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HORTICULTURE

ADDING NUTRITION AND INCOME

MICRO IRRIGATION - MAXIMISING WATER USE

SEPTEMBER 2019 | VOLUME XXII | ISSUE 9

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From the Editor's Desk

HORTICULTURE – INCOME, NUTRITIONAL AND FOOD SECURITY

Horticulture has emerged as one of the potential agricultural enterprises and has played a significant role in accelerating the growth of Indian economy. It has also played a stellar role in ensuring nutritional security, poverty alleviation and employment generation. Besides being a major avenue of diversification, they feed many agro industries that are modes of agri-entrepreneurship, rural employment and income generation.

India's horticulture production has grown at a phenomenal pace - Indian farmers now produce more than double the quantity of fruits and vegetables compared to what they did in early 2000.Fruits and vegetables account for nearly 90% of total horticulture production in the country. India ranks second in fruits and vegetables production in the world.

With relevance of horticulture increasing in Indian economy, the sector has seen many sweeping changes.Though cost intensive, many Hi-Tech technologies have become indispensable for horticulture development in recent years.Genetic Modification can be adjudged as a very promising technology that can fulfil the existing challenges of yield stagnation, biotic and abiotic stress.Micro-propagation is perhaps the most popular and widely commercialized global application of Plant Biotechnology in horticulture. Protected cultivation is emerging as a significant method of cultivation among horticulturists. Organic farming has also caught up with the new age farmers as customers have started to shun the conventional farm produce grown with inorganic inputs.Precision Farming has also found takers in horticulture. Soil less cultivation and high density planting have also been widely accepted in horticulture.

Micro irrigation has benefited horticulture immensely. India, with a total arable area of 140 million ha with almost 42% of arable land irrigated, too has a huge potential for micro – irrigation which is still underutilized. Despite these apparent benefits, farmers across the country have been reluctant to adopt this on a wide scale. High initial costs make the technology unfeasible for small and marginal farmers. It may not be suitable for closely planted crops like cereal grains which are grown across large areas in the country. Lack of technical support and follow up by the government, private companies and NGOs may be a hindrance for adoption. Only selected, pre-approved drip kits qualify for the subsidy which stifles creative marketing strategies on the part of manufacturers as well as efforts to bring down the cost of drip systems through innovative technology or product designs.

The increasing demand for horticultural products both locally and globally has prompted many farmers to take up horticulture. The high value attached to the horticulture products has also increased the sector's desirability among farmers. However, recurring gluts coupled with lack of suitable infrastructure for prolonging the shelf life of the produce have marred the profitability of the sector. Investments need to be made to strengthen the infrastructure and logistics.

Anjana Nair

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AGTECH WORLD 2019

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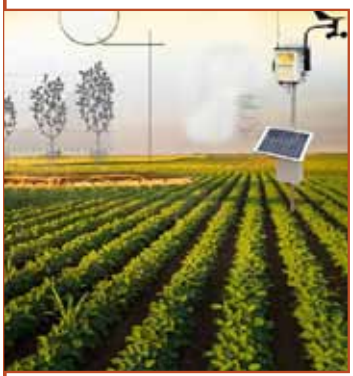

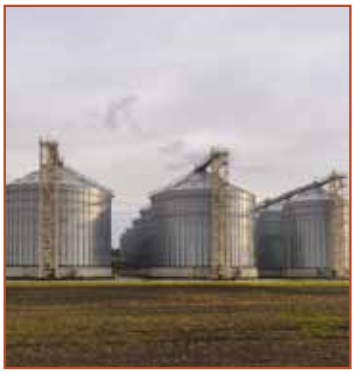


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Transforming India's Food Grains Distribution Network

India's current food programmes need a relook

India has strived hard for enabling food security of the country. Besides increasing the production, policies have also been designed to increase the access of adequate amount of food at affordable prices.However, our social schemes have far outlived their intentions and calls for frequent interventions in sync with the contemporary scenarios.

The pivotal National Food Security Act (NFSA) which was passed in 2013 specifically aimed to ensure food security for all people, at all times marked a paradigm shift in the approach to food security from welfare to rights based approach. About two thirds of the population covered under the Act receive highly subsidized food grains Rs. 3, Rs.2 and Rs.1 per kg for rice, wheat and coarse grains respectively. At present, the government supplies 5 kg of subsidized food grains to each person per month to over 81 crore people via 5,00,000 ration shops in the country, costing the exchequer about Rs 1.4 lakh crore annually.

Six years into successful implementation of the scheme, it appears only logical to revise the subsidized price. Increasing the prices marginally with due consideration of the economically vulnerable section of the society, will ease the burden on public funds to a large extent. Besides this, India is facing allegations 'trade-distorting subsidies' at the WTO. If a consensus emerges at WTO regarding this, India will be forced to reduce the quantity of agricultural products it buys from the farmers. In addition to this, the government wouldn't be in a position to increase the MSP in favour of farmers as it would increase the overall level of subsidies. This in turn will force the government to increase the prices of subsidized food grains distributed under National Food Security Act. Instead of caving under the pressure of increasing the price of subsidized food grains, the government can preemptively revise the price upwards for wheat, rice and pulses covered under food security act within comfortable zone.

It might be feasible to include the impact of inflation on existing prices and adding charges for all the actual expenses incurred like transportation, logistics, warehousing etc. , which may vary from approximately Rs. 5 – 7 per kgs in different areas. FCI may further suggest such cost based pricing to each state to be adopted to reduce the burden on government as well as ease pressure from WTO. It could safely be advised to make the food grains available to the targeted population at Rs. 3, Rs. 4 and Rs. 6 per kg for coarse grains, wheat and rice. The revised prices will be less than 25% of the prevailing average market prices of Rs. 12-14 for coarse grains, Rs. 18-20 for wheat and Rs. 26-30 for rice.

Currently the food stock with FCI exceeds three times the buffer stock norms of 21.04 million tonnes. The huge buffer stock of about 74 million tonnes available with the government although ensures food security, the excess indicates the blockage of money, adding to fiscal deficit. Besides,the food grains stored under CAP (covered area plinth) is partly exposed to rain and other weather conditions inflicting damage to the tune of 40%. This make liquidation of about 25 million MT excess stocks an immediate necessity.

It is high time decisions be made regarding the offtake of the excess food grains. Exploring options that would creatively utilize the excess would be rewarded to the producers as well. Involving states with advanced PDS systems; PSUs and private sector; extending part of surplus stocks to needy countries as humanitarian aid, especially to African countries, under South South Cooperation; doubling allocations under NFSA can change the current scene of loss and misuse.

Besides liquidating the stocks, strategy for future course could be changed by assessing buffer stock for excess, frequently than initially proposed 5 years. Also, conditional cash transfers (CCTs), rather than physical distribution of subsidized food, have been found to be much more effective in achieving food and nutritional security. In long term, changing the cropping pattern to include more coarse grains, oilseeds, pulses and horticultural crops need to be encouraged through rationalising MSP scheme.

Certifying All Seeds

Replacing the existing seeds Act will encompass all seeds sold commercially

India's move to replace the existing Seeds Act, 1966, to introduce certain changes in accordance with the changing norms, speaks of bringing uniformity in certification. It is a significant move considering the dependence of the majority of the farmers on seeds bought commercially.

Although certification of seeds are mandatory in India, hardly a few percentage of seeds sold qualify that criteria. More than half of all the seeds sold in India are not certified by any proper testing agency, and are often of poor quality. Currently, about one third of seeds used in India are saved seeds – the seeds that the farmer himself saves from his harvested crop which he may re-plant or sell locally. The remaining seeds which are bought and sold commercially, 45% come through the ICAR system which goes through the mandated certification process. The other 55% are sold by private companies, most of which are not certified, but are 'truthful label seeds'. The quality of this category of seeds are guaranteed by the producing agency i.e., the company. That is, they are simply self-certified by the company. It is this category of seeds that the new law will affect the most. This category will be removed with the new law, and certification through a proper lab process will be made mandatory. Planting materials such as cuttings, grafting and tissue culture plantlets would also be included in the definition of seeds, and hence would be brought under the ambit of the law.

The new law that replaces the Seeds Act, 1966 enacted over half a century ago, could increase overall agricultural productivity by up to 25%, according to the ministry. The main aim of the new legislation, which is ready for submission to the Cabinet for approval, is to bring uniformity to the process of quality regulation. The 1966 Act has not endorsed all category of seeds, as it states only 'certain' category of seeds to be regulated. The new law makes no exception to any category of seeds and all types of seeds sold in the country, including exported and imported seeds are included in its ambit. The new Bill will also raise the stakes by increasing penalties for non-compliance. Currently, the fine ranges from Rs. 500 to Rs. 5,000. This is expected to be raised to a maximum of Rs.5 lakh. The Bill has been pending for so long, but it is important that companies be held accountable for the quality of the seeds they sell, and the claims they make. If a seed fails at the germination, flowering or seed-setting process, the company which sold it must be held liable and made to provide compensation.

Barcoding which also forms part of the new law necessitates a software system that will be able to track seeds through the testing, certification and manufacturing process. The barcoded seeds ensures transparency and traceability. This will weed out poor quality seeds sold affecting the productivity of agri output. By connecting to a dealer licensing system, seeds will be tracked through the distribution process as well. In place, the system will be able to indicate region wise distribution of a particular seed.

The challenges however, would be to bring the thousands of seed companies on board. The fear of data being shared to competitors may deter or delay the process. The transition may also take some time as there are requirements of developing software, testing them and transferring them to states. Convincing the companies and farmers would be a mammoth task, so is creating awareness among farmers. Beyond implementation, spreading the relevance of this system among the farmers is more important.

Futures Market – The Future?

A study points at the benefits of Futures Market in increasing farmers' income

Futures market has so far remained farther from the farmers. Only a few have ventured into the uncertain terrains of futures market, although benefits galore. A similar finding has been voiced in a study co-authored by Tirtha Chatterjee, Raghav Raghunathan and Ashok Gulati.

Stating that linking farmers to futures markets can be mutually beneficial to both, a study by Icrier has suggested initial focus should be on commodities markets in which there is few government intervention. An early action by NCDEX, the premier agri futures exchange, in collaboration with Nabard, which is the main body promoting farmer producer organisations (FPOs), can bring rich dividends to farming community as well as the exchange, the study said. The study specifically asks for the exchange to identify production centres for those crops, which are not protected by heavy government intervention, build delivery centres around them and encourage futures trading in these areas through FPOs. Bringing in FPOs to the scene will be beneficial to small farmers. FPOs can procure and aggregate the produce and ensure that both size and quality standards are met as per requirements for participation in futures markets.

Only a handful of FPOs transact in the NCDEX. From the first FPO transacting on NCDEX in 2014, the number of FPOs has increased to 69 as of May 2018. However, 80% of these FPOs had traded only once on the futures platform.Their share in overall agri-futures trade was just 0.004% between April 2016 and May 2018.In India, the acreage-related decisions are based on the last year's prices rather than on future expectation of prices. This leads to a vicious cycle of glut and lower prices followed by scarcity and high prices.The role of agri-futures is therefore critical given that it not only aids in price discovery but also mitigates price risk by ensuring a predetermined price.

The study also pointed out how China has fared well in this segment. China is the world's largest player in futures market in terms of number of contracts traded, despite starting in 1993.A programme of futures plus insurance was introduced in China in 2016 as it intends to move from a state-controlled economy of minimum support prices towards a market determined price structure in future. Under the scheme, farmers buy insurance to ensure the minimum selling prices/earnings, while insurance companies make payments to compensate when commodity prices are less than agreed futures price levels. The price data related to the insurance contracts shall be based on futures prices of the Dalian Commodity Exchange. The scheme, started as a pilot stage for soybean and corn, has since been scaled up to cover more areas. "Alongside developing and focussing on the agri-futures markets, another critical initiative taken by the Chinese government is slowly freeing the commodity market from government intervention.

China was raising MSP since 2004, and ended up piling huge stocks. As a market correction measure, since 2014, it has been reducing its MSPs for rice and wheat and removed corn from the support. It is slowly moving towards a Direct Income Support (DIS) based intervention. Some of the key takeaways from China's experience in this regard are: state support for futures market is critical, encouraging use of futures by farmers and consistently training and educating farmers for that, easing government protection from the commodity market by reducing the number of commodities covered under MSP-scheme and reducing MSPs for others besides innovative and customised products.

For futures market to achieve the objectives of price discovery and risk mitigation and have an impact on Indian agriculture, it is necessary that more farmers and farmer-producer organisations (FPOs) participate in it. The prevailing notion that participation in futures market is akin to gambling need to be addressed. The small and marginal farmers need to be brought under larger groups to increase the scale to be traded in the futures exchange.

Storm in a Tea Cup

Tea sector is facing an unprecedented crisis

A storm is definitely brewing inside the tea cup. Tea workers going to strike quite recently over wage hikes and the world's largest tea producer, McLeod Russel's plan to sell tea estates with unviable yields due to adverse weather conditions, are perfect portrayal of things gone wrong for the tea industry. At a time when specialty tea is scaling new heights in the auction centres, tea industry has issued a public appeal asking government to ban expansion of tea for at least five years and provident fund (PF) contribution of workers to be taken over by the state government for three years to provide relief to the industry. India's successive production spurts have become reasons of peril for the industry as a whole.

India is the world's second largest producer of tea whose production has grown 60 per cent. However, the increase in production was not accompanied by price increments or exports. Exports remained stagnant at around 200 million kg. Except in FY13, there has been no significant spike in export prices. Per-unit realisation of tea has been more or less flat over the past six years. In the absence of export potential, planters are dependent on the domestic market. Interest of the ace tea marketers of India - Tatas or Unilever has waned. Mergers and acquisitions have become a rarity. To make matters worse, the production cost has increased. About one third of the Assam gardens have defaulted PF obligations.

The genesis of the problem was the over-supply of cheap tea hitting domestic prices. As a social measure, tea farming was encouraged in Assam as a part of which the Centre created provisions for bought-leaf factories to cater to the segment. The bought-leaf factories (BLFs) became the source of cheap tea that was produced using green leaf procured from small growers. Although it offered gainful livelihood opportunities to unemployed youth, it was also responsible for creating a deep imbalance in the sector.Besides, the cost of production of tea in India is one of the highest in the world.High wage structure, high social welfare cost, and high transportation and handling charges have contributed to the increase in production cost.

Many believe that Tea Board needs a structural overhaul as it has partly been held responsible for the debilitating tea industry. The CAG's performance audit in 2011 said that the Board had failed in regulation, its inspections were "non-transparent", the subsidy schemes didn't deliver, research was not fruitful, and even the internal audit was weak. The industry associations have no representation on the board, which is loaded with politicians and chosen 'experts'.

The tea industry is also burdened by the social obligations imposed upon them by the archaic Plantation Labour Act. With time, changes should be made. With tea industry fighting for its survival, states should extend a helping hand. While planters take charge of the wages in cash, PF, ESI, etc, as in other industries, the state should build hospitals, houses and schools.Governments can ensure that planters pay basic minimum wages for agriculture. The small grower-BLF combine should be replaced by contract farmers, creating room for the organised sector to grow. It would help in ensuring greater market connect.

The government can no longer turn a blind eye to the crisis brewing in the tea sector. With the Indian tea industry providing employment to over 1.2 million workers directly, any disruptions to the way of functioning may affect a sizeable population.

Zuari Agro tweaks rights issue size, price, entitlement ratio

The rights issue committee of Zuari Agro Chemicals recently decided to revise the terms of the rights issue, including the size, price, etc, on account of market considerations. Accordingly, the revised issue size is up to 3,92,54,139 compulsorily convertible debentures (CCDs) at Rs 102 each, aggregating up to Rs 400.39 crore. The rights entitlement ratio is 14 CCDs for every 15 equity shares held by eligible equity shareholders of the company as on the record date. One CCD of face value Rs 102 each will be automatically and compulsorily converted into one equity share of the company a face value Rs 10 each, upon expiry of 36 months from the date of allotment, without any further act or payment on the part of the CCD holders, the company said. Additionally, the CCD holders will have an option to convert the CCDs in the ratio of one CCD into one share of the company after a period of three months from the date of allotment, and, thereafter, at every subsequent interval of three months thereon till the expiry of 36 months from the date of allotment. Earlier, on July 3, the company board had approved issuing 3,36,46,405 CCDs aggregating up to Rs 405 crore. The issue and face value was fixed at Rs 120 a share, while the entitlement was fixed at four CCDs for every five equity shares of the company. The other terms of the issue decided by the committee at its meeting held on July 3 should remain the same, Zuari Agro further said.

FACT to enter eastern markets

Looking beyond the South, fertiliser major FACT will soon enter the eastern markets as part of plans to build up a pan-India presence. The public sector company is gearing to market ammonium sulphate in West Bengal, for which it has signed an MoU with Hindustan Insecticides Ltd. Initially, 5,000 tonnes will be dispatched a month by rail and the quantity will gradually be increased, depending on the demand in that State. The new initiative is estimated to fetch an additional revenue of Rs 8 crore a month, said Kishor Rungta, Chairman and Managing Director, FACT. There are also plans to sell its flagship products such as ammonium sulphate and Factamfos in Maharashtra through Rashtriya Chemicals & Fertilisers Ltd. Negotiations are on and the sales are expected to commence shortly. FACT has so far been confining itself to the southern States and the new initiatives are part of looking at additional avenues to expand its footprint across India rather than immediate revenue gains, Rungta informed. The company is also going in for imports and the first consignment of 27,000 tonnes of complex fertilizers from Russia has reached the Tuticorin Port. The total consignment of complex fertilizer NPK 16:16:16 for the whole year was five lakh tonnes which would be handled through the major ports of Paradip and Vizag. The current import price of complex fertilizer is $285 per tonne. “We were not into fertilizer imports for a long time. Since we are expanding our horizons, such shipments are imperative in meeting the country’s fertilizer demand as well as targeting a business turnover of Rs 3,000 crore,” Rungta said.

CSE rates fertilizer plants in India

India’s fertilizer industry is improving on energy efficiency and cutting on greenhouse gases. However, several of them are slacking on water consumption and water pollution parameters. Some plants are also getting affected because of lack of water and their water sources are getting depleted and disappearing very fast. Several of these plants are ageing and, in spite of performing “reasonably well” in meeting health and safety standards, most of them need to upgrade on site and off site disaster management plants. These findings are part of an 18-month-long process, wherein the country’s fertilizer sector was rated on more than 50 parameters by the Centre for Science and Environment. The rating covered all the 28 operational plants in the country. About 57% of the plants voluntarily participated in the rating programme by disclosing information and allowing teams to verify them on site. The remaining plants were rated on the basis of information available in the public domain and stakeholders’ surveys. National Fertilizers Limited and Indian Farmers’ Fertilizer Cooperative Limited, the biggest public sector companies, refused to voluntarily participate in the process. The top rated plant was Grasim Industries Ltd’s Indo-Gulf Fertilizers unit at Jagdishpur, U.P. The next three winners were Hazira (Gujarat) unit of Krishak Bharati Cooperative Ltd., the Panambur (Karnataka) unit of Mangalore Chemicals & Fertilizers Ltd. and the Babrala (U.P.) unit of Yara Fertilizers India Pvt. Ltd. The fertilizer industry contributes to two major environmental challenges — imbalance in the nitrogen cycle and climate change. The efficiency of fertilizer use in India is poor: nitrogen use efficiency is a mere 35% for lowland rice and under 50% for upland crops. Nitrogen pollution of surface and groundwater in the country has reached alarming proportions. The imbalanced application of these fertilizers was leading to widespread soil sickness, the report added.

Assam golden tea fetches Rs 50,000/kg

In what could cheer many in the "beleaguered" Assam tea industry, Manohari gold, a specialty tea produced in a garden in eastern Assam was sold at Rs 50,000 per kg, said to be the highest ever tea price in public auction so far. Rajan Lohia, owner of Manohari Tea Estate, where the tea was produced told that the handmade golden tea broke all auction price records at the Guwahati Tea Auction Centre. "This orthodox tea is made with the finest tea clones and is considered as the finest tea ever produced and the taste is unmatched. We produced only 5 kg of golden tea as it requires a lot of care and time. Today 2 kg was bought by Saurav Tea Traders Private Limited," he said. The golden tea is made from buds, plucked early morning between May and June, which is the second flush season. Last year, a kilogram of Manohari Gold Tea was sold for Rs 39,001 a record which was soon broken by Golden Needle variety from the Donyi Polo Tea Estate in Arunachal Pradesh which fetched Rs 40,000 per kg. 'Manohari tea having three gardens in eastern Assam's Dibrugarh and Sivasagar districts produce about 25 lakh kg tea every year. "Another 10-15 gardens are also making golden tea but we are very happy that our tea has been sold at the highest ever price. We hope this will give a push to the brand of Assam tea as the industry is going through a very tough phase due to the rising cost of production and low demand and prices. I want to request the government to intervene urgently and help us tide over the crisis," Lohia said. With more than 800 big gardens, Assam produces nearly 52% of tea in the country. But many gardens are now going for specialty tea to compete with Darjeeling, Nilgiri and Chinese tea in the market.

IFFCO reduces price of complex fertilizers

On Independence Day, fertiliser major IFFCO reduced the price of its complex fertilisers, including DAP (di-ammonium phosphate), by Rs 50 per bag as part of efforts to bring down farmers' input cost. "On the occasion of 73rd Independence Day, IFFCO has further reduced the rates by Rs 50/bag of its all complex fertilisers for the benefit of farmers and reducing their input agriculture cost," the IFFCO said on Thursday. On the other hand, Prime Minister Narendra Modi gave a clarion call to farmers to gradually reduce use of chemical fertilisers and eventually stop their usage to protect soil health. Modi, from the ramparts of the Red Fort, said the mother earth was being destroyed due to excessive use of chemical fertilsers and pesticides. The price of DAP has been reduced to Rs 1,250 per bag (of 50 kg) from Rs 1,300 earlier. Similarly, the rate of NPK 1 has come down to Rs 1,200 from Rs 1,250 per bag, while NPK 2 rate will now be Rs 1,210 from Rs 1,260 per bag. The rate of NP has been slashed to Rs 950 per bag from Rs 1,000. NPK stands for "nitrogen, phosphorus and potassium", the three nutrients that compose complete fertilisers. IFFCO managing director US Awasthi said the cooperative is continuously working for the growth and benefit of farmers to fulfil the Prime Minister's goal of doubling farmers' income by 2022. The cooperative provides its services to more than five crore farmers with more than 35,000 cooperative societies across the country. IFFCO is one of the biggest processed fertiliser cooperatives in the world with a turnover of Rs 27,852 crore in 2018-19 fiscal year. It has five manufacturing plants and produced 81.49 lakh tonne fertilisers. Besides fertilisers, IFFCO has diversified into sectors like general insurance, rural mobile telephony, oil and gas and international trading, food processing, organics, amongst others.

Shortage of cane: EID Parry to shut Pudukottai sugar factory

Murugappa group company EID Parry India has decided to shut down its unit at Pudukottai in Tamil Nadu. The unit, which is not in operation because of non-availability of adequate sugarcane, will not be operated in future as the expectation of the revival of cane cultivation in the area is low due to a variety of factors, according to the company's communiqué to stock exchanges. The company proposes to transfer assets of the unit to its other units and also dispose of other assets as may be deemed appropriate. Meanwhile, the company has reported a net loss of Rs 53 crore for the quarter ended June 30, 2019, compared with a net profit of Rs 54 crore, which was as a result of exceptional items, in the year-ago period. In previous fiscal's Q1, the company had recognised a profit of Rs 208.76 crore on sale of bio-pesticides division and Rs 35.16 crore on sale of investments in Parry America Inc. Loss before depreciation, interest and taxes (EBITDA) and before exceptional item for the quarter was Rs 31 crore compared to Rs 103 crore in the year-ago quarter. Loss after tax was Rs 53 crore as against the loss of Rs 81 crore. The company's revenue during this June quarter dropped to Rs 388 crore as against Rs 456 crore in Q1 of previous fiscal. The consolidated sugar operations reported an operating loss of Rs 53 crore (loss of Rs 180 crore).

Certification of seeds to be made mandatory to step up agri output

More than half of all seeds sold in India are not certified by any proper testing agency, and are often of poor quality. The Centre now hopes to mandate uniform certification by pushing through a replacement to the Seeds Act, 1966, in the winter session of Parliament, and also by barcoding all seeds to ensure their traceability. This could increase overall agricultural productivity by up to 25%, Agriculture Ministry officials say.The main aim of the new legislation, which is ready for submission to the Cabinet for approval, is to bring uniformity to the process of quality regulation. The 1966 Act starts with these words: "An Act to provide for regulating the quality of certain seeds for sale..." The new Bill removes the word "certain", and aims to regulate the quality of all seeds sold in the country, as well as exported and imported seeds."Currently, about 30% of seeds are what the farmer himself saves from his crop. He may re-plant that or sell it locally," said another senior official. He explained that of the remaining seeds which are bought and sold commercially, 45% come through the ICAR system and have gone through the mandated certification process. "The other 55% are sold by private companies, most of which are not certified, but rather what we call 'truthful label seeds'. That is, they are simply self-certified by the company. We want to remove that category with the new law and mandate certification through a proper lab process for all seeds," he said. "Truthful label seeds can be disastrous from the farmers' point of view, and should be removed," says Devinder Sharma, an agriculture and food policy expert. He has been engaging with the revised seeds legislation since it was originally proposed in 2004.

Centre Starts Registration for PM Kisan Maan Dhan Yojana

Agriculture minister Narendra Singh Tomar announced the roll out of the newly introduced farmers' pension scheme – Pradhan MantriKisanMaanDhanYojana (PM-KMY) – by enrolling 418 farmers on the first day. "The mega launch of this scheme will be done later by Prime Minister Narendra Modi. We expect to enroll 10 million farmers in the first year," he said. The government has budgeted Rs 10,774.50 crore for implementation of the scheme for the first three years starting this fiscal. Tomar said that the scheme, which is voluntary and contributory in nature, entitles beneficiary a monthly pension of Rs 3,000 on attaining the age of 60 years. "This scheme is open for small and marginal farmers in the age group of 18-40 years. Farmers will have to make a monthly contribution between Rs 55 and Rs 200, depending on the age of entry, in the pension fund managed by the state-owned LIC. The central government will also make an equal contribution of the same amount," he said. The government has a ready database of over 8 crore farmers who have been registered so far for the PM KISAN scheme which gives them direct income of Rs 6,000 annually in three equal instalments. "Beneficiaries of PM KISAN will have the option to allow their contribution directly from the benefit of that scheme directly. The initial enrolment of the scheme is being done through Common Service Centres where farmers will register their nomination along with self-attested land documents declaring that their land holding is less than 2 ha," Tomar said. Unlike PM KISAN scheme that is now open for all farmers irrespective of land holdings, pension scheme is for farmers owning less than two ha land. Also, the scheme is a voluntary and contributory pension scheme, with entry age of 18 to 40 years unlike PM KISAN scheme where there is no age bar. "We will reach out to PM KISAN beneficiaries for their enrolments. We will call them directly and would also ask state nodal officers of PM KISAN scheme to encourage them for the participation," he said. The scheme will have exit option also wherein farmers may get the entire contribution along with interest after five years of regular contributions.

Contract farming produce exempted from restrictions

Persons and firms engaged in contract farming agreements with farmers are exempted from the existing licensing and restrictions on stock limit and movement of foodstuff under the the Essential Commodities Act, 1955, a gazette notification has said. However, experts felt this is a piecemeal approach and will not do much to promote contract farming, which is almost non-existent in the country. The notification said the Removal of Licensing Requirements, Stock Limits and Movement Restrictions on Specified Foodstuffs Order, 2016 of the Essential Commodities Act is amended in favour of contract farming purchasers. Subsequently a new sub-clause was inserted, which read: "The provisions relating to stock limit under any order made under the Act shall not apply to a contract farming purchaser of any agricultural produce registered under any State Act made in this behalf, subject to the overall ceiling of registered quantity specified thereunder." It may be recalled that the Model Contract Farming Act passed in 2018 had promised to remove the restrictions on licensing, stock limits and movement of specific food products for those engaged in contract farming.

Nafed, FCI procure nearly 38 lakh tonne oilseeds and plses under PM-Aasha

Nafed and Food Corporation of India, among themselves, have procured nearly 38 lakh tonne of oilseeds and pulses under the flagship PM-Aasha scheme during both kharif and rabi seasons of 2018-19 crop year (July-June), as more and more farmers prefer to sell their crops to government agencies for getting the MSP benefit. According to official data, as high as 19.7 lakh tonne have been purchased during rabi crops of 2018-19 and 18 lakh tonne during kharif. But, the overall procurement by these agencies is about 45% of the quantity approved by the government, which implies that a lot more efforts need to be done to ensure farmers get the benefit of the minimum support prices, particularly when mandi prices are lower. Main rabi pulses and oilseeds include gram, mustard and masoor. Moong and urad, mainly kharif crops, are also grown in rabi season in some states. Odisha was the last state where the rabi season procurement ended on July 27 while in many other states it concluded in April. Nafed and FCI are the two agencies entrusted to procure pulses and oilseeds under the government's price support scheme. Once a state's request is received, the Centre approves procurement of pulses and oilseeds, up to 25% of the state's production. After the procurement, these agencies sell these commodities in the open market and the Centre bears the losses, if any. Haryana, Rajasthan and Madhya Pradesh are the only states where procurement of rabi pulses and oilseeds is over 50% of the quantity approved by the Centre. The procurement was 96% in Haryana. But in states like Maharashtra, Karnataka and Uttar Pradesh, it is abysmally low. In Maharashtra, the procurement was just 9% of the 2.5 lakh tonne approved while Uttar Pradesh saw 0.5% of 5.2 lakh tonne sanctioned. Karnataka was a non-starter with just 33 tonne purchased under MSP out of 1.3 lakh tonne approved. The number of farmers who avail MSP benefits has been increasing every year as more and more become aware, experts said. It also indicates that fixation of higher MSPs has not automatically resulted in improving the mandi prices at the benchmark levels, they said. During kharif season of 2018-19, as many as 13.4 lakh farmers had sold their oilseeds and pulses crops at MSPs to the official agencies while 9.4 lakh were benefitted during rabi season.

Govt promotes agri allied sectors to double farm income

The Government admitted in Rajya Sabha that doubling of farm income by 2022 was not possible with the current rate of growth in the agriculture sector, and said it was trying to promote allied sectors to achieve the target. During the Question Hour, SP member Ram GopalYadav said going by the present growth rate of 4 per cent in the agriculture sector, it was not possible to double the farmers income by 2022. Replying to supplementaries, Minister of State for Agriculture PurshottamRupala said, "We agree with Ram Gopalji's query that it was not possible to double farm incomes with the current growth rate in agri sector." He said the raising of farm income was not possible with growth in only one sector, but the government was making efforts to promote allied sectors of agriculture and that will aid in helping double the farm income. Rupala also informed the house that the government was making efforts to increase the clusters under organic farming and was giving them various incentives. "We are running 20 centres for promotion of organic farming.... We have set a target of setting up 1 lakh clusters of organic farming in this Plan," he said.

Govt raises subsidy for non-urea fertiliser, to cost Rs 22,875 cr in FY20

The Government hiked the subsidy on a non-urea fertiliser, sulphur, a move that would cost the exchequer Rs 22,875.50 crore in this fiscal. A decision in this regard was taken at the meeting of Cabinet Committee on Economic Affairs (CCEA) headed by Prime Minister Narendra Modi. "The CCEA approves NBS rates for Phosphatic and Potassic (P&K) fertilizers for the year 2019-20; expected expenditure during 2019-20 to be Rs 22,875.50 crore," Information and Broadcasting Minister Prakash Javadekar told media after the meeting. The subsidy for Nitrogen has been fixed at Rs 18.90 per kg, Phosphorous at Rs 15.11 per kg, Potash at Rs 11.12 per kg and Sulphur at Rs 3.56 per kg for the current fiscal, he said. This will help in promoting balanced use of fertilisers, the minister added. In 2010, the Government had launched the nutrient-based subsidy (NBS) programme under which a fixed amount of subsidy, decided on an annual basis, is provided on each grade of subsidised phosphatic and potassic (P&K) fertilizers, except for urea, based on the nutrient content present in them.

Loans to agri sector see sharp rise in NPAs

In what could be a major cause of concern about the rural economy and health of banks, bad loans in the agriculture sector are on the rise with a marked increase in fresh slippages in some banks. Going by the first quarter numbers of banks, an increase of up to 3 per cent is seen in non-performing assets (NPAs) under this portfolio on a year-on-year basis, as well as sequentially, with individual variation among banks. State Bank of India (SBI) registered a 13.08 per cent rise in NPAs as on June 30, 2019, against 11.60 per cent in the same period last year. The increase was more when compared to the June 2018 and June 2017 period. Fresh slippages almost doubled in the first quarter of this fiscal at Rs 4,239 crore, against Rs 2,560 crore in the year-ago period. For Canara Bank, NPAs in total agricultural advances surged to Rs 5,261 crore (Rs 4,136 crore) at 5.7 per cent of gross advances. A noteworthy feature is the increase in bad loans even when there was little or no increase in agricultural lending in the last one year. In Allahabad Bank, for instance, agri advances decreased by 0.25 per cent in June 2019. But fresh slippages in the agricultural sector were at Rs 1,127 crore, representing 38.5 per cent of total slippages. As a percentage of gross credit, NPAs had gone up to 2.47 per cent in the first quarter of the current fiscal, from 1.11 per cent in June 2018. The same is the case with Bank of India. Even though agricultural advances decreased by 0.28 per cent, agri NPAs surged to Rs 9,603 crore from Rs 6,557 crore. Some private sector banks are also not immune to the trend. At ICICI Bank, of a total retail slippage of Rs 1,511 crore during the first quarter, the Kisan Credit Card portfolio has a slippage of Rs 452 crore. A senior official with ICICI Bank attributed the stress in the Kisan Credit Card portfolio to farm loan waivers. “There has been stress mainly from the farm loan waiver schemes, which have been announced in various States,” he said. A top executive with SBI, too, concurred by saying: “The recent elections and loan waiver schemes, or expectations about them, have destroyed the credit culture in an otherwise normal repayment culture.” Interestingly, there is a dichotomy. On the one hand, schemes such as PM KisanSamman and RythuBandhu in Telangana have been handing out sops to farmers under income support schemes, but on the other hand, there has been a surge in bad loans.

2 crore farmers to be enrolled for PM’s pension scheme by Aug 15

The Union Government has set a target of enrolling two crore small and marginal farmers under its “Pradhan Mantri Kisan Maan-Dhan Yojana” (PMKMY) — a pension scheme — by the forthcoming Independence Day, and has roped in the Common Service Centre (CSC) for the job. “I have asked all village- level entrepreneurs, who run over 2-lakh CSCs in villages across India, to register at least 100 small and marginal farmers by August 15, 2019, said CSC CEO Dinesh Tyagi. The PMKMY was launched by Agriculture Minster Narendra Singh Tomar here on last Friday. The Central scheme, which was announced in the Budget 2019-20, envisages a monthly pension of Rs3,000 to eligible farmers on attaining the age of 60.

Crop insurance for Rs 12k cr taken in 2019

The topic of crop insurance was discussed in the Gujarat assembly for 48 minutes on Monday, making it the longest time given to any single topic this session. Stating that the government has already made representation to the Centre for setting up a corpus fund for crop failure compensation, chief minister Vijay Rupani said that for the year 2019, the state government has purchased crop insurance for Rs 12,000 crore sum insured. The CM was replying to a question raised by Danilimda MLA ShaileshParmar. The debate heated up when Parmar said that in the last two years, 2017 and 2018, companies offering crop insurance to the government have made net savings of Rs 2,351.05 crores from a premium of Rs 5,454 crores, while only Rs 3,104.95 crores have been paid to farmers. The chief minister was quick to point out that insurance is paid out only in case of crop failure. He highlighted that even in cases of vehicle insurance or term life insurance, the premium lapses if there is no loss to the vehicle insured, or if nothing happens to the person insured. During the discussion, Parmar also said that against a premium of Rs 2,785.40 crore paid to insurance companies in 2017, the companies have only paid Rs 1,054.75 crore as crop insurance to the famers. Admitting that there have been some complaints and discrepancies in paying crop insurance, Rupani said “We in the government have made representation to the Centre for permitting the state to set up a corpus fund from which the farmers could be compensated for loss. The fund can be used when there is crop failure. However, the central government is considering the demand from a larger perspective keeping in view other states too.” Leader of opposition PareshDhanani submitted that instead of paying huge premiums every year to private insurance companies, the state government should in fact divide the amount equally among all farmers in the state and the same should be deposited into the accounts of the farmers directly.

Farm loan waiver, new houses, rent for flood victims: CM Fadnavis

Loan waiver for farmers, new houses for those who lost their dwellings built under the PM Awas Yojana in deluge and free foodgrains are among the slew of relief measures announced by the Maharashtra government for the people affected by the recent floods. Heavy rains and floods battered several areas of western Maharashtra and the Konkan region earlier this month, with Kolhapur and Sangli districts bearing the maximum brunt. At a press conference in Mumbai, CM Devendra Fadnavis said a committee will ascertain causes for the unprecedented floods and suggest measures to avoid their recurrence. "The farmers who have lost crops on up to one hectare will get complete loan waiver," he said.

Farm lending process needs an overhaul: SBI chief

State Bank of India Chairman Rajnish Kumar said that the present model of agricultural lending in the country was not "viable" and needs an "overhaul". The high level of non-performing assets (NPA) in farm sector is an issue. SBI had registered slippages to the tune of Rs. 16,000 crore during the April-June 2019 quarter. The retail sector, particularly, agricultural advances, accounted for a bulk (nearly 69 per cent) of the total slippages at around Rs. 11,000 crore. Fragmented landholdings make agricultural lending unviable. FPOs or Farmer Producer Organisations can help dealing with the problem of landholding, he added. "These issues are being discussed with an open mind. Once these consultations are over we should be able to come up with a blueprint," he said. According to Kumar, credit growth has been muted primarily because of demand side constraints. "Credit demand as of now is subdued but there is no supply side constraints. Banks are adequately capitalised, interest rates have moderated and the system has surplus liquidity," he said.

Banks want longer repayment tenure for Kisan Credit Card loans

In view of significant stress in the agriculture sector, bankers have suggested enhancing the repayment cycle of loans under KCC (Kisan Credit Card) from 12 months to 36 or 48 months at the state level bankers' consultancy meet in West Bengal. Further, there were also deliberations on allowing farmers to take fresh loans even if they fail to repay earlier ones, as long as they service the interest.Based on the direction from the Department of Financial Services, public sector banks started a three-stage consultation process last week, with focus on nine issues, including digital banking, credit to MSME and agriculture sectors, direct transfer of benefits, education loans, among other issues. While last week was a intra-bank meet, this week banks are doing interbank meetings at the state level to discuss the key issues that transpired at the branch level meeting. There were also suggestions to have agriculture credit guarantee scheme, and a stronger institutional network to prevent multiple lending in the agriculture sector. Some of the suggestions at the branch level also included the need to press the government for digitization of land records, failing which there were instances of multiple borrowing. Bankers have also suggested the need to have a credit guarantee mechanism for The Pradhan Mantri Mudra Yojana (PMMY), the government's flagship credit scheme for micro and small enterprises, and source another big chunk of NPA for banks. Among other suggestions, the need for cyber security to promote digital transactions was also discussed.

Govt to scrap 61 of 209 incomplete irrigation schemes in State

The irrigation department has decided to pre-close 61 of the 209 schemes, including some major ones, which have remained incomplete since years. Work on some of these schemes had begun nearly 10 years back, although the progress so far has been pathetic – in some cases as low as 5 per cent. Around 526 schemes were taken up under the Accelerated Irrigation Benefit Programme between 2008-9 and 2013-14. The programme was launched in 1996-97 and under it 90 per cent Central assistance of project cost for ongoing and new schemes was given to the northeastern States. A recent review by the department revealed that 209 of the schemes – amounting to over Rs 400 crore – are still "ongoing" and incomplete. At least 20 to 30 such schemes are 10 years old. The minor schemes were to be completed within three years and the major ones in five years. "After a thorough scrutiny, we have decided to pre-close 61 of the schemes. In some of these schemes there is no source of water, in some there are land acquisition problems and in a few feasibilities are questionable. It appears that no proper study was undertaken while preparing the schemes," an official source told The Assam Tribune. Laxity on the part of officials and contractors' inefficiency were the other reasons for the failure of the schemes. Crores of rupees have been put into these schemes. The amount wasted has not yet been estimated, but in some schemes it can be said that up to Rs 15 crore were spent. "In some schemes, the progress has been as low as 5 per cent. There is no use in putting more money into such schemes," he said.

Heavy rains push plantations in Kerala deeper into trouble

Nature seems to have dealt another blow to the fortunes of Kerala's plantations just when the sector was recouping from last year's deluge and the drought that followed. The current spell of rains lashing the State, including the high ranges, has caused landslides in many places such as Munnar and Wayanad affecting plantation crops, especially tea and cardamom. Kanan Devan Hills Plantations Company (KDHP) — which owns majority of tea plantations in Munnar covering seven estates— is anticipating 20-25 per cent crop loss due to the 18-19-inch downpour. The high intensity rainfall will impact production during August-September, a senior company official said. He attributed the erratic weather pattern that has resulted in extended drought, frost, poor distribution and heavy spells of rainfall in the high ranges to climate change. It will impact production, he said. In Munnar, at Wentworth and Vandiperiyar estates of Harrisons Malayalam, plucking has been temporarily stopped due to power supply disruption. There has been no production in the last few days, company CEO VenkitaramanAnand said. Ajith BK Secretary, Association of Planters of Kerala, estimated that landslides have have affected large plantation areas forcing companies to close down estates. A detailed report on the losses is awaited. According to the plantation sector, losses during last year's floods had amounted to 3,300 crore and the sector was yet to make up them up. The current floods would not only delay the recovery but also aggravate the financial crisis in the sector, he said. According to SadasivaSubramaniam, Secretary, Kerala Cardamom Growers Association, inundation in several low-lying areas has affected the cardamom crop in Vandanmedu. Productive plants in some areas have been totally damaged and the situation is expected to be worse than in the previous year. Normally, Vandanmedu, Kerala's cardamom belt, receives 30 cm of rain in one monsoon month. But the region received the entire quantity in just 24 hours during the current season, he said.

Saffron Yield Drops on Kashmir's Woes

Yield from Kashmir's famed saffron fields has dropped sharply and officials say it is in large part due to political instability in the state and mismanagement by authorities. Data from the Jammu & Kashmir agriculture department shows that the average saffron yield in the state dropped to 1.7 kg per hectare (ha) in 2018-19 from 2.7 kg in 2010-11. The area under saffron cultivation, too, went down during the period, falling from 3,715 ha in 2010-11 to 2,462 ha in 2018-19, leading to a drastic fall in output. This was despite the central government announcing aRs 400-crore fund in 2010 for development of saffron cultivation in the state under the National Saffron Mission. "State governments over the last 10 years made a mess of saffron cultivation. We launched a mission to boost saffron production, but neither fund was properly utilised nor expertise. The mission, which was initially for 2010 to 2014, has been extended till 2020. But (there's) not much success," a senior agriculture department official, said. Kashmir is the world's second largest producer of saffron, the world's most expensive spice which can fetch anywhere between Rs 1.5 lakh and Rs 2.25 lakh a kilo. Iran, with over 60,000 ha under saffron cultivation, accounts for 90% of the world's total output of the commodity. Saffron is cultivated in June-July and it starts flowering in October. The plant needs extreme heat and dryness in summer and extreme cold during winter. According to official data, so far only Rs 235.69 crore has been released under the National Saffron Mission, which is less than 60% of the total project cost.

HP farmers turn to maize as erratic monsoon casts shadow on crops

Much of farming in this Himalayan state, in common with the rest of India, is rainfed. This is particularly important as 66% of the population of the state is dependent on agriculture. According to the latest report by the State Centre for Climate Change, an abnormal pattern of rainfall—an effect of climate change—over the past few years has caused "great fluctuations" in crop production. Rainfall has been uneven across districts, said the report, Impact of rainfall on agriculture in HP. While wheat yields have been affected by high maximum and minimum temperatures, some areas under rice crop have been diverted to maize crop due to irregular rainfall. "It is slow, but the transition has begun, especially in areas where the rainfall has seen a gradual decline," said R.S. Rana, principal scientist of the Himachal Pradesh Agricultural University, Palampur. "About 3,400 litres of water is required for sowing 1kg of rice here, while maize requires only 1,200 litres. There is a need to shift from water-intensive crops and maize offers the way, especially in Himachal, which is most suited for such cultivating through terrace-farming," said Rana. The area under maize has increased from 298,000 hectares to 356,000 hectares between 2001 and 2012, while that under rice has shrunk from 8.15 million hectares to 7.67 million hectares, according to government data. "Farmers are switching to hybrid varieties that are climate-resilient. As a result, their productivity has increased and they are slightly enthusiastic about planting maize," said S.K. Guleria, principal scientist (maize breeding) of the Hill Agricultural Research and Extension Centre in Bajaura near Kullu. The plant offers farmers the additional benefits of facilitating sowing of black-eyed pea and soya bean alongside, as it is widely spaced at 60cm. A recent study published in the journal Environmental Research Letters said reliance on a single crop such as paddy can hit India's food security. Irrigated rice yields may decrease by 7% in next 30 years, according to a recent assessment by the Indian Agricultural Research Institute in New Delhi. Himachal has long been known for its maize. People in Chamba district used to worship maize during MinjarkaMela in July. Eating habits have changed. However, now we need to revert to our old practices," said Rana. "Climate-resilient agriculture is the need of the hour. The sooner we adapt the better."

Floods ruin crops in Maharashtra

The floods in Maharashtra have affected agriculturally prosperous areas around Nashik, Pune, Kolhapur and some parts of Vidarbha. The extent of damage to the crops such as sugarcane and paddy is yet to be ascertained as the fields are still flooded. As many as 115 people were rescued from flooded areas in Baner area of Pune by the National Disaster Response Force (NDRF). Earlier the India Meteorological Department had issued high alert warning for the Pune district. Major dams in Pune such as Khadakwasla, Pavana and Mulshi had to release water into the Mula, Mutha and Pavana rivers, which has further worsened the flooding in some areas. Reports are still being collated about the extent of flood damage to the paddy crop in Gadchiroli district.

Odisha government's scheme for farmers runs into rough weather

The Odisha government's much-hyped Krushak Assistance for Livelihood and Income Augmentation (KALIA) scheme has gone haywire. The authorities are now facing a gigantic task of removing bogus beneficiaries who have already availed of the benefits. A total of 51 lakh cultivators, loanee and non-loanee farmers, sharecroppers and landless agricultural labourers have been provided with financial assistance under the scheme so far. The authorities have now found out that all beneficiaries were not entitled to the benefits under the scheme and have asked the ineligible people to refund the money. Chief Minister Naveen Patnaik had launched the scheme ahead of the simultaneous Lok Sabha and Assembly elections held in April and May. He had assured that no eligible beneficiary would be left out of the scheme. The State government, which had increased the target of KALIA beneficiaries to 75 lakh families, has stopped disbursement of financial assistance following the revelation about bogus beneficiaries. It is now busy verifying the genuineness of each and every beneficiary and has extended the deadline of the verification process from August 14 to August 27. According to official sources, out of the 51 lakh existing beneficiaries, the verification of 13 lakh of them was completed till Tuesday and 70,000 were found to be ineligible. The number of bogus beneficiaries is likely to increase since more than one member of a family have managed to get assistance. In a majority of blocks, the number of applicants have outnumbered the number of ration card-holding families. A total of 54,000 applications were received for inclusion under KALIA from one block in Jagatsinghpur district while the total number of ration cards issued in the block stood at 23,000 only.

India Likely to Miss Sugar Export Target this Season

India is likely to miss the target of exporting 5 million tonnes of sugar, which was expected to reduce the glut in the market, as it has shipped out only 3.4 million tonnes with barely two months left in the current season that ends on September 30. "Another one lakh tonne can be shipped out this season making it 70% of the total target set by the government. Higher production cost and weak global prices restricted the exports. Even incentives offered by government could not help match the global prices," said an industry expert, on condition of anonymity. The government has offered flurry of incentives this year to boost exports amid sugar glut which included transport subsidies of between Rs 1,000 a tonne to Rs 3,000 a tonne to sugar mills, depending on the distance to ports. The industry aims to export 7 million tonnes of sugar in the coming season amid possibility of shortage of global supply. "In the current season, there is net global surplus of 2 million tonnes. So, the prices are weak and we are not able to export the targeted 5 million tonnes. But in the next season, there is likely to be a gap of 4 million tonnes between demand and supply making exports lucrative," said Abinash Verma, director general of ISMA.

Pulses Prices Drop 10% over Imports

Arrival of imported pulses from Africa and Myanmar at Indian ports has led to a 5-10% fall in their prices in the past one week, said traders and millers. The supply will peak by end-August and the start of September, keeping prices weak during the festive season, they said. Pulses are a key ingredient of snacks and sweets, and their demand increases around the festive months of September and October. India has allowed import of 4 lakh tonnes of tur and 1.5 lakh tonnes each of moong and urad by processors till October 31, to avoid any shortages in the festive season and ensure that prices remain stable.

Poor Response to MMTC Tender Delays Maize Imports

India's poultry industry is worried about delays in maize imports by the state trading agency MMTC, which received a poor response overseas to its tender for buying 50,000 tonnes of the fowl feed. Of the total 1lakh tonne import of maize allowed by the government, the remaining 50,000 tonnes will be bought by another state agency Nafed, and the consignments are expected to land in about 3 weeks. India has allowed imports of 1 lakh tonne of maize during 2019-20 under tariff rate quota (TRQ) system. Industry sources said that Nafed's imports were hassle-free and faster as the agency has an online tendering process, which is not the case with MMTC. Although the area sown under maize in the kharif season is good, there are concerns about the crop size due to lingering risks from the fall army worm (FAW) pest and skewed rainfall. "Due to shortfall in production of maize and also due to skewed import of maize, many small and medium poultry farmers in Karnataka and other states are in distress, thus affecting production of poultry," said Akhilesh Babu, president, Karnataka Poultry Farmers and Breeders Association (KPFBA). "MMTC has not received the expected response from global suppliers for the tender floated, thus adding to the stress levels of farmers." "A few big players have also applied for import of maize in large volumes. The KPFBA fears that the big players may get all the maize, leaving nothing for the small and medium poultry farmers," said Babu, whose association wants centralised maize imports to be prioritised.

Iran is hot favourite for Indian cotton exporters

Amid slowing raw cotton exports in recent months, India has seen sharp jump in cotton demand from an unexpected buyer, Iran. After many Western nations imposed trade sanctions on it, Iran's cotton purchases from India has gone up multiple times in recent months. Going by the DGFT data, India exported 15,877 kg raw cotton (HS Code 52010015 of staple length 28.5 mm and above but below 34.5 mm) during the year 2017-18. Cotton exports to Iran reported a phenomenal jump of 1070 per cent to 1.85 million kg during 2018-19. The reason was favourable payment terms in rupee denomination and higher demand. As per the latest data, during the April-June period of 2019-20, India exported 5.03 million kg of raw cotton to Iran, up 813 per cent on year-on-year basis. Besides Iran, Oman is the only country where a growth in export is reported during the period. India exported 1.98 million kg of raw cotton to Oman during the first quarter of this fiscal, up from a nominal 0.02 million kg in the same period last year. Recently, Union Textiles Minister Smriti Irani had informed Parliament that India's cotton exports were reported at 44.64 lakh bales till April 30, 2019. According to CAI estimates, exports for the season ending September 2019 will hover at 46 lakh bales, which are lower by 23 lakh bales compared with the previous year's cotton exports estimate of 69 lakh bales.

Cotton Prices Take a Hit over Trade War Woes

In the ongoing trade war between China and the US, cotton prices have taken a hit of more than 32% in the international market in the past one year. During the last business session on MCX on Friday, the August contract closed at Rs 20,060 per bale (Rs 170 kg) with a 2.48% or Rs 510 fall over the previous session.

Indian Tea Faces Tough Fight Overseas from African Variety

Indian tea is facing a tough competition from African teas in the UK, European Union and Pakistan as prices of the beverage crop grown in that continent have declined significantly. Kenya tea prices have fallen 22% in a year and the Uganda crop is cheaper by 36%. Oversupply has caused the prices of African teas to fall to five-year lows. "This is impacting Indian tea exports as we cannot offer teas at prices lower than the Africa crop," said Vivek Goenka, chairman, Indian Tea Association. "Our cost of production is high and if we try to export teas at a lower price, we will face losses." Export of Indian teas in the first six months to the UK has dropped 35.43% and 31.16% to Pakistan. In EU, the drop is to the tune of 5%. The industry is also worried about low CTC tea prices. CTC is the most common black tea sold locally. "Prices are not picking up for CTC teas. The Tea Board is working on a plan to boost tea prices through modification of the auction system," he said. The Tea Board is working on a plan to modify the auction mechanism to help boost tea prices, enable sellers to reach out to a larger buyer base, and improve the quality of tea. The board is acting on the recommendations of IIM Bangalore, which was appointed by it to come up with suggestions to improve local tea pricing. It has recommended introduction of Japanese auction mechanism in tea, which is equivalent to ascending auction. Other recommendations are robust quality certification through a neutral party, re-designing of catalogue with no indication of valuation, standardisation of lot sizes, and elimination of divisibility of lots.

KAU develops fertiliser from human hair

Proper disposal of human hair waste has been a daunting problem for beauty parlours and salons. For K Mohankumar, proprietor of a waste management society at Attingal near Thiruvananthapuram, it is a source of wealth, thanks to the technology transferred to him by the Kerala Agricultural University to produce liquid fertiliser from human hair waste. KAU successfully developed a technology to treat human hair with a combination of chemical and thermal treatments. The hair samples were degraded using chemical agents with the combined application of heat, followed by neutralisation. The black solution received after the process with milder odours was found to be an effective supplement for leafy vegetables with high concentration of nitrogen, phosphorous and potassium. Mohankumar, president of the Kasargodu Social Service Society, which carries out waste management in Attingal, obtained the technology from KAU. He has started producing one litre of manure from 20 gm of hair on a trial basis. "We are collecting around 5-6 kg of human hair daily as part of waste collection in Attingal town and convert it into liquid manure at the mini lab set up in the town. We have asked salons to segregate used blades from hair waste before handing it over to our collection agents," he said. D Girija, Professor, Agricultural Microbiology, KAU, who spearheaded the research work, said the concentrated solution obtained from hair samples was standardised to be applied to the crop after diluting it with five-fold amount of water. The product, when applied to okra crop on the KAU campus, increased the vigour of the plant, height as well as yield of the crop. The KAU technology, which is currently under evaluation by various government agencies, is awaiting approval for commercial production of human hair fertiliser. This technology or its slightly modified version could possibly help convert poultry feather waste, animal fur and other similar materials also into fertiliser, she added.

New farm pests emerging as a food-security threat, maize yield hit

Global farm threats are knocking on India's doors in the form of newer pests, some of them voracious crop-destroyers that can roil farm production and farmers' incomes, prompting officials to call for stricter quarantine checks for biological imports. Among a flood of new pests that has emerged over the past couple of years, one has been super-invasive and the most threatening: the fall armyworm. The worm, cited by the UN Food and Agricultural Organisation (FAO) as a "food security nightmare", has cut maize yields by up to 30% in key producing states such as Karnataka, Andhra Pradesh, Bihar, Maharashtra and Telangana, experts said. The pest has spread rapidly across states after being first spotted in July 2018 in three maize hubs of Karnataka: Hassan, Bellur and Shimoga. "It's breaching new frontiers," said AN Shylesha of the National Bureau of Agricultural Insect Resources. The only region so far free from infestation – food bowl states in northwest India – is being fast raided by the worm, which can travel thousands of kilometers aided by winds alone. Shylesha said several new pests had appeared in India over the past couple of years, which he attributed to increasing trade in biological materials and global travel. These include the coconut-destroying spiraling white fly, the erlophyld mite, which attacks many crops, the woolly apple aphid, the berry borer beetle that drills into coffee, tutaabsoluta, which eats tomato plants, and the papaya-munching mealy bug. Shylesha and his team were in Kathmandu this week to help the country secure its farms since the pest has devoured maize crops in the Himalayan country too. "Maize farmers who have reported incidence of infestation by this pest have cited yield losses of up to 30%. In Karnataka, the losses have been reported to be 30%, while in Andhra Pradesh, up to 27% losses," said BhagirathChoudhary, director of the South Asia Biotechnology Centre (SABC). India produces over 20 million tonne of maize annually and the crop is a major source of farm income.

Kerala farm varsity offers tree-turmeric seedlings

Kerala Agricultural University has developed a germination technology to produce seedlings of maramanjal (tree turmeric), a medicinal plant. A large number of a year-old polybag seedlings of the plant have been made ready for cultivation. Called daruharidra in Sanskrit and daruhadi in Hindi, the root and stem of tree turmeric have excellent antibiotic and antiseptic properties. Tree turmeric, which belongs to Menispermaceae family and botanically known as Cosciniumfenestratum, is native to the natural evergreen forests of South India. Highlands with relatively high humidity and shade are ideal for its growth. Its root and stem are widely used in various Ayurvedic, Unani, Sidha as well as traditional medicinal preparations for the treatment of diabetes, skin diseases, jaundice, wounds and ulcers. Its stem is used to treat snake bites. Berberin contained in the plant is the active ingredient that gives it the medicinal properties. Rated as one of the largest trading medicinal plants from the tropical forests, almost 80 per cent of tree turmeric plants in South India have been lost. Realising the medicinal and commercial potential of this endangered species, KAU has taken up conservation-oriented research work on the flowering, fruit setting, seed viability and dormancy of tree turmeric.

Researchers find 'intriguing' trends in monsoon rainfall

Researchers from IIT Madras and IIT Bombay tracking monsoon rainfall pattern in India over the past century have come out results which they described as "intriguing and contradictory to common belief." These insights are critical not only for understanding geographic variations in seasonal rainfall, but also for framing long-term water management policies of the country, they said. The work has been published in the peer-reviewed journal PLOS. The research team comprised first author Subimal Ghosh and SubhankarKarmakar from IIT Bombay, and KS Kasiviswanathan, KP Sudhir and SachinGunthe from IIT Madras, along with their research students. Supported by the Max Planck Partner Group at IIT Madras, Department of Science and Technology, and Union Ministry of Earth Sciences, it analysed countrywide rainfall data over the past century to find trends and variations. The team warned that recent observations that monsoon has grown more unpredictable than before bodes ill for a country whose societal and economic well-being is critically linked to seasonal rains. Extreme events such as the floods in Kerala and the ongoing zero-water situation in the adjoining Tamil Nadu stand testimony to the recent vagaries of the Indian summer monsoon.

Assam tea sets record, scales Rs75,000 a kg

This is a new international record, bettering the previous high of Rs70,501 a kg less than a fortnight ago. A kilogram of 'Golden Butterfly tea' struck gold at the Guwahati Tea Auction Centre (GTAC) on Tuesday, when the Assam tea was sold at Rs75,000. This is a new international record, bettering the previous high of Rs70,501 a kg less than a fortnight ago. Growing demand for speciality tea helped the 'Golden Butterfly tea' surpass the earlier record by Rs4,499, GTAC said in a statement. The hand-crafted tea, made from tender leaves and buds available only around June-July, was produced by Dikom Tea Estate near eastern Assam's Dibrugarh town. Dinesh Bihani, secretary of the Guwahati Tea Auction Buyers' Association, said the tea was bought by one of the oldest tea trading firms that had also bought it at a premium at GTAC last month. "Speciality tea is setting records, riding on demand," he said. "This will encourage quality tea producers to sell it through the auction centre," he added.

HORTICULTURE
ADDING NUTRITION AND INCOME

Food grain production was the top agenda of the Indian government soon after independence. While that mission was accomplished rather spectacularly owing to various conducive policies and green revolution, India has endeavoured upon another journey where astounding results have been observed. India has started to witnessed voluminous increase in horticulture production over the last few years. The better incomes and the increasing demand from the sizeable financially stable population have spurred this transformation.

RISE OF HORTICULTURE

Horticulture has emerged as one of the potential agricultural enterprises and has played a significant role in accelerating the growth of Indian economy. It has also played a stellar role in ensuring nutritional security, poverty alleviation and employment generation. Besides being a major avenue of diversification, they feed many agro industries that are modes of agri-entrepreneurship, rural employment and income generation.

India's horticulture production has grown at a phenomenal pace - Indian farmers now produce more than double the quantity of fruits and vegetables compared to what they did in early 2000. Data shows that between 2001-02 and 2016-17, horticulture production rose from a mere 146 million tonnes to 295 million tonnes. During this period, production of foodgrains grew from 213 million tonnes to 273 million tonnes, showing the growing importance of short duration horticulture crops for Indian farmers. Production of horticulture crops such as fruits, vegetables and spices hit a record breaking 300 million tonnes in the growth year of 2016-2017, massively overtaking production of food grains for the fifth consecutive year.

India's horticulture production has grown at a phenomenal pace - Indian farmers now produce more than double the quantity of fruits and vegetables compared to what they did in early 2000

The horticulture crops were grown in less than 5 per cent of India's gross cropped area, compared to 63 per cent used to grow foodgrains. Maharashtra is the largest producer of fruits in India, while West Bengal is the second largest producer of vegetables. While Gujarat grows most amount of spices, Tamil Nadu tops the list of states in the production of flowers.

At present, horticulture contributes 24.5% of GDP from 8% land area. India's diverse climate has ensured cultivation of all varieties of horticulture crops. Fruits and vegetables account for nearly 90% of total horticulture production in the country. India ranks second in fruits and vegetables production in the world, after China. As per National Horticulture Database published by National Horticulture Board, during 2015-16, India produced 90.2 million metric tonnes of fruits and 169.1 million metric tonnes of vegetables. The area under cultivation of fruits stood at 6.3 million hectares while vegetables were cultivated at 10.1 million hectares.

India is the largest producer of ginger and okra amongst vegetables, and ranks second in production of potatoes, onions, cauliflowers, brinjal, Cabbages, etc. Amongst fruits, the country ranks first in production of Bananas (25.7%), Papayas (43.6%) and Mangoes (including mangosteens and guavas) (40.4%).

Besides the conventional fruits, India has also experimented with others. The arid zones of the country are potential areas for fruits like aonla, ber, pomegranate, annona etc. There has been a steady increase in the area and production of these fruits particularly aonla, ber and pomegranate in the country as a result of identification and development of suitable varieties and production technologies. In addition to these, date palm and fig cultivation is also finding favour in suitable areas. There are a large number of indigenous fruits such as jackfruit (*Artocarpusheterophyllus*), jamun (*Syzigiumcumini*), bael (*Aeglemarmelose*), kamrakh (*Averrhoacarambola*), phalsa (*Grewiasubinaequalis*), wood apple (*Limoniaacidissria*) mulberry (*Morusalba*) and Lasooda (*Cordiamixa*). These fruits have diverse uses, besides being hardy and well adapted to different agro-climatic conditions and stress situations. In recent years, olive and kiwi fruits have been successfully introduced in the temperate areas of Jammu and Kashmir, H.P. and U.P. Other useful introductions have been kinnow mandarin and low chilling varieties of pear, peach and plum, which have become very popular in the sub-tropical zone of northern plains. A number of tropical, sub-tropical fruits like avocado, macademia nut, mangosteen and rambutan though introduced in the country have yet to be commercially exploited. There is also need to give priority to nut fruit production, e.g. almond, walnut, pecan nut and pistachio nut in suitable areas in temperate regions of the country. Being low volume, high value crops having a long shelf life, these nuts will find favour with farmers in Jammu and Kashmir, Himachal Pradesh and Uttaranchal particularly in far flung areas.

The country's total horticulture production is estimated to rise marginally to 314.87 million tonnes in the 2018-19 crop year, according to the Second Advanced Estimate (2018-19) of area and production of various horticulture crops released by the agriculture ministry, as compiled from information received from different state/ UTs and source agencies. Horticulture production stood at 311.71 million tonnes in the previous year.The area under horticulture crop also rose to 25.6 million hectare from 25.43 million hectare. Under the horticulture crops, production of fruits is estimated to be around 97.38 million tonnes in 2018-19 compared to 97.36 million tonnes in the previous year. Vegetables production is estimated to rise 1.6 per cent at around 187.36 million tonnes. Among vegetables, onion Production is estimated to be around 23.28 million tonnes, slightly higher than production in 2017-18. Potato production is estimated to be around 52.96 million tonnes, which is 3.2 per cent higher than 2017-18. Tomato production is estimated to be around 19.66 million tonnes, which is 0.5 per cent lower than 2017-18. As per the data, spices Production is estimated to be around 8.61 million tonnes, which is 6.01 per cent higher than 2017-18.

HI TECH HORTICULTURE

With relevance of horticulture increasing in Indian economy, the sector has seen many sweeping changes.Though cost intensive, many Hi-Tech technologies have become indispensable for horticulture development in recent years.'Hi-tech Horticulture' involves the deployment of

technology, which is modern, less environment dependent, capital intensive and has the capacity to improve the productivity and quality of horticultural crops.

Genetic Modification can be adjudged as a very promising technology that can fulfil the existing challenges of yield stagnation, biotic and abiotic stress. World over, existing advancements have been made. India too had embraced this technology, albeit gingerly. So far, commercially only Bt cotton is cultivated in India. Research in other crops are being pursued. However, currently the policy and political environment are unfavorable for the acceptance of GM technology.

Micro-propagation is perhaps the most popular and widely commercialized global application of Plant Biotechnology in horticulture. Micropropagation is well-known as a means of producing millions of identical plants ('clones') under aseptic conditions, in a relatively short period of time, independent of seasonal constraints. An added advantage is production of pathogen-free planting materials. Propagation of plants through tissue culture, including sophisticated techniques of meristem culture and molecular indexing of diseases, are of immense use in making available healthy propagules. The global biotech business is estimated at around 150 billion US dollars. Around 50-60% of this constitutes Agribusiness. The annual demand of tissue cultured products constitute nearly 10% of the total, amounting to 15 million US dollars. The estimated annual growth rate is about 15%. Among the developing countries, India is in an advantageous position to exploit this market. There are about 130 small, medium and large tissue culture units in India. Their combined installed capacity is around 300 million plantlets per annum. However, not all units are functioning at their full production potential, with a combined capacity utilization of 25-30% only. As a result, many of the units have become non-viable. Some of the problems encountered by the Indian micropropagation industry are long gestation period; non-availability of skilled operators; high overhead costs; systems development needed for each new cultivar; problems of scaling up; genetic instability; greenhouse design and management expertise scarce; overproduction of a number of classical crops; difficulties in penetrating new markets; poor market intelligence and expertise; export bottlenecks and poor domestic base.

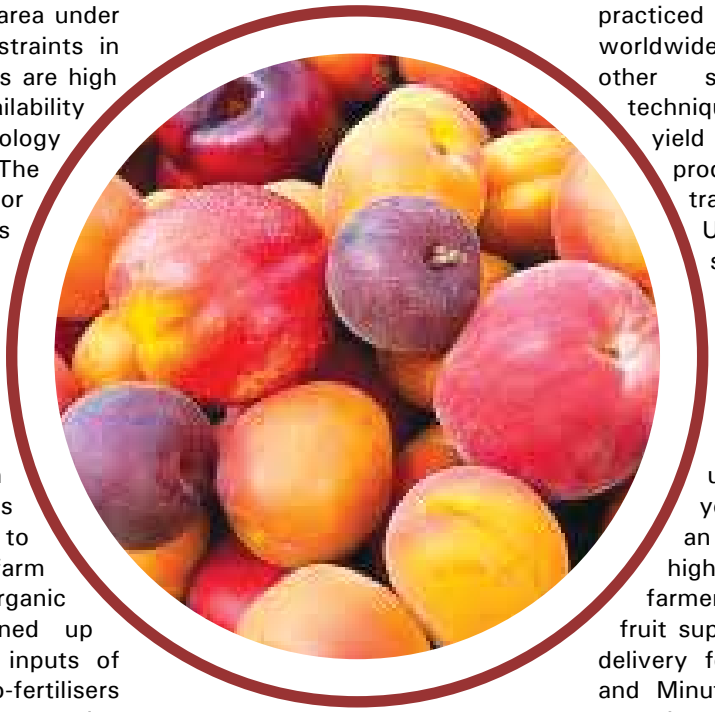
The annual demand of tissue cultured products constitutes nearly 10% of the total, amounting to 15 176 million US dollars. The estimated annual growth rate is about 15%. Among the developing countries, India is in an advantageous position to exploit this market

Protected cultivation is emerging as a significant method of cultivation among horticulturists. Their detachment from the environment and independence from climatic variables have rendered them stability. Considering the advantages of green house, there is

ample scope for encouraging area under protected cultivation of high value flowers and vegetables out of season, both in the temperate and tropical climate. However, profitability in green house cultivation will depend upon the choice of green house structure, selection of crops and varieties and production technologies adopted. States like Maharashtra, Madhya Pradesh, Karnataka, Kerala and the North Eastern States have also brought significant area under green houses. The constraints in adoption of green houses are high investments and nonavailability of cost-effective technology for many crops. The package of practices for green house cultivation is yet to be standardized. There is need to take up studies for perfecting the agro-techniques for cultivating inside green house.

Organic farming has also caught up with the new age farmers as customers have started to shun the conventional farm produce grown with inorganic inputs. This has opened up avenues for alternative inputs of biological origin. Bio-fertilisers offer an economically attractive and ecologically sound means of reducing external inputs and improving the quality and quantity of internal resources. Bio-fertilizers, containing microorganisms, are less expensive, eco-friendly and sustainable. Biological nitrogen fixers, phosphate solubilisers and the mycorrhiza fungi have proved to be useful in horticulture.

Precision Farming has evolved as a movement world wide. The technology involving application of inputs and use of resources for deriving maximum outputs by appropriately integrating different systems involving computers, Global Positioning System (GPS), GIS, Sensors and application control, has immense prospects for improving production and productivity of horticultural crops. However, by adhering to the basic principles of precision farming, farmers in Tamil Nadu, Maharashtra, Kerala and Andhra Pradesh, among others, have more than doubled their yields. Between 2004 and 2007, the Tamil Nadu Agricultural University undertook a pilot project in Tamil Nadu's Dharmapuri and Krishnagiri districts with about 400 farmers. Both districts suffered from water scarcity and farmers in the region followed traditional agricultural practices. The university helped the farmers adopt "precision farming". Within a short period, the farmers were enjoying yields that were three to 12 times higher than normal.



Soil-less Culture involving the usage of natural substrates like cocopeat, rock wool, gravel, sand, saw dust, groundnut and paddy husk, vermiculite, perlite etc., have been popularized in horticulture to overcome the variations arising from the non uniform soil compositions. Media constituents like cocopeat is successfully used for better management in both vegetables and flowers. It is already proven that crop grown on cocopeat and rock wool have better growth and development compared to soil grown plants. Hydroponic techniques using deep flow technique, nutrient film technique are used to limited extent for commercial cultivation of vegetables and flowers.

High Density Plantation is a proven technology, commonly practiced for mango cultivation worldwide and combined with other sustainable agricultural techniques, has the potential to yield upwards of 200% more produce than that by the traditional method. Project Unnati is aimed at a large scale adoption of UHDP in the country and aims to scale up the project to cover end-to-end fruit supply chain and further optimize delivery. The project to be scaled up over a period of 10 years, is aimed at creating an ecosystem that delivers higher growth and income for farmers and 'Grove to Glass' fruit supply chain and optimizing delivery for Indian brands Maaza and Minute Maid Mango. Project Unnati alone is expected to deliver close to 240KMT fruit by the year 2023 – 24. Ultra High Density Plantation (UHDP) technique enables plantation of nearly 600 trees in an acre, against the conventional method of planting 40 to 70 trees. In traditional mango cultivation, trees are allowed to grow as high as possible; they are pruned minimally or not at all. In UHDP, canopy is maintained in such a way as to attain maximum light interception and canopy volume per unit area in early years of plantation. This leads to the orchard attaining full potential in 3-4 years. The gestation period in UHDP is less, and the farmer starts getting returns in the early years,

as UHDP orchards start commercial bearing from the 3rd to 4th year onwards against the 7 to 9 years required in traditional planting. This innovative technique has been standardized and commercialized by Jain Irrigation at its R&D farm at Udmalpet, Tamil Nadu where currently 100 acres is under Ultra-High Density Plantation. The technique further utilizes drip irrigation, offering twin benefits to the farmers by improving yield/acre and simultaneously decreasing the quantity of water used per kilo of mango produced.

MICRO IRRIGATION- MAXIMISING WATER USE

Out of the total cultivated area of 172 million ha in the country, only 65 million hectare (37%)is irrigated. Of the 105 mha meters of utilisable water, only 70 mha meters is utilized for irrigation. Even if the entire water is harvested by 2025, by present methods of irrigation, 45 percent of the cultivated area will still remain rainfed.

With dwindling water resources, it becomes pertinent to judiciously use water in agriculture. Enormous quantity of water is wasted with the present methods of irrigation, which are in vogue. It is becoming increasingly clear that with the advent of high yielding varieties, the next major advance in our agricultural production is expected to come through efficient soil and water management practices, like adoption of water saving methods such as drip irrigation. It has been very successful for irrigating horticultural crops like mango, banana, grapes, pomegranate, guava, citrus, brinjal, cucumber, okra, capsicum etc. Some of the advantages of micro irrigation are saving of fertilizers upto 30%; increase in yield upto 100%; saving of water upto 70%; prevention of weed growth; saving of energy; improving in quality of produce. As per the estimates, the total cropped area suitable for micro irrigation in the country is to the tune of 27 million ha.

The benefits of micro irrigation and drip irrigation are not restricted to water saving. It increases the productivity and yields of crops due to better air : water ratio thus increasing farm incomes. It considerably reduces weed problems and soil erosion as the water is applied directly to the root zone in very small quantities. The technique also reduces atmospheric humidity which may reduce the occurrence of pests and diseases. It also reduces problems of water logging, salinity and ground water pollution. The continuous application of water in small quantities helps keep the salt concentration below the harmful levels. It reduces the cost of cultivation mainly due to savings in labour costs and energy savings. According to some estimates,

the system can save electricity of 278 kWhr/ha for wide spaced orchard crops and 100 kWhr/ha for closely grown crops. The continuous and uniform application of water across the field will also improve the quality of produce. Combining micro irrigation with water soluble fertilizers, fertigation is a recommended practice in horticultural crops. The fertilizer use efficiency can be increased up to 95% using this system when compared to conventional methods of water application. Moreover, micro irrigation is well suited to all soil types and undulating terrains as the water flow rate can be controlled.

At present, United States (1.64 million ha), China (1.67 million ha) and Spain (1.63 million ha) are some of the leading countries which have adopted drip irrigation. Considering the world's total irrigated area as 212 million ha, only 4.75% of it is currently irrigated under drip irrigation which shows the immense potential that still exists for this kind of irrigation.

India, with a total arable area of 140 million ha with almost 42% of arable land irrigated, too has a huge potential for micro – irrigation which is still underutilized. Task Force on Micro – Irrigation (2004) estimated a potential of 27 million ha for drip irrigation based on the area under crops most suitable for that form of irrigation, the Indian Committee on Irrigation and Drainage (INCID) estimates a potential of 10.5 million ha.

In India, Maharashtra (0.48 million ha), Andhra Pradesh (0.36 million ha) and Karnataka (0.17 million ha) account for more than 70% of the total area under drip irrigation. However, the total area covered under drip irrigation (1.42 million ha) is still quite low as compared to the potential area of 11.6 million hectare. While Andhra Pradesh (50% of Potential) and Maharashtra (43% of Potential) have been able to bring substantial area under drip irrigation, other states lag far behind.

Micro Irrigation systems have also seen several upgrades, one among which is the Automated Irrigation System which requires just a minimum of manual intervention besides the surveillance. Automated with the help of timers, sensors or computers or mechanical appliances, it makes the irrigation process more efficient besides considerably reducing the

labour charges. However, under the current context, such systems can be expensive and the complexity of the designs may warrant experts to plan and implement. Also, solar energy has replaced electricity which comes in useful in remote locations beyond the reach of electric power lines. According to experts, Solar Photovoltaic (PV) panel is one of the simplest possible ways to generate electricity beyond the reach of power lines. It has no moving parts and lasts for decades with virtually no maintenance. Solar power is no longer an expensive, experimental energy source.

Despite these apparent benefits, farmers across the country have been reluctant to adopt this on a wide scale. High initial costs make the technology unfeasible for small and marginal farmers. Installation of a drip irrigation system requires an initial investment of up to Rs. 1,25,000 per hectare according to some estimates. The system requires proper filtration so that dust and other particles do not block the small emitter holes and sometimes it entails high emitter clogging rates. Drip Irrigation has been used for irrigating only a few selected crops in India. It is adopted mostly for coconut (19% penetration), banana (11%), grapes (10%), mango (9.4%), citrus fruits (7.9%) and pomegranate (6.2%). It may not be suitable for closely planted crops like cereal grains which are grown across large areas in the country. Lack of technical support and follow up by the government, private companies and NGOs may be a hindrance for adoption. Only selected, pre-approved drip kits qualify for the subsidy which stifles creative marketing strategies on the part of manufacturers as well as efforts to bring down the cost of drip systems through innovative technology or product designs.

Horticulture has emerged as a successful agri enterprise in India. With the demand for horticultural products increasing both locally and globally, many farmers have been motivated to take up horticulture. The high value attached to the horticulture products has also increased the sector's desirability among farmers. However, recurring gluts coupled with lack of suitable infrastructure for prolonging the shelf life of the produce have recently marred the profitability of the sector. Investments need to be made to strengthen the infrastructure and logistics. Good Agriculture Practices and Precision technologies can not only guarantee assured markets, but also ensure judicious use of resources. We have to look for directions to increase the income of the farmers without compromising the integrity of natural resources.

IMPEDIMENTS TO EXPLORE THE POTENTIAL OF HORTICULTURAL PRODUCTS

The state procurement of wheat and paddy drifted the cropping pattern of an enitre nation towards two crops, Wheat and Paddy at the cost of the cultivated area in other equally important crops. Albeit, India is at number two in respect to horticultural products after China. But where China is at number one in the export of processed fruits and vegetables, India is far behind at number 19. In 2017, when China exported processed fruits and vegetables worth 8805 million dollars, India's export were only 1085 million dollars. Similarly, with respect to the export of fresh fruits and vegetables, where China is at number 6th, India is at number 28th. In the same period, China exported these products worth 5837 million dollars where India exported only of 1166 million dollars.

Apart from their low export, these products are not within the reach of every Indian. Particularly, the fruits, which should have been a regular part of the diet of every individual, are beyond the reach of 90 percent of Indians because of the high prices. If it may be assumed that there is no potential to enhance the production of these products, the cropping pattern and depleting area under these crops negates that conception. Positive co-relation between farm holding and the area under these crops was observed in number of studies. As the size of the holding is increasing, the area under these crops was also found to be increasing.

While analyzing the volatility in the prices of vegetables and fruits and often repeated circle of fluctuations, the lack of assured marketing was observed as the main impediment. As 93 percent of the Land holdings are below 5 acres, those are reluctant to grow such crops, because of the involved risk, either of price or of output. While assured marketing of wheat and paddy is the main reason for escalation of area under those crops, lack of assured marketing is the main impediment for depletion of the area, even with the high profitability. The small farmers are unable to bear the risk and they are prepared to forgo the high profits if it involves risk.

Fruits and vegetable crops are yielding more income as indicated by the fact that with 13 percent area under these crops, their contribution in the agricultural G.D.P is 30 percent. Where there is underemployment in agriculture, horticulture has the capacity to absorb more labour. When central and state governments are stressing

on diversification of cropping pattern as a measure to enhance the farm income, and where there is high potential of income and employment in horticulture products,the measure of assured marketing becomes the only issue that needs to be addressed by a prudent policy.

It is being reported that 18 percent of horticultural products goes wasted every year because of the lack of appropriate preservation facilities. Hardly 0.4 percent of these products reach cold stores. The farmers have least involvement in the cold storage services. About 96 percent of the cold stores are owned by the private entrepreneurs, and 4 percent belongs to co operative societies and government. The distribution of cold stores is also uneven. 60 percent of the cold stores are located in 4 states of Punjab, UP, West Bengal and Gujarat. The co operative movement could not involve the farmers to build their own stores and that proved as a hurdle.

Four percent of fruits and two percent of vegetables are processed whereas in developed countries, 85 percent of the horticulture products are processed to preserve and prolong their shelf life.Even in Thailand, 35 percent of products are processed and the China is far ahead in the area of processing. Role of processing is most imperative for their exports. While analyzing the slow progress of agro-processing, particularly of fruits and vegetables, inadequate supply of these products to avail the full capacity of the unit is assigned as the major factor. There is volatility in production as well as in prices. The instances to throw away the potatoes on roads in one year and to depend on their imports in the other are instances pointing at the unpredictable scenario.

This volatility of prices either of fruits or of vegetables never affects its traders. No risk is involved in their business. It is a daily affair and not seasonal. They may purchase from the market or from cold store, it is irrelavent for them. Even in the period when the potatoes were thrown out on road, traders were enjoying comfortable profit. Often the consumer price is double or three times from the prices obtained by farmers, in most of the vegetable and fruit products. But what is the share of the farmer in that price? This share can be created through the co operative model similar to the model of dairy co operatives in India, that have never been tried.

Now the Government of India has announced a new procurement policy in which some new crops would be added for state procurement with the collaboration of state governments. It is imperative to add some of the fruits and vegetables crops those are most suited to that areas. Even in the same state, the zone system can be adopted on the basis of more yielding crops of the zone. The contract farming system of developed countries like Canada, Australia, U.S.A etc., must be emulated in which the contracts are made for quantity and price with the farmers. The horizontal constraint of space in our country can be compensated by vertical expansion of space by growing fruit trees. The prudent policy assuring the marketing of horticultural crops can be much helpful to extricate the farmers from their web of deficit farming.

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VALUE ADDITION FOR BETTER INCOME

SUCCESS STORY OF MADHUR FRUITS

Doubling farmers' income has been a long standing objective of the government. The perishability and the inability to convert fresh perishable produce into value added products with a longer shelf life has most often deterred farmers from not only realizing profits but also forcing them to live in penury.

Thottiam Banana Producer Group, a young and dynamic farmers group founded in 2014 by 13 like minded agriculturist in a town called Thottiam in Trichy district, Tamil Nadu, tells a different story. MADHUR FRUITS a unique value added product developed by the farmer group has become a success story that could be emulated across the country. The Moniker derived from the presiding deity of Thottiam, 'Shri MADHURAKALI AMMAN' has become a common name for quality and taste. Launched by the then Minister for Agriculture Shri. Radha Mohan Singh and Minister of State Dr. Sanjeev Kumar Balyan in 2014, Madhur Fruits has even made a name in the global market.

The Farmers group is one of the sub groups functioning under the Tamil Nadu Banana Producer Company Ltd formed with the guidance of SFAC (Small Farmers Agri-Business Consortium, Dept. of Commerce, Govt. of India, New Delhi) and Tamil Nadu Agricultural Marketing & Agri-Business Department to effectively cater to the business needs of the Banana growers in Tamil Nadu. " Tamil Nadu Banana Producer Company has 1000 banana growers as shareholders which has been formed with Banana Producer Societies and Groups covering from 13 banana growing districts of our state. The company was incorporated in the 25th of July 2014," says Director, Mr. G. Ajeethan, Thottiam Banana Producer Group. Mr. Ajeethan, a post graduate in sugar technology redesigned his career to be a full time agriculturist with an on farm experience of 26 years. He was the first farmer to introduce Tissue culture banana seedling in Tamil Nadu in association with Spic Bio-tech ltd, Coimbatore in the year 1989. He cultivated tissue culture variety of native Poovan variety of

banana which doubled the yield to 21 M.T per acre for which he was awarded Best Banana Grower 2003 by the National Research Centre for Banana, Trichirappalli. He is also a recipient of Best Farmer Award 2005 from Rastriya Chemicals and Fertilizers(RCF)Ltd Mumbai, for judicious utilization of fertilizers combined with organic inputs for better yield in ground nut.

His pioneering work with a group of farmers from the neighbouring village to put up a solar dehydration facility for banana, first of its kind in India to add value and convert the traditional banana varieties in to value added products successfully was the beginning of the journey of Madhur fruits. The project that cost Rs.10 lakhs was donated by Bayer Material science and German Development Bank as a part of social upliftment initiative.

"Traditionally grown matured banana varieties like Poovan, Karpooravalli, Neypoovan and Rasthali are chosen to scientifically ripen in climate controlled ripening chambers. Farmers are paid Rs.1.50 per fruit or the prevailing market rate whichever is higher. This has enthused the banana growers to offer even the farm ripened bunches for solar dehydration. The fruits are processed by the technical protocol advised by National Research Centre for Banana, Trichirappalli. The project met with tremendous success. The government of Tamil Nadu realizing potential of this value added activity has now announced 100 solar driers at 50 percent subsidy to growers to improve their farm revenue and livelihood," says Mr. Ajeethan.

Fully matured Farm fresh bananas selected from the orchards grown on the confluence of river Cauvery in Thottiam Taluk forms the raw material. Quality fruits of traditional banana varieties are ripened in a scientific method using climate controlled ripening chambers. Ripened fruits are dehydrated in the state of the art "GREEN HOUSE SOLAR DRIER" hygienically. Honey, a natural preservative sourced from KOLLI Hills, are impregnated on bananas for sweetness and softness and rolled out into a Nutritive honey laced solar dried Banana, an instant energy booster. The shelf life of the product is six months.

"We have 3 PV ventilated Polycarbonate glazed Greenhouse Solar Dryer which uses German technology for Drying vegetables, fruits, herbal products, etc. Polycarbonate green house (PGH) drying is a natural ultraviolet filter, meaning that it protects the fruit from excessive exposure to harmful radiation. PGH drying provide better light diffusion than standard glass, meaning light will spread much more evenly throughout the greenhouse. All the fruits, vegetables, herbal leaves, etc are evenly dried. PGH drying reduces only the moisture content of the fruit without reducing the nutrition content of the fruit. PGH results in a hygienic dried fruit fulfilling microbiological norms, residues free from extraneous matter, better sensory attributes and Quality,' explains Mr. Ajeethan.

The company has also obtained license from Food safety standard association of India FFSAI No.22414317000614 with GS1 international Barcodes labelled on the product. The Farmers Group under the trademark "MADHUR FRUITS" distributes Solar Dried Bananas through various farmers' organic retail stores which operate under Brick and Mortar model such as: Unnathi (Retail outlet dedicated for farmer products) and Organic and curated outlets. Online stores such as Amazon and Qtrove are also used for marketing.

The farmers' group has evolved with a common objective of improving the livelihood of the banana farmers in and around Thottiam. Being a first of its kind in India, TBPG is the pioneer in solar drying of all type of fruits, vegetables and herbs. TBPG provides members with economic benefits in terms of access to dynamic markets. "Our collective action remains an important potential strategy to increase small-scale producer participation in emerging modern markets and to generate sustained commercial flows of high-quality products, "avers Mr. Ajeethan.

LITCHI – SWEET YET BITTER

Mr. BP Singh, Secretary, Litchi Grower Association

Litchi has over the years become a prominent fruit in India, with production mostly centered around Bihar and West Bengal. Litchi production in Bihar, that grows 60 percent of the country's litchi production, has gone up by 50 percent to 60 percent over the previous year. However, the alleged connection of Litchi with the Acute Encephalitis Syndrome in Bihar has affected the market prospects of this fruit. In an interview with Agriculture Today, Mr. BP Singh, Secretary, Litchi Grower Association enumerates the challenges and opportunities of Litchi cultivation in India.

What is the total production of Litchi in India?
The total production of Litchi in India is 750000 Mt annually. The crop covers an area of 80000 hectares. India is the second largest producer of litchi in the World after China. Among fruit crops, litchi ranks seventh in area and ninth in production but is sixth in terms of value in India. The national average productivity of litchi is 6.1 t/ha, which is much lower than the realizable yield of the crop under well managed condition.

What is the export potential of Litchi?
Litchi is most delicious and costly fruit. But due to lack of cool chain system and adequate infrastructure currently the export prospects are very limited. However, "Shahi litchi of Bihar has earned GI tag and I believe that it offers tremendous export possibilities with right infrastructure support.

Which states in India are the largest producers of Litchi?
Bihar is the largest producer of litchi in India. Bihar produces 300000 Mt litchi and covering 32000 hectares.

How did the recent association of Litchi with Acute Encephalitis Syndrome in Bihar affect the market of the fruit?
It affected the market heavily. The rumour linking all Acute Encephalitis Syndrome cases in Bihar state to consumption of Litchi has affected the market. About Rs. 100 crore worth of Litchi could not be sold.

What are the activities taken up by Litchi growers' association to improve the market of Litchi?
Litchi Growers Association has petitioned the state and union government to help us recover from the losses incurred due to the half truth information about litchi spread during the peak business season following the AES death every year. Association is also considering to knock the door of high court for protecting Litchi from rumours.

How economical is Litchi in doubling farmers' income?
Annual sales of Litchi in India is about Rs 2000 crore. If the government promotes organic farming and provide irrigation system in orchard and adequate infrastructure to develop market points, then litchi cultivation has the potential to double farmers' income.

What is the level of value addition happening in Litchi in India?
Mostly litchi growers of India are not doing any value addition. In fact, only one percent of total production is processed. We can double farmers' income by promoting and increasing value addition.

What are the challenges associated with Litchi cultivation in India? What are your suggestions in improving the same?
Research institutions should be encouraged for developing capacity building activities like providing pure commercial proposition of business which can be emulated by clusters. Awareness about Risk management against natural climates should be covered by" Restructured weather based insurance scheme" of govt. Litchi has very short shelf life, so research center should take it on priority to increase shelf life of Litchi. In remote areas, livestock rearing, antelope and wild pig are also a new big challenge for growers because they are unable to fence their orchard. Quick and smooth transport system to south Indian cities is also needed.

'INDIA NOW OCCUPIES A PLACE OF PRIDE IN THE WORLD OF HORTICULTURE'

Padma Shri. Krishna Lal Chadha has brought horticulture to a national focus raising India's esteem in the sector at international level. Today the growth of India's horticulture is recognized as phenomenal globally and India is the second largest producer of fruits and vegetables. Being the doyen of horticulture, Dr. Chadha is aptly referred to as the 'Father of Modern Horticulture'. In the words of Dr. M.S. Swaminathan "Dr K.L. Chadha has provided outstanding leadership to horticultural renaissance of India - he has rendered invaluable service for which we are all very grateful" a phenomena which has led to the Horticulture (Golden) Revolution in India. He has been recognized by various R&D organizations, Food Processing industry and Farmers Organizations through 20 awards, including Borluag Award, Om Prakash Bhasin Award, B.P. Pal Memorial Award, H.S.I.-Shiv Shakti Life Time Achievement Award. In an interview with Agriculture Today, Dr. KL Chadha discusses the journey of Indian Horticulture so far.

How has Indian Horticulture grown over the years?

India now occupies a place of pride in the world for production of different horticulture crops. Its role in crop diversification, food, nutrition and employment generation was realised only in mid 1980s. Thereafter, development of horticulture in the country has been planned systematically through higher financial allocation to the sector from a meagre sum of Rs 3.5 crores and Rs 25 Crores in VII Plan to 31.9 and 789 crores in VIII Plan to Rs 1,050 and Rs 15,946 Crores in the XII Plan for research and development respectively. The increase in budget was 300 times for research and 638 times for development between VII to XII plans. The increased allocation resulted in establishment of a sound R&D infrastructure and launching of several flagship programmes. As a result, this sector has witnessed tremendous growth in area, production and productivity from VIII Plan onwards. The area under horticulture crops has increased from 12.8 million ha in 1991-92 to 25.87 million ha in 2017-18 resulting in cumulative increase of 99 % during the last 28 years. During the same period, total production increased from 96.6 million MT to 314.67 million MT registering a cumulative increase of 223 %. The average productivity also witnessed a significant increase from 7.5 to 12.3 MT/ha in the same period with cumulative increase of 62%. As a result, India is now the second largest producer of fruits and vegetables in the world after China with a share of 12.2 and 10.7 per cent of total global production, though the Indian fruit productivity is higher than China. Among fruits, India is the largest producer of banana (26.2%), mango & guava (41.9%), lemon & lime (16.4%), papaya (44.4%), pomegranate, sapota and aonla. India also produces 21.04% of grape, 10.4% of citrus fruits and 14.96%

pineapple. Among vegetables, India is the largest producer of okra (73.6%) and pea in the world, while second largest producer of potato (12%), dry onion (22.1%), brinjal (27.1%), tomato (11.1%), cauliflower (36.4%) and cabbage (11.9%). In plantation crops, India tops in coconut and arecanut production and is the second largest producer of cashewnut after Vietnam. In spice crops, India ranks first in the production of chilli (dry), coriander, fennel, aniseed, cumin, while in turmeric, garlic, ginger and small cardamom, India ranks second. In pepper, it occupies the third position.

In recent years, production of horticulture crops outperformed the production of food grains starting 2012-13 recording 269 million MT production against 257 million MT of food grains. It touched 312 million MT in 2017-18 against 285 million MT of food grains.The first estimates for 2018-19 also showed that production of horticultural crops will touch 315 million MT. This has resulted due to proactive government policies, increased infrastructural support, as well as farmers' interest due to growing market and a quicker cash flow.The impact of the above initiatives have become quite visible, and their role in development of this sector has been recognised in our country. Horticulture has emerged as the Growth Driver of Agriculture in India. Future of sustainable agriculture in the country lies in promoting technology led horticulture development.Highest annual growth of 9.5% has been recorded in fruit production as well as 7% in vegetable production during the period 1991-92 to 2018-19. There is now a shift from production of bulk/ staple commodities to high value horticultural produce and products. Horticulture has emerged as a means for sustainable intensification and diversification globally to enable remunerative, viable, sustainable, alternate production system in agriculture and an economically viable option for small holders.

How significant is the role of horticulture in doubling farmers' income?

I believe horticulture sector has been a key contributor in enhancing farmer's income in the country. The staple crops such as cereals, pulses and oilseeds while occupying 77 per cent of gross cropped area have been contributing only 41 per cent of total output to the crop sector, whereas horticultural crops have been contributing 33 per cent of total output from 15.08 per cent area which clearly shows the potential of horticulture in enhancing farmers' income.

"Among fruits, India is the largest producer of banana (26.2%), mango & guava (41.9%), lemon & lime (16.4%), papaya (44.4%), pomegranate, sapota and aonla. India also produces 21.04% of grape, 10.4% of citrus fruits and 14.96% pineapple"

Diversification to horticulture has enabled the production of more energy resulting in high returns per unit area compared to field crops and earning more foreign exchange. These crops also have high potential for efficient utilization of wastelands, need comparatively less water than food crops and provide higher employment opportunities. These are also rich sources of vitamins, minerals and carbohydrates and have thus assumed a great importance both in food & nutritional security. Horticultural crops have a high potential for value addition for sustaining large number of agri and pharma industries generating huge employment opportunities besides being environment friendly. The rapid change in demographic profile of the country is resulting in increased consumption of high value food items due to increased realization about their role in health and nutrition.

Horticultural crops are perishable and high value commodities that require immediate market access and market linkages. Onion, potato and tomato are three most important income generating cash crops for the farmers. Horticulture sector is also supporting many alternate sources of income to the farmers such as bee keeping, nursery management, mushroom production, value addition opportunities besides additional income through intercrop.

What reasons would you attribute to the consistent performance of horticulture in India?

The performance of horticulture sector over the last two decades has been consistent and phenomenal. In fact I consider it virtually a repeat of the way green revolution took place in mid 60's in India. Starting with the VIII Five Year Plan, various initiatives taken for horticulture R&D by the Govt of India and farmers' interests in horticultural crops have contributed towards consistent performance of the sector. A sound horticulture Research and Education infrastructure in India is also available to develop technology and produce quality human resource.

After independence of the country, there were only 3 institutes, -related to Potato at Shimla, Tuber Crops at Thiruvananthapuram and Plantation Crops at Kasargod, Kerala. Subsequently, in 1967, the Indian Institute of Horticultural Research was established in Bangalore (now Bengaluru), Karnataka. However, major institutional development took place between 1985 and 1996 when a number of institutes, Project Directorates and NRCs were either established or upgraded. These include, institute on Subtropical

Horticulture (Lucknow), Temperate Horticulture (Srinagar), Arid Horticulture (Bikaner), Vegetable Crops (Varanasi), Citrus (Nagpur), Oilpalm (Pedavegi) and Spices (Kozhikode); Project Directorates on onion & garlic (Rajgurunagar, Pune), Floriculture (Pune), Cashew (Puttur), Medicinal & Aromatic Plants (Anand), Mushroom (Solan). In addition, there are National Research Centres on Banana (Trichi), Grape (Pune), Litchi (Muzaffarpur), Orchids (Sikkim) and Seed Spices (Ajmer). Subsequently, the Central Island Agriculture Research Institute (Andaman & Nicobar) was transferred to horticulture science division of ICAR and NRC on Pomegranate was also established at Solapur. As a result, the current infrastructure includes 12 Central Institutes with 25 regional stations, 5 Directorates & 6 National Research Centres. In addition, 13 All India Co-ordinated Research Programmes (AICRPs) with 215 centres are also operative at different research institutes & universities. A number of Central & State agricultural universities including 7 Horticultural Universities each in A.P., Haryana, H.P., Telangana and Uttarakhand and 2 in Karnataka, 39 SAUs, 2 deemed to be universities, 3 CAUs and 3 CUs with horticulture discipline, and 52 colleges of horticulture have also come up to meet the growing requirement of specialised manpower in horticulture sector. Besides ICAR, a number of institutions under the aegis of DST (CSIR), DBT, DoAE, DRDO, Ministry of Commerce, Ministry of Food Processing etc. have been working on different aspects of horticulture R&D.

For systematic development of horticulture, a large number of organizations have been established to promote the horticulture development in the country by Govt. of India under four Ministries, namely, Agriculture and Farmer's Welfare, Food Processing, Commerce and Rural Development. Notable among them are the National Horticulture Board, Bee Board, Coconut Development

Board, NCDC, NAFED, NHRDF, SFAC under Ministry of Agriculture and Farmers' Welfare and Spice Board, Tea Board, Coffee Board, Rubber Board under the Ministry of Commerce, to name a few. Separate Departments of Horticulture have been established in most of the states. Even separate ministries dealing with horticulture have been carved out of agriculture departments in several of the horticulturally important states. Few Central and State funded institutions have also been established like Institute for Organic Farming, Ghaziabad, Central Institute of Horticulture, Medziphema, Nagaland, International Horticulture Innovation and Training Centre (IHITC), Jaipur etc to promote horticulture by Govt of India. India also has the world's largest network of 11 Agricultural Technology Application Research Institutes (ATARIs) and 706 Krishi Vigyan Kendras (KVKs) under the aegis of ICAR for technology assessment, demonstration, transfer and capacity building. The Horticultural R&D infrastructure in India is thus today one of the best in NARS compared to several of the advanced countries.

Various research universities and institutions are engaged in region and crop specific education and research related to improvement, production and post-harvest management

Which are the areas that need improvement in horticulture sector today?

The requirement of horticultural produce and products are increasing in view of food and nutritional security, exports, food processing and pharma industry. Therefore, strategies need to be focused on achieving self-sufficiency in production of quality planting material and seeds, expanding existing area, improving productivity, quality, saving post-harvest losses, adoption of alternate horticulture systems, production of healthy pest free produce and products and improving the transfer of technology. There is a need to adopt hi tech horticultural technologies for improving productivity. It requires a holistic approach starting from production of high quality planting materials through establishment of model nurseries and their accreditation, increased adoption of hybrids, development and use of rootstocks, protected cultivation and precision input management, integrated pests and disease management to post harvest management and value addition.

Are you satisfied with the current level of research and development in the sector? Which areas in horticulture

need more R&D?

While a virtual revolution in horticulture has taken place in the Horticulture sector in the country through record production, improved productivity and increased exports, the demand of horticultural produce is increasing at a very fast rate due to demographic change, change in food habits resulting in increased consumption due to realization of nutritional and health properties, increasing exports and value addition. Diversification to Horticulture has been a fruitful proposition to farmers as it has brought substantial changes in the income particularly for small and marginal farmers. The requirement of horticultural crops particularly fruits and vegetables by 2030 would reach to 550 million MT. While significant development has taken place in food availability, a lot needs to be done to achieve high production levels in years to come. Though the conventional horticulture will continue to grow with small and marginal farmers, a shift to 'Hitech horticulture' with 'Alternative Horticulture' systems has become the need of the hour.

What are your views on the various programmes and schemes launched by the Government for Horticulture Segment?

A large number of central sector schemes have been launched during the past few plans for development of horticulture. These include Technology Mission for North Eastern and Himalayan States (TMNE) (2001-02), National Horticultural Mission (NHM) (2005-06), National Bamboo Mission (NBM) (2006-07), National Mission on Saffron (2010), etc. All the on-going schemes however, now stand merged in the Mission for Integrated Development of Horticulture (MIDH), a centrally sponsored scheme launched for holistic growth of the horticulture sector covering all the horticulture crops. The schemes launched by the Government of India have yielded the desired results. However, some new programmes required to be initiated are Creation of Horticultural Planting Material Development Authority to ensure large scale production and distribution of genuine quality planting material. I also feel the Creation of a Mission on Smart Horticulture is necessary to support adequate research and promotion of micro-irrigation and fertigation, smart nutrient management system, internet of things and Artificial intelligence, protected cultivation, hydroponics, aeroponics, peri-urban horticulture and use of precision tools in horticultural crops production

What reorganisation would you expect in the current market structure that will help the farmers in realising more profit?

Marketing infrastructures particularly for perishable commodities in India is quite inadequate. Marketing system in mandies is non-transparent and marketing costs heavy due to intermediaries. This calls for innovations in marketing of perishables. The Govt. of India has taken many initiatives through amendments in APMC Act, which cleared the way for contract farming, direct purchase centres and provision of special markets for fruits & vegetables, besides setting up of a unified market. Contract farming has been in existence in several export oriented and other high value commodities like baby corn, sweet corn, chillies, onion, gherkins and papaya which has resulted in acceleration of technology transfer, capital flow and assured market. A number of initiatives in organised retailing have also been taken up. However, setting up of Farmers Producers Organisation (FPO) mandating primary producers as members resulting in formation of corporative entity (a hybrid between cooperative society and a private limited company) largely proven successful and needs to be promoted. It is estimated that about 3000 FPCs have been established so far, in the states of MP, Rajasthan, and Maharashtra & Bihar. I see a future in cluster based farming. There is need to promote cluster based farming of horticultural crops enabling the agencies to create the desired infrastructure in the cluster locations

Horticultural trade is a potential area which requires more importance. Several issues are still affecting the horticultural exports need to be addressed such as pesticides residues, development of Sea Protocols for export of produce, imports of planting materials and patented varieties in fruits and vegetables etc.. There is need to improve exports through promotion of GAP, organic standards, pesticide residue standards. System wide interventions are needed to minimize food loss and to generate surplus for international markets. Flowers assume importance, particularly in tapping the international market. Spices are low volume high value crops which have the potential to provide better remuneration to farmers.

What are the challenges existing in the horti-segment?

Although horticultural sector has made spectacular progress not only in area expansion but also in production, productivity and exports of horticultural produce but still there are many challenges before the sector. Inadequate availability of quality seeds and planting material, large scale prevalence of old and senile orchards, poor canopy management, high cost of inputs, low crop yield compared to potential yield, high post-harvest losses and low value addition, lack of trained outreach personnel, unorganised supply chain management etc. are a few of them. In view of introduction of high tech horticulture and precision horticulture, emphasis on skill development has become imperative. The transfer of technology in horticulture crops needs trained horticulturists in R&D instead of influx of trained agriculturists, not well versed in horticulture. The present atmosphere is highly conducive for increased investment in the sector to make it more vibrant in the coming years.

INDIA HOLDS A PROMISING FUTURE FOR FARM MECHANISATION

In conversation with Mr Nagesh A. Basavanhalli, the Managing Director and Chief Executive Officer of Greaves Cotton Limited

As cultivable land resources are limited, increased agricultural production can only be attained through increased yields and preservation of already produced commodities. Mr Nagesh A. Basavanhalli, the Managing Director and Chief Executive Officer of Greaves Cotton Limited with 20 years of experience as a global contributor in mechanisation senses an increase in the number of the farming population moving towards mechanisation. Greeves Agri has been engaged in developing and manufacturing a range of power tillers and light agricultural equipment.

Mr. Basavanhalli describes farm equipment as machines that can be used for conducting a wide range of agricultural operations such as land development, seedbed preparation, sowing and planting, weeding, inter-cultivation, plant protection, harvesting, cultivation and post-harvesting, etc. "These pieces of machinery are used for the production of crops and agricultural livestock and have been a focus area for the government as it is the most direct way of assuring greater yield across the country. The adoption rate of farm equipment has been on a rise and a clear indicator of this is the sale of tractors, which increased from 0.35 million units in 2007 to 0.87 million units in 2019. Farm mechanisation is essential for sustaining agricultural growth, especially in the context of diminishing agricultural labour," he says.

By 2022, he expects farm equipment market to reach USD 12.5 billion and he believes that this very factor offers numerous possibilities to establish business models that can drive technological advances & innovation in the farm machinery sector. "Mechanisation has a lot to contribute to the development and sustainability of the agriculture sector in India. For example, CHCs (Custom Hiring Centres) could go a long way in promoting advanced farm machinery penetration for small and marginal farmers. In addition, technological innovation in the agricultural sector will drive the next phase of growth in the country by dealing with challenges that include climate change, water scarcity, among others," opines Mr.Basavanhalli.

He acknowledges the immense support received from the state for extending the mechanisation of the agriculture to the rural areas. Modern machinery in agriculture is currently being promoted by both private and public sector both, with several initiatives being taken up by the government like the Sub-Mission on Agricultural Mechanisation (SMAM) under National Mission on Agricultural Extension and Technology, Rashtriya Krishi VikasYojana (RKVY), and Mission for Integrated Development of Horticulture (MIDH). SMAM is one of the key initiatives towards achieving greater mechanisation rates. The program is a catalyst for inclusive growth of agricultural mechanisation in India by ensuring last mile reach of farm mechanisation to small and marginal farmers. Besides, the government also wants to achieve its target of 2.8 kW/ha of farm power by 2022 from 2.02 kW/ha in 2016-17.

Considering the small size of farms across India, farm mechanisation would have to be enhanced through promotion of custom hiring models. Government of India (GoI) has been encouraging mechanisation through various policy interventions viz., conducting performance testing for various farm machineries and equipments at the four Farm Machinery Training and Testing Institutes (FMTTI), designated State Agricultural Universities (SAUs) and ICAR institutions; promoting farm mechanisation among stakeholders by way of on-field and off-field training and demonstrations; providing financial assistance to small and marginal farmers for hiring machinery and implements in low mechanised regions; establishment of farm machinery banks for Custom Hiring; establishing Hi-Tech,

High Productive Equipment Centres; enhancing farm productivity at village level by introducing appropriate farm mechanisation in selected villages.

The future of mechanised farming in India as well as in global scenario is promising as it is the factor that is relied on for food security. Mr. Basavanhalli commented that in order to attain the projected demand of 280 metric tonnes of food grains by 2020-21, farm power availability in the country production has to be scaled up to at least 2.0 kW/ha by the end of the Twelfth Plan. For achieving this, farm mechanisation has to be given primacy. "It is now well recognized that the increase in agricultural production would have to come mainly from enhancement in farm productivity in the existing cultivated area. To meet future global grain demand, FAO estimates suggest that about 90 per cent of crop production growth is expected to come from higher yields, but land available for farming will also have to expand by approximately 120 million hectares in developing countries. We can only grow more food from less land, using fewer resources, by providing farmers with the innovation and the knowledge to use natural resources more efficiently. The government is indeed coming up with innovative schemes to increase farm mechanisation. It would also help if it could come up with a good public-private partnership (PPP) models that would bring more private players into the fray with the latest in farm mechanisation," he suggests.

Experts believe that agriculture needs an infusion of technologies, including mechanisation, as there is a scarcity of labour to undertake activities such as weeding in corn cultivation or manual transplantation in rice cultivation. With newer farm techniques such as zero-tillage, raised-bed planting, precision farming, drip or sprinkler irrigation, the dependence on farm mechanisation has increased.

Although India is the largest manufacturer of tractors in the world, accounting for one-third of the global production, farm mechanisation in India is still at a nascent stage, with the average farm power availability in the country lower than in countries such as Korea, Japan and the US. The Ministry of Agriculture is laying a major thrust on farm mechanisation through its various schemes. A dedicated Sub-Mission on Agricultural Mechanisation has been proposed for the Twelfth Plan, which includes custom-hiring facilities for agricultural machinery as one of its major components. Its focus is on increasing the reach of farm mechanisation to small and marginal farmers and to the regions where availability of farm power is low. Future investment in agriculture will be guided by a number of factors. Sales data gathered over the past ten years indicate a growing preference for tractors in the 41 to 50 hp range. High capacity machines will also be preferred in future, including rotary tillers, harrows, laser levellers, high clearance sprayers, planters, high capacity threshers and self-propelled and tractors drawn combines. The custom hiring of mechanical power for transportation, tillage, irrigation, harvesting and threshing will be preferred by those farmers who cannot afford or prefer not to own machines.

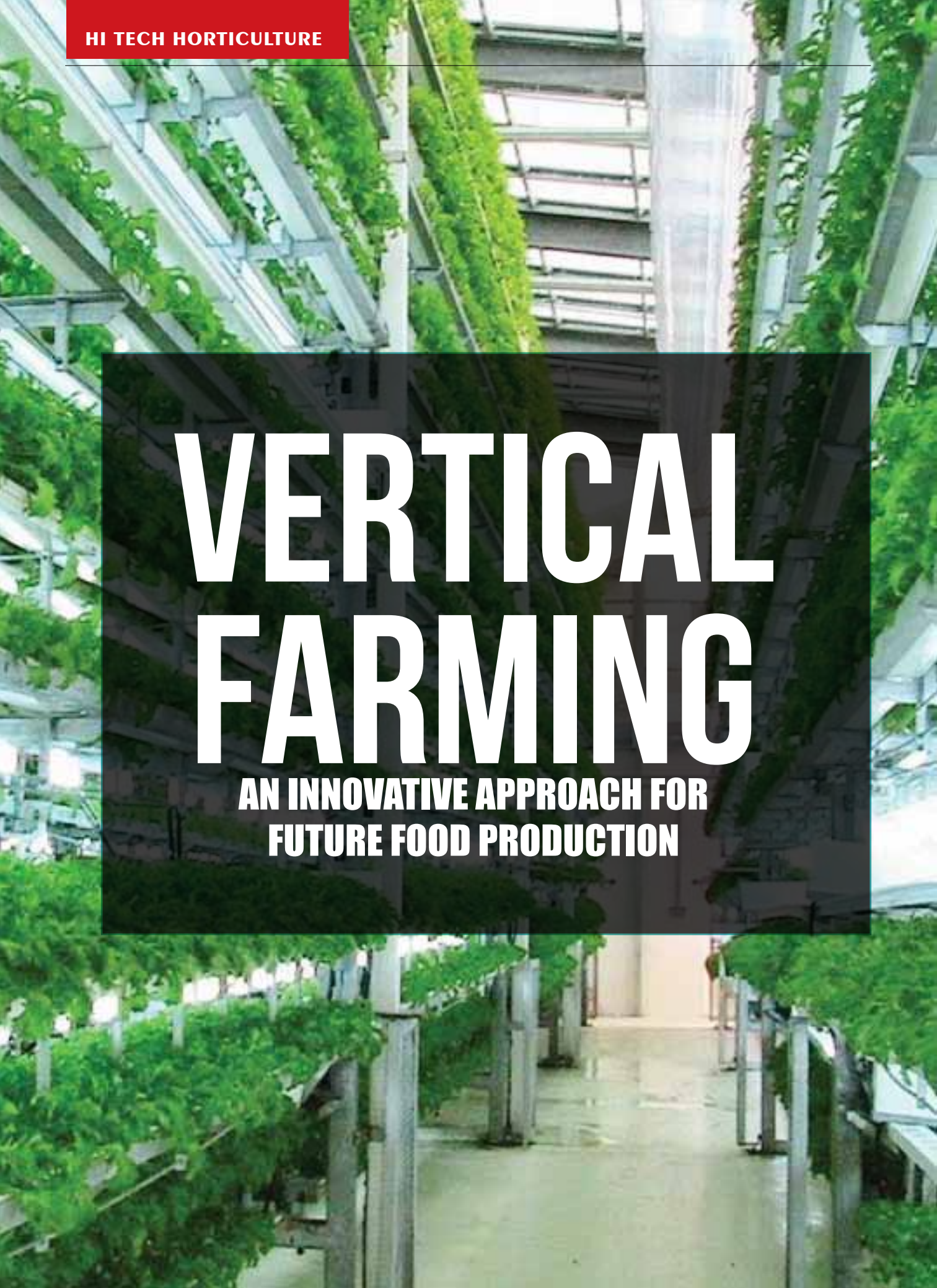
Mr Basavanhalli further highlights the contribution of Greaves Agri in the evolution of mechanised farming and the new technologies that the company has planned to develop. He pointed out that the Company offers a complete range of products for operations right from soil preparation to harvesting. It offers 8 models of Power tillers in the 9 to 16hp range, a wide range of Light argi equipment, petrol, Kerosene & diesel range of pumps, a complete range of electric pumps. "In 2018, Greeves Agri introduced micro-irrigation solutions tailored for Indian farming. Over the last few years, Greeves Agri has invested in expanding their product portfolio keeping in mind the growth potential of the farm equipment industry. As the farm labour costs have nearly doubled over the last few years and are still ticking upwards, the wave of farm mechanisation is expected to emerge even stronger. Adding to this, a new wave of digitally-controlled farm productivity

enhancement with advisory solutions is gaining traction. The Company with its comprehensive product portfolio is well-placed to ride this wave. Farm solutions will be demanding generators. Considering rainfall pattern, soil health & nutrition, depleting water resources, natural calamities etc., Greaves would engage in precision agriculture technologies for enhancing farm productivity. It would be a complete farm solution providing Farm Services, Tech Products, IoT based Inputs, Custom Hiring and Weather Monitoring & Yield Estimation," he says.

In FY 2018-19, he informed that the Company has continued to invest in developing technological capacities for making more indigenous products in the farm equipment space like petrol and diesel Reapers & Electric start Weeders. "The Company aims to increase farmers' productivity at each stage of the crop cycle – right from the soil preparation stage to the post-harvest stage through mechanisation. New products like Rice Transplanter, Harvester, mulcher/shredder, Piston Pump Sprayer, Mist Blower, Electric start Power Tiller are being introduced in FY20. Greaves has also introduced solutions in Micro Irrigation space. Greaves Agri is committed to investing strategically in Agri products to help farmers with complete end to end productivity solution," emphasizes Mr. Basavanhalli.

He is also aware of the challenges associated with the implementation of the new technologies for farm mechanisation across India. Mr. Basavanhalli cited financial inability of small farmers/higher cost of equipment and need of high investment in a variety of equipment/size/technology for different conditions/crops in addition to marginal farmer's belief that higher technology is complex & lack of proper knowledge as significant hurdles in adoption of farm mechanization in India. Moreover, there are other issues such as lack of repair and replacement facilities, especially in remote rural areas, and accessibility for procurement, repair and maintenance. "Pay per use could be a possible solution but it demands diligent planning and execution. Another challenge is knowledge transfer both for usage and manufacturing. The country needs to invest in design and development. Not only for adoption but also for the necessity for versatile equipment that can be used in multiple crops like we have multi-crop harvesters and tractors. In small size and scattered land holdings, the farm machinery has a large turning radius and thus require comparatively larger farm for economical use. There is also the issue of field accessibility for farm machinery movement into the field which is pitiable. Our fields are smaller and not connected with roads and hence many a time moving machine from one field location to another is not possible and/or efficient," he says.

Mechanisation can increase yields through the improvement of water control, better soil preparation for planting, more efficient weed and insect control and the proper harvesting, handling, drying, storing and processing of food, feed and fibre crops.



VERTICAL FARMING

AN INNOVATIVE APPROACH FOR FUTURE FOOD PRODUCTION

Due to the limited access to land for farming, increasing population, non-nutritional food, reduction of natural sources due to growing cities, erosion, different forms of contamination, there is a need for sustaining farming tasks so as to pave the way for adding to food needs. At present, throughout the world, over 80% of the land that is suitable for raising crops is in use. The answer to these issues is Vertical Farming. Vertical farming is the practice of producing food and medicine in vertically stacked layers, vertically inclined surfaces or integrated in other structures such as in a skyscraper, used warehouse, or shipping container. The modern ideas of vertical farming use indoor farming techniques and controlled-environment agriculture technology, where all environmental factors can be controlled. These facilities utilize artificial control of light, environmental control (humidity, temperature, gases etc.) and fertigation. Some vertical farms use techniques similar to greenhouses, where natural sunlight can be augmented with artificial lighting and metal reflectors. Vertical farming is cultivating vegetables such as lettuce, peppers, tomatoes etc. vertically by new agricultural methods, which combines the design of building and farms all together in a high-rise building inside the cities.Around the turn of the 19th century, Dickson Despommier, an American ecologist, and professor of public health, passionately revived the concept of vertical farming. He described the vertical farm as "the mass cultivation of plant and animal life for commercial purposes in skyscrapers.

WHY VERTICAL FARMING...??

Health related complications are becoming common these days. World Health Organization has determined that over half of the world's farms still use raw animal waste as fertilizer which may attract flies, and may contain weed seeds or diseasethat can be transmitted to plants. Accordingly, by consuming such produce people's health is adversely affected. Therefore, growing crops in a vertically controlled environment will reduce the risk of unhealthy produce and can provide better returns to the growers as well.

Further, indoor vertical farming is a revolutionary and more sustainable method of agriculture than its counterpart as it lowers the requirement of water to up to 70% (about 1/10th of that used in traditional farming) by offering precision irrigation and systematic scheduling.

Increasing population and urbanization can lead to shortage of land for agriculture which results in food scarcity as quality food demand could exponentially surpass supply. It is estimated that by 2050 we will need 70% more food to meet the demands of 3 billion more inhabitants worldwide (The United Nations 2017). In these circumstances, vertical farming is one of the transformative solutions to this global challenge.

TYPES OF VERTICAL FARMS

Vertical farms come in all different shapes and sizes, from simple two-level or wall-mounted systems to large warehouses. But all vertical farms use one of three soil-free systems for providing nutrients to plants-hydroponic, aeroponic, or aquaponic. The following information describes these three growing systems:

Hydroponics. The predominant growingsystem used in vertical farms, hydroponicsinvolves growing plants in nutrient solutions that are free of soil. The plant roots are submergedin the nutrient solution, which is frequentlymonitored and circulated to ensurethat the correct chemical composition ismaintained.

Aeroponics. The National Aeronautical and Space Administration (NASA) is responsiblefor developing this innovative indoorgrowing technique. In the 1990s, NASA was interested in finding efficient ways to grow plants in space and coined the term "aeroponics," defined as "growing plants in an air/mist environment with no soil and very little water."An aeroponic system is by far the most efficient plant-growing system for vertical farms, using up to 90% less water than even the most efficient hydroponic systems.

Aquaponics. An aquaponic system takes the hydroponic system one step further, combining plants and fish in the same ecosystem.Fish are grown in indoor ponds, producing nutrient-rich

waste that is used as a feedsource for the plants in the vertical farm. The plants, in turn, filter and purify the wastewater, which is recycled to the fish ponds. This simplifies the economics and production issues and maximizes efficiency.

Vertical farming systems can be further classified by the type of structure that houses the system.

- **Building-based vertical farms** are often housed in abandoned buildings but new building construction is also used in vertical farms.
- **Shipping-container vertical farms** complete with LED lights, drip-irrigation systems, and vertically stacked shelves for starting and growing a variety of plants. These self-contained units have computer controlled growth management systems that allow users to monitor all systems remotely from a smart phone or computer.

WHAT ARE THE PROS AND CONS OF VERTICAL FARMS?

Vertical farming provides number of environmental and social benefits over traditional farming listed as following:

INCREASED CROP PRODUCTION: Indoor farming can produce crops year-round.Crops would be sold in the same infrastructure in which they are grown, they will not need to be transported between production and sale centres, resulting in less spoilage, infestation, and energy required than conventional farming encounters.

PROTECTION FROM WEATHER RELATED PROBLEMS: Because vertical plant farming provides a controlled environment, the productivity of vertical farms would be mostly independent of weather, and protected from extreme weather events such as hailstorms, tornadoes, flooding, wildfires, and severe drought.

ENVIRONMENT FRIENDLY: Significantly reduces transportation distance, thereby reducing cost, energy and carbon footprint.

GROWING HIGHER QUALITY PRODUCE: Provides higher quality produce with greater nutritional value and a longer shelf life and there is no need of using harmful herbicides or pesticides.

VERTICAL FARMING FLEXIBILITY: It provides flexibility by growing over 80 varieties of leafy greens, micro greens and strawberries and also working on non-arable lands and close to major markets or urban centers which are scalable from small to very large food operations.

In spite of the advantages of vertical farms, below there are some disadvantages of vertical farming that works against its wider acceptability

Land and Building Costs: Urban locations for vertical farms can be quite expensive. Some existing vertical farms are based in abandoned warehouses, derelict areas, or Superfund sites, which can be more economical for construction.

Energy Use: Although transportation costs may be significantly less than in conventional agriculture, the energy consumption for artificial lighting and climate control in a vertical farm can add significantly to operations costs.

Pollination Needs:Crops requiring insect pollination are at a disadvantage in a vertical farm, since insects are usually excluded from the growing environment.

The vertical farm has the potential to playa critical role in the sustainability of food in urban areas. Vertical farming has various advantages over rural farming, observed within the three pillars of sustainability: environmental,social, and economic. New high-tech cultivation methods, including hydroponics, aeroponics and aquaponics, largely challenge the need for soil-based farming for a range of crops. Advancements in greenhouse and supporting technologies such as multi-racking mechanized systems, recycling systems, LED lighting, solar power, wind power, storage batteries, drones as well as computing power, software applications, databases and internet are likely to coalesce into efficient production systems in the near future. Increasingly, there is a need for interdisciplinary research and collaboration that promote collective thinking among the various disciplines involved in creatingvertical farms.This innovation in the field of agriculture with sustainability as its motto is providing healthy food, making more and more heads turn today with its eco-friendly methods and making the possibility of farming real in difficult environments.

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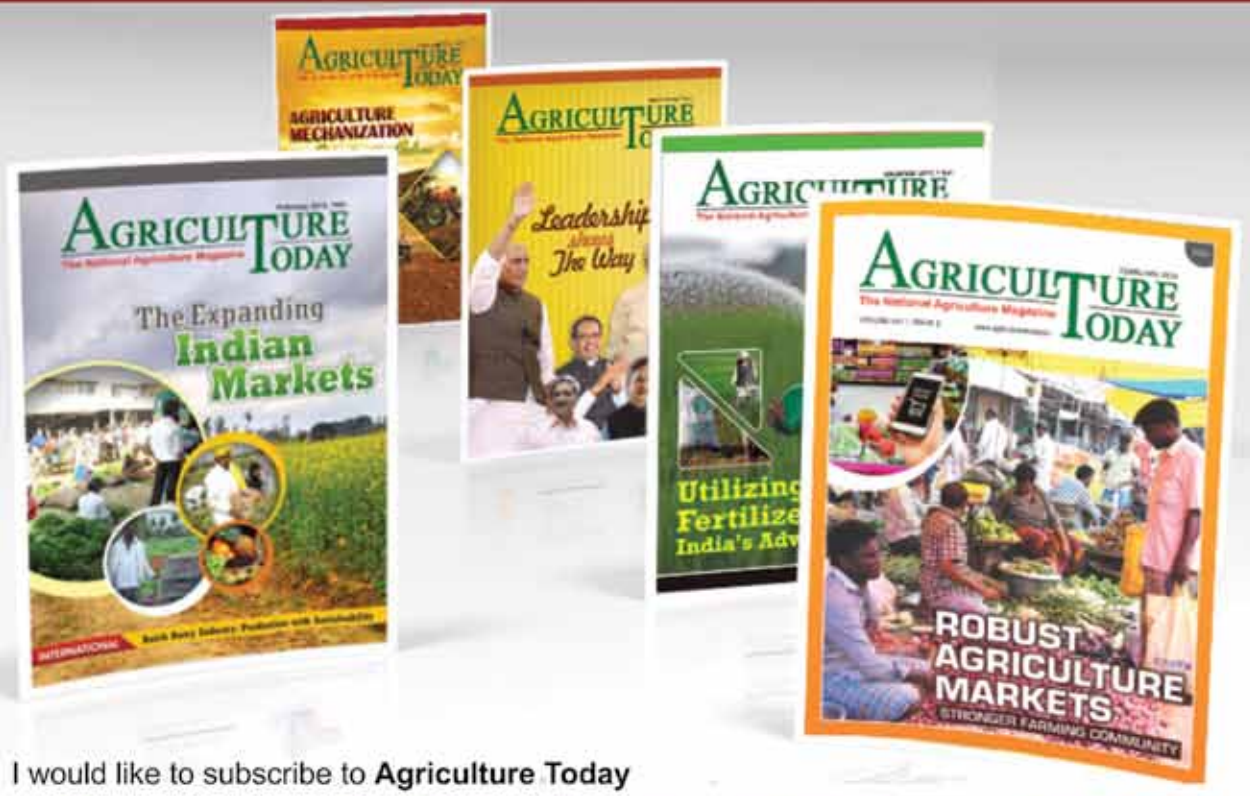

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AGRICULTURE TODAY

EARTH SUMMIT
WAY TOWARDS SUSTAINABILITY

The Earth Summits are decennial meetings of world leaders, organized since 1972 with the help of United Nations, to aid defining ways to trigger sustainable development at global level. The primary goals of the summit were to get an understanding of development that would support socio-economic development and prevent the continued deterioration of the environment and to lay a mutual foundation for global partnership between developing and industrialized countries. The first summit took place in Stockholm (Sweden) in 1972, the second in Nairobi (Kenya) in 1982, the third in Rio de Janeiro (Brazil) in 1992 and the fourth in Johannesburg (South Africa) in 2002. Last Earth Summit, called Rio + 20, also took place in Rio de Janeiro in 2012. The goal of the summit is to bring together the best individuals and organization humanity from all categories of life, to identify and update what are humanity's most pressing challenges that are quantified to develop a plan of action. This plan of action is called Agenda 21 and implemented by many local governments under the name Local Agenda 21.

Agenda 21 is a product of the Earth Summit. It is a global consensus non-binding comprehensive document/ action plan of the United Nations with regard to sustainable development. The number "21" in Agenda refers to the 21st century that has been affirmed and had a few modifications at subsequent UN conferences. It is an action agenda for UN, other multilateral organizations and individual governments around the world that can be executed at local, national and global levels. The work of the Commission was supported by numerous inter-sessional meetings and activities initiated by Governments, international organizations and major groups. Its aim is achieving sustainable global development.

Agenda 21 contains a detailed proposal for action in social and economic areas with 350 pages which is fragmented into 40 chapters. Each sectoral issue of health, human settlements, freshwater, toxic chemicals and hazardous waste, land, agriculture, desertification, mountains, forests, biodiversity, atmosphere, oceans and seas. Developments on most "cross-sectoral" issues are considered each year. These issues further to be effective, it has been clustered under 4 sections. The section I comprises Social and Economic Dimensions towards combating poverty, especially in developing countries, section II includes Conservation and Management of Resources for Development, section III encompass Strengthening the Role of Major Groups (women, children, farmers) and the section IV embrace Means of Implementation that includes science & technology transfer, international education institutions and financial mechanisms. Agenda 21 addresses today's pressing problems and aims to prepare the world for the challenges of the next century.

The 1972 summit gave birth to the United Nations Environment Program (UNEP) which aims in bridging the relationship between economic development and environmental degradation, at the UN Conference on the Human Environment, held in Stockholm. The UNEP which continues today to act as a global catalyst for action to protect the environment from problems like ozone depletion, global warming and water pollution which are currently accelerating at an alarming rate. In 1983 UN secretary asked the Norwain Prime Minister to create on organization independent of UN to focus on environmental problems, hence the World Commission on environment and development formed Brundtland commission. The Brundtland commission focused on the sustainable growth rate of both developing and industrialized

nations.

The third summit held in Rio de Janeiro, Brazil in 1992 launched the United Nations Framework Convention on Climate Change (UNFCCC), whose signatory countries have met annually since 1995. This is a complex process as each country needs to complete two steps to join viz., signing the treaty and ratifying it formally. The treaty enters into force only when sufficient number of countries have ratified it (the number varies from one treaty to another). The signatory countries of this type organize, roughly once a year, a conference of the parties (COP). Before each conference there is a preparatory meeting called the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) where governments negotiate the technical details of the treaty. This convention accounted to an official recognition that, climate change is a major global issue requiring governments to act, hence it is concerned with stabilization of greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

In 1995, the Commission established the Intergovernmental Panel on Forests with a broad mandate covering the entire spectrum of forest-related issues and dealing with conservation, sustainable development and management of all types of forests. The World Summit on Sustainable Development (WSSD), 2002 held in Johannesburg, South Africa, implemented to agree the Summit on world Sustainable Development. The concept of sustainable development dates back a long way but it was at the UN Conference on Human Environment that the international community met for the first time to consider global environment and development needs. The Conference led to the formation of the UN Environment Programme (UNEP). They produced defined principles for the preservation and enhancement of the natural environment and highlighted the need to support people.

The United Nations Conference on Sustainable Development (UNCSD), also known as Rio 2012, Rio + 20 or Earth Summit 2012, was the third international conference on sustainable development aimed at reconciling the economic and environmental goals of the global community. The mammoth summit was organized by the United Nations Department of Economic and Social Affairs and included participation from 192 UN member states, including 57 Heads of State and 31 Heads of Government, private sector companies, NGOs and other groups. The primary outcome of the conference was the nonbinding document, "The Future We Want," a 49-page work paper. The Rio + 20 Summit focused mainly on two themes:

- A "green economy" in the context of sustainable development and poverty eradication.
- The institutional framework for sustainable development.

Another important achievement of the summit was an agreement on the Climate Change Convention which in turn led to the Kyoto Protocol and the Paris Agreement. Added agreement was "not to carry any activities on the lands of indigenous peoples that would cause environmental degradation or that would be culturally inappropriate". The Convention on Biological Diversity was opened for signature at the Earth Summit and made a start towards redefining the measures that did not inherently encourage destruction of natural ecoregions and so-called uneconomic growth. Rio Earth Summit also established the Commission on Sustainable Development (CSD) to ensure the compliance of agreements.

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SUPPORTING DOUBLING FARMERS' INCOME – SCIENCE OF DELIVERY

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The National Agricultural Research System (NARS) of India, broadly comprising the Indian Council of Agricultural Research (ICAR) and Central/ State Agricultural Universities (CAUs/ SAUs), stands out among all developing countries, as also at the global level. It is the output of NARS, that has enabled India to leapfrog from one of food deficiency to one of sufficiency, and surpluses in certain segments.

There is no gain saying, that science and technology (S&T) constitute the fulcrum of advancement. However, a nation can only rest on its laurels at its own peril. For, the context does not remain stagnant. It is always dynamic, throwing up new challenges that warrant a new response. The new paradigm in the agricultural situation of India emanates from the farmers' perspective.Notwithstanding an impressive growth in productivity and production across the agricultural sub-sectors, it has failed to generate required incomes for the farmers. This can be well deduced from the data-points, that 48 per cent of the country's population holds a share of just 14.50 per cent in the nation's overall Gross Value Added (GVA). Knowing that welfare of the farmers is largely predicated upon the average incomes they earn, the logical conclusion is that much is desired to be improved upon. Hence the need for a mindset change of science community engaged with agriculture. This transition can be encapsulated as one from 'Science of Discovery' to 'Science of Delivery'.

SCIENCE OF DELIVERY

This is a disruptive approach to research & development (R&D), as it aims to focus on 'How' to realise large and sustained impact drawing from knowledge management & diverse methods of sharing. These include large scale demonstrations to communicate decisions, adapt new approaches and change mindsets that accelerate the pace of innovation cycle. It also includes consideration of local conditions, context and culture while developing and delivering products and services. Further, the new approach has to enable the squeezing of transit time from discovery to delivery.

A better understanding among all the stakeholders,of the challenges relating to delivery, will significantly improve the ability of the system to achieve consistent and transformational impacts on farmers' fields and consumers' plates.

SCIENCE OF DELIVERY IS CHALLENGING

Being relatively a new concept among most scientists, development practitioners and extension agencies, there will be several challenges in popularising the same. While innovations are happening at break-neck pace, not all of them are being translated into practical tools. It is assessed, that optimally deploying various of these interventions could increase grain yield by atleast 50 per cent and resource use efficiency by 5-7 per cent; besides reduction in cost of cultivation by 20 per cent (Wani et al., 2017).

SCIENCE OF DELIVERY- COMPLEXITIES OF AGRICULTURAL SYSTEMS

Farming is a highly complex and risky business, arising from unpredictability of monsoons and fluctuations of markets. The problems are seen to be exacerbating on account of increasing water scarcity, land degradation and climate change. Variables that impact the outcome are the attributes of land, weather, markets, knowledge, access to inputs, support services, capital and infrastructure etc. This suggests the need for finding solutions that are designed to sync with the local needs and production situations. Science of delivery vis-à-vis agricultural development demands an ecosystem approach consisting of strengthened farmer organisations, efficient service providers and an enabling institutional framework.

In the context of income approach to agriculture, that warrants efficiency of monetisation of produce, market actors will demand high-quality agricultural advisory services. The expected demand will be for compressing supply chains to increase safe & secure delivery, integrate traceability and ensure steady&timely supply, while also being competitive in market place. The demand on R&D will be to keep these last mile obligations in mind.

ISSUES THAT SCIENCE OF DELIVERY SHOULD ADDRESS

- Accelerating the innovation cycle will require agricultural research to compress the long 'research-into-use pathway' into a 'shorter &more impactful pathway' that leverages participatory research framework. Apropos the last mile along the value system, ICT can help by providing real-time feedback on appropriateness by both producers and consumers. The researchers can then respond as needed quickly.
- Modernisation of agriculture can take advantage of the fast paced evolution of molecular biology and information technology, and facilitate development of new varieties that integrate all required production and market traits.
- Convergence of data (agriculture, nutrition, environment, hydrology, soil health, weather, farm diversification, markets, socio-economic status of target group, government schemes/ programmes etc.) is critical in implementation. Spatial Data Integration (SDI) offered through commercial cloud services will be a key component, as Artificial Intelligence can be deployed to distil complex and disparate data sets to aid actionable recommendations at farmers' level.
- Partnership with private sectors and agri-entrepreneurs will enable efficient value addition, delivery of inputs & extension services in double speed of time.
- Backward integration of supply chains will ensure greater market opportunities for surpluses of farmers.
- A consortium of government research organisations, private sector research bodies, government ministries, as also non-government organisations need to work concertedly and in coordination, for cost effective and speedy delivery of solutions.

TO SUM UP

All the previously published articles of this author by Agriculture Today have laboured to highlight the need for adopting demand-pull approach in preference to supply–push mode of agricultural production. The doubling farmers' income strategy also demands market-centric outcomes from research. In reference to this, the R&D apparatus has to remember that an agricultural value system is rooted in research farms and laboratories, and should always design their research project accordingly, keeping the final delivery in focus.

FOOD FRONT FOR INDIA

The Kashmir agro-tourism vista for heritage protection and safeguarding risked habitat

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Principle 4 of the United Nations Stockholm Declaration 1972 emphasizes on responsibly safeguarding and wisely managing human heritage and its habitat, which are gravely imperiled by a combination of adverse factors.

Kashmir represents unique habitat and aesthetic ecosystem having infinite socio-economic potentials. Agriculture has systemic linkage with evolution and development. Agro-ecosystems across the world formed basis of evolution and preservation of diverse societies and cultures. Many agricultural landscapes and farm settings yield efficient ecosystem functions, and many others support tourism as a win-win business. The heavenly abodeof Kashmir combines both these advantages.

The United Nations Food and Agriculture Organization (FAO) recognized in 2011, the 'Saffron Heritage of Kashmir' as one of the three Globally Important Agricultural Heritage Systems (GIAHS) identified in India.This heritage system engages 17,000 farm families cultivating saffron crop on 3,200 hectares of karewa soils of Pampore district of Kashmir (http://www.fao.org/giahs/giahsaroundtheworld/designated-sites/asia-and-the-pacific/saffron-heritage-of-kashmir/en/).

Saffron is an important cash crop mentioned in 5th century B.C.old Kashmiri records. It is a premium agro-produce and boon to the state's agricultural economy.

Hardly one per cent of saffron growers have to engage in any supplementary occupation due to its high income potential.Knowledge on this agricultural heritage is mostly in the custody of women. However, saffron farmers have to face stiff challenges, including market volatilities and spuriousness in international market. It requires focused policy support and incentives for developing saffron economy in Kashmir.

The United Nations Conference on the Human Environment (UNCHE) also issued its Stockholm Declaration 1972, including 6 proclamations and 26 principles, to exert common efforts for preservation and improvement of human environment to benefit humankind and posterity. Principle 2 of this declaration obligates safeguarding representative samples of natural ecosystems through appropriate and careful planning or management, for the benefit of present and future generations.Whereas Principle 4 entrusts humans with special responsibility to safeguard and wisely manage the heritage and its habitat, which are now gravely imperiled by a combination of adverse factors.

Kashmir, despite its own robust agricultural heritage, is also receptive to new technology and competitive business practices. A vast tulip garden exists in the backdrop of scenic Zabarwaan Hill facing Srinagar.Its brisk publicity on the Internet also plays catalytic role in promoting international business

HABITAT CONSERVATION FOR DEVELOPMENT IN J&K AND LADAKH

Union of India is already rightly backed by the United Nations mechanisms and principles for its recent moves aiming at inter-alia the heritage and habitat conservation for development in the Jammu & Kashmir and Ladakh territories. Strategically combating terrorism on their soil could potentially mitigate any psychological disadvantage forced upon the youth of Kashmir by the terror mongers. Also, fortifying their sense of belonging to native India could potentially help them achieve the sustainable development goals and attain competitive economic growth.

in gorgeous Kashmir tulips. While in bloom the tulip garden is yet another beautiful tourist destination in the already well-acknowledged 'heavens on earth'. This well planned, systematically introduced commercial agricultural activity is surely fetching new dividends to the economy of Kashmir.

The famous Moughal gardensin Srinagar, including Chashmashahi, Nishat and Shalimar Baag were established nearly 400 years ago for the amusement of Mughal Emperors. These gardens provide employment and subsistence support to many gardener families. Diffusion of such horticultural practices over the generations to adjoining areas in Kashmir has rendered the territory a prominent farm gate to market several delicious fruits, nutritious nuts and aesthetic flowers.

The choice of species and varieties introduced and cultivated in the Mughal gardens over the centuries has rendered them invaluable gene harbor and conservation bank of large agricultural biodiversity of premium value. Among the several economic trees and plants grown here are some of the best varieties of apple, pear, plum, almond, rose, dahlia and

other flowers. Tourists can enjoy seeing colors of rainbow, hues of sky, vibrancy of dancing and joyful flowers, and murmur and humor of bees and butterflies amidst the bio-richness of the garden ecosystem.

Kashmir is well known for its expensive Pashmina wool and handicrafts besides its melodious music and classical folk dances. Hearts and minds of tourists are also thronged with simplicity and polite behavior of Kashmiris and Ladakhis, and easy communication wavelength with them.

In recent past, however, the media reports suggest that Kashmiri youth fell prey to terror mongers who brainwashed them to become stone-pelters and temperamentally unsure. This forced psychological disadvantage to the habitat has affected tourism and economic development in Kashmir. They needed to be turned around to the peaceful national mainstream. Salvaging the obnoxious terror mindset and preparing the youth to conserve the unique Kashmiri heritage for posterity became a national priority.

Sustainability of Kashmiriyat and economic growth in Kashmir are paramount. Isolation in perpetuity threatened by socio-behavioral changes forced by terror mongers may not be good for its economic and socio-cultural growth. Nevertheless, given the opportunity and safeguard against terror psychosis, the youth could potentially outshine in developing the territorial agro-tourism economy. Broadly, the world is optimistic that the unprecedented, obligatory, humane and bold steps taken by Union of India are capable of materializing habitat protection, and bringing sustainable economic and cultural development in the constituent territories of Jammu & Kashmir, and Ladakh.

CAMEL DAIRYING
AN INDIAN PERSPECTIVE

Milk has been a part of human nutrition since time immemorial. Ancient people started rearing animals once they changed to small community from nomadic tribal society for reducing their work loads. Later people started to use the byproducts of these domesticated animals such as milk. As they were rich in nutrients, it has been consumed in different forms.India stands first in the consumption of milk and production. Dairy industries in India has been enormously successful with buffalo and cow milk rather than camel milk. The nutritional importance of camel milk is not well known because of its localized distribution in Rajasthan and Gujarat. But now the Governments of both states are promoting and investing in camel dairying. Our country, today, is not only consuming camel milk but also various byproducts like ice-creams and milk powder are being made from them.

CAMEL DAIRYING IN INDIA

Indian camels have the unique adaptive characteristics to survive in hot arid zones. In India the major reared breeds of camels are Bikaneri, Jaisalmeri, Kachchi and Mewari. The distribution of camels in India are mainly limited to Rajasthan and Gujarat. Reports show that in 2012

the camel population was 4 million. But later a drastic decrease in the number of camels were observed and according to 2014-2015 camel population, no more than 3 lakhs camels were found. The current scenario shows the state animal of Rajasthan; Camel may figure in IUCN Red list in near future as a critically endangered species. In this context, awareness of camel rearing becomes necessary. The camels are reared based on traditional knowledge for self-domestic use, breeding and selling purpose and people are not known about nutritional value of camel milk.

HUMAN –CAMEL RELATIONSHIP

Historically Raika/ Reberi community of Rajasthan is closely associated with camel in India and these communities observed several taboos. They are not allowed to slaughter or eat the meat, can't sell the meat nor the wool, nor the female camels. The only benefit of rearing camels for this particular community is that their traditional customs allowed them to sell male camels. However, now this kind of beliefs are ebbing away and most of the camel breeders sell camel milk.In reaction to the drastic decline in the population of camel, Rajasthan Government has declared Camel as their State animal in 2014 and camel breeders released a "Biocultural Community Protocol" in 2017 for its protection. Now the Government is actively supporting camel rearing because of its less population and the nutritional, therapeutic importance of its milk.

NUTRITIONAL COMPOSITION OF CAMEL MILK

Camel milk is generally opaque white with sweet and sharp taste. But the taste and quality of the milk which camel produce depends upon the types of plants which the camel feed on. Reports shows that the plants like bordi and untkantalo makes the milk sweet and neem makes it more bitter and salty.The fat content varies in the range of 2.7-3.6%. The major carbohydrate, lactose content in the camel milk is observed as 3.4-5.6% which is slightly higher than cow milk. Among 19 present amino acids, Proline, Glutamic acid, Serine, Threonine are found to be more than cow's milk. Camel milk can be suggested for milk allergic children or lactose intolerant people. In fact, camel is not a ruminant even though it ruminates. It is a tylopode. The milk composition is vastly different from other ruminants and the lactose present in the camel milk can easily metabolized by lactose intolerant people. The proteins present in camel milk can prevent and cure milk allergies. It is also rich in Vitamin C, Iron and Calcium with immunoglobulins compatible with human milk.

Nomads consume camel milk as fresh because of the presence of natural antimicrobial proteins and medicinal properties of the milk. Some studies have shown that the extracted lysozyme, lactoferrin, lacto peroxidase, immunoglobulin G and immunoglobulin A from the camel milk works against *Lactococcus lactis subsp. cremoris, Escherichia coli, Staphylococcus aureus, Salmonella typhimurium* and rotavirus. Several articles were reported on the therapeutic importance of camel milk and it can be

used for Rota viral diarrhea, diabetes, cancer, rickets, autism, tuberculosis, hepatitis, liver cirrhosis and to lactose intolerance or milk allergies and can improve general well-being.

THREATS TO CAMELS

Disappearance of the grazing land ultimately affects the population of camel. With very less plants to eat, they are left to starving which makes them vulnerable to several diseases and this slows down its reproductive capacity.

Many camels have lost their lives to diseases like Mange, a skin disease caused by parasitic mites and trypanosomiasis caused by protozoan parasites. Veterinary services are available only at veterinary hospitals or in medical camps and herders find it difficult to bring sick camels to the hospitals all the time.

Closure of traditional markets have reduced the sale of male camels. With the new rule coming into existence in Rajasthan, it has become very difficult to sell young camels. Even if this rule is for camel protection this has interfered with the income of herders. So nobody is willing to buy herds and the new generation is moving to some other jobs.

Lack of awareness of the therapeutic and nutritional benefits of camel milk and its constrained distribution are the reasons of its less availability in the market. Currently in India there is only one dairy "Kumbhalgarh dairy" that officially accepts camel milk and pays a decent price to herders. Recently Amul has started marketing of processed camel milk.

HISTORY OF CAMEL MILK PROCESSING AND MARKETING OF ITS PRODUCTS IN INDIA

Even though camel milk contains low fat and has high percentage of unsaturated fatty acids, the high vitamin and mineral content puts camel milk in the category of super foods. In 1996 Dr Kohler-Rollefson (Nari Shakti 2016 awardee) set up a nonprofit firm "Lokhit Pashu Palak Sansthan (LPPS)" for the working of camel breeders in Rajasthan. In 2008 LPPS set up a dairy project near Jaisalmer and started supplying camel milk locally for diabetic patients and later they started a small micro dairy "Camel Charisma" with a production capacity of 150 liters in a week in 2011. This micro dairy has the capacity of pasteurizing and chilling of 200-liter milk in a single cycle. Apart from camel milk they are the producers of camel milk soap,camel poo paper etc.

People living in deserts have been taking advantage of camel milk since ages. So to improve the market of camel milk across the world, Aadvik foods started its journey with camel milk and its products from 2015. They are the manufactures of camel milk powder, camel milk chocolate apart from pasteurized milk.

FSSAI fixed the standards of camel milk to be sold commercially in 2016. FSSAI has framed the standards of camel milk specifying the minimum content of milk fat and milk solids-not-fats as 3% and 6.5% respectively, but after stakeholder's consultation FSSAI brought down the value of fat (2%) and SNF (6%). Government aided dairy cooperatives in Rajasthan has worked hard for the standards even before FSSAI standards became public. Rajasthan's decision to make camel as its State animal in 2014 led to restrictions in slaughtering which worked for the advantage of promotion in the use of camel milk and its products

Recently Amul has also started marketing Amul Camel milk in 500ml PET bottles for Rs 50. They have claimed the shelf life of the product to be about 72 hours from the date of packing if kept under refrigerated condition or below 4 degree Celsius.

Despite its availability, India was a late entrant in the marketing of camel milk and now the Governments of Rajasthan and Gujarat have taken initiative steps to promote camel milk and its rearing. Beyond a beverage, it is a source of income to local herders and it is beneficial to the people who are suffering from different diseases like diabetes, autism, lactose intolerance. The challenges in the processing and marketing of camel milk is immense, but to embark in camel milk consumption and its marketing first of all awareness about its therapeutic importance should be done among public. Now India is witnessing the rising demand of camel milk which may fruitfully help in the protection of this critically endangered species of the desert.

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SOURCETRACE- DIGITAL SOLUTIONS FOR FARMERS' LIVELIHOODS

India is switching from the archaic agricultural practices with the use of advanced technology,with new wave of budding entrepreneurs and emerging start-ups leading the way to disrupt the agriculture sector in the country.SourceTrace have come up as an early player with an esoteric agriculture mobile software application which will lead in developing economies with a primary focus on sustainable agriculture and empowerment of smallholder farmers.

Agriculture in India and around the world, especially smallholder farmer agriculture,is plagued with a lot of issues. The issues range from lack of access to good quality inputs to access to finance and insurance, access to markets in addition to facing weather perils and pest and disease. Most of these issues can be overcome or at least minimized, if farmers and all the stakeholders in the value chain can be equipped with real-time information for decision-making and are able to adopt best agricultural practices. Digital Agriculture is one of the effective systems of collecting and processing data related to all agriculture activities throughout the value chain in order to increase the profitability, sustainability, and predictability of agriculture.

SourceTrace,a global company, has come up with a thorough understanding of the worldwide scenario in agriculture and have come up with a digital solution. Small-sized farms and a combination of very low literacy status have made it hard for small farmers to sustain any meaningful bargaining power with external players such as input suppliers or off-takers.About 450 - 500 million small and marginal farmers in the world, are facing issues related to the digitalization. In addition, the small size of farmland makes it less attractive and risky for financial institutions for credit and crop insurance.Similarly, any digital interventions in agriculture cannot be dealt with smallholder farmers directly – a sophisticated agency needs to intervene and handhold, in order for digitization to have a profound meaningful impact.So to cover up the digital gap among farming society it is important to aggregate farmers into sizeable groups. This could be through the formation of cooperatives or farmer producer companies, or through

contract farming by agribusinesses, or supported collectively by government extension services. Digitization of agriculture in developing economies is still at its nascent stage. The evolving technologies such as ubiquitous connectivity combined with advances in technologies such as Big Data, Remote Sensing, Artificial Intelligence and Machine Learning, IoT, Drones and Blockchain are going to have an insightful impact on the way food production is planned, produced, marketed and consumed in the years to come - all for the betterment of farmer livelihoods, while also minimizing the impact on the planet. SourceTrace's digital solutions are working to improve

the farmers' livelihoods by providing greater access to global markets and customers, improving productivity through efficient use of inputs and reliable procurement processes and minimizing risk by access to timely knowledge and Information.

Traceability is one of the strong points of SourceTrace capabilities and has implemented very advanced traceability solutions for various value chains around the world.IT tools have a very important role to play in the traceability of farm produce. It is hard to conceive any meaningful traceability without proper IT tools. Some of the examples include organic cotton value chain from farmtobrand and QR-code based traceability for fresh produce and aquaculture. SourceTrace has also begun work with blockchain technologies and is in the process of implementing traceability and smart contracts solution enabling Haiti fruit growers to sell directly into US markets.

SourceTrace is one of the early players to attempt the digitization of smallholder farmer agriculture and it took a certain time to get the traction and scaled up to more than 1 million farmers in 26 countries. SourceTrace has come across many challenges while implementing its software application for farming society. Firstly, there is very limited margin in agriculture; so convincing farmer groups, agribusinesses or government agencies to invest in advanced digitization technologies was not easy. Secondly, the low literacy levels and sophistication of the field-level management and staff made it tough to implement on the ground even when the higher-level management was willing to understand the benefits to the overall organization. In addition, there was also inherent resistance for implementing any technology which makes the field staff more accountable.

Besides that at the policy level, achieving inclusive growth in agriculture is also important to strengthen the linkages between agriculture and

its development. For that, sound government policies are very important which ultimatelyimpact a large section of their population. The solitary and the most important thing that a farmer requires is a good market and a guaranteed support price.

Agriculture impacts the livelihood of more than 2 billion people worldwide who are living at the margins. Improvements in agriculture sustainability and farmer communities have not only economic and social impact, but also on the environment. SourceTrace has been contributing one or the other way to implement sustainable development goals. The first two goals are, Zero Hunger and No Poverty, which are contributed directly, as per the solutions provided, farm management has been improved as a result, the productivity of the farm, income, and livelihoods of farmers. Beside that indirect solutions have impacted several other UN SDGs such as Good Health and Well-being, Decent Economic Growth, Reduced Inequalities, Responsible Consumption and Production, and Climate Action. This is accomplished by aiding sustainable farming communities through certification, which help in sustainable and ethical production practices throughout the value chain.Certification demands certain norms to be followed which guarantees a better standard of life for small and marginal farmers in rural areas.Cotton, coffee, cocoa, and palm oil are some sectors in which certification have already made a positive impact.

SouceTrace have come across a long way and have many success stories to embrace which has helped to build up trust and confidence among masses. One of which is Chetna Organic Agricultural Producer Company Limited, a pioneer in promoting organic cotton in India which is operating across 43,500 acres in Andhra Pradesh, Maharashtra, and Telangana. Also SourceTace has provided solutions for farmer's management, certification, and traceability to one of its customers. Traceability is the capability to track back and track forward at any point in the supply chain. It is a critical factor that help brands identify the source of raw material, especially when catering to today's mindful consumers who are looking for sustainably and ethically sourced products. As a result of better solutions provided, more than 20 clothing brands based in New York and London who are focused on highly ethical fashion have decided to procure all the organic cotton produced by Chetna ensuring Chetna's cotton farmers with a direct and guaranteed market and premium price for their produce. Another instance in which farmers have directly benefited by SourceTrace Solution is Cargill Cocoa and Chocolate. West Africa is the hotbed of cocoa production, and Cargill engages more than 220,000 cocoa farmers in Ivory Coast, Ghana, and Cameroon. Cargill is utilizing SourceTrace solutions for implementing Cargill's ambitious program called "Cargill Cocoa Promise" which aims to increase certified cocoa procurement and decrease deforestation and child labor in their supply chain.

Mr. Venkat Maroju,
CEO, SourceTrace Systems

I have a request for our farming community... We are going to celebrate 75 years of our Independence. Gandhi has shown us the path. Can we reduce the use of chemical fertilisers by 10 to 25 per cent in our farm lands

NARENDRA MODI
Prime Minister

"The global trends of a growing inequality, shifting demographics, increasing urbanisation and changing climate have created a global challenge. We have to increase food production while protecting the environment from biodiversity loss and climate change"

KUNDHAVI KADIRESAN
FAO Assistant Director-General and Regional Representative for Asia and the Pacific

"India exports 65% edible oil and to reduce this quantity, we need to develop a variety of oilseeds. The use of GM crop is a much-debated issue. However, countries from where we import edible oil also use GM technology. I am not an expert and cannot decide whether it is good or bad. So there must be some certification for the use of GM crops and if they can be certified as per our rules and regulations, then use of GM crops should be allowed"

DEVENDRA FADNAVIS
Chief Minister, Maharashtra

"Despite working hard, farmers does not earn enough. Therefore ensuring social security is important. We have taken several measures to ensure better income and the Pradhan Mantri Kisan Maan-Dhan Yojanais yet another effort towards this direction"

NARENDRA SINGH TOMAR
Agriculture Minister