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HORTICULTURE AND MICRO IRRIGATION DOUBLING FARMERS' INCOMES

THE GOLDEN ERA OF POLISH FARMING

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From the Editor's Desk HORTICULTURE AND MICRO IRRIGATION—INCOME BOOSTERS

ndian horticulture, has in the recent decade, recorded enormous growth. The horticulture production has now officially surpassed the food grain production for the sixth straight year. The country ranks second in fruits and vegetables production. Counted as the world's largest producer and exporter of spices, India also leads in the total production of certain plantation crops in the world.



The tremendous success in horticulture originates from the keen interest the Indian consumers have taken

in including nutritious fruits and vegetables in their diet. With better expendable incomes and consumer awareness, Indians have also developed a liking for many exotic fruits. This has also initiated certain farms in India to grow certain exotic fruits and vegetables. Broccoli, Kale, Zucchini, Kiwi fruit, Dragon fruit have all dedicated growers and suppliers in India. Being of short duration and with better returns than the food grains, the number of small and marginal farmers growing fruits and vegetables have increased. Besides this, the Indian agro climatic conditions are suitable to raise a wide variety of horticulture products.

The returns from these crops are promising and at the same time are also unstable. Peak harvest seasons experience fall in prices. The absence of food processing units that are located close to the farm gate is a severe handicap. In the presence of one, the excesses could be converted into products with longer shelf life and better value. An efficient and complete cold chain network with pack houses and access to refrigerated transport can also help prolong the shelf life of fresh produce and earn better value for farmers.Better access to markets, technology and intelligence can help translate the higher perishable production to higher earnings for farmers. Fragmented markets pose a major handicap for the farmers.The markets across the country needs to be connected and a full fledged refrigerated facilities connecting the market can help stabilize the price across the country. This will not only help check inflation but also stabilize the income earned.

Micro – irrigation techniques can also help in enhancing the income earned from horticulture. Besides, enhanced water efficiency, they have also been associated with better yields and hence better farm incomes.Combining micro irrigation with water soluble fertilizers, fertigation is a recommended practice in horticultural crops. Despite these apparent benefits, farmers across the country have been reluctant to adopt this. High initial costs make the technology unfeasible for small and marginal farmers.

Horticulture combined with better technologies like micro irrigation is a good avenue for enhancing the income for farmers. With better infrastructure, this avenue can be further explored and expanded.

Anjana Nair

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The recent hike in MSP is a welcome move

he recent announcement of the MSPs by the Union Government comes as a relief to the millions of toiling farmers who have been particularly vociferous of their woes this year. Numerous protest marches later, the farmers of the land are receiving a fair deal. The MSPs announced for 14 commodities for the 2018-19 kharif season has seen a substantial hike quite in line with the proclamation in the Union Budget 2018-19. The promise of MSPs at 150% of the cost of production has spiked the support prices ranging from 4% for arhar and urad to 52% for ragi, with a median hike of 25%. The scale of increase can be gauged from the fact that the median increase during the last four years was 3-4%. This massive hike is expected to yield a handsome return of more than 50% over the cost of production to farmers-as high as 97% for bajra and 60-65% for urad and arhar.

This year which is expected to see record food grain production, the hiked MSPs are a welcome move. With a potential glut, the hiked MSPs would guarantee a fair price to the farmers pushing them closer to the Union government's ambitious objective of doubling farmers' income. The MSP, the rate at which government agencies like Food Corporation of India (FCI) and other state government-owned agencies procure grains from the farmers, is also taken as benchmark prices in the market. By quoting higher MSPs this season, the government has ensured that prices in the market remain high.

Besides, ensuring profits to farmers, MSP can incentivize a specific food crop which is in short supply. By protecting farmers from any sharp fall in the market price of a commodity, MSPs announced at the beginning of the sowing season, helps farmers make informed decisions on the crops they must plant. Computed on the basis of the recommendations made by the Commission for Agricultural Costs and Prices (CACP), MSP considers factors such as the cost of production, change in input prices, market price trends, demand and supply, and a reasonable margin for farmers. To an extent, MSPs can stabilize the economics of production and help the farmers in ridding them of financial liabilities. MSPs are definitely a better proposition than loan waivers.

With the price support policy initially favoring food grains, this price support instrument has been highly asymmetric and skewed mainly towards the production of rice and wheat at the cost of cultivation of pulses, oilseeds and other crops. This had created serious imbalances in demand and supply of principal crops in the country and faced large shortages of pulses and edible oils and had to depend on imports to meet about one-tenth of its demand for pulses and close to half of the demand for edible oil from imports. With introduction of MSP for pulses and oilseeds, there was a change in this situation. The central government procured a record Rs29,070 crore worth of pulses and oilseeds from farmers at minimum support prices (MSPs) in the 2017-18 crop season, arresting what could have been a sharper fall in wholesale prices.

The importance of MSP cannot be ignored considering the pivotal role played by the same in increasing India's food production. It can continue to do the same in years to come. However, awareness of MSP is critical for the success of the programme. If the farmers are aware of the MSP of crops, they can bargain price and refuse to settle for less. Their ignorance would make it easy for middlemen and other traders to exploit the farmers by quoting less price.Despite the hype surrounding MSP figures announced each year, only a tiny section of Indian farmers benefit from the price-support mechanism. According to the HLC report, just 6% of farmers sell their produce to state-run procurement agencies. Incentive prices in the form of minimum support prices are essential to the success of agricultural production programs.

Make In India – A True Game Changer

India's Make in India Programme can successfully enhance agricultural productivity and incomes

ndia, a premier producer of food grains and horticultural products, with a pool of skilled labourers holds immense potential to be a manufacturer of value added and processed food products for the entire world. Make in India programme of the government of India provides an ideal platform to materialize this notion and in the process reinforce the income earned from agriculture, increase rural entrepreneurship and moreover, increase the contribution of agriculture to the Indian economy.

Besides the agricultural advantages, buoyed by the growth in the food and grocery market, India has evolved into a fertile ground for processed and value added products. India's food and grocery market ranking sixth in the world contributes approximately 70 % to the total retail sales.India's strong 1.2 billion consumers provide an excellent domestic market for the food processing industry in India. With the Indian consumers becoming more health aware, the demand for nutritious food options is growing. Ready-to- eat and frozen food segment have now loyal customer base. India's own food value chain presents a host of opportunities for investment and employment in storage infrastructure, farming, retail and quality control.

The robust market aside, India's raw material base is also equally conducive. The country is first in terms of milk production and second in terms of fruits and vegetables in the world. It is also the largest producer of spices, ranks third in egg production, fifth in meat production and second in fish production. India's diverse agro-climatic zones allows the country to produce a variety of crops.

Despite the presence of these propitious factors that could have celebrated India's food market potential and taken the glory across the globe, India is still far away from realizing this potential. A growth in the agriculture production segment hasn't bought forth a concomitant growth in infrastructure. The result is a loss of 25 per cent to 30 per cent of produced food. Inadequate logistical support, lack of refrigerated storage, supply chain bottlenecks, poor transport and underdeveloped marketing channels have contributed to this loss.

The steady supply of raw materials and availability of cold storage infrastructure will complement the growth in sub-segments like dairy, horticulture, plantation, animal husbandry and fisheries.Under the Make in India initiative, the Government plans to stimulate growth in the Food Processing sector through the creation of a strong infrastructure, reduction of food wastage and promotion of Ease of Doing Business (EODB) measures. The 100% FDI in trading and e-commerce of food products through Government approval route would invite investment and technology from overseas. The 100% Foreign Direct Investment (FDI) for Food Processing in e-commerce through government approval route for products manufactured/ produced in India will open new avenues for growth in food retailing and boost the income of the farmers. India's geographical proximity to food importing regions such as Singapore, Middle East, Thailand, Europe, Korea and Malaysia will further boost exports.

With an impetus on the food processing industry, Indian agriculture would transform from its current state of being dependent on traditional means of agriculture to the one that is vigorously receptive to new technology. Currently, Indian agriculture in terms of productivity fares well below the rest of the world. One of the main reasons of it being the diminished efficiency of resources. Mechanization will be the key to raise the productivity and efficiency of agriculture. Mechanization from sowing to harvesting, although a norm in developed nations is a rarity in Indian farming. The peculiar form of agriculture that India practices, relies on the collective strength of small and marginal farmers whose area of operation rarely extends beyond 2 hectares. Mechanization with heavy machines thus is not only economically unviable but impractical. India is a suitable market for gender sensitive smaller machines suitable to the smaller farms. Such customized smaller machines made in India enjoys not only domestic markets but also several other South East Asian countries where similar agricultural situations exist.

India's diverse agro climatic conditions have been a strong ally of farmers. However, we need to further capitalize on them to enhance the returns on the investment. India needs to invest in technologies and processes that can streamline India's demand-supply by converting excesses into value added products. Make in India can be a true game changer for Indian agriculture by safeguarding farmers' interest and extending the reach of farmers beyond the borders.

FTAs - A Free Run for Cheaper Imports?

Free Trade Agreements are consistently suppressing prices in domestic market

ndian farmers have always paid the price of free trade agreements. The cheaper farm products that are copiously dumped into India following the trade arrangements have consistently distorted the domestic trade affecting prices of agricultural commodities and agricultural incomes.

Oilseeds were the recent victim of this trade agreement. The price of Indian oilseeds plummeted recently dropping drastically 4% in a span of 15 days. The entry of duty-free refined edible oils from neighbouring countries of Bangladesh, Nepal and Sri Lanka under South Asian Free Trade Area (SAFTA) agreement is hurting Indian oilseed farmers and refiners. Around 20,000 tonnes of edible oil have already entered India from Bangladesh. India depends on edible oil imports as seventy percent of its oil demands are met by imports and has been categorized as the world's biggest vegetable oil importer. So essentially the free imports were a blessing to the consumers. However, for the oilseed farmers and the extractors, the policy has back fired. Quite often the prices of oilseeds have fallen below MSP creating distress among farmers.

This is a situation where the policies directed to safeguard the interests of the consumers is in deep contrast to the ones which protect the interests of the farmers. On one hand, the government policies are trying to contain inflation, while on the other hand, the government wants to increase the area under oilseeds. India's agricultural experts have time and again pitched for expanding the area under oilseeds and pulses to cut short on our dependence on imports. To some extent, India has been able to increase the production of pulses, although marginally. Oilseeds were also on the road to recovery. But policies like these are not definitely helping the small group of oilseed farmers and also that of aspiring ones.

This is not the first time when the government trade agreements have resulted in deep distress

to the farmers. The free trade arrangements are sometimes tweaked to facilitate cheaper imports into country causing a slump in the prices. Pepper from Vietnam through free trade channels of Sri Lanka under the pretense of import to Nepal resulted in price crash of pepper. Pepper imports from Sri Lanka attract just 8 per cent duty as against 70 per cent from other countries as India and Sri Lanka are signatories to SAFTA agreement. Under the India-Sri Lanka Free Trade Agreement (Isfta), Sri Lanka is allowed to export 2,500 tonnes of pepper to India per annum at zero duty. Around 4,000 tonnes of pepper exported by Vietnam to Sri Lanka has found its way to India with certificate of origin issued by the Sri Lankan authorities by paying no duty under ISFTA or 8 per cent concessional duty. The imports have hit pepper growers in Kerala, Karnataka and Tamil Nadu. The ordeal is the same with rubber, coconut oil, tea and coffee. The ASEAN-India Free Trade Agreement (AIFTA) has negatively affected India's balance of trade in rubber and rubber products.

Free trade agreements expose the farmers in the developing nations to the competitions existing in the world market. Farmers here are thus an unfair game, where their competitors are with the advantage of better technologies and lesser cost of production. India's dependence on manual labour for majority of its farming population increases the cost of production with traders and processors favouirng cheaper imports. The free trade agreements with the diminished trade barriers are thus increasingly becoming a threat to the Indian farmers. The reduced tariffs on the import of cheaper products to India has artificially suppressed the prices of those commodities in Indian market but also sunken India's opportunities in the global market. It is high time the government sit back and assess the situation in India. While trade agreements are a necessity in the globalized and liberalized world it should not be at the cost of one's own country's ruin.

Waiving loans - Waiving Progress!

Loan waivers have never supported development

oan waivers have once again usurped the attention as the newly elected Minister of Karnataka H.D. Chief Kumaraswamy scurries to keep his poll promises of loan waivers. The politically most alluring temptation to offer the rattled farming population loan waivers has been a go to solution in most of the elections. All the recently held elections have seen the political parties vying to offer the best of the waiver schemes to its electorates in a bid to woo them. The loan waivers has been such a hit that it has become a necessity and considered a right by the farmers. Apart from being an expensive tool to the state, it has hardly caused any positive difference in the state of agriculture.

Loan waivers _ either completely or categorically - are temporary solutions to a larger problem. The debt cycle that farmers fall in due to investing and following farming as their vocation has many underlying reasons which either work in unison or in isolation. Interestingly, whenever the farmers had incurred huge losses, the reasons have remained more or less the same. Apart from rooting for loan waivers, no one seems to acknowledge these reasons and work to give a permanent solution. Farmers are too naïve to see through this and hence are satisfied with these one time solutions. These transient measures are at the expense of all the developmental activities that could have happened in agriculture - that could have increased the income derived from farming.

Farm income growth has been subdued in recent years due to poor rains, falling global prices and limited MSP hikes. Besides this, agriculture in India also suffers from inherent issues like fragmented land holding, depleting water table levels, deteriorating soil quality, rising input costs, low productivity, monsoon vagaries, poor penetration of technology, minimal mechanization, increasing labour cost, supply chain inefficiencies and poorly developed infrastructure. Farmers' reliance on local moneylenders to meet the unforeseen expenses at exorbitant interest rates have also made matters worse. The farmer protests that India witnessed in different parts of the country had similar undertones, although they had a unified demand to waive their loans!

Farm loan waivers typically does not absolve the problems of farmers. Only a small share of farmers are even benefitted by this gesture. Only 15% of the marginal farmers (with less than one hectare of landholding) have access to formal credit, so a loan waiver might help them. Previous waivers have led to banks reducing credit outlay for small farmers during the next loan cycle, thereby diminishing their chances of getting formal loans which in turn pitch them closer to the informal sources of credit. The cost difference for loan rates between the formal and informal sector varies at the least between 30% and 45%, annually. Moreover loan waivers can erode credit discipline and year after year, this is expected out of governments.

What Indian agriculture needs is not huge debt write offs, instead avenues to increase the income prospects of the farmers. Strengthening of agriculture infrastructure is what the governments can do. Currently, there exists a huge gap between the demand and availability of storage facilities for agriculture products especially in the case of perishables. In case of over production, our capacity to convert excesses into products with longer shelf life is nonexistent. In the case of perishables, Government can work in lines of procuring food grains and pulses. But here instead of storing, the centers can be processing units! This will help in converting the excesses into value added products which the government can sell under a brand name. This will protect the price crashes in the market and help to stabilize prices in the market - a win-win solution for both consumers and producers.

As a country we should be promoting innovation. Our strategy must be to develop the under developed sectors by introducing novel methods to overcome the challenges and not covering it up with a blanket. Loan waivers just do that – they do not solve anything nor do they allow progress.

PexalonTM- the solution that protects rice crop against deadly hopper pest

OcrtevaAgriscience[™], the Agriculture Division of DowDuPont, announced the launch of Pexalon[™], a sustainable hopper management solution, aimed at shaping the future of agriculture industry in India, through Dupont. Over the years, farmers in India have been facing the menace of aggressive plant hoppers attacking rice crops, this has led to many cases of crop burning, loss of income and severe distress to farmers and their families. The losses in grain yield might vary from 10% in moderately affected fields to 70% in severely affected fields if proper control measures are not initiated at the right time. With Pexalon[™], CortevaAgriscience[™] hopes to win the confidence of growers and ensure that their every hour spent in the field is a promise for a better life for communities at large. KV Subbarao, South Asia leader, CortevaAgriscience[™], said, "Despite the fact that almost 60 per cent of rural India depends directly on agriculture for their livelihood, India's rice yields are significantly lower than the global average. Pexalon[™] is a result of extensive research developed specifically for the Asian rice market and is a step towards fulfilling our commitment to providing sustainable



solutions for farmers in India." Pexalon[™] is powered by Pyraxalt[™] and is tailored towards meeting the needs of Indian rice growers and help them address the longstanding challenge of damaging pests, specifically the brown plant hoppers and white-backed plant hoppers. Pexalon[™] has a unique mode of action and provides outstanding and long-lasting control of BPH and WBPH in rice. Pexalon[™] is highly effective against all damaging life stages of hoppers and has a relatively large margin of safety to non-target organisms and a favourable environmental profile. Therefore, Pexalon[™] is a valuable tool in the management of difficult-to-control hoppers in rice. In addition to Pexalon, CortevaAgriscience[™] offers a wide range of crop protection products for management of various pests and diseases in rice, enabling higher incomes for farmers.

Walmart Foundation Invests nearly US\$2M in 'Farmer Market Readiness Program' in India

• Over 6000 farmers in Andhra Pradesh will move to an improved business model for better value chains and better incomes through an intensive two-year project supported by the Walmart Foundation in partnership with ICRISAT. At a meeting in New Delhi, senior representatives from Walmart and the International Crops Research Institute for the Semi-Arid Tropic (ICRISAT) launched ICRISAT's program focussed on two key national priorities: doubling farmers' incomes and addressing malnutrition in rural areas. Over the next two years, ICRISAT will work in Andhra Pradesh's dryland farming areas with 6,100 smallholder famers, 2,000 of whom are women. The project will set up



community-based millet and legume legume processing facilities, provide access to training and more productive plant varieties and educate buyers in the market about the nutritional value of grain legumes to help boost demand. Walmart Foundation has granted close to US\$2 million to the project as part of an ongoing initiative to improve market access for India's smallholder farmers. Funds from Walmart Foundation of close to \$4 million have now been allocated to projects in Andhra Pradesh within the past six months.

Adventz launches Jai Kisaan Ann-Dhan-Sampann TV campaign

• Zuari Agro Chemicals Limited (ZACL) has rolled out the Jai Kisaan Ann-Dhan-Sampann TV commercial to commemorate 50 years of brand Jai Kisaan and to bring out the 'business-to-farmer' transformation of the agri business led by the Adventz Group's flagship company. The one-of-a-kind integrated farmer-centric TV commercial, Ann-Dhan-Sampann captures how enriched and fulfilled farmers mean a prosperous India; it highlights the mission of brand Jai Kisaan to enable farmers produce high-quality crops. For a nation that is coming back in realising its renewed potential in the agrarian economy, the mission has been crucial in charting a course in bettering lives within the farming community. Mr Sunil Sethy, Managing Director, Zuari Agro Chemicals Limited, said: "For 50 years Jai Kisaan has been a key driver to address the agricultural requirements of a growth-intensive nation. Jai Kisaan has been consistently delivering quality products and services across India. A campaign such as Ann-Dhan-Sampann essentially conveys to our stakeholders the fundamental transformation that Zuari Agro Chemicals, thereby Jai Kisaan, has undertaken -- moving from a purely B2B company to establishing direct connect with the farmers. Over the years we have been working towards such a goal and our Jai Kisaan Junctions bear testimony to the resurgence. Through them we have established one-stop shop for farmers and farm-support services. We have now set a path and aim to be the single-largest facilitator for the farmers, either by manufacturing or sourcing agriinputs and partnering with farmers, to achieve the farm economy's full potential."

UPL set to acquire Arysta Life Science for over S4 bn

• UPL Ltd is close to buying the farm pesticides business of investor Bill Ackman's Platform Specialty Products Corp.-known as ArystaLifeSciencefor more than \$4 billion in one of the largest outbound deals by an Indian company. UPL has arranged funds from a consortium of lenders, including a Japanese bank. The Arysta acquisition will help UPL enhance "its solutions to fit local farming needs" and bring in synergies that can benefit its operations in overseas markets, a third person aware of the matter said. The acquisition will also boost UPL's agrochemical and crop protection business.

IBM spots a Rs 5,000-cr opportunity in agritech

Olobal IT major IBM is looking at technological inputs for the farm sector to be a Rs 5,000-crore opportunity in the next five years, according to a senior official. "IBM sees a Rs 5,000-crore opportunity from agritech in India over the next five years," HimanshuGoyal, India sales and alliances leader, The Weather Company, which is an IBM division, said here. The revenue will come from providing both business services and advisory for the entire agriculture ecosystem or agriculture value chain on weather data, big data, the Internet of things, blockchain, analytics and artificial intelligence services, he said. The Weather Company, which is a unit of the IBM, recently tied up with the NITI Aayog for piloting certain solutions for the farm sector using technological interventions, Goyal said, adding his company already works with 70 startups engaged in the agritech sector. Without divulging any numbers, Goyal said agriculture contributes a sizeable part of the revenue for The Weather Company in the country at present. It can be noted that around 60 per cent of the countrys over 1.3 billion population depends on agricultural or allied activities, but contributes only about 15 per cent to GDP, resulting in government introducing a slew of targeted programmes for the sector.

GNFC looks to use blockchain technology for fertiliser subsidy

NITI Aayog and Gujarat Narmada Valley Fertilizers & Chemicals Limited (GNFC) have signed the Statement of Intent ("SOI") to work together towards implementing a Proof-of-Concept ("PoC") application using blockchain technology for fertiliser subsidy management. Under the SOI the parties would undertake joint research, interactions, exchange learnings, and disseminate learnings across their networks. Insights and outcomes of the POC will enable NITI Aayog to suggest policy recommendations and actions in strengthening the subsidy mechanism, making it more transparent and immune to leakages. Fertilizer units manufacture approximately 31 Million MT of fertilizer sales across country, where total approximately Rs 70,000 crores of subsidy is disbursed to the manufacturing units. The current system of fertilizer sales and distribution is multilayer, multi-agency and multi-functional. This process also requires authentication from multiple entities, overall it takes 2 to 3 months' time. With adoption of Blockchain Technology, it is expected that the distribution will become effective and efficient, and subsidy transfer would be automated and made real time. The system will also be integrated with soil card in the next phase, which will be useful in advising farmers to use a particular type of fertilizer based on soil heath.

IFFCO teams with Korean firms for agri-equipment, finance

Indian farmers' cooperative IFFCO tied up with South Korean firms specialising in agri equipment and agri finance to explore business opportunities in India. IFFCO has entered into a strategic partnership with LS Mtron Ltd, a South Korean agriculture equipment manufacturer, and NH Capital co. Ltd., South Korea's leading financial services provider, whose leaders were part of the business delegation accompanying visiting South Korean President Moon Jae-in, IFFCO said in a statement. According to MD US Aswasthi, IFFCO together the Korean firms, would explore business opportunities involving supply, sales and distribution of agricultural machinery and finance to fulfil the market demand in India.

DowDuPont arm launches solution for paddy farmers

• CortevaAgriscience, the agriculture division of the merged entity of DowDuPont, has launched Pexalon, a hopper management solution for paddy farmers. Hoppers can cause serious damages to paddy. "Losses in grain yield vary from 10 to 70 per cent if proper control measures are not initiated at the right time," KV Subbarao, South Asia leader of CortevaAgriscience, has said. Announcing the launch of the insecticide here on Monday, he said the product would hit the market in August, just in time for use in the Kharif crop. "It will meet the needs of Indian rice growers and help them address the longstanding challenge of damaging pests, specifically the brown plant hoppers," he said.



Centre hikes support price for Kharif crops

Ahead of the Lok Sabha elections next year, the government reached out to farmers by offering them higher support prices for agricultural produce, a key election promise made by Prime Minister Narendra Modi in 2014. The Cabinet Committee on Economic Affairs approved the minimum support price for 14 kharif crops, which the government claimed was 1.5 times of the production cost incurred by the farmers. A battery of Union Ministers led by Home Minister Rajnath Singh, Law Minister Ravi Shankar Prasad, Agriculture Minister Radha Mohan Singh and Food Processing Minister Harsimrat Kaur Badal announced that the MSP for paddy was increased by Rs 200 a quintal over last year's support price of Rs 1,550 a quintal. Rajnath Singh said the government has approved a sharp increase in the support price for coarse cereals such as ragi, jowar and bajra of up to Rs 1,000 a quintal. In the pulses category, the support price for moong has been increased by Rs 1,400 a quintal - from Rs 5,575 to Rs 6,975. The MSP of urad has been hiked from Rs 5,400 to Rs 5,600 a quintal and for tur by Rs 225 a quintal to Rs 5,675 a quintal. Singh claimed that the new support prices were in line with the Prime Minister's commitment to fix the MSP at 1.5 times of the production cost.

Govt Looks to Increase FRP of Sugarcane by 8%

• The government plans to recommend an 8% increase in the fair and remunerative price (FRP) of sugarcane over the previous year, which the industry fears will make their operations unviable. If FRP is raised to Rs 275/quintal for the 2018-19 season beginning October, mills may find it difficult to pay farmers their dues. Official sources said the Prime Minister's Office (PMO) has asked the Food and Consumer Affairs ministry to examine the minimum selling price (MSP) of sugar, currently fixed at Rs 29/kg. The industry wants the price to be Rs 33/kg for south and west India and Rs 35/kg in North India. The FRP set by the Centre is the minimum price that

sugarcane farmers are legally guaranteed. The hike would impact farmers in Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu, Madhya Pradesh and Gujarat who are paid by mills at FRP rate. In other key growing states of Uttar Pradesh, Punjab, Haryana, Tamil Nadu and Uttarakhand, farmers get the State Advised Price (SAP) fixed by state governments which is usually higher than FRP.



Govt plans system soon to ensure MSP for farmers

• The government will soon announce a new mechanism to ensure that farmers get the minimum support price (MSP) if market prices fall below the benchmark rate, Minister of State for Agriculture Gajendra Singh Shekhawat said on Friday. The minister said the government has increased the MSP of Kharif (summersown) crops substantially and farmers community are now happy with this decision. Asked when the government will come up with a new mechanism to ensure MSP to farmers, Shekhawat said "it will be announced soon".

Govt to Pursue States to Move to Zerobudget Natural Farming

● In yet another effort to double farmers' income by 2022, the government will now pursue states to move on to zerobudget natural farming that aims to bring down the cost of farming, thereby significantly enhancing the profit margins for farmers. Under zero-budget natural farming, a set of natural farming methods are used where the cost of growing and harvesting crops is almost zero. This means farmers need not purchase fertilisers and pesticides in order to ensure healthy growth of crops. The inputs used for seed treatment and other inoculations are locally available in form of cow dung and cow urine. This lowers the cost of inputs for farmers. Besides, it also protects soil from degradation, helps in retaining soil fertility and is climatechange resilient. According to NITI Aayog vicechairman Rajiv Kumar, most states have agreed to adopt zero-budget natural farming under two existing schemes: the Paramparagat Krishi Yojana and the Rashtriya Krishi Vikas Yojana. "These pilots will then be validated by ICAR (Indian Council of Agricultural Research), following which states will be allowed to move entirely to ZBNF," he said, adding, "Niti's role is to identify best practices, validate them and transfer them back to states for adoption."

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Telangana clamps down on use of glyphosate to curb HT cotton

In a bid to curb the illegal use of herbicide tolerant cotton (or Bt3), the Telangana government has put severe restrictions on the use of glyphosate, a controversial herbicide, in the State. It has asked the pesticide dealers not to sell the herbicide, which is used in HT cotton crops, without a recommendation slip from the relevant Agriculture Extension Officer. A Government Order has warned that any violations will be dealt with severely. The herbicide-tolerant cotton, or HT cotton, is a third generation biotechnology developed by Monsanto which lets the cotton plant to withstand the herbicide sprays intended to kill the weed. Glyphosate is used in HT crops to kill the weed. This technology has not received the GEAC's (Genetic Engineering Approval Committee) permission for commercial use. Its use, however, has been rampant in several parts of the country. With the pink bollworm developing resistance to Bollgard-II, farmers have looked at HT or Bt3 as a saviour. Telangana farmers alone grew HT cotton on about 15 lakh acres last year, which was one-third of the total cotton area of 45 lakh acres that year. Andhra Pradesh, which is also a major cotton growing State, filed cases against two cottonseed firms after raids on some farmers' fields tested positive for HT cotton. The Telangana government too said it won't allow the illegal Bt to be grown.

Cannabis cultivation is now legal in Uttarakhand

• Uttarakhand will be the first State in the country to allow commercial cultivation of hemp crop, a rich source of high-quality fibre and a host of medicinal and nutritive products. The State government, earlier this month, granted licence to the Indian Industrial Hemp Association (IIHA), a non-profit organisation that promotes industrial application of hemp, to grow the fibre over 1,000 hectares, on a pilot basis."We will commence cultivation of non-narcotic hemp soon with the initial focus on creating a seed bank. The cultivation will be taken up in villages in PauriGarhwal region," said Rohit Sharma, Founder-President, IIHA.Even though the policy to allow cultivation of non-narcotic cannabis was formulated in 1985 along with opium, hemp cultivation failed to take off in the country as proper procedures were not laid down for its cultivation, procurement and use, unlike that in the case of legal opium, said Sharma." About five years ago, when we started working on industrial hemp, we tried to figure out why India is not tapping on this \$1-trillion industry unlike advanced economies in Europe and North America and even China. We then realised that though the authorities are interested, they had little idea how to proceed on this," Sharma told BusinessLine.IIHA subsequently was able to convince the then Congress government in Uttarakhand to come out with a policy for hemp cultivation, which was adopted by the subsequent BJP government with some changes.



Maharashtra Turns to MBAs to Increase Rural Income

• Maharashtra government is bringing in experienced management professionals hoping they will help improve the state's rural livelihood programme and boost farmers' income. Professionals with experience in sales and marketing are being hired for the Village Social Transformation Foundation (VSTF). They will be posted in different districts and would work with the cooperation department and cooperative societies for transformation of 5,000 Primary Agriculture Credit Societies. "Their mandate is to motivate talukalevel cooperative marketing societies, farmer producers organisations, women's self-help groups and cooperative societies. They will have to generate business ideas, create backward linkages, think of branding and marketing of the farmers produce," said Maharashtra's state cooperation and marketing minister SubhashDeshmukh. The professionals will be divided into three levels. Those at district level would be called district business development managers. Their job will be to visit primary agriculture co-op societies, self-help groups and FPOs to look at local produce. Professionals at the district level will report to regional business development and marketing managers, who would manage five to six such districts. They would report to a top boss, also an MBA, who will supervise them.

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Flood-resistant rice varieties being tested in 19 districts of Assam



With recurring flood-induced crop damages hurting the State's agriculture, Assam Agriculture University (AAU) and the agriculture department have joined hands for promotion of submergence-resistant rice varieties. As part of this floodadaptation strategy, two varieties of rice - Ranjit-Sub 1 and Bahadur-Sub 1 - are being extensively popularised across villages in North Lakhimpur, one of the worst flood-affected districts of the State. This is for the first time that the two flood-resistant varieties are being tested on a major scale. The two varieties were notified in March this year. Swarna Sub-1 variety was in use earlier, but the latest two varieties are said to be of superior quality in terms of submergence resistance. "The Ranjit and Bahadur varieties will be planted this khariff season. Preparations are afoot for this, with flood-adaptive cluster demonstration and head-to-head demonstration for farmers in Naoboicha and Bihpuria revenue circles of

North Lakhimpur," DrPrabalSaikia, Chief Scientist, Regional Agricultural Research Station under AAU, North Lakhimpur, said. The two varieties can resist submergence for up to two weeks, and significantly, they do not sacrifice their potential yield because of the prolonged submergence.

Punjab, Haryana, AP account for 50% rice purchase

• Three states — Punjab, Haryana and Andhra Pradesh, account for more than 50 per cent of the total rice procurement in the country. Ironically, West Bengal and Uttar Pradesh, the top two rice-producing states, account for less than 10 per cent of the total procurement. According to data from Food Corporation of India (FCI), in 2017-18 Kharif season, of the 36.18 million metric tonne of rice procured by various agencies, about 11.83 tonne was from Punjab, followed by 3.99 metric tonne in Haryana and 3.87 metric tonne from Andhra Pradesh. Together, the three states accounted for close to 54 per cent of the total rice procurement by government in the country. West Bengal is the largest producer of rice, and accounts for nearly 13-14 per cent of the total rice production in the country. However, only 54000 metric tonne of rice was procured by government agencies last year, which is just about 0.36 per cent of the total rice production in the state. Uttar Pradesh, which is the second largest producer of rice, had 2.87 million tone procured from the government. The situation in UP is better than West Bengal, for government procurement is about 23 per cent of the produce, against less than one percent in case of West Bengal. In contrast, rice procurement in Punjab and Haryana is close to 100 per cent of the produce, and in some years, the quantity exceeds production.

WhatsApp to help farmers in adopting better farming practices

• Himachal Pradesh government is connecting farmers with research centres to help them in adopting better farming practices and double their income by 2022. A state government official said 13 research centers and 8 science centers have been made functional to provide advanced and latest information on agriculture and horticulture to farmers. "The government has taken new imitative by connecting the farmers of their periphery with all the science centers with WhatsApp. This will result in farmers getting quick solution to their issues while receiving information related to seasonal crops," he said. He said agriculture department has also started toll free helpline number '1550' to redress the grievances of farmers on priority basis. He said Himachal is the only state where 89.96 percent of the population lives in rural areas which result in their dependency on agriculture



and horticulture as compared to other states. The government has launched various schemes to give new direction to the agriculture sector and many other new schemes have been proposed so that people get maximum employment in this area. Efforts are being made to strengthen the economy with full commitment to double the income of farmers by 2022 as has been announced by the Prime Minister, the official said.

Farm waiver quantum sees a jump

• The quantum of the Janata Dal (Secular)-Congress coalition government's much-discussed farm loan waiver is now about Rs. 40,000 crore — a jump from Rs. 34,000 crore announced in the State Budget. Recently Chief Minister H.D. Kumaraswamy announced that all crop loans in cooperative institutions to the tune of Rs. 1 lakh availed till July 10, 2018 would be waived under the scheme. While the budget announcement had set the eligibility of crop loans taken between April 1, 2009 and December 31, 2017, the Chief Minister extended the date of eligibility till July 10, which is expected to benefit about 45 lakh families. The announcement, according to Mr. Kumaraswamy, would have a net benefit for farmers of about Rs. 8,500 crore in the cooperative sector alone. Currently, in Karnataka, the size of crop loan in both cooperative institutions and nationalised banks is to an extent of Rs. 48,091 crore from 43.56 lakh accounts. Mr. Kumaraswamy announced the additional waiver during his reply to the discussion on the budget in the Legislative Assembly, even as he defended the loan-waiver scheme and provided statistics as to how it would be implemented. This was in reaction to the Opposition BJP's charge that the loan waiver was a mere "eyewash" and that the coalition partner was shying away from its election promise.

Centre brings in UNDP to expedite crop insurance scheme



• The Centre has put in place a new professional team to fast-track crop insurance scheme Pradhan Mantri Fasal Bima Yojana and raise the coverage under the scheme to 50 per cent of the gross cropped area in 2018-19. The United Nations Development Programme (UNDP) has been contracted as a consultant for two years to help establish a Programme Management Unit (PMU) at a cost of Rs 28 crore, the official said. "The unit will have 15 professionals whom the UNDP is in the process of hiring on its payroll. Some professionals have already been recruited...," an official said. The unit, to be housed in Shastri Bhavan or Krishi Bhavan, will not only monitor all issues related to the PMFBY, but will also address them comprehensively. PMFBY was launched in 2016 and is being implemented in 25 States. Under the scheme, farmers pay very nominal premium and get full claim for damages. The crop insurance claim is estimated to be Rs 15,853 crore for the kharif 2017 season, of which Rs 6,622 crore has been settled, as per the government data. Under PMFBY, farmers' premium has been kept lower between 1.5 and 2 per cent for foodgrains and oilseed crops, and up to 5 per cent for horticultural and cotton crops. There is no cap on the premium and 25 per cent of the likely claim will be settled directly in farmers' accounts.

Over Rs 35,000 cr deposited into farmers' A/Cs: MP CM

Madhya Pradesh Chief Minister Shivraj Singh Chouhan has said that his government had deposited over Rs 35,000 crore into the accounts of farmers as part of various state-run schemes over the past one year. He was speaking at a "Kisan Mahasammelan" organised here where he distributed approval letters to beneficiaries of various state and Central welfare schemes. "Financial assistance of about Rs. 35,000 crore under various schemes has been deposited in the bank accounts of farmers in Madhya Pradesh during the last one year," Chouhan said. He said that the state government had carried out the "impossible" work of connecting the Kshipra River with the Narmada in order to enhance irrigation facilities.



Govt plans financial penalties to push agri crop insurance

• More than two years after its formal launch, the Centre is planning to impose financial penalties on state governments, banks and insurance companies for violating the guidelines of the Pradhan Mantri Fasal Bima Yojana (PMFBY), including delay in claim settlement. It is also looking to incentivise states that promptly pay their share of premium, disburse claims to farmers on time and use technology for crop cutting, officials said PMFBY is an yield-based programme, where farmers are charged two per cent for all kharif crops, 1.5 per cent for all rabi crops and five per cent for commercial and horticulture crops. Almost 30 per cent or a third of the agriculture ministry's budget, is spent on premium for the PMFBY every year. The penalties on states could be in the form of a levy on the premium amount due or asking them to bear a higher share of the premium than the current 50:50 between Centre and states. In the case of banks, the government could lower the four per cent service charge it gives from farmers' share of premium. And in the case of better performing banks, this might even be rattled. Against the mandatory two months, the government has found the average time for settlement of claims under PMFBY has been five to six months. Earlier, too, the Centre had warned states and other stakeholders of financial penalties for delay in claim settlement, but it was never seriously implemented. This time, officials said, the matter was being seriously considered.

Revised crop insurance rules coming soon

▶ The Union government will published revised guidelines for the Pradhan Mantri Fasal Bima Yojana (PMFBY) soon. These will correct specific gaps in the existing ones, informed Ashish Kumar Bhutani, additional secretary at the ministry of agriculture. "There will not be any dramatic differences from the existing guidelines. Basically, it will provide more details on some procedures to make it more understandable, to ensure uniformity in implementation of the scheme," he said.



New RBI norms may see borrowers' liquidity profile come under pressure

• The liquidity profile of borrowers, specifically those that have high dependence on cash credit or overdraft facilities, could come under pressure as the Reserve Bank of India's draft guidelines on 'Loan system for delivery of bank credit' require at least 40 per cent of working capital borrowings to have a defined repayment schedule, according to credit rating agency ICRA. It cautioned that default rates could go up. As per the guidelines, for borrowers having aggregate fund-based working capital limits of Rs 150 crore and above from the banking system, a minimum level of 'loan component' of 40 per cent will be made effective from October 1, 2018, which will thereafter increase to 60 per cent with effect from April 1, 2019. As per ICRA's analysis, the



adverse impact might be more pronounced on entities in sectors including cut and polished diamonds, gems and jewellery (retail), media broadcasting, metals, thermal power, sugar, and textiles (cotton spinning). These are the sectors where not only the average sanctioned working capital debt per entity in ICRA's rated portfolio is estimated to be upwards of Rs 150 crore but also the gross cash conversion cycle is high - ranging between 120 days to 220 days. "It may be noted that sectors where the utilisation of working capital limits is seasonal, such as textiles (spinning) and sugar, adapting to the new system might be less burdensome as the working capital required ebbs as the inventory gets converted into sales. However, for sectors where the working capital required remains elevated throughout the year, the credit implications of the new system are likely to be more onerous," said the agency.

Chile's kiwifruit imports set to double to 10,000 t

Chile's kiwifruit export to India is expected to double to 10,000 tonnes this year, as the country enjoys customs duty advantage over other competing nations like New Zealand, according to a trade body. The south American country produces around 2,00,000 tonnes of kiwifruit per year, out of which 90% are exported mostly to European nations like Germany and Italy. With the demand for kiwifruit growing in India, Chilian Fruits Exporters Association is eying to boost export of the fruit in the south Asian country. "We started exporting kiwifruit 2-3 years ago. ... We are hopefull of reaching 10,000 tonnes mark by end of 2018 calendar year," the association's director Marketing Charif Christian Carvajal said.



Smartphones, the main farming tool in China

• With 96 per cent of China's villages connected to the Internet and each rural household having on an average three mobile phones, the sickle and hoe have been replaced by the smartphones and apps as the country's emblematic farming tools. In east China's Jiangxi province, smart greenhouses with watering and fertilising controlled via mobile phone are a rage. In a demonstration greenhouse covering 5,000 sq m in the city of Yingtan, most work is done by a system of perforated plastic pipes combined with sensors to monitor temperature, air humidity, mineral content and water content of the soil. "Everything is controlled by a cellphone app," said Wei Yulong of Dongrui Industrial, which developed the system. "The system delivers water and fertiliser directly to the roots of the plants," Yulong added. The polythene that covers the greenhouse can also be adjusted according to the sunlight. This and another 200 agriculture projects are backed up by a provincial Cloud platform. According to the Jiangxi provincial agricultural department, 59 out of 100 county-level cities are covered by the network, which also helps the local government monitor food safety and rural e-commerce development. More than 20,000 rural families are registered at the platform. China's Ministry of Agriculture and Rural Affairs wants smart phone applications to be widely used in agriculture and has set up demonstration bases to help farmers get familiar with the latest gizmos.

Vegetable export to Kuwait to resume but Kerala has to wait

• For the first time, Kuwait has isolated Nipah virus affected Kerala for import of fruits and vegetables from the rest of India. Kuwait has opened import of fruits and vegetables from the rest of India, but has continued its ban on the purchase of horticulture products from Kerala due to the virus that affected the state earlier this year. Most countries in the Middle East, including the UAE, Saudi Arabia, Qatar, Bahrain and Kuwait, banned the import of fruits and vegetables from India early June due to spread of Nipah virus, which claimed about two dozen lives in Kerala. Contagious and untreatable, the brain-damaging virus hit Kerala in May with fruit bat of the Pteropodidae family being its natural host, according to the World Health Organisation. As a result, major importing nations are wary of the produce grown in Kerala and have also issued severe travel advisories against visiting the state. The timing is expected to hit the southern state hard, as fruit export generally swells in the month of Ramadan. Indian exporters of fruits of vegetables, however, believe that orders have started coming in and exports could re-start in a couple of days, with India being one of the closest partners of the Middle East countries in the world.



Coffee exports rise 12% in H1

Offee shipments have risen 12 per cent in volumes during the first half of calendar 2018 over last year on good demand from traditional buyers, such as Italy and Germany, among others. In value terms, the exports were up by over 7 per cent, both in rupee and dollar terms. Official sources said an increase in re-exports boosted overall shipments during the period. Re-exports surged 70 per cent to 48,005 tonnes, while green coffee shipments registered 2.21 per cent growth at 170,856 tonnes. India imports coffee to re-export it as value-added instant coffee.

IG International to import Hass avocados from Peru

Fresh fruits importer IG international has tied up with Camet Trading, a fresh and processed fruit trader in Peru, to import avocados to India. In the first sea shipment, IG International will receive a 40-foot container carrying 4,000 boxes of Peruvian Hass avocados, which will be distributed in major cities in the domestic market, Tarul Arora, Director, said. Camet Trading produces both Hass and Fuerte variants of avocados. From a commercial viewpoint, Hass avocados are the most popularly consumed avocados in the world. Considered to be a heart-healthy super fruit, avocados contain a high amount of potassium, and are also rich in antioxidants, he said. IG International imports 31 global varieties of fruits from 22 countries.

US-China trade war may reopen oilmeal export window for India

Amid the US-China trade war, the Indian oilmeal sector has spotted an opportunity for the possible resumption of Chinese imports of Indian oilmeals. The Solvent Extractors' Association of India (SEA) has expressed a hope that China may reconsider the ban on Indian oilmeal imports it had imposed in 2012. "Prior to the, China used to import nearly half a million tonnes of oilmeals including 3.5-4 lakh tonnes (It) of rapeseed meal and one lakh tonnes of soybean meal from India. The ongoing trade dispute between the USA and China has forced China to look at other sources," said B V Mehta, executive director, SEA. This is likely to open up the Chinese market for India subject to clarification about phytosanitory certificate for export of oilmeals from India. SEA has requested the Commerce Ministry to seek clarification from Chinese AQSIQ authority about phytosanitory certificate conditions, said Mehta. Industry sources said China had banned Indian oilmeal earlier after India had banned milk products import from China. It had also alleged presence of malachite green, an organic chemical, in rapeseed meal.

Relaxation of fumigation norms extended

India has extended the relaxation on mandatory fumigation of imported cereal crops with methyl bromide at the port of origin for six months till December 31. The relaxation was to end by June 30. But none of these commodities is being imported due to high import duties. Indian plant quarantine norms stipulate that farm commodities, particularly grains, have to be fumigated with methyl bromide at the port of loading to prevent foreign insects and pests from reaching Indian shores. The government has been relaxing this rule for a year at a time since 2005 to facilitate import of pulses and wheat from countries where use of methyl bromide is banned due to environmental and health concerns. It has been permitting importers to either use alternative fumigants or fumigate imported grain shipments with methyl bromide once they enter Indian waters.

India Sees Record Spices Exports in FY18

● India exported a record 1.03 million tonnes of spices and spice products in FY18, registering an increase of 8% in volume terms. At about Rs 17,930 crore, exports were 1% higher in rupee terms. In dollar terms, exports were pegged at \$ 2.8 billion, up 5%. "Exports of Indian spices maintained an increasing trend during 2017-18 and exceeded the target fixed for 2017-18," Spices Board Secretary AJayathilak said. Compared to the target of 1.023 million tonnes, valued at Rs 17,665 crore (\$2.64 billion) for FY18, the achievement was 100% in terms of volume, 101% in rupees, and 105% in dollar terms. Jayathilak attributed the increase to innovative market interventions and the emphasis on value-added products by the board. Exports of small cardamom created an all-time record, with shipments of



5,680 tonnes valued at Rs 609.08 crore as against 3,850 tonnes worth Rs 421.50 crore a year earlier, registering an increase of 48% in volume and 45% in value. Chilli continued to lead Indian spice shipments with export of 4,43,900 tonnes, fetching an amount of Rs 4,256.33 crore. While volumes increased by 11%, the value declined by 16% from the previous year due to volatility in prices of chilli in international markets. Mint products fetched the second highest revenue among spices with a volume of 21,500 tonnes worth Rs 3,228.35 crore. The value rose by 28% but volumes fell 3.5%. Cumin exports touched 1,43,670 tonnes valued at Rs 2,418 crore, increasing 21% in volumes and 23% in value. Other gainers included garlic, asafoetida and tamarind and valueadded products like curry powder, spice oils and oleoresins. A total volume of 17,200 tonnes of spice oils and oleoresins worth Rs 2,661.72 crore were exported, marking an increase of 42% in volume and 15% in value.



Fertilizers rich in potassium can help increase paddy yield: Study

• Fertilizers with high potassium content in farms located in areas that are chronically short of water can help increase paddy yield. Ireland and Belgium produce three times more yield of paddy compared to countries in South Asia because the fertilizers farmers there

use have high potassium content, an essential plant nutrient, says a research report. Water availability for agriculture will reduce by 15 per cent by 2025 in the country for various reasons, and thus use of fertilizers with high potassium content in farms will only help save the day for us. Dipika Patel, a graduate student of department of genetics and plant breeding, in her research report done under the guidance of Dr Kirti Bardhan and Dr Dhiraj P Patel of Navsari Agricultural University (NAU), says fertilizers with high potassium content in areas facing moisture deficit condition, help rice plant (Variety NAUR-1) produce roots with a significant reduction of root area, average density, maximum width of the root system, and width-to-depth ratio but with increase in the rooting depth as the plant roots grow deep in search of water.



IIM-A's course in food and agri-business is world No 1

▶ IIM-A's two-year Post-Graduate Programme in Food and Agri-Business Management (PGP-FABM), has been ranked No 1 in the world for the third consecutive year in 2017-18 by Eduniversal, Paris. A Post-Graduate Programme with Specialisation Package in Agriculture (PGP-SPA) was started in 1974. In 2000, the Indian Institute of Management-Ahmedabad, revamped it following the Institute's new approach to agri-business management education under the changing economic environment. More than 125,000 candidates apply for this programme each year, and only about 45 are selected. The PGP-FABM is a full-time residential programme that evolved and expanded beyond agriculture to other allied areas such as food processing, commodities and rural development sector, and rural infrastructure.

ICRISAT develops biofortified sorghum

As millets gain currency in urban areas, ICRISAT has come out with country's first biofortified sorghum (jowar), with higher iron and zinc content than the regular sorghum. Developed by the Patancheru-based International Research Institute for Semi Arid Tropics (ICRISAT), the ICSR 14001 variety was taken up under the sorghum biofortification project HarvestPlus. The sorghum variety has been named as 'Parbhani Shakti' by its maiden user, Vasantrao Naik Marathwada Krishi Vidyapeeth (VNMKV) of Maharashtra. ICRISAT and VNMKV has signed an agreement for seed multiplication to let more farmers benefit from the improved variety. "It offers a cost-effective and sustainable solution to address micro-nutrient deficiency," a senior ICRISAT representative said after the formal launch of the seed variety. "Biofortification is an important approach we take as it is cost-effective and sustainable. It addresses hidden hunger with no additional cost. Sorghum is the cheapest cereal available in the market," Peter Carberry, Director-General (Acting) of International Crops Research Institute for Semi-Arid Tropics, said.





Teenage prodigy invents farmer-friendly IoT device

● Ishan Malhotra, a 17-year-old boy from Delhi, has created a revolutionary device that helps farmers operate water pumps from anywhere with the help of their mobile phones or even landline connections. Pluto, as the device is called, was invented by Ishan—who is a 12th grade student at the Jayshree Periwal International School, Jaipur—when he was in the 10th standard. The idea for Pluto occurred to Ishan when he was visiting his grandmother's old house in Sirsa, a small town in Haryana. "I spent ample time with the locals there and they told me about some of the problems they face on a daily basis," Ishan tells Guardian 20. "They told me that every day, a farmer or any of his family members have to wake up early in the morning, having to walk to their fields just to turn on a water pump. I was flabbergasted



when I heard this. I thought about the energy, the time that was being wasted on a daily basis. That was the moment when I realised that something needs to be done to help the rural farming community." Pluto is an IoT (Internet of Things) device that is activated with a SIM card. Once the SIM is inserted, Pluto can be linked up with the water pump's switchboard. All one needs to do now is to make a call on Pluto's SIM number. The device picks up the call in two rings, after which the user has to dial 1111 on the keypad to turn the water pump on. To turn the pump off, one needs to dial 2222. Ishan has successfully manufactured and distributed over 500 Pluto devices to farmers to date, at a subsidised price of Rs 750 (Plut0's MRP is Rs 2,000 approximately). The manufacturing process is supported by a crowdfunding campaign, run on Impactguru.com.

Biopesticide harpin to boost plant immunity, control fungal infections

• Researchers at the University of Hyderabad (UoH) have demonstrated the ability to deliver the biopesticide harpin into plants and boost their immunity levels using nanotechnology. They have developed a delivery system that uses harpin-loaded chitosan nanoparticles that help increase the bioavailability of the biopesticide to both improve immunity and drastically reduce the effects of a fungal infection. The efficacy of the tool was tested in the tomato plant, where the team led by Appa Rao Podile, Vice-Chancellor, and Sravana Sandhya found a sharp decline in infection up to 80 per cent. The fungal infection in tomato crop is due to Rhizoctonia solani. They have published their work funded by the Department of Biotechnology in the Journal Carbohydrate Polymers. Fungi, bacteria, viruses and insects are the leading pests that challenge agriculture production. Synthetic chemical fungicides and pesticides are used to control plant diseases. Since these chemicals are often not degraded easily in the soil, they exert a damaging effect on environment.

Global pepper body rolls out app to help Indian farmers



• The International Pepper Community has joined hands with All India Spices Exporters Forum to facilitate and strengthen the knowledge base of the farming community as well as to establish a market link. The Jakarta-based IPC has come out with an app which would be disseminated and introduced by the All India Spices Exporters Forum (AISEF) among the Indian farming community. A letter of understanding to this effect was signed by Hoang Thi Lien, Executive Director, IPC, and Prakash Namboodiri, Chairman, AISEF, in Kochi. The app, which will be launched in August, is an interactive platform designed to assist farmers in pepper cultivation practices, Namboodiri said. The app will help farmers to identify the pest or disease affecting the crop and take control measures. Any changes in recommendation or technology are

updated real time onto the farmers' mobile phone. It will also assist them with long-term global price trends in pepper markets, thereby equipping them to take right decision in terms of enhancing area of cultivation or holding stocks in anticipation of better prices. It also has a feature on market linkage.



HORTICULURE & MICROIRRIGATION



HORTICULTURE AND MICRO IRRIGATION DOUBLING FARMERS' INCOMES

ndia has witnessed voluminous increase in horticulture production. While India's post independence era primarily focused on food security, the priorities were later redirected to nutrition. This engendered a phenomenal growth in horticulture segment. India became the second largest producer of fruits vegetables. Urbanization, and increase in expendable income, changing customer preferences and globalization have all been instrumental in this growth. India's food basket now not only has increased presence of locally grown fruits and vegetables but also many imported ones. Horticulture with better returns on investments suitable candidate are а for the introduction of many new technologies. Micro Irrigation systems have become an important ally of horticulture.

Indian Horticulture – Spectacular Success

India is a prominent producer of horticultural crops in the world. Fruits and vegetables account for nearly 90% of total horticulture production in the country. The country ranks second in fruits and vegetables production. There has been a record production of horticultural crops with production during the year 2016-17 reaching 300.6 million tonnes, 5% higher than in the previous year. Productivity for horticulture sector as a whole, has increased by about 3.45% in 2016-17 as compared to 2015-16.

In fruits, productivity has increased from 14.3 tonnes/ha in 2015-16 to 14.6 tonnes/ha in 2016-17. In vegetables, it has increased from 16.7 tonnes/ha in 2015-16 to 17.4 tonnes/ha. Production of fruits is estimated to be 93 million tonnes which is 3% higher than previous year. In vegetables also there was a palpable increase in production. A record production of 178 million tonnes of vegetables has been estimated which is about 5% higher than the previous year. With an increase of 7%, the production of Onion during the year 2016-17 is estimated at 224 lakh tonnes as against 209 lakh tonnes in 2015-16. Production of Potato in the year 2016-17 is estimated at 486 lakh



tonnes as against 434 lakh tonnes in 2015-16 which is 12% higher. With an increase of 10.5%, the production of Tomato in year 2016-17 is estimated at 207 lakh tonnes as against 187 lakh tonnes in 2015-16.

The First Advance Estimates for 2017-18 released by the Ministry of Agriculture also presents an impressive picture. The total horticulture production of the country is estimated to be at an impressive level of 305.4 million tonnes during 2017-18 which is 1.6% higher than the previous year and 8% higher than the past 5 years' average production. Productivity for horticulture sector as a whole, has marginally increased by about 1.3% in 2017-18 as compared to 2016-17. Production of fruits is estimated to be about 95 million tonnes which is 2% higher than previous year. Production of vegetables is estimated to be about 181 million tonnes which is about 1% higher than the previous year. Onion production in the in the current vear is likely to be around 214 lakh tonnes as against 224 lakh tonnes in 2016-17, which is about 4.5% lower than the previous year. Potato production is estimated at 493 lakh tonnes as against 486 lakh tonnes in 2016-17 which is about 1% higher than the previous year.



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The country ranks second in fruits and vegetables production. There has been a record production of Horticulture Crops with production during the year 2016-17 reaching 300.6 million tonnes, 5% higher than in the previous year. Productivity for horticulture sector as a whole, has increased by about 3.45% in 2016-17 as compared to 2015-16



Tomato production in the current year is likely to be around 223 lakh tonnes as against 207 lakh tonnes in 2016-17 which is about 7.7% higher than the previous year.

The record production during 2017-18 will mark the sixth straight year of horticulture production outstripping that of foodgrains (estimated at 276mt in 2016-17), suggesting a structural change in Indian agriculture where farmers are increasingly growing perishable commercial crops. Even in the drought years, when country's food grain production took a beating, horticultural production remained unaffected or stable. This is perhaps due to the fact that most horticulture crops are grown with assured irrigation and monsoon vagaries making a little impact on this sector. Eight vegetables that make up 74% of the total vegetable production in the country have 73% access to irrigation. The total vegetable production was highest in case of Uttar Pradesh (26.4 million tonnes) followed by West Bengal (25.5 million tonnes).

Great potentialities exist for cultivation of flowering plants. In addition to the beautification of the local landscape, flowers have great export value and are significant for beekeeping industry which too provides an alternate source of income to the Indian farmers. The highest production of flowers was recorded in Tamil Nadu (416.63 thousand tonnes) followed by Karnataka (280.92 thousand tonnes).

India has the largest domestic market for spices in the world. It is also the world's largest producer and exporter. The country accounts for over 20% of the global trade and within the Indian agri export basket the spices rank 7th in terms of value contribution. Indian spices exports have been able to record strident gains in volume and value. Spices exports have registered substantial growth during the last five years, registering a compound annual average growth rate of 7% in rupee terms and 5% dollar terms of value and India commands a formidable position in the World



Spice Trade. During 2017-18, a total of 10,28,060 tonnes of spices and spice products valued at Rs.17929.55 crores (US\$ 2781.46 Million) has been exported from the country as against 9,47,790 tonnes valued Rs. 17664.61 crores (US\$ 2633.29 Million) in 2016-17 registering an increase of 8% in volume and 1% in rupee terms and 6% in dollar terms of value. As compared to the target fixed for the period 2017-18, the total export of Spices has exceeded the target in terms of both volume and value. In terms of production volume, Chilli, Garlic, ginger and turmeric





constitute 75% of the total spice production. Andhra Pradesh ranks at the top in Chilli production followed by Telangana and Madhya Pradesh. In case of Garlic, India is the second largest producer after China. Madhva Pradesh, Rajasthan and Gujarat are the top producing states in the country. Ginger production in India is carried out in as many as thirteen states, with Assam, West Bengal and Karnataka ranked the top producers in 2016-17.

Plantation crops occupy less than 2 per cent of the total cultivated area (i.e. 3.82 per cent of total crop land) but they generate an income of around Rs. 16,000 million or about 12.72 per cent of the total export earnings of all commodities or 75 per cent of total earnings from the export of agricultural produces. India is the leading country in the total production of certain plantation crops in the world. Our production meets the share of 47 per cent in tea and 66 per cent in each of cashew and Arecanut. Plantation industry provides direct as well as indirect employment lo many millions of people. For instance, tea industry offers direct employment to 10 lakhs and indirect employment to 10 lakh people, while-cashew processing factories alone provide employment to 3 lakhs people besides 2 lakhs farmers who are employed in cashew cultivation. During the current year the record production of Plantation crops (areca nut, cashewnut, cocoa

and coconut) is estimated to be around 18.3 million tonnes which is 10.2% higher than the previous year. The area and production is more in Kerala (1073000.7 ha and 4359000.9 MT) followed by Karnataka (679000.2 ha and 1401000.0 MT), Tamil Nadu (503000.0 ha and 3810.6 MT), Andhra Pradesh (289000.0 ha/and 1021000.2 MT). Being one of the largest producers of fruits and vegetables, India also has a significant presence in the global market. Among the fruits, grapes occupy the premier position in exports with 232.9 thousand tonnes valued at Rs. 2,08,835 lakhs . Banana and Mango are have attained significant position in exports. Fresh vegetable (e.g. Peas, Potatoes etc.) exports have also been on the rise.

India presents some very promising prospects for horticulture

The consumption pattern of the Indian population have changed over the years. More expendable incomes, urbanization and awareness consumer regarding the health benefits of consumption of fruits and vegetables have spurred the demand for fruits and Consumption vegetables. data from the National Sample Survey Organisation (NSSO) shows that





According to the **latest Agriculture** Census, as much as 67 percent of India's farmland are held by the marginal farmers with holdings below one hectare. As land holdings become increasingly fragmented, production of vegetables ensure quick returns to farmers, compared to the conventional food grains that take up to six months to harvest.

while monthly consumption of cereals per person in rural areas declined from 13.4 kg in 1993-94 to 11.2 kg in 2011-12, consumption of vegetables went up from 2.7 kg to 4.3 kg during this period. A similar rise in consumption of high value products has been noticed in the urban centers as well.

Globalisation has played an important role in the transformation of food consumption patterns of Indian households by introducing them to newer tastes and choices. According to the Indian Council of Agricultural Research, the market for exotic products is growing at 15% to 20% per year.

Agri farms across the country are leveraging

this growing demand for exotic vegetables and spices in the food services sector. Different types of vegetables like basil, lettuces, fennel, broccoli, leek, sweet corn, cherry tomatoes, babycorn, coloured pepper, zucchini are grown in Goa-based Palavi Agro Farm. Some farms such as 'Offering Farms' in the outskirts of Pune go as far as growing vegetables like baby rucola, wild arugula, butternut squash, malabar spinach and even chia, kale and baby kale to suit the finer palates of high

end restaurants. The Rajasthan government initiated the olive cultivation project with technical support from Israel in 2008. Seeing the ample possibilities, the state government formed the Rajasthan Olive Cultivation Ltd (ROCL) in the public-private-partnership (PPP) mode. Olive cultivation is at present spread over 800 hectares, of which 182 hectares is government land.

In terms of cultivation too, these agricultural commodities fare much better than the food grains. Vegetables are short duration crops that are mostly grown on small patches of land by marginal farmers, often in less than an acre of land. According to the latest Agriculture Census, as much as 67 percent of India's farmland are held by the marginal farmers with holdings below one hectare. As land holdings become increasingly fragmented, production of vegetables ensure quick returns to farmers, compared to the conventional food grains that take up to six months to harvest. The fact that farmers continue perishables despite to grow recurrent price fluctuations shows that returns are better for these compared to traditional foodgrains. This signifies a fundamental shift in Indian agriculture. Farmers are seemingly taking more risks by growing perishables where annual losses are as high as Rs. 32,000 crore.

India's varied agro climates supports a wide variety of fruits, vegetables, plantation crops and spices. With geographies as diverse as desert and tropical rainforest, hill and plains, India can continue to explore growing newer crops adding more diversity to the produce.

Bottlenecks galore

Better incomes, urbanisation and higher consumption of fruits and vegetable seem to be driving demand for horticultural products and their cultivation. The returns from these crops are promising but at the same time are unstable.

Mr. SS Mehta, President, Amla Grower Association

"There is a lot of scope to grow Amla in India provided attention is given to production of quality as it is said 'In North, Amla is grown while in the South it is cultivated'. Today in Tamil Nadu alone, over 75,000 acres of Amla is grown giving an annual income of over Rs.500 crore at farm gate. Tamil Nadu has the blessings of nature – Amla is available round the year. The farmer gets a price ranging from Rs.14/- to Rs.24/- per kg.We can still expand Amla Production as there is a market which is growing due to the awareness of health that is being spread. Similarly, there is a large scope for export of fresh fruits as well as processed products. The full potential of Amla is yet to be realized. If the procedures which are now overlapping are made single window, there is a lot that can be achieved. There are a lot of products in the market like Murabha, Candy sweet, Canda masala, recipes, shred in honey, chutney, pickle, juice, squash, jam, etc. Further there is a very large use in medicinal preparation as an input, powder capsules, tablets, etc.Organic agriculture in Amla is fully possible and should be supported, but the powers to be there should be a regulatory system to check the quality of the spate of organic inputs that are coming up. Despite the tremendous scope, very little field oriented research has been done in Amla. There needs to be a lot of work put in for much crops like Amla, Bael, Jamun, Mulberry, Phalsa, etc."



Prices crashing during peak harvest season and peaking during lean months are a regular phenomenon. The recent farmer protests that shook India highlighted this issue. This indicates the absence of food processing units that are located close to the farm gate. If there was one, the excesses could be utilized to develop them into products with longer shelf life and preventing the price crashes. A better cold chain network with pack houses and access to refrigerated transport can also help to prolong the shelf life of fresh produce and earn better value for farmers.

Although there is a scope for different crops, the state departments are reluctant to pursue something new or radical. The departments promote the existing crops and new crops are rarely introduced. Farmers are not exposed to the market trends and are not able to guage the opportunities existing in the market. Niche crops catering to gourmet cuisines fetch premium





prices. The states can explore the possibilities of the cultivation of the same and requisite know-how can be introduced by liaising with other countries. Indian farmers need market intelligence—a clearer idea on future demand and supply to make better crop choices.

Better access to markets, technology and intelligence can help translate the higher perishable production to higher earnings for farmers. Fragmented markets pose a major handicap for the farmers. Lack of cold chain facilities is equally detrimental. The markets across the country needs to be connected and a full fledged refrigerated facilities connecting the market can help stabilize the price across the country. This will not only help check inflation but also stabilize the income earned.

India falls short in terms of adoption of new technologies. New technologies are crucial in horticulture. The likes of green house technology, tissue culture, high density planting, protected

cultivation, hydroponics, automated irrigation etc., have already made their presence felt in Indian agriculture. However, these kind of technologies are restricted to few farms and not popular on a large scale. The country, if intends to maintain the current rate of progress in horticulture, should think of expanding the technological footprint. One such technology that has found to influence yield in horticultural crops is the micro irrigation sytems.

Micro Irrigation Systems Micro Managing Irrigation

Micro – irrigation techniques, including drip and sprinkler irrigation, have emerged as an important water conservation technology. Besides, enhanced water efficiency, they have also been associated with better yields and hence better farm incomes. According to some estimates, the system can save electricity of 278 kWhr/ha for wide spaced orchard crops and 100 kWhr/ ha for closely grown crops. The continuous and uniform application of water across the field will also improve the quality of produce. Combining micro irrigation with water soluble fertilizers, fertigation is a recommended practice in horticultural crops. The fertilizer use efficiency can be increased up to 95% using this system when compared to conventional methods of water application. Moreover, micro irrigation is well suited to all soil types and undulating terrains as the water flow rate can be controlled.

At present, United States (1.64 million ha), China (1.67 million ha) and Spain (1.63 million ha) are some of the leading countries which have adopted drip irrigation. Considering the world's total irrigated area as 212 million ha, only 4.75% of it is currently irrigated under drip irrigation which shows the immense potential that still exists for this kind of irrigation. India, with a total arable area of 140 million ha with almost 42% of arable land irrigated, too has a huge potential for micro –

he total coverage under Microirrigation in India is estimated to be 9 million hectares, which is about 13 % of the ultimate Micro-irrigation potential at 69 million hectare as reported by Micro-irrigation Technology Mission Report in 2005. Drip irrigation constitutes approximately 54 % of the total coverage under micro irrigation. The advantages of drip irrigation, which is by far, the most efficient sustainable irrigation technology available with us, are immense. They offer optimum utilization of agriinputs in terms of water saving (40-50%), lesser requirement of power, labour, fertilisers and plant



AVINASH THAKUR CEO, Ajay Industrial Polymers Pvt. Ltd.

protection chemicals. We know for sure that in our country, how scarce, these resources are. Yield maximization – both quantitative and qualitative have been observed with micro irrigation. It leads to substantial additional income. It enables uses of even marginal and otherwise un-cultivable area! It also eases farm operations and spare time to focus on other productive assignment.

Government has so far offered immense support in spreading microirrigation technology. Capital subsidy support system has addressed capital intensivity of this technology to a large extent. It has helped reducing the price of the system for farmers to the tune of merely 30-40 %. It is because of this support, farmers could come forward to adopt the technology, and taste the success. Other support has been in the form of extension activities, Incentives for importing irrigation components, various infrastructural support in putting up MI manufacturing plants, etc.

Smaller holdings have limitations in adopting technological advancement which is otherwise suitable for large holdings. Microirrigation System is blessing in disguise for such holdings. Huge water saving, coupled with high quality and enhanced production results in a quick return on investment. It helps in taking multiple crops from the same acreages of land and available water for irrigation. Superior quality fruits and vegetables fetch higher price in the market. Lesser engagement for weeding and other plant protection measures enable them spending time on other associated activities like – cow and goat rearing, pottery, etc. It helps getting additional income. Now a days there are specially designed micro-irrigation kits for small and marginal holdingswhich are available in the market, which is based on easy to install and simple to operate principle. There has been additional capital subsidy support for small and marginal farmers as well.

Still 87% of the MI potential is left to be covered. Since it has proven advantages and farming fraternity have seen it themselves, spread of this technology is going to go up in future, I believe.More than wish, there is the compulsion, as mentioned above and I am sure that the present as well as upcoming Government would continue providing various support systems to this industry.In coming years, the demand for quality products and service support will require quantum of skilled workers in this industry. Farm automation will consolidate further. The big ticket item, I foresee is adoption and spread of this technology in commodity crops.All in all a challenging but encouraging future ahead for all of us! " irrigation which is still underutilized. Task Force on Micro – Irrigation (2004) estimated a potential of 27 million ha for drip irrigation based on the area under crops most suitable for that form of irrigation, the Indian Committee on Irrigation and Drainage (INCID) estimates a potential of 10.5 million ha.

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

Despite these apparent benefits, farmers across the country have been reluctant to adopt this. make initial costs "High the technology unfeasible for small and marginal farmers. Low awareness levels about the technology; No understanding of the true 'value of water'; Delayed credit supply; Lack of training and capacity building; Poor extension work; Lack of skilled manpower for survey, designing and installation of the systems; Varied climatic conditions in the country and vast country size which takes time for penetration and Lengthy and cumbersome subsidy procedure are some of the challenges faced by this industry," says Mr. Anil Jain, Vice Chairman & MD, Jain Irrigation Systems Ltd.

Horticulture represents a significant opportunity for small and marginal farmers to enhance their income prospects. However, the perishability of the products interferes with the stability of the income earned. A suitable intervention from the technology side can elevate the income prospects and its permanency.

'Indian Retail Chain is inefficient for Selling Perishables'

PICK N SERVE FOODS PVT LTD, the fastest growing Fresh Produce company in India with dedicated professional operations team for the management of the Contract Farms, supply chain management from Farm to Port till it reaches customer has two decades of experience in working with Fresh Produces like Banana, Pomegranates, Grapes, Mango, Papaya & strawberry. With the experience spanning two decades, PICK N SERVE FOODS PVT LTD. has dedicated farmers catering to their demands and a robust market to cater to. In a discussion with Agriculture Today, Subrata Mondal, MD & CEO, PICK N SERVE FOODS PVT LTD shares his perspective on the organized retail sector of perishables.



What are the apparent growth drivers behind organized retailing in fresh food category in India?

Health consciousness of the consumers, City based consumers, Growing Upper Middle Class are some of the drivers for retail growth in Fresh produces.

What is the share of organized retailing in fresh food category in India?

There is no researched data yet on Pan India basis, but seems to be less than 1%.

How has branding and packaging improved the marketability of perishables?

In India, perishables branding is a very nascent and recent phenomenon. Branding per se does not mean only labeling but to have loyal and repeat customers as the brand takes care of customers' requirements on regular basis and fulfill the promise.

Has the advent of retail chains specializing in fruits and vegetables affected the farmers' income?

Majority of Indian retail chain is actually inefficient than alternate channels for selling perishables. This is primarily not understood by the retailers in India. Perishables are footfall drivers and not a segment for margin business for multiproduct retailers. Thev earned money in other segments against footfall they will receive due to perishables. Hardly any retailers have understood the concept. For specialized perishables retail chains, the margin from perishables will come only when the demand is huge and fruit sales is atleast 60-70% of the total perishables value. Until and unless the retail sales of perishables are 20-30% of the total market share in that particular region, farmers' income cannot be impacted positively.

How do you procure fresh

products? Is there any contract between the company and farmers?

We procure directly from the farmers and pay them higher than alternate market and that's why we can demand better quality. It is basically cash and carry on harvest and same day payment to farmers.

Apart from procuring, are there any kind of services from your side to the farmers?

We help farmers for right selection of the seeds and fertilizers and pesticides and right package and practices for higher yields. These are free services as we have region specific and crop specific sourcing plan and need to work with the farmers for their best return to create a positive impact.

How important is grading and standardization in horticulture?

This is important when you have the brands and dealing with retailers

either in India or abroad. Retailers across has their own standardization for acceptance of any produce. Each produce has its own standard for grading and specification depending upon the markets they operate.

What is the scope of organic fruits and vegetables in Indian retail space?

This is tricky. Demand is huge for organic fruits and vegetables as every citizen demands that. Nobody wants to feed their children with pesticides loaded fruits and vegetables. In India, there is a great need of disruptions into this segment and certified fruits and vegetables should sell on par with the conventional fruits and vegetables. This is not far away...actually the organic fruits and vegetables is cheaper than growing using synthetic fertilizers and pesticides but due to higher production and lesser cost. But, since the volume of certified produces is astronomical, the demand is actually never captured and those who can afford are only able to purchase, besides non-availability is another huge concern. Besides, if you measure the nutritional the parameters of fresh produces now and fifty years back, you can find, the quality of nutrition has drastically come down at 30% level only due to very high use of synthetic fertilizers and almost negligible or no use of FYM, organic manures. Soil has lost its quality and hence the fresh produces. Next revolution will come with higher nutrients, higher rate for this segments... this is too early for that kind of intervention but slowly picking up at conceptual level.

'Share of organized retailers in F&V category is increasing'

Mr. Gopal Bihani, Head Farm Fresh, Big Bazaar - Future Group

Fresh fruits & vegetable markets in India are mainly dominated by traders and unorganized retailers. This scenario is changing and the share of organized retailers is now visible with 8% - 9% share of the total market. The traditional habit of visiting daily vegetable markets has been on the decreasing trend and has started shifting to convenience store visits .The weekly / bi weekly visits to super and hyper markets for buying fresh produce & top up groceries have significantly increased.



The focus of direct sourcing has become sharper than before. We are closely working with more and more farmers

and farmer groups. We have been educating them for sorting, grading and retail specifications and have also helped in fading out the middle men out which has increased their income. We are bringing farmers and customers closer to each other which is actually a win- win situation for both. Future Group has entered into a joint venture and has tie up with Andhra government to source Banana and Pomegranate directly from + 12,000 farmers in the State. We have also partnered in Food Tech India project (An Indo-Dutch National Importance project) in the state of Karnataka. This project is working towards reducing the food waste in India and transforming Dutch knowledge for better productivity of farm produce and contribute in doubling the farmers' income. We are aiming towards opening up more than 100 collection & distribution centers and connecting to 10,000 small stores coming up in next 5 years.

Grading and standardization in horticulture have become very important in this space. Retailers, Food Processers, Institutions, Hotels& GT all have their required specifications for fruits and vegetables. Grading and standardization also helps farmers in getting right price for the right product. With changing lifestyles and increasing consumer expectations, the grading and standardization in produce has become more important. Customers today demand a consistent quality, size and product standards throughout the year, and therefore keeping in line with this need it becomes important for retailers to give in depth attention to the grading process and ensure that they define product standards for their sourcing as it impacts their produce uplift by customers at the end of the day

This segment also has its share of challenges. Fruits and vegetables are very highly perishable category and in our country more than 35% of the produce is going into waste. To make sustainable end to end farm fresh supply chain we need to reduce this food waste by increasing the farmer's productivity and having complete end to end cold supply chain along with adequate infrastructure facility. Transforming knowledge for best farming practices, fruit safety practices, use of right inputs etc. will help farmers in increasing their productivity.Providing infrastructure with cluster based approach i.e. pack house, cold storage and cold transport chain along with use of scientific packaging will further increase the shelf life of products and reduce food waste significantly. Government bodies, various NGOs, international organization has already started working on this along with support of retail marketing linkages. Saving in food waste will absorb the cost of end to end cold supply chain and make Farmers and Customers both happy.

'Indian Warehousing Market has a High Growth Potential'

Arya Collateral Warehousing Services Pvt Ltd provides cost-effective warehousing solutions at strategic locations anywhere in the country. They advise clients on storage and preservation norms for commodities and follow it through with impeccable execution for best quality storage strengthened by specialised quality testing and pest control mechanisms. These operations are supported by a web-based software application (with access to Clients), thorough Audit processes and adequate Insurance coverage. In an interview with Agriculture Today, Mr. Anand Chandra, Executive Director, Arya Collateral Warehousing discusses the extent of warehousing in India and the challenges in the sector.



What is the outlook of warehousing in India?

Indian warehousing sector is valued at approximately Rs.60 billion with a capacity of around 110 million tonnes. The organized warehousing sector is roughly 70 % of total market and mainly occupied by industries like Agro,Retail, Pharma, FMCG, Auto etc. With the implementation of GST we may see free movements of goods across borders. This may further increase the requirement of warehouses at consumption centres (slightly away from the current tax benefit zones).

What is the role of warehousing in horticultural products?

For horticultural products, we need temperature control atmosphere to increase the shelf life. We need more of cold storages with ambient temperature and conditions, which actually vary from crop to crop, e.g fresh veggies, fruits &flowers need to be stored at 0-2 degree Celsius, but it also requires precooling before storing them in cold storage for increasing the shelf life. Humidity, Light, Carbon Dioxide level, Air circulation, Stacking and Loading rate are some of the other crucial factors to be considered for storage. Over supply during harvesting period is a major concern for horticultural crops. We often see news of Onion, Potatoes, Tomatoes being thrown away by farmers because of the low prices during this period. Small scale farmers incur heavy losses because of this. Cold storage is one of the major solutions for this problem, whereby farmers can store their produce for longer periods and sell as per market demand at favorable prices during off season. But again, there is acute shortage of cold storage infrastructure in India for storing fruits and vegetables. Currently, around 90% of the cold storages are used for storing potatoes only.

What is the status of warehouse infrastructure available in

India?

Warehousing service in India was started about 60 years earlier, with the set up of the Central Warehousing Corporation (CWC) in 1957 & Food Corporation of India (FCI) in 1964 by the Government, CWC is operating around 432 Warehouses across the country with a storage capacity of around 9.96 million tonnes providing warehousing services for a wide range of products ranging from agricultural produce to sophisticated industrial products. FCI is having around 128 warehouses across India with storage capacity of around 35.7 million tonnes for food grains. The State warehousing corporation spreads throughout the country with the network of around 1700 units having aggregated operating capacity of around 20.9 million tonnes. These are major Public institutions in warehousing sector. The Private Warehouses segment is highly fragmented which comprises own managed facilities of manufacturers as well as by their channel partners, apart from various



unorganized service providers. Many manufacturers have their own chains of storage facilities owned & controlled by their stockiest & distribution agencies. Private Warehousing Sector is estimated to have a capacity of 45 million tonnes, where 20-25 % is organized & rest is unorganized.

What is the scope of private players in warehousing?

Indian warehousing market has а high growth potential driven by the Government's support initiatives, GST regime, 100 % FDI, Make in India program & increasing preference of logistics enduser companies to outsource activity to professional LSPs. Organized LSPs and those focusing on developing and managing Agro-produce warehouses are expected to benefit significantly. Private companies having capabilities to guide and support end users are likely to have significant growth opportunities. However, return on capital and / or payback period remains a challenge in Agro-warehousing post withdrawal of capital subsidy scheme by government.

What are the challenges associated with warehousing in India?

Absence of the appropriate scale and quality of warehousing infrastructure, Lack of alignment of capacity, Low capital and operating efficiencies, Ability for handling multi-model interfaces, limited value addition for specific industry, insufficient automation, know-how & training of manpower & value based costing are the major challenges.

What are the policy changes that you would expect from the government in the warehousing segment?

Both Central & state governments must play proactive role in developing large and smart infrastructures for warehousing and cold storages at strategic locations. They should also introduce Single window system to address investors / private player's challenges. On the Agro- warehousing / Cold storage front support from government in terms of land acquisition and capital subsidy will help in boosting investment in this sector.

MR. TARUN ARORA, Director, IG International Pvt. Ltd

"India, with its diverse climate, is among the largest growers of fruits and vegetables in the world. It currently imports 3.50 lakh metric tonnes of fruits per annum, worth about INR 3,000 crore, which is expected to increase to INR 4,000 crore in two-three years.

Indians are also increasingly developing a taste for exotic fruits. The Indian fruit market has introduced a diverse variety of fruits to satisfy changing tastes of consumers. The growing purchasing power of people, prospering urban class and high exposure to the cultures of different countries are some of the reasons why people are opting for exotic fruits. As exotic fruits are high in vitamins, minerals, and fiber, a lot of health-conscious and young Indians are driving the demand for high-value, exotic fruits. Furthermore, the associations of specific fruits with a certain kind of lifestyle, or diet-charts being popularized by famous celebrities have resulted in high demand of exotic fruits, especially in the affluent belts of metropolitan cities. Indeed, the business of imported exotic fruits is expected to grow by 25 per cent over the next couple of years. Fruits like kiwi, avocados, premium apples, dragon fruit, cherries, blueberries and persimmons are some of the new fruits that have found favour in the Indian market.

In general, logistics is a problem in India - though not for us. Our fleet of over 70 refrigerated trucks is a big advantage in a country where transportation can be notoriously tough to execute. Additionally, our network of cold storage facilities allows us to provide a consistent supply of fresh fruit throughout India. As we know, India is the world's largest producer of many fruits and vegetables, but a huge gap exists between demand and supply due to enormous wastage experienced during post-harvest storage and handling caused by improper bagging without crating, lack of temperature controlled vehicles and the unavailability of cold chain facilities in various parts of country for preserving the produce. So to bridge this gap, there are certain areas which need improvement in terms of logistics and infrastructure such as Improving efficiencies and productivity in logistics operation; Attaining the ability to target logistics initiatives that drive business growth; Improving asset utilization; Improving end-toend visibility and Demand-based packaging".



'An Integrated Supply Chain will help contain the Price Fluctuation'

Adani Group, one of India's leading business houses, with revenue of over \$11 billion, has grown to become a global integrated infrastructure player with businesses in key industry verticals - resources, logistics, energy and agro. Adani Wilmar owns the 'Fortune' edible oil brand, India's edible oil market leader with a 19% share (consumer pack). It also owns and operates one of the country's largest edible oil production capacities. Adani Agri Logistics is a pioneer in bulk handling, storage and transportation (distribution) of food grains, and in providing an end-to-end bulk supply chain solution to Food Corporation of India and various state governments. Adani Agri Fresh established its presence in the horticulture sector through world-class packaging operations and storage facilities. These services ensure selection of only the highest grade of horticulture products for storage and consumption. It pioneered the controlled atmosphere storage technology for apples, transforming the apple growing and storage ecosystem of Himachal Pradesh, while creating a popular 'Farm-Pik' brand. In a conversation with Agriculture Today, Mr. Atul Chaturvedi, CEO, Adani Wilmar Limited discusses the horticulture prospects of India and the challenges facing the sector.



India's horticulture production has registered impressive growth year after year. What do you think are the growth drivers?

Rising income of the middle class families and urbanization is driving the growth in demand for horticulture produce. Indian farmers have risen to the occasion to meet the increasing demand by growing more and more horticulture produce. Access to irrigation and participation of more small and marginal farmers in horticulture, higher income from horticulture are the major factors for the higher production.

How receptive has India been as a market for exotic fruits?

The growing number of Indians travelling abroad expose them to different fruits and vegetables available elsewhere in the world. The growing middle class is also inclined to try out exotic fruits and vegetables. The growth in the sale of Kiwi fruit in India in the recent years is testimony to this changing preference. But had it not been for the cold chain infrastructure bottlenecks and the limited size of the organized retail in India, the growth in the consumption of exotic fruits and vegetables would have been much higher.

The growing middle class is also inclined to try out exotic fruits and vegetables. The growth in the sale of Kiwi fruit in India in the recent years is testimony to this changing preference. But had it not been for the cold chain infrastructure bottlenecks and the limited size of the organized retail in India

improved infrastructure for storing perishables?

As per the study conducted by National Centre for Cold Chain Development (NCCD) in 2015, the gap in cold store infrastructure is only 33 lakh MT which is just 9% of the total requirement. However, the gap in refrigerated trucks, pack houses and ripening chambers is more than 80%. Therefore we need to make more investment in the cold logistics segment.

In your opinion, can eNAM prove be successful in addressing the current problems in marketing of agricultural products?

For eNAM to be effective, we need to have

certain pre-requisites in place. Reforms in APMC Act to make provision for electronic а auction as a mode of price discovery, single license across the State to enable a national buyer to pay market fees at a single point, scientific sorting/grading facilities or quality testina machines, internet connectivity, storage facilities at the mandies etc., are some of the pre-requisites. Not all the mandies which are currently connected to the eNAM network have these prerequisites in place. Only when we have these things in place,

eNAM will be able to have any impact.

How can an integrated supply chain improve the economic prospects of a farmer?

An integrated supply chain comprising pack houses, refrigerated trucks, cold warehouses and markets not only help balance the supply and demand of the horticulture produce but also maintains the quality of the produce for an extended period. This helps avoid glut in the harvest and also shortage in the off-season. An integrated supply chain not only helps the farmers but also the consumers and the economy as well by eliminating wastage. Adani Agrifresh's apple supply chain in Himachal Pradesh is testimony to the benefits to farmers, consumers and the economy.

Where does India stand in terms of

How can perishables fit onto the new concept of e-marketing?

As stated above, eNAM has hardly had any impact in the marketing of agricultural products currently. When it comes to perishables, the challenges are even more. Therefore, eNAM has to become successful in handling the marketing of staples first.

How can the interests of the farmers producing perishable products be safeguarded from price fluctuations?

An integrated supply chain will help contain the price fluctuation to a certain extent. For investments to happen in the supply chain, certain policy measures are needed such as removable of Essential Commodities Act, Stable export policy and incentives to the industry. Harvel Agua India Private Limited, involved in the manufacturing of BIS certified Agricultural Irrigation Equipments, was incepted in 1984.A promising Manufacturer, Exporter, Supplier and Service Provider, offering Drip Irrigation Equipment, Fertigation Equipment, Sprayers, Irrigation Sprinklers, Sprinkler Irrigation System, AZUD Filters and many more, Harvel is counted among the largest Manufacturers, Exporters, Suppliers and Service Providers assuring guaranteed quality & competitive price. In an interview with Agriculture Today, Primal Oswal, Managing Director, Harvel Agua India Private Limited discusses the scope and challenges associated with micro irrigation technology in India.



HORTICULURE & MICROIRRIGATION

What is the scope of Micro Irrigation in India?

Two of the most pressing challenges before India today are water scarcity and a growing population. The gap between food production and population increase, though alarming, has not yet reached a crisis situation but shall soon, unless immediate measures are taken to increase food production to keep pace with growing population. The present agricultural practises and methods in the country are highly water intensive and we are already drawing nearly 85% of country's scarce water resources for agriculture. There is really no way we can afford to draw any more water for agriculture. The only solution is to leverage technology to achieve the twin objectives of utilizing our available water resources to the optimum and increase food production. Micro Irrigation must be integrated into agriculture on a war footing and to that extent Micro Irrigation's scope is enormous.

What is the current growth rate of the Industry in India? Despite two successive drought

years in the recent past, the industry has come out of its consolidation phase and is growing at a healthy rate. The central outlay for MI has also increased from INR 1,000 Cr in 2015-16 to INR 3,100 Cr in 2018-19 which is one of the indicators of the Industry's growth.

What according to you are the challenges associated with implementing Micro Irrigation across India?

Micro Irrigation has not been treated as a standalone programme and this aspect alone is one of the biggest challenges which have impeded its implementation across the country. Although, presently MI is part of Hon'ble Prime Minister's flagship programme 'Pradhan Mantri Krishi Sinchai Yojna' (PMKSY), its implementation is yet in the hands of States where policies are not uniform. Therefore, uniformity in process management and online tracking schemes are the need of Also States other than the hour. Maharashtra, Andhra Pradesh, Telangana, Karnataka, Gujarat, Rajasthan and Haryana, which alone account for more than 80%

of Micro Irrigation coverage, need to catch up with attractive policies to bring these States on the MI map. In addition, policies like 'on demand' Micro Irrigation as well as bringing Micro Irrigation equipment manufacturers under 'priority sector lending' shall greatly enhance the spread of MI on a pan India basis.

What lessons can India learn from other nations with respect to establishing Micro Irrigation effectively?

Almost all the countries which are ahead of India in adopting Micro Irrigation technology identified Water Rights Laws as one of the key areas, the effective management of which could help them in the spread of Micro Irrigation. For example all water in Israel is common property resource and the government does accounting for every drop of water, ensuring good water governance. With such a tight water management policy, the farming community in Israel has no alternative but to leverage Micro Irrigation and that is why with a per capita water availability of less than 200 cum Israel is able to export high-value

agri-produce to Europe and other countries of the world. India needs to learn tighter water management policies from the world for scaling up of technologies. The government needs to emphasise that Water is neither infinite nor free. It needs to be priced such as to reflect its scarcity. Once that is done, the spread of MI technology will speed up.

How has the subsidy programme helped in popularizing the MI Systems in India?

Drip Irrigation was introduced in India in early seventies in Agricultural Universities and other Research Institutions. However, the adoption of Micro Irrigation was very slow till early eighties mainly because of lack of awareness

at the level of farmers. However, the formation of the National Committee on the Use of Plastics in Agriculture (NCPAH) bv the Ministry of Petroleum, Chemicals and Fertilisers, Government of India, during 1981 addressed this aspect somewhat. Thereafter, successive government Schemes up to PMKSY with Central and State funding have kept Micro Irrigation afloat and in contention and to the extent it could be said that subsidies on Micro Irrigation have familiarized farming the community with the technology, if not exactly popularized.

Depending upon the nature of crops and the quality of material used, the installation of Drip Irrigation System requires an initial investment of Rs.1 to 1.25 Lacs per hectare. Even with financial assistance from government, such a relatively huge investment requires advance crop planning on the part of farmers and an assured income for the produce which is possible only for high value crops

the concern. The solution lies in gravity based Drip Kits which can cater to farm areas as small as 500 – 1000 SqMtrs and are relatively affordable. The government needs a revisit on their policies for promotion of such kits and bring a majority of small and marginal famers within the ambit of MI technology.

What is the scope of Automated Irrigation System in India?

Precision Farming and Extensive Agriculture are relatively new concepts for Agriculture in India where majority of farming is still done using traditional methods. Automation is required less for savings in labour costs but more with uniform irrigation and precision farming and

therefore apart from some Universities, Agricultural Research institutions and a few progressive large agricultural farm holdings/ corporate farming, as of now Automated Irrigation is being used in urban landscapes for irrigating Golf Courses, Sports Fields, private farms and infrastructure projects. However, with the setting up of 'Centres of Excellence' under the aegis of Government of Precision Farming India, and Extensive Agriculture have received a boost and consequently automation of irrigation systems has received a fillip. As the rate of integration of

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

It is a fact that high initial costs make Micro Irrigation technology unfeasible for small and marginal farmers which constitute nearly 70% of India's farming community. Depending upon the nature of crops and the quality of material used, the installation of Drip Irrigation System requires an initial investment of Rs.1 to 1.25 Lacs per hectare. Even with financial assistance from government, such a relatively huge investment requires advance crop planning on the part of farmers and an assured income for the produce which is possible only for high value crops. Here the efficacy of the technology is not the question but the economics of it is technology into agricultural practises increases, Automation in Irrigation shall have a greater role to play in increasing productivity and cost reduction.

What is the future of Irrigation Systems?

As is very well known,only a small portion of the cultivable land in the country is under some kind of irrigation and vast unending tracts, in fact majority of agriculture, still depend on the rain gods for their irrigation needs. Therefore, with ever depleting water resources, leverage of technology is the only way forward and thus future of Irrigation Systems will play an important role in water saving and increasing productivity.

HORTICULTURE - BRIGHT SPOT OF Karnataka

Status of Horticulture in Karnataka

Karnataka is one of the most progressive states with greater potential for horticulture. In the recent decades, owing to holistic support for horticulture development, the area under cultivation has increased to 20.36 lakh ha with production of 191.24 lakh MT and productivity of 9.39 MT/ha. With conversion of 19% of the area from traditional crops to horticulture. The state stands fourth and seventh in area and production respectively, in the Country.

With contribution to 5.74 % of the state's GSDP, horticulture produce is valued at Rs.43923.00 Crores. Presence of a well-established State Department of Horticulture and University of Horticultural Sciences have strongly contributed and empowered the growth of the sector. Besides, horticulture provides employment security to around 12 lakh farm families and 10 lakh subsidiary farm families.

On research side, developments from indigenous and open pollinated seed, usage of hybrids, seedlings dominance to grafts and tissue culture plants have led to a paradigm shift in crop improvement. Various public and private sector institutional mechanisms in research and development have complemented multidimensional the economic growth in the state. Professional education platform to generate technical human resources with skills and entrepreneurship capabilities in collegiate and universities system is worthy for productive growth.

Technological advances in protected cultivation, irrigation, nutrition, pest and disease management, high density crop and canopy management, inter and multi-storied cropping and mechanization applications, improved post-harvest and market



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networks have all enhanced the value appreciation of various horticultural produces.

From policy perspective, state's policy frame work and investments from public and private sectors are congenial for horticulture growth in the state to become a forerunner for horticulture in the Country.

Karnataka's advantages in Horticulture

With 10 different agro-climatic zones, the state is bestowed with opportunities to grow variety of tropical, subtropical, arid, semi-arid and horticultural crops. Horticulture sector plays a significant role in providing a product shift from conventional crops towards a more liberal and diversified agriculture sector. Horticulture brings a unique visibility in enhancing profitability, employment generation and balanced growth in processing and value added activities. Following successful launching and implementation of various developmental programmes, there has been a tremendous progress in-terms of area expansion and produce volume. The policy push on farmers'collectivization has enabled to establish about 90 Farmer Producer Companies with 91000 farmer members which is a new path breaking inclusive growth mechanism.

Shift in dietary patterns towards high value nutritious diet has led to increase in demand for horticulture commodities, there by triggering supply. As a response to this, Institutional initiatives of horticulture produce marketing through establishment of HOPCOMS,Karnataka State Cooperative Marketing Federation (KHF) during 1998 was established and of market infrastructure for procurement, sorting, cold storage and other corporate institutions for bulk processing were created.

HOPCOMS has presence in 22 districts with over 400 retail outlets actively engaged in supply and Commodity based transactions. institutions such as Mango Board, Lime Board, Wine Board, Spices Boards, IFAB for flowers and fruit and vegetable commodity based marketing have augmented for end to end convergence. State has also promoted 290 private accredited nurseries with State Nurserymen Cooperative Society at the apex level which are catering to the needs and requirements of planting materials. At the Government level, presence of an exclusive Department of Horticulture established since 1963 with 3356 qualified technical personnel positioned at hobli/cluster level provides technical guidance and enables implementation of several developmental programs. Horticultural plantation farms numbering 405 and accredited nurseries producing horticultural produce seeds and planting material complement as a revenue model. The Department has established five high-tech tissue culture laboratories, three bio control laboratories, 12 skill



supportive training centers, mission programs on oil palm, medicinal plants, and apiculture. The state's budget for horticulture in the current year 2017-18 was Rs.1100 crores.

The capital city of the State hosts many research and development institutes such as IIHR, CIMAP, CFTRI, IAHS. Also, seven theme specific Centers of Excellence and 4 Indo-Israel and one Indo-Holland International collaborative programs R&D contribute to initiatives. Government interventions and policy initiatives such as agriculture policy of 2006; Karnataka State Food Processing policy, wine policy, organic policy have contributed to horticulture promotion. The varied agro-climatic zones (10's) provide a congenial environment for cultivation.

Important Horticultural Crops of Karnataka

The cropping pattern in Karnataka is dominated by plantation crops such as Coconut, Arecanut, fruit and vegetable crops which are highly water intensive. Karnataka is one of the most progressive states and has greater potential for horticulture development and is a driving force for state's economy. The sector is emerging as a sunrise sector and is one of the fastest growing and most profitable ventures. The annual growth in area and production of horticulture crops in the state is around 5% to 9% respectively with productivity enhancement of 26% during the last decade.

productive capabilities The of farmers have resulted in the realization of enhanced productivity over average yields at the National level in case of lime, papaya, guava, pineapple, vegetables, sweet potato, watermelon, tamarind and turmeric. The area under horticulture in the state between the period 1960 and 2015 increased from 4.5 lakh ha to 19.77 lakh ha while on the production front, it increased from 25 lakh MT to 197 lakh MT. The importance of horticulture as a sector lies in educational, economical, environment and nutritional aspects which are transforming societal status towards quality lives.

Challenges associated with horticulture farmers in Karnataka

The state ranks fifth in India in terms of total area under horticulture. Horticulture sector has been considered as a sunrise sector in Karnataka. During 2015-16, the State had 20.35 lakh hectares under horticulture crops with a total production of 191.21 lakh MT. Karnataka stands 3rd in farming area and 7th in production in the country. The average productivity of horticulture crops in Karnataka is 8.45 MT/ Ha. The area under horticulture crops has been increasing @ 5% every year while, the production has been increasing @ 9% annually. In-spite of the tremendous growth, there are several challenges. Retaining farmers and

youth in the farming sector is itself a major concern and hence needs huge strategic efforts. The sector specific challenges broadly include; reduction in cost of production; low unit productivity: dearth of gualified and skill field working force; availability of quality seeds and planting materials; unorganized procurement; aggregation and market network system; wide price fluctuation; inadequate cold storages; low levels of technology adoption; mechanization, technology commercialization and higher postharvest losses. The productivity levels of some of the fruits like mango, papaya, guava, sapota, pomegranate and vegetables like tomato, onion and brinial are at higher level relative to National average. However, the productivity levels are low in comparison of leading producers of these crops.

Karnataka being drought prone state requires new technological approaches and interventions for retention of farmer in agriculture and horticulture.Planting material plays an important role in the production of horticultural crops. Inadequate availability of quality planting material is one of the important deterring factors in development of a sound horticulture industry. At present 30-40% demand for planting material is being met by the existing infrastructure. Farmers do not have access to certified disease free materials as a result of which production; productivity and quality of the produce suffers. They mostly depend on the unregulated and unmonitored private sector in most of the states. The existing nurseries lack modern infrastructure such as greenhouses, mist chambers, efficient nursery tools and gadgets, implements and machinery. Ensuring quality planting materials byaccredited scientific nurseries, establishment of food quality testing mechanism for pre and postharvest food safetv: insurance support mechanism during natural disasters and calamites as safety net measures; remunerative alternate / substitute to saturated crops (like Arecanut) with multi tierplanning; strengthening

domestic marketing of system through establishment of modern Horticulture markets. The pace at which the science has translated into outcomes in the field of agri-horti sector has been rather slow. There are several problems in commercial micropropagation like non-availability of proven and reproducible protocols manv desired crops, hiah in production costs and sale price of tissue culture plants, inadequate quality control of tissue culture plants, inadequate availability and unorganized market of tissue culture plants, proper demonstration and technology validation for exploitation commercial scale and there is on no control over genetic fidelity and freedom from viruses in tissue cultured plant.

Indiscriminate and injudicious use of plant protection chemicals has resulted in development of resistance in pests and pathogens. Lack of fool proof guarantine measures is likely to further aggravate the threat of new pests and diseases in horticultural crops. Also, though Integrated Pest Management (IPM) aims at judicious use of cultural, biological, chemical, resistance/tolerance, host plant physical-mechanical control and regulatory control methods, there is no proper monitoring of the quality of bio-control agents being produced and traded.

Large number of farm equipments have been developed in the country for cereals, pulses and oilseeds. However, little attention is made in mechanizing fruits and vegetable production in the country. Some of the small equipments produced are not cost effective and also not up to the mark in-terms of quality. Stacking systems for vegetable crops lacks development and adoption, transplanting of vegetable seedling, low cost equipments for, spraying, pruning and harvesting of fruit crops, mechanization of planting and harvesting for ginger and turmeric, efficient irrigation systems, tools for nursery management, low cost weeding equipments for horticultural crops and equipments that help in reducing drudgery of women are some of the existing challenges in mechanization of horticultural crops.

Extent of value addition of fruits and vegetables happening in the state

Food processing sector which has been identified as а thrust development needs area for huge investments in logistics for supporting the value chain from farm to plate. Department of Agriculture in Karnataka is implementing the Agro-Processing scheme under which various agro processing equipments are made available to farmers, self help groups and farm women at subsidized rates.

In Karnataka, only about 1% of the total production of fruits and vegetables is currently being processed for value addition. About 25 - 30% of post harvest loss is estimated due to inadequate cold storage, required transport, poor handling, insufficient processing and other value addition facilities. An estimated Rs. 50,000 crore is lost annually in the marketing chain due to poorly developed storage infrastructure. At present, there are only 98 cold storage units having 2.97 lakh MT for handling fruits and vegetables. Of these units, 2 are in co-operative, 90 are in private and 6 are in public sector. According to assessment by the National Spot Exchange in 2010, the cold storage gap assessed is to the tune of 1997 metric tonnes. Therefore, ample scope is available for investing to strengthen the cold storage and transportation facilities. However, the problem of low occupancy percentage, high cost of electricity, high interest rates on loans and addressing technical parameters for storing different commodities still remain. Some of the other problems are, decentralized processing units, unavailability of raw materials on continuous basis, infrastructure bottlenecks, taxation policies and extension and awareness.

Level of Organic Cultivation happening in Karnataka.

Karnataka is the first state to develop organic farming policy in the country,

with an intention of proposing an alternate model in over throwing the farmers' distress. Policy encompasses education, research and extension to promote organic eco-tourism and training on certification.Karnataka has taken some promising steps to promote organic farming and as a result an area of about 1,18,739 ha has come under organic certification. The State is bestowed with varied climatic conditions and soil types spread across ten agro-climatic zones. With an annual average rainfall of 1130 mm and a moderate temperature, the state of Karnataka provides ideal conditions to grow a variety of crops throughout the vear. The State is also known for its excellence in horticultural crops and animal husbandry, and hence it is also referred to as the state with "Cafeteria of Crops ". In addition, many farmers from the State are pioneers in organic agriculture and developed many different have systems and methods of cultivation through indigenous knowledge base, utilizing organic wastes and development of holistic pest and disease control mechanisms. The state has formulated policy on organic farming as early as 2004. However, since the policy formulated was less farmers centric, organic farming policy was formulated during 2017 with focus on collective farmer's centric approach. Karnataka state has approved a program of producing organic horticulture in mission mode program under NHM. The process of organic certification is underway with selected farmers. The Farm Universities and NGOs are involved in awareness generation, integrated planning and development of business plans. The Policy promotes development of large number of programmes for active participation of farmers to produce nutrition food in a sustainable manner by adopting eco-friendly farming practices.Due to large extent of lands in rainfed areas, steady and sustainability through organic farming appears to be slow process for transition.



Micro Irrigation - The Most Efficient Way to Deliver Water and Nutrients

n agriculture India is facing two major challenges and these are arowina urbanization leading to less availability of land for agriculture and growing water crisis. Almost 50% of India faces high to extreme water stress. If you look at statistics you will find that only 40% of agricultural land is under some sort of assured irrigation and rest of the agriculture in India is still rainfed.With the growing population and increasing urbanization, the available agriculture land per person will further come down in coming years. This means we need to grow more food from less available land .Currently on 6% of net cropped area is under micro irrigation and only 13% of irrigated area is covered under micro irrigation. There is tremendous scope for micro irrigation in India, and to have assured irrigation is the key to food security.

Micro irrigation has been around 5 decades now. It is well known to be the most efficient way to deliver water and nutrients to plants and has proven 'knock-out' benefits, but global penetration is still limited – probably less than 10% of all irrigated land. And India is no different than the global trend and adoption.Initial cost of a complete micro irrigation system is still very high for an average farmer. Although 'permanent' solutions can last for as long as 15 years, this cost remains a major inhibitor to large scale adoption. Hence farmers are dependent on govt support for subsidy and any subsidy scheme has its own limitations. Besides, micro irrigation is complex by nature. A farmer cannot install it by itself .lt requires detailed hydraulic designs. Systems need to be maintained over a long period of time - tubing and filters need to be flushed, repairs must be made and emitters must be kept clean at all times to avoid clogging, often by injecting acids and other chemicals. All of this requires skilled labor which is difficult to find and requires training. The Return On Investments (ROI) for micro irrigation has been proven again and again, but if you remove the subsidy then ROI for normal farmer growing a regular crop has not been consistently high enough for massive adoption. In my views, it is very critical to bring down cost to a level where average farmer can adopt it without subsidy.

We need to find our own solutions and one of this can be to promote community irrigation schemes and forming of water user associations. This will help in pooling of resources and bringing the cost down for individual farmer. MP is doing very good job in creating the pressurized pipe network and farmers will be able to attach their micro ir-





Kaushal Jaiswal,

Managing Director, Rivulis Irrigation India Pvt. Ltd.

rigation systems at a later stage to the outlets provided at his farm.

Subsidy programme has also helped in popularizing MI system in India. Some of the states like Guiarat /Maharashtra/AP/TN have done real good job in popularizing it among farmers. But because of very high percentage of subsidy in some of the states where subsidy is as high as 90 to 100%, it leads to lesser area coverage limited availability of funds. It is very important to have a relook at the entire subsidy distribution and moderate the subsidy and cap it to a level to cover more farmers and bring more area under micro irrigation with existing fund availability.

In India more than 200 million farmers who own small tracts of land, affordability and initial cost of the system is an issue. To encourage these farmers, Govt of India has announced different schemes like PMKSY (Pradhan Mantri Krishi Seenchai Yojna) with the key objective of "Har Khet ko paani" and Govt is providing 50-90 % subsidy to encourage the farmers to adopt Drip Irrigation. It is definitely economical for the farmers who get the subsidy and effectiveness of the MIS is a proven fact.



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

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

पुराने रामय 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 ज़मीन 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 छोढ़ना चाहेंगें ?

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

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

आप भी पानी बचा सकते है... अपने घर में, रकूल में, फेक्ट्री में, संस्थान में, गाँव में.... अधिक जानकारी के लिए कृप्या सम्पर्क करें savewater@dhanuka.com



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J&K - THE HORTICULTURE PARADISE



PROF.NAZEER AHMED Vice-Chancellor, Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir

n J&K fruits are grown over an area of 3.26 lakh hectares with a production of 24.87 lakh MT while vegetables are grown over an area of 0.63 lakh hectares with a production of 13.86 lakh MT (2016-17). The state, with its R&D efforts, has given commercial orientation to important horticultural crops including vegetables. Among the fruits grown in the state, apple covers 48.07 % of the total area (1.62 lakh hectares) and 79.00 % of total production. The area under apple has steadily increased over the years but its productivity has yet to reach desired level. Walnut, plum and apricot have also shown a commendable progress both in terms of area and production over the years, but their productivity too has shown comparatively less growth. There has been significant growth in cherry which necessitates due emphasis on development of logistics for its disposal and value addition.Besides, the state has been increasingly bringing more area towards other fresh and dry fruits like peach, plum, apricot, grapes, mango, pecannut etc. which also contribute towards horticultural economy. Owing to excellent

development in horticulture sector, the state has been declared as an agro-export zone for apple and walnut.

In J&K, therefore, horticulture has great significance. It plays a vital role in providing nutritional and livelihood security of the people of the region. The state is endowed with natural advantages of topography and agro-climatic diversity which is highly suitable for growing crops ranging from subtropical to temperate horticultural crops and possess rich horticultural crop diversity which provides immense scope for varied horticultural activities. Today it is gaining momentum in the state as its contribution to GSDP has gradually reached to 8 percent over the past few years and this sector is generating an income of over Rs.10,000 crore annually benefitting over 7 lakh families (35 lakh people)who are directly or indirectly associated. The temperate climatic conditions in the region provide unique opportunity for seed and bulb production of cole, bulb and root among vegetables and liliums, tulips, lilies, alstromeria among flowers. This can generate lot of employment and reduce the



burden on foreign exchange being spent on import of these seeds.

The agro-climatic conditions of the region are most ideal for growing off-season and high value vegetables and flowers especially capsicum, cucumber, peas, lettuce, Chinese cabbage, broccoli, parsley, celery, asparagus etc.when these are not available in the plains. Identification and development of suitable varieties and hybrids of high value temperate vegetables and flowers especially for off season and protected cultivation matching with production and protection technologies and minimal processing and value addition for export to distant markets can bring enormous revenue to the vegetable growers. Saffron and kalazeera are other important crops of temperate region which are most expensive and popularly known as "Golden Spices". Their cultivation is mostly confined to J&K owing to ideal climate and soil, and have monopoly in the market.

Among horticultural crops, apple, pear, peach, plum, kiwi fruit, apricot, cherry, almond and walnut are important in fruits with apple and walnut sharing major area while in vegetables, temperate cultivars of cole crops, bulb and root crops; capsicum, peas, high value leafy vegetables like lettuce, parsley, celery, chinese cabbage etc. are commercially important. In floriculture, tulip, lilium, alestromaria, carnation and gerbera and in medicinal and aromatic plants, Lavender, Lavendine, Geranium, Dioscoria, Podophyllum, Pyrethrum, Mentha, Artemisia etc. are becoming increasingly significant in the recent years. High value and low volume crops like saffron and kalazeera which are exclusively grown in this region too are commercially important. Horticulture, therefore needs to be developed systematically to harness the vast potential of genetic wealth and natural resources in the coming years.

The horticulture sector although occupies a commendable place in terms of increasing production and



bringing more area under important commercial crops like apple, walnut and some vegetables like cole and solanaceous crops, the productivity and quality is still very low. Monoculture of inferior varieties, traditional farming practices, alternate bearing, old and senile orchards, high incidence of insect pests and diseases, small and marginal land holdings, rainfed farming and water scarcity, poor orchard and canopy management, deteriorating land and water resources, poor weed, water and nutrient management, heavy pre and post-harvest losses are of major concern and have led to poor yield and quality.

The challenges are many, but these weaknesses have to be converted into opportunities, through appropriate scientific interventions in the form of more efficient genotypes and technologies which are modern, environmentally stable, cost effective and have the capacity to improve productivity as well as quality to provide sufficient food, fuel, nutrition and health care coupled with increased availability of produce at affordable price, better returns to farmers and higher employment and environmental services to the growing population, besides making available enough quantity for export market. Processing is undoubtedly an excellent remedy to reduce both quantitative as well as qualitative losses happening in the postharvest stage. But, the processing on commercial scale is only 1% in J & K due to lack of adequate processing facilities. At present, the fruit and vegetable processing industry in the state is extremely decentralised and majority of the processing units are small scale. Value addition of Horticulture produce is less than 7% both at state as well as at national level.

The post-harvest losses take a lion's share of fruits and vegetables in Jammu and Kashmir. The state lacks basic as well as specialized infrastructure facilities such as cold storages, reefer vans, ripening chambers etc. Also there is a missing link between producers, researchers and consumers. The state is short by 18 to 20 lakh Metric tons of cold/CA storage capacity due to which over 20 percent of horticultural produce goes waste every year.Undoubtedly, the state has a huge opportunity to lead the country in the supply of temperate fresh and processed



horticultural produce at global level, if it has adaptive, responsive and efficient supply chain.

The economic prospects of horticulture farmers in the state can be improved by means of well placed supply chain concept through some specific gains like - reduction of produce losses in transportation and storage; increase in sales; dissemination of technology, capital and knowledge among the chain partners; better information about the flow of products, markets and technologies; transparency of the supply chain, tracking and tracing to the source; better control of product safety and quality; large investments and risks shared among partners in the chain; productivity Improvement; high customer satisfaction; increased profit to farmers and on time delivery of products and returns to farmers.

The traditional way of fruit production is being replaced by practices which are more related to manufacturing processes, with a good co-ordination across farmers, processors, retailers and other stakeholders in the value chain. With the increase in income, the pattern of food consumption is changing, demand for high-value commodities like fruits, vegetables, nuts, saffron etc., is growing and farmers are trying to diversify their production systems accordingly. Organizing horticulture along the value-chain framework has been conceived as one of the strategies to bring more efficiency in the horticultural sector. The real measure of supply chain success is how well activities coordinate across the supply chain to create value for consumers, while increasing the profitability of every link in the supply chain. However at present, the supply chains of horticultural commodities in the state are very poor with challenges stemming from the inherent problems like dominance of small/ marginal farmers, fragmented supply chains, lack of cold chains, low level of processing/value addition, inadequacy of marketing infrastructure

The major challenges which are impacting horticultural growth and production in the region are:

- Degradation of land and water resources in fragile Himalayan agro-ecosystem, affecting nutrient and water availability.
- Low productivity and quality of produce of temperate fruits and vegetables resulting in poor returns.
- Poor crop and varietal diversification, monoculture and traditional orcharding system leading to heavy incidence of pests and diseases, poor yield and quality.
- Inadequate number of improved genotypes/rootstocks having higher productivity, superior quality, stability and resilience to biotic and abiotic stresses.
- Old and senile orchards and alternate bearing, affecting productivity and quality.
- Inadequate availability of quality planting materials of elite varieties and rootstocks restricting commercialization of HDP for achieving higher productivity.
- Climate change has led to shift in seasons resulting in change in cropping pattern, reduced yield, quality and availability.
- Emergence of new pests and diseases and problem of existing pests and non availability of suitable IPM module severely affecting the overall yield and quality.
- Erratic precipitation, water scarcity and constant droughts limiting water availability and causing severe crop losses.
- Lack of scientific knowledge on protected cultivation and seed production of vegetables and flowers is yet to be popularized and commercialized.
- Inadequate intensive production technologies of orchard, canopy and pollination management affecting productivity and production of quality fruits.
- Continuous and heavy application of pesticides, pesticide residues and substandard spurious pesticides, fertilizers, seeds etc. hindering realization of higher productivity and quality.
- Lack of efficient, cost effective and eco-friendly plant nutrient, weed and protection technologies and forewarning systems leading to heavy losses.
- Severe pre and post-harvest losses and lack of maturity standards, post-harvest processing facilities, storage, cool chain, transport and marketing affecting overall yield and returns.
- Lack of trained skilled manpower and shortage of labour is another constraint in efficient production system.
- International competition and heavy flow of fresh and processed products is the biggest challenge affecting domestic production and marketing.



etc. A majority of farmers in the state sell a large part of their produce in villages resulting in low returns for their produce. There is a difference in the price prevailing at different levels of marketing, i.e., the village, the primary wholesale market, the secondary wholesale, and retail levels. Also, majority of the farmers tend to sell their horticultural produce immediately after the harvest at low prices prevailing at that time particularly in case of highly perishable commodities. Further, the presence of numerous stakeholders which are working in isolation and the infrastructure connecting these partners is very weak. The present supply chain which lacks system integration and connects the farmers to both the organized, as well as the unorganized retailers, is highly inadequate and inefficient with several intermediaries and manual handling which causes lot of wastage and leads to less remuneration to the farmers. Besides that, the existing horticultural supply chain management system of the state suffers from the following limitations.

- Inadequacy of institutional marketing infrastructure and lack of producers' organizations.
- Multiplicity of market charges.

- Existence of malpractices in the marketing system
- Lack of reliable and up-to-date market information.
- Low marketable surplus of a large variety of products.
- Absence of grading and standardization of produce.
- Absence of quick transport means.
- Absence of adequate cold/CA storage facilities.

There has be structural to changes at different farmers intermediaries and consumer levels. The government, private, publicprivate partnership, cooperatives, technology providers, and even media can play a crucial role. Infrastructure like roads, transport, information and communication technology and cold/ CA storage are basic requirement for better results in supply chain. Demand forecasting is one of the important requirements for improving the supply chain effectiveness. Due to poor forecasting, there is an imbalance between supply and demand. Vertical coordination of farmers through cooperatives, contract farming and retail chains would facilitate better delivery of output, reduce market risks, provide better infrastructure,

attract more public interest, acquire better extension services, and awareness regarding create the prevailing and new technologies. Customized logistics is another important immediate requirement to make logistic effective. This reduces the cost, facilitates the maintenance of quality of the produce and fulfils the requirements of targeted customers. Information system for better coordination among different stakeholders from farmers to consumers is the need of the hour. The internet and mobile communication can also be used to enable information and financial transfer between the stakeholders. Public-private partnership is another solution. Scientific strategic interventions in unit operations like pre-cooling, washing, waxing, grading, sorting, packing, handling, transport and processing would add value to supply chain functioning. Establishing Food and Technology Parks on cluster approach to promote horticulture based processing industries in areas where there is predominant horticultural production. Such parks will also provide the required infrastructural and common facilities which are essential for sustenance of the industries.

HIGH VALUE AGRICULTURE

She Land

ndian spices are recognized the world over for their aroma, texture and taste. Apart from being the largest producer and exporter of spices in the world, India consumes approximately 90% of its spices production every year. Total of 109 spices are listed by ISO and 63 spices are grown in India, out of which 20 are classified as seed spices. During the 2016-17 total area under spice cultivation in India was about 3529200 hectares and production was about 7075500 million tonnes. Out of the total spices, seed spices contributed about 20% of production and occupied about 50% of area.lf we lookat the area and production in spices, maximum area is under Rajasthan followed by Gujarat and Andhra Pradesh, while maximum production is in Andhra Pradesh, Rajasthan and Gujarat. Besides these states, Telangana, Karnataka, Tamil Nadu, Kerala, Maharashtra, West Bengal, Orissa, Uttar Pradesh, Madhya Pradesh and Assam are other major spices producing states in India. Indian spices exports have been able to record strident gains in volume and value.

Spices exports have registered substantial growth during the last five years, registering a compound annual average growth rate of 7%. India accounts for half of the global trading in spices. During 2017-18, a total of 10,28,060 tonnes of spices and spice products valued at Rs.17929.55 crores were exported as against 9,47,790

tonnes valued Rs. 17664.61 crores in 2016-17. Among the different spices, massive jump in export was noticed in cumin. As compared to the target fixed for the period 2017-18, the total export of spices has exceeded the target in terms of both volume and value. Compared to the target of 10,23,000 tonnes valued at Rs.17665.10 crore for the financial year 2017-18, the achievement is 100% in terms of volume and 101% in rupee. India's spice exports comprise whole spices, organic, spice mixes, spice blends, freeze dried, curry powders/mixtures, oleoresins, extracts, essential oils, spice in brine and other value added spices.

India has a glorious past, pleasant present and a bright future with respect to production and export of spices. Pepper, chillies, cumin, coriander, cardamom, turmeric, garlic and ginger are some of the important spices produced in India. Maximum area is under chilli followed by cumin, coriander, fenugreek, garlic, turmeric, ginger and pepper. In terms of importance of spices in terms of export values, chilli ranks first followed by cumin, turmeric, pepper, small cardamom garlic etc. Among the spices, black pepper, "the king of spices" is the most important dollar earning crop which has a decisive role in our national and state economies. Cardamom is known as the 'queen of aromatic spices' and is mainly used for masticatory, flavouring and medicinal purposes.

There are some lesser known spices

cultivated in India. For instance, Parmotrema perlatum, commonly known as black stone flower or kalpasi, is a species of lichen used as spice. The species occur throughout the temperate Northern and Southern Hemispheres. Another spice, a high curcumin turmeric exclusive to Meghalaya, Lakadong turmeric is counted among the finest turmeric in the world. The root and rhizome (underground stem) of the Curcuma lomba L. plant is crushed and powdered before being sold in the local markets of Jaintia hills (Meghalaya). The curcumin content (known for its many health benefits) in Lakadong turmeric is between 6 to 7%, which is one of the highest, as against a mere 2 to 3% in most varieties of turmeric. Radhuni (Dried Fruit of Wild Celery) is often confused with ajwain, caraway and celery seeds due to its similar appearance, radhuni is actually the small dried fruit of Trachyspermum roxburghianum or wild celery, a flowering plant that grows extensively in South Asia. Radhuni smells similar to parsley and tastes quite like celery. In Bengali cuisine, whole radhuni is quickly fried in very hot oil until it crackles. It is also a part of the Bengali five-spice mix, paanchphoran. Kanthari mulagu (White Bird's Eye Chilli) is grown in Kerala and some parts of Tamil Nadu, the super hot, ivory coloured kanthari mulagu chilli is mainly cultivated as a homestead crop. A rare variety of Bird's Eye Chilli, kantharimulagu has traditionally been used to stimulate

appetite, control cholesterol levels and ease arthritis pain. In Kerala, this chilli is used in relishes, pickles and curries.Jaiur (Winged Prickly Ash Seeds) is a uniquely flavoured spice of Meghalava, known by its more common name, Szechuan pepper. Not very hot or pungent on its own, it has slight lemony overtones and creates a tinalv numbness in the mouth that sets the stage for hot spices. The tiny seed pods are toasted before being crushed and used in chutneys. Only the husks are used and the gritty black seeds are discarded. In Meghalaya, it is added to a traditional side dish of fermented fish called tungtap.Kodampuli (Garcinia Cambogia/ Malabar Tamarind) is a sun dried fruit used to flavour curries in Kerala.

Organic seed spices are highly remunerative because of the export demand and moreover the organic produce is of high quality and is safe, nutritive and eco-friendly. The related benefits accrued are that long term fertility of soils is protected as it is based on the principle of sustainable farming and the insoluble nutrient sources can be utilized through action of micro-organisms. Since the market for organic products is gradually registering an upward trend, there is large scope for promoting organic cultivation of spices in suitable locations. The production of seed spices in arid region is organic by default and it is rather easier to shift towards certified organic farming of seed spices. However, there is lack of specific varieties for organic cultivation and responsiveness to organic nutrient sources. Seed spice crops such as fenugreek, anise, coriander, ajowan, fennel, dill can be grown organically easily, while cumin is a bit risky crop may have some difficulties, while cultivating organically.

The basic challenges compared to conventional farming are that, organic farming is costly and needs more market linkages. Basic knowledge at farmer level about the merits of organic farming is also a challenge. Hence, we need more awareness programme which requires time and money. Another important thing is the certification of organic spices so that

consumer should not be cheated. India recently declared Sikkim as the first fully organic state of India. Bestowed with varied agro-climatic conditions, some of the major crops produced in Sikkim are cardamom, ginger and turmeric, Besides Sikkim, all Northeastern states have huge potential for organic farming of spices. Arid and semi arid parts of India do no use much chemical fertilisers and hence can be converted into organic farming. While converting the land into organic farming, initial 2-3 year farmers may get slightly low yield but later it will be on par with modern techniques of spice cultivation. Other Indian states such as Rajasthan, Jharkhand, Uttarakhand, Karnataka, Mizoram, Kerala, Andhra Pradesh, Himachal Pradesh, Madhya Pradesh, Tamil Nadu and Maharashtra have enormous scope for organic spice cultivation.

In spite of India being largest producer and exporter of spices in the world, India has several challenges with respect to spices cultivation. India exports worth Rs. 10,28,060 Crores of spices and also importing spices and spices products worth Rs. 4,500 Crores. There remains the challenge to minimise the import of spices. Indian spices export fight international competitions, particularly with Vietnam, a new producer of pepper and cardamom. Likewise, India is out priced by Guatemala for cardamom, Pakistan for chillies, China for ginger and turmeric, and Turkey for cumin seed. Tightening of checks on pesticide residue by importing countries has hit Indian spices export, which in turn has pushed down the spices' price in the local market. High prices coupled with a fall in guality of certain spices, mainly chillies, due to the presence of pesticides residue, have adversely affected the export of Indian spices.

Traditional marketing of spices from the state is much of the domestic nature. There is prevalence of a large number of intermediaries. The brokers should be removed from the marketing channel so that farmers can get genuine price of their produce and enhance their income too.Standard good agriculture practices should be followed to reduce the pesticides load as well as presence of aflatoxin. Several adulterations in spices were also reported which should be taken into consideration. Besides these, several diseases and pests reduces the production and quality of spices. Diseases like Alternaria blight in cumin, stem gall and powdery mildew in coriander, Phytophthora blight in black pepper, capsule rot and leaf blight in cardamom, anthracnose and leaf curl in chilli, rhizome rot in turmeric and ginger, chirke and foorkey in large cardamom, purple blotch in garlic are prevailing at different places. Important pests that attacks spices crops includes aphids in seed spices, polly and top shoot borer in black pepper, thrips in cardamom, onion and chilli, shoot borer and rhizome scale in turmeric, shoot borer in ainaer.

Good Agricultural Practices (GAP) and Sustainable Agricultural Practices (SAP) under contract farming system can lead to produce high quality spices. The industrial sector includes manufactures of food and beverages, pharmaceuticals and cosmetics products. Spices are used as a key ingredient in processed food such as condiments and pickles and in non-alcoholic beverages. Great emphasis has been given to organic spice farming; organic spice farming is gaining prominence in India, and the investors can invest in organic spices production. India's Spice Parks provide excellent processing facilities that are on par with international standards in terms of cleaning. grading, sorting, grinding, packing and warehousing. Development of spice parks help ensure better pricing of spices by reducing supply chain costs. They provide spice farmers with the necessary infrastructure and facilities to improve spice quality and sell spices directly to spice exporters. India has great position in world spice trade with significant additions in the manufacturing of value added products can add more profitability to spice industry.

> Dr.Gopal Lal, Director, ICAR-National Research Centre on Seed Spices, Tabiji, Rajasthan

THE GOLDEN ERA OF POLISH FARMING





ith agricultural land of 15.4 million ha, constituting nearly 60% of the total area of the country, Poland is an important European and global producer of a number of agricultural and horticultural products as well as products of animal origin. Polish agriculture, in a departure from EU agriculture has more number of private farms exceeding 2 million with relatively small areas - 9 ha on average. Adhering to traditional production meth \neg ods, the farm products cater to farmer's own family. Animal breeding carried out with small intensity contributes to the protection of the natural environment. However, simultaneously, more and

Poland's position and share in the global and EU production in 2016

Specification	World		European Union	
	Position	Share	Position	Share
Cereals*	19	1%	3	10%
Pork	10	1%	4	8%
Poultry meat	10	2%	1	16%
Cow's milk	12	2%	5	8%
Potatoes	10	2%	2	16%
Fruit, including:	63	0.2%	4	11%
apples	3	4%	1	29%
currants	2	29%	1	84%
raspberries	2	20%	1	60%
strawberries	8	2%	2	16%
Mushrooms**	5	2%	3	14%

* Including rice. ** Mainly champignons (Agaricus)

Source: KOWR elaboration based on the data from the FAO, the USDA, the European Commission and the EUROSTAT (access date – 19 February 2018).

Annual production and export of significant agri-food products in Poland

Polish food sector generates considerable surplus production in relation to the domestic demand

Specification	Production (thous. tonnes)	Export (thous. tonnes)	Share of export in production (%)	Change in share of export in production in comparison to the previous year
Cereals	29,849	7,567	25	1
Rapeseed	2,219	237	11	I
Sugar	1,785	568	32	1
Fruit in total	4,644	1,366	29	\leftrightarrow
Fruit preserves	1,155	1,001	87	1
Vegetables in total	5,610	474	8	\leftrightarrow
Vegetable preserves	1,312	672	51	I
Pork	1,880	700	37	1
Beef and veal	505	437	87	↓
Poultry	2,241	1,248	56	1
Milk	13,244	3,880	29	+
Spirit drinks	124	22	18	1
Beer	41	3	8	\leftrightarrow
Grain mill products	3,680	736	20	†

Source: KOWR elaboration based on the data from the GUS, the Ministry of Finance (MF) and the Institute of Agricultural and Food Economics (IERIGŻ).

more big market-oriented agricultural holdings also exist.

Poland, a leading producer of fruits (apple, raspberry, black currant, bilberry), meat (poultry and pork), milk, dairy products and agaricus in Europe, also grows grains(the highest yields come from rye, wheat, barley, and oats), potatoes, sugar beets, fodder crops, flax, hops, tobacco, and fruits. Poland is currently the largest producer of potatoes and rye in Europe and is one of the world's largest producers of sugarbeet.With an Impressive organic farming sector, Poland now has about 25 000 organic farms and 500 companies that process organic produce.



Agriculture is currently the fourth largest sector of economy in Poland, and its contribution to the country's GDP is much higher than the EU average. Over the last 25 years, Polish agriculture has changed considerably due to the economic transformations occurring in the years 1989-1990 and Poland's accession to the EU. The main drivers of agricultural development were increase in average farm size from 5 ha to about 9ha, strong emergence of cooperativetype farming, joining the EU and the government's attempt to preserve farming traditions.As a result of the EU and the government's support, the Polish farming sector has become one of Europe's most innovative, and boasts a higher number of young farmers than any other EU country. Approximately 14.7% of the country's farmers are younger than 35, compared with only 7.5% across all EU countries. Only 8.4% of Polish farmers are older than 64, compared with 30% across the EU. The agrifood sector is an important component of the country's economic potential as it accounts for almost 8% of the total gross added value. It also provides employment for nearly 20% of the economically active population. The exports of agrifood products stand for almost 12% of total polish exports.

Export market

The EU remains by far the most important market for Polish agricultural products, accounting for 80% of all exports. The products that contributed most to total export sales are poultry, chocolate, beef, wheat, pork, dairy and fruit juice. The country's favourable location, in the centre of Europe, where the main communication routes intersect makes it possible to export goods to all European countries and thus reach over 500 million consumers. Poland's major trade partners are, among others, Germany, Russia, China, France, the UK, Italy, Hungary, Ukraine and Spain.

KOWR: Supports the development of Polish agri food sector

The National Support Centre for Agriculture (the KOWR) according to statutory provisions is a state legal entity which is an executive agency in accordance with the Public Finance Act of 27 August 2009. KOWR is supervised by the Ministry of Agriculture and Rural Development.

uring the visit to KOWR headquarter in Warsaw, Ms.MonikaSwiezawska, Head of International Cooperation Unit; Export Support Department of KOWR along with other representative of KOWR explained the mandate and activities of the organisation. "The main objective of the National Support Centre for Agriculture is to execute tasks resulting from the state's policy, particularly in terms of agricultural support instruments implementation, application as well as active agricultural and rural development policies. Some of the activities taken by KOWR are Management of the State Treasury Agricultural Properties resource; Promotion of agri-food products; Support for innovation and development; Shaping the agricultural system; Supporting companies, agricultural markets and food chain: Education and know-how in rural areas; and tasks related to renewable enerav sources."

Strategic companies under the National Support Centre for Agriculture include 8 plant breeding companies, 19 livestock breeding companies and herds of stallions which contributes to biological progress in Polish agriculture through valuable genetic material, breeding programmes and generation of new varieties of plants and animals.

Some of the activities of KOW Rconcerning agricultural markets and promotion include support for innovation in agriculture and agrifood industry; Monitoring of the milk market and contracts for the delivery of agricultural products; Monitoring of and supervision over the tobacco growing; and support for activities concerning renewable energy sources (RES), particularly in agriculture



to name a few. "KOWR support the development of foreign trade cooperation in the agri-food sector. It organises information and promotion activities aimed at promoting the agricultural and food products, and collect, analyse and disseminate information about agricultural and food products market", mentioned Ms. Swiezawska.

KOWR supports the promotion activities on foreign markets and support export. Ms. Swiezawska mentioned that KOWR supports such kind of activities by organising economic missions for Polish entrepreneurs and inbound business visits to Poland of foreign entrepreneurs. 'We also do analysis of trade and investment conditions in foreign markets and organise workshops and informational seminars for entrepreneurs and study visits of foreign journalists and officials. We try to participate in important international trade fairs and exhibitions around the world to promote Polish food and agriculture."

Europe's growth engine: Polish agri-food products

The Polish food sector employs about 15% of the work-force in industry. The value of sold production of food industry amounts to over 45 billion EUR.Food exports have been one of the main drivers of the sector since Poland's EU accession, supplying over 500 million consumers in the EU. The European Single Market accounted for almost 80% of Poland's food exports in 2014.

Meat, milk processing, fruits and vegetables, sugar and secondary cereal processing are some of the most competitive sectors.Polish food products are known all over the world due to their high quality, unique taste and competitive prices. Based on the tradition of family holdings, Polish agriculture combines tradition with modernity. In Poland, small quantities of mineral fertilizers and plant protection products are used, and thus natural environment and landscape remain intact. As a result, Polish food is healthy and attractive to consumers.

Polish food processing industry known for its diversity in is manufacturing not only food but also alcohol and tobacco products. Furthermore, Polish food processing market comprises over 14,700 companies and this number is constantly growing. Most of them, about 80%, are SMEs employing less than 50 people. Since the early 90s many international companies like Danone, Heinz, Unilever, Mondelez or Nestle entered the polish market and set up their operations.

Poland is also the place where many well-known companies and brands have their roots. Some examples of polish firms within food processing industry are Mlekovita and Mlekpol, dairy products manufacturers, Maspex, manufacturer of juices, nectars, pasta, cereals or Hortex, manufacturer of juices. Furthermore, brands such as Wyborowa, Sobieski (spirit), Tymbark (juice), Grycan (icecream), Wedel (chocolate), Sokołów and Pudliszki (sauces and ketchup), Kujawski (oil) and Winiary (spices and different kinds of instant food products) were established here.

Polagra Food 2018: An event of high quality food and innovations

The International Trade Fair for Food - POLAGRA FOOD offers a preview of trends in a food industry. This food expo allows its participants to have a look at what food producers and distributors have to offer. The vistors can get to know the Polish food and the tastes from all over the world. Every year the event is visited by several dozen thousand professionals



of food businesses who come to



around the world in search of the latest products, inspiration, and, most of all, looking to start long-lasting contracts. On top of that, the fair is an important event for all people trying to develop their export potential, where the Hosted Buyer program comes into play.

The Polagra Food Fair in Poznań is for the food and catering industry an opportunity to get acquainted with the latest trends in the food industry, as well as the promotion of the Polish economy aimed at foreign markets. This year's Polagra Food exhibition covered 3 halls full of novelties and innovations. The exhibition was created by almost 170 exhibitors from 16 countries, such as Belgium, Bulgaria, China, France, Spain. South Korea, Lithuania, Macedonia, Germany, Sri Lanka, Switzerland, Ukraine and Hungary. The fair was attended by 3221 representatives of the food industry.

Polagra Food Fair is an event designed to stimulate the exports of Polish food. Therefore, in addition to Polish entrepreneurs, owners of wholesale companies and grocery stores, or traders representing chain stores - also the representatives of the management of large groups of wholesalers and supermarkets, and importers and distributors of food products from abroad were all invited

to participate in the Fair. The fair was also attended by many foreign food distributors invited under the Hosted Buvers Programme. The experts present also addressed the issues related to the behavior of modern consumers, the optimization of production and sales, and consumer expectations in terms of the standards of service. A more solid dose of knowledge could also be drawn in the Inspiration Zone of the National Center for Promotion of Agriculture, where invited guests shared their insights on how small and mediumsized businesses can build brand recognition, product positioning and take advantage of new distribution channels, and why they should have quality certificates.

During this year's Polagra Food, as in previous years, the Know Good Food awards gala was also held, which was the culmination of the first trade fair day. The ceremony was attended, among others, by Mr. Jacek Bogucki, Secretary of State in the Ministry of Agriculture and Rural Development.

Poultry

Poland is the number one producer and exporter of poultry products in Europe and contributes to 16% of the total EU production. The country ranked 10th in poultry, globally and contributes 2% of the world production. Poland's poultry export is valued annually at around 2 billion Euros, representing 0.7 % of GDP. Of this, 20% goes to Asia and Africa. Halal Chicken is 8-10 per cent of the exports and Poland wants to increase this component as this market is growing.

The Polish poultry industry is highly integrated and export oriented. In 2017, 30 percent of Poland's poultry meat production was exported. Export growth will continue due to expanding demand from intra EU and Asian markets. Major markets within the EU are Germany, France, the Netherlands, and the Czech Republic. Hong Kong, China, Congo and Benin are the main markets outside of the EU. The total production of poultry meat in 2017 was 2419 thousand tonnes of which 1375 thousand tonnes was exported.

Consumption of poultry meat is higher than the average in Europe, it is stabilized at the level of 26 kg per person, and the growing surplus of supply is exported. Chicken meat is the majority of export (76%), then Turkey (18%) and other kinds of poultry (duck, goose: 6%)

The European Union has one of the strictest poultry production standards in the world. All the member countries are obliged to implement integrated quality management systems, such as: Hazard Analysis Critical Control Point (HACCP), Good Manufacturing Practices (GMP), Good Hygienic Practices (GAP), and Good Agricultural Practices (GAP). They guarantee that the poultry products that reach consumers' tables are completely safe.

Milk and Dairy Products

Poland is the 5th producer of milk in the EU, and ranks 12th in the world production of milk and dairy products. The total production of milk in EU in 2016 was 163 million tonnes;Poland contributes 8% of EU production. In Poland, milk production is one of the basic spheres of agricultural production. Poland has self-sufficiency in milk cow production. Headage of milk cows in the European Union in 2016 is 23.3 million heads . Poland's



share in the EU headage is9%.

National production of milk was 13.5 bn litres and milk purchase was 11.9 bn litres in the year 2017. The total export of milk was Euro 2.1 bn out of which 76.5% exported within EU i.e., Euro 1.6 bn.

The Commodity structure of export of milk products in 2017 are Cheese and cottage cheese-35%; Liquid milk and cream-18%; Butter and milk fats-13%; Condensed and powder milk-13%; Whey-10%; Yogurt and fermented drinks-6%; Ice cream-5%; Casein-1%

The main export destinations are EU countries, Algeria, China, Saudi Arabia, Vietnam, Indonesia, Cuba and South Africa. In the recent years, cheese and curd have become the most important dairy products exported from Poland.Polish dairy industry is as advanced as those of Western European countries in terms of modernity and sanitary standards.

Fruits and Vegetables

Poland is one of the biggest European



producers of fruits and vegetables. The country is EU leader in the production of apples, carrots and soft fruits like sour cherries, cherries, strawberries and currants. Polish fruits occupy major share in the EU production Grapes-75%, Cherries-63%, Berries-61%, Apples-29%, Strawberry-16%.

Poland is one of the leading EU producers of frozen fruit and vegetables as well. The total production of fruit crops in Poland is 3200 thousand tonnes, out of which 2500 thousand tonnes are apples and 500 thousand tonnes are berry fruits. Polish international trade of processed fruit products in 2017 stood at 1200 million EUR of exports and 665 million EUR of imports.

Fruit juices of apple, sour cherry, currant, strawberry and chokeberry are the favourites from Poland. One of the more important products manufactured by the processing industry are high-quality fruit and vegetable juices. Apple juice concentrate occupies the dominant position in this segment.

Poland is biggest producer of mushroom, cabbage and carrot in the EU. Polish vegetables occupies major share in the EU productionMushroom-26%, Cabbage-22%, Potato-16%, Carrot-14%, Onion-10%. Polish international trade of processed vegetable products in 2017 stood at 512 million EUR of exports and 268 million EUR of imports.

King of Apples: The Apple Factory

Świeży Owoc is an apple producer and exporter located at Grójec surroundings, which is considered to be the biggest apple-growing area of Poland and the biggest apple orchard of Europe. The Apple Factory belongs to the group of fruit producers - Świeży Owoc L.L.C. - which produces and sells fruits. The company has been growing fruit on their territory since 1545.

r. Bartlomiej Brodzik, **CEO of Apple Factory** in an interaction with the AT team during the field visit of their apple orchards in Poland explained about apple production and facilities of the company. "Poland, with an annual production of 2.5 million tonnes, is the first producer of apples in Europe. Apples represent more than 80 % of the fruits produced in the country. The main varieties are Puala red, Ida red, Champion, Jonago red, Gloster, the Golden Delicious, Gala Royal and Gala Must. We offer for export most of the varieties of apples produced in Poland. Besides the production of apples, the company also produces sweet cherry, pear, plum, watermelons, peaches, lemons, grapefruit, tangerines, apricots. nectarines, oranges, strawberries, grapes and vegetables".

The company's headquarter is located in Goszczyn, Poland. "We have been working for many years in one of the biggest polish apple-growing region. Modern sorting and logistic base allows us to have big batches of fruits year round. Also, we enforce Global Gap certification. One of our goals is to maintain perfect quality of offered goods. In the production of our fruit, we care especially for food safety, protection of the environment and all living organisms surrounding our orchards. Apple Factory provides safe food for distant markets with the help of our highly developed R&D department. Choosing Apple Factory products, you can be sure that they will measure up to yours requirements and expectations" mentioned Mr. Brodzik.

These last years, there is a growing request of the Polish apples by the importers from many countries. Polland



Mr. Bartlomiej Brodzik, CEO of Apple Factory

exported 991,000 tonnes of apples last year. Geographical distribution of apple export from Poland in 2017 are Belarus-44%, Kazakhstan-7%, Germany-7%, Romania-6%, Ukraine-4%, Serbia-4%, Egypt-2%, other EU countries-13%, and other non EU countries-5%.

"The export structure of Polish apples is changing dynamically. The country is selling fruits to countries it would not have imagined a few years ago. The biggest potential is in Asia and the Chinese market, which opened up to Polish apples recently. This is due to the fact that we are better prepared to meet the needs of the new, more demanding markets", said Manoj Lookhar, Trade specialist, Apple Factory.

Poland is a producer of very good fruit and the world's largest grower of dessert apples.Apple Factory, supplies to its Polish and international clients 365 days a year. "The number of countries to which we export our fruit is really very high and growing. Our common warehouse and sorting plant quarantee year round deliveries of large, homogeneous, appropriately packed top quality products. Customers appreciate Polish apples and above all, their health benefits. Also, it turns out that apples are produced more naturally and therefore have a better taste and a real aroma that can simply not be imitated," assures Mr.Manoj Lookhar.

Polish Meat Industry

oland is the fourth largest producer of pork in the European Union in terms of production volume. The country produces 2 million tonnes of pigmeat and exports 765 thousand tonnes of pigmeat out of which 70 percent is exported in EU ie. 336 thousand tonnes in 2017. The major export destinations are EU countries, USA, Hong Kong, Vietnam, Canada and Chile.

Poland is 7th producer of beef in the EU. Poland produces 6% of the total beef production in the EU ie 0.5 million tonnes. About 90% of beef produced by Poland is exported. Total production accounts for 543,000 tonnes. Total 483 thousand tonnes of beef and calf are exported out of which 347 thousand tonnes are exported within EU. Main export destinations of the country are EU countries, Israel, Bosnia and Herzegovina, and Turkey.

Mr. Witold Choinski, President of the Board, Polish Meat Association in an interaction during the exhibition said, "Poland boasts a rich tradition of producing poultry and pork. Meat is a staple part of Polish diets, accounting for 27.9% of the nation's total food sales. The meat industry provides employment to more than 100,000 people working in slaughter houses and in the meat processing industry, as well as to one million people working in agriculture. This is around 7% of employees in Poland. It generates approximately 8.5 milliard PLN of added value i.e. 1.7% of GDP".

The Polish Meat Union is an organization representing the economic



Mr. Witold Choinski, President of the Board, Polish Meat Association

interests of its affiliated entities acting within the meat industry and cooperating with the Association in the field of the manufacturing, trading and/ or services, particularly in front of the state authorities. The Meat Union was established in 1994 as an all-Poland professional organization. Currently, it consists of over 100 companies from the meat industry and its surroundings, of which the vast majority is made up of big and medium-sized modern industrial enterprises.



Poland is proud of its long tradition of producing cold meats, sausages including kabanos sausages appreciated all over the world, ham, pork loin, bacon and pâtés. The recipes for their production have been passed down from generation to generation. Poland's meat appetites are seemingly focused on two main categories: poultry and pork. Poultry meat constitutes 38% of total meat consumption, with pork accounting for 55%. Beef, on the other hand, makes up just 2% of Poles' meat eating habits. Lamb, considered a premium product, is eaten even less. Per capita annual consumption of poultry and pork stands at 28.5 kilograms and 40 kilograms respectively and per capita beef consumption is 1.5 kg per year.

"The total share of the Union's member companies in the selling of meat and meat products exceeds 70% on the domestic market and 80% on the export market. The main export directions are the countries of Central and Eastern Europe. Furthermore, the sale on the Community markets, which appreciate to a great extent the quality and the taste of the Polish products, is definitely increasing", said Mr. Choinski.

Polish meat stands out against the background of other countries due to its high quality and excellent culinary values. Meat producers follow the farm to fork principle, so as to guarantee safety in the supply chain. According to the association, "Polish meat complies with strict European standards and does not contain any antibiotics or growth hormones. In order to guarantee the highest guality of products, the significant part of Polish meat production is conducted under national food quality schemes, such as Pork Quality System (PQS), Food Quality Guaranteed System (QAFP), Quality Meat Program (QMP). These systems impose strict conditions of production from animal breeding, through further stages of processing in order to guarantee safety, taste qualities and high nutritional value of products".

AGRICULTURE.....A POSSIBLE MULTIFUNCTIONAL SOLUTION ???

here is a very very widespread understanding today that soils sequester carbon, and towards this there is an avalanche of schemes to promote planting of trees as much as anti deforestation for all citizens across ages, thus revealingly clear that green growth would put back carbon into soil and so conserve it there lest it combines with oxygen to create the dreaded carbon dioxide.

May we also see this act as "carbon farming" and which has the elegant solution to many of the problems of the 21st Century. By design, definition, and necessity, this idea is multifunctional and draws from agricultural frameworks and traditions. The idea that humans can meet their needs whilst improving the health of the ecosystem is remarkable and of huge hope.....and more so when one is inundated with bad news syndrome and approach of many environmental movements across the world.

In such a multifunctional approach, each element would be seen to perform many functions.Specifically, carbon farming would necessarily mean that all strategies employed will also perform other functions such as producing food and crops and stabilizing erosion etc. amongst others.The critical function of carbon sequestration must have a mosaic of perennial farming systems and this will build resilience into the system with interwoven relationships and not all eggs in one basket for a complex problematic issue.

In this context, it is seen that agricultural activity goes far beyond producing crops and food and fibre, but also makes possible renewable natural resource management such as landscape and biodiversity conservation and contribution to the socio economic viability of rural areas very possible.A good illustration of such would be the tea plantations in the Country.

Unfortunately, agricultural solutions are a small part of climate mitigation conversation and much of which is dominated by clean energy geoengineering conversations. or Geoengineering ideas or climate engineering is yet a set of theoretical practices which aim through massive and hugely expensive ways call for intervention at a large, very very large scale.Climate leader Al Gore's opinion :"insane, utterly mad and delusional in the extreme"!The massive all around impact of such remains to be conversed in detail.

And above all, such solutions do not pass the multi functionality test in as much they do not feed people, do not increase rain water percolation, add to oxygen or shrink the gap between rich and poor.As a matter of fact such geoengineering projects would only help the well off, almost as in case of agriculture, the farmers' distress in our Country in more ways than helps the cause of the business that surrounds the farmer and his activity, but the central figures of the farmer is at woods.

An idea gaining traction is the multifunctional approach with carbon farming, essentially farming and agricultural practices that do not degrade soils and the environment, but contribute to the ecosystem services that come almost free of cost. This also has to include agro forestry and which greatly reduces flooding and increases rainwater infiltration round the year. Perennial farming allows less leaching of nutrients and reduced impact in downstream quality of water as compared to conventional agriculture. Agro forestry in rural tropical regions reduce pressure on natural forests for firewood and land clearing. Many many hectares of deforestation is prevented.

Also is true that such practices were not developed for carbon

sequestration but for reasons of building soil fertility, erosion proofing farms etc....once upon a time, but may now be called on in a newer role as times demand.

All carbon farming practices increase soil organic matter and higher soil results in fertility, improved drought resistance, less vulnerability to erosion and more rain water percolation. Reduced tillage of soils increase the complexity and diversity of the life in soils, notably the beneficial mycorrhizal fungi which help transfer food and nutrients to plant roots and from plant exudates transfer nutrients to soil life. In such situation and more so in perennial agriculture, reduced fossil inputs are said to be required in comparison to the conventional mode of farming.

Resilient agriculture can have the ability to adjust to misfortune and bounce back to becoming strong and healthy, after something goes awry as it always does in agriculture. This increase in soil organic matter is the backbone of all carbon farming systems by whichever varied name be they called.

The benefits to people in general should not be missed with perennial carbon farming and agroforestry. And here these social impacts are a powerful argument for use of climate mitigation funds to support the development of carbon farming systems. Institutions in our Country too must incentivize such sustainable practices instead of the reverse.... the brave words setting a direction towards organic farming of the Prime Minister seemingly ring untrue when the State machinery and Institutions lag behind.

Ashok Trivedi Tea Farmer





"The SAMPADA (Scheme For Agro-Marine Processing And Development of Agro-Processing) scheme is in place so that the farmers don't lose their produce. New warehouses and food parks are being built across the country. The entire supply chain is being strengthened and it is being ensured that the farmer does not suffer due to crop failure" NARENDRA MODI

Prime Minister

"Modi government has taken a historic decision in farmers' interest to hike the MSP of Kharif crops to 1.5 times the cost of production from the 2018-19 kharif season"



RADHA MOHAN SINGH Union Agriculture & Farmers Welfare Minister



"The increase (in MSP) announced by the central government did not meet the expectations of the distressed farming community, nor was it adequate to address the root of the problem, as identified by the Swaminathan Commission. It will only offer marginal relief to the beleaguered farmers, reeling under huge debts"

CAPTAIN AMARINDER SINGH Chief Minister, Punjab

"We will ensure that each grain is bought at MSP. We have fulfilled the promise. The decision is not linked to next year general election"



RAM VILAS PASWAN Cabinet Minister of Consumer Affairs, Food and Public Distribution



"The decision taken by the Union Cabinet will help boost farmers' income, mitigate rural distress and administer the farm sector a booster dose. It is for the first time since Independence that such massive hike in MSP has been effected by any government"

MANOHAR LAL KHATTAR Chief Minister, Haryana



11th Global Agriculture Leadership Summit



PROF. M.S. SWAMINATHAN UNESCO Chair on Ecotechnology

11th Global Agriculture Leadership Awards

PROGRAM DETAILS

24 October 2018		
Inaugural Session	09:30 am – 10:30 am	
Tea Break	10:30 am – 11:00 am	
Policy push for agriculture growth and doubling farmers' incomes	11:00 am – 12:00 pm	
Role of FPOs and private sector in providing farmers market connectivity	12:00 pm – 01:00 pm	
Lunch Break	01:00 pm – 02 :00 pm	
Global experiences and success models in agri marketing	02:00 pm – 03:00 pm	
Connecting farmers with markets - role of eNAM	03:00 pm – 04:00 pm	
Tea Break	04.00 pm – 04.30 pm	
Empowering farmers through national and global trade	04:30 pm – 05:30 pm	
Agri startups in providing market connect to farmers	05:30 pm – 06:30 pm	
Tea Break	06:30 pm – 07:00 pm	
Presentation of 11th Global Agriculture Leadership Awards 2018	07:00 pm - 08:30 pm	
25 October 2018		
Inauguration of AgroWorld 2018 at IARI, New Delhi	10:00 am – 11:00 am	
Tea Break	11:00 am – 11:30 am	
Visit to India International Agro Trade & Technology Fair (AgroWorld) 2018	11.30 am – 01.00 pm	
Lunch Break	01:00 pm – 02:00 pm	
Global Business Dialogue Sessions organized in various halls at AgroWorld	02:00 pm – 05:30 pm	
Tea Break	05:30 pm – 06:00 pm	
Special Session: MS Swaminathan Global Dialogue on Climate Change and Food Security	06:00 pm - 08:00 pm	
Presentation of 1st World Agriculture Prize	08:00 pm - 08:30 pm	
Dinner	08:30 pm onwards	

- AWARDS CATEGORIES

- Policy Leadership Award
- Technology Leadership Award
- Academic Leadership Award
- Farming Leadership Award
- Agribusiness Leadership Award
- CSR Leadership Award
- Corporate Leadership Award
- Entrepreneur Leadership Award
- Development Leadership Award
- International Leadership Award
- Africa Development Award
- Life Time Achievements Award
- Best Agriculture District Award
- Best Animal Husbandry State
- Best Horticulture State Award
- Best Agriculture State Award
- Media Leadership Award
- Global Business Leadership Award

Awaiting to assist your participation



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