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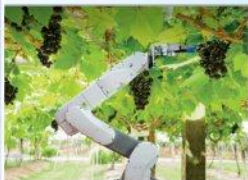
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FARM MECHANIZATION

Ensuring Productivity and Livelihood Security



Agriculture in Japan
Powered by Innovation



President	Dr. MJ Khan
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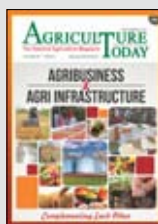
Circulation Incharge Rajkumar

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Graphic Designer A. Rehman

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E-mail: editor@agriculturetoday.in
business@agriculturetoday.in



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From the Editor's Desk**FARM MECHANIZATION – FASTER ROUTE TO FOOD SECURITY**

Farm Mechanization in India in the last few years has demonstrated impressive growth. Indian agriculture, heavily dependent on manual labor, has started moving away to automation owing due to a host of factors. The declining labour force, spiraling labour charges and most importantly the considerable pressure that has fallen upon the farms to be more productive and efficient has fuelled this trend.



Besides the obvious reasons of production increment, several other factors have favoured the introduction and expansion of mechanization in agriculture. Labor shortage is experienced during peak seasons due to the enactment of the National Rural Employment Guarantee Act and huge demand from the construction sector in cities, is an important determinant. The support from the government through schemes and subsidies have also been able to generate interest among the farmers. Besides, low Penetration of Farm Equipment provides a strong growth opportunity. Increasing the yield from the same land is an urgent requirement to meet the needs of a growing domestic population. This limitation can only be overcome by increasing the food productivity, for which farm mechanization plays a vital role. Emergence of custom hiring centers have also given another reason to adopt farm mechanization. Around 85 per cent of India's agricultural lands belong to marginal and small farmers with farms less than two hectares. This set of farmers find it difficult to purchase farm equipment which needs significant investment. Custom Hiring, under these circumstances solve an important issue faced by them who struggle to optimise their usage of modern machinery mainly due to adverse economies of scale, especially in operations like land harvesting and preparation.

While tractors and power tillers still outsell other farm equipment like paddy transplanters and combine harvesters, the gap has closed in recent years. This is creating a big market for specialized machineries, such as threshers, rotavator, transplanters, reapers, zero till drills, laser levellers and power weeders.

Alongside the opportunities, challenges are also immense for absolute farm mechanization in India, the most significant being the small land holdings of the farmers. Research and development, hence should be directed towards development of machines that are suitable for smaller land area and which is economical, ergonomic and gender sensitive. Indian agriculture has an unusual penchant towards investing in tractors. It is to be noted that for a sustainable agricultural future, other farm implements, and not just tractors, need to be advanced to farmers in the country. The entire process of acquiring farm equipment is very tedious and cumbersome for a farmer. Besides these, the financial obligations, the discontinuous after sales service options and most importantly the lack of awareness regarding the efficient and important machines and implements in agriculture are impediments in the adoption of farm mechanization in India.

Mechanization can no longer be considered to be superfluous. In this context of declining resources and increasing demand, automation can help us achieve our goal of food security faster and efficient.

Anjana

Anjana Nair

CONTENTS

VOLUME XXI | ISSUE 10 | OCTOBER 2018



Cover Feature

FARM MECHANIZATION ENSURING PRODUCTIVITY AND LIVELIHOOD SECURITY



International

AGRICULTURE IN JAPAN POWERED BY INNOVATION

Editorial	01
Editorial Comments	04
News Corner	08

Cover Feature

Farm Mechanization - Ensuring Productivity and Livelihood Security	18
---	----

Success Story

Returning to Roots	28
--------------------	----

Interview

Eco Agriculture for Evergreen Revolution	30
--	----



Spices

Golden Condiment (Saffron) on its Way Out in India	32
--	----

Perspective

Agricultural Growth	34
---------------------	----

Opinion

SOIL ... Secrets	37
------------------	----

International

Agriculture in Japan: Powered by Innovation	38
---	----

Different Strokes	56
-------------------	----



धानुका खेती की नई तकनीक

हर किसान की सुरक्षा के लिए

• खरपातारपातार • बीटपातार • कबूतरपातार • उपजसर्वक

रहिमन पानी राखिये, बिन पानी सब सून । पानी गये न ऊबरे, मोती, मानुष, धून ।।

वर्षों पहले से हमारे पूर्वज
पानी के महत्व का वर्णन कर गए हैं ।

पुराने समय में पानी का स्रोत
नदी, कुएं, झरने इत्यादी हुआ करते थे
और पानी का उपयोग
आवश्यकता अनुरूप होता था ।

आज आधुनिकता के दौर में
हम जमीन से ज़रूरत से ज्यादा पानी निकाल रहे हैं,
जो उपयोग कम और बर्बाद ज्यादा होता है ।
जिससे भू-जल दिन प्रतिदिन कम हो रहा है
और कुछ सालों बाद शायद पूरा ही खत्म हो जाये!

अब सवाल उठता है
कि हम हमारी आने वाली
पीढ़ी के लिए कितना पानी छोड़ना चाहेंगे ?

इस परिस्थिती को भांपते हुए
धानुका ने 2005 में नारा दिया था,

"खेत का पानी खेत में – गांव का पानी गांव में"
बचावे पानी की हर बूंद ।

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अपने घर में, स्कूल में, फ़ैक्ट्री में, संस्थान में, गाँव में....
अधिक जानकारी के लिए कृपया सम्पर्क करें
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खेत का पानी खेत में



बचावे पानी की हर बूंद

गाँव का पानी गाँव में



Dhanuka Agritech Limited

14th Floor, Building 5A, Cyber City, DLF Phase-III, Gurugram-122002 (Haryana), Phone No. : 0124-3838500,
Fax: 0124-3838888, email: headoffice@ghanuka.com, Web: www.dhanuka.com

AASHA – PM's New Hope

PM AASHA- the new scheme intends to ensure MSP to farmers

Prourement of food grains and ensuring minimum support prices to the farmers have always remained an issue of considerable contests and difference in opinions. While the first part of 2018 was rattled with the calculation of minimum support prices, the period leading to the procurement season has seen policy tweaks to ensure income support and satisfaction to farmers. The new PM AASHA (Pradhan Mantri Annadata Aay Sanrakshan Abhiyan), the Umbrella Scheme comprising of Price Support Scheme (PSS), Price Deficiency Payment Scheme (PDPS) and Pilot of Private Procurement & Stockist Scheme (PPPS) has thus been introduced.

MSP in general has not been able to meet the purposes, in its entirety, for which it was instituted. It has been realized that merely increasing MSP year after year was not sufficient to realise its full benefits. So through this umbrella scheme, the government intends to purchase notified commodities, either at MSP or through indirect means to ensure that MSP is provided to the farmers.

The pre-existent Price Support Scheme (PSS) has been expanded to include the physical procurement of pulses, oilseeds and Copra where in the Central Nodal Agencies and State governments would take the lead. It is also decided that in addition to NAFED, Food Cooperation of India (FCI) will take up PSS operations in states /districts. The procurement expenditure and losses due to procurement will be borne by Central Government as per norms. Under Price Deficiency Payment Scheme, inspired by the Bhavantar Bhugtan Yojana of Madhya Pradesh, which pays the difference between the MSP and the market price, all oilseeds for which MSP is notified are expected to be covered. The direct payment of the difference will be made to pre-registered farmers selling his produce in the notified market yard through a transparent auction process. This scheme does not involve

any physical procurement of crops as farmers are paid the difference between the MSP price and Sale/modal price on disposal in notified market.

Another notable feature of this scheme is the involvement of private sector in procurement operation. In the case of oilseeds, states have the option to roll out Private Procurement Stockist Scheme (PPSS) on pilot basis in selected district/ APMC(s) of district involving the participation of private stockiest. The pilot district/selected APMC(s) of district will cover one or more crop of oilseeds for which MSP is notified. Since this is akin to PSS, in that it involves physical procurement of the notified commodity, it is expected to substitute PSS/PDPS in the pilot districts.

PPS which has a longer history in the country and which procures the commodities on MSP, needs to be reinforced with better infrastructure. MSP, the price support for the farmers, although stood the test of time has been contested for its poor reach and hence its purpose. Awareness remains the key for the success of any programme. The success of the scheme hence hinges on the provisions for expansion of the infrastructure and procurement means and also on the awareness component. The PDPS, although abdicates the government from the responsibility of physical procurement and hence from the associated infrastructure machinery associated with it, there remains rather murky areas as well. Fear of an artificially induced slump in prices by traders is extant. The idea of compensating for the losses suffered by the farmer at the hands of the traders are further fuels market distortions.

PM AASHA is in extension to the recent increment of MSP and hence tries to derive the maximum advantages of MSP through different means. These measures are all in line with the larger purpose of compensating the farmers and ensuring a steady income. However, there should also be a concomitant investments in building logistics and infrastructure and increasing awareness.

Kerala Agriculture – Post Floods

Reclaiming farm lands post flood is going to be a task of mammoth proportions

After, a historical flood that ravaged Kerala submerging and eroding vast stretches of land that displaced farms, roads, houses and lakhs of people, the state has embarked upon a long journey of rebuilding. The task at hand is a mammoth responsibility, as the state is staring at colossal losses in terms of infrastructure, livelihood, resources and most importantly morale. Although Kerala's agriculture contributes less than 10% of the state gross domestic product, the sector occupies an important position in the livelihood security and the ecological balance of the state.

The net area under cultivation occupies 52.06% of the total area in the State. Unlike the rest of the country, the agriculture scene in Kerala is dominated by perennial plantation crops. Coconut, rubber, arecanut, pepper, coffee, cashewnut, cardamom and tea — account for more than 65 per cent of total cultivated area in the State. Paddy occupies less than 10% of the net sown area of the state.

The perennial nature of the crops have warranted replanting in vast stretches of area. Unlike the annual crops such as vegetables or rice, plantation crops need time. Pepper will take four years of minimal harvest, rubber about seven years, and coconut up to 10 years to start yielding to its fullest potential. The farmers are expected to wait for a considerable amount of time, before they can realize returns on investment. The state is thus expected to provide a long time support to the farmers. The state endowed with resources was already seeing a considerable decline in agriculture. The flood is therefore feared to alienate even the practicing farmers from agriculture, considering the economic losses and time required to reclaim the lost glory of these farms.

However, this could be a good time to review the status of crop insurance in the state. Kerala has only insured just about 2% of the gross cropped area and covered banana, paddy and tapioca under

the Pradhan Manthri Fasal Bima Yojana (PMFBY) launched in 2016. Under the more popular, weather-based crop insurance scheme, Kerala has covered areca nut, banana, cardamom, ginger, pepper, pineapple and sugar cane. During the kharif 2017 season, 25,666 loanee and 2,593 non-loanee farmers insured their crops and paid a premium of Rs 3.76 crore, while the gross premium was Rs 12.45 crore. Against the estimated claims of Rs 9 crore, the insurance companies settled claims of Rs 6.12 crore, benefiting 14,694 farmers. If the crop insurance scheme had covered more area and farmers were encouraged to insure their crops, it would have been a source of great relief.

Beyond crop insurance and the gargantuan groundwork that need to be followed, it will also be a right time to think about the future course of developmental activities to be pursued by the state. The new development model should be centered around sound principles of ecology, economics, and sustainable development. With the overpowering need to supplying the inputs for agriculture, it will also be a great opportunity to work upon climate smart agriculture. Flood and drought tolerant varieties, soil and land conservation measures, emerging pest and disease problems will become crucial issues. Another area of concern is the change in soil characteristics. The floods and erosion following landslides have washed away resource-rich soil in many parts. The soil pH was also found to be altered. The agricultural lands need to be subjected to soil testing to derive at the package of practices that need to be adopted to ameliorate the situation.

What the state is looking at is the complete upheaval of the agri sector. Rebuilding farms post floods is a huge obligation as these farms and farmers need to be better poised to sustain and overcome natural calamities in future. This opportunity can be seized upon to deliberate and develop a climate suitable package for the state and not repeat the earlier mistakes.

Simmering Stubbles

Stubble burning has to be managed effectively

Late October, the farms spread across the rice growing belt of North India, especially Haryana and Punjab burn, sending up plumes of smoke, the extent of which is felt across the NCR region. The practice of burning stubbles, post harvest of paddy has been one such tradition that has refused to fade over the years. Absence of an alternative and the inability of the authorities to enforce stricter measures has left this practice untouched. However, the increasing pollution levels choking the cities during the October-November months has called for an immediate intervention.

The agriculture centric states of Punjab and Haryana, the front runner states of green revolution, produces a significant amount of food grains essential for the food security of the country. The by product of paddy, straw which is also produced in huge quantities and which unfortunately finds no use in any other way are burnt away by the farmers to make way for the next crop. Resorting to burning stubbles has been an easier and economical process and has stuck with the farmers over the years. However, the ensuing pollution has persistently increased with years, with demands from every quarter, to put to rest the practise.

From the environment point of view, this is a serious issue that needs to be dealt with utmost urgency. It is not that the farmers are oblivious to the associated environmental problems. Stubble burning has so far remained the most effective way to eliminate the crop remnants from the fields and make the field ready for the next crop, wheat. There usually remains a very small window between the harvesting of paddy and sowing of wheat. Combine harvesters are therefore entrusted with the responsibility of harvesting, threshing and cleaning the separated grain at one go. The machines however, leaves about 80 per cent of straw (6-8" long) on the field. The left over straw which are practically

useless are burned as it is easier, faster and less expensive.

Over the years, many solutions to the problem have surfaced, although an effective one is yet to initiate at field level. As one of the reasons to stubble burning is to clear the field faster to make way for wheat sowing, the preceeding crop, in this case paddy, can be of short duration variety. Breeding for a reduced duration can help extend the planting window for wheat. But it still leaves behind stubbles. The most viable technology available currently to address this issue is Turbo Happy Seeder (THS) which is a tractor-mounted machine that basically cuts and lifts the standing stubble, drills the wheat seeds into the bare soil, and deposits the straw over the sown area as a mulch cover. The THS not only dispenses with the need for burning residue, but actually allows wheat to be planted even on fields containing straw. This takes care of the standing crop residue.

Besides technical interventions, technology to convert paddy straw into economically important products can be a route that can be pursued. Ethanol production from paddy straw has been addressed recently which can be taken up if conducive policies are developed. Besides this the state governments need to actively pursue this issue consistently. So far the states has not been very effective on cracking down on this not so clandestine activity. Farmers, a prominent vote bank in these regions cannot be pressurized into adopting an alternative way of clearing the fields as stubble burning. Every year from October- November, this problem pops up, the state governments acknowledge the problem and move on.

No matter whatever technological advances are made, until an effective leadership is established to navigate the issue and reach a consensus, stubble burning will continue and the entire region will be plunged into a smothering smog.

Shifting Policy Perceptions

Jhum Cultivation needs an inter-ministerial approach

Jhum cultivation practised for centuries in the North East, has remained controversial in its operation and execution. Considered archaic and detrimental to the environment, Jhum practitioners had endured years of policy neglect and contradictions. Similar sentiment was echoed in the recent Niti Ayog's publication that recommended that the Ministry of Agriculture should take up a "mission on shifting cultivation" to ensure inter-ministerial convergence. This comes in the wake of the fact that this type of cultivation has been misrepresented and misunderstood in many policy statements.

Jhum cultivation also referred to as the slash and burn agriculture, is the process of growing crops in patches of land after clearing the land of trees and vegetation and then burning them. About half a million families in northeast India practice jhum, over an area of roughly half a million hectares (5,000 square kilometres). Considered as detrimental to environment due to the emission of greenhouse gases, soil erosion and subsequent siltation in reservoirs and loss of nutrient rich top soil, the type of cultivation has been recommended to be banned. However, certain studies have also revealed that soil recovers its nutrients after a forest patch has been cleared for agriculture and the patches that lie fallow for several years have higher pools of nitrogen and phosphorous. The study also found organic matter in the soil of the oldest fallow is not significantly different to that found in uncut forests indicating that long-fallow shifting cultivation can be sustainable. Beyond the reasons and rationale associated with environmental effects, policies and perceptions rarely look at the 'human element' involved. Not only are their livelihoods, but Jhum cultivation practices have deeper social and cultural connect with the lives of its practitioners. Jhum cultivation should therefore be approached respecting the interests and traditions of the people involved.

Unfortunately, the cultivation practice have elicited divergent approaches from the Central as well as State government departments of forests and environment,

agriculture and allied departments. Shifting cultivation lands fall under the purview of agriculture when they are in the cultivation phase, but the same lands come under forests during the fallow phase. Thus, the same piece of land is subjected to different laws, regulations and management, which become self-contradictory. It affects upland farmers, restricting their control, decisions and investments on such plots. The document has therefore called for policy coherence, emphasizing the fact that land for shifting cultivation should be recognised as "agricultural land", where farmers practice agro-forestry for the production of food rather than as forestland.

According to the report, the fundamental characteristic of shifting cultivation—two different types of land use on the same piece of land—has never been considered while formulating policies on managing shifting cultivation. The oversight has led to the present policy incoherence and contradictions in the management of shifting cultivation.

Shifting cultivation fallows must be legally perceived and categorized as 'regenerating fallows', which may, if given sufficient time, regenerate into secondary forests. The government has to realize that the practice of shifting cultivation could increase forest cover through the regenerating fallows. Hence the report advises to duly recognize the fact and to give due credit to the practice. According to NITI Aayog, a review of all relevant legal regulations and frameworks should be initiated immediately to develop a solution that respects the rights of access and management of the recognized tenure holders.

A range of enabling programmes and policies is needed to provide the right environment to support communities to overcome the challenges. Hence the "Mission on Shifting Cultivation: Towards Transformative Changes" under the Ministry of Agriculture & Farmers' Welfare is highly warranted. The mission would set an institutional mechanism that ensures inter-ministerial convergence, particularly with the Ministry of Environment, Forest and Climate Change and Ministry of Development of North Eastern Region, as well as with other related ministries/departments at the centre and NE states.

Goodricke in talks to buy two tea estates from McLeod

➤ The Rs 730-crore Goodricke Group is in negotiations to acquire two plantations from the world's largest tea producer, McLeod Russel of the Williamson Magor Group. Goodricke hopes to add 4.1 million kg capacity (mkg) through the acquisition of 2.6 mkg capacity at the Bargang tea estate and 1.5 mkg at the Harchurah tea estate in Assam. Considering McLeod's last sale of four gardens with four mkg capacity to Luxmi Tea at Rs 141 crore, the proposed acquisitions could cost Goodricke about Rs 143 crore. Goodricke MD and CEO Atul Asthana acknowledged that the company is in negotiations with McLeod but denied being anywhere near to closing the deal. He also refused to confirm the names of the estates. The Rs 1,596-crore McLeod Russel has sold 12 Assam estates with a total capacity of 14 mkg at Rs 472 crore since June to pare debt (Rs 976 crore as on March 31, 2018), as well as to acquire overseas assets and invest in the packet-tea segment, where the company has a small presence.



Maha, Tata join hands to compile farming data

➤ Amidst falling productivity and uncertainty over crop production due to change in weather, the state and Tata Trust will launch a pilot project in six tehsils covering 769 villages for the compilation of real time data for farming. Six tehsils comprise Baramati, Kamthi,



Wada, Achalpur, Dindori and Philumri which will cover in all 3.19 lakh farmers. The state government and Tata Trust have recently entered into memorandum of understanding for the execution of pilot project during the ongoing Kharif crop sowing operations. An officer from the state agriculture department said, "The government issued notification in this regard. The Commissioner of Agriculture will share crop codes for each crop with Tata Trust and conduct joint trainings in collaboration with village talathis. On its part, the Tata Trust has developed farmer-friendly mobile application for self-reporting of crops by farmers. It will set up self-reporting innovation lab to support data mining. Tata Trust will examine existing registration module for registration of mobile numbers used by farmers crop reporting and set up district data centre." He informed that the self-reporting of crops by farmers will also simplify crop loan disbursement, payment of compensation in the wake of natural disaster. The Tata Trusts has offered its resources for a dedicated server and manpower. The

exclusive team will work with the state government and National Informatics Centre to bring in flexibility and speed to ensure that timelines are met. The hardware and the dedicated project lab will be supervised by state IT department to ensure security of data transactions.

Ruchi Soya's promoter sells 3.18% stake in firm

➤ Ruchi Soya's promoter entity has sold 1.06 crore shares, or 3.18% stake, through open market transactions, the debt-ridden edible oil firm said in a regulatory filing. The company has a total debt of about Rs12,000 crore. Ruchi Soya's promoter entity Disha Foundation Trust sold these shares on August 24. After the sale of these shares, the promoters' stake in the firm has come down to 38.88% from 42.06%.



Agri biotech firms form an alliance



➤ To promote adoption of global advances in agri-technology, seeds and plant breeding nine agri biotech companies have come together to form 'Alliance for Agri Innovation', a body to promote adoption of global advances in agri-technology, seeds and plant breeding in the country. Besides this, it will also work for enhanced investments in the area, create public awareness of the issues as well as work with government and regulatory authorities towards a more supportive policy environment, said Ram Kaundinya, Advisor to the Alliance. Stating that a few more firms were also expected to join the Alliance, he said the challenges faced by agri biotech companies pertained to the regulatory process, intellectual property protection and price control.

ICEX to enter farm futures market

❶ The Indian Commodity Exchange will mark its foray into the farm futures market next week, as National Multi-Commodity Exchange's 11 contracts migrate to its platform with the merger of the two bourses nearing completion, said Sanjit Prasad, Managing Director and Chief Executive Officer of ICEX. The National Company Law Tribunal had approved the merger in August. "We expect to approach the Registrar of Companies with a detailed order of the NCLT allowing NMCE's merger into our exchange," Prasad told Cogencis. ICEX had relaunched operations barely a year ago with the world's first diamond futures contract and so far has just two contracts, including a steel long contract launched last month. Currently, NCDEX is the largest player in the farm futures segment, accounting for over 80 per cent of total volumes followed by MCX. ICEX is awaiting approval of the Securities Exchange Board of India to use the services of the Metropolitan Clearing Corp of India Ltd to comply with regulatory norm of having a mandatory independent demutualised clearing corporation by all commodity exchanges by the end of September.



Olam to retail sugar in India this fiscal

❶ Global agri-business giant Olam plans to enter the sugar retailing market in India before the end of the financial year in March, according to Bharat Kundal, Business Head-Sugar (India), Olam Agro India Pvt Ltd. "We will be piloting it in the beginning," Kundal told Cogencis on the sidelines of Kingsman Sugar Conference here today. "We will bring sugar packets of 1 kg and 5 kg, sachets of 5 gram, demerara sugar or brown sugar, sugar cubes, and some value-added products." Olam currently operates two sugar mills in India — one each in Madhya Pradesh and Maharashtra — and has a good presence in the business-to-business segment in the world's largest consumer of the sweetener. "Olam is also exploring possibility of private labelling," Kundal added. The share of branded sugar in the retail segment is still small as loose sugar is available at a significant discount.

Amazon plans to connect India's small tea growers to buyers abroad

❶ The Indian arm of e-commerce giant is keen to bring small tea growers (STG) into its Global Selling platform. This follows a staggering 310 per cent growth in Indian exporters using the Amazon Global Fulfillment channel last year, led by home décor, handicrafts and leather items. Amazon India has been aggressive in trying to get entrepreneurs from tier-2 and tier-3 cities to join its Global Delivery platform. This exposes them to a global market and raises their revenue with foreign exchange earnings. It says a little over 120 million made-in-India products are being offered to Amazon's worldwide customer base, via Amazon Global, the exporters being a little over 37,000. The list has big names such as Dabur, Titan, Himalaya, Manyavar, Amul, and Liberty.



And, individual enterprises StonKraft, Callista and others. Most of these small sellers are in the business of textiles, leather, tapestry, and handicrafts. Some tea retailers cater primarily to European markets. "Our Global Selling programme has witnessed huge interest from makers of home décor and handicraft items, books, health, and personal care, as well as exporters of tea, rice, and apparel across Assam," says Abhijit Kamra, head of global selling at Amazon India. Overall selection from Assam, he said, grew from 4,093 products in 2017 to 41,640 in 2018, a rise of over 900 per cent. Of a little over 100,000 STGs in Assam and the rest of the northeast, around 200 produce organic and handmade exotic teas. These are much sought in the European, Japanese and West Asian markets. However, these producers mostly aren't able to export directly to buyers in those countries. They, instead, have to sell to exporters from India, at much lower prices.

Centre may raise ex-mill sugar price

➤ The government may increase the ex-mill price of sugar at factory gate to Rs 33-34 per kg against the current rate of Rs 29 and make it mandatory for private mills to export at least seven million tonnes next year to tide over the crisis of high arrears of cane-growers. The cane arrears usually peak in April, which would be just a month before the Lok Sabha elections are slated and sugar cane farmers can influence the poll outcome of at least 100 parliamentary seats. The decision would be announced soon to help the millers prepare their action plan. Sources said these options are being considered keeping in mind that the peak cane arrears during April could touch Rs 40,000 crore due to bumper crop. "The government has no option other than taking a decision to address the concerns of farmers. The millers have said they cannot clear the arrears if the sugar rate at factory gate is Rs 29," an official said.



Cabinet clears new procurement policy

➤ The Centre has announced a Rs 15,053 crore scheme to ensure that farmers growing oilseeds, pulses and copra actually get the minimum support price (MSP) they are promised for their crops every year. The umbrella policy — Pradhan Mantri Annadata Aay Sanrakshan Abhiyan (PM-AASHA) — was approved by the Cabinet Committee on Economic Affairs. According to an official statement, it clubs together an existing procurement scheme with newly introduced options — meant for oilseeds only — of additional procurement by private traders or a cash payment scheme. Apart from the Rs 15,053 crore to be spent over a two-year period to implement the scheme, the Cabinet approved an additional government credit guarantee of Rs 16,550 crore for agencies undertaking procurement. "The government is working with a holistic approach... Increasing MSP is not adequate and it is more important that farmers get the full benefit of the announced MSP," said the statement. The government announces minimum support prices for 23 crops every year. This year, these rates were set at 50% higher than the farmers' production costs, including that for labour. The rates are meant to give remunerative prices to the farmers and assure them of some profits. About one-third of the harvest of the two major foodgrains, rice and wheat, are procured by the Centre at the MSP for sale in ration shops. However, most of the 21 other crops are sold at market prices, often below the MSP, as the government's procurement operations are temporary.

Centre hikes ethanol prices

➤ The Centre has hiked ethanol prices, with a special incentive for ethanol directly produced from 100% sugarcane juice, in a dual bid to reduce both surplus sugar production and the fuel import bill. The ethanol produced from sugar is blended with petrol. The decision was taken by the Cabinet Committee on Economic Affairs at its meeting. The price of ethanol derived from 100% sugarcane juice is raised from Rs 47.13 to Rs 59.13. The rate for ethanol produced from B-heavy — or intermediary — molasses has been raised to Rs 52.43. The rate of ethanol produced from C-heavy molasses (which has no sugar left), however, has been marginally reduced to Rs 43.46. By increasing the price difference between ethanol with no sugar left and that of fully made up of sugar to almost 35%, the Centre has given sugar mills a clear incentive to increase ethanol production from sugar. In fact, oil marketing companies have been told to prioritise ethanol from 100% sugarcane juice followed by B-heavy molasses, said a statement. The companies will also pay GST and transportation charges, it added.

Fertilizer firms told to keep required urea stock ready

➤ The State Government has asked fertilizer companies to maintain required quantity of stocks of urea for timely supply to the needy farmers since the cultivation of paddy is expected to go up by 2 to 3 lakh hectares against the normal extent of 9.5 lakh ha this kharif season. In a meeting with the representatives of fertilizer companies and officials of the Agriculture Department and Markfed held recently, Agriculture Production Commissioner (APC) C. Parthasarathi stated that transplantation of paddy under different water sources, excluding the ayacut under Nagarjunsagar and Sriramsagar projects, was nearing completion. But it could be taken up in another 2 to 3 lakh ha under the two projects since they have received sufficient water. Use of urea was also likely to be above normal in the next rabi season with the availability of ample water in most of the projects, Mr. Parthasarathi said and directed the representatives of NFCL and SPIC companies to supply urea in accordance with plan for August. The officials of NFCL stated that the companies two plans would start production soon.

Maharashtra tops in covering 'non-loanee' farmers under PM's crop insurance scheme

Seventy-two per cent of Maharashtra's farmers insured under the Centre's flagship crop insurance scheme come under the non-loanee segment. The figure, for kharif 2018, is the highest in the country. A total of 86.17 lakh of the State's farmers were insured under the Pradhan Mantri Fasal Bima Yojana (PMFBY) between July and September, which corresponds to the kharif season. Non-loanee farmers are those who do not avail any agricultural loans. The success of the programme is being attributed to the mobilisation by Common Service Centres (CSCs). Fifty-eight per cent of Tamil Nadu's insured farmers were non-loanees, placing the State second in the country. Of the 2.15 lakh farmers insured from Tamil Nadu, 1.26 lakh come under the non-loanee segment. This is followed by Odisha, with the State covering 2.6 lakh, and West Bengal, which covered 2.06 lakh non-loanee farmers, according to the data compiled by the Government. According to the data — obtained through sources as the information is yet to be made public — the CSCs mobilised 71 per cent of the total non-loanee farmers who had registered for the scheme during the kharif season. Non-loanee farmers accounted for 5 per cent of the total coverage under pre-PMFBY crop insurance programmes, the sources said. Launched by Prime Minister Narendra Modi on February 18, 2016, PMFBY is the Centre's flagship scheme to insure crops against the vagaries of weather and other risks. Farmers pay a premium of 2 per cent (of the total premium) for the kharif season and 1.5 per cent for rabi crops.

Bihar government pushes agriculture loans to boost productivity

With the Bihar government targeting to disburse loans of Rs 60,000 crore to farmers this financial year and the disbursal in the first quarter (April to June) being just Rs 8,755 crore, the agriculture department plans to hold a series of camps across the state to encourage farmers to take loans and raise productivity. After the state government's third agriculture roadmap was launched by President Ramnath Kovind in November, the agriculture department has been implementing various schemes to ensure a rise in productivity and the earnings of farmers. The roadmap, in which 12 state government departments are stakeholders, is a comprehensive five-year (2017-2022) project worth Rs 1.54 lakh crore that aims at making every sphere of agriculture modernised, competitive and financially rewarding. For Bihar, the year 2017 brought laurels in agricultural achievements as production of foodgrains in the state reached a record high at 185.61 lakh tonnes, pipping the previous record of 178.29 lakh tonnes achieved in 2012-13. Bihar also witnessed record maize production of 38 lakh tonne in 2017, and the state bagged the Centre's Krishi Karman Award for the feat.



Soon licence must for money lenders in Punjab

The Punjab Government has decided to streamline the system of money lending to farmers by fixing a limit on the advance on per acre of land, with the rate of interest also to be duly determined by the government. The cabinet also approved another bill to create a Price Stabilization Fund to ensure that farmers in the state get the Minimum Support Price (MSP) for their produce. The state cabinet today approved the introduction of Punjab Settlement of Agricultural Indebtedness Bill, 2018, in the Vidhan Sabha session. Bill, aimed at further relieving the state's farmers from the vice of debts, proposes a series of measures to protect the interests of the farming community, saving them from the clutches of unauthorized money lenders who charge exorbitant rates to give unlimited amounts as loans. With the enactment of the Bill, only licensed money lenders will be allowed to advance the money, with lending by others deemed to be illegal. Only these licensed money lenders will be allowed to move the debt settlement forums, which will be headed by Commissioners. The lender would be required to submit proof of the amount lent to the farmer. It has also been decided to bring down the total number of debt settlement forums from 22, as per the existing Act passed in 2016, to five. The new forums would be constituted at the divisional levels. This would help in ensuring a more systematic approach to handling farm debt cases. The decision to amend the existing law on farm loans has been taken to curb the growing trend of agricultural indebtedness, resulting in the mismatch between the prices of agricultural inputs and minimum support price of agricultural produce. The farmers raise loans from both institutional and non-institutional resources.

Nafed to begin disposal of 13K tonne buffer onion stock



➤ National Agriculture co-operative Marketing Federation of India (Nafed), which procured onions from Lasalgaon and other wholesale markets in the state over the past four months is now set to dispose nearly 13,000 tonnes of the buffer stock from its various storage facilities across Nashik district, top officials of NAFED said. These onions will be supplied either to state governments as per requirements or be sold in the wholesale markets in the country. In April this year, the Centre had directed the Nafed to start onion procurement in a bid to create a buffer stock to tackle scarcity and stabilise prices in domestic market. Five months ago, Nafed started procurement of around 25,000 to 30,000 tonnes of onion from Nashik, Maharashtra's onion belt. Sanjeev Kumar Chadha, MD, Nafed had informed that the plan was to procure onions under the price stabilisation fund (PSF) from Nashik in view of falling prices. Onion prices had fallen to a modal price of Rs 806 per quintal. "We will gradually dispose as per instructions of the Consumer Affairs Department. It has just started and will continue till October," Chadha said. Nafed is currently in the process of deploying transporters to carry onions to various locations in the country.

Maharashtra to bring non-MSP crops in state under SMP

➤ The Government of Maharashtra is working on a framework to bring non-MSP crops in the state under Statutory Minimum Price (SMP) under the Agricultural Produce and Livestock Marketing (Promotion and Facilitating) Act, 2017, Maharashtra cooperation minister Subhash Deshmukh informed. The SMP is announced by the Central government based on the cost of cultivation estimated by the Commission for Agricultural Costs and Prices. This is the basic price that sugar mills must pay sugarcane growers. The decision concerning the SMP would be tabled before the Maharashtra Assembly for deliberation before any call was taken on it. "We have just proposed to include the fines and jail term on the SMP for those found not paying the State Advisory Price (SAP) and SMP," a senior official said. This is limited to cane so far, he added. The Minister said that the issue is yet to be taken up and it could be over a year before it comes up before the cabinet and this is being confused with. The minister said that according to their plans, the SMP could in future be declared for some crops via an ordinance for fair sale of their specific produce in the market," the minister said. The existing Acts and rules already have provisions for violation of the MSP, the minister said.

Early onset of pink bollworm in cotton triggers alarm in Telangana

➤ Perhaps for the first time in the country, incidence of pink bollworm has surfaced in the first 30 days of the kharif season in Telangana, one of the major cotton producing States, triggering alarm among agricultural scientists and farmers. Scientists say this early cycle of pink bollworm incidence is unprecedented and surprising. Both the cotton farmers and the Department of Agriculture were anticipating the pest attack during November-December as it developed resistance to the Bollgard-II. With reports of early incidence reaching the State Capital, Prof Jayashankar Telangana State Agriculture University (PJTSAU) rushed a team to the areas where the incidence was reported. "We found three reasons: First, the incidence has been reported in areas surrounding the ginning mills, which ended up as major sources of the worm, gathered through the cotton stocks they procured from farmers in the previous season," Jagadeeshwar, Director of Research of PJTSAU, has said. The second reason, according to him, is the extension of the crop beyond December, which is not advisable. "We have been advising the farmers not to keep the crop beyond December. We ask them to burn the remains. But they continue to keep it, hoping to reap a final pick," he said. The third reason is the farmers don't go for a deep ploughing immediately. "We advise them to go for greengram. But they wait for the rains for ploughing, giving chance for the dormant remains of the worm to resurface again," he said.



Fall Armyworm attacks maize crop across Telangana

➤ A fresh problem in the form of Fall Armyworm, or *Spodoptera frugiperda*, threatens farmers across the country this kharif season. Currently infesting the maize crop, agricultural scientists warn that this pest could soon spread and attack other crops, including cotton, sorghum, sugarcane, cabbage and soyabean. This pest, which reportedly entered India from Africa, could result in huge economic losses if not attended to in time. “From Karnataka where it was reported first, it spread to Telangana and Andhra Pradesh. It can infest 80-100 crops,” said an official from Andhra Pradesh. India grows maize on about 9 million hectares, with a significant amount of the produce going into animal feed. Telangana is among the hardest hit, with the Fall Armyworm extensively affecting the maize crop in 17 out of 30 districts (excluding Hyderabad). Each worm could lay 900-1,500 eggs. They attack leaves first — the damaged leaves look like they have been cut with scissors.



Chhattisgarh, Uttarakhand, MP performers in soil health card scheme

➤ Chhattisgarh has been adjudged the best performer in soil health card scheme, followed by Uttarakhand and Madhya Pradesh, while Gujarat and West Bengal are at 23 and 24 places, respectively, in the ranking of states by the agriculture ministry on the basis of parameters fixed by NitiAayog. Chhattisgarh has achieved 100% in both distribution of the soil health cards in cycle I & II and in entering the data on the designated portal in 2017-18 (April-March), the sources said. The Uttarakhand government has also 100% achievements in distribution of the soil health cards in cycle I & II, but in entering the data in the portal, the state has completed 70% of the job in cycle I. Madhya Pradesh, which is at number three in the ranking, is yet to enter in the portal with 72% of the cards printed after testing. In distribution of cards, Madhya Pradesh achieved 100% in cycle I and 80% in cycle II. Punjab, where farmers are facing major soil problems due to excessive use of chemical fertilisers and pesticides, is placed at 32 and Haryana at 30 in the ranking. The “Soil Health Card” scheme was launched by Prime Minister Narendra Modi in February 2015 with an aim to check the declining fertility of agriculture land and improve the fertility of soil.

Haryana to Buy 1 LT Bajra at MSP this Year

➤ Anticipating higher arrival this year, Haryana government has set a target to procure one lakh tonnes of bajra at minimum support price (MSP), three times more than the amount it procured last year. Karan Dev Kamboj, minister of state for food, civil supplies and consumer affairs, said procurement of bajra will start from October 1. The grain will be distributed to the consumers under public distribution system (PDS) in December, January and February, he said. The minister said farmers should get their bajra crop registration done in the agriculture department of their respective areas, to help ensure the government does not procure the grain from farmers of Rajasthan and other states in Haryana, or from merchants. Last year, Haryana had procured 31,449 tonnes of bajra. Kamboj said procurement of bajra was introduced in the state during the tenure of former Prime Minister Atal Bihari Vajpayee in 2003. It was stopped in 2012 during the UPA regime. The present central government again started procurement of bajra in 2015.

Kerala floods: Cage fish farmers in troubled waters

➤ The deluge in Kerala has had a cascading effect on the cage fish farming ventures of both the Central Marine Fisheries Research Institute (CMFRI) and the Kerala University of Fisheries and Ocean Studies (Kufos), the nodal agency promoting pen and cage fish farming in the State. Commercially valuable fish such as Pearl Spot, Sea Bass and Red Snapper were lost in the floods, especially at a time when farmers were about to harvest the fully-grown fish ahead of the Onam season. The CMFRI estimated the loss at around Rs 4 crore in Ernakulam and Thrissur districts. According to Imelda Joseph, Head, Mariculture division, CMFRI, around 300 cages were submerged under the muddy waters. Pizhala Island, a model village in cage fish farming, with around 200 units, experienced a massive loss when those units were washed away in the floods. A Gopalakrishnan, Director, CMFRI, pointed out that lack of proper insurance in the cage fish farming sector has become a major impediment. “This issue should be seriously addressed at least in the wake of this extreme situation. We are looking into mechanisms by which we can support the issues related to cage fish farming when flooded conditions occur,” he said. “We will prepare a detailed report and submit it to the government for all kinds of help, other than finance, to re-establish the farming units. We are not in a position to extend financial help since knowledge transfer is our prime motive,” said A Ramachandran, Vice-Chancellor, Kufos.

Cooking oil imports rise 11% in August

Despite rupee depreciation, import of vegetable (cooking) oils in August jumped to 15.12 lakh tonnes from 11.19 lakh tonnes in July, as pipelines were dried up due to lesser import during June and July 2018. This coupled with improved parity in import of palm oil due to reduction in spread between palm oil and soft oils, resulted into higher import. According to the data compiled by the Solvent Extractors' Association of India (SEA), the import of vegetable oils during August 2018 is reported at 15,12,597 tonnes compared to 13,61,272 tonnes in August 2017 consisting 14,65,594 tonnes of edible oils and 47,003 tonnes of non-edible oils, an increase by 11%. The overall import of vegetable oils during November 2017 to August 2018 is reported at 1,22,78,673 tonnes.



Canada permits pineapple, mandarin import from India



Five months after a formal request, Canada has opened its market for pineapple and mandarin (a variety of oranges) import from India. Our Union ministry of commerce had sent its first request on April 10, with a reminder on May 18. Responding, the Canadian Food Inspection Agency of their government conveyed its approval on August 9, noting general phytosanitary requirements would apply, beside some specifics. In an advisory to Indian exporters, U K Vats, general manager of the Agricultural and Processed Food Products Export Development Authority has asked that they "strictly adhere with the required conditions". Pineapple import into Canada has been increasing

consistently over years. It was 127,000 tonnes in calendar year 2017, from 118,210 tonnes the previous year. The quantity of mandarin import was not clear but the value was C\$257.2 million in 2016, from all parts of the world. Mandarin output in India was 4.4 million tonnes in 2017-18, from 409,000 hectares. Total pineapple production was close to two mt from 115,000 ha of sowing. India currently exports both pineapple and mandarin in very small quantities.

Oilmeal exports jump 21% in April-August

The exports of oilmeals during April to August 2018 is reported at 11,92,095 tonne compared to 9,86,606 tonne during the same period last year – up by 21% – according to figures compiled by the Solvent Extractors' Association of India (SEA). The export of rapeseed meal is sharply increased to nearly 4,90,232 tonne (107%) in first five months, mainly exported to South Korea, Vietnam and Thailand. The ongoing trade dispute between USA and China has created a lot of uncertainty, forcing China to look out for other origins for their requirements of soybean and oilmeals, said BV Mehta, executive director, SEA. This has compelled China to re-look at its ban imposed on oilmeals imports from India since 2012, he added, stating that this will open up Chinese market for India.



Pulses export more than doubles in April-July

➤ Pulses export from India more than doubled in first four months of this fiscal after the government removed restrictions to increase shipments as it aims to double the country's agricultural products exports to over \$60 billion by 2022. The export of pulses was 1,24,465 tonne during April-July this year against Rs 58,575 tonne in the year-ago period, up by 112.5%, according to official data. Pulses export was restricted until November last year, when it was completely made free of all curbs. "All varieties of pulses, including organic pulses, have been made 'free' for export without any quantitative ceilings, till further orders," the director general of foreign trade said in the notification. "Nearly 70% of the entire quantity shipped last year has been exported only in four months. This shows the potential of increasing the pulses export from the country, provided there is consistency in the policy," a pulses trader from Mumbai said. Many of the traders who were earlier importing pulses are now exporting the commodities, he added. India's total pulses exports were about 1,80,194 tonne, valued at \$ 228.32 million (1,473 crore) in 2017-18.



Saudi Arabia curbs: Apeda urges exporters to follow guidelines

➤ The Agricultural and Processed Food Products Export Development Authority (Apeda) has advised all exporters of processed and frozen vegetables and fruits to strictly comply with the requirements as informed by the Saudi Food and Drug Authority. Kerala's fruits and vegetable exporters said that the decision will not impact as the State focuses only on exports of fresh fruits and vegetables and not on frozen ones. Even the shipments of frozen products from here are nominal compared to the 150 tonnes sent on a daily basis to Gulf countries from all the three airports in the State, PE Ashraf Ali of Pomona Exports, Kozhikode, said. SFDA said the source of frozen vegetables and fruits should be the farms that are monitored by the control authority and there should be a certificate (Global Gap) from a globally recognised authority.

After UAE, Qatar lifts ban on import of fruits, vegetables from Kerala

➤ Close on the heels of the UAE lifting a ban on import of fruits and vegetables from Kerala, Qatar has also followed suit, with the end of the Nipah virus threat. The Export Inspection Council received a letter from the Director of Food Safety & Environmental Health, Ministry of Public Health, Qatar, allowing the import of fresh, chilled and frozen vegetables and fruits from Kerala. The Agricultural and Processed Food Products Export Development Authority (Apeda) has also received a similar communication from the Qatar Embassy conveying the decision of the Joint Committee for Human Food Control lifting the ban. "With this, all the Gulf nations except Saudi Arabia and Bahrain have lifted the ban on exports from the State. We expect Saudi Arabia also to soon lift the embargo as the Haj pilgrimage season has come to an end," PE Ashraf Ali of Pomona Exports, Kozhikode, said. Though exports were on in full swing following the lifting of the ban, he said the recent floods had impacted the shipments. He added that the threat of contagious diseases in Kerala in the aftermath of the floods is also affecting future export consignments. The 40-day ban in June due to the outbreak of the Nipah virus had impacted fruit and vegetable exports, causing an estimated loss of around \$2-3 lakh per day. Kerala ships around 150 tonnes of fruits and vegetables on a daily basis to Gulf countries from the three airports in the State, he said.

Australian nutrition farming therapy gains traction

➤ To counter the challenges faced by farmers in the form of costly inputs and hardening of soil, an Australian agronomist has introduced a system of nutrition farming for Indian agriculture. After 23 years of research, Australian agronomist Steve Capeness and his Queensland-based company Nutri-Tech Solutions have developed a holistic farming protocol for soil and plant health and physiology. According to Capeness, the therapy helps create nutrient-dense crops that have a high level of resilience and can exhibit better tolerance to external attacks such as pest or disease. “We provide our protocol on two principles of soil balancing and plant therapy. This applies to all kinds of food and non-food crops, including horticulture crops. Soil enhancement and balancing process is a 3-5 year process, while plant therapy is a nutrition programme that goes on every season,” said Steve. Promoting the concept of zero-residue farming, Capeness said Indian agriculture has a great potential to tap nutrition farming for key crops such as cotton and horticulture crops. Such practices have had positive implications for soil structure and enhanced its productivity and softness, which is often missing due to excessive use of nitrogen-based fertilisers and DAP on most Indian farms.



CAI, BSE in pact to develop cotton exchange

➤ The Cotton Association of India (CAI) and the Bombay Stock Exchange (BSE) signed an agreement to develop a futures trading platform for cotton. Under the Memorandum of Understanding (MoU), CAI and BSE will jointly develop a user-friendly cotton exchange to cater to the hedging needs of the entire cotton value chain in the country, which will be effective for the next five years, an official release said. CAI President Atul Ganatra said the futures contract would not only help cotton growers get the best price for their produce but also benefit exporters as well as spinning mills by providing them a platform to hedge, something now lacking for domestic futures. Further, Ganatra said, CAI had recently decided to set up a farmer training centre at its Cotton Exchange Building, and would spend Rs 1.25 crore on it in the next five years. Maharashtra Agriculture Price Commission Chairman Pashabhai Patel said the endeavour would boost the cotton sector and help in its goal to double farmers' income.

Coffee board launches digital initiatives

➤ The Coffee Board, under the Ministry of Commerce and Industry, launched a number of mobile phone applications for the benefit of all relevant stakeholders across the sector eco-system. The initiatives were launched by Suresh Prabhu, Minister of Commerce & Industry, Government of India, in the presence of Anup Wadhawan, IAS, Commerce Secretary. One of the applications launched, by the Commerce Minister, included Coffee Mobile App ‘Coffee Connect’ developed by Coffee Board in association with National Institute for Smart Government (NISG) developed by WINIT. This application will provide field functionaries with relevant information using a combination of digitisation technologies like geo-tagging etc. They will have information including plantation details (location etc.) as well as plant material, age, production, Infrastructures, machinery available, etc. The solution will help in improving the efficiency of the field functionaries, transparency in the activities of the extension officers and in subsidy disbursement and real time report generation. The “Coffee Krishi Tharanga” will be pilot tested in the Chikmagalur and Hassan districts of Karnataka State covering 30,000 farmers during the first year.



India's foodgrain production to touch new record of 284.83 million tonnes in 2017-18

➤ India's foodgrain production is estimated to grow to an all-time high of 284.83 million tonnes in the 2017-18 crop year ending June, driven by record output in wheat, rice, coarse cereals and pulses after a normal monsoon, according to the Agriculture Ministry. Wheat output has been pegged at record 99.70 million tonnes, rice at Rs 112.91 million tonnes and pulses at 25.23 million tonnes for the 2017-18 crop year, it said. The previous record foodgrain output was 275.11 million tonnes achieved in the 2016-17 crop year. The foodgrain basket comprises of rice, wheat, coarse cereals and pulses. In its fourth advance estimate released on Tuesday, the ministry revised upward the total foodgrain production by 5.3 million tonnes from the previous projection of 279.51 million tonnes for the 2017-18 crop year. "As a result of near normal rainfall during monsoon 2017 and various policy initiatives taken by the government, the country has witnessed record foodgrain production in 2017-18," the ministry said in a statement.



M'ashtra to Sign MoU with IISc to Make Drones for Crop Assessment

➤ The Maharashtra government plans to soon sign a memorandum of understanding (MoU) with Bengaluru's Indian Institute of Science (IISc) to use drone technology developed by its aerospace engineers for estimating area, yield and health of soyabean and cotton. Although India is among the top producers of several agricultural commodities, it continues to have grossly inaccurate production estimates. Maharashtra, the second largest producer of cotton, soyabean and sugarcane in the country, has often missed its production and yield estimates. Accurate data is also required to compensate farmers for crop losses caused by natural calamities and for settlement of insurance claims. In the case of sugarcane, production estimates have gone wrong time and again. Despite use of satellites, the sugar industry estimated 2017-18 sugar production at 251 lakh tonnes while the actual production was 28.5% higher at 322.5 lakh tonnes. In the absence of reliable government data, vested interests are known to manipulate production and storage estimates of commodities such as cotton, soyabean and pulses. While the central government set up the Mahalanobis National Crop Forecast Centre in 2012 to use state of the art technologies developed by the Isro, accurate data continues to be elusive.

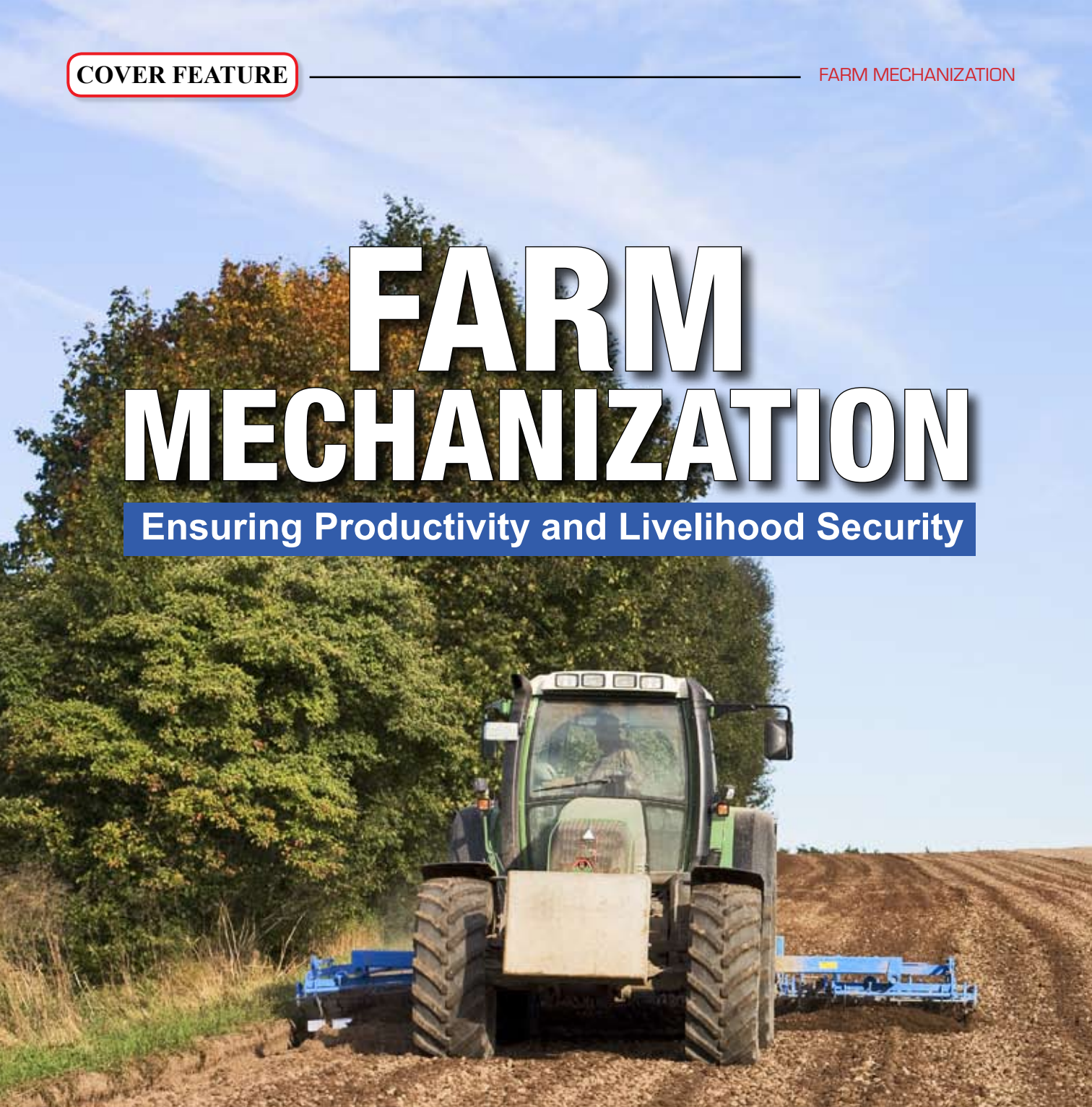
New hybrids will help raise yields of silkworm farmers

➤ Sericulture farmers could soon see higher yields of silkworm cocoons, with the Central Silk Board notifying some of the recently developed races of mulberry (which feeds on mulberry leaves) and vanya (forest-based) silkworm eggs. These races are now authorised for commercial production. The newly developed hybrid of mulberry silkworm (PM x FC2) can produce 60 kg of cocoons per 100 Disease Free Layings (silkworm eggs) and is said to be 'better than' the earlier race titled PM x CSR. The tropical tasar silkworm (BDR-10) has 21% more productivity than the traditional Daba breed and the Eri silkworm (C2) race is found to be 'better' than the local breed, according to industry experts. It can produce 247 numbers of Ericocooons per 100 DFLs, says a press release. In the south, some tasar silk is produced in Andhra Pradesh (A.P.). That apart, almost all the silk produced is the mulberry variety. Within this, production of bivoltine silkworm is high in T.N. and A.P. South, and Maharashtra. The new hybrid of mulberry silkworm is suitable for farmers across Tamil Nadu, Karnataka, Andhra Pradesh, Telangana, and Maharashtra. The national average of cocoon production for mulberry silkworm is 50-55 kg per 100 DFLs, said V. Sivaprasad, director, Central Sericultural Research and Training Institute. This can, however, vary for each State. The recently developed hybrid can produce 60 kg of cocoons per 100 DFLs. The silk yield from the cocoons will also be higher. As a result, a farmer's income can go up 5-10%.



FARM MECHANIZATION

Ensuring Productivity and Livelihood Security



Agriculture has witnessed tremendous change with farm machines performing several important operations spanning from land preparation to harvesting and post-harvest processing. Indian agriculture although heavily dependent on manual labor has started moving away to automation owing to a host of factors. The declining labour force, spiraling labour charges and most importantly the considerable pressure that has fallen upon the farms to be more productive and efficient has fuelled this trend. The increasing demand for food from an increasing population and the thrust on market led production has forced open the gates of farm mechanization.

Current level of Farm Mechanization

Despite being the top producer of food grains, India ranks lower in the adoption of farm machines for its agricultural

operations. Farm mechanization in India currently stands at about 40%-45%, a figure which is low when compared to countries such as the U.S. (95%), Brazil (75%) and China (57%). However, the level of mechanization has seen strong growth through the last decade. The farm power availability on Indian farms has grown from 1.47 kW/ha in 2005-06 to 2.02 kW/ha in 2013-14.

Farm equipment market in India is currently estimated at USD 8.8 billion in 2017 and it is expected to reach USD 12.5 billion by 2022. The farm equipment market is expected to grow at a CAGR of 7.5 per cent during the forecast period of 2015-2022. With a gamut of agricultural operations and with the availability of farm machines for each type of farm operation, the future would see a palpable increase in the level of farm mechanization in India.

A number of agriculture equipment is either domestically manufactured or imported in India. Major agricultural

Farm equipment market in India is currently estimated at USD 8.8 billion in 2017 and it is expected to reach USD 12.5 billion by 2022. The farm equipment market is expected to grow at a CAGR of 7.5 per cent during the forecast period of 2015-2022.





equipment includes tractor, combine harvesters, power tiller, thresher, rotavator and multi-crop planter etc.

Tractors constitute the largest segment in the agricultural equipment market in India and account for over 80 per cent of the total number of agricultural equipment sold in India. In addition, India is the largest manufacturer of tractors and accounts for nearly one-third of the total tractor production in the world. The sale of tractor has been growing due to the increasing rate of mechanisation. Tractors and tractor-driven equipment are the key products of the organised market. The tractor market in India is expected to grow at a CAGR of 7 per cent during 2015-2022. Currently, the total sales for tractors in FY 2017 was 691,631 units with exports accounting for 12 per cent, i.e. 84,650 units. A good monsoon for the current year combined with continued effort by the government to move towards mechanisation and an increase in construction activity will likely result in significant growth in demand for tractors in FY2018.

Combine harvesters, another key category, is used to harvest grain crops. The three harvesting activities are reaping, winnowing, and threshing. Crops such as oats, rye, barley, sorghum, soybeans, corn, flax, sunflowers, canola, and wheat can be harvested using combine harvesters. The harvester market in India is expected to grow at a CAGR of 14 per cent during the forecast period of 2015-2022.

Power tillers are widely used in India as they are used in smaller farm sizes and can reduce field-levelling time considerably. By adding different attachments, power tillers can be used for various other processes such as land levelling, seed bed preparation, puddling, ridging, sowing and inter-culture. The increased government focus on farm mechanisation in India has led to the growth of the power tiller market which is expected to grow at a CAGR of 9.5 per cent during 2015-2022. The penetration of power tillers in India is higher in southern and eastern India as compared to the others parts of the country on account of the small size of land holdings per farmer in these respective regions. In fact, small land sizes and high cost of labor, coupled with rising income levels in rural areas, provide a huge untapped opportunity.

While tractors and power tillers still outsell other farm equipment like paddy transplanters and combine harvesters, the gap has been closing in recent years. It is because of rural youth population is migrating to cities in search of better paying jobs in services and factories. This is creating a big market for specialized machineries, such as threshers, rotavator, transplanters, reapers, zero till drills, laser levellers and power weeders.

The level of mechanization varies greatly by region in India. The green revolution states in the north such as Punjab, Haryana and Uttar Pradesh have high level of

mechanization. The western and southern states in the country have a lower level of mechanization owing to the smaller and scattered land holdings. In north-eastern states, the level of mechanization is extremely low as their hilly topography, high transportation cost, lack of state financing and other financial constraints due to socio-economic conditions and dearth of agricultural machinery manufacturing industries have hindered the growth of farm equipment sector within these states.

Operation-wise, the level of mechanisation varies from 42 percent for soil working and seed bed preparation, 29 percent for seeding and planting, 34 percent for plant protection and 37 percent for irrigation.

India is a strong exporter in agricultural machinery with a CAGR of 6.2 per cent over the last four years. India's leading export market for agricultural machinery continues to be the United States despite a decrease in the percentage of exports from 23.2 per cent in FY 2016 to 20 per cent in FY 2017. In contrast, the import for agricultural machinery has seen a CAGR of around 6.8 per cent. China continues to be India's leading partner for imports with 10.2 per cent of total imports for agricultural machinery. India's export market is dominated by tractors, with approximately 60,000 units exported per annum. India is the global market leader today for tractor exports accounting for approximately one-third of the

total exports. India's largest share of tractor export was to the United States of America in the year 2017. It exported 84,650 units to USA which was approximately 12 per cent of its total exports in 2017.

Players in Indian Market

In India the farm machine requirements are met by producers of different scales. Among them, Village level craftsmen are the primary source of supply, repair, and maintenance of hand tools in villages. They deal with a number of farm tools such as spades, sickles, local ploughs, sowing devices, yokes, levellers, grinding wheels, hand mills, hand operated milk churning tools, sieves, wooden storage structures, bullock carts, and manual water lifting devices etc. There are more than 100,000 village-level artisans currently operating in India. They exert considerable influence over the farmers and is believed to effect the decisions of the farmers.

Small-scale industries who occupy the next level, manufacture and supply improved farm equipment such as ploughs, cultivators, disc ploughs and harrows, seed drills, planters, plant protection equipment, reaper harvesters, combine harvesters, soil working tools, seeders, graders,

mills, and oil expellers and many others. They also manufacture equipment for tractor and power tiller manufacturers. There are nearly 2,500 small-scale industries currently operating in India.

Organized farm machinery industries are more sophisticated and structured. They are in the business of manufacture of sophisticated agriculture machinery such as diesel engines, electric motors, irrigation pumps, sprayers and dusters, land development machinery, tractors, power tillers, post-harvest and processing machinery and dairy machinery. They also provide after-sales services to the distributors. They focus on product upgradation and process technologies through their own R&D efforts. There are nearly 250 medium- to large-scale units currently operating in India.

Among the many farm machines, tractors constitute the largest segment in the agricultural equipment market in India and account for over 80 per cent of the total number of agricultural equipment sold in India. In addition, India is the largest manufacturer of tractors and accounts for nearly one-third of the total tractor production in the world. Tractors and tractor-driven equipment are the key products of the organised

market. The tractor market in India is expected to grow at a CAGR of 7 per cent during 2015-2022. Currently, the total sales for tractors in FY 2017 was 691,631 units with exports accounting for 12 per cent, i.e. 84,650 units. The major tractor players in the market include, Mahindra & Mahindra, TAFE, VST, International Tractors, Force Motors and Escorts.

Power tillers are widely used in India as they are used in smaller farm sizes and can reduce field-leveilling time considerably. By adding different attachments, power tillers can be used for various other processes such as land levelling, seed bed preparation, puddling, ridging, sowing and inter-culture. The increased government focus on farm mechanisation in India has led to the growth of the power tiller market which is expected to grow at a CAGR of 9.5 per cent during 2015-2022. Crompton Greaves, Shracchi, VST and KOEL are some of the notable companies operating in India in this segment.

India – A Potential Market for Farm Machines

India's agricultural dominance remains unrefuted. The production surpluses and the demands emanating from them has extended the trade of agricultural products beyond borders. With a stable market inside and outside the country, there has been tremendous pressure on the farm sector for reliable production. This has warranted the use of technology and automation in many agricultural operations.

Besides the obvious reason of production increment, several other factors necessitated the introduction and expansion of mechanization in agriculture. Labor shortage is being experienced at peak seasons due to the enactment of the National Rural Employment Guarantee Act and huge demand from the construction sector in cities. It has been observed that the



The tractor market in India is expected to grow at a CAGR of 7 per cent during 2015-2022. Currently, the total sales for tractors in FY 2017 was 691,631 units with exports accounting for 12 per cent, i.e. 84,650 units. The major tractor players in the market include, Mahindra & Mahindra, TAFE, VST, International Tractors, Force Motors and Escorts

percentage of agricultural workers to total workers in India has been gradually declining and it is expected to further decline to 25.7% by 2050 leading to severe farm labor shortage. Contract Farming Business establishments provide farmers with specialized farm equipment and various amenities to improve crop yield through the adoption of latest agricultural technologies. The continuation and growth of contract farming with more entities getting involved provides future opportunities for the expansion of the industry.

The government is promoting 'balanced farm mechanization' by providing subsidy on various equipments and by supporting bulk buying through front-end agencies. The government also provides credit and financial assistance to support local manufacturing of farm mechanization equipment. Both Central and State governments have been increasing its focus to develop farm mechanization in the Himalayan and North Eastern region where the Centre alone has allotted Rs.3,700 crore for next five years starting 2016-17. This would push the demand for machines such as power weeder, sprayers, and

other smaller implements suitable for hilly and terrace cultivation.

Low Penetration of Farm Equipments in India provides a strong growth opportunity. In 2012-13, it was estimated that the penetration of tractors was about 20 per 1,000 hectares. The penetration is lower with the small and marginal farmers who own land less than 5 hectares. This segment forms over 80 percent of the land holdings in the country. Thus, there is a lot of potential for increasing the penetration and therefore growing the market size.

As per the Vision 2030 document by Indian Council of Agricultural Research, domestic demand for food grains is expected to increase at around 2% CAGR in CY2000-30. Food grains demand is expected to reach 355 MT in CY30 vis-à-vis 192 MT in CY10. Fruits and Vegetables demand is expected to reach 290 MT in CY30 vis-à-vis 136 MT in CY10. However, given the limitations in land use and in increasing cropping intensity over a certain period, increasing the yield from the same land is an urgent requirement to meet the needs of a growing domestic population.



This limitation can only be overcome by increasing the food productivity, for which farm mechanization plays a vital role.

Emergence of custom hiring centers have also given another reason to adopt farm mechanization. Around 85 per cent of India's agricultural lands belong to marginal and small farmers with farms less than two hectares. This set of farmers find it difficult to purchase farm equipment which needs significant investment. Custom Hiring, under these circumstances solve an important issue faced by them who struggle to optimise their usage of modern machinery mainly due to adverse economies of scale, especially in operations like land harvesting and preparation. Different stakeholders including private and government organisations have been participating in promoting the concept of custom hiring in India.

Government Backed Mechanization

Farm mechanisation has the potential to raise farmers' income and hence can play a significant role in realising the government's vision of doubling farmers' income. Several schemes has hence been developed and implemented by the government to aid in the expansion of farm mechanization.

The Government of India through several schemes and policies have tried to further enhance the spread of farm mechanization. Rashtriya Krishi Vikas Yojna (RKVY), Mission for Integrated Development of Horticulture (MIDH), National Mission on Oilseeds and Oil Palm (NMOOP) and National Food Security Mission (NFSM) are the schemes that are intended to expand country's agricultural productivity. Provisions have been made under this scheme to adopt farm mechanization and hence the government has accorded an important status to the sector.

Under the National Food Security Mission (NFSM) launched in October, 2007, provisions for assistance (up



to 50 percent the cost of machinery) have been provided for adoption of farm machinery such as pump sets, tractor mounted sprayers, seed drills, zero till seed drill etc. to varying degrees. Similarly, under the Mission for Integrated Development of Horticulture (MIDH), an important intervention is 'Horticulture Mechanisation' which aims to improve farm efficiency and reduce drudgery of the workforce. Assistance in this regard is provided for activities such as procurement of power operated machines and tools, besides import of new machines. Assistance is also available to grower associations, farmer groups, self-help groups, and women farmer groups etc. (with more than 10 members) that are engaged in cultivation of horticulture crops. 60 percent of the cost of machines will be borne by such groups. Mission on Agricultural Extension and Technology (NMAET) also includes a Sub-Mission on Agricultural Mechanisation (SMAM) which is implemented in all the states to promote the usage of farm equipment and to increase the ratio of farm power to cultivable unit area up to 2kW/ha.

Sub-Mission on Agricultural Mechanisation (SMAM) under the Ministry of Agriculture was

started in 2014-15. This scheme is implemented in all the states to promote the usage of farm mechanisation and increase the ratio of farm power to cultivable unit area up to 2.8 kW/hectares by 2022 under its new 7-year plan. SMAM is a sub-mission under National Mission on Agricultural Extension and Technology and enlists 8 components under it ranges from promoting agricultural mechanisation through training, testing and demonstration to providing financial assistance to farmers to help them procure agricultural machinery and equipment.

Capacity building and training are an essential part of the sub mission because they aim at sustainability and ensure proper utilisation of the technology to maximise productivity, thereby increasing returns for farmers. States with low mechanisation like the north-eastern states and others need special attention and had been neglected before the implication of the sub mission. SMAM aims to promote farm machinery and equipment in these states and has incorporated it as a component of the sub-mission.

The 7-year plan which ranges from 2016-17 to 2021-22 implemented from August, 2017

has defined new targets for the sub-mission

- Farm Power availability of 2.8 kW/hectares to be achieved by 2022 from the existing level of 2.02 kW/hectares in 2016-17.
- 1,48,000 trainees to be trained to develop skilled manpower in farm mechanisation sector.
- 10,270 agricultural machineries to be tested.
- 2,80,000 CHCs to be established at the village level.
- 19,000 demonstrations to be organised on farmer fields.
- 19,00,000 numbers of farm machinery to be distributed under SMAM.
- 8 new Farm Machinery Training and Testing Institutes (FMTTIs) to be established in addition to the existing 4.
- 2,00,000 beneficiaries to be benefitted from distribution of farm machinery for individual ownership in north-eastern and Himalayan region.

Going Digital National Portal on Mechanisation and Technology is an active online portal developed and launched by Department of Agriculture to help farmers across the country to get acquainted with and apply for all types of schemes and subsidies they are eligible for. Online booking for farm equipment testing, financial assistance application and other numerous facilities can be directly accessed by farmers even in remote villages. Portals are also separately available and functional for state level schemes and policies under SMAM and other missions like RKVY, MIDH, NMOOP and NFSM which allow aid and subsidies for farm mechanisation across all crop types, ranging from cereals, horticulture crops to oilseeds as per their functional guidelines and regulations.

Challenges Ahead

Although India offers immense opportunities in farm mechanization, there are several factors that can delay or to some extent hinder the



adoption of automation. Majority of the functional farms are small holdings. The average farm size in India is less than 2 hectares, making not only the farms smaller in size for successful operation of farm machines but also reducing the investment potential of such farmers. This explains the rather slow expansion of farm mechanization in India. The situation demands development of farm machines that are appropriate for small holdings or making them available through collective ownership or on custom hiring basis.

India has until the recent past has not looked beyond the conventional tractors. In fact whatever mechanization that have happened in India can be attributes as tractorisation and not mechanization in the true sense. Tractors have an annual market of 600,000-700,000 units in India whereas, threshers, the next largest segment, has an annual market of just 100,000 units. The penetration of tractors has grown from one per 150 hectares to one per 30 hectares on agricultural land. However, such a growth in penetration has not been seen in other agricultural implements. It is to be noted that for a sustainable agricultural future, other farm implements, and not just tractors, need to be advanced to farmers in the country.

Also, the entire process of

acquiring farm equipment is very tedious and cumbersome for a farmer. A farmer has to go through various levels/departments to get his land records verified. Post clearance, he has to go through further checks from the District Agriculture Officer in order to obtain approval and clearance for the purchase. This process itself becomes a big hindrance and discomfort to the farmer. Another issue that has been persistent is financing the purchase of standalone implements. This seems to discourage farmers from investing at large, as they need to shell out a huge amount.

Besides, farm equipment, especially the energy-efficient options, is capital intensive and is a major investment for most of the farmers in India. A majority of them belong to the low income bracket. The quality and after-sales service of farm equipment is another concern, since agriculture is largely carried out in rural parts of India and there is still an inadequacy of service-centres for proper maintenance.

Agri Mechanization is crucial for India as we desperately need to break free from the low productivity bracket. Our objective is not only to satisfy the gaps in production but also to ensure incomes to farmers associated with agriculture. Farm mechanization is the next big step that India needs to take firmly and confidently.

‘Post harvest mechanization has great potential to increase rural entrepreneurship and livelihood’



Mechanization in the post harvest operations have immense potential to enhance the productivity and efficiency of Indian agriculture. The ICAR-Central Institute of Post-Harvest Engineering and Technology (CIPHET) Punjab, is a nodal institute to undertake lead researches in the area of the Post-Harvest Engineering and Technology appropriate to agricultural production catchment and agro-industries. In an interview with Agriculture Today, Dr. R K Singh, Director, ICAR-CIPHET, Ludhiana discusses about mechanization in the processing of agricultural commodities.

What is the extent of mechanization in food processing segment in India?

Mechanization in Food processing segment covers all levels of handling and processing technologies, from simple and basic hand tools to more sophisticated and power-driven equipment. The food processing sector is highly fragmented industry. It widely comprises sub-segments like food grains processing, fruits and vegetables, milk and milk products, beer and alcoholic beverages, meat

and poultry etc. Earlier, huge number of entrepreneurs in this industry were small in terms of their production and operations, and were largely concentrated in the unorganized segment. Presently, there are more than 900 flour mills, 5300 fruits and vegetables processing units, 450 fish processing units and 200 meat processing units in the organised sector. The mechanization is largely required at the rural level where processing of agricultural produce is very traditional and highly

unorganized.

Primary milling of grains is considered to be the most important activity in this industry. Around 65% of rice production is milled in modern rice mills. There are 139208 traditional rice mills and 35088 modern rice mills in India. Dal milling is the third largest in grain processing industry, and have about 11,000 mechanized mills in the organised sector. Oilseed processing is another major segment. There are approximately 50, 000 mechanical

oil expellers in the country.

Fruit and vegetable (F&V) processing is mainly dominated by unorganised players, who occupy a share of about 60 per cent of the total market size. Over the last few years, the industry has witnessed rapid growth of Ready to Eat foods, frozen vegetables, processed mushroom etc. Presently, the mechanized processing of fruits and vegetables is estimated to be around 2.2 % of the total production in the country. The major processed items in this segment include pulps and juices, fruit based ready to serve beverages, canned fruits and vegetables, jams, squashes, pickles etc.

How has the mechanization improved the efficiency of the post harvest processing operations?

Mechanization continues to play an increasingly important role in post-harvest processing operations such as shelling, milling, processing, packaging, transportation, storage and marketing. Mechanization in post harvesting sector replace the lengthy and laborious work with more labour saving, quality-improving machinery and process technology to improve postharvest handling and agro-processing. This also improves the efficient use of resources, enhances market access and contributes to mitigating climate related hazards. Mechanization improved the efficiency of the postharvest processing operations by Improved productivity and timeliness of agricultural operations; Enhance income and greater profitability of farmers; Increased safety of the process and operator; Mitigating climate related hazard; Relieves labour shortages; Processing of food items in hygienic conditions; Improved food quality; Reduced postharvest losses; Reduction in by-product generation; Lower production cost in the long term; Creation and maintenance of brand value through quality product and Reduced fatigue and human labour.

How can the post harvest mechanization enhance rural entrepreneurship and livelihood?

Postharvest mechanization has great potential to

increase rural entrepreneurship and livelihood by generating employment possibility along the value chain of the production. Post-harvest operations such as storage, processing (cleaning grading, shelling, milling and dehulling) add value at each step of food production which leads to entrepreneurship development in terms of setting up the agro-processing center. Postharvest machinery and equipment transform the farmer from 'producer' to 'producer-cum-processor' to get more profits by increasing quality through value addition and efficient utilization of by-products in addition to reducing postharvest losses.

Establishing small and tiny units of agro-processing centers in rural areas and linking them with urban markets can be one of the alternatives to increase income and employment opportunity for youth. This sector generates the demand for more production of agricultural commodities resulting into more intensive agriculture and ultimately employment generation in rural areas.

An entrepreneur can start processing of agricultural commodities into more refined products

including: milling maize and other grains, cooking, curing or drying meat, drying fruits and vegetables, mixing commodities such as nuts and raisins, create handicrafts with commodities such as grasses and flowers etc. Each of these represents a value-adding possibility in which entrepreneurial farmers can become involved to capture value within the value chain. If they can organise the necessary finances, they can establish a business.

Perishables need immediate cold storage facilities within the vicinity of the farms. If the rural farmers are educated about the latest scientific mechanized techniques and cost-effective ways of storage, they can form co-operatives and communities to pool in resources and make the trained youth responsible for setting up basic infrastructure.

Recognizing the importance of rural entrepreneurship and skill development number of initiatives like "Start-up India" and "Stand-up India", ASPIRE (A Scheme for Promoting Innovation, Rural industry and Entrepreneurship),

About 65-70% of total food grains produced in the country are stored at farm level with intention of immediate sale in market. This is driven by lack of availability of suitable machinery and other accessories at their disposal for handling and processing of farm produce

Pradhan Mantri Kaushal Vikas Yojna and Aajeevika are recently launched by Government of India. Indian government has established separate ministry 'Ministry of Skill Development and Entrepreneurship' for promoting entrepreneurship and skill development. In this way entrepreneurship in mechanised post harvest processing and value addition is emerging as a solution of rural unemployment, rural poverty & can enhance rural entrepreneurship and livelihood.

Which are the areas in post harvest segment that badly needs automation?

Being a biological material, agricultural commodities are prone to large variation in size, shape, texture and other properties that plays important role in its postharvest management. It is high time that machineries are equipped with techniques to adopt to varying nature of agricultural produce. Looking at the technological interventions in postharvest segment so far, it is evident that technologies for labour intensive operation (threshing, milling etc) are readily available whereas mechanisation in skill dependent operations (harvesting of delicate F&V, grading, sorting etc) is scarce and cost intensive. Emphasis on use of artificial intelligence, machine learning, image processing, and robotics in such machinery could boost its widespread adoption in farming as well as industrial community. Further, automation is required in storage (specially controlled atmosphere) and packaging (modified atmosphere) of fresh fruits and vegetables, cold chain management including pre-cooling facilities. Besides, the working condition of agro-processing industries are not very conducive for human being due to lot of air and noise pollution. The sophistication in postharvest machines is required for their precise and safe operation which can be achieved through

automation.

What are the challenges associated with the adoption of mechanization in post harvest operations?

Indian agriculture is characterized by small land holdings and hence small portion of produce owned by large number of farmers/producers which limits the consistent supply of quality raw materials for processing. About 65-70% of total food grains produced in the country are stored at farm level with intention of immediate sale in market. This is driven by lack of availability of suitable machinery and other accessories at their disposal for handling and processing of farm produce. Commodity specific design of post-harvest machineries restricts their use for limited period which demotivates the farmers from its wide scale adoption.

Purchase of any equipment is a significant investment for most of the manufacturers in India. Hence, reasonable financing norms are a must for ensuring mechanization in any industry. An issue that has been persistent in financing is the purchase of standalone implements. This seems to discourage the people from investing at large, as they need to shell out a huge amount. As the majority of customers are cost conscious; quality of the product takes a major hit. In addition, the inability of local low cost manufacturers to come up to the levels of standard designs of equipment also poses a big challenge in adoption of mechanization in post-harvest operations.

Knowledge about selection of machinery is inadequate. Shortage of skilled, semi-skilled and unskilled workers has emerged as a critical factor causing a major hindrance to the growth of mechanization. The after sales service of farm machinery is the other concern in India as the majority of the manufacturers are cost conscious.

There are inadequate service centers for proper upkeep, repair and maintenance of the equipment and the market lacks regulations on Custom Hiring services.

What are the policy measures that supports post-harvest mechanization?

The Indian Government gives considerable importance to the food-processing sector. The Ministry of Food Processing Industries is concerned with the formulation and implementation of various policies and plans for the Food Processing Industries within the overall national priorities and objectives. The government has implemented various programmes that supports post-harvest mechanization in the country through several schemes. NABARD has created a separate window with a corpus of Rs. 1,000 crore for refinancing loans to the sector, especially for agro-processing infrastructure and market development. The Department of Animal Husbandry, Dairying and Fisheries (DAHD&F), GOI launched a pilot scheme titled "Venture Capital Scheme for Dairy and Poultry" in the year 2005-06. The main objective of the scheme was to extend assistance for setting up small dairy farms and other components to bring structural changes in the dairy sector. Under the Central sector scheme of Cold Chain, Value Addition and Preservation Infrastructure, government provides grants in aid up to 50% (75% in North East and Hills) of a cold chain project subject to maximum Rs. 10 Crore. Such cold chain projects can be set up by individuals, groups of entrepreneurs, cooperative societies, Self Help Groups (SHGs), Farmer Producer Organizations, NGO, Public Sector Companies etc. Loan to food & agro-based processing units and cold chain has been classified under Agriculture activities for Priority Sector Lending (PSL) subject to aggregate sanctioned limit of Rs. 100 crore per borrower.

RETURNING TO ROOTS

GULABRAO'S SUCCESS STORY

Atapadi is a drought stricken block in Sangali district, bordering the dry part of Sholapur district with only 350 mm annual rainfall and hilly degraded lands. This part of the Deccan Plateau is made up of shallow gravelly soils, with no ground water, forming a hostile environment even for hardy tree species to survive. This region has been neither good for crop production nor animal husbandry. Nevertheless, villagers were completely dependent on traditional agriculture for their livelihood. Most of them grew sorghum, bajra, pigeon pea, grams and other minor millets during monsoon season, but the yields were very low to generate any surplus. Greenery in summer was confined to very small plots located in the valleys, where farmers dug open wells to establish some fruit plants. In the absence of alternate sources of livelihood, most of the



small farmers were living in chronic poverty.

Gulabrao Patil grew up in a remote hamlet near Atapadi. His father was a small farmer with 2.5 ha dry land. He grew up with 2 elder brothers and 2 younger sisters in a thatched hut without basic amenities like clean drinking water, electricity and toilet. He lost his mother when he was 9, which compelled his eldest brother to drop out of school. They struggled even for their meals. But Gulabrao stood first in Atapadi taluk in SSLC exam, which compelled his father to support his further study. But in 1990, his father seeing some large farmers, dug a well and planted pomegranate on a small plot,

availing the wage support from the Employment Guarantee Scheme of the government. This generated a small surplus, which was carefully invested in educating the children. He passed B. Sc. (Forestry) in 1991 and immediately joined BAIF, a Research Foundation. He managed several development projects related to forestry, horticulture and livestock development and in 2014, he decided to return back to his village to develop his 4 ha barren land, which he had purchased from his savings, at Rs. 25,000/ ha.

Having a flair for tree based farming and the sentiments for pomegranate, he opted for cultivation of pomegranate. He dug a well and





the water was adequate to support only small plot. Fortunately an irrigation scheme named as Tembhu, initiated by the Maharashtra Government for bringing Krishna river water from a distance of 90 km to At padi was at the verge of completion. This raised his aspiration to expand the area under orchards. He boldly decided to bring his 4 ha of rocky lands under horticulture. First step was to engage bulldozers to pull out the boulders while excavating the gravelly land to increase the soil depth. The field was then divided in to small levelled plots forming bunds across the slope to conserve soil and water. He brought some silt from the tank beds, mixed with farm yard manure and mixed in the soil. Then he established Bhagawa variety of pomegranate on 2.4 ha (6 acres) of poor quality land and planted grapes on 1.5 ha (4 acres) of better quality land. As the soil was poor and water was in scares, he decided to apply higher doses of farmyard manure and bio-pesticides, with a principle of producing chemical free food. This was almost like organic farming, but with application of essential chemicals, which will not be carried in the food at the time of harvest. Installation of drip irrigation system was the only option, as he had to buy water from the Tembu scheme. For the orchards established in 2013-



14, Gulabrao spent over Rs one lakh each on purchasing farmyard manure and water every year. Last year, he was able to harvest over 35 tonnes of pomegranate from 6 acres. Out of this, 18 tonnes were sent for export, fetching Rs. 102 per kg, while the rest were sold in local market fetching Rs.30 per kg. This year he is expecting 55 tonnes of fruits. The grape orchard with Manik Chaman and SS varieties are expected to yield 10 -12 tonnes per acre to generate a gross income of Rs. 5 lakhs/ acre/ year. Gulabrao has not only doubled his annual income, but also set himself as a role model for the new generation. Presently there are over 2500 farmers cultivating pomegranates on over 3000 ha in Atapadi block. When we see these plantations amidst vast stretches of barren lands and low yielding cereal crops, we can feel that it is not difficult to double the income of our farmers in the next five years, if they can take care of certain critical

factors. The model farm of Gulabrao ensures even 4 fold increase in income, through sustainable farming, using proven technologies.

Some critical inputs essential for the success of small farmers are, suitable cropping plan, adequate land preparation, efficient water use, good crop husbandry practices including nutrition management and crop protection to meet the export and local market requirements. Above all, confidence and determination of the farmers are most critical. Basically small farmers need mentoring, by boosting their confidence and hand holding in the initial stage. When the farm production goes up, these farmers are chased by several input suppliers, who often are engaged in unethical practices to sell their products. Many consultants solicit themselves to sell their expertise and avoiding these agencies is a big challenge. Hence it is desirable for farmers to come together to form their formal or informal groups at the village level to share technologies and establish the value chain.

Government has to play a critical role in facilitating water resource development, monitor the supply of good quality planting materials and inputs and develop linkage with research institutions to transfer new technologies and address technical problems encountered by these farmers from time to time. Providing market information services, better roads for faster and safer transportation, cold storage facilities, periodic training for farmers and liberal finance in the form of soft loan will further boost the productivity and income. There are many such success stories across the country. Our policy should be to widely replicate the success, engaging successful farmers as our Extension Champions to motivate other farmers.

Narayan Hegde

ECO AGRICULTURE FOR EVERGREEN REVOLUTION

Food production without due recognition of the environment has many times led to unflattering effects on the ecosystem and the productivity of farms. Eco agriculture, which balances the need for food production and ecological balances, thus becomes a suitable alternative. In an interview with Agriculture Today, Padmashri Dr. M. H. Mehta – internationally known Scientist for his leadership and contribution on ecology and agriculture, elaborates on the relevance of this system of farming. Dr. Mehta is the Chairman of the forthcoming International Conference on Eco Agriculture (being held on 26th October, 2018 by ICFA at New Delhi – during Agri World 2018).



It is being said that after the Green Revolution, it is now time for Eco Agri Revolution or Ever Green Revolution. What is Eco Agriculture?

Eco Agriculture or Agro Ecology is the approach capable of producing enough accessible food without harming the environment. It is based on the convergence of two scientific disciplines, agronomy and ecology and is a broad term that includes organic farming, biological farming etc. If the past sixty years led to Green Revolution, the coming decades will be the Evergreen or Eco Agri Revolution or Sustainable Ever Green Revolution.

We understand that the Working Group on Eco Agriculture has been functioning under your Chairmanship. Can you give details?

Realizing the importance of Eco Agriculture such a Working Group has been created by ICFA. It has an excellent and balanced representation from Farmers Organizations, Experts from Government and Non-Government bodies, industries,

research institutions and universities. We already had two very successful Round Tables and a Road Map and Action Plan are being worked out. For this 3 Expert Groups are formed - Policy Thrust to plan and promote Eco Agriculture; Agri Bio Inputs and Scale up and Eco Agri Models.

Please tell us about the forthcoming International Conference on Eco Agriculture being held at New Delhi on 26th October, 2018.

International Conference will be organized on 26th October, 2018 on "Eco Agri Revolution for Ever Green Revolution" - during Agri World – 2018 at New Delhi. Global and National leaders and Experts, Farmers Associations, Industries & Scientists and Ministers from various states are expected to participate. It will be a great event to discuss and launch the initiative for the coming Eco Agri Revolution.

Is Eco Agriculture and Organic Farming the same? What are the differences?

We may call Eco Agriculture as a broader term which includes –

but not limited to – practices like organic farming. To simplify, it is said that organic philosophy is a social movement based on science of agroecology of Eco Agriculture. Eco agriculture is understood in diverse ways but organic has emphasis on 'standards'. For a large percentage of small farmers, the standards and certifications are too complex and often impractical. Eco Agriculture practice emphasizes the path of lower input costs, soil health, sustainable productivity, new generation eco-friendly bio inputs, scientific management of farm wastes etc. Some time, Eco Agriculture is regarded as the more practical middle path between the two, i.e. 'chemical' farming and 'no input' farming.

What are the major driving forces for moving from Green Revolution to Eco Agri Revolution?

Green Revolution brought a major jump in production of food grains. However the country's farm productivity has been going down particularly in the green revolution areas like Punjab, and

Haryana. Closely linked with this is the drastic reduction of carbon in the soil and lowering of the fertilizer use efficiency. Also, the problem of contamination of chemical pesticide in food, milk, river and water sources have been alarming in many situations. The worldwide awareness of harmful effects of organo-chlorine and organo-phosphorous pesticide is clearly making impact on the Indian chemical pesticide industry. This has spurred organic movements. Rain-fed agriculture is being increasingly looked up as a major sector to shoulder the larger burden of providing foods in developing countries. Bio-pesticide and Bio-fertilizers industries are rising at a very high rate, though its size and contribution on a global scale is much smaller than chemical pesticides. There is thus the time and need for the next revolution- Eco Agri Revolution – A revolution that is sustainable, balanced and farmer-friendly.

In the foreword of your recently published book “Eco Agri Revolution – Practical Lessons and the Way Ahead”, Prof. M.S. Swaminathan, has said that Eco Agri Revolution is the pathway to Ever Green Revolution and has emphasized the need for ‘Do-How’ – and your 20 – 20 model. Can you elaborate?

It was heartening to hear him often say that and further emphasizing on how we can achieve advances in productivity in perpetuity without ecological harm. Realizing that farmers get convinced only when they see demonstrations and field results to convince them about the improvement in productivity, lowering of input costs and ecological improvement. Therefore, it is called “Do Ecology”.

The “20 – 20 Model” is about increasing farm production by 20% with lowering of ‘input’ costs by 20% in sustainable model. It is based on using new generation eco-friendly bio inputs like Bio-fertilizers, Bio-pesticides (both – microbial and botanicals), from farm agro wastes etc. In a way, it is the ‘Middle Path’ of moving from chemical to eco-friendly farming. It is also a practical model. We can’t wish away chemicals overnight and there are many failed examples of such switch overs. On the other hand, it is possible to have stepwise change over by including eco-friendly products that help reduce input costs on one hand and at the same time improve farm productivity sustainably. This is what the farmers want and have started accepting. Once this is demonstrated in the next

years, the bio inputs can be doubled and tripled and have total switch over. It is good to see the gradual adaptation of this model in the different parts of India and even other countries in Asia and Africa.

Is the scientific solution being suggested by you for Crop Residue Burning problem a part of Eco Agri Revolution?

As you know, scientific conversion of agro wastes to bio-composts is the most important component of Eco Agriculture. We have worked & demonstrated that using multimicrobial sprays after crop residue harvesting and mechanical shredding, the agro wastes from residues of rice, banana, wheat etc. can be converted in-situ to highly useful Bio-compost. The challenge earlier was doing this in a short time of 20 to 30 days. This too is possible and has been demonstrated in a small way. It should immediately be implemented in a Big Way – especially in northern states like Punjab, Haryana, Western UP, Delhi etc. Crop residue burning plays havoc with the soil health, air quality and human health. On the other hand, adopting this solution can help save a great deal of input costs including nutrients and micro nutrients, improve soil organic carbon and air quality. It can definitely become a most important component of eco agriculture practice. I am very impatient and hope that the implementation is taken up soon for the benefit of all.

What is the potential of eco agriculture in the objective of doubling the farm income?

Any exercise, report for doubling of farmers income would pertain to three areas:- (1) Productivity gains (2) Reduction in cost of cultivation and (3) Remunerative prices. Of this, the sustainable farming, lower input costs and production enhancement are extremely important requirement. These are also the main strong points of Eco Agriculture model. There are also tremendous opportunities for new generation entrepreneurs. These industries are R&D based, small to medium scale and offer great opportunities to attract youth to work with farmers in a win-win situation. Eco Agriculture model can and will play a major role in improving farmers income by reducing the input costs and improving farm productivity sustainably. It is based on new generation agri-bio inputs, scientific management of farm wastes and integrated farming.



GOLDEN CONDIMENT (SAFFRON) ON ITS WAY OUT IN INDIA

The current status of saffron crop in India in general and Kashmir (J&K state) in particular merits immediate and serious policy and administrative intervention. Amongst various saffron producing countries, Iran, Spain and India are the largest producers accounting together for more than 95% of the world production (200 MT) including India's share

of 6.4 MT. In India saffron is primarily grown in the state of Jammu and Kashmir, although attempts have been made to extend its cultivation to Uttaranchal and Himachal Pradesh, but has yet to attain the status of a commercial crop. As per the authentic sources, the maximum area under the saffron crop in J&K state has been 5707 hectares (1997) which over the years declined drastically to 2436 hectares (2004) and has remained static with around 3000 to 3600 hectares (2005-2015). Similarly the production slumped from 15.9 MT to as low as 3.5 MT, but averaged between 5 to 9 MT during most of the years. Similarly, productivity per unit area has remained in the range of 1.5 to 2.75 kg ha⁻¹ with a just few exceptional years touching between 3 and 4 kg ha⁻¹.

Comparison of quality parameters from different saffron producing countries clearly indicate the comparative fine quality attributes of Indian saffron in terms of crocin (13-14%) and safranal (6-9 mg/g) compared to that of Spain (crocin, 11-20%) and safranal, (5-6 mg/g) and Iran (crocin, 10-11%) and safranal (2-3 mg/g). These compounds are highly responsible for coloring and flavouring, the two important traits of saffron. Jammu and Kashmir enjoys the monopoly in its cultivation in the sub-continent primarily because of ideal climatic conditions and soil suitability thus playing a vital role in the state's economy.

The spatio temporal variations in area and production reveals its nature of being patchy in distribution and limited mainly to Karewas of Pampore. The area has a rich heritage of cultivating the world's most expensive spice – saffron, also known as the "Saffron town of Kashmir". It has been recognized as a Globally Important Agriculture Heritage Site (GIAHS) by FAO (Food and Agriculture Organization), Rome, started in 2002, with an objective to understand and appreciate the nature friendly agricultural practices of local and tribal population around the world, and to document indigenous knowledge with an aim to conserve and promote the knowledge at global scale to promote food security and sustainable development,



besides, providing incentives for local populace by measures like eco-labeling, eco-tourism etc.

Critical analysis of the core issues viz; area shrinkage, dwindling production and subsequently its adverse effect on productivity could easily be assigned to narrow genetic base because of complete sterile nature of corms; lack of germplasm bank; non-availability of high yielding corms; longer planting cycle of 10-15 years. Planting of non-graded corms at random; incidence of corm rot disease; proper nutrition management; lack of irrigation especially at critical stages of crop growth and development; inadequate H&D support; lack of quality standards; inadequate post harvest handling, processing and marketing; low plant density; improper land use planning; population pressure on land resources, absentee landlordism and shying away of younger generations from the mainstay of farming, lack and use of farm machinery are a few hiccups other than quality standards and proper market's structure.

Besides, saffron being expensive material is liable to frequent adulteration for economic gains, despite attempts at quality control and standardization. Typical methods include mixing in extraneous substances like beetroot, pomegranate fibres, red dyed silk fibres or taste and odourless yellow stamens of saffron. Other methods include dousing saffron fibres with

viscid substances like honey or vegetable oil to increase their weight. Adulteration also consist of selling mislabeled mixes of different saffron grades. Thus high grade Kashmiri saffron is often sold and mixed with cheaper Iranian Imports and these mixes are then sold as pure Kashmiri saffron. Safflower is a common substitute sometimes sold as saffron. The spice is reportedly counterfeited with horse hair, corn silk or shredded paper.

All these issues have further aggravated not only the problems of production but – have put a big question mark on the quality of the saffron.

Therefore, the most important challenge before us is the low productivity, lack of irrigation facility, critical inputs, absence of farm machinery, awareness about the package of practices and potential technologies, adulteration issues coupled with unorganized marketing infrastructure, pre and post harvest management problems, urbanization of saffron belt and crop diversification.

Concerned over the slow growth and declining trends of saffron in Kashmir, Government of India has launched a "National Saffron Mission to bail out this industry in August 2010, initially with a total cost of Rs. 327.18 crores, of which GOI share was Rs. 288.06 crores. The mission was initially proposed to

be completed within a period of 4 years. The scope and strategy under the National Mission on saffron envisaged various components for its economic revival like, rejuvenation / replanting of existing saffron area, soil health improvements by INM, IPM, IDM practices, standardization of quality corm production in public nurseries, development of irrigation system, enhancing product quality, mechanization, infrastructure development, transfer of technologies, quality testing and marketing, enhancement of Research and Development capabilities, delineation of package of practices, dissemination of weather forecasts, marketing alerts, market intervention through e-trading, establishment of electronic auction centre, grading, packing and branding.

Even after completion of project life (4 years), the project has been given another two years to achieve the targets envisaged in the programme.

The present situation is grim and gloomy as hither to fore. There has to be proper monitoring and evaluation to be undertaken by a core group of persons representing all sections of the society including the stake holders and address to those issues which have resulted in the failure of this important Mission launched by GOI.

M. Hussain Shah
Former Director Research



AGRICULTURAL GROWTH

Speed, Skill and Stability a Must



Let us begin with positive news: Around one-third of the world's farms have adopted more environmentally friendly practices while continuing to be productive, according to a very recent global assessment by 17 scientists in five countries. For arriving at the result, the researchers analyzed various practices, including organic farming, that use land, water, biodiversity, labor, knowledge and technology to both grow crops and reduce environmental impacts like pesticide pollution, soil erosion, and greenhouse gas emissions.

Side by side - The reality: In many developing economies, Government after Government tumble down, President / Prime Ministers succeed President / Prime

Minister, but the state of agriculture changes at snails pace! So, another Five Year Plan is going to be over – a mixed performance- giving way to the next one. The major grey area, as usual, has been the farm sector, where the uncoordinated efforts still continue to exist in spite of the GDP drum beating. It is crystal clear that tinkering around the ongoing weapons cannot help reach the target. Had we been one of the leading farm output holders, the world market could have been explored in much better way!

The purpose here is not to belittle the results achieved, but to flash the point that we deserve better and have the ability to forge ahead. Reaching a target of 280 million tonnes+ of foodgrains output, in India, for example, [up from 51 million tonnes in 1951 when the

first Five Year Plan was taken up], does not necessarily allow us to be complacent!

The point here is that had we, the developing zone, been one of the grain bowls [still the scope remains] - by now we could have reaped large benefits from the rising international prices of the agri-commodities. The most important factor on this score is that demand for such commodities – especially the food grains- would never come down rather it is all set to go up over time. Population upsurge coupled with growing demand from industrial sectors could keep the demand factor at reasonably high level.

So the question of complacency is not at all there, rather the time is ripe for looking at the inhibiting factors. It is very difficult to understand why the pulses [main protein source for the vegetarians] output hovers [in India] around 12 – 19 million tonnes since 1960's! It is still considered as a second grade citizen – though there is no doubt that a number of programmes have been taken up by the Government. Poor implementation continues to hit hard.

Clearly, if the current trends are of any indication, the food and agricultural policy system itself is in disarray. The symptoms of such a disarray are not difficult to locate – incoherent / inadequate response to exploding food prices; slowdown

in agricultural productivity growth; water problems; a disorderly response to continuously disturbing energy prices; rapid concentration in multinational agri-business corporations without adequate institutional innovation aiming at properly guiding them; lack of progress in addressing scarcity; widespread nutritional problems [hunger / obesity / chronic diseases] plus agriculture related health hazards [avian influenza, etc] and adverse impacts on climatic fluctuations.

Under investment in areas related to food, nutrition / agriculture [research / infrastructure / rural institutions] invite spill over effect / global impacts, among others. It is high time that sincere collaborative programmes are resumed among the countries in order to adequately address opportunities and challenges.

Positive points do exist. Ongoing

trend is steadily moving in terms of registering quicker growth in agricultural productivity. Good going - growth and modern farm practices and inclusive technologies are being implemented in order to foster the rural growth process. It is also a fact that cellular technologies, wireless communication networks as well as GIS based agro-software technologies are reaching rural India to disseminate vital information and updates on weather, farming technologies, fertilisers, livestock, commodity prices as well as stock markets. Still, a huge number of villages do not have access to advanced farming technologies and interactive communication networks, not to speak of the pace of rural electrification and clean drinking water availability.

Is it not the appropriate time to broaden the sight and look at vital aspects – re-identifying policy dimensions and initiatives; capacity

building through PPP, individual initiatives and joint ventures; boosting agri-business and agri-marketing; GIS mapping and harvesting trends; mitigating climatic change hazards; precision farming – optimum utilization of resources; leaning heavily on most modern agri-practices; micro-finance and micro credit and attaching top importance to food security? Needless to say the responsibilities are to be shouldered not only by banks, but also Government Departments; NGOs, Commodity Exchanges; agri-marketing and State Marketing Boards and of course the Extension Departments of various States. Time is ripe for a more well-knitted coordinated actions so as to : initiate inter-sectoral-linkages; progressive decision making, information sharing and performance improvement; capacity building; creating more opportunities for partnership building, development reorganization



and capacity enhancement for the rural stakeholders.

In fact the problems are so vast that every aspect requires individual care. Fortunately, India is blessed with a number of good agricultural universities, personnel having the necessary knowledge backed by Government encouragement plus skilled farmers. But where is the harm to learn more from the rich experiences in the West and countries like Israel? Water management is something that we have to learn from them, among others, for example.

Clearly, agricultural modernization has no alternatives. Area under cultivation cannot be raised continuously even if the fallow land is brought within cultivation [that too not more than 10 percent in a year]. The question is regarding availability of quality seeds, bio fertilisers' applications, and finally technological consolidation of holdings. Best water use process is another area that deserves attention. Here also scientific planning regarding exploration of ground water holds the key as indiscriminate use gives rise to other problems. Surface water utilization has also not been optimally done.

The urgent need is there to go for overall farm development efforts. For that matter, needless to say, the infrastructure holds the key. The loss incurred during the entire production process inclusive of the damage done in the unscientific threshing, rat menace, field loss, can be minimised. Without proper training imparted to the farmers as regards to post harvest technology not much can be expected on this score. Connectivity between the producing zone and the selling zones calls for immediate reinforcing. Buy-back arrangement is obviously a good process, provided the actual producer receives the legitimate benefit in due course.

The specific point here is that whichever country had not attached

enough of importance on this score had to bear the brunt. It is also a fact that overnight success is not more than a wishful thinking. Systematic planning is the only way out. And for that matter the tools of regional planning can be readily made use of. Regional peculiarities must be the starting point of any realistic decision making on this score. Economic factors alone cannot give a fullfledged guidance as the strength of non-economic factors count for no less. There is always the gap between the cup and the lip. Initiating change has never been an easy matter and change resisting factors count for.

It must be agreed upon that In India's planning this is nothing uncommon – set the high targets and ultimately become a laggard! Most of the Plans lack the realistic touch in as much as sectoral target fixing cannot ignore the spatial dimensions, regional peculiarities and related other sociological factors. More than often the politics pushes back the economic positives. Rather economics is used for achieving the political purposes. Not only is this the reality in India but in the entire developing world. Either the projects are not taken up or even when the same is taken up the rate of progress remains at a palpably low level – cost escalation is rewarded! What is more projects completed are not subsequently followed up, supervised adequately as a result of which the same assignment is to be repeated within a short span of time involving more expenses.

The potentialities still remain so high. How many countries are there in the world that can produce grapes twice in a year! The quality of many horticultural crops enables countries, like India, Bangladesh, and Vietnam, to remain largely unbeatable in the global market. In spite of competition becoming intense – hotter and hotter – we are able to retain the markets for many agri-commodities. The flip side – we have to remain contended

with insignificant share in global trade in agri-commodities! Strong cooperation among the developing and developed world is a must, as hunger cannot go on waiting ad infinitum!! Let there be a good inter-regional cooperation in a more practical way.

An economy like India is still counted as the largest reservoir of poverty in the world, with 300 million of people, as per the national poverty line definition, and well above 800 million people just surviving on less than \$2 per day! SE Asia requires immediate pep up on this score. Neglecting agriculture results in heavy immediate and future loss. The huge upcoming population in the workable category, in turn, is one of the rare assets that could give rich dividends exactly by the same route as China gained in the previous years.

Whatever is, the lead is to come from the two giants – India and China. As a matter of fact the world would heavily depend on these two regions in the days to come. China has, of late, also has been stressing hard on this sector, clearly realising that those big industries alone or an export-led growth ultimately hinges heavily on how the food factor extends support.

For India, fortunately that severe negligence has not been there – the missing factor remained at not properly exploring the resources at a quicker pace. Had it been so by now we could have ruled the world so far as many such commodities are concerned.

A lot thus depend on formulating realistic policies, implementation and then regular practical follow up and supervision.

**Dr. Mukhopadhyay, a
noted Management
Economist, an
International
Commentator on
contemporary
Business and
Economic Affairs can
be reached at m.bibhas@gmail.com**



SOIL ... Secrets

Of valuable interest is an analysis, recently carried out and which reveals a hard hitting fact that 0.01% of the planet's bio mass comprises human beings and the remaining 99.99% of natural bio mass is made up of plants, bacteria, fungi, animals and birds etc., and as things are today the 99.99% is at risk by the miniscule 0.01% !

That sums up the equation in a nut shell and not in anyways happily.No creature on earth befouls its best with such abandon as does Homo sapiens.

Such was amply clear as far back as 1912 to Dr.Alexis Carrel, a Nobel Prize winner, eminent French scientist, who warned that since soil is the basis for all human life our hope rests on re-establishing the harmony in soils that modern methods of agronomy had disrupted.Directly or indirectly all food comes from soil.

To carry on into such tired, overworked, depleted, sickened soils made so by continuous application of synthetic chemicals, has this day resulted in a poor quality of crops for consumption by human and animals. MALNUTRITION begins with the soil and can to a great degree be combatted by wholesome food which comes from fertile and productive soils. Minerals in soil control the metabolism of cells in plants,animal and man. Ailments come about generally by disharmony amongst mineral substances present in infinitesimal amounts in air,water,food but most importantly in soil. Suppose soil is deficient in trace elements food and water is affected negatively too.

Carrel was of the view that plants are the super intermediaries by which elements in rocks, converted by soil micro-organisms into humus, is to man made available, to be built into flesh, blood and bones. This work is way beyond chemical fertilizers. Chemical fertilizers, he said, increased abundance of crops without replacing all the elements exhausted from soils and thus bringing about a change in the nutritive value of cereals.

The more civilization progresses the further it gets away from a natural diet. Our crop yields

have hugely added on but there is seen to be a decline in the nutrient content.The increase in diseases over the past fifty to sixty years inspite of rapid strides in medicine is a pointer in this direction. Even though that is a fact there is a creeping concept that choices of diet and lifestyle can help undo a lot of the negative health aspects. Protection against disease is more important and effective than later therapy. And this rightly may start from within soil.

Hence would not it be worth the effort to have this aspect be included in public health issues?

This is barely a new idea as by 1916 Sir Albert Howard, Imperial Chemical Botanist to the Raj at Pusa was advocating maintaining the soil organic matter alongwith good aeration to allow soil microbes to provide nutrients to feed animals and plants. This coupled with renewal of data on human gut microbes and the work they do in every human stomach makes sense....if one can realise the systemic causation and see the dots to join thema clearer image comes through.

Chemical fertilizer consumption in India rose from 1.1 million tonnes in 1966-67 to 50 million tonnes in /as far back 1978-79....in just about a little over a decade.By then or even earlier Weisner, science counsellor to President Kennedy was reporting that "use of pesticides is more dangerous than atomic Fallout". Notably by then Mosca, winner of chemistry prize at Brussels World Fair presented startling findings to clarify that to IC chemicals used in farms are radiomimetic in that they ape the radiation. He computed that the amount of chemical used annually in 1970s would possibly cause damage equal to atomic Fallout from 72000 atomic bombs of Hiroshima type.

Now it is also seen and increasingly clearly that all such horror is unnecessary, redundant and avoidable....the secret lies buried no deeper than the first few inches of our soil !

Ashok Trivedi
Tea Farmer





AGRICULTURE IN JAPAN POWERED BY INNOVATION

Agriculture is a major industry in Japan and has grown modestly over the past few decades. Crop production is vital to Japan despite limited arable land (13% of the total area) and the highest degree of industrialization in Asia. Terraced lands of rice and other crops, help carry out cultivation in tiny patches far up mountainsides. With the aid of a temperate climate, adequate rainfall, soil fertility built up and maintained over centuries, and such a large farm population that the average farm has an area of only 1.2 ha (3 acres), Japan has been able to develop intensive cultivation. Agriculture exists in every part of Japan, but is especially important on the northern island of Hokkaido, which accounts for 10% of national production. Since World War II (1939–45), modern methods, including commercial fertilizers, insecticides, hybrid seeds, and machinery, increased the harvests substantially through the 1970s.

Rice is by far the most important crop in Japan and planted on the best agricultural land. Other crops grown in Japan include soybeans, wheat, barley, and a large variety of fruits and vegetables. The climate in Japan ranges from temperate in the north to semi-tropical in the south, with abundant rainfall (typhoons are common), hot summers, and relatively mild winters (except in the northern Japanese island of Hokkaido).

Farmland is scarce in Japan and efforts have been taken to expand and improve crop acreage in general and paddy land in particular. Rising age of farming population is another major challenge faced by Japan. Japan's Ministry of Agriculture, Forestry and Fishery (MAFF) has been in the forefront to increase the interest of the younger generation in agriculture and allied sector.

Japan is the second-largest agricultural product importer in the world (after the US), with total agricultural product imports of \$34.6 billion in 2001. About 39% of all arable land is devoted to rice

cultivation. Overproduction of rice, as a result of overplanting and a shift to other foods by the Japanese people, led the government in 1987 to adopt a policy of decreasing rice planting and increasing the acreage of other farm products. However, the per capita consumption of rice has been dropping for decades due to urbanization, adoption of western foods, and an aging population. The Japanese strongly prefer to eat the native Japonica (sticky) rice. Japan is required to import a set amount of rice each year (770,000 tons) under the terms of the WTO Minimum Access agreement, but most of this is put into storage or used for food aid or industrial processing (sake, rice flour, feed, etc).

Consumers in Japan are highly sensitive to quality issues in their food, demanding fresh, uncontaminated, and attractive products. Japan has a unique and complex food import and distribution network that is geared to moving produce as quickly and efficiently as possible, while maintaining the highest quality.

“JAPAN CAN COOPERATE WITH INDIA IN DEVELOPING ITS FOOD VALUE CHAIN”

Mr. Masakazu Ikefuchi, Assistant Deputy Minister in charge of India, Ministry of Agriculture, Forestry and Fisheries (MAFF)

How is the agriculture production scenario of Japan?

Total agricultural output grew for the second straight year exceeding 9.3 trillion yen for the first time in 16 years. Various support measures are being implemented for expanding production and consumption.

In Japan per capita rice consumption has decreased by nearly half during the past 50 years due to the aging of society, the declining population and changing dietary patterns. This trend is estimated to continue. On the other hand, besides producing rice, paddy fields also have multifunctional roles that include preventing flooding and soil erosion and stabilizing the water volume of rivers. This is why paddy fields must be maintained in the future. Accordingly, efforts are being made towards the full utilization of paddy fields by shifting production away from rice as a staple food to crops demanded such as rice for feed, wheat and soybeans. Although the purchase of fresh vegetables has declined, there has been an increase in demand for processed vegetables such as for salads and demand for processing and industrial-use vegetables now accounts for around 60% of total demand for vegetables. Meanwhile, within processing or industrial-use demand, the share of domestically produced vegetables has declined to around 70% due to a rise in imported vegetables. Fruit production has expanded for citrus fruits such as Benimadonna and Kanpei and for the high-sugar content apples. “Shine Muscat” grape shipments increased in response to robust domestic demand, leading



Mr. Masakazu Ikefuchi, Assistant Deputy Minister in charge of India, Ministry of Agriculture, Forestry and Fisheries (MAFF) with other officials

prices in 2018 to exceed the previous year's levels. Land area under Shine Muscat cultivation has increased approximately eightfold over the past four years. In recent years, grape and peach exports in value have continued to grow. In recent years, demand for wheat produced in Japan has increased on the development of products using Japanese wheat and the development and diffusion of new excellent varieties. In recent years, demand for Japanese soybeans has increased in line with growth in sales of Tofu, soybean cake and Natto using Japanese soybeans.

Is Japan self sufficient in its food requirements? What are the plans afoot to usher in self-sufficiency?

Japan's food self-sufficiency ratio is trending downward. Various

measures are being implemented to attain the targets of raising the food self-sufficiency ratio from 38% in 2016 to 45% in 2025 on a calorie basis and from 68% in 2016 to 73% in 2025 on a production value basis. Production centered on potatoes would provide necessary calories (2,146 kcal) for daily living. However, production centered on rice, wheat and soybeans, which is close to the contemporary dietary pattern, does not provide sufficient calories. The government will seek to maintain or improve the food self-sufficiency ratio and potential by increasing agricultural production through the intensification and integration of farmland use and by expanding demand for Japanese agricultural products at home and abroad.

What are the challenges

associated with the Japanese agriculture?

The aging farming population and expansion in abandoned cultivated land are the major challenges we are facing. The average age of persons engaged in agriculture is around 67. By age bracket, the population of farmers is conspicuously unbalanced, with persons aged 60 and above accounting for around 70% of farmers while persons aged 40 and below make up just about 10% of all farmers. In view of this situation, efforts are made to increase young farmers to ensure the sustainable development of agriculture. A strong agricultural structure must be established to make agriculture a progressive industry amid the challenges. Comprehensive efforts are being made to concentrate and intensify farmland for business-minded farmers, aiming to increase the ratio of farmland used by business-minded farmers from 50% in 2013 to 80% over the next 10 years. Also, to accelerate the farmland consolidation for business-minded farmers, a public corporation for farmland consolidation (Farmland Banks) was established in each prefecture in 2014. The Farmland Banks rent agricultural land from the land lender (person wishing to rent out the land) and lease land to farmers after consolidation that enables ease of use (sublease).

What are the developments in agriculture trade in Japan?

Japan's 2020 goal of agricultural, forestry and fishery products and foods exports totaling over JPY 1 trillion (USD 8.9 billion) is within reach as overseas sales is growing year after year. Our value of exports of agricultural, forestry and fishery products and foods have increased for four consecutive years since 2013, reaching a record-high JPY 750.2 billion (USD 6.7 billion) in 2016. MAFF has formulated export promotion strategy of agricultural,

forestry and fishery products and foods and newly established the Export Strategy Execution Committee to boost the exports of the whole country. At the same time, efforts are made to expand exports through export bodies set up for each priority product. Among agricultural products, beef, garden trees, green tea, rice and strawberries hit record highs. The export value of fishery products, accounts for roughly 40% of total export value of agricultural, forestry and fishery products and foods. Japan aims to boost annual export value of fishery products to 350 billion yen in 2020, up from 170 billion yen in 2012. To achieve this aim, efforts are being made to improve export circumstances, which includes the initiative of Fisheries Agency starting HACCP authorization of fishery processing facilities required for exports of fishery products to the EU.

Which are the other areas in agriculture where Japan and India can cooperate?

Japan can cooperate with India in developing its food value chain. MAFF is now promoting "global food value chain strategy" to increase agricultural and fishery products and processed food made with/ by Japan abroad through public private partnership and India is one of the most important targets for the strategy. Memorandum of cooperation between MAFF and the Ministry of Agriculture and Farmer's Welfare took place in November 2016 in Tokyo where both countries decided to promote cooperation in the field of agriculture and food related industry through joint activities; establishing of Joint Working Group including state governments; focus on cooperation to develop food value chain in India. In November 2017, first India-Japan Joint Working Group meeting was held in New Delhi. We are now trying to design master plan for developing food value chain in Andhra Pradesh

state with Mizuho Information and Research Institute and Mizuho Bank. Recently, Memorandum of Cooperation was signed on designing of master plan between MAFF and the state government of Andhra Pradesh on February 2018 in Vishakhapatnam. Both sides shared the importance of materialisation of specified cooperation areas such as processing and export of shrimp and fish, export of fresh mangoes, cold chain development, development of value added price products, tomato production and processed tomato products. MAFF is now discussing with the State Government of Maharashtra and the Uttar Pradesh for developing food value chain in the states. After signing master plan with Andhra Pradesh, we will try to scale out it to other states or India as a whole.

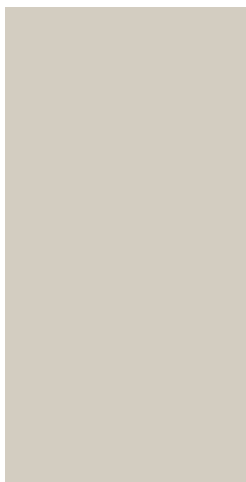
In terms of technology adoption in farming India is still far behind. How can Japan help in this segment?

We can help India in expanding the scale of agricultural operations and realizing labor-saving and low-cost operations by introducing cutting-edge Japanese technologies from interdisciplinary fields such as robotics and information communications technology (ICT). We are coming up with the new technologies in farming industry such as automated tractors, innovative technology for tomato harvesting, robots suits, IT, drones for efficient farming which India can adopt. Smart agriculture involves using ICT and robot technologies to improve soil productivity, plant seeds, weed and harvest as well as to record farmwork using cloud systems. This new type of agriculture is now moving closer to reality. It utilizes leading-edge technologies such as robot technologies and ICT to enable ultra-labor-saving and high-quality production. Smart agriculture can be adopted in India with the help of Japan.

JICA: A BRIDGE LINKING JAPAN WITH DEVELOPING COUNTRIES

JICA is an independent administrative institution under the Government of Japan, established with the aim of promoting international cooperation. JICA works as a bridge between Japan and emerging countries, and provides assistance in forms of loan, grant and technical cooperation in an integrated manner so that the developing countries can strengthen their capacities. Since joining the Colombo Plan in 1954, Japan has been providing financial and technical assistance to developing countries through Official Development Assistance, ODA, aiming to contribute more proactively to the peace, stability and prosperity of the international community. JICA assists and supports developing countries as the executing agency of ODA. In accordance with its vision of "Leading the world with trust", JICA supports the resolution of issues of developing countries by using the most suitable tools of various assistance methods and a combined regional-country- and issue-oriented approach. JICA, the world's largest bilateral aid agency, works in over 150 countries and regions and has some 90 overseas offices. In a discussion with Agriculture Today, Mr. Kyosuke Inada, Senior Director, South Asia Department, JICA talked about strengthening cooperation between the two countries and JICA's cooperation in agriculture, irrigation and forestry sector in India.

Japan has been a partner of India for more than six decades. On August 1, 2011, a comprehensive economic partnership agreement between Japan and India went into effect, and 2012 is a memorable year of the 60th anniversary of Japan-India diplomatic relations. JICA is providing assistance to realize Japan-India cooperation such as the Delhi-Mumbai Industrial Corridor (DMIC) and the Chennai-Bengaluru Industrial Corridor (CBIC) in South India, as well as assistance to strengthen Japan-India academic-industry networks, and human resources development for industries. It is extending its assistance to contribute to stronger relations between Japan and India. It is noteworthy to point out that the first ODA loan from Japan was extended to India in 1958, and ever since the partnership between Japan and India has grown by leaps and bounds. Today, India is JICA's



*Mr. Kyosuke Inada,
Senior Director, South
Asia Department, JICA*



largest development partner, with approximately 100 ODA loans, technical cooperation and grant aid projects. The relationship between Japan and India is upgraded to "Japan-India Special Strategic and Global Partnership" in 2014, and cooperation through official development assistance is an important part of this partnership. JICA has extended ODA loan of 517 billion Japanese Yen (approx. Rs 30,600 crore) cumulatively since 1981/82 to enhance agricultural productivity and forest resource management in India.

"JICA is assisting India in enhancement of agricultural productivity and livelihood improvement in rural areas. It has been focussing on uplifting and stabilizing farmers' income, and improving agricultural productivity through construction/rehabilitation of irrigation facilities, enhancement of Water Users Association (WUA), improvement of cultivation technology, crop diversification and strengthening market linkages. Cross sectoral issues, such as gender equity and equality, global warming and full utilization of Information & communications technology, are required to be addressed as well", said Mr. Kyosuke Inada, Senior Director, South Asia Department, JICA. "JICA has facilitated development of irrigation facilities in Himachal Pradesh, Andhra Pradesh, Telangana, Odisha, Rajasthan and Jharkhand. To increase the production, it facilitated crop diversification in Himachal Pradesh; enhancement of soybean production in Madhya Pradesh; enhancement of silk production from bivoltine cocoons in Andhra Pradesh, Karnataka & Tamil Nadu. It is also facilitating sustainable forest resource management across Rajasthan, Gujarat, Kerala, Tamil Nadu, Punjab, Karnataka, Haryana, Odisha, Tripura, Himachal Pradesh, Uttar Pradesh, Sikkim, West Bengal, Uttarakhand and Nagaland."

VISIT TO JICA TSUKUBA CENTER

JICA has 15 domestic branch offices throughout Japan. JICA Tsukuba, responsible for Ibaraki and Tochigi prefectures, is located in the Tsukuba Science City, Ibaraki prefecture. With collaboration with the research institutions holding world-class technologies and experiences, JICA Tsukuba provides "Knowledge Co-Creation Programs" to develop human resources of developing countries engaging in various fields like disaster prevention, environmental protection, education, and promoting mutual learning among participating countries and Japan.

Ibaraki prefecture is one of the Japanese leading prefectures in the field of agriculture production. Farmers in Ibaraki prefecture are experienced with upland varieties, contributing to 74 % of the national production. This offers an ideal learning environment for those African countries which have started cultivating upland rice in recent years. JICA Tsukuba has been providing agricultural courses for over a half century. It provides practical training for agricultural professionals specialising in such field as rice cultivation, vegetable cultivation, irrigation and drainage, and agricultural machinery. JICA

Tsukuba effectively contribute to human development with advanced and progressive knowledge and skills by using its human resource network in the field of agriculture and rural development, by coping with the individual and practical challenges faced by developing countries. Some of the ongoing Knowledge Co-Creation Programs witnessed during the visit to JICA Tsukuba center were vegetable production technology for livelihood improvement of small-scale farmers; Upland rice cultivation, seed production and variety selection techniques; Improvement of rice cultivation technique; development and improvement of agricultural machinery for small-scale farmers; and market oriented agriculture promotion focusing on vegetable production for extension officer in Africa.



Ongoing Knowledge Co-Creation Programs witnessed during the visit to JICA Tsukuba center

JETRO: A GATEWAY TO JAPAN

As Japan's core organization for promoting inward foreign direct investment, the Japan External Trade Organization (JETRO) has provided support to more than 16,000 overseas companies interested in setting up business bases, of which over 1,600 have gone on to successfully establish operations. JETRO's core competency lies in its customized support and reputable experts. In a discussion with *Agriculture Today*, Mr. Yasukazu Irino, Executive Vice President, JETRO explained the business environment in Japan and exports of Japanese agri-products to India.



What is the mandate of JETRO?

JETRO is a government-related organization promoting two-way trade and investment between Japan and the rest of the world. We have 74 overseas offices in 54 countries and 46 offices throughout Japan. Our five offices in India are located in New Delhi, Mumbai, Bangalore, Chennai and Ahmedabad. JETRO has been designated as the core organization for promoting Prime Minister Abe's plan to double inward FDI in Japan. One of our activities is providing foreign investors with abundant information on all aspects of doing business in Japan through expert consultation. JETRO's Invest Japan Business Support Centers (IBSCs), located in six cities in Japan, offer free office space for two months to allow international companies to prepare business bases. Free consulting services, including those covering administrative procedures and market information, are also provided as one-stop services for companies starting business in Japan.

JETRO connects Japanese goods and services with the world. We support the export of high-quality Japanese agriculture, forestry, fishery and food products as well as delivery of excellent manufactured goods and services produced by small and medium-sized enterprises (SMEs) in Japan. In addition, we also support overseas expansion of these SMEs while helping to foster local industry of developing countries. We contribute to enhancement of global economic partnership through policy studies. JETRO's research on bilateral and multilateral economic partnership agreements (EPAs) has been an invaluable asset to the trade policy of Japan and other countries. Using the function of the Institute

of Developing Economies (IDE-JETRO), an international research institute on emerging and developing economies which has produced prominent results such as in value-added research, JETRO gives policy recommendations within Japan and abroad. Throughout the year, we also organize and sponsor numerous symposiums, seminars, conferences and dialogues in cities worldwide in order to stimulate interest in doing business in Japan. This includes our Invest Japan Symposiums, which provide the latest information on Japan's investment and business climate.

What is the trade volume in agriculture between Japan and India?

The total value of export to India is 1.3 billion yen. Indian imports from Japan come to 5 million USD, which is 0.03% of its total import amount of 19.216 billion USD.

What are the potential areas where this trade can be further expanded to?

Partnering with Japanese companies to add Japanese technology to Indian products will be a great advantage for India. In Japan, there are organizations and companies that have excellent R&D capabilities, especially in the fields of agriculture, environment, energy conservation and robotics. Also, an announcement on collaboration in food safety between India and Japan was made during a seminar on enhancing accessibility of Japanese food in India organised by JETRO in New Delhi. Establishing a base in Japan dramatically increases the potential for overseas companies to partner with these SMEs.

How do you view India as a destination for agriculture-based companies from Japan?

We believe that India has a huge market for agriculture-based companies from Japan. On July 5, JETRO held the opening ceremony for the Business Support Centre Ahmedabad (BSCA), which aims to assist Japanese companies in entering India, especially the state of Gujarat. It is JETRO's fourth BSC in India following those in New Delhi, Mumbai and Chennai.

According to the government of Gujarat, in the state the amount of investment by Japanese companies to date is about 1 billion USD (about 110 billion yen) and their goal is to draw an additional 3.3 billion USD by 2021. The establishment of the BSCA will facilitate entry of Japanese companies to the state, which will further boost the "Make in India" policy. During the ceremony, a MOU and letter of intent between the government of Gujarat and 10 Japanese companies assisted by JETRO were presented. On a related note, JETRO has been contributing to assisting Japanese companies investing into and creating jobs within the state in line with an MOU between the government of Gujarat and 15 Japanese companies, as announced at an event held during a visit to India by Prime Minister Abe in September 2017. Based on this MOU, JETRO Ahmedabad has facilitated the Japanese industrial Park GIDC Mandal in Vithalapur by offering assistance in occupancy and various procedures since 2013. In addition to that, through the BSCA, JETRO will also be involved in various business activities in Gujarat by Japanese companies as well as collaboration between Indian and Japanese companies.

What are the bottlenecks in trade with India in the agricultural sector?

Some of the hurdles we face are regarding the distribution system, temperature control, labelling regulations and retail FDI regulations in India.

How is the business environment in Japan for foreign companies?

Japan offers a business-friendly environment. It is a profitable market that ranks third among the top 12 OECD countries on rates of



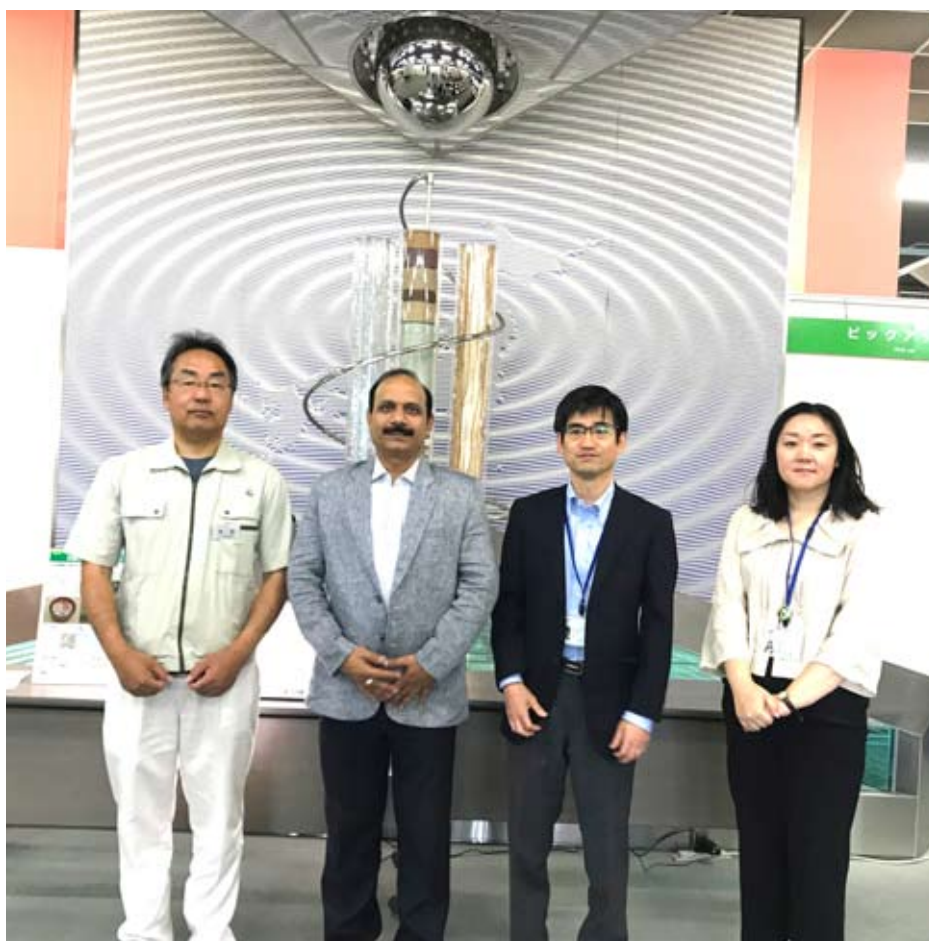
return on inward FDI, and ranks first in services among 22 countries. It ranks eighth out of 138 countries on the Global Competitiveness Index and second out of 138 countries on business sophistication. Japan is one of the most livable countries in the world. According to the Global Peace Index 2017, Japan ranked 10th among 163 countries and first in Asia.

The effective corporate tax rate has been reduced to the 20% level and the earning power of companies increased through corporate governance reform. Foreign companies hold a high share of sales in Japan, particularly in consumer-related markets. Japan has the second largest retail market in the world, and its market as a whole is highly appreciated as a source of global standards. These factors alone make it very appealing.

A world-class innovation hub in terms of funding and the number of researchers, Japan generates R&D and innovation on a tremendous scale. About 80% of 197 foreign companies see its well-maintained infrastructure (transportation, logistics, information and communications and energy) as an advantage of Japan's business environment, which was declared by the World Economic Forum as the most sophisticated business environment in the world. It also provides safe and comfortable community infrastructure. The growth in the Japanese market has also drawn greater investment from overseas.

NARO: TECHNOLOGIES FOR CREATING NEXT-GENERATION AGRICULTURE

The National Agriculture and Food Research Organization or NARO is the core institute in Japan for conducting research and development on agriculture and food. The overall mission is to contribute to the development of society through innovations in agriculture and food, by promoting fundamental and applied R&D. NARO conducts technological development to make agriculture a competitive and attractive industry, and contribute to increasing the nation's food self-sufficiency. In addition, the organization conducts R&D regarding global issues such as climate change, and the utilization of local agricultural resources to maximize the multi-functionality of agriculture. During the visit of Agriculture Today to NARO Headquarters at Tsukuba city, Mr. Koji Tanaka, Head of the Public Relations and Communications Section, explained various research initiatives and achievements of NARO in the field of food and agriculture research.



L-R: Dr. Tomokazu Yoshida, Director of Smart Agriculture Promotion; Dr. MJ Khan, President, Agriculture Today; Mr. Koji Tanaka, Head of the Public Relations and Communications Section, NARO

NARO focuses on six high-priority research areas in agriculture and food production in accordance with the 5th Science and Technology Basic Plan of the Council for Science, Technology and Innovation (CSTI) towards the realization of a super smart society (Society 5.0). These research areas include creation of a data-driven innovative smart agriculture; development of a smart breeding system and cooperation with the private sector in breeding new cultivars; construction of a smart food value chain including exports; utilization of biological function to create new industries and enhance health care through food; development of essential agricultural knowledge and technologies (environmental data, gene bank, soil etc.); and advancement of fundamental technologies such as artificial intelligence, data linkage, robotics etc.

"At NARO, we research on establishing highly productive paddy-field farming and upland

farming, in accordance with the climate and soil conditions of a given region. We research on applying robotics, Information and Communication Technology (ICT) to develop innovations in agricultural production. For livestock industry, we research on strengthening the production base and enhancing the competitiveness of the livestock industry. Also, the organization do research on developing and implementing technological beef-production and cattle-breeding systems in accordance with the specific conditions of a given region", said Mr. Koji Tanaka, Head of Public Relations and Communications, NARO. "We are promoting the development of novel crops and new agricultural products through genomic and agrobiological research, innovative research focusing on new elementary biological materials such as high-quality silk products which can factor in the development of new industries, and communicating the merits of such products to producers, users and consumers. We have developed silk fibers containing fluorescent proteins of different colors and new functionality silk materials with spider dragline protein. Also, recombinant gene technology and the silkworm's high protein production capacity are combined and exploited for production of drugs, cosmetic materials etc."

The organization is producing high-quality and healthy foods and ensuring the safety and reliability of agricultural products. NARO's research target high value-added fruit trees, tea, vegetables and flowers. They aim at ensuring the safety and reliability of food, livestock products, and agricultural crops. Besides, the organization research on animal diseases and crop pests which constitute a threat to domestic industry and public health.

WORKING TOWARDS DATA DRIVEN SMART AGRICULTURE

The Institute of Agricultural Machinery, NARO (IAM/ NARO) is a prioritized research center established for collaborating agricultural work with ICT technologies and robotics, with a strong emphasis on interdisciplinary cooperation. Through research and development of innovative agricultural machinery and technology, the institute promotes improvement of productivity, labor saving, reduction of environmental burden, as well as farm labour safety. Dr. Tomokazu Yoshida, Director of Smart Agriculture Promotion explains the application of robotics and ICT in the field of agricultural work in Japan.



The mission of IAM/NARO is to play a central role in the development of advanced and innovative agricultural machinery, by utilizing interdisciplinary technologies, such as robotics and ICT to achieve smart agriculture, as the agricultural structure of Japan

changes significantly with the aging farmers. The Cross Ministerial Strategic Innovation Program (SIP), is a national project created towards the realization of science and technology innovation through promotion of R&D overlooking from basic research to application and commercialization by

cross ministerial cooperation. Agri Innovation is one of the 11 themes under SIP.

“To achieve a society that implements smart agriculture and to develop a totally new agricultural production system, we develop not only leading edge, basic technology but also machinery for regional needs, and collaborate with agricultural machinery research fields both inside and outside NARO, and a holistic R&D that combines breeding and cultivation system”, said Dr. Tomokazu Yoshida, Director of Smart Agriculture Promotion. “We have developed multiple robot operating system to handle multiple robot tractors safely in fragmented fields. We have also developed a simultaneous operation system involving both harvesting and discharge, in which a man driven truck accompanies a robot combine harvester. By use of this machine transplanting and harvesting can be done by one person at low labor cost and expanded operation scale.”

The IAM/NARO conducts research on agricultural robotics and the implementation of autonomous farming to address issues of managing large farms with minimal labor. “The automated farm machinery is guided by a global positioning system (GPS) and an altitude sensor to perform tasks from tilling to harvesting with accuracy. The robot tractors and rice transplanters are already put into action and used by people. Whereas, multi robot tractor operating system, automated transplanter and robot combine harvesters will be implemented in early 2019”, said Dr. Yoshida.

The Horticultural Robotics Unit of IAM/NARO is working with technical development utilizing cutting edge technologies such as ICT and robotics, so that optimization and automatization of protected horticulture could be made possible. The institute has developed a robotic strawberry harvester as well as its predecessor, a movable bench system for high-density cultivation of strawberry. The institute has commercialized a robotized strawberry packer to automatize packing of strawberries after harvesting. It also developed a spraying robot, an unmanned sprayer for greenhouse use.

“We are implementing information technology through agricultural data collaboration platform. We will integrate and consolidate research results of SIP agriculture and function as a hub for realization of Society 5.0 in agriculture. Data collected from robotics include data on weather, agricultural lands and farm operations. The government is working to accumulate all data together and bring it on one platform so that people can use the information” mentioned Mr. Yoshida.

The Institute of Fruit Tree and Tea Science, NARO (NIFTS) conducts basic and innovative research in fruit tree and tea science in order to respond to the needs of consumers, producers and people involved in related industries, and contributes to the advancement of fruit and tea production and the enrichment of dietary life in Japan. Dr. Hideo Bessho, Director of Division of Fruit Breeding and Genetics, NIFTS explained about creating new cultivars and technologies to realize efficient and stable production and distribution.



The NIFTS has successfully created many new cultivars by crossbreeding. Some of the cultivars developed by NIFTS are world's most widely grown apple cultivar 'Fuji', known for its good taste and storability, and citrus cultivars 'Kiyomi', 'Setoka' and 'Shiranuhi', whose growing area is increasing due to their good taste. Among Japanese pear cultivars, 'Kosui' and 'Hosui' account for approximately 65% of pear grown in Japan and 'Akizuki' is popular for its juicy texture and its cultivation has been increasing in recent years. The grape cultivar 'Shine Muscat' is a very popular variety developed by the Division of Grapes and Persimmon Research.

“We have also developed DNA markers that efficiently select self-compatible seedlings. The utilization of DNA markers in fruit tree breeding is expected to facilitate efficient and accurate breeding of new cultivars. In addition, DNA markers are currently used for cultivar identification and may provide a suitable method to prevent fraud in marketing of highly valuable fruits. NIFTS is developing efficient techniques by using information from genetic analyses and genetic resources. It has also identified genes for pest and disease resistance, which are used in breeding new cultivars”, said Dr. Hideo Bessho, Director of the Division of Fruit Breeding and Genetics. “The Pear and Chestnut Breeding Unit aims to develop new varieties of pear and chestnut that combine high eating quality and delicious fruits with other agronomic traits such as ease of cultivation and harvesting, and resistance to various pests and diseases. It is also developing technologies which enable the efficient selection of new varieties.”

Whereas, the aim of the Postharvest Physiology and Health Benefits Unit of the institute is to contribute in providing delicious fruits and developing new cultivars by pursuing research focusing on the flavor ingredients related to the taste of fruits and the storage conditions for fruits.

JAPANESE POULTRY TO TRANSFORM NUTRITIONAL SECURITY OF INDIA

Japan's largest egg producer, Ise Foods, is launching major egg production operations in the enormous Indian market, aiming to sell 4 billion eggs annually, about 5% of India's current egg consumption. Economical Japanese cars have had an epochal relationship with India, but the auto major has teamed up with Japan's leading egg manufacturer, ISE Foods Inc., to bring the protein-packed offerings to India's billion-plus consumers. ISE Foods Inc. has 100 years of history and has major operations in the U.S, China and ASEAN countries, in addition to Japan. ISE Foods has recently signed memorandum of agreement with the Indian government with an investment commitment of Rs 217 crore to begin operating poultry farm. The Tokyo-based firm is keen to develop a complete, integrated system for egg production, including a poultry farm, post harvest management and feed mill factory. Japan India Food Business Consortium was established on May 29, 2018 under the leadership of Chairman Ise. Mr. Hikonobu Ise, Chairman, ISE Foods Inc discussed his plans to transform food security of India.

The genesis of ISE Foods Inc. and his journey so far

ISE Foods Inc. has over hundred years of history. The company holds the largest number of hens and that ships the largest number of eggs in Japan, a country where chicken eggs are generally considered safe. It is expanding its business not only within Japan, but also to the United States, China and ASEAN countries. ISE Foods is number one in domestic shares. In 1929, his father attained world record for the most productive hens that could continue to produce eggs for 365 days consecutively, and in 1940 achieved the world record again. ISE way of productive hens produce is 1 kg of eggs with 2.2 Kg of feeds.

Ise Foods Inc. has three generation traceability to ensure safety. They have consistent production control that includes information about the grandparents of laying hens. This is why they can provide fresh, origin traceable eggs. They have created Eggs Research Centers at farms, actively striving to check and inspect products that meet with customer satisfaction. Specialists are working on testing, evaluating, and analyzing eggs daily.

The special features of ISE eggs

ISE Foods produces eggs free from salmonella, antibiotics and chemical fertilizer, they are



Mr. Hikonobu Ise, Chairman, ISE Foods Inc (left) with Dr. MJ Khan, President, Agriculture Today (Right)

hygienic and nutritious which have high-value as a product. Their highly hygienic, scientific, large-scale and fully automated poultry farm brings costs down and high profit. Their windowless farm prevents hens from diseases like bird flu etc. Stress free environment allows hens to produce nutritious eggs with high productivity.

Efficient ISE's Integration system

The ISE integration system is the ultimate form of the management the company has created. It includes raising three generations of chickens, egg collection, grading/packing and delivery.

Creation of the ultimate eggs starts from creating secure and safe feed. Feed is very important source of life that has a major influence on chicken breeding and egg production. ISE foods Inc. utilises technical information acquired over many years based on experience and research into feed production in order to raise healthy chickens, and produce safe, tasty, and highly nutritious eggs.

Temperature-controlled windowless bird house prevents trespassing of wild birds and laying hens are raised in stress free environment and in clean chicken houses. Only very limited workers after sterilization are allowed. In order to avoid bacterial infection from humans, high quality eggs are collected without being touched by humans.

The key to producing good eggs is to keep providing a good environment to the laying hens. To prevent diseases, the chicks are raised for 17 weeks without being exposed to any environmental changes. The chicks are raised into healthy young chickens without using antibiotics, providing with comfortable environment, appropriate vaccinations, and high-quality feed. The laid eggs are collected and graded automatically by belt conveyors within the day. Temperature control starts from this

stage. All of inspections are carried out daily to verify eggshell strength, yolk color, egg freshness and others.

Inspiration behind his move to the India market

Ise Foods Inc.'s move into India is in large part in response to a request from the governments. In early November, ISE Foods attended the World Food India in New Delhi, where Mr. Ise talked directly with Prime Minister Narendra Modi, who made requests to supply safe and nutritious eggs to Indian children to improve malnutrition, transfer Ise's technology and know how to India and train poultry farmers.

ISE egg factories are known for strict quality control based on the company ethos. Mr. Ise plans to bring this Japanese high standard into India to supply safe and nutritious eggs to Indian consumers. With farmers accounting for a half of India's 1.3 billion population, productivity improvement is vital for economic growth. Prime Minister Narendra Modi aims to double farmers' income in India by 2022. If the venture takes root widely in India, it could help tackle the challenges and make farming profitable for the farmers.

Promises and challenges in Asian markets

The potential for growth for Indian Market is huge. In India, about one egg per week is consumed per capita, compared to one egg per day, per capita in Japan. Ise Foods Inc. accelerates their move into promising Asian markets in recent years, recognizing that the Japanese market is already mature. Once they choose local partners, new joint ventures could be set up with the Ise Suzuki India joint venture. To increase the nutritional value of the eggs, they will introduce a proprietary feed.

In Japan, the company also produces processed egg products, such as liquid eggs, pastries and side dishes, selling them to food

manufacturers and convenience stores. In India, where the culinary culture is changing, the company will also focus on the processed foods market. Diets change with economic development, and they see a major shift in India's food consumption patterns is in the offing. Hygiene-conscious city people will find Ise eggs the right product. A bit of Japan on the breakfast table seems imminent.

In Asia's emerging economies, eggs are prone to salmonella and other bacterial infection during the production, slow delivery and inadequate temperature control. Amid outbreaks of bird flu, Asian companies are eager to tap Ise's technology. In addition to setting up local poultry farms and grading/packing factories they will accept resources from India, Thailand and Vietnam etc for training in Japan, with the aim of transferring Ise Foods' skills and knowhow to make them future managers of modern poultry farms operated by Ise Integration System across Asia.

Also, during the World Food India, ISE Booth was crowded with many visitors every day. More than 250 companies and organisations showed interest to partner with ISE foods to start poultry farm by ISE integration system. This shows the interest of companies in partnering with ISE Foods for achieving high quality egg production.

Mr. Ise's future plans of the company

He plans to use the internet of things to make food distribution more efficient. He wants to build a 'direct-from-the-farm' network that utilizes smartphones and similar technology. Mr. Ise plans to train 500 Indian youth by pure Japanese system in Japan to make them efficient and introduce them with the Japanese technology and know how. Also, he aims towards achieving women empowerment in India by positioning women in various leadership roles.

FRESH MAMA: A REVOLUTIONARY NEW FILM FOR FRESH PRODUCE INDUSTRY

Nissan Steel is a Japanese manufacturing company based in Kyoto and normally concentrates on producing steel products. The company has recently developed an amazing and revolutionary new film which helps keep freshness in fruits and vegetables for longer periods and cuts losses in delivery chain. The company has introduced new technologies about germfree preservation and transportation for fruits and vegetables by introducing non destructive inspection technology using AGEs as a freshness indicator; new sterilisation technology without chemicals; and preservation technology by controlling ethylene gas. The company decided to build on the strength of its connections with the retail sector by becoming involved in a cooperative venture with the Agriculture Research Development of the University of Osaka and Nissho Chemicals in the field of food packaging.

The key feature that makes the Fresh Mama film sheet so remarkable and unique is its ability to break down ethylene gas, which causes fruit and vegetable to age and lose their freshness, into its harmless constituents of carbon dioxide and water. "The product called Fresh Mama looks set to completely transform the fresh produce distribution sector. It is plastic like film sheet that keeps fruits and vegetables fresh for a longer period and so offers the potential to cut losses in the delivery chain in India and to boost exports to foreign markets. Moreover, the reduction in loss rates from 30% to about 10% will directly translate into higher profits for all involved in the shipping and distribution of fresh produce. We have decided to establish Freshmama factory in India. Part of the profit generated in India will be given to



Mr. Kiyoshi Nishibe, President & CEO, Nissan Steel Industry Co. Ltd. (left) with Mr. Shigeki Kawakami, Associate Professor of Osaka University (Right)

Indian farmers to help them", said Mr. Kiyoshi Nishibe, President & CEO, Nissan Steel Industry Co. Ltd. "The truly unique element of the new technology is that it works even if foodstuffs are loosely wrapped with air still trapped inside the packaging materials. The sheets themselves are

reusable which is another ecological plus point in terms of easy recycling and the avoidance of unnecessary waste."

The FreshMama sheets incorporate a raised concentration of carbon dioxide, inhibiting respiration and slowing the ageing process in the cells thereby enabling the items to be kept fresh for longer. "Tests have shown that a period of just three hours used delivers a dramatic decrease in the concentration of ethylene gas of some 80%, and after 6–24 hours it is almost entirely eliminated. By comparison to the conventional packaging, this allows the freshness of the fruit and vegetables to be preserved for an extra 4–5 days longer, and even keeping the items in the refrigerator or in complete darkness makes no difference to the process of breaking down the ethylene. Temperature has no effect on it but UV rays can affect the products", informed Mr. Shigeki Kawakami, Associate Professor of Osaka University.



GREEN FARM MT. FUJI: JAPAN'S LARGEST LED HYDROPONIC VEGETABLE FACTORY

FARMSHIP is an agricultural business company of LED hydroponics. The company develops projects leveraging large-scale manufacturing capacity, using plant factory technology as core tech. It aims to create a unique value chain and expand project areas to include the entire value chain, to maximize added value. A plant factory is a system that controls environmental conditions inside the facility via man-made means, allowing for stable production of vegetables and other products, regardless of season or location. Development of artificial light is thriving within Japan, and currently in the middle of its third boom, as its introduction into the plant factories of other industries is being implemented and evaluated.

During the visit to LED hydroponic vegetable factory at Green Farm Mt. Fuji, Mr. Kentaro Kozako of Fujisan Green Farm Co., explained about the characteristics of plant factories as compared with outdoor farms. "The plant factories can significantly reduce or totally eliminate risks posed by poor weather or seasonal variations. The cultivation takes place in a closed environment, it is possible to grow vegetables without pesticide and insecticide. By optimizing the amount



of light (light quality), temperature, humidity, CO2 and nutrient solutions, it is possible to improve growth speed and yield per area unit. Because the environment can be controlled by restricting growth speed, it is possible to align supply quantity with demand. It is possible to consistently supply large quantities, making supply chain management comparatively easier. By adjusting the composition of nutrient solutions and light quality, it is possible to modulate the amount of specific nutrients. Also, it is easier to secure staff for plant factories than for outdoor farms" said Mr. Kozako.

Whereas, some of the factors that should be kept are that the startup costs for building, as well as for growing facilities, are expensive. Organic farming is challenging,

since the use of chemical fertilizers is standard for hydroponic farming. Energy costs are high for running this kind of business. Also, more high-level project administration and technology is necessary. Though plant factory businesses are comparatively more difficult to manage than outdoor farms, since they allow for strategic project management, they can produce highly profitable models.

The large-scale plant production factories have daily yields of 10,000 plants. The factories are generally working 365 days a year. The work is handled by 30 to 40 part-time employees who primarily do manual labor, divided into growing (seeding, planting), harvesting, packaging (trimming lower leaves, regulating weight, packing), shipping, cleaning and other tasks. Commercial distribution primarily goes from producers (factories) to brokers, then to supermarkets, the food service industry and the ready-made meal industry. Vegetables from plant factories differ from outdoor produce, in that they typically do not go through agricultural co-ops (markets).

The Farmship massive plant factories are among the best worldwide. The one of the company's leading project is Green Farm Mt. Fuji, one of the world's largest plant factory fully lit by LEDs, with 12,000 plants grown per day. "The farm's large-scale major plant factory, a renovated distribution warehouse, is the first of its kind in Japan which is putting abandoned farmland to good use.

Farmship's plant factory projects are Japan's largest plant factory production and sales group having total investment of 10 billion yen. We are expanding our customer base, primarily supermarkets and built a sales network of around 2,000 stores in four years, centered in the areas around Tokyo and in Kansai", said Mr. Kozako.



ON-SITE INSPECTION OF PEACH SORTING FACILITIES OF JAPAN AGRICULTURAL COOPERATIVES (JA) IN FUEFUKI CITY, YAMANASHI

Yamanashi Prefecture is dubbed as Japan's kingdom of fruits for the year-round production of numerous types of fruits, and for producing the country's largest volume of grapes, peach, and plum.

Fresh fruits and vegetables produced by Japanese Agricultural Cooperatives (JA) are sent across Japan to customers including co-ops, supermarkets, processors, and commercial buyers. By equipping each of its main facilities with packing equipment, it also carries out high value added packing operations to meet consumer needs as well as the particular needs of producers.

In the peach sorting facility of JA in Fuefuki city, the computer automatic testing system of infrared examination automatically removes irregular fruit, measure the size, weight, after mechanical



fractionation. Classification is done on the basis of sugar degree, acidity, maturity and finally chooses the different grades of pear. After, it is packed and sealed for storage and transport. After such a strict process of fruit sorting, pear quality is guaranteed. Depending on the quality, the price is high; a Japanese pear can be sold for 500 yen.

Modern post-harvest comprehensive system

Shibuya Seiki Co. Ltd. provides customers worldwide the precision of industrial technology in sorting and grading of premium fruits and vegetables. Such technologies include non-destructive internal quality measurement, high-speed appearance inspection, and precision weight measurement which are controlled by computer system. The

company manufactures agricultural grading machine, automated picking system, food and packaging machines, agricultural robots, image processing technology and high quality brand products.

"We have come up with these wonderful machines to achieve uniformity in quality and to increase efficiency and cope up with labor shortage at fruit-grading stations. It offers high return for high quality products to farmers. Also, it provides farming support system based on inspected grading data. Our high quality sorting and grading systems adopt the latest electronics, fiber optical sensor technology and NIR-spectroscopic analyzing method by chemometrics to achieve automation and save labor cost", said Dr. Rajendra Peter of Shibuya Seiki Corporation.

RUNTEC: INTEGRATING WAREHOUSE AND TRANSPORTATION FOR IDEAL STRATEGIC DISTRIBUTION

Runtec support customer's food logistics strategy from total overseas procurement of raw materials to domestic end user delivery of products. The company is leading in food logistics industry and maintains strict temperature control and sanitation management in its warehouses and transportation vehicles. The company responds flexibly to customer needs through their high-quality, high-precision logistics technologies and services. It is supporting customers' global business development with a consistent logistics system both in Japan and overseas. During the on-site inspection of cold-chain at Osaka branch of Runtec Co. Ltd. (Senko Group Holdings), Mr. Kiyotada Yamaguchi, Head of Osaka branch of Runtec, Mr. Tomoyuki Matsuda, Manager of Senko, and Mr. Masato Iizuka, General Manager of Logistic Research Institute, Senko Group Holdings explained about integrated warehouse and transportation system of the company.



"Integration of transportation and warehouse leads to highly efficient distribution. Our nation wide warehouse maintenance will help customers reducing the cost of warehouse facilities. Integrated transportation and storage system realizes efficient distribution system. We integrate advance system and transportation. Computer system is integral for large scale distribution planning. As one of distribution customization services, we also construct customer's computer systems. We can adapt to various temperature, such as



frozen, cold, dry etc. We can thoroughly handle products that need to be stored in specific temperature. We customize the transportation modes by arranging various vehicles and transport methods", said Mr. Kiyotada Yamaguchi, Head of Osaka branch of Runtec. "We have sophisticated refrigerators car. In the double deck freezer, there are two independent freezers that control temperature in the front and back room. Taking environmental problem into consideration, we achieved the reduction of noise and CO2 emission. Our refrigerator cars are using new structures, sanitary floor and lashing rail. The car can keep the flow of cold air around side walls even when it is full of cargoes. The vehicles are environmentally friendly and cost efficient advanced refrigerator cars."

"Loading and unloading are done in a low temperature environment. In the warehouse all over the country, we are keeping the fixed temperature from entrance to sorting room. We can keep proper temperature (-5 degree Celcius to +5 degree Celcius) even during the short period of time from freezer to refrigerators. We prevent deterioration of products by minimum amount of handling.", said Mr. Tomoyuki Matsuda, Manager of Senko.

"Recognizing the need for food safety and security, we have implemented traceability system and expiration date management. Also, the company food logistics system manages product lot by system, it is possible to carry out individual product tracking management at the time of emergency", added Mr. Masato Iizuka, General Manager of Logistic Research Institute, Senko Group Holdings.

“AGRICULTURE PRESENTS CONSIDERABLE SCOPE FOR EXPANSION IN JAPAN”

Mr. Masaaki Taniai, State Minister for Agriculture, Forestry and Fisheries.



What are the strengths of Japanese agriculture?

Agriculture, forestry and fisheries industries constitute an important sector of Japan's economic structure, contributing outstandingly to the development of national economy and stabilization of national life through their role of providing stable supply of foods indispensable to our daily life. The biggest challenge we have in the domain of agriculture is Japan's ageing population. The population who work as farmers is decreasing and abandoned farmlands are increasing. So it is really a big concern for us in the domain of agriculture.

The challenges surrounding the agriculture, forestry and fisheries industries of Japan are severe, due to factors such as imbalance between supply and demand in agricultural products (e.g. rice), delay in the management scale expansion in the so-called land-extensive agriculture like rice cultivation, and the escalating pressure for opening up the market from various overseas countries.

Still I believe that there is lot of potential for Japanese agriculture. In Japan, a variety of agricultural and livestock products are produced in accordance with the conditions and circumstances of each region. The main agricultural products such as rice, vegetables, fruits, flowers and livestock products are indispensable in Japanese food

culture and hence various support measures are being implemented for expanding production and consumption. The agricultural products such as rice, fruits, and vegetables produced in Japan are very well reputed for its delicious taste and high-quality not only within the country but also in other countries. Therefore, there is immense potential for exporting these products and we believe that agriculture presents considerable scope for expansion in Japan.

For this reason, we are going through reforms in the domain of agriculture, exports and for various policies related to the agriculture industry. A strong agricultural structure must be established to make agriculture a progressive industry to face the challenges of aging farmers and expansion in abandoned cultivated land. We have implemented some reforms in the rice industry and the use of ICT in agriculture.

Especially in 2012, since Mr. Shinzō Abe became the Prime Minister of Japan, a lot of reforms have been implemented in agriculture. We are trying to change the image of agriculture to inspire and motivate younger generation. While business farmers have aged and decreased, the annual number of newcomers in agriculture has remained high in recent years. Young farmers responsible for the next generation should improve productivity through increased value addition and greater

business sizes to realize efficient, stable farming business.

How did Japanese agriculture cope with the Tsunamis and other related calamities?

The Great East Japan earthquake was the most powerful earthquake ever recorded to have hit Japan generating enormous tsunami waves and destruction all over the country and caused enormous destruction of agriculture and fishery fields. We have done our best to restore the affected areas. Salt removal, rice paddy boundary reconstruction and other restoration operations have made progress in tsunami-damaged farmlands, making 90% of the affected farmlands available for farming resumption. A lot of infrastructure has been restored so that agriculture and fisheries can take place normally like before. Farmland partitions have been expanded in line with the restoration of tsunami-damaged farmlands. Farmland development projects were implemented at 16 sites of 10 municipalities by the end of January 2018 in conjunction with residents' collective relocation for disaster prevention. From FY2011 to FY2017, a total of 34 large-scale industry-academia-government demonstration studies involving agriculture and rural areas were conducted. In the future, initiatives to diffuse and utilize the fruits of these studies should be developed and enhanced.

But the one big subject for us is still Fukushima nuclear plant accident. We have to help them to not only restart agriculture again but also to deal with the big problem of reputation of the farm products grown there. In the market we have approved only safe food and products which are distributed in Japan and exported overseas. After Great Eastern earthquake a lot of countries had restricted agricultural exports from Japan but India has lifted this restriction and continued importing from Japan. We highly appreciate this

gesture from India

By April 2017, the government lifted evacuation orders for all accident-affected areas other than difficult-to-return zones, for which the revised Fukushima Special Measures Act has created reconstruction and restoration plans. The rice production resumption area in 2017 expanded from about 2,500 ha in the previous year to about 3,000 ha in Fukushima prefecture. Fukushima Prefecture in May 2017 proclaimed "Fukushima GAP Challenge Declaration" with the aim of achieving the largest number of GAP certified producers among Japanese prefectures.

Recently in July, we have faced heavy rain in Japan which caused heavy damages and unfortunately more than 200 people died. In Ministry of Agriculture, we have established the headquarters for urgent measures to be taken. Around 200 billion yen worth damages were reported in the agriculture and fisheries industry. We are trying to restore farmlands and facilities related to agriculture and also helping farmers with machineries. When natural disasters occur such as this one, most important thing is to let farmer think that they don't have to give up farming.

How attractive is India as a market for Japanese products?

I believe that Indian market has a lot of potential. We would like to expand our export to India and our objective is to achieve 1 trillion Yen (USD 8.9 billion) worth of exports by 2020.

However, there are some areas where we need to work on. For instance consumption of food and the culinary tradition is very different between India and Japan and also the price range that the people look for agriculture products is quite different in India.

Which are the areas where India and Japan can cooperate in agriculture?

Japan is very strong in the area of

establishment of food value chain. In order to accelerate strategic participation in global markets, MAFF is supporting the development of Global Food Value Chains through international cooperation by public sectors and overseas investments by private sectors. In November 2016, with the Minister of Agriculture and Farmer's Welfare of India, we have agreed for the promotion of the food value chain in India. In November 2017, first conference between public and private sectors of Japan and India took place to discuss about food issues.

How do you view India as a destination for agriculture based companies from Japan?

According to the data of 2016, Japanese companies working in food and agriculture industry in India were only 15, whereas, in China which has same population as India, hosted 264 Japanese companies in 2016. Considering the size of the market which is as big as China, we think that 15 is very less as compared to China. Still a lot of potential exist in this field which is not yet fully explored.

In World Food India 2017, there were participation of 55 Japanese companies that already existed in India and also Japanese companies who are interested in starting business in India. From this it is evident that Japanese companies are interested in Indian market. With the initiative of Suzuki Motors and ISE Food Corporation of Japan, we have come up with the project to have ISE Food eggs to be distributed in Indian market from 2020. This was one of the fruits of participation in the World Food India besides other. Also, Japan India Food Business Council was launched recently which is going to be advantageous for both the countries. As Prime Minister Modi took the initiative of Make in India, we see India's growing interest in participation of more and more foreign companies in India and also Japanese companies are more keen to enter Indian markets.

“I do see a point in blending the subsidy support with investment because a model which sustains indefinitely only on subsidy will not be sustainable. Investments will make the farm sector self-sufficient. With much lesser subsidies, a self-sufficient farmer may be able to serve the cause of Indian agriculture much better”

ARUN JAITLEY
Union Finance Minister



“We want to encourage crop insurance companies and State governments that have to provide yield data, based on which crop assessments are done, to come forward to expedite the payments due to farmers”

RADHA MOHAN SINGH
Union Agriculture Minister

“When prices collapse, if you want to help farmers who have been affected, don’t tweak the price policy; instead give them direct income support. That way you don’t mess up with the market”

ASHOK GULATI
Infosys Chair professor, the Indian Council for Research on International Economic Relations (ICRIER)



“The challenges to meet the world food requirement in 2040 are manifold and mammoth. There would be a requirement of 25 per cent increase in production from the present scenario while there was the possibility of 50 per cent reduction in the number of people engaged in the agriculture sector by 2040”

MATTHEW MORRELL
Director-General, International Rice Research Institute (IRRI)