branding. "Now that the TSSOCA has secured accreditation, it's authorised not only to inspect and certify the organic farms and produce but can inspect the outlets to examine the products being sold by them as to whether they are genuine organic products or not", the officials said.



#### Gujarat to have a seed-potato centre for excellence

• A centre for excellence for potato-seed is all set to come up in Gujarat, through a collaboration between Indian and Dutch companies. The setting up of the centre for excellence is being facilitated by Netherlands Business Support Office (NBSO), with a view to helping produce better quality potatoes which will help improve the yield per hectare of potatoes. "We aim to produce better quality seedpotato with the use of latest technology and innovative farming processes. This will not just improve the quality of seed potatoes for the farmers of Gujarat but also help improve the yield," said AlphonsusStoelinga, the ambassador of the Kingdom of Netherlands to India, who was in Ahmedabad at the kickstart ceremony of Gujarat Seed Valley Federation (GSVF). Stoelinga said that a similar facility was inaugurated in Mohali, in 2016, as a joint venture between an Indian company and a Dutch company. The location for the centre for excellence is yet to be finalized, said sources in the NBSO. NBSO is also facilitating other projects in Gujarat in the textile sector using recycling technologies available with Dutch companies. Officials confirmed that by October 2018, a pilot collaboration project will begin. "There are a few companies based in Netherlands which specialize in technologies that help convert the discarded cotton textiles into yarn. We will take up a pilot project through collaboration between a Gujarat-based firm and a Dutch company," said Amlan Bora, Trade and Investment Commissioner of Netherlands to Gujarat.

#### Himachal apples give imported varieties a run for their money

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• Apples grown in Himachal Pradesh are giving a run for their money to imported varieties, particularly those from the China and the US, in the Indian market although the crop has fallen prey to vagaries of the weather. The traditional Himachali variety, Royal Delicious, is fetching a higher price than apples grown in the US, as plucking of the fruit picks up following a slow start in midJuly because of a strike by truckers. The American apple varieties are selling between Rs 1,800 toRs 2,200 per standard box. Apple farming was introduced in the region by Samuel Evan Stokes, known as Satyanand Stokes, an American missionary settled in Kotgarh, in 1916. More than 450 cultivars of apple are now grown in the hilly state .In terms of commercial importance, the main varieties are Royal Delicious, Rich-A-Red, Red Delicious and Golden Delicious.



#### Rajasthan first State to implement biofuel policy

Pajasthan has become the first State in the country to implement the national policy on biofuels unveiled by the Centre in May this year. The desert State will lay emphasis on increasing production of oilseeds and establish a Centre for Excellence in Udaipur to promote research in the fields of alternative fuels and energy resources. The policy on biofuels seeks to help farmers dispose of their surplus stock in an economic manner and reduce the country's oil import dependence. It has expanded the scope of raw material for ethanol production by allowing use of sugarcane juice, sugar containing materials, starch containing materials and damaged foodgrains like wheat, broken rice and rotten potatoes for ethanol production. Rural Development and Panchayati Raj Minister RajendraRathore said here on Tuesday that a biodiesel plant of the capacity of 8 tonnes a day had already been installed in the State with the financial assistance of the Indian Railways. The State government would promote marketing of biofuels and generate awareness about them, he said. While approving the policy on biofuels for implementation in the State at a meeting of the high-power Biofuel Authority, Mr. Rathore said the Biofuel Rules, 2018, would shortly be brought into effect. The Minister said the State Rural Livelihood Development Council would also encourage women's self help groups to explore the scope for additional income through the supply of biodiesel.

## Farm loan waiver: Karnataka in talks with Nabard to raise refinance limit

• The Karnataka government is in talks with the National Bank for Agriculture and Rural Development (Nabard) to seek an increase in the amount of refinance to help in waiving crop loans farmers have taken from the co-operative banks in the State. Currently, Nabard's refinance limit is 40 per cent. The State government wants this to be hiked to 75 per cent as it will ease in implementing the farm loan waiver programme. "When this is done, the State government may get an additional Rs 4,500 crore and this can help us to waive farm loans and give relief to farmers who do not come under the ambit of co-operative banks or commercial public sector banks," said BandeppaKashempur, Karnataka's Minister for Co-operation.



#### Centre's flagship crop insurance scheme sees 15% drop in cover

> The Centre's flagship crop insurance scheme, launched in the 2016-17 kharif (summer sown crop) season, has reported a 15% decline in coverage of farmers in its second year (2017-18) and one of the key reasons for this dip is the loan waiver announced by several states last year.Data on the crop insurance scheme, shared by the government in Parliament, showed that farmers' enrolment declined from 57.3 million in 2016-17 to 48.8 million in 2017-18 with Karnataka, Rajasthan, Uttar Pradesh, Bihar and Maharashtra reporting substantial decline. Incidentally, four of these five states — Karnataka, Rajasthan, UP and Maharashtra — announced loan waiver schemes last year, affecting the footprint of the Pradhan MantriFasalBimaYojana (PMFBY) in 2017-18. Giving reasons for the dip, the agriculture ministry said in its written response to a question in Rajya Sabha on Friday, "This is mainly due to factors like announcement of debt waiver scheme in Maharashtra and Uttar Pradesh, farmers' perception of mitigated risk in 2017-18 which was a good monsoon year, deduplication due to Aadhaar being made mandatory for coverage etc."

#### Government expands scope of loan waiver scheme to farmer's family

• The Maharashtra government has expanded the scope of the loan waiver scheme by extending the benefits to every member of the farmer's family in case of a separate loan account and issued an official order to this effect. The state government had said that it had spent around Rs 14,000 crore as part of the loan waiver till March this year. The government said the scheme had so far benefitted 35.32 lakh farmers in the state. A government resolution (GR) was issued on expanding the scope of the loan waiver scheme on August 10. The decision had been announced in the monsoon session of the state legislature held in Nagpur this year. Earlier, the state government had considered the farmer's family as one unit and considered it eligible to claim waiver of Rs 1.50 lakh agricultural debt. As per the GR, every member of the family having some agricultural debt will now be covered under the scheme, which was announced last year following strident protests by farmers.

## 12% interest for firms for delay in crop loss claims

• Insurance companies that fail to clear claims of farmers for crop loss within two months will have to make the payment with 12 per cent interest, Union Agriculture Minister Radha Mohan Singh said during question hour in the Lok Sabha. Replying to questions from members, Singh said: "Those insurance companies which fail to clear claims of farmers for crop loss within two months will have to pay with 12 per cent interest." The state governments will also have to pay the same rate of interest to farmers if they delay the contribution of their share, he added. Singh said said the Central government had introduced the Pradhan MantriFasalBimaYojana (PMFBY) from Kharif 2016 to address risks associated with agriculture. Farmers will get full insurance cover as there is no capping of the sum. The minister said the scheme offers insurance cover at all stages of the crop cycle, including post-harvest risks in specified instances. The PMFBY, according to him, addresses all shortcomings of previous schemes, and the premium is very low. His deputy, Gajendra Singh Shekhawat, said 10 crore farmers in the country had taken PMFBY cover and 5 crore of them had availed of insurance benefits so far.

## Crop loan disbursal: Maharashtra threatens to withdraw deposits from PSBs

• Despite several directives, warnings and reminders by the government of Maharashtra to grant crop loans to farmers, public sector banks in the state seem to have decided against it. Following the inaction by the banks, chief minister DevendraFadnavis has approached Union minister ArunJaitley in the matter. The banks seem to be reluctant to disburse crop loans which forced the state government to issue a warning that its deposits in these banks shall be removed unless they fulfil their crop loan target. By the end of July 2018, crop loans worth Rs 16,000 crore were disbursed in the state, out of which the share of nationalised banks or public sector banks was only 8%. District Co-operative Central Banks(DCCBs) and Regional Rural Co-operative Banks have disbursed 63% and 29% of the crop



loans respectively. Following the state's decision to grant a debt waiver, the government directed the allocation of crop loans to the farmers to public sector banks along with district central co-operative banks and regional rural co-operative banks. Since public sector banks have not touched even 10% of their priority lending or crop loan targets, the Department of Cooperation has expressed dissatisfaction and has issued a strict warning that if the banks do not comply, the state government will have to seriously take a decision with regard to government deposits kept in these banks. This year, the government has set a crop loan target of nearly `43,731 crore. Loan targets were also set for public sector banks, district central cooperative banks and regional rural cooperative banks. Out of these, DCCBs have met their targets to a large extent. However, because of the reluctance shown by the public sector banks, farmers in the state have been subjected to distress and have been kept waiting for long.

#### Oriental Insurance eyes growth in crop cover

▶ KR Srivats State-owned Oriental Insurance plans to ramp up its crop insurance portfolio to Rs 1,300 crore this fiscal from Rs 500 crore in FY18, said AV Girija Kumar, CMD. "We have made a good beginning in crop insurance and developed a good technical team. We will scale up. We will be selective (in writing new business)," he added. Girija Kumar further said Oriental is looking to double online sales this fiscal to Rs 1,600-Rs 1,700 crore. It had clocked Rs 400 crore in revenues through online sales (all channels in aggregate) in the first quarter this fiscal. For FY18, it had achieved revenues of about Rs 850 crore through online sales."All the products that we sell online are profitable for us, " he said.Girija Kumar said crop, retail and motor insurance will be the company's main growth drivers this fiscal.Oriental Insurance achieved a financial turnaround in FY18, recording its highest ever net profit of Rs 1,510 crore, against a net loss of Rs 1,691crore in the previous fiscal.Asked what helped this turnaround, he said the company had taken a conscious decision to improve the quality of business, pruned loss-making portfolios and moderated growth in unproductive group (commercial) health insurance against market growth.For FY19, Oriental Insurance has set twin targets for itself — business growth of 20 per cent and combined ratio of 110 per cent. It had closed FY18 with a combined ratio of 118 per cent, down from 148 per cent in the previous year.

#### Rural demand, farm income set to grow: RBI

• Keeping track of the farm sector that accounts for about 14 per cent of India's \$2.6 trillion economy and employs more than half of the country's 1.3 billion people, the six-member monetary policy committee said that it expected a boost in rural demand as strong monsoon and a hike in the minimum support prices (MSP) will increase farmers' income. The Reserve Bank of India governor-headed MPC in a statement, issued after three-day meeting, said, "robust corporate earnings, especially of fast moving consumer goods (FMCG) companies, also reflect buoyant rural demand." Several high-frequency indicators of services activity increased at a faster pace in May-June. Tractor and two-wheeler sales growth accelerated significantly, suggesting strong rural demand," MPC said in the policy statement. In its third bi-monthly meeting of 2018-19, MPC-led by Urjit Patel decided to hike the repo rate by 25 basis points to 6.50 per cent. Describing the impact of the steep MSP hike something very challenging to assess properly, deputy



governor Viral Acharya (in pic) said: "What is known as of now is that the increase for kharif crops is much larger than the average increase seen in the past few years." Such increases operate through multiple channels in affecting inflation as there is a direct impact on the prices of targeted food items, he said.

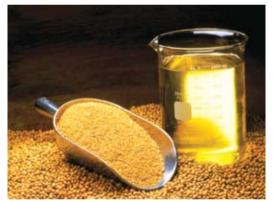
#### Tea exports up 5% in H1

● Tea exports from the country are expected to be more in the current calendar than in 2017 despite some reduction in prices because of higher volumes slated for shipment. According to the latest data available with the Tea Board, in the first half of the current calendar year, exporters reduced their price marginally, by 88 paise a kg, to average Rs 194.26 a kg against Rs 195.14 in the first half of 2017. The major price loss was in South India. This helped the volume shipped to rise to 112.1 million kg (mkg) from 107.2 mkg. This increase of 4.9 mkg marked a gain of 4.55 per cent. Besides, the higher volume shipped helped the overall realisation to increase by Rs 85 crore to Rs 2,177 crore. Tea exports from North India rose to 66.7 mkg, valued at Rs 1,435 crore, from 65.5 mkg valued at Rs 1,435 crore. Here, the average price rose to Rs 215.02 a kg from Rs 211.58. South India exported 45.3 mkg



of tea worth Rs 742 crore against 41.7 mkg worth Rs 706 crore in H1 of 2017. Here, the prices dropped to Rs 163.72 a kg from Rs 169.32. Exporters said that if this trend continues, overall shipments in 2018 will be a little higher than the level of 252 mkg exported in 2017.

#### Indian Oilmeal exports jump 18% in July: SEA



● The total export of oilmeals for the month of July are reported at 1,48,983 tonnes, recording a spurt of 18.33% compared to July last year. The overall export during April-July 2018 was reported at 8,98,871 tonnes, up nearly 24% over the comparable period last year, data complied by the Solvent Extractors Association of India (SEA) stated. The SEA noted that export of rapeseed meal jumped sharply, recording a spurt of 90% in last three months due to strong demand from South Korea, Vietnam and Thailand. The ongoing trade dispute between US and China has also created a lot of uncertainty and is forcing China to look out at other origins for their requirements of Soybean and oilmeals. This has compelled China to re-look over ban imposed for importing oilmeals from India since 2012, according to the SEA. This will open up Chinese market for India.

#### India's Rice Heads to Beijing Now

Ochina is set to import Indian basmati and non-basmati rice for the first time, said millers and traders who have started getting inquiries from buyers from the neighbouring nation. Beijing has already cleared 19 Indian rice companies to buy rice from. India exports 4 million tonnes of aromatic basmati rice a year and expects that to grow 5% this year with the opening of the new market, traders said. The country ships another 8.5 million tonnes of non-basmati rice to international markets. "Trading companies like Louis Dreyfus, CofcoAgri and regional players like Beijing Guchuan Rice Mills and Nice Foods are keen to import basmati, nonbasmati and even broken rice from India. It is a good development for Indian rice companies and farmers," said Vijay Setia, president of the All India Rice Exporters Association. Kohinoor Foods, LT Foods, KRBL, Lalitha Enterprises Industries, Sriram Foods and Gajanan Rice Mills are among companies which have the permission to export to China and are already in talks with buyers. The trade expects four more Indian companies to get clearance to export post China's General Administration of Customs and state-owned food processing company Cofco making an inspection of Indian mills, said BV Krishna Rao, managing director of Pattabhi Agro Foods. "It's a great opportunity and a huge market to tap into. With large disposable incomes, the consumer is looking for quality product." China wants freshly milled rice which is soft and sticky, said Setia. "Initially, we will export 300 tonnes for trial with demand largely to be from Indian diaspora and restaurants." The trade sees major demand in the east coast of China: Shanghai and Guangzhou, from Arabs, Iranians and Indians.

#### Farm exports clock 6% growth in Q1 to touch \$4.68 billion

Exports of farm and processed food products registered near 6 per cent growth in dollar terms to \$4.68 billion during the April-June quarter over the corresponding period last year. In rupee terms, the growth was higher, at around 10 per cent, touching Rs 31,397 crore as against Rs 28,564 crore in the corresponding quarter last year, according to the latest numbers from the Agricultural and Processed Foods Export Development Authority (Apeda). The higher growth in rupee terms could be attributed to the weakening of the currency, which fell by around 5.45 per cent against the dollar during the quarter. The export growth has come about mainly on account of strong demand for non-basmati rice, pulses, dairy products, guar gum, fruit and vegetable seeds, among others. Key products such as basmati rice and buffalo meat registered flat to negative growth in dollar terms on a dip in volumes. Basmati exports dropped in volumes to 1.16 million tonnes (mt) as against 1.25 mt in the same period last year. A weak currency in Iran — the largest buyer — impacted the earnings. Similarly, buffalo meat volumes fell to 2.76 lakh tonnes (2.79 lakh tonnes). Vietnam continued to be the largest buyer of Indian buffalo meat and accounted for 51.6 per cent of the total volume. Non-basmati rice shipments sustained their growth with exports touching 1.97 mt (1.75 mt). Groundnut exports surged to 1.26 lakh tonnes (90,103 tonnes) on good demand from South-East Asian countries such as Indonesia, Philippines, Vietnam and Malaysia. Exports of pulses have picked up, with volumes exceeding over one lakh tonnes during the quarter, enjoying robust demand from countries such as Turkey, Algeria and UAE. Similarly, volumes in dairy products increased to 35,720 tonnes (23,703 tonnes).

#### Global consumption of cotton seen at record 27.5 million tonnes

The International Cotton Advisory Committee has raised its estimate for global consumption of the fibre crop during 2018-19 to a record high of 27.5 million tonnes (mt) from 27.4 mt pegged earlier, on the back of "strong" demand. With global consumption seen at record high, world reserves of cotton are expected to reduce by 1.6 mt to finish 2018-19 at 17.7 mt, the committee said in its monthly report. The revised number is 100,000 tonnes lower than its July estimate. Stocks in China are projected to decrease for the fifth consecutive year to 7.5 mt, while stocks outside are expected to remain stable at 10.1 mt, it said. The global cotton body has largely retained its estimate for production in 2018-19 at 25.9 mt. It is, however, down 4 per cent on year. Meanwhile, international prices of cotton, which had dropped to 92 cents per pound in early July from a season-high of 101.7 cents a pound, have bounced back, it said. Cotton prices "remain higher than the season average of 88 cents per pound". "Although China's tariffs on US cotton helped drag international prices down from June's season-high of 101.7 cents per pound, strong demand in Asia and South-East Asia has helped them rebound by the beginning of August," the committee said. For India, the International Cotton Advisory Committee has pegged area under the crop to fall 3 per cent on year to 11.9 million hectares.

#### Spices Board to make testing mandatory for cardamom exports

● The Spices Board is likely to make testing of cardamom consignments for exports mandatory very soon, a source has told Cogencis. "This (mandatory testing) may help in addressing the issue of excessive pesticide residues, which has hit India's cardamom exports to Saudi Arabia," he said. "...complete model has not been worked out yet, we have various quality evaluation laboratories across the country for checking whether the sample is binding with the phyto-sanitary norms," an official at Spices board said. The Board's proposal comes in the wake of Saudi Arabia's food regulator's plan to make pre-inspection of the spice in the country of origin mandatory from September 1.





#### International research team cracks sugarcane genome

After years of arduous effort, scientists have mapped the genome of the sugarcane — a crop that produces 80 per cent of the world's sugar and has emerged as the primary crop for biofuel production. Because of its complex genetic make-up, it was one of the last crop plants to expose themselves to the tools of science. A global team of researchers led by AngéliqueD'Hont of France's



CIRAD mapped the sugarcane genome using a variety grown in the Réunion Islands. The findings, reported in the journal Nature Communications last week, will help scientists create a reference genome, which can be used to develop molecular tools to supplement conventional breeding methods. Until now, sugarcane cultivar breeding programmes were restricted to hybridisation, followed by cumbersome field assessments. Sugarcane breeding can now enter the age of molecular biology. The genome is so complex that classical sequencing approaches proved

useless, said Olivier Garsmeur, a CIRAD researcher and lead author of the study. "The sugarcane genome is nearly 20 times bigger than that of rice. While the rice genome could be sequenced about 15 years ago, the sugarcane genome proved a tough nut to crack," said G Hemaprabha, head-in-charge for crop improvement at the ICAR's Sugarcane Breeding Institute in Coimbatore. "We have identified around 25,000 sugarcane genes," Garsmeur informed. According to Hemaprabha, the newly acquired genomic information will help sugarcane breeders develop varieties as per their requirements. For example, they can breed varieties that can withstand droughts, require lesser water or cultivars containing higher sucrose levels.

#### Tea production set to decline this year

• Given a 4.58 per cent (20.77 million kg) decline in tea output in the first half of 2018, India appears to be heading towards lower production compared with 2017. In the first half of 2018, production fell by 4.6 per cent to 432.46 million kg over the H1 of last year. The production has dropped to 432.46 million kg from 453.23 million kg in 2017. In June, production declined by 3.8 per cent from a year earlier to 142.70 million kg due to less plucking in West Bengal, the second-biggest tea-producing state, said the state-run Tea Board. In West Bengal, production dropped 14.5 per cent to 40.86 million kg in June, the board said. The harvest of green leaf was affected by the adverse weather. Thus, production of black tea in both north and south India was lower. Production in North India was down by 1.21 million kg to 120.18 million kg. While Assam, the country's largest tea producing state, reported a 6.25 million kg rise in production, West Bengal lost 6.93 million kg. Tea production in south India dropped by 4.49 million kg to 22.52 million kg. Apart from weather, stoppage of production by the bought leaf factories in the Nilgiris due in protest against the Tea Board's average price fixation for green leaf, pulled the output down. Going by the present trend, overall tea production this year is likely to be nearly 1,300 million kg against 1,322 million kg in 2017, planters say. It would make 2018 the first year in recent times when the output would be below the previous year.

#### Giving wheat a healthy tinge

Scientists from the National Agri-Food Biotechnology Institute (NABI), Mohali, Punjab, have developed new varieties of coloured wheat that are enriched with antioxidants and minerals. Dr Monika Garg and her team of researchers at NABI have developed three varieties of coloured wheat — purple, blue and black. These three wheat varieties are enriched with antioxidants called anthocyanins. Anthocyanins are naturally occurring chemicals that give fruits like blueberries their colour. Pomegranates, plums, black grapes, brinjal and bell peppers are also rich sources of anthocyanins. Regular inclusion of anthocyanins in our diets can help remove free radicals from our body and prevent many lifestyle disorders like obesity, heart disease and inflammation. The major challenge in growing coloured wheat varieties is their low yield. Also, the anthocyanin-enriched varieties developed abroad do not thrive well under Indian climatic conditions. This, therefore is the



first time that coloured wheat varieties that are adapted to the local climate and soil conditions have been developed. Scientists crossed the donor lines of coloured wheat (blue and purple), procured from the US and Japan, with high yielding white wheat varieties grown in Punjab and Haryana. After many trials, they were successful in developing purple, blue and black wheat.



### Drone tech in state to help farmers up productivity

• Very soon drones will hover over the skies in select villages of Haveri district to assist farmers in carrying out farming activities. The State government has roped in Delhi-based firm Omnipresent Robot Tech to deploy drones on a pilot basis to assess the crop acreage, crop types, crop health and yield estimation among others. According to Gaurav Gupta, principal secretary, Department of Information Technology, Biotechnology and Science and Technology, the use of drones in farming activities is going to be a gamechanger in Karnataka. "The project is being piloted in Haverikasaba-hobli in Haveritaluk in an area of about 200 sq km," he said. Gupta said the drone operations will be carried out over a period of three months during the crop life cycle in the current kharif season. "The Karnataka Science and Technology Promotion Society (KSTePS), a subsidiary organisation of the Department of Science and Technology, has now taken the initiative to implement the pilot project," he said. KSTePS has awarded the project to robotics, industrial UAV/drone and video analytics solutions provider Omnipresent Robot Technology. The government has made a grant provision of Rs 2.5 crore for implementing the pilot project. Commenting on the project, Omnipresent Robot Tech founder Akash Sinha said the company will provide data on crop health from multi-spectrum images. "We give inputs on crop water content, requirement of fertilisers and pesticides, health condition of plants and this will help 10% to 15% hike in production," he said. The company's data analytics platform Nervecentre will give AI-based analysis on a realtime basis on the crop type, area, volume and health of crop among others.



#### Coconut Board gets new Head

▶ Raju Narayana Swamy took over as Chairman of the Coconut Development Board. He has held several posts including Agriculture Production Commissioner and Principal Secretary (Agriculture), Kerala Government; Director of Fisheries and of Collegiate Education; Managing Director of Marketing Federation; and Commissioner in the Civil Supplies Department. Recently, he was the International Observer for the Zimbabwe General Election.Swamy is a 1991 batch Kerala cadre IAS officer and a graduate in Computer Science and Engineering from IIT, Madras. He also holds a postgraduate Diploma in IPR (Intellectual Property Rights) from the National Law School, Bengaluru and also has a professional diploma in Public Procurement from the World Bank.



#### Alarm over deadly pest in Karnataka

• The Indian Council for Agricultural Research (ICAR) has sounded the alarm after the invasive agricultural pest, Fall Armyworm (Spodopterafrugiperda), was discovered in Karnataka this July. A major maize pest in North America, the Fall Armyworm arrived in Africa in 2016. Since then, it has threatened the continent's maize crop, a staple which feeds 300 million people. The Karnataka finding is the first report of the pest in Asia. The discovery is more worrisome because the pest feeds on around 100 different crops, such as vegetables, rice, and sugarcane. Its discovery in Karnataka means its spread to the rest of the country, as well as neighbouring countries, could be just a matter of time. Entomologists C.M. KalleshwaraSwamy and Sharanabasappa from Shivamogga's University of Agricultural and Horticultural Sciences first suspected that something was amiss when the pest infestation in maize crops in Shivamogga spiked this year.



## AGRIBUSINESS AND AGRI INFRASTRUCTURE Complementing Each Other



griculture contributes the livelihood to of more than sixty percent of the Indian population. Majority of the rural populace is involved in this vocation, probably the oldest one in the human history. From raising the crops to selling them in the market place, the agriculture of today's era has expanded in its horizon and its imprint in the national and global economy. With technology being constantly added and updated, the agricultural operations now requires more than just working hands. Mechanization of agricultural operations has opened up new vistas and new set of business avenues, so is the wide world of agri input segment. From seeds, fertilizers, crop protection to credit, agricultural activities in the upstream segment is diversified and has turned into an important segment. The business post production scenario which has now moved beyond the commodities era into value addition and processing, has created a strong presence in the Indian economy. Agriculture is now more of an enterprise than a mere vocation and its area of operation has extended beyond Indian borders. This has necessitated the infrastructure associated with agriculture to evolve and develop to help the farm segment to withstand the pressures and demands of the new and evolving agri segment. Agri infrastructure, however, is still in its nascent stage and holding back the true potential of Indian agri business. Therefore it becomes significant for the agri infrastructure segment to develop concomitantly to accommodate the vast scope of agribusiness.

#### AgriCommodities – The Foundation of Agribusiness

Agriculture, in this new era multifaceted and is better is represented by the moniker. Agribusiness. The agricultural commodities that are produced by the country's strong population of farmers constitute the basis for the agribusiness. In that sense, it can be inferred that India has a strong base in agribusiness considering the commendable position the county holds in the production of these commodities.

The largest producer of milk, the second largest producer of foodgrains, fruits and vegetables and fisheries, India has the world's largest arable land and more than fifty per cent of its population dependent on agriculture. India is estimated to have harvested a record 279.51 million tonnes (MT) of foodgrains in the 2017-18 crop year, up 1.6 per cent from the previous year. The country achieved an all-time high production in all four foodgrains -- rice, wheat, coarse cereals and pulses -- during 2017-18 crop year (July-June), according to the third advance estimates released by the agriculture ministry.

Total agricultural exports from India grew at a CAGR of 16.45 per cent over FY10-18 to reach US\$ 38.21 billion in FY18. In April-May 2018 agriculture exports were US\$ 6.43 billion. India is the largest producer, consumer and exporter of spices and spice products. Spice exports from India reached US\$ 3.1 billion in 2017-18. Tea exports from India reached a 36 year high of 240.68 million kgs in CY 2017 while coffee exports reached record 395,000 tonnes in 2017-18.

According to the data, rice output is estimated at record 111.52 MT as against 109.7 million tonnes in the 2016-17 fiscal. The production of wheat during 2017-18 is estimated at record 98.61 MT as against 98.51 MT in the previous year. Coarse cereals output is also seen at record 44.87 MT tonnes as against 43.77 MT achieved during 2016-17. Total pulses production during 2017-18 is estimated at record 24.51 MT which is higher by 1.37 MT than the previous year's production of 23.13 MT.

With a significant increase by 49.03 MT over 2016-17, total production of sugarcane in the country during 2017-18 is estimated at 355.10 MT.Production of cotton during 2017-18 is estimated to have increased to 34.86 million bales (of 170 kg each) from 32.58 million bales in the previous year.



Jute and Mesta output is estimated at 10.62 million bales (of 180 kg each), lower than the production achieved during 2016-17.

Production of horticulture crops like vegetables and fruits is expected to touch a record 305.4 million tonnes (mt) in 2017-18, about 1.6% higher than the previous year and 8% higher than the previous five years' average. Within horticulture, production of vegetables is estimated at 181 mt in 2017-18, about 1% higher than the year before, while that of fruits is estimated at 95 mt, 2% higher than the previous year. The record production during 2017-18 will mark the sixth straight year of horticulture production outstripping that of foodgrains (estimated at 276mt in 2016-17).

India's milk production is estimated to have increased by 6.6 per cent to 176.35 million tonnes during the last financial year. Egg production in the country during 2017-18 was 27.95 billion — up 7.4 per cent than the previous year. Combining the production of all types of fisheries (capture and culture), the total fish production has reached at about 11.41 million tonnes in 2016-17 and India has become the second largest fish producing country in the world.

#### Agri Input industry – The Strong AgriBusiness Segment

While we have a promising farm segment delivering to the demand for farm products, a robust agri input industry is another feature of India. Agri inputs such as seeds, fertilzers, crop protection chemicals, farm machines have played an important role in fortifyng the country's agriculture segment and has helped immensely in the leap from the segment being farm oriented to being business oriented.

Indian Seed industry has played a crucial role in ensuring country's agriculture production. The journey from farm saved seeds to the GM seeds, Indian farmers' dependence on seed companies and corporations have been increasing. India constitutes the fifth largest seed market measured in value terms in the world. The share of Indian seed industry in the global seed production is 4.7 percent preceded by the US (28.1 percent), China (21.2 percent), France (8.4 percent), and Brazil (6.2 percent). With a turnover of over Rs.15,000 crore, the Indian seed industry ranks fifth in the world. India produces four million tonnes of seeds every year. The domestic seed industry is expected to grow at a double-digit growth rate in the medium-term driven by improved seed replacement ratio (SRR) and rising adoption of improved hybrid seeds according to ratings agency ICRA. The profitability of private seed companies will remain healthy while investments in R&D and working capital to maintain a strong product pipeline will keep private sector's indebtedness at moderately high levels. The favourable policy environment aimed at supporting the usage of seeds through National Seeds Plan and boosting agricultural productivity through National Food Security Mission (NFSM) augur well for the industry. According to the





report, the Indian seeds industry grew at a Compound Growth Rate (CAGR) of 8.4 percent in volume terms from FY 2009 to FY 2015 to reach 3.5 million tonnes in consumption. On an average, private sector companies saw operating margin of about 15.5 percent between Financial Year 2011 - FY 14 vis-a-vis 9.3 percent for state run companies.

Agrochemicals have played а crucial role in engendering positive outlook for Indian а agriculture. Fertilizers and crop protection chemicals have become indispensable components of Indian agriculture. India is the fourth largest producer of agrochemicals globally, after the US, Japan and China. This segment generated a value of USD 4.4 billion in FY15 and is expected to grow at 7.5% per annum to reach USD 6.3 billion by FY20. Approximately 50% of the demand comes from domestic consumers while the rest goes towards exports. While the domestic demand is expected to grow at 6.5% per annum, exports are estimated to grow at 9% per annum during the same period. However, the usage of agrochemicals in India is one of the lowest in the world at just 0.58 kg per hectare against 4.5 kg per hectare in the US and 10.8 kg per hectare in Japan and nowhere near the world's average consumption of 3 kg per hectare. This shows there is clearly a large scope of growth in usage and demand. With limited availability of fertile land to cultivate food and feed for an ever growing population, the only alternative we have is to increase productivity per hectare. Besides, it is proven that protection chemicals can increase crop productivity by 25-50%, by mitigating crop loss due to pest attacks. Crop protection chemicals are therefore very crucial to ensure food and nutritional security. Insecticides dominate Indian crop protection market and they constitute around 60% of domestic crop protection chemicals market. Fungicides and Herbicides are the largest growing segments accounting for 18% and 16% respectively of total crop protection chemicals market. India has been slowly emerging as a strong exporter of pesticides. Currently, India occupies the thirteenth position in terms of export of pesticides. India exports to Brazil, USA, France and Netherlands. Low cost manufacturing, availability of technically trained manpower, seasonal domestic demand, overcapacity, better price realization globally and strong presence in generic pesticide manufacturing (India has process technologies for

more than 60 generic molecules) are the drivers of this new trend. Contract manufacturing of agrochemicals also presents good opportunities for Indian companies. By 2020, agrochemicals worth USD 4.1 billion are expected to go off-patent providing significant export opportunities for Indian companies which have expertise in generic segment. Top 6 importing nations constitute only 44% of India's agrochemical exports. This also indicates export potential for Indian companies. The herbicide consumption in India stood at 0.4 USD billion in FY15 and is expected to grow at a CAGR of 15% over the next five years to reach ~0.8 USD billion by FY20. On the other hand the fungicide industry in India has grown due to the growth in Indian horticulture industry, which has grown at a CAGR of 7.5% over the last five years.

Although heavily dominated by manual labour, Indian agriculture has recently witnessed an increase in mechanization and automation. Development of smaller machines, group farming and custom hiring have increased the scope of farm mechanization in India. Tractors, threshers and power tillers are the most common farm machinery used in India. Among these, the biggest market in terms of annual sales is that of tractors (around 6 lakh units annually), threshers (around 1 lakh units annually) and power tillers (around 56,000 units annually). The tractor market is by far the largest (both in volume and value terms). Among farm machinery, tractors are most widely used by domestic farmers with the total market size estimated at Rs. 34,000 crore annually. Tractors and power tillers have been at the forefront of driving the mechanisation wave in India. Tractor sales have grown at a CAGR of 9.0% in FY05-15 to approximately 5.5 lakh tractors in FY15 (around 2.3 lakh in FY05) while sales of power tillers have grown at a CAGR of 10.6% in FY05-15 to 48,000 power tillers in FY15 (17481 in FY05). Penetration of tractors in India is higher in northern India, mainly Punjab and Haryana. On the other hand, the penetration of power tillers in India is higher in southern and eastern India. This is on account of the small size of land holdings per farmer in these respective regions.

Irrigation is yet another significant segment that supports agriculture. Although the tracts under rainfed irrigation is more in India, irrigation especially Micro Irrigation Systems (MIS) are catching the fancy of Indian farmers. The current domestic industry is estimated at around Rs. 4,500-5,000 crores and is considered to be highly competitive. There are more than 100 large and small scale drip and sprinkler irrigation systems producers and marketers across different states. Major players include Jain Irrigation, Netafim India, Finolex and EPC Industries Ltd. Jain Irrigation commands a market share of more than 30% and Netafim India has a market share of about 18%. The industry has been growing at a CAGR of 5-7%. However, given the increasing reauirement of water management, according to some estimates, the total market in India is expected to be more than Rs. 8,000 crores by 2020.

#### Food Industry – Fuelling Agribusiness

Better income prospects and a marked enthusiasm in income spending has propelled the growth of retail segment in India. Of the overall retail industry, food and grocery accounts for the largest share in revenue in India. India is the world's second-largest producer of food. Food and grocery retail in India exceed US \$294 billion representing 16 percent of India's GDP. By 2020, food and grocery segment is estimated to constitute 66 percent of the total revenue in the Indian retail sector.

The Indian food and grocery market is the world's sixth largest, with retail contributing 70 per cent of the sales. The Indian food processing industry accounts for 32 per cent of the country's total food market, one of the largest industries in India and is ranked fifth in terms of production, consumption, export and expected growth. It contributes around 8.80 and 8.39 per cent of Gross Value Added (GVA) in Manufacturing and Agriculture respectively, 13 per cent of India's exports and six per cent of total industrial investment. The Indian gourmet food market is currently valued at US\$ 1.3 billion and is growing at a Compound Annual Growth Rate (CAGR)



of 20 per cent. India's organic food market is expected to increase by three times by 2020.

Between April 2000 and June 2017, the Indian food processing sector received FDI worth \$7.81 billion, making it the 13th largest sector receiving FDI in the country. In fact, 80 percent of the FDI in the food processing sector was received in the period since April 2012. FY17-18 is already showing strong promise for foreign investment in this sector, with \$263 million invested in the April - June guarter (FY17 Q1), according to Department of Industrial Policy and Promotion (DIPP) Quarterly Fact Sheet (April 2000 to June 2017). With the entry of multinational companies and their expansion in the market, India is rapidly becoming a production hub for processed foods, which are increasingly consumed in India as well as exported to countries in South Asia, the Middle East and Africa. The food processing sector is growing at an average rate of 8 percent per annum as per the Government of India (GOI) February 2018 budget report. As per the 2016-2017 Annual Survey of Industries, there are 37,175 registered food processing units in the country that employ approximately 1.7 million people in food and beverage manufacturing.

#### Farm Infrastructure – The Weakest Link

A sound and adequate infrastructure becomes pertinent for agribusiness to thrive and develop. Unfortunately it is this area where India lags behind. Despite the presence of a bountiful natural raw material base, the country suffers from inadequate storage capacity, cold stores and even proper links between farm and market.

Warehouses serve as transit places for the agriculture produce between harvest and market. The duration of the transit varies depending upon a host of factors. Warehousing helps to maintain



food security in the country through uninterrupted supply of agricultural commodities throughout the year irrespective of harvest season. The issues of glut and scarcity are thereby kept at bay. Beyond the traditional functions of warehousing, today warehouses have become financial instruments as well which help the food producers access credit from financial institutions. Warehouse receipt financing has been primarily developed to provide liquidity for depositors while allowing them to hold on to their goods till they receive a better price. It also allows farmers to use this system to avoid a distress sale and obtain working capital. WR finance is estimated to be \$3.0- \$3.5 billion in India, quite far from its potential of \$60 billion.

The total agri warehousing capacity in India is about 109 million tonnes as against the total demand of about 180 million tonnes. Agricultural warehousing accounts for fifteen percent of the warehousing market in India and is estimated to be worth Rs. 8,500 crore. However, there exists a gap between the demand and existing capacity. As on May, 2015, the cumulative storage capacity of various agencies such as Food Corporation of India, Central Warehousing Corporation, state warehousing corporations, cooperatives and private parties stood at just 121.11 million metric tonnes (mt), while the marketable surplus of food grains in 2013-14 alone was approximately 159 million metric tonnes.

To tackle the situation, the central government is implementing a host of schemes to augment India's storage capabilities. The government is implementing the Integrated Scheme for Agricultural Marketing (ISAM) - a sub-scheme of which, the Agricultural Marketing Infrastructure (AMI) facilitates construction and renovation of warehouses in rural areas of various states. Between April 2001 and June 2015, 35,226 godowns with a capacity of 555.13 lakh mt have been sanctioned for construction and renovation, for which a subsidy of Rs 1908.50 crore was released. Of this, a total of 28,694 godowns with a capacity of 480.59 lakh mt have been constructed and 1,743 godowns with a capacity of 22.13 lakh mt have been renovated.

The widening gap has attracted many private players to invest in this space. Agri-commodity warehousing firms have witnessed strong growth



in their businesses adding just more than warehousing services. Apart from stocking a range of commodities and issuing receipts against them, modern commodity warehouses provide allied services such as procurement, maintenance, collateral management and financing. These new services have provided firms with more revenue lines and higher margins, attracting private equity investors to the space. Recently, Canadian investment firm, Fairfax bought a majority stake in National Collateral Management Services Ltd for Rs.800 crore. In 2014, Temasek invested Rs.250 crore in Star Agriwarehousing. Agri-warehousing firm Sohan Lal Commodity Management Pvt. Ltd had lately raised Rs.100 crore in private equity funding led by Chicago-based Creation Investments Capital Management Llc and existing investor Everstone Capital. Additionally, the shortage of agriwarehousing capacity and the lowlevel of private sector participation in the sector too has been an attraction for investors. Even the infrastructure existing storage has become outdated and would soon be required to be replaced by modern ones.

In addition to dry storage capacity, there is an acute shortage for cold chains in India. This is a severe handicap considering our post harvest losses. Cold Chain, a chain of logistics activities that ensure market connectivity of perishable produce from harvest to consumers, is still in a nascent stage in India despite its immense potential in an agriculturally significant nation like India. India's cold chain sector is a combination of surface storage and refrigerated transport.

Currently, India has 7645 cold storages with a capacity of 34.95 million MT in the country. These are mostly used for storing potatoes. However, the market is gradually getting organised and focussing towards multi-purpose cold storages.



More than 50% of the cold storage facilities in India are currently concentrated in Uttar Pradesh and West Bengal, while other states still face a challenge with investments from the government and private operators.

Recently in a bid to expand the cold storage capacity of the country, the Centre has sanctioned 101 new integrated cold chain projects that will leverage a total investment of Rs.3,100 crore. The projects, which will be developed by companies including Balmer Lawrie, Sterling Agro and Haldiram Snacks, are aimed at doubling farmers' income, reducing wastage in the agri-supply chain and creating huge employment opportunities. In May 2015, the Ministry announced the sanctioning of 30 cold chain projects. The total expected grant-in-aid to be released to these projects is Rs.838 crore. The balance funds is expected to be raised from the private sector. The 101 new projects - which are for fruits and vegetables (53 projects), dairy (33), fish, meat, marine,

poultry, ready-to-eat/ready-to-cook sectors – will create additional capacity of 2.76 lakh MT of cold storage/controlled atmosphere/ frozen storage. Maharashtra cornered the maximum number (21) of the projects followed by Uttar Pradesh (14), Gujarat (12), Andhra Pradesh (eight) and Punjab and Madhya Pradesh (six each).

Indian needs more investments in cold storage considering the heavy losses the country incurs by way of wastage of fruits and vegetables which was pegged at Rs. 92,000 crore on the basis of the wholesale prices of 2014. The government has also plans for building National Cold Chain Grid in the country so that all food producing hubs are connected to cold storage and processing industries.

Agribusiness has immense scope for an agrarian and skilled country like India. However, we need an equally strong and updated infrastructure support for the rapidly expanding agri production and consistently evolving challenges.

## PLASMA IN AGRICULTURE

#### Plasma

Plasma-a fourth state of matter, has been characterized with various properties like temperatures (cold & hot plasma), particle trajectories, fluid flow properties, wave's formation & propagation etc. due to different components of plasma like particle nature (e.g., electrons, ions, neutral particles) and as a fluid under the influence of external electric and magnetic fields. Plasma initially being researched as a source of fusion

energy has come a long way with its exotic spin off applications to mankind like plasma medicine, activated water, plasma plasma agriculture, plasma modification of surfaces, plasma in pollution control, plasma propulsion, plasma electronics, plasma cutting welding, and waste to energy conversion, sterilization, etc. Most of these applications of plasma are already meeting the requirements mankind and others are expected to reach to commercial level soon. Plasma in its different forms i.e., cold and hot plasmas are proposed to be generated by using various techniques, however, each process

is still difficult, costly and highly energy demanding. Moreover, confinement of plasma for longer times has not been very successful due to various instabilities arising by virtue of plasma containment itself. In a simple case, a gas discharge (plasma) is initiated via a plasma power supply in an oxygen and nitrogen containing gas flow. This ionizes the gas flow, creating ions, radicals and reactive species.

#### **Role in agriculture**

With the planet's population projected to reach almost

10 billion by 2050, growing trends of people shunning away from agriculture due to un-reliable agriculture produce outcomes, too much dependence on unpredicted natural climatic conditions, dependence on the un-wanted use of pesticides & fertilizers, innovative approaches to both food production and processing will be required to meet food demands. Increasing agricultural productivity-caused by population growthand closing the yield gap between real yields and potential yields plus taking into account

protection of the environment, must be addressed with novel approaches. Decontamination of foods and minimization of food spoilage are critical issues to ensure food safety and sustainability. While thermalandchemical approaches remain a cornerstone for food processing, there is an ongoing search for nonthermal solutions the treatment for food. of Such approaches should contribute to improved food safety and quality profiles. Use of plasma in agriculture and food will concentrate on each step of this agriculture-food chain from seed germination- plant growth- plant yield-food safety during transportation &

storage. Cold plasma technology has brought a new dimension to the concept of decontamination under ambient conditions, in that it truly is an ensemble of both physical and chemical decontamination methods. This innovation stems from the development of methods to generate plasma at atmospheric pressures and temperatures.

Obtaining high yields in agricultural production is essential due to the world's population growth and increased food demand; but at the same time, adverse effects of agriculture on the environment need to be kept to a minimum. Plasma Technology has many agricultural benefits and some of the notable benefits are: increased farm productivity, enhanced food and fiber production, better soil fertility management, better plant and livestock health management, sustainable food production, and globally increased plant and human health. The recent developments in cold plasma (also known by other names like: rarefied, non-thermal. weekly ionized) sources, the confirmation of strong antimicrobial action and the ability to plasma treat foods with the retention of their quality has led to the emergence of a new subject area within food science. Plasma can be used in the entire life cycle of fresh produce, from soil to fork:

- Sterilize seeds while in storage
- Enhance seed germination
- Air cleaning, sterilization, and removal of volatile organic compounds in greenhouse facilities
- Treatment, sterilization, and cleaning of water used for produce washing after harvest
- Disinfection of produce before packaging
- Air cleaning, sterilization, and removal of volatile organic compounds in the packaged produce storage facility and transportation vehicles
- Control of pests and pathogens at the in-store display case and in-store storage
- Removal of ethylene from air to reduce rate of aging
- Sterilization of cutting boards, knives, and other food processing equipment both at home and in food processing facilities or grocery stores
- Plasma-assisted destruction of hazardous waste and/or wasteto-energy conversion of the nonhazardous food wastes



#### Plasma technology in agriculture

In agriculture, plasma technology is increasingly transforming people's understanding of plants and soils, and their diverse magnetic and gravitational fields' interactions with their environments. With this new understanding, plasma scientists and agricultural practitioners are, in turn, revitalizing agricultural development, research. and education and practice across the world. The new plasma technology has potential to completely revolutionize agricultural practices, enhance environmental health and healthy living for both producers and consumers, and virtually eliminate external inputs in agricultural systems across the world. With full understanding of how plants absorb carbon dioxide from the atmosphere, scientists designed a technology that replicates a plant's leaf for the effective capture of CO2 and other gases in their Nano states (GANS). A gas in Nano state is a new state of matter, where a gas molecule that becomes Nano of itself appears as a solid state of matter. It is especially this seemingly simple GANS capture technology that will completely transform global agricultural development and

practice once and for all. CO2 GANS are increasingly used to transform agriculture practices across the world. Before sowing, for example, seeds are soaked in CO2 GANS liquid plasma to decontaminate any that may be disease infected or adulterated, while irrigation of crops with CO2 liquid plasma virtually eliminates the need for fertilizers and pesticides. The use of CO2 liquid plasma and other such liquid plasmas increasingly provide the much needed agriculture solutions for enhancing plant growth, ensuring plant health, and increasing crop yields at minimum cost to producers. For crop pests, application of CO2 GANS liquid plasma creates conditions under which the pests do not damage crops. In addition, pests also absorb the energy of the applied CO2 GANS liquid plasma. When they absorb enough energy for their bodies' metabolism, such pests do not need to feed on the crops.

The plasma treatment increases the nitrogen content of the water. Nitrogen is one of the main components in many commonly used fertilizers, the other two being potassium and phosphorus. Nitrogen is especially important in the germination phase of a plant's life. Other benefits of the plasma treated water include the ability to control pH and increased efficiency of water use. The technology is not only beneficial in the stages of growth for the plant but can also be used to sterilize fruits and vegetables for consumption as well as to keep fruit fresh when it is in transportation and storage by eliminating ethylene oxide, the chemical responsible for food spoilage. Plasma is emerging as a disinfectant in a variety of applications, including wounds and crops. It is used to sterilize crops after the harvest, where there is little concern about damaging living cells. Diseased rice seeds treated with atmospheric plasma show significant improvement and growth, offering a potential tool to protect rice crops from fungus and blight. A research team found that immersing infected rice seeds in hot water and then irradiating them with plasma reduced infection rates between 60 and 90 percent. The team found the most effective way to reduce disease rates was the hot water bath followed by plasma irradiation. There was no damage to the seeds, which germinated and grew like healthy seedlings. The researchers concluded that the combination of water immersion and plasma irradiation of rice seeds seems to provide an excellent pest integrated management system to reduce risks to human health and the environment by minimizing the use of chemical pesticides.

#### **Recent developments**

Low temperature plasmas (LTPs) show promise as efficient green technologies for enhancing productivity while maintaining good food quality and safety in the many steps of the food cycle. As a result, applications of LTPs in agriculture have led to creation of a new, rapidly developing field called "plasma agriculture." One such approach is to use LTPs in agriculture whereby plasma can boost yield in a robust way without demanding more water or more chemical fertilizer. In other words, Plasma agriculture potentially offers increased production with less impact on ecosystem, by suppressing plant diseases and enhancing crop yields. For a long time the link between plasmas and food processing was limited to the treatment of packaging materials to improve, for examples, wettability, sealability, printability, and barrier properties,

or for purposes of decontamination. More recently, the capability of plasma as an antimicrobial agent has been explored for the sanitation of food products. Indeed, the emergence of new pathogens that can contaminate products, change production processes, and consumer lifestyles and needs, are posing unprecedented new challenges. To achieve this goal, collaborations between plasma research scientists, plant biologists, agricultural experts, and food technologists will be needed to understand, control, and scale up these new processes. Agriculture across the globe is moving more and more towards new ways to increase sustainability and environmental responsibility. Water shortage, a growing world population, shortages of land, and increasing government regulations are all reasons behind agriculture's move towards utilizing new technology to achieve improved and progressive results. By activating air and water with plasma, lab studies have shown that an increased production of crop yield is possible, among several other benefits.

Plasma state of matter offers a unique source of energy with lots of useful and controllable properties towards in its applications in its various forms like plasma activated water or plasma injections or plasma environment in agriculture to food chain is gaining its grounds with lots of benefits to the users. Efforts should be made further towards quantifying and repeatability of the effects of plasma applications in agriculture and food. Less complicated, having low energy requirement, affordable and safe methods to generate plasma have to be developed for best use of plasma spin off applications like in agriculture, food and medicine.

> Rakeshkumar, SKUAST, Jammu and Amit Ahuja, IARI, New Delhi



#### 'There will be a continuing and substantial growth in use of MIS in India'

Premier Irrigation®, the pioneer manufacturer of modern water saving irrigation systems and equipment in India introduced sprinkler irrigation in India in 1965 to save water and irrigate more land. The pioneering work undertaken by the company included demonstrations and trials and convincing governments to assist farmers to become self sufficient in irrigation through loans and subsidy. The subsidy programme has helped millions of Indian farmers. Premier has developed rugged, high pressure capable sprinkler and piping systems for plantations which have helped tea plantations in North East India and tea, coffee and cardamom plantations in South. The drip irrigation range from Premier, introduced inline product and they were the only manufacturer of both cylindrical and flat emitter inline products. In 2008 the irrigation assets of Premier Irrigation® were transferred to a new company in which Adritec Group International



(AGI) has a minority interest and since then was known as Premier Irrigation Adritec<sup>™</sup> (PIAL). In an interview with Agriculture Today, Mr. Shrikant Goenka, Managing Director, Premier Irrigation Adritec delves deeper into the micro irrigation scene existing in India.

#### What is the potential of Micro Irrigation (MI) in India?

Government of India on realizing the need for water conservation due to very low water use efficiency in the conventional flood irrigation method used in India constituted a Task Force in 2004 to study the potential for use of Micro Irrigation System(MIS) of Sprinkler and Drip irrigation. The task force worked out a detailed state-wise and crop-wise potential of MIS in India and their study revealed that out of India's total arable land of 140 million hectare, approx 69 million hectare can be brought under MIS in India. Further, the strategic decisions made by Central Government for watershed development and canal command areas development, the potential of MIS in India has further increased by

several million hectares today.

#### What is the current growth rate of Micro Irrigation Industry in India?

MIS has seen CAGR of approx 9.6% over the last 5 years. But this CAGR is not representative of the potential. Just over 12% of total potential has been penetrated so far and hence CAGR required for MI at this stage is much higher, otherwise it will take several decades to penetrate the entire potential of MI in India.

What according to you are the challenges associated with implementing MI across India? In the Indian context, implementation of Micro Irrigation requires making drip/sprinkler system available to lakhs of farmers in the remotest villages in the country.Each solution is specifically designed for the farmer's field. This clearly requires major organization and infrastructure.

Adequate thrust is there from Central Government for leapfrogging growth in MIS. Some states have prioritized farmer welfare and made MIS a priority. However, uncertainty and sporadic changes in scheme quidelines in the states need to be streamlined inline with PMKSY guidelines. The Central Government has come up with large subsidy schemes for MI for this fiscal which will be followed during the years to come. This should be availed and backed up with equal thrust at the state level. Delays in disbursement of payment discourages the MI

System Manufacturers and they are unable to cope up with the faster growth required due to lack of working capital. Last but not the least, it is essential to bring transparency into the system with strong IT backed operation for implementation of the entire process.

It is encouraging to see that most States are aware of these impediments and both states and MIS manufacturers are together addressing these challenges and substantial improvements have been achieved in all these fronts to progress MIS further rapidly for the benefit of the farmers.

#### Which are the crops that have benefited the most from MI in India, so far?

MIS has,by now penetrated all the crop irrigation areas in large scale with majority being in sugarcane, fruits, vegetable etc. all over India. Farmers are getting substantial benefits from same by way of savings and improved yield.According to 4th advance estimates, India Economic Survey 2015, India is the world's largest producer of fresh fruits, pulses and spices and the second largest producer of fresh vegetables, sugarcane, groundnut. Cotton is also showing promising growth. India in general ranks second in farm output worldwide. Quantitatively, things have improved further since then.

#### How have subsidy programmes helped in popularizing the MI system in India?

Subsidy system has immensely helped propagation of use of MI extensively and without same the growth what we achieved so far would not have happened. On realizing the importance of updated modern technology MI, our Hon'ble Prime Minister declared his flagship projects of various subsidy schemes such as "Per Drop More Crop" & "Har Khet Ko Pani" with project outlay of Rs. 50000 Crs for same during the next 5 years. Most of the State Governments are preparing their plans and guidelines to avail the subsidy schemes and we can now foresee the rapid growth of MI going to happen in India which would be of immense help to the farmers towards doubling their income over the next 5 years.

#### In a country like India where majority are small and marginal farmers, how effective and economical is Micro Irrigation?

In advanced countries, 1000 acres land are held

between 1 to 10 farmers, whereas in India for 1000 acres land, over 1000 farmers own same, individually having one or less than an acre each. It is, therefore, extremely challenging for individual farmers in India to afford to buy the modern MIS equipments. Although pay-back period of using MIS is hardly 2 years, availability of credit for farmers to invest in MI System to save water and improve yield is difficult.Hence the necessity of subsidy scheme.

India is an Agrarian economy and over 50% of its arable land belongs to small and marginal farmers. The subsidy scheme declared by the Central Government is rightly focused for this sector and hence small and marginal farmers will reap maximum benefit out of this subsidy schemes for overall economic growth of our country.

#### What is the scope of automated irrigation systems in India?

Priority now is to propagate MIS among Indian farmers. Technology in MI is improving world over and India is no exception. Use of automation is limited in India at present and only rich farmers having large landholding have started using them. It is still not economical to use automation for small landholdings due to its higher cost. But over a period of time technology will further improve and cost of automation will further go down. Hence there will be more use of same in the years to come with improvement of ROI of farmers.

#### What is the future of irrigation systems?

There is a lot of talk about water conflicts, including often quoted remarks that the third world war will be fought over water. To address the climatic changes and global warming, one of the major solution is water conservation. Agriculture sector is the highest contributor and accounts for approximately 70% of the global fresh water withdrawals. According to the projections by the United Nation (UN), nearly 3.4 bn people would be living in "water-scarce" countries by the year 2025. Additionally, in India, feeding a growing population is going to be a major challenge for Indian Agriculture. Hence it is imperative that MIS is adopted in a big way in India which not only saves 50-90% water but improves the yield of crops by 30-40% which are substantial. We strongly feel that there will be a continuing and substantial growth in use of MIS in India and around the world during the next decade.

## ORGANIC FARMING OF VEGETABLES TOWARDS HEALTHY LIFE

rganic farming avoids or largely excludes the use of synthetic compound fertilizers, growth regulators and livestock feed additives. To the maximum extent, feasible organic farming systems rely on crop rotations, crop residues, animal manures, legumes, Green manures, off farm organic wastes and aspects of biological pest control to maintain soil productivity. Thus, the organic farming implies recycling of waste and residue to the native soil itself, replenishing the nutrients depleted from the soil during the crop growth, encouraging the growth of microorganisms which would regulate phased release of stored nutrients in the soil to the crop growth in the right proportion maintaining soil health by balancing the soil moisture and soil aeration and ensuring soil fertility by firmly binding the nutrient elements in the complex organic molecules.

#### **Organic Farming in India**

India, only 30% of the total cultivable area is covered with fertilizers, where irrigation facilities are available and the remaining 70% of the arable land is mainly rainfed where negligible amount of fertilizers is being used. Farmers in these areas often use organic manure as a source of nutrients that are readily available either in their own farm or in their locality. The Northern eastern region of India provides considerable opportunity for organic farming due to least utilization of chemical inputs, It is estimated that 18 million hectares of such land is available in the NE, which can be exploited for organic production. With the sizable acreage under natural organic cultivation, India has tremendous potential to grow crops organically and emerge as a major supplier of organic product in the world's organic market.

#### How it works?

India is the second largest producer of vegetables next to china. The productivity of different vegetables in our country is comparatively lower than the world's average productivity. Again the per capita availability of vegetables (210g/head/day) is still behind the recommended quantity (285 g /head/day). Our demand by 2020 will be around 250 million tonnes. Thus due to rapid growth of the population with reduction in land, in order to feed the population, the only solution is the vertical expansion or by increasing the productivity per unit area in unit time. Our strategy should be to produce more vegetables from less land, less water with less pesticides.

Organic vegetable cultivation offers one of the most sustainable farming systems with benefits not only in long term soil health but



also in providing a lasting stability in production. Overall organic vegetable and fruits production will improve the nutritional quality which will protect from degenerative diseases like cancer and will improve healthy life of human being.

#### ORGANIC FARMING TOWARDS SUSTAINABILITY

Organic farming systems encourage the use of rotations and manures to maintain soil fertility. Green manuring and intercropping with legumes is another important aspect. Crop residues are also utilized in organic farming. Burning of crop residues not only results in loss of organic matter and plant nutrients, but also causes environmental pollution, fire hazards and destruction of natural flora and fauna in the soil. However, application of organic resources to the soil can favorably affect its structure, as denoted by porosity, aggregation and bulk density as well as causing an impact in terms content, addition of organic manures supply essential plant nutrients including micronutrients to crop.

#### Steps for adoption of organic farming

- Increase and enhance government policies and assistance especially during the conversion process.
- Introduce organic extension services and training schools for farmers.
- Build up adequate infrastructure for transport, storage, processing and market facilities.
- Create a guarantee system for the domestic market.
- Increase consumer awareness about the safe and environmentally friendly system of production of food.
- Spur production and supply of organic seeds, organic manure, organic bio-fertilizers and biopesticides.
- Provide funds for proper scientific studies on income generation, household income and food security, yields and soil improvement from organic agriculture.

Organic farming system not only ensures safe and healthy food but also promises sustained soil health, fertility and better profitability. The organic movement of India is however, seriously constrained because of the lack of policy support, research and technology back up and absence of proper extension mechanism. If these above constraints are made favorable then organic farming can play a role in doubling the farmers' income, food security and safety with sustainability and environment preservation in the country.

Rakeshkumar, SKUAST, Jammu and Amit Ahuja, IARI, New Delhi



# **CONTRACT FARMING**

#### STRENGTHENING FARMERS THROUGH INNOVATING AGRICULTURE PROCESSES

he Modi government's dream of doubling farmers' income by 2022 is now closer to reality. In a big move aimed at protecting farmers' interests, increasing their income and providing them right minimum support price for their produce, the government has drafted the Model Contract Farming Act, 2018. Not only does the Act emphasize protection of farmers' interests, it also includes services contracts, including preproduction, production and post-production. The Centre has also appealed to states to enact such a law in the interest of farmers.

This Act will protect farmers from price risks and encourage food processing companies to invest more in infrastructure and farming technology. With 70 per cent of farmers possessing only small or marginal land holdings, many agro-companies have been reluctant to engage with them due to lack of economies of scale in the past. Sometimes, despite a contract, companies set very high standards which farmers are not able to meet. This forces farmers to sell their produce at a low price. Such contracts often ignore market risks in the agriculture industry, which is riddled with price volatility and poor harvests, and which often leaves farmers vulnerable to exploitation. The model Act has tried to address this critical issue and will be beneficial to farmers.

Contract farming refers to pre-production season agreement between farmer(s) and sponsor(s) (marketing firms) for the production and supply of agricultural products and transfers the risk of post-harvest market unpredictability from the former to the latter. At the same time, it



helps farmers develop new skills and opens new markets for them. In recent times, agriculture has undergone a tremendous shift. An expanding urban middle class and increasing commercial investment in agricultural processing and retailing are creating demand for more standardized, higher-quality agricultural produce. But underdeveloped supply chains and small farm sizes make sourcing of such produce difficult. Contract farming is a viable solution as it offers organized agricultural production. In fact, it is a revolutionary step which promises a win-win situation for farmers and marketing firms.

The Contract Farming Act, 2018, provides establishment of 'Contract Farming Authority" at the state level and setting up of "Registering and Agreement Recording Committee" at district/block/taluka level for registration of contract farming sponsor and recording of contract. This will ensure that the contract is documented beforehand with all specifications (quantity/ quality of produce), terms and conditions and is protected by law if breached by any party. Since the contracted produce will also be covered under crop/ livestock insurance in operation; the farmer is not bound to any unforeseen post-production risk. Additionally, it also allows production support, including extension services to the contracting farmers through the supply of quality inputs, a scientific agronomic package of practices, technology, managerial skills and necessary credit by the buyer. Further, the Act also entails the creation of Contract Farming Facilitation Group (CFFG) at village/panchayat level. It will guicken need-based decisions relating to production and post production activities of contracted agricultural produce, livestock and/ or its products. At the same time, it will promote contract farming and services at village/panchayat level.

One key feature of the Act is that it has kept contract farming outside the ambit of the state APMCs. This



implies that buyers will not pay market fee and commission charges to APMCs to undertake contract farming. This will save at least 5-10 per cent of the transition cost and thus benefit buyers as well.

Provisions such as Farmer Producer Organization (FPOs)/Farmer Producer Companies (FPC) to mobilize small and marginal farmers; non-allowance of developing any permanent structure on farmers' land/premises; no rights, title ownership or possession to be transferred or alienated or vested in the contract farming sponsor etc. will bring more transparency and simplify the process between farmers and buyers. This Act includes an accessible and simple dispute settlement mechanism at the lowest level possible for quick disposal of disputes.

In India, 86% of farmers fall into the small and marginal category. By integrating the small and marginal farmers, this Act will truly catapult Indian farming into the global arena while protecting the interests of the small and marginal farmers. The Government has taken a long-term step to provide economic support to farmers. The Contract Farming Act is a big step in the right direction which will take the country forward into a new era of global agriculture.

> Amit BK Khare Dhanuka Agritech Limited

## **VALUE ADDITION IN HONEY**

piculture practices is an interesting and skillful scientific art to rear honey bees for the production of honey. Nowadays beekeeping practices are in the trend either in backyard farming or as an integral part of agriculture. Honey is the main product of the beekeeping and contains nutritional properties as well as have a huge economic impact. Since ancient times, honey is included in the food and other dietary habits throughout the world. Honey is also employed in the making of Ayurvedic medicines as well as in various religious activities. Apart from honey, there are various primary products which are directly isolated from the hives and bees. These primary products include wax, pollen, propolis, royal jelly, venom etc. All these products have their own economic importance and also enhances the quality of other derived secondary products.

Honey itself is involved in the making of various kinds of valueadded products, which involves creamed honey, comb honey, beer, various edible paste and for dressing, honey with nuts, honey filled with pollen and propolis, jelly, biscuits, caramel, and liquid syrups. The value-added products are listed below:

#### **Creamed honey**

Once you eat the creamed honey it may alter your preference over normal honey, as it is tastier and fetches more income. As the name indicates, creamed honey is completely crystallized, more thick,



and is a homogeneous material with a smooth appearance. It can be eaten raw or with bread in the breakfast.

#### **Comb honey**

Honey Bees make hexagonal shaped chambers in hives naturally and the honey is stored in it in liquid form. Honey is not extracted separately, instead combs are cut along with honey packed in various sizes and sold in the market. This type of honey remains in its natural form until consumption. Once you extract honey it loses it various antibiotic and therapeutic properties, while these losses can be avoided by using the comb honey.

#### Tahini paste

Tahini paste is a thick paste, made of honey and sesame seed butter. Tahini paste contains high protein content and vitamins. Tahini paste is used as edible material in food directly or can be used as a dressing material on vegetable salads.

#### **Fruits in honey**

Various fruits are seasonal and perishable in nature. But these

fruits can be preserved in honey and be used throughout the year. Many kinds of fruits like apple, pear, grapes etc. can be sun-dried and chopped finely and placed directly in honey. This type of fruits in honey can be stored for a long period of time.

#### Dry nuts in honey

As with the fruits, dry nuts can also be stored in honey. In this case, light colored and slow crystallizing honey can be used. It can be made in various proportions of honey and nuts, bottled and sold.

#### **Honey beer**

Honey brewing to make beer is faster and easier to make. Honey beer is a fermented product. It cannot be stored for a long time and can be revitalized by the addition of more honey.

#### Honey with pollen and propolis

Bee pollens are rich in vitamin B complexes, folic acids and contain many other proteins. While propolis which is used by the bee to seal cracks in hives is a resinous compound. Propolis has various medicinal properties. Honey with pollen and propolis is generally recommended in the diet for a healthy life.

#### Honey wound dresser paste

Honey with wax and propolis in a proportion is used to make a wound dresser paste. This paste can be directly applied to wounds and can be packed in a jar and stored in a dark place. Honey and other bee products have been proved to contain antibacterial properties.

#### **Honey jelly**

Honey jelly is made with honey, pectin, tartaric acid and water in a definite proportion. Honey jelly can be eaten with loaves of bread.

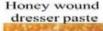
#### **Honey syrups**

Honey syrups are so easier to make. Just mix the equal proportion of honey











Salted honey butter caramels





#### Value added products of honey

and water and boil it until honey melt in the water. In this syrup, lime juice can also be blended to enhance flavor and antioxidant values.

#### Salted honey butter caramels

Caramel is a nutritious product and contains mostly sugars. Caramel is used as topping of food items and to add flavors in desserts. Ingredients like salt, honey, glucose, caramel, water etc. are used to make salted honey butter caramel.

#### **Greek halvah**

Halvah is a delicious sweet, prepared for the various occasion. Greek halvah is prepared by using honey, sesame oil, ground nuts, flour, sugars, cloves, and cinnamons.

#### Honey biscuits

Honey biscuits can be made easily by an individual. The components of biscuits are eggs, honey, baking powder, oats and warm water.

There are many other dishes that can be made with honey. In India,

half of the population is rural and indulged in subsistence farming. Beekeeping, a scientific and skillful art can be learned easily and should be integrated into the agriculture practices. Selling honey in the market directly fetches income, but if it is converted to value-added products, the income earned by an individual will boost. The learning of making value-added products of honey is easy. All the recipes and procedure are documented in the literature and available on the internet. In a short scale honey production, it can be adopted as a hobby in a household as a component of backyard farming while for a large scale production, the individual should get proper training and should get expertise in the art of apiculture. The current context doubling the farmer income by 2022, apiculture practices are crucial.

#### Amit Ahujaa and Rakesh Kumar SKUAST, Jammu

## **KISAN CALL CENTRE** INFORMATION JUST A CALL AWAY



nteraction is the key to development. Exchange of ideas through any mode refreshes our cognitive skills and improves our power of judgement.

India has witnessed a transformation in the information delivery system in the last two decades or so with the invasion of information and communication technologies (ICTs) in all walks of life. Agriculture should not remain beyond it's reach, as it has become an out and out dynamic sector, with ever changing technologies and practices. Farmers' livelihood depends substantially on the decisions they make, which in turn is guided by the information available to them. The present information needs are demand driven and farmers cannot rely only on traditional sources like fellow farmers, friends, input dealers, radio, television and print materials. The need for latest information is more intense in a state like Punjab facing many challenges in agriculture. Any aspect of knowledge leading to sustainability of state agriculture, be it conserving the dwindling resources, lowering the cost of production, new policy initiative by the government etc. must be shared with the farming community. The usage of ICT is a welcome step in this direction. Kisan Call Centre, an initiative of Government of India, launched in 2004 across 25 states of India is aimed at filling the information gaps.



The purpose of setting up these call centres is to answer the queries of farmers instantly in the local language, free of cost through a toll free number on continuous basis.

The state level Kisan Call Centre, located at Chandigarh was established on 1st May, 2012 and has been catering to three states, Haryana and Himachal Punjab, Pradesh. Punjab state is being served by 26 Farmers Tele Advisors (FTAs), the main respondents to receive and answer farmer's queries. The centre works in three shifts on all seven days a week. The calls received after 10 p.m. get recorded and are answered by 1st shift FTAs, the next morning. The centre has state wide accessibility by dialling a single toll free number 1551 and 1800-180-1551. The numbers can be reached through landline and mobile phones of any service provider. The response is instantly given in local language i.e., Punjabi. When a farmer makes a call at KCC for the first time, the respondent at the centre registers him/her by creating an ID. He/she asks for basic information about the caller i.e., name, age, education, size of holding, district, tehsil, village, cropping pattern, languages known and Aadhar Card number. It was found that some farmers were apprehensive about providing this information, but this basic information is needed for registration and it is to be given once only. Later on, whenever that caller seeks any information, his/ her data base is available with the respondent. So, the farmer should put his inhibitions to rest and share the basic details with KCC. Farmer is also asked about the hand set he/she is using. If it turns to be a smart phone, he/she is advised to download the 'Kisan Suvidha' app of



KCC. This app provides information about weather and market prices in the caller's area. Another app 'Iffco Kisan' can also be installed and used for queries with photographs of problematic aspects by the caller.

Majority of FTAs working at the centre are B.Sc. Agriculture graduates, having good knowledge about all aspects of agriculture. Their knowledge is also updated through trainings arranged at Punjab Agricultural University, Ludhiana from time to time regarding latest in all aspects of agriculture. Apart from their self knowledge, they also consult their colleagues and supervisor, seek help from extension booklets, printed material of government departments and internet by exploring various related websites, to give a satisfactory response to farmers' queries.

In a research study about Kisan Call Centre, undertaken at Agro Economic Research Centre, PAU, Ludhiana, it was found that farmers of the state were not aware about this useful and cost effective service. Those farmers who were availing it, were also seeking knowledge about technical aspects or weather related information. So, there is need to make the farmers aware about availability of this all time, free of cost service. Farmers can seek information about any aspect of agriculture and allied activities, be it prices, marketing, government schemes, machinery, subsidies The information etc delivery system at the centre has three levels. At first level, farmer reaches the FTA sitting at the centre who responds to his/her queries and problems. If respondent at this level-I, is not able to satisfactorily answer, the call is then taken as a conference call with an expert at level-II in an institution involving State Agricultural University, Krishi Vigyan Kendras (KVKs) and state agricultural departments, for handling and giving advice. Even then if the farmer is not fully satisfied, the problem is recorded and then addressed at level-III, called

the Nodal Centre and further advice is given through post or by visit of an extension worker. The purpose of this call escalation process to different levels is to satisfactorily answer the gueries and problems of the farmers. The decision making, right from the selection of crop, choice of practices, resource use, method of harvesting, post harvest handling, method or venue of sale, mode of transportation, processing etc. till the sale of product to final consumer, all aspects need availability of information. So, there is need to popularize this service among the state farmers. Efforts should be made both by those availing this service as well as department of agriculture to spread the word and make farmers aware of it and take advantage of this new age initiative.

D K Grover, Arjinder Kaur, Sanjay Kumar & J M Singh, Agro Economic Research Centre, PAU, Ludhiana

## THE POWER OF MODERN AGRICULTURE

China, a big agricultural country endowed with rich agricultural resources, has a long history of farming and the tradition of intensive cultivation. The Chinese government has always placed high priority on the development of agriculture. Since 1978, China has carried out step by step the policy of reform and opening up, bringing along a quickened pace in agricultural reform and development. Particularly, in recent years the government has abided by giving first priority to the work on agriculture, rural areas and farmers.

hina has succeeded in producing one fourth of world's grain and feeding one fifth of world's population with less than 10 percent of world arable land. Currently, China ranks first in the world in terms of the production of cereals, cotton, fruits, vegetables, meat, poultry, eggs and fishery products. More than 300 million people in China are employed in agriculture which is almost 50 percent of the total work force of the country. Since the turn of the century, China has made remarkable achievements in agricultural and rural development. By 2015, its grain production has set a new record of 12 successive years of increase, offering abundant and diversified agricultural products. Ongoing agricultural and rural economic growth basically meet people's increasing demand for agricultural products, providing strong support for the industrialization and urbanization

that are unprecedented in terms of scale and speed, and making due contribution to food security around the world.





#### China's Crop Culture and Trade

China, home to rich plant and animal resources have thousands of crop varieties, over 1,200 of which are cultivars, including grain crops such as rice, wheat and corn, and cash crops such as fruits, vegetables, forage grass, flowers, tea, sugarcane, beet and natural rubber. There are about twenty livestock species whose genetic resources are found in China, including swine, chicken, goose, yellow cattle, and buffalo, with a total of 742 breeds. It is also home to more than 20,000 recorded aquatic breeds, including more than 3,800 types of fish.

About 75% of China's cultivated area is used for food crops. Rice is China's most important crop, raised on about 25% of the cultivated area. The majority of rice is grown south of the Huai River, in the Zhu Jiang delta, and in the Yunnan, Guizhou, and Sichuan provinces. Wheat is the second most-prevalent grain crop, grown in most parts of the country but especially on the North China Plain. Corn and millet are grown in north and northeast China, and oats is important in Inner Mongolia and Tibet. Other crops include sweet potatoes in the south, white potatoes in the north; China is the largest producer of potatoes in the world, and various other fruits and vegetables. Oil seeds are important in Chinese agriculture, supplying edible and industrial

oils and forming a large share of agricultural exports. In North and North East China, Chinese soybeans are grown to be used in tofu and cooking oil. China is also a leading producer of peanuts. Other oilseed crops are sesame seeds, sunflower seeds, and rapeseed.Other important food crops for China include green and jasmine teas, popular among the Chinese population, black tea as an export, sugarcane, and sugar beets. Tea plantations are located on the hillsides of the middle Yangtze Valley and in the southeast provinces of Fujian and Zhejjang. China is the leading producer of cotton, which is grown throughout, but especially in the areas of the North China Plain, the Yangtze river delta, and the

middle Yangtze valley. Sericulture, the practice of silkworm raising is also practiced in central and southern China.

China has a large livestock population, with pigs and fowls being the most common. As demand for gourmet foods grows, production of more exotic meats increases as well. Increased incomes and increased demand for meat, especially pork, has resulted in demand for improved breeds of livestock, breeding stock imported particularly from the United States. Some of these breeds are adapted to factory farming. The country accounts for about one-third of the total fish production of the world. Aquaculture, the breeding of fish in ponds and lakes, accounts for



more than half of its output.

China has become the 7th largest exporter and the 2nd largest importer of agricultural products, thus holding an increasingly important status in the world agricultural trade. China's total agricultural trade had increased by 3.1 times between 2002 and 2015, from 30.05 billion dollars to 123.318 billion dollars. Labor intensive products are taking the lead in export, such as vegetables, fruits and processed agricultural products, and import products mainly involve land intensive products, like oil crops and cotton.

The leading export products include fresh/frozen vegetables, processed vegetables; fish products, shrimp, shellfish and mollusks, crabs, pearl; canned fruit, fruit juices, other processed fruits, fresh/ frozen fruit; tea; food made of flour; seeds; cocoon and silk; poultry products, eggs, rabbits, and other animal products; mung bean, red bean; garlic, mushroom, etc.Leading import products include natural rubber, soybean, cotton, palm oil, wool, wine, hides, soybean oil, rapeseed, sugar, milk powder, dry cassava, feed meal, pork, etc.

#### Technology Reshaping Agriculture in China

Technology has become a main driver in China's agricultural development. In 2014, technology contributed to 56% of the total agricultural growth. The annual growth rate of research funding is 11%. The construction of modern agricultural industry technology system was initiated in 2007. Systematic research and service system has been established, connecting farms to dining table, production to consumption, and research to market. More than 50 major agricultural products including rice, corn, wheat and pigs are covered by the system.Pursuant to disciplinary subjects, industry demand and regional characteristics, 33 comprehensive key laboratories, 195





specialized/regional key laboratories and 269 scientific observation and experiment stations are set up all over the country.

Taking full advantage of heterosis and molecular marker breeding, transgenic breeding, cell engineering and other means, a large number of premium varieties such as super rice, high-yield wheat, hybrid maize, BT cotton, and hybrid rapeseed have been bred. Testing for molecular characteristics of genetically modified organisms (GMOs) and environmental safety evaluation and monitoring system are enhanced to improve the guarantee for the safety of GMOs. Soil testing and formula fertilization projects are further promoted.

China has advanced the scientific and technological innovation of agricultural machines, providing efficient equipment and technical support for the upgrading of its agricultural mechanization.World famous equipment manufacturers such as John Deere and AGCO from the United States and Italy's SDF Group are frequent visitors of machinery exhibitions and agricultural fairs held in China.Accompanying the increasing use of machinery is the growth of scale farming.

#### Deepening Cooperation in Agriculture with the Belt and Road Countries

Α Seminar International on **Cooperation in Agricultural Production** Capacity among the "Belt and Road" countries was held in Beijing. Under the theme, the seminar introduced the backgrounds, ideas and outlooks as well as Chinese practices of the Belt and Road agricultural cooperation, also made brief account of the overview of trade in agricultural products between China and the Belt and Road countries as well as policies involved. 17 representatives from 8 countries including Bulgaria, Cambodia, Egypt, India, Laos, the Philippines, Thailand and Uzbekistan participated in the seminar.

The seminar built a platform of information exchange for enhancing international cooperation in agricultural production capacity, and finally contribute to the sustainable



and healthy development of the world's agriculture. During the seminar, foreign participants and representatives of the Chinese government departments and enterprises exchanged their ideas on trade for agricultural products, introduction of agricultural machinery and equipment as well as agricultual capacity cooperation on imports and exports of pesticides and chemical fertilizer. The opening ceremony of the seminar was graced by Ms. MA Hongtao, Deputy Director General, **DepartmentofInternationalCooperation** (DIC), Ministry of Agriculture and Rural Affairs (MARA), People's Republic of China; Mr. Bl Jianving, Vice President, Agricultural Management Institute, MARA, People's Republic of China; Mr. GU Weibing, Director, Division of the Treaties and Law, DIC, MARA, People's Republic of China; and Mr. Wang Yigun Director, DIC, AMI, MARA.

"In the past three years, great progress has been made in agricultural cooperation between China and countries along the Belt and Road. We have entered into proactive collaborations and connection through bilateral and multilateral cooperative mechanisms. In the new era, agriculture remains the foundation of the national economy in B&R countries, and agricultural cooperation is their common pursuit since many long to fight hunger, eradicate poverty, and achieve food and nutrition security. Therefore under the Initiative, agricultural cooperation can be a good foothold for B&R countries to build a community of common interests and destiny", said Mr. BI Jianying, Vice President, Agricultural Management Institute, MARA, PRC.

"Lack of momentum for a sustained growth and changes in the supply and demand structure at agricultural market are the new issues and challenges for countries all over the world to address jointly. Especially, it's imperative for many countries along the belt and Road to achieve food and nutrition security and eliminate hunger and poverty. So there is an urgent need to conduct promote cooperation to jointly agricultural sustainability.Now China is working closely with B&R to dock strategies and build framework for cooperation. The bolstered bilateral and multilateral mechanisms offer platforms and infrastructure connectivity and financial intermediation provide guarantees to pursue the endeavour", said Ms. MA Hongtao, Deputy Director General, Department of International Cooperation (DIC), MARA, PRC. "The Chinese government proposes that B&R countries seek complementarities through stronger connection of

strategies on agricultural cooperation, on the basis of the principle of mutual consultation, joint efforts and shared interest and consists of peace and cooperation, openness and inclusiveness, mutual learning and benefits under the B&R initiative. accommodate interests and concerns all parties involved, proceed of from science and technology, focus on policy coordination, facilities connectivity, unimpeded trade, financial integration, and people to people bonds to deepen collaborations on optimal technologies, priority products, and trade and investment along the six economy corridors (new Eurasian Land Bridge, China-Mongolia-Russia, China-CentralAsia-WestAsia, China-Indochina Peninsula, China-Pakistan and Bangladesh-China-India-Myanmar), and work jointly for a full fledged and wide ranged new cooperative relationship", mentioned Ms. Hongtao.

Mr. GU Weibing, Director. Division of the Treaties and Law, DIC, MARA, PRC said that in future, China will keep promoting agricultural cooperation under the Belt and Road initiative by partaking in the development of regional agricultural cooperation platforms, supporting talks on agriculture related trade and investment agreements bilaterally or mutilaterally, jointly devising the plan of bilateral cooperation on agricultural investments, increasing agricultural least investment in developed countries, facilitating implementation of 10 cooperation plans between China and Africa, mobilising the South-South Cooperation Assistance Fund and promoting South-South cooperation in agriculture, supporting developing countries to implement the 2030 agenda for Sustainable Development, engaging in agricultural cooperation with developed countries innovatively, assisting in formation of a new pattern of relationship agricultural cooperation on and promoting cultural sustainability in the world.



#### Meeting Tomorrow's Demand

COFCO is world's leading Grain trader and food producers with fully integrated value chain. Guaranteeing national food security and ensuring food safety, COFCO Corporation has its operational networks cover the world's major production and sales regions. Recently, COFCO Corporation was included in the list of China's Top 100 Enterprises in Foreign Agricultural Cooperation 2017 and topped the list by a big margin.

Founded in 1949, COFCO has become a leading supplier of agriproducts with grain, oil, sugar and cotton forming core business and business scope ranging from branded products to financial services and real estate. "COFCO's unique advantages is global distribution, fully-integrated value chain, and agricultural innovations, as well as its seat in the world's largest emerging market making it one of the world's leading agribusinesses, ready to build even more stable food corridors between the major production areas and the emerging markets", said Mr. Alex Li, Deputy General Manager of International Trading Dept, COFCO Food Grains Company. At present, COFCO has total assets of 544.4 billion RMB, annual revenue of 470.9 billion RMB, total annual turnover of

150 million tonnes, a global storage capacity of 31 million tonnes, an annual processing capacity of 90 million tonnes, and an annual port transit capacity of 65 million tonnes. In China alone, COFCO has an integrated processing capacity of more than 60 million tonnes."COFCO is China's largest food processing company, with products covering all the main categories of Chinese daily consumption, including rice, wheat, corn, oil and oilseeds, sugar, cotton, meat products, dairy products, wine, tea, and so on. COFCO has 2.3 million terminal sale points throughout China's 952 large and medium-sized cities and more than 10,000 counties and villages, capable of providing consumers with a sufficient supply of quality and safe food year-round. COFCO plays an important supporting role in the maintenance of China's grain and oil market stability", mentioned Mr. Li. "We have a global coverage of grain and oil producing areas and own a sophisticated global production & procurement platform and trade network. The company already earns more than 50% of its operating income from overseas business. With its access and strong planning, COFCO can ensure a stable supply for two markets, domestic and International, and be the foundation for food security", said Mr. Li.COFCO

has also established packaged foods, finance, and real estate as three major complementary businesses. COFCO produces high-quality packaged food products and has created several high-quality brands covering oil, dairy products, meat, wine, and tea, of which Fortune, Mengniu, Greatwall, and ChinaTea are the most influential. In the future, COFCO will continue to focus on creating the world's leading grain trader and food producer, aiming to become a model for national food security strategy and food safety strategy implementation.

Chinese Academy of Agricultural Mechanization Sciences (CAAMS), founded in 1956, is a modern hightech manufacturing enterprise group with the self-innovation as the drive and high-end products manufacturing as the main business, integrating science, industry and trade. The business scope of CAAMS covers seven areas of modern agricultural machinery, agro-products (food) processing and packaging machinery, renewable energy equipment, special equipment, exploration, engineering design and construction, and media. It is one of the first innovative and hi-tech enterprises in China.

CAAMS sixty-year achievements since its founding comprises of 3200 agricultural machinery product technologies; 500 national and



ministerial-level awards: 700 national patents: 2500 national science and technology projects; 1400 industrial standards. "80% of the first sets of farm machinery technologies in the whole country have been originated from CAAMS. The applications of these technologies have made great contribution in the national farm equipment, machinery industry and farm mechanization. CAAMS merged into China National Machinery Industry Corporation in 2009. It comprises of 11 production bases and 1 Logistics Park", said Mr. Song Xiaomin, Project Specialist, Department of International Cooperation and Public Relations, Chinese Academy of Agricultural Mechanization Sciences. CAAMS has one national-level key laboratory, two national engineering laboratories, two national engineering technology research centers, two national quality supervision and testing centers for agricultural machinery and tools and food machinery. It is the chairman of Technology unit Innovation Promotion Alliance for Agricultural Machinery Industry (TIPAAMI), Technology Innovation Promotion Council for Food Machinery Industry (TIPCFMI) and Capital Technology Innovation Promotion Alliance for Biomass Energy Industry (CTIPABEI) respectively. "With gradually improved high-end equipment manufacturing industry bases and market pattern, CAAMS has formed five industrial zones, twelve industrial production bases and one logistics technology park in the east, west, south, north and center of China where a number of products are manufactured with hitech and high value-added products, supplied over 3000 agricultural mechanical products to the society from harvesters to farming machinery, plant protection and water saving machinery, biomass energy and products agriculture processing machinery, etc. Large scale grain combine harvesters, large scale sprinklers, high-clearance cultivators, precise and efficient sprayers, precision seeders, high-speed rice transplanters, smart cotton pickers,

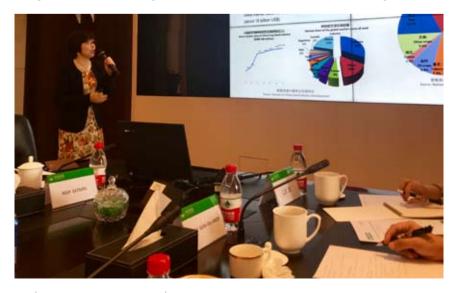
forage harvesters, potato harvesters, straw harvesters and others have occupied the forefront of the market. The transformation, extension, promotion and application of such high level products and technologies surely met the urgent need of Chinese economic development and modern agriculture", said Mr. Xiaomin.CAAMS has created an international development platform with international cooperation and communication as the carrier for technology and products export, established extensive communication and cooperation with over 40 foreign academic societies, international organizations and technological research institutions and enterprises in over 80 countries.



Sinochem Group is one of China's four largest state oil companies, China's leading chemical service provider, biggest agricultural inputs (fertilizer, seed and agrochemicals) company and integrated modern agricultural service operator. Sinochem Group also exerts strong influence in city operation and nonbanking financial service sector. Headquartered in Beijing, China, Sinochem Group was founded in 1950. Sinochem Group is among the earliest Chinese enterprises on the Fortune Global 500 list and ranked 98th in 2018 and has been honored as Fortune's World's Most Admired Companies for two consecutive years. Mr. Hengde Qin, CEO, Sinochem Agriculture and Head of Departments in an interaction with Agriculture Today discusses the achievements and work of various business units of the company. Supervised by the State-owned Assets Supervision Administration Commission, and Sinochem Group is China's largest operator of three major agricultural inputs (fertilizer, seeds and agrochemicals) and modern agricultural service. "Based on our advantages in integrating leading technologies, premium products, and professional service, we innovate our service model, provide wholeprocess and comprehensive solutions for growers, contributing to China's

supply-side agricultural reform and national rural revitalization strategy. Through strategic transformation, diversified business portfolio, and sound operational control, Sinochem Group has maintained a steady growth with corporate strength constantly increasing", said Mr. Henade Qin, CEO of Sinochem Agriculture's Agriculture.Sinochem MAP (Modern Agriculture Platform) encourages "moderate strategy scale of land", employs modern technologies to "do better farming", takes modern agriculture planting technologies and smart agriculture as its measures, and provides online and offline comprehensive solutions throughout the whole production process.

China is a large seed industrial country.Crop seed usage ranks first in the world (10.281 billion kg in 2016) and seed market value ranks second in the world (USD 18 billion in 2016). Security capability of seed industry has been dramatically enhanced over the years and independent innovation capabilty of seed industry has been highly improved. Competetiveness of enterprises has increased markedly. The number of seed companies has reduced from 8700 to 4300 and R&D investment and innovation capabilties have also been strengthened. The development environment for seed industry has improved significantly.



The new seed law has promoted intellectual property protecton and market supervision in seed industry. The value of export in 2017 was USD 200 million and value of import was USD 417 million.

China National Seed Group Co. Ltd. (Chinaseed) was established on the basis of the Seed Bureau of the Ministry of Agriculture in 1978. The company has been awarded twice in a row as number one among the top fifty seed companies in China. In June 2007, Chinaseed became a wholly-owned subsidiary of Sinochem Corporation with the approval of the State Council."The company has registered capital of RMB 944 million (148 million USD), CNSGC owns 6 rice companies, which are top five in rice seed business and covers all the main rice ecological regions. The company has 6 wheat companies ranked top three in the market share and sales in wheat seed business, and is expected to be No. 1 in 2019, CNSGC take leading market share in oil sunflower market of China. In vegetables sector, the company strengthens the cooperation with world class seed companies and integrates the advantages of vegetable resources domestically and seek the opportunity to introduce the good varieties to the world", said Ms. Tian. CNSGC has set up China Seed Life Science and Technolov Centre in Wuhan with RMB 5.06 billion investment, aiming to create a world class commercial breeding platform. Breeding program combines biotechnology and conventional breeding method. The company has also set up National Key lab of Crop Breeding Technology Innovation and Integration. The first gene chip for rice breeding in the world was born in China. It has registered more than 80 rice varities, developed and improved over 100 inbred lines with IP. CNSGS has 5 stable production basis and 14 processing centres. The company focuses on marketing by establishing national wide distribution network and 22 provincial organisations.



# The future, today.



INTERNATIONAL AGRICULTURAL AND GARDENING MACHINERY EXHIBITION

# Bologna, 7.11 November 2018





# FOOD TAIPE

griculture is one of the main industries in Taiwan contributing to the food security, rural development and conservation. Warm ocean currents give Taiwan a climate conducive to the growth of lush vegetation and two or three rice harvest per year. Around 24% of Taiwan's land is used for farming.

Rice, the principal food crop, is grown along the western plain and in the south. Other food crops include sweet potatoes, bananas, peanuts, soybeans, and wheat.

Sugar, pineapples, citrus fruits, crude tea, and asparagus are plantationgrown and are the principal cash and export crops. Small amounts of cotton, tobacco, jute, and sisal are also produced. Taiwan's worldrenowned oolong tea accounts for about 90 percent of the island's total tea production, while small volumes of green and black teas are also produced. A fast rising industry, mushroom canning, led to the development of mushroom cultivation in Taiwan. Betel nuts have become Taiwan's second most valuable cash crop after rice. The main varieties of

fruits are citrus, mangoes, lychees, bananas, pineapples, wax apples, and Asian pears. Pineapples and lychees are canned to satisfy domestic and international demand, while other fruits are processed into juice for local consumption.

Taiwan has over 1,600 kilometers of coastline that provides the country with a wide variety of sea life. As a matter of fact, Taiwan's fishing industry has expanded from smallscale coastal fisheries to cover commercial aquaculture and deep-sea fishing over the past six decades.

Taiwan is ready to become the

silicon valley of agriculture. The country is well suited for developing smart farming devices and large-scale precision agriculture projects. Nearly all of the skills and components needed for smart agriculture can be found in Taiwan, a place that although small in size, boasts the largest number of electrical engineers per capita in the world. Taiwan produces 25% of the world's semiconductors, and is a manufacturer for most of the sensors used in IoT and smart farming projects.

The country is also a major player in robotics, drones and the global leader in solar cells. The growth in indoor farming as a more productive alternative to traditional farms is proving to be a boon for the LED industry in Taiwan, the second largest in the world. A number of indoor farming companies have branched out of the LED sector and can offer full intelligent indoor farming and hydroponic solution.

#### Super Trade Show FOOD TAIPEI 2018

Food Taipei 2018, one of the major trade shows in Asia, took place from June 27-30, 2018 at Taipei World Trade Center and Taipei Nangang Exhibition Center, with the participation of more than 1,628 exhibitors from 37 countries around the world, covering every

link of the supply chain.Food Taipei hosts Taiwan suppliers of specialty products who offer a full spectrum of food for global buyers scouting unique foods and ingredients. Across Asia, Taiwan is renowned as the epicenter of gourmet foods, fine dining, fresh produce and skilled chefs.

The four-day long trade show consisted of five trade events such as







Food Taipei, Foodtech & Pharmatech Taipei, Taipei Pack, Taiwan HORECA and Halal Taiwan running simultaneously.Over 34 nationalthemed pavilions were set up at the trade show, while approximately a third of all exhibitors came from abroad.

The exhibits coveredfresh fruits, vegetables, poultry, seafood, meat, processed meat products, edible oils, dairy products, organic and vegetarian food, frozen prepared food, canned food, biscuits, wine, liquor, coffee, tea, juice and soft drinks etc.Buyers from over 100 countries sniffed fresh and savory biz chances around exotic 34 national pavilions. In the top 10 countries of buyers, Asian buyers represented over 80% of its overseas buyers.

Those across the industry trust this 5-in-1 Food Expo for offering the best international platform to Taiwanese promote agriculture, aquaculture, refrigeration, processed food, food machinery, and packaging equipment.Exhibitors have brought their best from the USA, Canada, Japan, and South Korea, as well nations in the EU and in Central and South America. The visitors witnessed the best olive oil from the Aegean Sea, tart cherries from Michigan, organic chocolate from Italy, American Ginseng, coffee from Central America, Belgian fries, and much more. The exhibition featured products such as Jamón Ibérico from Spain, Inca nut oil from Peru, wheat beer from Germany, quality pork from the Netherlands. More than a display of specialty foods, it is also an ideal platform for building friendships across the world.

Food Taipei the most is exhibition internationalized in Taiwan The first "Bubble Tea Shake Robot" in Taiwan was launched this vear. A bar with robotic arms set up to shake and offer bubble tea samples to visitors. The first Taiwan Bubble Tea Pavilion presented the six major industry areas: tea leaves, materials, packaging and containers, food machinery, franchising, chained brands. All levels of the industry chain layout are covered, expanding the competitive advantage of the unique bubble tea industry.

To help create halal business opportunities for Taiwanese companies and a muslim-friendly environment on the island, this year's Halal Taiwan has set up the first-ever "Taiwan Halal Pavilion". The display included sections on halal-certified food for specific health uses (FOSHU), general foods and household goods. Among this year's exhibitors were delegates from five countries that have been covered in the new southbound policy: Malaysia, the Philippines, Sri Lanka, Thailand, and Vietnam.

The smart machinery competition took place during Foodtech & Pharmatech Taipei, where exhibitors in line with productivity and smart manufacturing are chosen by industry experts. The criteria included smart software value-adding, robotics and automated surroundings. International buyers witnessed Taiwan's solid foundation in smart manufacturing and production. Most of Southeast Asia are emerging economies with large populations, which is ideal for food processing of all kinds and packaging machinery industry development. Taiwanese companies have an edge in geographical proximity, low transportation costs, and customization. The region is therefore an important overseas market for business expansion.

The exhibition offered a variety of activities on its premises, setting up the best exchange and trading platform for buyers and exhibitors alike.In addition, various professional seminars and forums took place in order to provide the latest industry trends and market information.Taipei International 5-in-1 Food Show is undoubtedly the best international selling platform for Taiwan's food products, agricultural and fishing industries, food machinery and packaging equipment as well as catering equipment. It is also the first choice for company procurement and new product search. It is the can't-miss annual event in the food industry

#### Bubble tea takes Taiwan to the world

Taiwan's bubble tea, a delicious mix of decoction, milk powder, ice cubes, sugarcane syrup, and boiled tapioca balls, is an important part of the island culture. With its climate and geography conducive to growing tea, Taiwan soon emerged as the producer of some of the best teas in the world. Green tea, black tea, and oolong are the three main types cultivated here. However, Taiwan's claim to fame among tea aficionados is its bubble tea, also known as pearl milk tea. This cold milk- or fruit-based tea, shaken with small, chewy tapioca balls, is a hit among South East Asians, Canadians and Americans. In recent years, bubble tea shops have flourished overseas, first in Hong Kong, Malaysia, Singapore and Taiwan expat communities in North America, the U.K. and the European continent. As commonplace as the streetside drink might appear to most Taiwanese, more and more entrepreneurs are recognizing its potential to stir up the world.

Sunnysyrup Food Co. Ltd. isdevoted to develop various flavors of bubble tea material, mango concentrated juice, syrup and star fruit juice. Popping boba comes in more than 12 flavors such as mango, strawberry, Lychee, chocolate and more. Mr. Jacky Chen, Director, International Marketing, Sunnysyrup Food Co. Ltd., in an interaction during the event explained about the rising bubble tea culture in Taiwan and companies innovative products. "Tapioca pearl is one of the most



#### TAITRA

Founded in 1970, TAITRA is Taiwan's foremost nonprofit trade promoting organization. Sponsored by the government and industry organizations, TAITRA assists enterprises to expand their global reach. Headquartered in Taipei, TAITRA has a team of 1,300 specialists and operates 5 local offices in Taoyuan, Hsinchu, Taichung, Tainan and Kaohsiung as well as 60 branches worldwide. Together with Taipei World Trade Center (TWTC) and Taiwan Trade Center (TTC), TAITRA has formed a global network dedicated to promoting world trade.



Mr. Jacky Chen, Director, International Marketing, Sunnysyrup Food Co. Ltd.

important factors for the rising trend of bubble tea, and it's called bubble for its chewiness and fitness to go with bubble tea drinks. More than 30 years ago, pearl tea was being sold in store as an experimental product, but it did not become popular until few years ago. Sunnysyrup pearls feature its chewiness, elasticity and non stickiness", said Mr. Chen.

Besides juice manufacturing, the company is vertically connected with related products and now being able to produce the materials of bubble tea by its own. "Of all the products we have displayed in the Expo, the microwave Tapioca pearl is the most popular kind among them all, as it features the trait that it can be heated to serve in drinks as instant pearls, there are plenty of restaurants and coffee chains using this product domestic and overseas, they are also free of preservatives and available in eight flavours", mentioned Mr. Chen.

With decades of experience in the market, the company is familiar with the natural taste of fruits, and they share their true tastewith the customers.

#### ANKO's speciality: Frozen Food and Bakery Machines

ANKO Food Machine Co. Ltd. is a leading company in Taiwan food machine industry, offering a wide range of food equipment. Since 1999, ANKO has been certified with ISO 9001 to ensure the highest quality machines. Also, many series of machines are CE approved to meet safety requirements. The company has won a reputation for providing guality-assured machines, tailor-made solutions at reasonable prices, and until now, ANKO's food machines have been exported to 110 countries.

Mr. Robert Ouyoung, Chairman, Anko Food Machine Co. Ltd. in an interaction during the exhibition talked about the food processing industry in Taiwan and food machines and equipments of the company. "After two years in depth field survey and evaluation throughout worldwide professional food and its machine related exhibitions, we found great potential demand for food machines to adapt to fast changing food trends. Since 1987, ANKO has devoted to develop series of Chinese dim sum machines for dumplings, shumai, spring roll, pot sticker, mini juicy bun, green onion cake, glutinous rice ball etc., till now, you can find almost every machine solution for Chinese dimsum from us.Besides Chinese dim sum machines, we also received lots of inquiries from Indian clients for Indian samosa", said Mr. Ouyoung.

After Robert's Indian field surveys and exhibitions, he was sensitized of the booming potential of frozen food demand of nearly 1.3 billion domestic and overseas Indians. Ever since, ANKO has started to develop machines for traditional Indian food. In 1992, Robert set ANKO's vision to



Mr. Robert Ouyoung, Chairman, Anko Food Machine Co. Ltd.

become the most professional ethnic food machine manufacturer in the world. ANKO thus enhanced R&D team to design food equipments for East Europe, North and South America, South-East Asia, Middle East, Africa, etc. "ANKO's food machines are not only able to produce various types of flatbreads and pastries, such as roti, chapati, thepla, parathas, and samosa pastry, but are also able to make snacks such as samosas and beautiful desserts like gulab jamun, rasgulla. India is the seventh largest country by area, and the second most populous in the world and is definitely a very big market for us", mentioned Mr. Ouyoung.

ANKO is capable of helping customers adjust recipes for machine production without sacrificing quality and taste. Relying on the cumulative experiences of ANKO's team, any tiny changes such as recipe adjustment, mold customization, or conveyor speed alteration, etc. can make a huge difference to taste.

**Environmental Consciousness** Day Young cup is Taiwan's highquality food container manufacturers. Since 1996, Day Young cup has been the top three leaders in Taiwan for manufacturing quality and highly functional food packaging supplies. The company showcased a variety of disposable tableware including paper cups, PET cups, PET lids, PP cups, PP soup cup lids, fruit boxes, tomato boxes, Deli cups, ice cream cups, yogurt cups, fried chicken buckets, American Takeout boxes, lunch boxes and all kinds of paper lunch boxes meet the needs of customers for all types of food packaging at the exhibition Food Taipei.

Mr Jackv Lee, President, Day Youg Enterprise Co., Ltd. in an interaction during the event explained about the environment friendly products of the company. By manufacturing a great variety of foodservice packaging, the company collaborates with customers across a wide range of market segments to meet consumers' demand for highguality, sustainable, and innovative products. "Day Young Cup plastic cups and plastic containers, using acid-resistant double-sided PF laminated, oil-proof and moistureproof, robust construction, can maintain beverage flavor and provides perfect leak-proofing. All plastic production is kept in-house to meet health and safety standards, as well as to reduce costs. Our materials and products have achieved international accreditation including: ISO9001:2008, FDA, FSC, SGS", mentioned Mr. Lee.

Day Young takes environmental issues seriously and always meet Taiwan's environmental regulations in recycling and energy saving. "We are committed to developing and ensuring that all of our plastic plates, plastic cups, and plastic containers products are eco-friendly and biodegradable. All kinds of paper cups and paper containers are made of high-quality paper raw materials from the European advanced wood fiber, in line with the USFDA standards; the use of acid-resistant single-sided PE lamination, anti-oil moisture, to maintain the beverage flavor", said Mr. Lee.

Since its inception, the company is working to innovate and develop new products involving environmental issue to protect the earth. Day Young cup strictly selects raw materials. All paper rolls must be food grade, approved by the USFDA, and FSC accredited. The main raw materials are derived from recyclable and renewalable resources, to avoid unnecessary waste or cause "We environmental pollution. concerned are seriously about product safety and environmental sustainability. Since protecting our environment is critical, our goal is to produce containers that won't add an additional burden to our mother earth. Compared to plastic and styrofoam containers, paper containers can be much more environmentally friendly, poison-free, heat-resistant and water/ oil repellent. We have put a lot of effort into developing PLA coated containers which are 100% bio-degradable and waterproof", said Mr. Lee.

Day Young cup is a young but experienced paper container producer that is continuously working on bringing out the highest quality products at the most competitive rates available in the market.With continued dedication in this field, the brand has been expanding worldwidein food service distributors, ice cream makers, beverage shops, chain stores, restaurants, and government agencies

#### New Tea Culture in Taiwan

Ms. May Lee, International Trade Manager, Shih Chen Foods Co. Ltd. explained about Taiwan tea culture and different popular brands of the company. For unique climate and skillful tea processing, it makes Taiwan tea win the praise in the world. Taiwan tea trees are planted in four seasons but only the harvest



*Ms. May Lee, International Trade Manager, Shih Chen Foods Co. Ltd.* 

in spring and winter are valuable. Besides, climate and rain affect the quality of tea. Once the purchaser is not satisfied by the quality, tea farmers face lots of tea stock. "The company plant and process tea for three generations and we are well aware of the sufferings of tea farmers. When we saw a lot of slow selling oolong tea leaves, we decided to look for a solution for tea farmers. Shih Chen Foods Company is determined to spotlight Taiwan tea all over the world. We look forward for making qualified Taiwan tea and respectable tea farmers, well known around the world", said Ms. Lee.

Based on 100 years of experience in tea planting and production, all the tea gardens and manufacture process are well managed to meet the highest quality standards. "As per 100 years of tea processing experiences, Shih Chen Foods formulate tea leaves appropriately and create the best quality and aroma tea, even tea leaves are from different seasons. Therefore, we created the brand "3:15PM" to spotlight Taiwan tea all over the world. The tea comes in different flavors with pre mix milk in it under the brand 3:15PM", mentioned Ms. Lee.

Shih Chen Company started from

tea planting. The company insists to process and develop various tea products in traditional and conscientious attitude. "To make global consumers realize Taiwan culture and Taiwan Tea, Shih Chen Company enhances and develops new processing skills to produce tasty and healthy tea products in different flavours. We look forward our tea drink to be loved by oriental and western people in the world. Our product includes drinks, qualified Taiwan tea and natural healthy drink. Our policy is to develop products to suit local demand in different foreign countries", mentioned Ms. Lee.

#### **The Noodle Making Machine**

Kuo Chang Machinery Co., Ltd. was founded in 1967. Since its Kuo Chang establishment, Co. has been dedicated to design and manufacture the noodle making machines. Kuo Chang Co. machines continually provide the customers the best performance, modern style and productiveness for noodle making machines and therefore make the customers achieve the profitability. "In an attempt to achieve the goal of providing the highest standard and best quality of noodle making machines, we have been utilizing the latest computer equipment and software in designing the machines. A setup network system is used starting from machine design to CNC automatic precision process", said C.T. Wang, Chairman, Kuo Chang Machinery Co. Ltd.

In some cases, the customers may need to do some modification to the machines to further maximize the output. Kuo Chang listens to the customers, understand their needs and then satisfy them with the best quality. In 2002, the company was accredited with ISO 9001. "In 2003, due to the noodle marketing trend, we evolved national advanced technology and successfully designed the automatic water-cook noodle making production line.



Kuo Chang Co. will continue to produce the high technical and high efficient noodle making machines. Those are the reasons why lots of well-known food manufacturers are using Kuo Chang Co. noodle making machines", said Mr. Wang.

#### Quality is the permit for the marketing

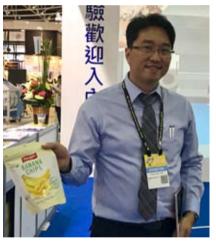
Ou-Dean Foods is the leading producer of a wide range of high quality beverages. The company has different filling lines just for aloe vera drink, coconut drinks, Ice coffees, teas and other juices. Ou-Dean is BRC, ISO and HACCP certified which guarantees not only the best guality in drinks, but also a high standard in production methods. "We currently are exporting drinks to more than 70 countries. As a result we have a lot of experience in exporting these drinks from our warehouse in the Netherlands and Taiwan. As a dynamic and healthy company, we have an ambitious mission to enable consumers worldwide to enjoy the most delicious exotic beverages", said Ms. Lily Nien, Sales Manager, Ou-Dean Foods factory Co., Ltd.

The world conquest by our aloe veradrinks continue unabated. Tropical world food has the complete production chain in-house, allowing company to offer the highest quality at competitive prices. The company produces more than 30 million litres aloe vera per year. "Tropical and Gourmet are our premium brands. We blend the best natural ingredients and fruit juices into healthy, delicious and refreshing drinks. In addition to producing our own range of drinks, we also develop many private labels. Create your own label design, select your preferred type of packaging (cans, plastic / glass bottles, tetra pack) and create drinks according to your own specifications. We are able to turn almost any type of flavour into a very tasteful drink", said Ms. Lily.

#### **Continuous Frying Machine**

Based in Taiwan, Tsung Hsing Food Machinery Co., Ltd. is a continuous frying machine food processing equipment supplier since 1965 in snack foods industry.TsungHsing developed fryin series oil fryer having unique design, to break the traditional concept of frying with the introduction of new technology. The company has been able to quickly move towards fully automated production plants and upgraded the overall plant by means of automation equipment." TSHS has been offering customers high-quality food processing machines for green peas, nuts, potato chips, grain puffs and corn puffs, with total snack foods solutions. They represent trust, specialization, which is where their name TSHS came from.The current products are sold to more than 60 countries around the world, with more than 500 production lines. Our fryin series oil fryer (FRYIN-302E) was awarded with 25th Taiwan Excellence Awards in 2017. We got the patent of non-sticky conveyor and its delivery chain", said Mr. Ben Yang of Tsung Hsing.

Some of the quality products of the company are continuous oil fryer, continuous microwave hybrid fryer, potato chips production line, grain puff production line, kurkure production line, green pea production line, inflate (pellet) production line, nuts processing machine, noodle snack



production line, conveyor-type auto dryer. Fried foods are always popular over the world, so the demands of frying machine will not decrease. "For the international market demand, Tsung Hsing developed fryin series oil fryer. There are many advantages like space saving, high efficiency and energy saving. It is suitable for a variety of products such as beans, pellet, snack foods, etc. Fryin series oil fryer will provide high-quality capacity for customers' products, including sheet, strip and shaped products", said Mr. Yang.

### SEMINAL CONNEXIONS YET TO BE SEEN ?

urrent times, contain across all the different kinds of media, on almost a day to day basis reports on : Human health /animal health/ epidemics/antibiotics resistance/ pollution/climate and it's changing patterns/ malnutrition/mortality/erosion/rainwater harvesting/flood/drought/nutrients/foodgrains/ public health matters/soil health/receding water tables and levels of reservoirs/deforestation/ silting of rivers,and many such affecting all ecology and life.

There are no definite boundaries between all these concerns but invariably ,importantly and certainly an interdependency /an intricate and changing relationship, as a tiniest movement in one such parameter has, perhaps differential affect on others and the combined affect is possibly beyond normal imagination.

A person who normally goes around earning a living in whatsoever way would not have the wherewithal to see the linkages and how she / he can possibly be affected or can in small meaningful ways cause to affect such concerns meaningfully, albeit significant ways.

The farmers of the Country have a crucial and pivotal role to play is a huge likelihood and that may well be examined, by all so as to impress on the community that does farming ,their indescribable,beneficient role .The esteem in eyes of the citizenry could someways have the farmer take pride in doing along with his farming a lot of other positives for all at large. And that briefly may well be :

A move towards non chemical and non industrial kind of farming.

Establishing a move to make soils healthy .

Try reducing input costs on chemicals and fertilizers and which will help the two factors,noted above and reduce carbon footprints.

Revive Life in soils by organic process as also with reduced soil tillage.

The above in tandem with a constant ground cover would bring down irrigation need and conserve soil moisture as also arrest soil erosion.Good rainfall penetration as against run off shall assist renew ground water tables, which over decades has fallen to abysmal lows for now there have arisen areas with acute water shortage.Routinely check soils for health and carbon matter. All vegetation, trees etc is a natural carbon sequestration scenario.

This shall be a big help to clean air and water. It must be noted and emphasized that all this is achievable by farming and farmers.A very recent study reveals that the mass of human beings etc is 0.01% on the planet as against other bio mass but the impact which this 0.01% is having on the planet is outsized. Hence "ANTHROPOCENE" age is a reality. The human activities have a profound influence on a wide range of issues and which are not helping the human beings on the planet.

All that ails, as in the second paragraph, of this opinion, is connective and to see it in a compartmentalised manner, as is generally being done, comes quite naturally but may be somewhat lacking in imparting a cohesion to a fragmented way of looking and which hardly dovetails into a bigger picture seamlessly.

Be that as it may and without meaning to disrupt and sideline what is being done at present to try tackle the issues ,the idea in suggestions submitted is to bring the weave and warp to some design of cohesion, when the holistic effect may out do and better the work being done by fragmented approaches and which can be technologically prohibitive , with an uncertain future.

A fallout of such could be reduced costs and indebtedness for many small farmers and better realizations, as the people would see a clear sense in affording that for the agro ecology, and also be active participants, and the various reasons as cited.

And this could evolve as it grows into a movement when perhaps many, many farmers may see small is in the long run better and healthier for all as also the environment. Quite against the grain of things as of now but well worth a thought.

AS YOU SOW YOU REAP....applicable not just to only farming but all activities ! In a sense harvests of ideas and thoughts which practiced.

> Ashok Trivedi Tea Farmer



"Despite apprehensions of many, we have set a goal to double farmer incomes by 2022. We will achieve this target with our focus to help farmers with better seeds and markets, and value addition of farm produce"

NARENDRA MODI Prime Minister





"Farmers provide an important direction to the efforts made in economic reforms. Therefore, to make radical changes in the system, proper emphasis should be given to post-harvest marketing and related arrangements"

**RADHA MOHAN SINGH** Union Agriculture Minister

"It is our aim to help farmers earn double or even more by enabling them take up farming activities throughout the year. We want the farmers to go for multi-cropping to augment their agricultural production so that they are economically independent and self- reliant. Assam will not progress if the agriculture sector is neglected"

SARBANANDA SONOWAL Chief Minister, Assam



"Agriculture plays a very important role in ensuring good public nutrition since it has the potential to reduce poverty, which is a key contributor to undernutrition. Agriculture also contributes to the economy and increases government revenue. We should prioritise nutrition at all levels."

DR. M.S.SWAMINATHAN Renowned Agricuture scientist