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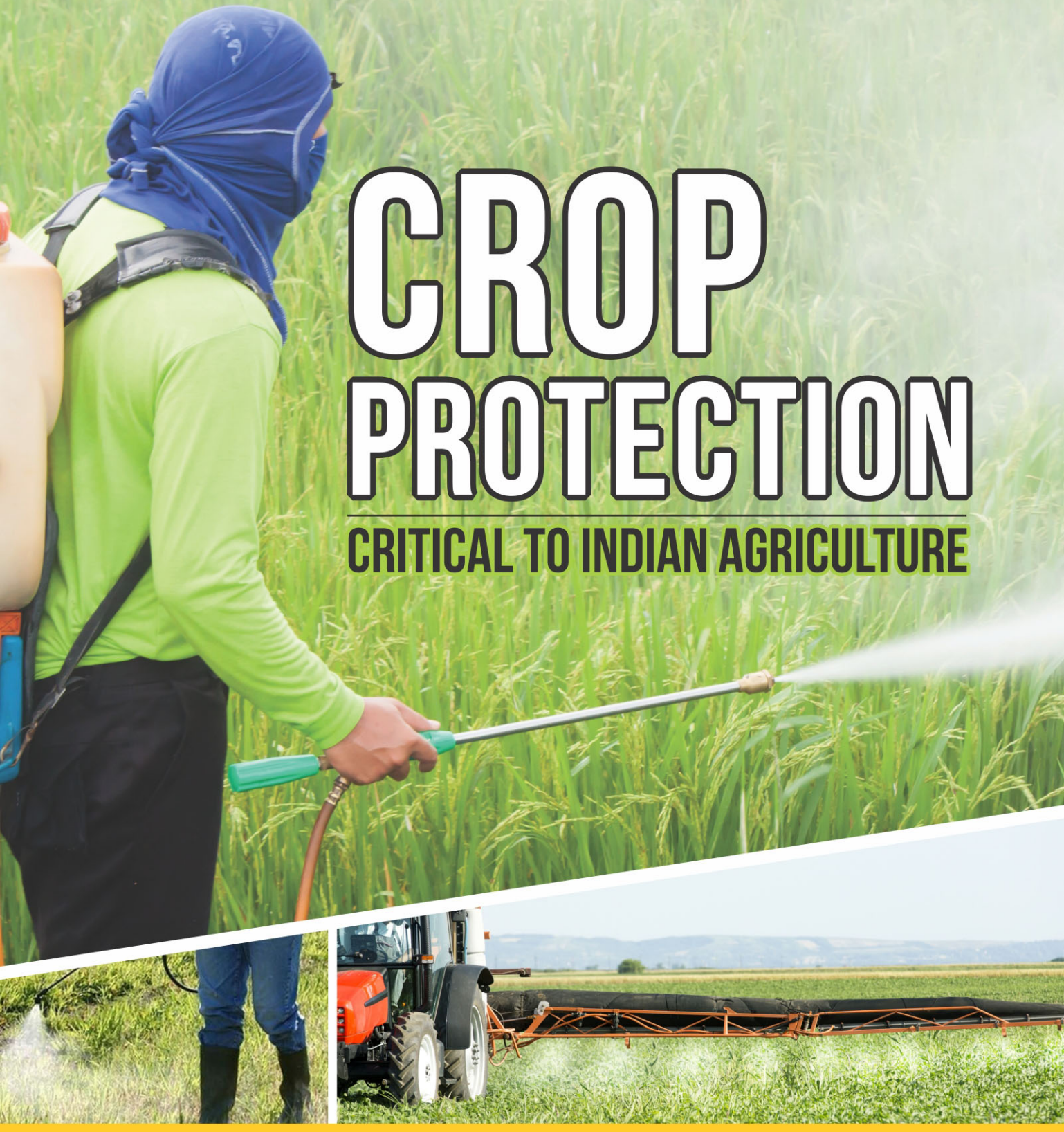

CROP PROTECTION

CRITICAL TO INDIAN AGRICULTURE

JULY 2017 | VOLUME XX | ISSUE 7

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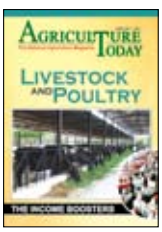

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CROP PROTECTION MEASURES DETERMINE SUCCESS OF AGRICULTURE

Crop losses owing to pest and diseases are inherent to any agricultural system. It is quite significant in Indian agriculture owing to the tropical situation. Although India has been able to effectively manage the losses, we are not close to reducing the proportion of crop losses to total yield. Around 15-25 per cent of the crop produced is lost to the elements of pest and diseases. The introduction of high yielding varieties, monocropping, climate change and an absent disease forecasting machinery have together been able to keep the losses at significant levels in Indian agriculture.

Indian crop protection industry has played a key role in addressing the crop losses with regular and timely intervention through agrochemicals. India is the fourth largest producer of agrochemicals globally, after the US, Japan and China. This segment generated a value of USD 4.4 billion in FY15 and is expected to grow at 7.5% per annum to reach USD 6.3 billion by FY20. Approximately 50% of the demand comes from domestic consumers while the rest goes towards exports.

However, the usage of agrochemicals in India is one of the lowest in the world at just 0.58 kg per hectare against 4.5 kg per hectare in the US and 10.8 kg per hectare in Japan. It is no where near the world's average consumption of 3 kg per hectare. This shows there is a clearly large scope of growth in usage and demand. With limited availability of fertile land to cultivate food and feed for an ever growing population, the only alternative we have is to increase productivity per hectare. Besides, it is proven that protection chemicals can increase crop productivity by 25-50%, by mitigating crop loss due to pest attacks. Crop protection chemicals are therefore very crucial to ensure food and nutritional security.

But the crop protection segment is rattled by several problems. There is a significant share of non-genuine pesticides including counterfeit, spurious, adulterated or sub-standard products which are freely available in the market. The size of the spurious pesticide market in India is as high as 30% by volume and 25% by value. Also, Indian manufacturers places low emphasis on R&D, and hence our share of novel molecules is comparatively less. Indian Companies spend only 1-2% of their revenues in Research and Development as against the global MNCs which invest about 8-10% of their revenues. This makes Indian manufacturers uncompetitive globally in specialty molecules. Misdiagnosis. Pesticide Resistance, and Pest Resurgence have been observed to decelerating the achievements made in the food front in India. Pesticide residue is yet another theme closely related to crop protection segment and has affected credibility of Indian agricultural produce in a big way.

Although crop protection measures figure only towards the end of any package of practices, they ultimately determine the health and quantity of the harvest. Investing in appropriate crop protection measures is hence a very wise and prudent way in ensuring successful agriculture.

Anjana Nair

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Editorial Comments

Debilitating Debt Waivers

Loan waivers are the newest contagion in agriculture

Loan waivers are the newest fad among the states in India, with Maharashtra joining the bandwagon of states celebrating loan waivers. Farmer protests that erupted in States such as Maharashtra and Madhya Pradesh with the potential to spread to other states have led the administrators to take the step of waiving the debts to contain a volatile situation. A serious trend that would have far reaching consequences in the banking pattern and debt culture, loan waiver is the newest calamity to strike Indian agriculture.

Politically motivated, loan waivers in India continue to serve as the most important or probably the only solution at hand of the authorities to deal with farmers' distress. Although seeds of farm loan waivers were sown decades ago, it has achieved its crescendo lately. When it all started it looked like an innocuous token of appreciation for the farmers who battled all odds to produce food for the country. But today, repeated introduction of loan waivers by governments in different states with different political background suggests that this financial instrument has repeatedly been misused for electoral gains and public adulation.

Uttar Pradesh, earlier this year, decided to waive loans of Rs 36,359 crore taken by about 94 lakh small and marginal farmers. The reason for this benevolent action was the poll promise by Yogi Adityanath. The waiver amount included Rs 5,630 crore loans of seven lakh farmers whose accounts were declared non-performing assets (NPAs) by banks. Even last year, loan waivers made repeated appearances in different states such as Tamil Nadu and Telengana. Post Maharashtra's decision to waive loans, many more states are believed to demand this extravaganza. Punjab, Haryana, Tamil Nadu, Gujarat, Madhya Pradesh, and Karnataka are other potential states where this debt write off is expected. India faces a cumulative loan waiver of Rs 3.1 lakh crore ($49.1 billion), or 2.6% of the country's gross domestic product (GDP) in 2016-17.

The most pertinent question at this point is whether the loan waiver was able to address the farmers' issues? Hardly so. The debt waivers are applicable to organized banking sector i.e., those farmers who access loans from formal financial organizations – banks. The loan waivers are thus helpful to those farmers who access services of banks and not the small and marginal category of farmers, who form a sizeable population of 79.38 million and whose farm holdings comes to less than 1 to 2 hectares as they rely on informal sources of credit such as local money lenders. The loans procured thus are charged with heavy interest rates which pushes them into deeper debt traps. Only a third of small and marginal farmers have access to institutional credit and this loan waiver benefits them.

The mode of action of loan waivers is similar to that of pain killers. They may bring down the pain instantly, however, the same would reappear again and the process continues until the root cause of pain is eliminated. Repeated distribution of loan waivers corroborate this theory. Unless the real cause of debt is systematically analysed and eliminated, neither the farmers nor the government can shirk off the addiction to loan waivers.

In general, Indian agriculture has been in a bad shape since a few years. Back to back droughts followed by bumper harvest did little to navigate the troubled waters of agriculture. A bumper harvest resulted in fall in prices and has precipitated the crisis. Investment in agriculture is exhibiting a declining trend. Demonetization affected the purchasing capacity of market traders, forcing farmers to undertake distress sales and even deter sowing in some parts. Efforts must be directed towards better integration of farmers with markets and price intervention strategies for non-food crops, but also large investments in agriculture. These are essential for creating better marketing infrastructure, storage capacities, transportation network, farming technology, research for new crop varieties, extension services and above all irrigation.

Loan waivers are not going to mitigate agrarian crisis but would precipitate it. Government should adhere to realistic strategies and not populist ones.

Editorial Comments

The Seething Farming Community

Farmer protests have erupted in many parts of India

Farmers in many Indian states are up in arms and the situation has deteriorated with the protests claiming lives of five farmers in Madhya Pradesh. Disgruntled over a plethora of problems, most importantly falling prices, farmers protest had turned violent in many parts of the country. Their sense of dissatisfaction with the current state of affairs in agriculture is evident from the many forms of agitations that have been reported from different parts of the country. Although the crops cultivated and the immediate trigger behind the strikes may vary, the underlying cause of farmers' discontent is uniform across the country.

A bountiful rain in 2016 that followed two consecutive drought years raised the expectations of a bountiful harvest, which materialized leading to glut. As a result, the prices plummeted which did not help farmers to emerge from the debts accrued in the previous season owing to poor monsoon forcing farmers to take to streets demanding support from the government. Loan waivers by neighbouring states made matters worse and demands for similar actions erupted among farmers. Besides the current issue, farmers are plagued perennially by lack of infrastructure, poor knowledge of market demands, price fluctuation, and dependence on monsoon among many other factors.

Renewed emphasis must therefore be laid to evolve strategies that can address these issues by the farmers. The starting point could be assuring a decent income for the farmers which infact has been persistently emphasized by the current government in power in Center. Recommended first in 2006 by the National Commission on Farmers (NCF) headed by the eminent agricultural scientist, MS Swaminathan, the Minimum Support Prices (MSP) for crops must be fixed at levels of at least 50 per cent more than the weighted average cost of production which has the potential to enhance the profitability in agriculture, by ensuring a minimum of 50 per cent profits over the cost of production.

Another area where government can lay emphasis is developing easily accessible procurement centers which can to some extent help farmers especially those, whose storage potential is minimal. Building block level grains and pulses banks can thus ensure Effective Procurement and Market Price stability ensuring dependable and stable income.

Similarly geo tagging of all farmers' fields can help in arriving at accurate production estimation data which can be further used for planning needful market intervention. Opening up of domestic and international markets for free trade which is biggest establisher of prices can also help farmers in realizing better profit prospects.

Operating futures markets can be considered as another effective strategy for offsetting the uncertainties associated with price fluctuations of agricultural commodities. Futures contract route helps the farmers to decide on a trade for a standing crop at a future date at a price agreed before the harvest. This is a suitable instrument to offset risks associated with price dip arising out of peak harvest seasons. Farmers with their regular acquaintance with forward markets can understand the price trends for a particular agricultural commodity at a commodity exchange and they can decide on the sowing pattern.

Establishing national network of Panchayat level Rural Growth centres is a prospective strategy to develop village level agribusinesses and connect farmers with institutions, banks, technologies and markets. This in turn will guarantee flow of technology, credit and demand to centers of production which again adds to the productivity and profitability of agriculture.

Renaming the Ministry of Agriculture to include the interests of Farmers' welfare was a very thoughtful and progressive step. Moving beyond that initiative, a department of Farmers Welfare can be created. This will ensure to keep farmers in focus while formulating plans and schemes for agriculture, budgeting and greater coordination among different states.

The government has repeatedly asserted its intention of doubling farmers' income and has made some serious provisions to attain the same. But considering the situation at hand, the authorities have to act fast and precise and break away from the quick fixes like debt waivers.

Editorial Comments

FTAs – Good or Bad?

India gets ready to host the Regional Comprehensive Economic Partnership (RCEP) meeting among ASEAN members

Free Trade Agreements (FTAs) have never been a sweet pill for Indian agriculture. Latest to face the heat of the FTAs was the country's plantation sector and the country is again threatened by another trade agreement currently under negotiation. As India gets ready to host the Regional Comprehensive Economic Partnership (RCEP) meeting among ASEAN members in July, negotiated between India and 15 other countries including the 10-member Asean, Japan, South Korea, New Zealand, Australia and China, tension is rife among farmers, trade unions, intellectuals and non-governmental organisations who have decided to vehemently oppose the talks considering the negative impact of such FTAs on farmers and Indian agriculture. The RCEP requires countries to reduce make import duties to zero as soon as the agreement comes into force.

International trade in today's world is a significant parameter for economic development and recent years have seen rapid expansion of trade and trade agreements between India and other nations. In an ideal scenario, the international trade agreements present the opportunity to expose country to foreign goods and services and in turn provide markets for Indian manufacturers and producers. Although it is a give and take relationship, trade does not usually happen along those lines due to certain distorted tariff structures and unequal trading terms. Recently Economic survey had called for a review of India's free trade agreements (FTAs), saying they have led to more imports than exports and has cited the reason of high tariffs being maintained by India and hence had larger tariff reductions than its FTA partners.

The current FTAs being mooted could be detrimental to Indian interests in dairying and other agri based enterprises when cheaper goods make their way to Indian markets and consumers. Protected by heavy subsidies in their home countries, the imported agriculture products will be cheaper affecting the economic interests of the Indian farmers. One particular case in point is the dairying industry. Although India is the world's largest milk producer, Indian dairy industry is largely small scale with many small and marginal farmers dependent on it for their existence. In the event of FTA materializing through RCEP, milk-surplus countries such as Australia and New Zealand may dump butter oil and skimmed milk powder in India at cheaper rates which in turn will be converted to re-combined milk and sold at lesser prices. The after effects of a similar FTA with certain South East Asian countries has debilitated India's plantation sector. Indian farmers who produce black pepper, cardamom and rubber went through a lean phase. Prior to signing the agreement, India was a leading exporter of these commodities in international market. But after the agreement, India's exports have been on a continuous decline.

But India, at this juncture cannot do away with FTAs as they are essential for expanding India's market penetration and maintaining the existing global market share. This can improve the competitiveness of Indian products and in the process may introduce new technologies and services which would eventually help in improving the production efficiency in agriculture. In this globalized world, FTAs are to stay. So India must devise ways to utilize the FTAs in a better way. India should be careful in selecting partners for FTAs and sign trade deals with countries having complementarities of economic or commercial interests, and hence not merely on the basis of geo-political considerations only. Also, FTAs need to be entered into where there is potential for Indian business to expand and deepen market penetration in partner countries. Making substantial progress towards completion of the pending domestic reforms is vital for competitiveness of Indian products. This would enable us to take advantage of export opportunities and face the challenges of tariff liberalisation brought about by FTAs. We have to navigate the FTAs skillfully, simultaneously strengthening our infrastructure without compromising the policies protecting the farmers.

Soothing the Seething Farmers

Government Proposes Policies aimed at Doubling Farmers' Income

The discontent that is wide spread among farmers has sent jitters across political power centers in India. To appease the unhappy farmers, a sizeable vote bank and currently a volatile group, authorities are in a hurry by doling out complimentary proposals.

The first tranche of freebies to arrive was the loan waiver that have already made their presence felt in some states. States today are vying to distribute loan waivers and some calculations put the value of cumulative loan waiver as Rs 3.1 lakh crore ($49.1 billion), or 2.6% of the country's gross domestic product (GDP) in 2016-17.

But this time, the government policies have moved farther and beyond, and have been decided to place emphasis on cost of agricultural production. With constant emphasis being laid on doubling farmers' income, the government has come to the conclusion that to raise the income levels of farmers, the production cost has to be brought down. Ground level works have been initiated in this direction and the results emerging looks promising. Recently, the Centre has initiated a proposal to provide 10 per cent discount on the maximum retail price of seed packets. The Union Agriculture Minister Radha Mohan Singh made an appeal to all seed companies to consider 10 per cent discount proposal as the objective of the move is to motivate farmers to buy new seeds at affordable prices. According to market experts, the seed companies offer a margin of about 20-30 per cent to their retailers and when the 10 per cent discount offer would be implemented, the firms may share the 'discount burden' among their retailers and the companies. The seed industry thus decided to cut retail prices of hybrid seeds, excluding cotton, by 10 per cent from June 19 through the ensuing 2017- 18 kharif season. Hybrid seeds are majorly used in vegetables, grains and paddy. Retail prices of hybrid seeds range between Rs 300 to Rs 500 per kg and hence a discount of ten per cent will go a long way in cutting down input costs. More than 80 per cent of seeds sown are hybrids in the country. The size of hybrid market is about Rs 6,000 crore and hence the decision taken by the seed companies is a welcome move and in good interest of the agricultural community.

A similar call was made to the pesticide manufacturers of the country and they have agreed to roll back prices of about a dozen products, which they'd increased by up to five to 10 per cent recently. The increase followed a five to 10 per cent rise in prices of technical grade products, due to the Chinese agriculture season and rising demand.

Apart from reducing the input costs, the government has also decided to increase the minimum support price of agricultural commodities. Besides this, the states were also asked to procure it by all means so that the farmers are not forced to sell it at low prices. This would ensure remunerative prices to farmers when the prices fall due to supply glut.The maximum hike in the MSP is fixed for pulses whose output is estimated to be a record 22.40 million tonnes (MT) in the 2016-17 crop year ending June, as against 16.35 MT in 2015-16. The record production was attributed to good monsoon, higher MSP and better procurement arrangement. Among oilseeds, the government has increased the MSP of groundnut-in-shell (Rs 4,450 per quintal), soyabean (Rs 3,050 per quintal), sunflower seed (Rs 4,100 per quintal), sesamum (Rs 5,300 per quintal) and nigerseed (Rs 4,050 per quintal).

The Union Cabinet has also approved an interest subvention scheme worth Rs 20,339 crore with which farmers will continue to get short-term loans up to Rs 3 lakh. The decision is also aimed at soothing the farmers.

Policies aimed at assuring farmer welfare is critical to the agriculture sector of the country. Agriculture reforms at macro level are important but the time required to reflect that on the overall status of farmers' welfare is more and hence grass root level reforms are critical.

Aarti industries bags Rs 4000-cr agro-chemical supply contract

Aarti Industries Ltd, a speciality chemicals company, said it has entered into a Rs. 4,000 crore multi-year contract with a global agriculture company for supply of high value agro-chemical intermediary. The project will entail an investment of about Rs. 400 crore by the company, AIL said in a BSE filing. As per the contract, the company will supply high value agro-chemical intermediary for use in herbicides over a period of 10 years. The supplies are expected to commence from the 2019-20 fiscal and would generate expected revenues of approximately Rs. 4,000 crore over the contract terms, it said. AIL also said the global agri-company, to which the supplies would be made, is investing about USD 1 billion in the project. Aarti Industries Chairman and MD said, "The opportunity in the agro-chemicals space is quite sizeable. This

deal in particular will boost our growth trajectory further". Governments across the world are encouraging viable agrochemicals use to secure food supply to meet the increasing food demand, owing to industry growth, AIL said. The company also said that the speciality chemicals market has been growing at 14 per cent over the last five years and the market size is expected to touch USD 70 billion by 2020. India is the third largest producer of agro—chemicals globally and the 'Make in India' campaign provides the framework for Indian companies to deliver secular growth, it added.

Centre grants Rs 580 cr to Markfed for buying pulses in MP

The Centre has approved Rs 580 crore to cooperative Markfed in Madhya Pradesh for procuring various pulses in the current year. The Union Agriculture Ministry has approved the said amount to the National Cooperative Development Corporation (NCDC) which in turn will release it to the MP-Markfed. The ministry has also approved under the Price Support Scheme (PSS), procurement of 11,250 tonnes of Urad and 55,500 tonnes of Moong to be grown in the 2017 kharif season. This is being done to ensure farmers get at least minimum support price in case prices fall in the 2017-18 crop as well. Pulses prices have come under pressure during the 2016-17 crop year owing to record production. Wholesale prices of some pulses, especially Tur, have crashed in states like Madhya Pradesh and Karnataka. To cushion farmers from the price fall, the central government had procured 1.04 lakh tonnes of Tur from Madhya Pradesh during the 2016-17 kharif season under the Price Stabilisation Fund (PSD), which is being operated by the Union Food Ministry, for creation of buffer stock. About 6,460 tonnes of Moong and 5,996 tonnes of Masoor were also procured from MP for buffer stock purpose.

K-Tec Releases 28' Wide Land Leveler for Field Leveling

K-Tec Earthmovers have released a new land leveler model to expand the company's product offering to agricultural contractors and farming professionals. The K-Tec 2822 Flex land leveler has been designed for precision field leveling and

drainage projects. The K-Tec 2822 heavy duty land leveler is 28 feet wide, offering a productive and precise towed implement. Various advancements are included as standard features such as walking axle, single simplistic tilt, and depth & slope meter level gauge. The revolutionary 2822 Flex model enables the folding back of the hitchpole, pivoting the machine 90 degrees to drop down a set of transportation axles for a legal road transportation width of under 8.5'. This is ideal to transport the leveler between fields or jobsites, with the same tractor unit without the need of a trailer.

New Holland Agriculture delivers the most powerful tractor in India

New Holland Agriculture, one of the world's leading agriculture equipment brands, delivered the first 230-hp tractor in India to Antony Lara Enviro Solution Pvt Ltd recently. The award-winning T7070, from the New Holland exclusive Blue Power range, will be part of a project in Greater Mumbai which aims to cut the city's greenhouse gas emissions by improving solid waste treatment. The T7070 will operate a compost windrow turner, a large machine which aerates biodegradable waste.

Jain Irrigation begins trial run at mango processing unit in TN

Jain Irrigation Systems commenced trial run at its mango processing plant at Elayamuthur near Udumalpet, in Tamil Nadu. The crushing capacity of the unit is 200 tonnes of mango per day and varieties such as Totapuri and Alphonso alone will be processed here, Ashok Bhavarlal Jain, Chairman, Jain Irrigation informed. The unit will, however, crush only 100 tonnes per day to start with this year, he said pointing out that the mango season had come to a fag end. "We have the capacity to scale up and will utilise it if there is a requirement. During the next season, we will commence processing the fruit from May 10 to end-August," he added. To ensure supply of mangoes, the company has tied up with around 750 farmers in the region. "We are at present procuring the fruit from major mango growing areas of Tamil Nadu such as Salem and Dharmapuri and the neighbouring States as well. But in the coming years, there should be no issue as we have entered into a buy-back agreement with farmers under the Unnatiprogramme," said Sunil Deshpande, Managing Director, Jain Farm Fresh Foods Ltd, a subsidiary of Jain Irrigation. The company has invested Rs. 25 crore in the facility.

Case IH Sugarcane Harvester records highest harvesting in 3.5 hours in India

Case IH, a brand of CNH Industrial, recently bestowed the Karnataka-based sugar factory, Krishna Sahakari Sakkare Karkhane (aka Krishna Sugars), with the 'National Record' Award for harvesting 146 MT sugarcane in just 3.5 hours with the Case IH Austoft 4000 Series sugarcane harvester. In India, the 4000 Series has been performing well with 100 to 150 tonnes per day on average, with hourly average of 15 to 20 tonnes. An award ceremony was recently organised at Krishna Sugars' premises in Athani, Belgaum district in Karnataka, to celebrate this outstanding achievement. The event was attended by Mr Parappa C Savadi, Krishna Sugars Chairman; Mr J.A. Patil, Krishna Sugars Vice Chairman; Mr G.M. Patil - Krishna Sugars Managing Director and other senior officials from Case IH's parent company, CNH Industrial. Other guests included representatives from other sugar mills and prominent farmers from Athani administrative district. Mr Ramesh Kumar, Head of Crop Solutions Service at CNH Industrial, also praised the operators of sugarcane harvester and in-fielders for their untiring efforts in this remarkable feat.

Insecticides (India) Ltd. Enters Agri Organic Sector

Insecticides (India) Ltd. launched a revolutionary biological product Kayakalp that is expected to transform the health of the soil and rejuvenate it organically to improve plant health and productivity. The launch of Kaya Kalp marks a major leap for IIL into the organic products sector. Kayakalp, a Hindi term which means 'Rejuvenation' or 'Transformation' of one's physical being, works as a natural catalyser to improve soil's organic capacity, strengthen its nutrient value and act as a health booster tonic for the soil that will help Indian farmers improve output. The product is also duly approved by National Centre of Organic Farming, Ministry of agriculture and farmer welfare, Government of India for its features. "At IIL, our endeavor has always been to research and innovate solutions that help farmers address the most pressing challenges to farm productivity. Soil degradation and successively declining soil fertility is certainly among the gravest concerns for farmers. With our most advanced innovation, Kayakalp we will be able to equip farmers with a tool that will transform the health of their soil, making them grow better and produce more. This will certainly prove to be a major step towards realizing the vision of our Prime Minister of doubling the income of our farmers within six years," said Mr. Rajesh Agarwal, Managing Director, Insecticides (India) Limited. Highlighting the need of educating farmers about protecting and rejuvenating the health of soil, Mr. Aggarwal also announced the launch of a country-wide awareness drive for farmers under the name of "BhumiKayakalpAbhiyan" (Land Rejuvenation Campaign), under which the company aims to reach out to over 10 lakh farmers within next two years.

Centre hikes MSP of pulses, cotton, oilseeds

Amid unrest among farmers for multiple reasons in different states, the Centre has increased the minimum support price (MSP) of pulses, oilseeds and cotton for 2017-18 crop year and also convinced seed associations to curtail prices of hybrid seeds by 10%. The government has also asked states to procure all farm produce so that farmers are not forced to sell at lower prices. The move is meant to provide remunerative prices to farmers at a time when prices are under pressure due to a supply glut. The maximum hike in the MSP is fixed for pulses whose output is estimated to be a record 22.40 million tonnes (MT) in the 2016-17 crop year ending June, as against 16.35 MT in 2015-16.The record production was attributed to good monsoon, higher MSP and better procurement arrangement. The MSP of tur (arhar) was increased from Rs 5,050 per quintal (including bonus) in 2016-17 to Rs 5,450 per quintal (including Rs 200 bonus) in 2017-18 a hike of Rs 400 per quintal. Similarly, the support price of Urad has risen from Rs 5,000 (including bonus) per quintal in 2016-17 to Rs 5,400 (including bonus) per quintal in 2017-18. In case of moong, it stands increased from Rs 5,225 (including bonus) per quintal in 2016-17 to Rs 5,575 (including bonus) in 2017-18. Among oilseeds, the government has increased the MSP of groundnut-in-shell (Rs 4,450 per quintal), soyabean (Rs 3,050 per quintal), sunflower seed (Rs 4,100 per quintal), sesamum (Rs 5,300 per quintal) and nigerseed (Rs 4,050 per quintal).

No plan to hike import duty on wheat, sugar, edible oils: Govt

The government has no plans to raise import duty on wheat, sugar or edible oils as of now, Minister of State for Food and Public Distribution CR Chaudhary said. A fall in the prices of these commodities had led to speculation that import duties on them would be hiked. In March, the government had imposed a 10 per cent import duty on wheat to check the fall in domestic prices. Prices of wheat in key markets of Kota in Rajasthan are currently at Rs 1,500-1,530 per 100 kg, lower than the minimum support price of Rs 1,625. A bumper crop this year has kept prices of most farm produce under pressure. Wheat production in the country for 2016-17 (July-June) is estimated at 97.44 mt, up from 92.29 mt a year ago. The government also levies a 40 per cent customs duty on import of raw and white sugar. Earlier this month, sugar mills had urged the government to raise the import duty to 60 per cent, as low global prices of raw sugar have made imports attractive. The edible oil industry too has been lobbying for an increase in import duties of crude and refined edible oils to 20 per cent and 35 per cent from 12.5 per cent and 20 per cent, respectively.

Govt releases Rs 700 crore to nafed for buying pulses at MSP

The Centre has released Rs 700 crore to cooperative Nafed to undertake procurement of rabi pulses and other agri-produce, grown in the 2016-17 crop year, at the support price and protect growers from falling prices. The fund, made available under the Price Support Scheme (PSS) operated by the Agriculture Ministry, will also be used to clear all outstanding payments to farmers for procurement of pulses, mustard seed, groundnut and other commodities undertaken in the 2016-17 crop year that ends this month. The purpose of PSS is to protect farmers with the minimum support price for their produce in times of price fall.

Hybrid seed prices cut by 10% for 2017-18 kharif

Giving some relief to farmers burdened with high production costs, the seed industry recently decided to cut retail prices of hybrid seeds, excluding cotton, by 10 per cent from June 19 through the ensuing 2017-18 kharif season. The decision in this regard was taken at a meeting called by Union Agriculture Minister Radha Mohan Singh to reduce voluntarily the seed prices. "We appealed to the seed industry to bring down the prices of hybrid seeds in the interest of farmers. They have agreed to do so," Singh said. Elaborating on the decision, National Seed Association President M Prabhakar Rao said the minister shared that there is a distress among farmers due to low profitability in agriculture and they appealed to us to bring down seed prices. "The industry after consultation agreed to make arrangements for sale of hybrid seeds at prices 10 per cent below MRP as printed on seed packet effective from June 19," he said. However, the new rates will not be applicable on cotton seeds which are already regulated by the government. Retail prices of hybrid seeds range between Rs 300 to Rs 500 per kg. Hybrids seeds are sold in crops like corn, rice, bajra, mustard and vegetables.

Bihar bans sale of 'research variety seeds'

The Bihar government has banned sale of "research variety" seeds. In a June 9 order, state agriculture director Himanshu Kumar Roy said that the government had learnt that several private companies and retailers were selling "research variety" seeds to farmers in attractive packets. "Such seeds are sold in name of research seeds… Seed Act, 1966, Seed Rules, 1968, and Seed Control Order, 1983, do not have mention of research seeds. Such seeds are sold at a higher price in the name of research. The state government bans research variety of seeds with immediate effect.' The order will be applicable from the kharif season during which farmers sow varieties of hybrid seeds. There are two variety of seeds — certified and truthfully labelled. The government gives certification for certified varieties while companies have to seek licenses for truthfully labeled. The order came a month after CM Nitish Kumar wrote to PM Narendra Modi raising doubts over GM mustard. He had demanded a study on impact of GM varieties of seeds to know if they benefit farmers and multinational companies. The Seeds Association of Madhya Pradesh has asked the National Seed Association of India to intervene saying that the order infringes upon provisions of Central government's Seed Act, 1966.

Refurbished milk processing plant inaugurated in Nagpur

Shri Devendra Fadnavis, Hon'ble Chief Minister of Maharashtra inaugurated the refurbished milk processing plant in Civil Lines area of Nagpur on 4 June 2017. Shri Radha Mohan Singh, Hon'ble Minister for Agriculture & Farmers Welfare, Govt of India and Shri Nitin Gadkari, Hon'ble Minister for Road Transport & Highways, Govt of India graced the occasion as Chief Guests. The Hon'ble Ministers of Maharashtra Government - Shri Pandurang Fundkar, Minister for Agriculture & Horticulture; Shri ChandrashekarBawankule, Minister for Energy, New & Renewable Energy, State Excise; Shri Mahadev Jankar, Minister for Animal Husbandry, Dairy Development & Fisheries and Shri Dilip Rath, Chairman, NDDB were also present. The plant has been upgraded as per the agreement between Government of Maharashtra and National Dairy Development Board signed on September 14, 2016. Mother Dairy Fruit & Vegetable Pvt Ltd, a subsidiary of National Dairy Development Board (NDDB) will operate the plant and take up dairy development initiatives like setting up of milk procurement network in Maharashtra. In his address, Shri Fadnavis said that Vidarbha and Marathwada region of Maharashtra includes some of the most backward districts in the country with extreme drought conditions prevailing over many years. Dairying often remains the only hope in such adverse climatic conditions to ease farmer distress. He is confident that NDDB and its subsidiaries will put in their best efforts to implement the dairy development initiative for the benefit of the milk producers of Vidarbha and Marathwada.Lauding NDDB's efforts, Shri Radha Mohan Singh conveyed that dairy development activities in Vidarbha and Marathwada will ensure regular and better returns to milk producers. He said that the core components of this dairy development initiative are productivity enhancement of milch animals and creation of sustainable farmers owned institutions.

Punjab set to take over farm loans

Punjab Chief Minister Amarinder Singh said his government would soon take over farmers' loans and ensure that their mortgaged land or property was not confiscated. The CM said his government had already fulfilled the promise to bring an end to 'kurki' (auction of mortgaged land). Meanwhile, Minister Navjot Sidhu said the government was looking for a permanent solution to the problem of farm debts."The aim is to make the farmers self-reliant so that they don't have to take loans in the future," he said, and assured the farmers that the State would do everything in its power to help them stand on their feet.Mr. Sidhu suggested a licensing system for moneylenders to ensure a fair and just system of taking loans in case of dire necessity. The Minister also listed crop insurance as a measure that the government was looking at to secure the State's beleaguered farmers. He sought the Central government's intervention to check the misuse of MGNREGA.

Maharashtra announces loan waiver, farmers call off protest

In a major concession to the farmers' lobby, the Bharatiya Janata Party (BJP)-led government in Maharashtra announced a sweeping farm loan waiver with certain conditions to ensure the scheme benefits only marginal famers and "genuine farmers" who have been paying off their loans. Maharashtra is the only state that has agreed to give a total farm loan waiver. The government waived the farm loans of marginal farmers—3.1 million out of the total 13.6 million registered farmers—with immediate effect. While the farm loan waiver for marginal farmers will cost around Rs. 30,500 crore, the cost of the total farm loan waiver is not known. Last week, Chief Minister Devendra Fadnavis had announced loan waiver for marginal farmers but ruled out a blanket waiver on the grounds that it would cost the government "an unaffordable Rs1.14 trillion".

Karnataka farmers earn 138% by direct sale via e-trading

At a time when farmers' unrest in Madhya Pradesh and Maharashtra is making news, Karnataka farmers have realised 38 per cent more income from sale of their produce through the e-trading interface, Unified Market Platform (UMP) that was launched in 2014 by the Rashtriya e-Market Services (ReMS) to facilitate interaction between traders and farmers. The Niti Aayog report, titled 'Doubling Farmer Incomes', has showed that the average increase in famers' income was 38 per cent in nominal terms and 13 per cent in real terms. Copra, Black gram and Tur, Bengal gram were commodities which gave among the highest realisation, it added. According to officials of Ministry of Agriculture, the e-trading enhanced the income of farmers by weeding out middlemen. "They (middlemen) eat up almost 75 per cent of the final price, leaving very little for the farmers. The State-run Agricultural Produce Market Committee (APMC) often has the disadvantage of middlemen deciding the price of the produce. "The UMP has managed to eliminate middlemen from the equation all together. Traders can quote product prices online, which the farmers then have a right to reject if it isn't satisfactory," officials said.

5% interest subsidy on crop loan

Union Cabinet has decided to provide 5 per cent interest subsidy to farmers on short-term crop loans during the current fiscal. The short-term crop loan up to Rs 3 lakh will be made available to the prompt payee farmers at 4 per cent interest rate as against the prevailing 9 per cent. As per Interest Subvention Scheme for the current fiscal, the Centre will provide interest subvention of 5 per cent per annum to all prompt payee farmers for loan up to one year. The loan amount cannot exceed Rs3 lakh. In case farmers do not repay their loans in time, they will only be eligible for interest subvention of 2 per cent instead of 5 per cent. All short-term crop loan accounts will be linked to Aadhaar from the current year. That apart, farmers will also get loans for post-harvest storage of their produce at a subsidised interest rate, the Central Government has approved an interest subvention of 2 per cent, ie an effective interest rate of 7 per cent for loans up to six month. To provide relief to farmers affected by natural calamities, the Government has decided to give 2 per cent interest subsidy for first year on the restructured amount. The Cabinet has approved the total expenditure of Rs20,339 crore in the current financial year (2017-18) as interest subsidy on short-term crop loans.

Jharkhand woos farmers with loan at 1% interest rate

The BJP government in Jharkhand announced cheaper credit to farmers - a community that is protesting in several parts of the country for loan waiver. After a cabinet meeting, chief minister Raghubar Das said farmers in the state will get credit at an interest rate of 1% if the loan is paid within a year. Farm loan is provided at the rate of 7% but the Centre provides a concession of 3% for on-time payment. "We will waive off another 3% if farmers pay loan within a year," he said. "A provision of Rs 40 crore is being made to extend relief to the farmers," he said. A spokesperson of the Jharkhand government said bank will have to make claim to the government to get money against the 3% concession reimbursed. Loans taken through Kisan Credit Card will be eligible for the benefits under the new scheme. About 39 lakh farmers in Jharkhand avail loan through Kisan Credit Card.

Insurance up for crop loan in Rajasthan

The Rajasthan government has raised the insurance cover by Rs 1 lakh to Rs 6 lakh for farmers who avail crop loan from cooperative banks in the State, as it aims to bring around 25 lakh peasants under the scheme. The Rajasthan government has raised the insurance amount by Rs 1 lakh in the present fiscal year in the 'Raj Sahakar Personal Accident Insurance Scheme' targeted to cover more than 25 lakh farmers, a State minister said. Last year, the insurance amount was Rs 5 lakh and 23.31 lakh farmers were covered under the insurance scheme.

In Maharashtra, crop loan recovery hit low of 35 per cent in 2016-17

Despite a good monsoon, crop loan recovery in Maharashtra hit a low of 35 per cent in 2016-17. This was lower than the recovery in three successive drought years between 2013 and 2015, the average of which was 54 per cent. According to senior government officials, Rs 51,235 crore was disbursed among 52 lakh farmers. Three successive droughts had led to a steep rise in loss of crops and revenue in 15,000 villages in 2013; 23,000 villages in 2014; and 28,000 villages in 2015. Maharashtra has 40,913 villages. Yet, in these drought years, crop loan recovery was 52 per cent, 54 per cent and 57 per cent, respectively, according to official data. The state government's core committee and farmers' representatives are now working out stringent guidelines to define farmers eligible for loan waiver. Government sources said rich farmers, and those with alternative income, would not qualify for the promised waiver. The Rs 1 lakh ceiling that is likely to be imposed is expected to cover the small, marginal and needy farmers, whose number is pegged at 30 lakh.

PoS machine crunch hits transfer of fertiliser subsidy

Short supply of point of sale (PoS) machines is slowing down the government's direct benefit transfers (DBT) for fertiliser subsidy, with not even half of the total two lakh retail outlets selling fertiliser receiving the machines, delaying the scheduled June 1roll out. Government sources said three PoS suppliers, who have got contracts, have told the fertiliser ministry there is huge demand for the machines and they are struggling to meet requirements. "We have set a June 30 deadline for supply of the entire lot of PoS devices. They have assured the deadline will be met," a ministry official said. Officials said progress of installation of PoS machines is better in north-eastern states, Delhi, Haryana and Uttar Pradesh. It is less than 50% in southern states. Retail fertiliser outlets equipped with PoS machines will be able to read buyers' Aadhaar cards. As the farmer buys, the difference between market rate and the subsidised amount will be credited to the bank account of the manufacturer concerned. Un like other DBTs where the subsidy is directly transferred to beneficiary accounts, in this case the subsidy will go to the manufacturer. Sources said records of sales and purchase will bring transparency about the quantity of fertilisers companies are selling to farmers.They expect this will reduce the burden on the exchequer by Rs 6,000 crore annually ."The scheme is based on no denial policy where anyone can buy fertiliser after giving details of Aadhaar card. Once the beneficiaries are identified, the subsidy will be transferred to their bank accounts," said an official.

Plans finalised for implementation of Pradhan Mantri Fasal Bima Yojana

The Assam Government has finalised plans for implementation of the Pradhan Mantri Fasal Bima Yojana (PMFBY) during this Kharif 2017 season and all the districts of Assam have been divided into clusters for coverage under the scheme. The decision to implement the scheme in Kharif 2017 was taken during a recent meeting of the State Level Coordination Committee on Crop Insurance (SLCCCI) which also finalised the modalities. For the Kharif 2017 season all the old 27 undivided districts of Assam have been compartmentalised into eight clusters. There will be implementing agencies for all clusters. "For each crop, specific districts or areas within the eight clusters are selected for implementation of the scheme. For the major crop of sali paddy the scheme will be implemented at gram panchayat (GP) level and with each GP to be considered as one unit for the purpose of Crop Cutting Experiments (CCE). For other crops like ahu paddy, jute and black gram the unit of insurance will be revenue circle district and subdivision," said an official.

Farmers should get Rs 10,000 loan, says Fadnavis

Chief Minister Devendra Fadnavis had urged national, commercial and district central cooperative banks to start disbursement of Rs 10,000 crop loan to all debt-ridden farmers. At the state-level bankers' meet in Mumbai, Fadnavis said he had written to the Reserve Bank of India, conveying the state's decision to provide Rs 10,000 to farmers and requesting it to help expedite the process by instructing the banks. The CM said his letter was addressed to RBI Governor Urjit Patel, who had in-principle given his consent. It was also indicated that all banks would be officially instructed in a day or two. "The amount of Rs 10,000 should be credited to the bank accounts of all farmers who have taken crop loan in the past. It includes all debt-ridden farmers," said Fadnavis. The amount aims to help farmers begin the sowing for the Kharaif season. The loan will be extend to more than 70 lakh farmers across the distressed Marathwada, Vidarbha and parts of north and western Maharashtra.

Indian veg oil imports rise

Sustained lower prices of oilseeds following a bumper crop have discouraged farmers from bringing their crop for crushing, which in turn has resulted in a sharp jump in the import of vegetable oils in India. According to the latest data shared by the Solvent Extractors' Association of India (SEA), imports of vegetable oils during May 2017 increased by 35 per cent to 1,384,439 tonnes, against 1,024,878 tonnes in the same month a year ago.

Experts attribute the rise in imports to increased demand and the lack of availability of domestic oils. SEA reported a sharp increase in import of edible oils during past two months as oilseeds prices dipped below the MSP, discouraging farmers from selling their crop.

"Currently, the domestic crushing activity is low mainly on account of lower realisation of oilseeds for farmers. "This has resulted in reduced domestic crushing activity, causing imports to rise. Considering the trend, we expect veg oil imports in India to match that of last year against the initial estimation of decline of about 500,000 tonnes," said Atul Chaturvedi, President, SEA.

Sanlucar, First Company to Meet Grasp Criteria in Tunisia

SanLucar's Tunisian farms, La Cinquième Saison and Flor'Alia, have obtained the assessment certificate GRASP, which recognizes good social practices in the agricultural sector. The multinational company producing and commercializing premium fruits and vegetables, has become the first company in Tunisia to pass this evaluation, receiving excellent grades. GRASP complements the international norm Global G.A.P. towards social aspects like workers' health, safety and welfare. In accordance with national and international legal provisions, GRASP assesses questions like salary, overtime hours, holiday entitlement, protection of minors, the election of a workers' representative, or the compliance with legal requirements in contracts. The majority of SanLucar's producers in Spain have already passed the assessment and now the two Tunisian farms join in on this voluntary initiative. "The wellbeing of people and the respect for nature are essential for SanLucar. We live the corporate responsibility naturally, it's part of our DNA. We also understand that everyone should be involved. Therefore, we encourage all of our partners, no matter where they are, to prioritize the fulfillment of good social practices. Moreover, if this corporate philosophy is also shared and valued by external organizations though evaluations like GRASP, we are proud and satisfied", emphasizes Michael Brinkmann, international CEO of SanLucar.

Coffee exports increase by 11.5% in April

India's coffee exports grew by 11.5 per cent year-on-year to $92.42 million in April this fiscal on account of strong demand in the global markets. The country had shipped coffee worth $82.88 million in April last year, according to the commerce ministry data. In rupee terms, the exports recorded a growth of 8.22 per cent at Rs 596.17 crore in April. India mainly ships robusta and arabica varieties of coffee besides instant coffee. Coffee is one of the most widely traded agricultural commodities in the world. India accounts for about 4.5 per cent of the world coffee production and the industry provides jobs to over six lakh people. India's major export destinations include Italy, Germany, Greece, Belgium, Spain and Switzerland. Coffee output in the 2016-17 crop year is estimated to decline to 3,16,700 tonnes from the record level of 3,48,000 tonnes achieved last year, due to severe drought in some key growing states, especially Karnataka. The country's tea exports too grew by 8.25 per cent to $49.74 million in April as compared to $45.95 million in the same month last year. India is the world's second biggest tea producer and also one of the largest consumers. The country exports CTC (crush- tear-curl) grade tea to countries like Egypt, the UK, and other traditional varieties to Iraq, Iran and Russia.

Record growth in export of spices in 2016-17

Exports of Indian spices and spice products surged to a record growth in 2016-17, touching 9,47,790 tonne, valued at Rs 17,664.61 crore ($2,633.30 million), thereby registering an increase of 12% in volume, 9% in rupee terms and 6% in dollar terms, officials of the state-run Spices Board said. During the previous fiscal 2015-16, exports stood at 8,43,255 tonnes, valued at Rs 16,238.23 crore ($2,482.83 million). Chilli continued to be the most demanded spice in FY17 with exports of 4,00,250 tonnes amounting to Rs 5,070.75 crore, registering an increase of 15% in volume and 27% in value. Cumin was the second-most exported spice, recording an increase of 22% in volume and 28% in value. A total volume of 1,19,000 tonnes of cumin valued at Rs 1,963.20 crore was exported from India in 2016-17. The increase was largely due to the mandatory checks on cumin and its by-products implemented by the Spices Board in the backdrop of rapid alerts from importing countries. "India has surpassed all previous export records and has fulfilled the increasing international demand for its quality spices in the face of tough competition in global markets. More satisfying was the fact that the appreciable increase in exports came in the face of strict food safety regulations that now define and determine the international commodity trade," Spices Board chairman A Jayathilak said. Increased global demand for turmeric, especially in the pharmaceutical sector, drove its exports to attain figures of 1,16,500tonne in volume and crossed Rs 1,241 crore in value terms in 2016-17. The spice which showed the maximum increase as compared to the previous financial year was fennel, registering a 129% increase in volume and 79% hike in value. Garlic exports contributed substantially to the overall growth during the year, notching figures of 92% in value terms and 39% in quantity. The export demand of nutmeg and mace was also on a higher side, registering an increase of 25% to 5,070 tonne, as compared to 4,050 tonne during 2015-16. Jayathilak said the efforts of Spices Board to promote production of large cardamom, especially in the country's North-Eastern region which is the organic area by default, led to a rise in its exports by 30% in volume and 9% in value.

India to export all premium mangoes

India will be pushing for exports of all premium mango varieties, apart from the traditional alphonso, produced in the country, said DK Singh, chairman of Agricultural and Processed Food Products Export Development Authority (APEDA). He was in South Korea recently to meet the buyers. Mango importers in S Korea said local consumers have a great liking for the taste of Indian mangoes, particularly the alphonso variety. Also, Koreans usually prefer spotless and evenly-sized mangoes. There is a great potential in promoting other premium varieties like Banganapalli, Chausa, Dashehari, Kesar, Langraetc, in the Korean market, the APEDA chief said. India's mango exports have significantly increased from $49.6 million in FY16 to more than $57.5 million during the April-February FY17.

Access to quality seeds a focus at global industry gathering

Mr van der Feltz, along with EWS Vice President Michel Devarrewaere and General Manager for Philippines Mary Ann Sayoc, is in attendance from 22 May and 24 May at the yearly event which gathers more than 1,000 seed industry professionals from 64 countries worldwide. In a statementon the opening day, the ISF stated the Congress's mission is to enhance the quality and accessibility of seeds, with plant breeding innovation as a key priority. "We support the ISF's mission and priority areas as these align with our core values at East-West Seed," Mr van der Feltz said. "We know firsthand that access to quality seeds is critical to improving farmers' livelihoods and increasing their income, especially in developing countries where agriculture is the mainstay. On a broader level, it also improves access to nutritious food and contributes to socio-economic growth." Among the key issues discussed in WSC 2017 are plant breeding innovations (gene editing, new breeding techniques), intellectual property rights, genetic resources (Support to the International Treaty on Plant Genetic Resources for Food and Agriculture), and the international movement of seed (International Standard on Phytosanitary Measures; efforts to curb illegal seed practices). Mr van der Feltz added that the Congress had successfully brought together industry-leading peers to share knowledge and ideas. "Working on developing solutions to accessible, quality vegetable seeds in the tropical world has been part of East-West Seed's identity since the beginning. In 1982, our founder Simon Groot was determined to improve the livelihood of smallholder farmers by providing better seeds for better yields and, 35 years later, we still focus on that mission," said Mr van der Feltz. The company's mission was recognized by the independently organized Access to Seeds Index where East-West Seed ranked #1 in 2 out of 3 indices published in February 2016.

Drones Helping out with Palm Oil Cultivation

In Malaysia, the world's second-largest producer of palm oil, about $1.2 billion of oil may be left in the field this year. That's why the industry is working on new technologies like electric cutting machines and pesticide-delivering drones to boost output. Unlike soyabeans or rapeseed, cultivation of palms is tricky on the sometimes hilly plantations in tropical Malaysia and Indonesia, which combined supply about 86% of the world's palm oil. Current methods to treat bagworm infestations involve piloted aircraft that carry out blanket, untargeted spraying of pesticide.Malaysian-based Braintree Technologies has developed drones equipped with cameras that can detect infected trees, enabling more targeted treatment. Drones also speed up the process of everything from tree-counting to forecasting yields, according to Arif Makhdzir, managing director of Braintree. They can help increase yields by around 20%, saving as much as 50% of the cost, he said.

Israeli technical knowhow for Punjab farmers

The Punjab government gave in-principle approval to a pilot project under which an Israeli company would provide technical knowhow to farmers for boosting crop yield and farm income. The project would be undertaken in collaboration with Israel-based farming solutions provider ARNA. The company would provide a state digital agriculture platform with a database of all Punjab farmers, besides tracking their agriculture activities, such as fertiliser usage, timely soil, water and tissue analysis. The project would be aimed at enhancing crop quality and yield, thereby increasing their capability to repay their debts.Earlier, in a presentation to the Chief Minister, ArikMatlaw of ARNA said the company would provide a comprehensive solution for balanced and optimal use of fertilisers by the farmers. Expressing concern over the dependence of farmers on selective crops, the company also offered facilitation in crop diversification by providing technical support to encourage farmers to shift towards horticulture, pulses, citrus, maize, and vegetables etc. Finance Minister Manpreet Singh Badal, meanwhile, offered his Kinnow orchard farm for undertaking the pilot project, and also offered to bear the entire cost involved. The latest farm practices and techniques that will emerge from the pilot project could be later replicated in other parts of the state, leading to immense benefits for the farming community, he said.

Tur dal to turn pest resistant

City-based research institute, ICRISAT, has re-sequenced the genome of 292 pigeon pea varieties to develop a new, stronger DNA line that will have various resistant qualities. The International Crops Research Institute for the Semi-Arid Tropics and nine other institutions, is deriving the new DNA trait that would be better suited for cultivation in times of climate change, with higher yield and shorter life cycles. The research has also proved the origin of the pulse to be from Madhya Pradesh. Pigeon pea, commonly known as arhar or turdaal, is a major pulse crop for farmers and consumers. There are over 13,700 varieties of the crop, but researchers have to spend up to 10-12 years to develop a new hybrid variant. With this finding of a new DNA trait, it would only take 6-7 years to develop a new variety. The DNA trait in question will also produce a crop which is resistant to various diseases and has a shorter life cycle. "Usually farmers sow in June and harvest the crop by January, taking 5-6 months to complete the life cycle. The new variant will yield a crop in a shorter duration of 2-3 months," said Dr C. V. Sameer Kumar, Principal scientist on the project.

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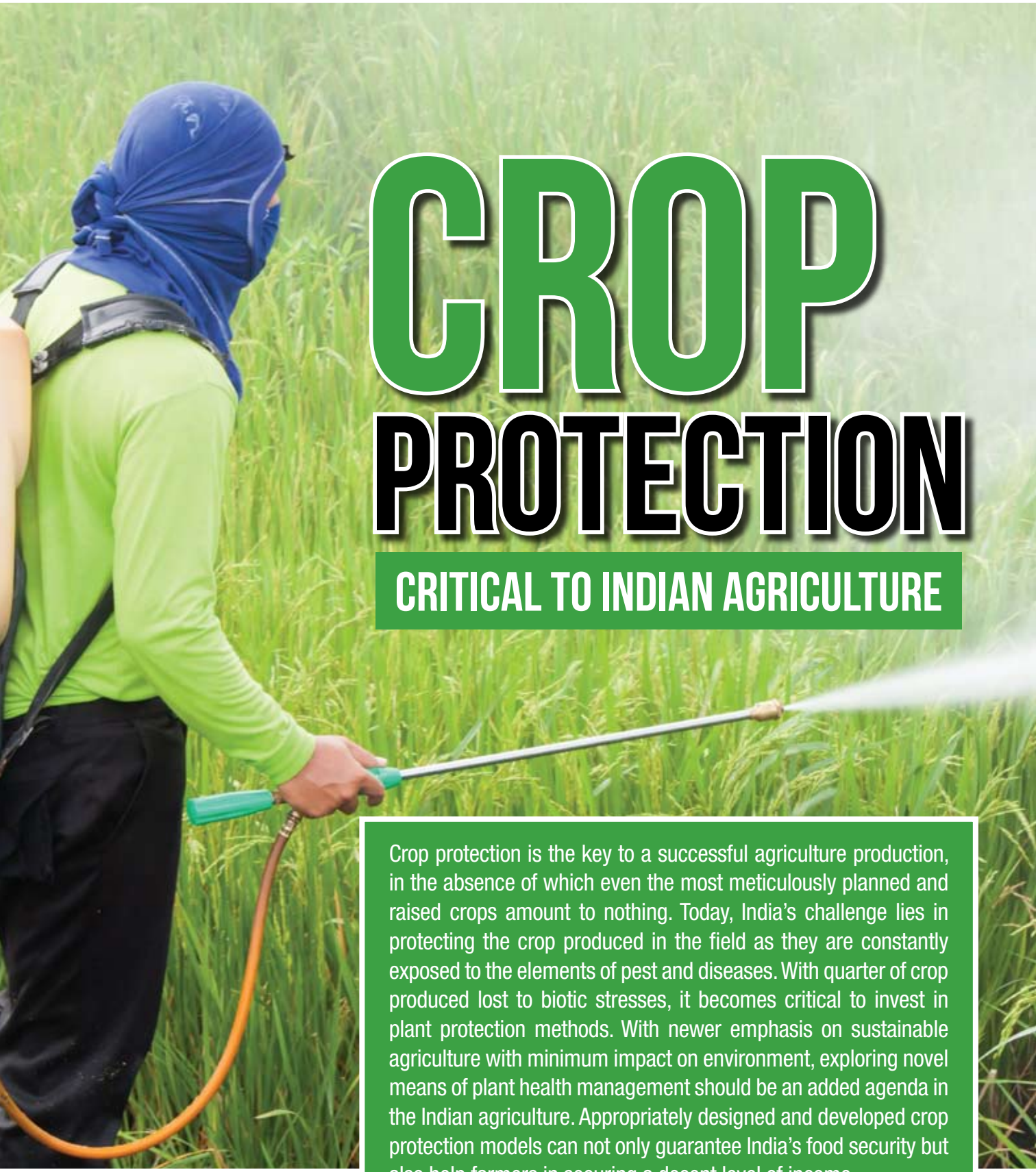

CROP PROTECTION

CRITICAL TO INDIAN AGRICULTURE

Crop protection is the key to a successful agriculture production, in the absence of which even the most meticulously planned and raised crops amount to nothing. Today, India's challenge lies in protecting the crop produced in the field as they are constantly exposed to the elements of pest and diseases. With quarter of crop produced lost to biotic stresses, it becomes critical to invest in plant protection methods. With newer emphasis on sustainable agriculture with minimum impact on environment, exploring novel means of plant health management should be an added agenda in the Indian agriculture. Appropriately designed and developed crop protection models can not only guarantee India's food security but also help farmers in securing a decent level of income.

With another record output in the offing, it would not be an exaggeration to state that Indian agriculture has performed spectacularly well in the past years. From a mere 55 million tonnes in 1960's to an estimated 272 million tonnes in 2017, Indian agricultural production took rapid strides owing to the steady intrusion of technologies and inputs which commenced with the green revolution era. Improved varieties, better agronomic practices and most importantly appropriate crop protection measures made sure that food security remained a reality rather than a possibility for Indian population. However, the current agricultural production may not suffice for the projected population in the future and for the same reason maintaining food security remains a perennial challenge and a struggle. Continued research and development and better management practices thus assumes importance.

INDIAN CROP PROTECTION INDUSTRY

Crop losses owing to pest and diseases are inherent to any agricultural system. It is quite significant in Indian agriculture owing to the tropical situation. Although India has been able to effectively manage the losses, we are not close to reducing the proportion of crop losses to total yield. Around 15-25 per cent of the crop produced is lost to the elements of pest and diseases. Put in monetary terms, Associated Chambers of Commerce and Industry of India attributes annual crop losses due to pests and diseases to Rs. 50,000 crore ($500 billion). The introduction of high yielding varieties, monocropping, climate change and an absent disease forecasting machinery have together been able to keep the losses at significant levels in Indian agriculture.

India is the fourth largest producer of agrochemicals globally, after the US, Japan and China. This segment generated a value of USD 4.4 billion in FY15 and is expected to grow at 7.5% per annum to reach USD 6.3 billion by FY20

Indian crop protection industry has played a key role in addressing the crop losses with regular and timely intervention through agrochemicals. India is the fourth largest producer of agrochemicals globally, after the US, Japan and China. This segment generated a value of USD 4.4 billion in FY15 and is expected to grow at 7.5% per annum to reach USD 6.3 billion by FY20. Approximately 50% of the demand comes from domestic consumers while the rest goes towards exports. While the domestic demand is expected to grow at 6.5% per annum, exports are estimated to grow at 9% per annum during the same

period. However, the usage of agrochemicals in India stands is one of the lowest in the world at just 0.58 kg per hectare against 4.5 kg per hectare in the US and 10.8 kg per hectare in Japan. It is no where near the world's average consumption of 3 kg per hectare. This shows there is clearly a large scope of growth in usage and demand. With limited availability of fertile land to cultivate food and feed an ever growing population, the only alternative we have is to increase productivity per hectare. Besides, it is proven that crop protection chemicals can increase crop productivity by 25-50%, by mitigating crop loss due to pest attacks. Crop protection chemicals are therefore very crucial to ensure food and nutritional security.

Insecticides dominate Indian crop protection market and they constitute around 60% of domestic crop protection chemicals market. Rice and cotton crops are major consumers of insecticides. Fungicides and Herbicides are

the largest growing segments accounting for 18% and 16% respectively of total crop protection chemicals market. Herbicides are mostly applied in rice and wheat crops in India and the current scenario of increasing labor costs and labor shortage, have driven the sales of the weedicides. Fungicides find application in fruits, vegetables and rice and the shift towards fruits and vegetables cultivation with potential for exports have been driving this segment. Bio-pesticides constitute only 3% of Indian crop protection market. However, significant growth opportunities exist for them due to increased emphasis on organic agriculture.

The future lays bright for the crop protection industry as significant opportunities lies ahead of them.

India has been slowly emerging as a strong exporter of pesticides. Currently, India occupies the thirteenth position in terms of export of pesticides. India exports to Brazil, USA, France and Netherlands. Low cost manufacturing, availability of technically trained manpower, seasonal domestic demand, overcapacity, better price realization globally and strong presence in generic pesticide manufacturing (India has process technologies for more than 60 generic molecules) are the drivers of this new trend. Contract

manufacturing of agrochemicals also presents good opportunities for Indian companies. By 2020, agrochemicals worth USD 4.1 billion are expected to go off-patent providing significant export opportunities for Indian companies which have expertise in generic segment. Top 6 importing nations constitute only 44% of India's agrochemical exports. This also indicates export potential for Indian companies.

Labor shortage, rising labor costs and growth in GM crops have led to phenomenal growth in the use of herbicides. The herbicide consumption in India stood at 0.4 USD billion in FY15 and is expected to grow at a CAGR of 15% over the next five years to reach ~0.8 USD billion by FY20. On the other hand, the fungicide industry in India has grown due to the growth in Indian horticulture industry, which has grown at a CAGR of 7.5% over the last five years.

Enhancing country's food production potential is crucial agenda in India's growth plan. To ensure steady supply of food to the second most populous country in the world, along with increasing productivity, loss of agriculture produce through pest and diseases must be stemmed. Considering the fact that India has one of the lowest per hectare consumption of pesticides in the world, there lies immense scope in increasing the same to meet the said objectives. Therefore domestic markets are sure to expands driving the sales of agrochemicals.

Product innovation has also led to release of several new products catering to certain specific demands from the emerging situations. For instance, labor shortage has accelerated the introduction of slow release or controlled release type of formulations which avoid multiple sprays. Farmers are also investing more in seed treatment agrochemicals that help ensure disease resistance along with better and more uniform germination.

CROP PROTECTION SOLUTIONS

Plant protection strategies and activities have become pertinent in ensuring environment friendly and sustainable agriculture. Plant protection strategies, today are aimed at minimizing crop losses due to pests through integrated pest management, plant quarantine, regulation of pesticides, locust warning

The herbicide consumption in India stood at 0.4 USD billion in FY15 and is expected to grow at a CAGR of 15% over the next five years to reach ~0.8 USD billion by FY20

and control besides training and capacity building in plant protection. The cultivated area treated with pesticides has also increased in the last two decades. Around 40 per cent of the total cultivated area is treated with pesticides. Approximately, 65-70 per cent of the cultivated area treated with pesticides is irrigated. With regard to pesticide usage, land holding size-wise, medium size land holding are treated the most, followed by the small and marginal land holding. Large land holding (above 10 hectare) are least treated. At a micro level, on an average 65 per cent of the area under the fiber crops are treated with pesticides followed by fruits (50 per cent), vegetables (46 per cent), spices (43 per cent), oilseeds (28 per cent) and pulses (23 per cent).

Crop protection has been conventionally believed to be chemical in nature. A large part of crop protection activities centered around pesticides. However, the challenges that panned out of the indiscriminate use of chemicals led to more structured and innovative models of plant health management.

Integrated Pest Management (IPM) was evolved as a sustainable approach to pest management using a combination of techniques like Biological control, mechanical control, modified agronomic practices and use of resistant varieties. Pesticides only form the last line of defense and that too in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment.

In India, so far 166 exotic biological control agents have been introduced of which 33 could not be released in the field, 71 recovered after release, 6 providing excellent control, 7 substantial control and 4 partial control. The current emphasis on organic agriculture has increased the relevance of biocontrol

Imparting disease resistance or pest resistance on crops can create a first line of defense to biotic stresses. This can considerably bring down the yield losses and contain an epidemic. Genes of resistance are transferred from resistant varieties to cultivars. Conventional breeding, although takes years to commercially release a variety, is the most preferred and acceptable method by the farmers. Its alternative, genetic modification has often been met with public resistance and legal troubles.

Biocontrol which uses biological agents to bring down the pest or diseases has been considered to be environmentally safe and eliminates the possibility of pesticide residue in final produce. Biological control or bio-control constitutes a deliberate attempt to use Natural enemies either by introducing new species into the environment of a pest or by increasing the effectiveness of those already present. In India, so far 166 exotic biological control agents have been introduced of which 33 could not be released in the field, 71 recovered after release, 6 providing excellent control, 7 substantial control and 4 partial control. The current emphasis on organic agriculture has increased the relevance of biocontrol. Other than biological agents, botanical substances are also widely used to manage plant diseases.

Another new and probably the most controversial technique of disease management has been the application of biotechnology. Transgenic crops developed through insertion of foreign genetic material into the plant's genetic make up has been able to endow plants with reliable resistance to pest attack and hence significant yield enhancements. A case in point is India's tryst with Bt cotton. The commercial cultivation of Bt cotton was approved in 2002. Later on, the area under this particular genre of

crop variety considerably increased. By 2009-10, Bt cotton had spread to 85 per cent of the country's cotton area. This was primarily due to the considerable yield advantages exhibited by Bt cotton varieties. A significant enhancement in production from 2004-05 onwards was noticed as compared to the earlier years (from 3.01 mt in 2003-04 to nearly 4.59 mt in 2006-07). The average national productivity showed a remarkable spurt from nearly 303 kg lint/ha (2001- 02) to 520 kg lint/ha in 2006-07. The country was the third largest importer of cotton in the world in 2002-03. In 2005-06 the country was the third largest exporter of cotton in the world.

Diagnosis always hold the key to sound plant health management. The use of Information technology in some cases have been explored to make the correct diagnosis of the disease or pest problem. An app that allows farmers to identify pests and diseases using their mobile phones and provides remedial measures is the latest addition to using modern digital tools to benefit smallholder farmers. A key feature of the mobile app 'Plantix' is automated disease diagnosis. Farmers can upload a photo of their infected crop and the app will provide a diagnosis. Besides giving a diagnosis and steps to mitigate the disease, the app also provides information on preventing the disease in the next cropping season. Farmers are also presented biological treatment options for pest and disease control. Given the rampant overuse of chemical pesticides in India, the app will also help disseminate best practice methods to reduce pesticides. The app also features a library of diseases which farmers can refer in case there is no connectivity. Plantix, developed by the German start-up Progressive Environmental & Agricultural Technologies (PEAT) in collaboration with its knowledge and extension partner, the International Crops Research Institute for the Semi-Arid tropics (ICRISAT) and the Acharya N.G. Ranga Agricultural University, currently has a database over 60,000 photographs and covers 30 crops in India, 60 crops worldwide and has prescriptions for over 200 crop diseases. Every time a farmer uploads a photograph for diagnosis it will be time marked and georeferenced. Hence, the database

Biological control or bio-control constitutes a deliberate attempt to use Natural enemies either by introducing new species into the environment of a pest or by increasing the effectiveness of those already present

also facilitates pest and disease outbreak monitoring and can send early warning messages for specific locations.The app can be downloaded on any Android-based mobile device. For farmers without a smart phone an extension worker or farm facilitator or progressive farmer equipped with a tablet or smart phone can be the mediator. To overcome connectivity issues, photographs can be taken and later uploaded when internet connectivity is available.

CROP PROTECTION CHALLENGES

The size of the spurious pesticide market in India is as high as 30% by volume and 25% by value. The spurious chemicals market is growing at 20% per year and this will lead to a loss of 10.6 million tonnes in foodgrain production during the current year

There is a significant share of non-genuine pesticides including counterfeit, spurious, adulterated or sub-standard products which are freely available in the market. The size of the spurious pesticide market in India is as high as 30% by volume and 25% by value, according to a study released recently by industry lobby FICCI and the Tata Strategic Management Group. The spurious chemicals market is growing at 20% per year, the study said, adding that this will lead to a loss of 10.6 million tonnes in foodgrain production during the current year. The study, titled Substandard, Spurious/Counterfeit Pesticides in India, predicted that the market for spurious agro-chemicals will reach 40% by value of pesticides sold in the country by 2019.At present, the size of the domestic crop protection industry is estimated at Rs 13,000 crore. Overall, use of fake products can reduce crop yields by 4%, the study estimated, implying a loss of 10.6 million tonnes in food production in the current year.States like Uttar Pradesh, Madhya Pradesh, Andhra Pradesh, Maharashtra, West Bengal, Haryana, Maharashtra, and Karnataka are some of the worst affected, it said.These products are inferior formulations which are unable to kill the pests or kill them efficiently. They also result in by-products which may significantly harm the soil and environment. Apart from crop loss and damage to soil fertility, use of non-genuine products leads to loss of revenue to farmers, agrochemical companies and government. "The Crop protection industry in India has been facing major challenges like influx of counterfeit crop protection solutions, which affects food production, the health of farmers and consumers, and the overall environment. In India, as per the FICCI and TATA Strategic Management Group reports, the industry estimate the non-genuine pesticides could account for more than 40% of the pesticides sold in India in FY14. The situation needs to be addressed to curb further proliferation. Stringent procedures are required by the customs to identify and analyse chemical compounds in the various entry points. Recently Punjab Government took stringent steps against such dealers and

manufacturer after epidemic of whitefly in the year 2015. If other state governments take similar action, such unscrupulous pesticides can be stopped. These pesticides are imported by wrong declaration by scruples manufacturers, and Central Government should take stringent action against such culprits," says **Shri R. G. Agarwal, Chairman, Dhanuka Agritech Limited**.

Indian manufacturers places low emphasis on R&D, and hence our share of novel molecule is comparatively less. Indian Companies spend only 1-2% of their revenues in Research and Development as against the global MNCs which invest about 8-10% of their revenues. This makes Indian manufacturers uncompetitive globally in specialty molecules.

Misdiagnosis often leads to use of incorrect pesticides which not only increases the unnecessary cost on the part of farmers but also leads to significant yield losses. Lack of awareness among farmers is one of the key reasons behind it. Also lack of a disease diagnosis system by certified agriculture professionals make the practice of plant heath management unscientific. It is important to educate the farmers about the appropriate kind of pesticide, its dosage and quantity and application frequency. However it is not easy to reach the farmers owing to differences in regional languages and dialects and a general inertia towards adoption of newer products on account of possible risks of crop failure. The main point of contact between the farmers and the manufacturers remain the retailers who don't have adequate technical expertise and are thus unable to impart proper product understanding to the farmers. It is also very difficult for the farmers to convey their needs effectively to the manufacturers.

Misdiagnosis often leads to use of incorrect pesticides which not only increases the unnecessary cost on the part of farmers but also leads to significant yield losses. Lack of awareness among farmers is one of the key reasons behind it

Pesticide resistance is another phenomenon that has been reported to be quite prevalent currently. The inability of the regularly used pesticide to manage the pest arises out of natural selection. Even indiscriminate use of pesticides have also led to development of pesticide resistance. A similar phenomenon, pest resurgence is also associated with plant protection. Pest resurgence is the rapid reappearance of a pest population in injurious numbers, usually brought about after the application of a broad-spectrum pesticide has killed the natural enemies which normally keep a pest in check. The issue can only be counteracted if the pesticide manufacturers constantly upgrade and update with the pest scenario existing in the country.

Pesticide residue is another serious problem faced by the Indian agriculture. Use of pesticides above the prescribed limit adds to the presence of pesticide residue beyond the acceptable levels in the final produce. There have been several instances where consignments have been rejected and certain products banned for the presence of pesticides above their prescribed limits. Basmati rice export is a classic case that has constantly experienced the curse of pesticide residue. Several US-bound consignments were rejected due to the presence of traces of pesticides

such as Bavistan, Isoprothiolane and Tricyclazole that have not been registered with the US Food and Drug Administration (USFDA). In June 2010, a Hamburg-based lab issued reports to buyers objecting that organic Basmati rice imported from India had elevated levels (0.03 percent) of Carbendazim and Isoprothiolane. This stalled the export of 20,000 tonnes of organic rice from India. In 2010, the European Union (EU) rejected three consignments of bhindi from India because of the same reason. Higher levels of monocrotophos, acephate and triazaphos residues were found in these consignments. As a result, the "Monitoring of Pesticide Residues at National Level" scheme has been initiated for monitoring and analysis of pesticide residues in agricultural commodities in different agro-ecological regions of the country. During the last five years, the incidence of residues in various commodities has shown an increase from 1.2 per cent to 2.6 per cent. The Department of Agriculture has taken a number of measures to ensure that chemical pesticides are employed as a last resort to pest management

department has revised 68 Integrated Pest Management (IPM) Packages of Practices for major crops giving impetus to ecological and cultural techniques of pest management. Capacity building and training programmes are held annually to sensitize stakeholders (farmers, extension officers, pesticides dealers, etc) about various facets of pest management. "Grow Safe Food" Campaign has been launched to create awareness among the stakeholders regarding judicious use of Plant Protection chemicals.

Crop protection is significant to India's agriculture. Amidst the threat of dwindling resources and consistently peaking demand for food, it becomes imperative to protect the food produced. Suitable crop protection techniques and a permanent plant health management regime can raise the productivity and stability of Indian agriculture.

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'SOLUTIONS FOR CONTROLLING PESTS & DISEASES REMAIN ESSENTIAL FOR ENSURING FOOD SECURITY'

As an industry leader with a broad portfolio of fungicides, insecticides, herbicides and seed treatments, BASF has been helping farmers to sustainably increase the yields and the quality of their crops. By nurturing a culture of innovation in alignment with customers' needs, technologies at BASF aim to ensure that crops grow healthier, stronger and more resistant to stress factors, such as heat or drought. BASF also offers a range of smart solutions for pest problems in urban and rural areas. BASF has been continuing its commitment to creating innovative solutions for growers, supporting them with the task of nurturing a hungry planet. In an interview with Agriculture Today, Mr. Rajendra Velagala, Business Director, Crop Protection, BASF South Asia discusses the crop protection trends and overview.

What is the growth rate of India's pesticide industry?

A UN study on global population trends predicts that India will surpass China to become the most populous nation in the world by 2022. To meet the increasing demand for food, India needs to increase agricultural productivity so that farmers can grow more high quality food using the same amount of land and resources. Sustainable crop protection solutions are going to play a very important role in increasing yields and improving quality – and this is expected to drive growth in the industry.

What are the growth drivers of the industry?

The per hectare consumption of pesticides in India is amongst the lowest in the world — 0.6 kg/ha compared to 13 kg/ha in China.It is a very important driver as usage is bound to increase as farmers seek to increase productivity. Labor shortages drive growth in herbicide use as increase in herbicide usage will help overcome the challenge of labor availability by effectively controlling the unwanted weeds.The demand for higher quality produce is driving increased fungicide use: As consumers demand better quality produce, farmers will make more use of fungicides to enhance the quality of their crops. The current labor shortage is accelerating the introduction of slow release or controlled release type of formulations along with active ingredients, giving longer duration of control to the farmer and helping avoid multiple sprays. Seed treatment is another opportunity to introduce innovation. With the increase in awareness of farmers and consumers, the demand for safer and greener chemistries will increase giving more opportunity for crop protection industry. With more and more farmers using smart phones and the internet, digital tools will be a key factor in helping farmers manage their crops better and to learn and apply new techniques and solutions for increasing productivity. At BASF, we have also been focused on these trends and contributing towards the growth of the industry.

What was the role played by crop protection in ensuring India's food security?

India has come a long way from the time it was a low-income food-deficient country. Today, the country is not only self-sufficient in rice and wheat, it also produces over 260 million tonnes of food grains and 269 million tonnes of agricultural produce. The green revolution during the 1960's and 1970's played a key role in increasing the crop production and making India self-sufficient. And innovations like high yielding seeds, chemical fertilizers, irrigation and pesticides all contributed to increasing the nation's food security. But there is still more work to be done. One

of the major issues that still negatively impacts food production is the problem of pests and plants diseases. Every year in India, pests and diseases eat away an average of 20-30% of crops, worth about Rs. 45000 crore. The world over, the damage by fungi to rice, wheat and maize crops alone costs $60 billion per year. a. As such, solutions for controlling pests and diseases remain essential for ensuring food security to the growing population of the country.

Has the objectives and methods of crop protection changed in the recent years to cater to the new and emerging needs of sustainable agriculture?

Indian agriculture has come a long way and the approach has changed from simple promoting products towards promoting more complete solutions to increase the productivity. There is a big focus among industry to promote safe use of crop protection products. Effective soil health management is another area which has seen the active participation of the industry partners. At BASF, we help farmers to sustainably increase the yields and the quality of their crops. By nurturing a culture of innovation in alignment with customers' needs, our technologies aim to ensure that crops grow healthier, stronger and more resistant to stress factors.

How has spurious pesticides affected Indian agriculture?

Using spurious pesticides can prevent farmers from getting the most out of their crops. Farmers' associations, industry players and government bodies must work together in a proactive way to address this. To get the best results, farmers should buy from reputable, authorized dealers, check for quality BASF packaging, and report suspected counterfeits. A FICCI study showed that the current market for counterfeit pesticides is ~INR 3,200 Cr (USD 525 Mio) which constitutes to ~25% by value and 30% by volume of domestic pesticide industry in 2013."

What role can be played by India's crop protection companies to ensure GAP in agriculture?

Good Agricultural Practices (GAP) encompass promoting the right agronomic practices along with safe use practices while conducting farming operations. Crop Life, a leading industry association that BASF is a part of, has been busy promoting this initiative - promoting the right agronomic practice along with the safe use practice, while conducting farming operations. It is important for the farmers to keep the following 9 steps of responsible use of crop protection products in mind while doing farming operations

- Buy agrochemicals only from authorized retailers and ask for a bill
- Never transport pesticides together with food items
- Always store pesticides in a locked and well ventilated place which is beyond children's reach
- Always read product labels and leaflets carefully
- Do not mix the agrochemical with bare hands, use stick for mixing. Wear the right Personal Protection Equipment while mixing
- Triple - Rinse Pesticide Containers
- Wear correct personal protection equipment while spraying pesticides
- Do not throw empty pesticide containers in water bodies or in the field or near livestock and never use empty pesticides containers for storing food
- After spraying pesticides, wash Personal Protection Equipment, wash clothes and take a bath

"Stemming fungal diseases alone in the world's five most important crops could feed more than 600 million people."

As an organization, we are deeply committed to GAP. With our initiatives like 'Suraksha Hamesha', we are at the forefront of promoting safety among farmers. Given our dedication to sustainable farming, in 2016, BASF conducted dedicated Suraksha Hamesha meetings with farmers, with an aim to create a platform to educate farmers and spray men about the 9 steps of responsible use of crop protection products and emphasised on the use of personal protective equipment. We successfully reached out to 23,000 farmers and spray men in 2016. Our aim is to reach out to 40,000 farmers in 2017.

What are the future technologies that are expected in the Indian crop protection segment?

Leading crop protection companies are putting a focus on India to introduce the latest solutions for better crop protection and the country now has quick access to innovative chemistries. Moving ahead, the demand for safer and greener chemistries will increase,which will also create a demand for low dose rate, longer efficacy and high potency chemistries. Innovations in seed treatment products is another area which will be imported in future. Lastly, digitization will play a major role in defining the future course of not only how the companies operate but the future of farming itself.

'PESTICIDES ARE THE MEDICINES FOR OUR CROPS'

Dhanuka Agritech Limited manufactures a wide range of agro-chemicals like herbicides, insecticides, fungicides, miticides, plant growth regulators in various forms – liquid, dust, powder and granules. The Company has a pan-India presence through its marketing offices in all major states in India, with a network of more than 7,000 distributors/ dealers selling to over 75,000 retailers across India and reaching out to more than 10 million farmers. The Company keeps adding new products every year through its collaborations and is continuously on the lookout to bring the latest technology to Indian Farmers. In an interview with Agriculture Today,Shri R. G. Agarwal, Chairman, Dhanuka Agritech Limited discusses the crop protection scenario existing in India.

What is the role of crop protection sector in safeguarding country's food security?

In current scenario, Indian agriculture faces the challenge of having to produce more from less for more to meet the needs of the growing human and animal population under conditions of diminishing water resources, and expanding environmental stress. The current world population of 7.3 billion is expected to reach 8.5 billion by 2030, 9.7 billion in 2050 and 11.2 billion in 2100, according to a new UN DESA report, "World Population Prospects: The 2015 Revision". During 2015-2050, half of the world's population growth is expected to be concentrated in nine countries, India is one of them listed according to the size of their contribution to the total growth. And on the other side, India continues to have serious levels of widespread hunger forcing it to be ranked a lowly 97 among 118 developing countries for which the Global Hunger Index (GHI) was calculated. With increasing population and hunger index graph, we require 450 million tonnes to feed our future generation till the year 2050. While on the other side, crop losses due to pests, diseases, weeds are pulling back our country's economic growth and production. Pesticides protect our crops from weeds, insects, diseases and increase farmer's income. According to the 37th standing committee report by petroleum and chemicals(2002), the total losses caused by weeds, insects, diseases, rodents etc. in India is roughly 28% of our production of food grains amounting to Rs. 90000 crores and over the year it may also increase by few more lakhs. In other words, the production of food grains in 2002-03 was 174.8 million tonnes and the losses were amounting to Rs. 90000 Crore. With present MSP, these losses would be much more approximately Rs. 250000 to 300000 Crore per year. We can't afford these losses and therefore Standing Committee has recommended to increase the use of herbicides and fungicide in its report. By the judicious use of pesticides we may reduce these losses, increase the production and it will help in boosting farmer's income. Pesticides are the medicines for our crops just like pharmaceuticals are for humans.

Despite India ranking low with regards to per hectare consumption of pesticides, the allegation of pesticide residue is quite rampant in India. What is the reason behind it?

At present, per hectare consumption of pesticides in India is amongst the lowest in the world. It currently stands at 0.6 Kg/Ha against 5-7 Kg/ha in the UK and at 20 times i.e., 13 kg/ha in China. Pesticides protect our crops from weeds, Insect, pest and increase farmers income. Even then some NGOs, urbanites, environmentalists and media, due to their own ulterior motives and/or for reasons best known to them, under the garb of saving environment, human concern and safety, have been voicing hoarsely against use of pesticides for raising crops. Recently there was an NGO report suggesting the presence of residue of banned pesticides like Aldrin, Dieldrin, Heptachlor and Chlordane in vegetables and fresh fruits. These pesticides have already been banned in India about 30 years ago and therefore there is no chance to get residues of these pesticides in fresh fruits and

vegetables. According to All India Network Project on Pesticide Residues, Ministry of Agriculture and Farmer Welfare, Government of India analysis, no residue of above pesticide has been found in any of the samples. As per the analysis of more than 1,13,000 samples by All India Network Project on Pesticide Residues, Ministry of Agriculture and Farmer Welfare, GOI, 98% was safe and only 2% sample was found above MRL, much lower than other countries like USA where it was 2.2% (during 2008-13), U.K. 3.4% (during 2008-14), and EU 5.0% (during 2011-13). It proves that the report of NGO is biased and totally erroneous. We should also note that not even single pesticide product is listed as a human cancer causing chemical in Group – I in the Registry of International Agency on Research on Cancer (IARC). Those who frame pesticides industry or/and agriculture negatively probably do not want India to reach a leading position in the field of agriculture in the world. They may be a foreign funded organization or involved in chaotic activities.

What role can crop protection industry play in ensuring scientific and safe application of pesticides?

Crop protection Industry is very sensitive regarding the use of pesticides and following the norms of CIB (Central Insecticide Board, Government of India). In all bottles and packs we provide DFU (Direction for Use) or user manual in all major languages including Hindi and English for making farmers aware of judicious and safe use of pesticides. Besides this, regularly organized training programs, field visits, demonstration on farmers' fields, farmers meeting etc. are adding more weightage in ensuring scientific and safe application of pesticides. Indian Farmer has come a long way from green revolution to self-sustainability and he knows the relevance of integrated pest management (IPM) for healthy crops, high production and profitability.

How significant is good agriculture practices in rendering proper crop protection practices?

The Food and Agricultural Organization of the United Nations (FAO) uses Good Agricultural Practice (GAP) as a collection of principles to apply for on-farm production and post-production processes, resulting in safe and healthy food and non-food agricultural products, while taking into account economical, social and environmental sustainability.GAPs may be applied to a wide range of farming systems and at different scales i.e., in full crop cycle starting from seeding to harvesting. Reducing erosion by wind and water through hedging and ditching, application of fertilizers at appropriate moments and in adequate doses, green manuring, use of hybrid seeds & seed treatment, proper irrigation system, integrated pest management (IPM) etc. are the major focus areas of GAP. By regular monitoring, the farmer may understand the need of crop or identify pests, diseases and weeds at early stage and controlling them at early stage are the safest way of integrated crop management.

Can organic farming effectively contain pest and diseases? Or is it a mere fantasy?

It will not be an exaggeration to say that advocacy against pesticide industry is a sponsored strategy to create a niche for organic produce in a market. Firstly I would like to say, word organic is misused in a terms of organic farming, as per science, organic, means 'carbon based'. Accordingly, we are organic, plants and trees are organic and similarly our food is also organic, because they are all carbon based. To say that organic farming is somehow superior is only a marketing term or we may call marketing propaganda. Many NGOs, urbanites, environmentalists and media used to insist on the sale of organic products, but many of these so-called organic food, which should be totally free of pesticides, have more pesticides than crops grown under modern agriculture with application of pesticides. Analysis of 166 samples by Government Laboratories (AINPPR, ICAR) showed that 27% samples contained pesticide residue in these 4.8% of organic vegetable samples had pesticide residue above MRL. "There are 6.6 billion people on the planet today. With organic farming we could only feed four billion of them. Which two billion would volunteer to die?" Norman Borlaug said.

What are the recent trends in Indian crop protection segment?

Crop protection sector has set a long journey from dependency in 1950 to sustainability at today. Use of pesticides in India began in 1948 when DDT was imported for malaria control and BHC for locust control. India started pesticide production with manufacturing plant for DDT and benzene hexachloride (BHC) (HCH) in the year 1952. In 1958, India was producing over 5000 metric tonnes of pesticides. Currently, India is the fourth largest global producer of agrochemicals after the US, Japan and China. This segment generated a value of USD 4.4 billion in FY15 and is expected to grow at 7.5% per annum to reach USD 6.3 billion by FY20. Approximately 50% of the demand comes from domestic consumers and the rest from exports. During the same period, the domestic demand is expected to grow at 6.5% per annum and exports at 9% per annum.If we examine the history, chlorinated pesticides like DDT & BHC came first which were used in KGs and later on OP Compound, carbamates were introduced which were used in low dose compared to chlorinated pesticides then Synthetic Pyrethroids has come, it was very safe and used in low dose. After that, neonicotinoids were launched which are used as few grams per hectare. Industry is continuously working on R&D for safer molecules and Diamides is the latest technology which is used in very small doses with great effectiveness. The industry is continuously working and bringing new technology to put minimum burden on environment, safe for the human and for increasing productivity & profitability.

CLIMATE CHANGE
CHANGING THE WORLD

Climate is usually defined as the "average weather" in a place. It includes patterns of temperature, precipitation (rain or snow), humidity, wind and seasons. Climate patterns play a fundamental role in shaping natural ecosystems, and the human economies and cultures that depend on them. But the climate we've come to expect is not what it used to be, because the past is no longer a reliable predictor of the future. Our climate is rapidly changing with disruptive impacts, and that change is progressing faster than anything experienced in the last 2,000 years.

The Intergovernmental Panel on Climate Change (IPCC) is a scientific and intergovernmental body under the auspices of the United Nations, set up at the request of member governments, dedicated to the task of providing the world with an objective, scientific view of climate change and its political and economic impacts. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change dispelled many uncertainties about climate change. Warming of the climate system is now unequivocal. It is now clear that global warming is mostly due to man-made emissions of greenhouse gases (mostly CO2). Over the last century, atmospheric concentrations of carbon dioxide increased from a pre-industrial value of 278 parts per million to 379 parts per million in 2005, and the average global temperature rose by 0.74° C. According to scientists, this is the largest and fastest warming trend that they had been discerned in the history of the Earth. An increasing rate of warming has particularly taken place over the last 25 years, and 11 of the 12 warmest years on record have occurred in the past 12 years. The IPCC Report gives detailed projections for the 21st century, and these show that global warming will continue and accelerate. The best estimates indicate that the Earth could warm by 3°C by 2100. Even if countries reduce their greenhouse gas emissions, the Earth will continue to warm. Predictions by 2100 range from a minimum of 1.8°C to as much as 4°C rise in global average temperatures. India is the fastest-growing major economy in the world. It is the fourth largest

greenhouse gas emitter, accounting for 5.8 percent of global emissions. India's emissions increased by 67.1 percent between 1990 and 2012, and are projected to grow 85 percent by 2030 under a business-as-usual scenario (IPCC,2007).

The key environmental challenges in India have been sharper in the past two decades. Climate change is impacting the natural ecosystems and is expected to have substantial adverse effects in India, mainly on agriculture on which 58 per cent of the population still depends for livelihood, water storage in the Himalayan glaciers which are the source of major rivers and groundwater recharge, sea-level rise, and threats to a long coastline and habitations. Climate change will also cause increased frequency of extreme events such as floods, and droughts. Erratic monsoon with serious effects on rain-fed agriculture, peninsular rivers, water and power supply. Drop in wheat production by 4-5 million tonnes, with even a 1°C rise in temperature. Farmers of the countries like India and others, who are dependent on agricultural economy will be worst affected due to change of rainfall pattern and desertification. In near future, the world will be facing scarcity of food and agricultural products. These in turn will impact India's food security problems and water security.

It has been projected that over the next 100 years, the earth surface temperature would increase from 1.40°C to 5.80°C. If it happens, this would be greater than what man had experienced in the last 10,000 years. And it would be accompanied by changes of rainfall pattern and rising sea level across the world. Many of these changes have already started affecting our lives. The abnormal weather conditions are already a reality. For example, the Gangotri glacier in Himalayas is retreating at a speed of about 30 meter in a year. If the present trend continues, then over the next 25 years, the Ganga could initially swell in volume because of increased melting but then dry out as the water supply in the mountains runs low. This will endanger the lives of about 400 million people who live in the river's plains and depend upon it for their supply of water.

Climate change, the outcome of the "Global Warming" has now started showing its impacts worldwide. Climate is the primary determinant of agricultural productivity which directly impacts the food production across the globe. Agriculture sector is the most sensitive sector to the climate changes because the climate of a region/country determines the nature and characteristics of vegetation and crops. Increase in the mean seasonal temperature can reduce the duration of many crops and hence reduce final yield. Food production systems are extremely sensitive to climate changes like changes in temperature and precipitation, which may lead to outbreaks of pests and diseases thereby reducing

harvest ultimately affecting the food security of the country. The net impact of food security will depend on the exposure to global environmental change and the capacity to cope with and recover from global environmental change.

Erratic monsoon will have serious effects on rain-fed agriculture, peninsular rivers, water and power supply. Farmers of the countries like India and others, dependent on agricultural economy will be worst affected due to change of rainfall pattern and desertification. In near future, the world will be facing scarcity of food and agricultural products.

The rise in average temperature, long spells of drought during summers, less snowfall during winters have rendered large area supposed to be marginally suitable for apple cultivation unfit for the same forcing farmers to shift to cultivation of other cash crops. Apple cultivation has been adversely affected in lower areas of Kullu and Mandi districts, and as a result of this, the farmers in the state have shifted to cultivation of vegetables like tomato and peas. In Rajgarh area of Sirmaur district, apple area has been diverted to peach.

When hailstorms and unseasonal rains destroyed large yields of rabi crops in 2013, they were considered to be freak weather events. But farmers of Marathwada region of Maharashtra were hit again in 2014 and 2015. Prior to 2013, the same Marathwada region faced one of the worst droughts in recent history. Since 2009, many regions of India received scanty rain and faced severe droughts.

Central India's Bundelkhand region, a semi-arid area also suffers from inclement weather. Most farmers in this area depend on agriculture alone and grow only one crop a year. Farmers require only a few showers of rain. But the region has been reeling from a long course of drought in the past decade. In Madhya Pradesh (MP) alone, between February and May 2015, around 40 farmers committed suicide or died from stress-related issues arising from the vagaries of monsoon. According to MP government figures, the state was among the worst hit last year, with over 570,000 hectares (1.4 million acres) of rabi crops getting damaged. Unseasonal rain and erratic weather, which has affected Indian farmers,

agriculture, economy, and politics, is no more an aberration, according to global studies.

The climate change in northern India is likely to have a severely detrimental impact on the productivity of wheat, the prime crop in Punjab, which is likely to go down by over 8% by 2035. Temperature in the state is expected to go up by over 1.5 degree Celsius, than that is being experienced in summers at present.

In India, there is a long sea coast area over 6000 Km which is densely populated facing severe threats by the sea. A 1-metre rise in sea level would displace about 7 million people in India. If the earth's surface warms by about 2 °C, sea levels are expected to rise because of two factors: first, glaciers and polar ice sheets will melt and release water into the seas and oceans. Second, water will expand due to heating and also contribute to a rise in sea level. By 2100, a rise of about 9 cm to 88 cm is expected which will have a physical impact on coastal areas by increasing flooding and the intrusion of salt water. Low-lying areas of the world may be submerged leaving the people who live there homeless and landless. In the developing countries and small island states, coastal areas are densely populated and millions of people are likely to be affected - about 7 million people in our own country are projected to suffer from the effects of a 1-m sea-level rise. Sea level rise may have a physical impact on coastal areas and islands. People living in low lying areas like Bangladesh is living with the fear of severe flooding. Flooding is a major problem as the flood cannot be drained away. Low-lying coastal cities such as Mumbai will be at the forefront of impacts caused due to the sea level rise, changes in water regimes, saltwater intrusion, siltation and land loss.

Studies indicate that over 50% of India's forests are likely to experience shift in forest types, adversely impacting associated biodiversity, regional climate dynamics as well as livelihoods based on forest products. Average temperature changes are likely to cause some of India's forests areas to dieback. Climate change will also endanger a significant number of plant and animal species. There is a serious threat to species living in Sunderbans due to sea level rise. Heritiera fomes (mangroves), the dominant species of this area is threatened due to inland movement of saline water. With rise in the salinity, the plants are losing their red and green colors becoming like bare twigs. This is destroying the wild life of the region especially the number of Royal Bengal Tigers is fast depleting.

Possible Remedies

Reducing green house gases emission for the mankind is the toughest challenge today. Moving from fossil fuels to renewable energy is one answer to reduce green house gase emission. Countries will have to adopt renewable technologies. Developed countries used fossil fuels for decades. They continue to have high emission rates of green house gases. Cutting the use of fossil fuel and using fuel cell (Hydrogen) & Solar Powered Vehicle, they must lead the way to reduce green house gases emissions.

Deforestation currently accounts for around 20 percent of the world's carbon emissions. A normal way out for reducing green house gases is to stop deforestation.

Thousands of organizations all over India have been formed to initiate reforms. These organizations aided by the Govt. have adopted new technologies to develop harvesting process, water management for irrigations in agricultural sectors and filtration of green house gases emitted from industrial sectors. However, a macro level initiative must be taken to meet up the challenge of the global warming and the climate changes.

Another way out is to protect coastal areas especially in tropical countries like India and Bangladesh with forest, managing water resources prudently and strengthening drought and disaster management. In the state of Gujarat no one needs to tell the villagers that the forests are their life line. Thousands of forest protection committees have been formed by the villagers to work with the forest department to protect the forests.

There are many ways that your actions as an individual will add up to help meet local emissions reduction goals, national goals, and ultimately the goal of reducing global emissions enough to prevent the effects of catastrophic climate change. In doing so, your efforts will help your community become more sustainable and economically resilient.

Dr Loveleen Kaur Brar (Scientist B)
Pushpa Gujral Science City

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OATS: AN ECCENTRIC PACKAGE OF NUTRIENTS

An evidence-based, prevention-oriented, population-wide life cycle approach to preserving health includes strategies for both the general population and those at high risk of disease. There is need to explore the optimal dietary pattern to maintain a good health status. It's well known, in fact, that nutrition is capable of substantially modifying the risk profile of a subject in primary and/or secondary prevention.Cereals are staple foods, and are the good sources of macronutrients like energy, carbohydrate, protein and fibre, as well as a range of micronutrients such as vitamin E, some of the B vitamins, magnesium and zinc. Evidence shows that regular consumption of cereals, specifically wholegrains, have preventive action in chronic diseases such as coronary heart disease, diabetes and colorectal cancer.

The oat grain is a wholegrain cereal that has been consistently viewed as a healthy choice, oats have been recommended for several therapeutic diets, including heart health, gut health and weight management. The oat *(Avenasativa)*, sometimes called the common oat, belongs to the Poaceae family.

It is best grown in temperate regions. They have a lower summer heat requirement and greater tolerance of rain than other cereals, such as wheat, rye or barley, so are particularly important in areas with cool, wet summers.They are annual plants, and can be planted either in autumn (for late summer harvest) or in the spring (for early autumn harvest).

They are considered as healthy grain due to their rich content of several essential nutrients. In a 100 gram serving, oats provide 389 calories and are an excellent source

(20% or more of the Daily Value, DV) of protein (34% DV), dietary fiber (44% DV), several B vitamins and numerous dietary minerals, especially manganese (233% DV). Oats are 66% carbohydrates, including 11% dietary fiber and 4% beta-glucans, 7% fat and 17% protein

TYPES OF OATS

Oat Groats

The whole oat as it is harvested from the grain but "de-hulled" so that the inedible husk has been removed and the oat has been cleaned, making it safe to eat. These oats can take up to an hour to cook.

Steel Cut Oats/ Oat Kibble/ Irish Oatmeal

Oat groats are cut into 2-3 pieces with a steel blade (before being rolled). Cutting the oat exposes more surface area which can be penetrated by water during cooking, making it quicker to prepare than an oat groat (around 30 minutes).

Scottish Oats

The Scots traditionally stone ground their groats and then roll them rather than rolling out steel cut oats. The result are rolled oats that naturally vary in size and can help deliver a creamy textured oatmeal.

POTENTIAL HEALTH BENEFITS:

- Oats lower the cholesterol because soluble fiber(β- glucan) trigger to pull LDL-C from the bloodstream for excretion. β- Glucan helps to trap the cholesterol in the gut and prevent it from entering the bloodstream.
- Maintaining a healthy blood pressure is key to controlling chronic disease risk. The scientifically supported dietary approaches to stop hypertension (DASH) diet encourages consumption of whole grain cereals along with fruits, vegetables and low fat dairy which aid to manage the hypertension.
- It improves heart muscle function and slows the development of clogged arteries, known as atherosclerosis by maintaining endothelial function. In addition, antioxidants in oats (Avenanthramides) help to reduce the inflammation and improve blood flow.
- It delays the sugar uptake in the GI(Gastrointestinal tract), which help in controlling the blood sugar levels as well as improve insulin response.
- It provides the feeling of fullness for longer time than any other breakfast because its viscosity slows the rate by which the food leaves the stomach and signals the appetite controls in the gut.
- It promotes the healthy digestive system as the fibre content of oats helps to increase the frequency and quantity of output (intestinal transit time). Thus, influence variety of health concerns like obesity, allergy, immune function, skin problems and even some forms of cancer.

DIETARY FIBRE CONTENT OF DIFFERENT TYPES OF CEREAL PER 100G

	Oats	Whole wheat	Brown rice	Barley
Total dietary fibre (g)	9.5	11.3	3.2	11.7
Insoluble fibre (g)	6	10.6	1.6	5.2
Soluble fibre (g)	5	1.6	<0.1	5.4
ß-glucan (g)	3.4	0.7	0.1	4.4

Source: Food Standards Australia and New Zealand 2010 and courtesy of Grains & Legumes Nutrition Council, various sources.

Muesli Oats
Muesli oats are rolled to a greater thickness than other rolled porridge-type oats. As with other rolled oats, the oats are often kilned to give them a "nutty" taste and help prevent rancidity and then steamed and rolled to the desired thickness

Traditional/ Rolled Oats/ Oatmeal
As with muesli oats, these are steel cut oats which are then kilned, steamed and rolled to a specific thickness. They generally take around 2-5 minutes to prepare

Quick Oats
Quick oats are the same as other rolled oats, taking the steel cut oat groats and then kilning, steaming and rolling the oat. They are simply rolled thinner to allow the oat to cook more quickly; around 90 seconds to prepare in the microwave

SUSTAINABLE QUALITY

Oats have value as a key component of the agriculture system that includes several other crops in rotation. It

- Protects the earth by reducing the need for herbicides by developing a dense cover that shades competing weeds, so there is less risk of pollutants and ground water contamination.
- Take less nitrogen and nutrients from the soil compared to other crops.
- Preserve water, as they flourish with less water than most crops.
- Save the soil by controlling erosion
- Give back their leftover hulls in multiple ways: renewable energy source and an excellent fibre source, thus avoiding landfills.

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Marketing of Cattle Dung for Periurban Agriculture

A Case Study at Anand, Gujarat

India ranks first in milk production, accounting for 18.5% of world production. At the other side of it, total GHGs emission from Indian livestock is estimated at 247.2 Mt in terms of CO2 equivalent emissions. Although the Indian livestock contributes substantially to the methane budget, the per capita emission is only 24.23 kg methane/animal/year. In the past two decades, India has been experiencing a dramatic growth in urban population. The latest census (2011) specifies that 32 per cent of the population lives in cities which makes a growth of 5 per cent in comparison with 2001 census. Urbanization is one of the key drivers of change in the world today as the world's urban population will almost double from the current 3.5 billion to more than 6 billion by 2050. It is a challenge not only for urban areas but also for rural areas. Supporting the most vulnerable group in an urbanizing world, demands discussions on food, agriculture and cities in the context of rural-urban linkage. India's population is more than one thousand million people and out of which 35-40 percent of population currently lives in cities. This proportion is expected to increase to about 60% by 2025. India is not only the largest milk- but also the largest cow dung producer worldwide. In parallel to the milk industry, also the occurrence of dung will further grow from an estimated current total output of 2 million tonnes of dung per day to over 3 million tonnes in 2022. A dairy cow produces about 115 pounds of manure each day, carrying on an average 10 Pounds Nitrogen, 4 Pounds Phosphorus and 8 pounds Potassium per tonne of manure. Although nutrient content per pound may seem small, still this is equivalent to 200 to 600 pounds of nitrogen per acre. Production of dung from cattle not only has negative impact on climate change but also creates a

routine headache among the farmers due to piles of cow dung heaps in their courtyard.

Anand is known as the milk capital of India. Economy of Anand is very vibrant which ranges from farming to large scale industries. Major crops include Tobacco and Banana. Tobacco requires one time application of dung for cultivation, but Banana requires a continuous supply of dung to support its production. Besides that, ginger and garlic production demands more dung for organic production on a continuous basis.

Different forms of dung like cakes, powder and organic biodiesel gears up dung demand in periurban parts of Anand city. "Cleanliness is Godliness" is the mantra of Mahatma Gandhiji, Father of Nation and people of Anand are more proactive towards Swachhatta; that gives a sense of sanitized society in coming days. Piling of Dung, hygiene and sanitation around the cattle shed, proper pricing of dung, labour problem for loading and unloading of dung, lack of knowledge of proper dung disposal are some major problems faced by the dairy owners on a routine basis in this area. Around Anand city, in the villages both organized and unorganised dairy farms exist. Every day milk production has been systematized in presence of Gujarat Cooperative Milk Marketing

Federation and its cooperative channels. Similarly, farmers are also handling feed problems through proper storage and its management. But, dung disposal has emerged as a major thrust area for dairy farmers.

It has been observed that dairy farmers who have semi-plaster or muddy cattle shed is selling cow dung to trader at Rs 600 - 650 per tonne whereas, its selling price lies between Rs 800-850 in plastered cattle shed. It may be due to addition of dirt with dung that may be reducing the value in further marketing processes. Trader is carrying one tonne of dung at a time in which labour cost was added up to Rs 300/- per tonne for digging, loading, unloading and levelling of cow dung per one complete carting. Transportation cost also varied from Rs 300-350 per tonne according to distance and time considered in each carting. In this way the market value of cow dung was increased up to Rs 1200-1400 per tonne in suburban region of Anand district. Again value addition of cow dung has been changed from traditional vermicomposting to current granules and liquid biofertiliser. Here one big cow dung processing industry has been set up very near to Anand city, at village Sunderpura. That Industry processed the cow dung into liquid biofertiliser, powder granules and even biodiesel. The processed liquid and powdered granule are used rampantly in nursery and kitchen gardening. The dry cow dung is also available in two price rates in the particular district. The small size cake (appx. Diameter 10 cm) has been sold at Rs 25/- per kilo whereas larger cake (appx. Diameter 25 cm) has been sold at Rs100/- per kilo. The market of cow dung has been showing positivity due to its use as fuel and fertilizer. These days' dairy farmers of Anand district are also mixing cow dung with potato and sugarcane residues and making its more viable for fertilizer purpose. There two residues are found profusely nearby the city itself which gives scope for further new contract farming model in coming future.

It is a win-win situation for all the stakeholders. Though dung is a routine problem for dairy producers as it is estimated that on an average a 500 kg body weight dairy animal produce 20-30 kg cow dung per day. So its disposal is necessary. But for periurban cultivators, it is a boon. Organic residues intact in cow dung helps the plant to grow in a sustainable basis. Processing industries emerging in this area are also helping the periurban cultivators and dairy producers as well. Cleanliness is also managed during this process.

Shakti Ranjan Panigrahy, Dilip Vahoniya, Assistant Professor, International Agribusiness Management Institute, AAU, Gujarat

Mushroom Cultivation to Uplift Rural Livelihood

Mushroom cultivation is one of the agricultural activities in which rural youth can play a vital role without sacrificing their household responsibilities. It can provide self-employment and earn extra money for both the semi-urban and rural areas, especially suitable for small, marginal poor farm household, farmwomen, landless labourers, rural unemployed youth and even retired or in-service person in order to raise their social-economic status. Apart from the socio-economic status of the mushroom growers, it not only solves the problems related to employment of both literate and illiterate person (specially women) but also serves as an alternative source of income to uplift the living standards of poor people and also add high quality protein in their daily diets to eradicate malnutrition problems. There is no skilled labour and capital required during initial stage. Its relevance in the present scenario where the agricultural land is decreasing, is very high as the mushroom cultivation is an indoor affair. It is highly women friendly in nature and will provide them with more opportunities for cultural, societal, and technical education in improving the quality of family and community life by income generation.

Agriculture is the livelihood of majority of the rural population of India, with over 80% of the cultivators as small and marginal farmers. High labor-land ratio and alarming rate of population growth may pose a threat to our food security in the very near future. In addition to their role in agricultural production, women are gainfully employed in agri-based allied activities like dairying, animal husbandry, poultry, goatery, rabbitry, beekeeping, mushroom cultivation floriculture, horticulture, fruit preservation, post-harvest technology, value added food products, etc. Cultivation of edible mushrooms is one of the most economically viable processes for the bioconversion of lingo-cellulosic wastes. Mushroom cultivation is simple, low cost, labor intensive and suitable for rural areas which can provide employment for rural, urban, poor and marginal people in many developing countries. Mushroom cultivation will improve the socio-economic condition of farmers, families and solve employment problems of both literate and illiterate, especially women.

Recently, unemployment is increasing rapidly both in developed and developing countries. In this situation, self-employment can be one

important way to increase employment rate for small and marginal poor farm households for generating employment; and earning extra money. They can easily cultivate mushroom in their home yard because it requires small piece of land where mushrooms can be grown. The objectives of rural development in developing countries are mainly diversification of rural income and attaining a competitive structure for agriculture in order to increase job opportunities and development.

It has been observed that the employment opportunity has been squeezed in the Government sector due to scarcity of funds as well as imposition of restriction by different financial agencies. In India, 70% of the total population depends upon the agriculture and allied sector directly or indirectly. So self-employment opportunity can be created easily in rural areas through agriculture and allied sector.

Mushroom farming today is being practised in more than 100 countries and its production is increasing at an annual rate of 6-7%. In some developed countries of Europe and America, mushroom farming has attained the status of a high-tech industry with very high levels of mechanization and automation. Present world production of mushrooms is around 3.5 million tonnes as per FAO Statistics and is over 25 million tonnes (estimated) as per claims of Chinese Association of Edible Fungi. In Indian context, the mushroom production systems are mixed type i.e. both seasonal farming as well as high-tech industry. Mushroom production in the country started in the 70s but growth rate, both in terms of productivity as well as production has been phenomenal. In seventies and eighties, button mushroom was grown as a seasonal crop in hills, but with the development of the technologies for environmental controls and increased understanding of the cropping systems, mushroom production shot up from mere 5000 tonnes in 1990 to over 1,00,000 tonnes in 2010. Today, commercially grown species are button and oyster mushrooms, followed by other tropical mushrooms like milky and paddy straw mushroom etc. The nominated areas of production in India are the temperate regions for the button mushroom, tropical and sub-tropical regions for oyster, milky, paddy straw etc. Two to three crops of button mushroom are grown seasonally in temperate regions with minor adjustments of temperature in the growing rooms; while one crop of button mushroom is raised in North Western plains of India seasonally. Oyster, paddy straw and milky mushrooms are grown seasonally in the tropical/sub-tropical areas from April to October. The areas where these mushrooms are popularly grown are Orissa, Maharashtra, Tamil Nadu, Kerala, Andhra Pradesh, Karnataka and North Eastern region of India. Some commercial units are already in operation located in different regions of our country and producing quality

mushrooms for export.

India produces about 600 million tonnes of agricultural waste per annum and a major part of it is left out to decompose naturally or burnt in situ. This can effectively be utilized to produce highly nutritive food such as mushrooms and spent mushroom substrate can be converted into organic manure/ vermi-compost. Mushrooms are grown seasonally as well as in state-of-art environment controlled cropping rooms all the year round in the commercial units. Mushroom growing is a highly labour-oriented venture and labour availability is no constraint in the country.

Opportunities

Mushrooms can play an important role contributing to the livelihoods of rural and urban dwellers, through food security and income generation. Mushrooms can make a valuable dietary addition through protein and various micronutrients and coupled with their medicinal properties, mushroom cultivation can represent a valuable small-scale enterprise option. Mushrooms can be successfully grown without access to land and can provide a regular income throughout the year. Growing mushrooms also helps avoid some of the challenges facing collectors of wild fungi, including species identification, obtaining

Profit after cost-benefit analysis to produce in one quintal of substrate (Fresh straw) for oyster mushroom

Particular	Quantity	Rate (Rs.)
Mushroom seed (Spawn)	4 kg	400/-
Fresh Straw	100.0 kg	500/-
Choaker	10.0 kg	100/-
Chickpea flour (Besan)	10.0 kg	240/-
PP bag	34 no.	50/-
Bavistin	30 g	20/-
Formalin	200.0 ml	80/-
Other	-	200/-
Total cost	-	1590/-
Gross income	-	7500/-
Net income	-	5910/-

access and permits for collecting and practicing sustainable harvest. Cultivation is also independent of weather and can recycle agricultural by-products as composted substrate which, in turn can be used as organic mulch in growing other horticultural crops, including vegetables. Mushroom cultivation is highly combinable with a variety of other traditional agricultural and domestic activities and can make a particularly important contribution to the livelihoods of the disabled, women and the landless poor who with appropriate training and access to inputs can gain financial independence and self-esteem through income generation. However, any interventions to promote livelihood activities should be carefully planned and it is important at the outset to agree with potential mushroom growers: cultivation objectives and the skills, assets and resources available, as well as to identify what market opportunities exist, should they wish to trade their harvested crop.

Cost benefit analysis in mushroom business

Before starting the business in mushroom, information regarding expenses incurred in this business, such as mushroom hut, straw, spawn (mushroom seed), Chickpea flour (besan), polypropylene bag (pp bag) and chemicals etc. and income generated from sale of fresh mushroom and its value added product such as powder, soup, curry, chutney, murabba, chips, ketchup, pickles etc. is very essential for cost benefit analysis.

As a livelihood diversification option, mushroom cultivation has enormous potential to improve food security and income generation, being fast yielding and nutritious food with great medicinal value. Cultivation does not require any significant capital investment or access to land, as mushrooms can be grown on substrate prepared from any clean agricultural waste material. It can be carried out on a part-time basis, requires little maintenance and is a viable and attractive activity for rural, peri-urban and urban dwellers, in particular women and people with disabilities. Through the provision of income and improved nutrition, successful cultivation and trade in mushrooms can strengthen livelihood assets, which not only reduce vulnerability to shocks, but enhance an individual's or a community's capacity to act upon other economic opportunities. The cultivation of Pleurotus mushrooms requires less elaborate technologies. It can be easily adapted in rural areas as it can utilize farm wastes and could be an avenue to solving problems associated with deficiency of proteins, minerals and vitamins. During the last two decades, cultivation of Pleurotus mushrooms has become popular worldwide because of their desired attributes. These attributes include: the wide choice of species for cultivation under different climatic conditions, ability to grow on a variety of agricultural and industrial wastes, and their richness in culinary and nutritional values. The other tropical mushrooms viz., paddy straw (Volvariella spp.), milky mushroom (Calocybe indica), reishi mushroom (Ganoderma lucidum) and black ear (Auricularia polytricha) can also be grown at different temperatures in different seasons which needs to be intensified, thus enabling the cultivation of mushrooms throughout year. Awareness and training on mushroom cultivation has helped in income generation, nutrient supplementation for farm women. Farmers have realized the importance of mushroom and incorporated it in their diet. It also provided an opportunity to strengthen the link between farmers and scientists which helped in technology dissemination and overall development for weaker section.

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AGRICULTURE TODAY

'Bharat' on the anvil of a new-age green revolution

Indian agriculture with its unique attributes is acknowledged to be unparalleled in the world. No other country have over 500+ million people actively engaged in agricultural activities. India's farmers work in every known agro-climatic zones, from snow-covered alpine meadows high in the Himalayas to deserts and coastal plains.

In the wake of increasing food demand, shrinkage of agricultural land, low yield, water scarcity and climate fluctuations among others, new age technologies such as water harvesting, micro irrigation and mulching for water conservation, crop management technologies and high-tech agriculture production practices like'protected cultivation' is gradually gauging attention of various regulatory authorities to turn the sector lucrative.

India is embracing 'protected cultivation' with a renewed vigor as companies involved in the technique are anchoring the famer community across the country while enabling them to avail path-breaking solutions that not only protect the crops from natural calamities like wind, high rainfall & temperature, hail storms etc., but also helps to maintain a controlled environment to produce higher yields in a shorter gestation period.

Protected cultivation is also an excellent practice to save water as it employs polyfilm & shadenets which reduces evaporation by almost 30%. The advanced techniques under the practice also enable cultivation in problematic soil conditions such as barren and unfertile land with the use of technologies like Soilless cultivation, Nutrient Film Technique and Hydroponics among others.

However in India, the agricultural research and adoption of innovative techniques is still in the infantile stage. Lack of co-ordination between the farmers and the research laboratories has left the industry parched for new ideas and innovative farm practices leading to lower agricultural yield.

'Protected Cultivation' being a totally customized, efficient and long-life system practice, apart from augmenting the quality and generating high yields, also ensure water conservation, reduced pesticide usage as well as manpower. Currently, there are more than 55 countries in the world where cultivation of crops is undertaken on a commercial scale under cover and it is continuously growing at a fast rate internationally.

With the rising involvement of the government national boards and the respective state agricultural

agencies, the area under protected cultivation is expected to grow at a CAGR of 84.2% for the period FY'2013 to FY'2017.This leaves a huge scope for the Indian agricultural markets to catch up with the new revolution.

Protected cultivation can offer a number of advantages which include year round production, multiple cropping, cultivation of exotic vegetables & flowers and increased productivity by almost 2-5 times as compared to open field conditions amongst others. The practice while combating adverse climatic conditions makes cultivation of vegetables possible in areas where it is not possible in open conditions such as high altitudes deserts and barren lands.

While a green-house is an enabler to control temperature, humidity, light intensity and carbon dioxide; shade nets available in different shade factors & colors are ideal to prevent plant burn and overheating within the Greenhouse/Nethouse apart from rendering protection from birds, insects, heavy rains and excessive water evaporation.

In the process of protected cultivation, primarily shade nets are used to protect the yields against weather risks such as restricted UV action, reduced crop desiccation, improved ventilation and reduction in temperature range variations. Among additional applications they protect the yield against the effect of frost by crystallization of water droplets and since they have a high resistance to tearing, they form an ideal solution for protection against hail.

Apart from disbursing subsidies for protected cultivation, farmers need to be guided on implementation tactics and available avenues for availing the rebates. The government has currently rolled out a slew of measures to propagate the practice by allotting financial support through schemes like NHM, NHB, RKVY among others; technological and market support through Farmer Producer and technical support through District Horticultural offices and technical support through District Horticultural offices (HTC), PFDC and MACP amongst others.

The government has currently rolled out a slew of measures to propagate the practice by allotting financial support through schemes like NHM, NHB, RKVY among others; technological and market support through Farmer Producer and technical support through District Horticultural offices and technical support through District Horticultural offices (HTC), PFDC and MACP amongst others.

The practice of 'protected cultivation' has aided a number of new developments lately to the advantage of the sector which are all poised to gradually redraw the very dynamics of the industry. For instance in the absence of suitable soil; 'soilless technology' through water reuse and recycling enables conservation of water and fertilizers upto 70% and 50% respectively. Similarly 'hydroponic growing'which adds an extra crop rotation per year increases crop yield weight by up to 30 percent or to a specific market weight. With huge initial investments involved and in the absence of subsidy funds, low-cost structures such as Wire Rope, MS Angle, & Bamboo can be encouraged.

While there is a consistent growth seen in the area under protected cultivation in states of Gujarat and Maharashtra; the current signs evidently advocate it is high time for the adoption to seep through other states of the country as well. Farmers are taking efforts and are switching to shade net house that have shown remarkable growth in horticultural crops and orchids and other exotic variants.

Demand for healthy organic food is increasing at a faster pace in India and there is no option but to increase the yield per acre. Association with other countries and continuous financial assistance from state governments will definitely bring about revolutionary boost to protected cultivation in India. Protected cultivation is a better alternative that will not just bring in a significant boost to the production volumes but will also give higher return on investments to farmers. This is turn will play a critical role in up scaling the socio-economic status of the farmer community and thus building a better 'Bharat'.

Mr. Shujaul Rehman, Chief Executive Officer, Garware-Wall Ropes Ltd.

GROUP FARMING FOR EMPOWERMENT

Thirty five acres of land at Sadivayal Village, Thondamuthur Block, Coimbatore District is now home to successful organic farming. A major tribal belt of Irulas community constituting 44 households, the farmers primarily relied on monsoon for farming. In the absence of irrigation facilities, rice was cultivated once a year. However, as agriculture production is not sufficient for most of the families to sustain them throughout a year, villagers also resorted to daily wage labour activities in nearby forest area.

Amrita Farmers Groups is a collaboration to improve the livelihood of poor and marginal farmers by bringing them into groups by adopting innovative agricultural activities and to improve the overall security of farmers- food, social , health and safety. After various discussions with farmers' groups, Amrita SeRVe(Amrita Self Reliance Village) team came to the conclusion that to enhance the income of farmers, group farming is the best method. The increase in their income would only be possible by group farming and all round support from various line departments using convergence method and the project investment can lead to sustainable livelihood enhancement. It was inferred that training farmers and supplying inputs such as fertilizers and seeds will lead to enhanced agriculture activities leading to economic independence and social empowerment.

On 09 May 2016, a resolution was passed at the village level where 20 most deprived families of the village were selected to start group farming and a bank account the name of 'Amrita Vyavasayam Kulu' was started in Canara Bank, Alandurai. Together they defined the responsibilities and formulated guidelines for internal management. The A.SeRVe team too focused approach to address

various needs of the farmers, starting with the activities like selection of seed,soil testing, seed testing, crop planning, water budgeting and water conservation measures. Upon completion of discussion, farmers began their activities on June 20th 2016.

The group contributed their labour for land clearance, land development, land plotting, constructing water channel and fencing the area. Using convergence method, the tractor for Primary-tillage and cage wheel was rented out from PudhuVaazhvu- farmer's federation and seeds were provided by TNAU and DST Project and the institution and capacity building program was supported by DST-Seeds. The DST project for organic farming at Sadivayail was supervised by Dr. Maya Mahajan, Associate Professor at Department of Chemical Engineering, School of Engineering, Amrita Vishwa Vidyapeetham (Amrita University).

Amrita Sadivayail Vyavasaya Kulu (Amrita Sadivayail Farmers Club) purchased 590 Kg of rice from various sources using convergence method (500 kg using DST-Seed and 90 Kg from Tamilnadu Agriculture university). For one acre of land, 25 Kg of seeds were acquired, at the rate of Rs. 30/Kg. Primary tillage was done using tooth harrow(five tooth).It was used to further loosen the previously ploughed land before sowing. It also helped in destroying weeds that had germinated after ploughing. At the same time, seeds were kept soaked for 24 hours in Beejamridham for seed treatment which prevents and controls seed-, soil-, and air-borne diseases. Seeds were then drained and dried in the bag for 24 hrs in a shady area where air can circulate around the bags. Secondary tillage using cage wheel was also performed to prepare the wet land and final harrowing and leveling was also conducted just before sowing. It helped in breaking the clods and mixing crop residues.

Eight seed beds were prepared at different locations. Pre-germinated seeds were broadcast on the well-leveled seedbed. The seedbed was irrigated three days after sowing with water coming from natural main stream from top of the hill. Farmers applied Jeeva-mridam and Beeja-mridam at regular intervals. Monitoring of the seedbed and regular visits were done to observe occurrence of pests or diseases. 26 days old seedlings were transplanted to the prepared paddy fields. Random planting methods were used for transplantation,where two to three seedlings were transplanted per hill. For one acre, an average of 6 women worked for 1 ½ days. Different groups of women worked for 15 days to finish all 35 acres of land. Water in the paddies was maintained at 3 – 5 cm depth during most of the growing period.

Farmers used hand-weeding method to remove weeding at regular intervals of time. The crop duration until harvest took 140 days, out of which the farmers applied organic fertilizers and pesticides for 110 days. Direct control of weeds were done through manual weeding which started between 20 -40 days after sowing. After 140 days, the farmers harvested the paddy and sold it for Rs. 28/Kg. The total production from 35 acres amounted to around 3.6120 tonnes(36120 kg) . The farmers sold the straw at the rate of Rs.24.000 per acres. So each farmer earned a profit between Rs 18822 per acres after all other expenses. The farmers' group emerged confident so that in 2017 farmers were ready to go for organic certification to improve the yield and bring back the traditional variety.

The project was planned and executed by Sreeni K.R. Program Manager, Amrita SeRVe under the guidance from Director Swami Jnanamritananda and Co-Director Anju Bist as part of 101 village program.

THE IMPACT OF MERGERS IN AGROCHEMICAL INDUSTRY

The agrochemical industry market is estimatedto reach USD250.5 billion by 2020. The growth can be attributed to a number of factors such as increased participation from private players, innovative farming practices, increased R&D investment, support for Intellectual Property Rights,emergence of a variety of agrochemicals and IT-enabled safety procedures. However, the intense competition between the players has been a game-changing trend in the industry in the past few years. In fact, 2016 was a year of mega mergers in the agrochemical industry. These 'Big Six' players dominated more than 80% of the market share!

DuPont-DowChemical

In December 2015, the US chemical giants DuPont and Dow Chemical announced a merger to form a new entity DowDuPont with a combined market capitalization of about USD130 billion. Post merger, the entity would be split into three independent public listed companies, namely specializing in agriculture, material science and specialty products.The merger will help Dow combine its chemical and trait expertise with DuPont's forte in germplasm and seeds, along with R&D. Both companies are looking at strengthening their global markets, achieve R&D synergies and enable faster allocation of resources after the merger.

ChemChina-Syngenta

In August 2016, the Chinese state-owned chemical company ChemChina acquired the Swiss seed giant Syngenta AG for USD 43 billion. This deal marks the biggest acquisition of a foreign firm in the Chinese corporate history. Syngenta, which currently enjoys the position of market leader in pesticides in North America, is hoping to push its sales in China, the fastest growing agricultural sector in the world as well as the markets in Brazil and UK. In return, ChemChina will become the world's biggest supplier of pesticides and agrochemicals. It will be also able to reduce its dependency on petrochemical and petroleum products, which accounts for almost half of its revenue.ChemChina is also hoping to take advantage of Syngenta's biotech capabilities and spread its geographical presence in emerging nations, especially Africa where the demand for seeds and crop chemical is high.

Bayer-Monsanto

In December 2016, the US agribusiness giant Monsanto approved merger worth USD66 billion with the German company Bayer to form the world's largest seed and pesticide producer. The merged entity will sell 29% of the world's seeds and 24% of the world's pesticides. The deal brings together two vastly different, yet highly complementary businesses under one umbrella.Monsanto's expertise lies in seeds, trait products& big data enabled farming consultancy, whereas Bayer is known for its chemistry expertise and crop science technology.The merged company will be able to cross-sell several products, including pesticides, seeds and chemicals, as well as provide solutions in crop protection and digital farming.

Reasons for Merger

There are several reasons which have pushed these players to shake hands.

The recent fluctuations in currencies, crop prices and crude oil prices have adversely affected the sales and profit margins of agrochemical companies.

The cost of raw materials has gone higher. So, the farmers have reduced spending on crop inputs which translates into lower production and reduced sales for the agrochemical

companies.

The shareholders and investors in these companies are demanding justification for their investment in R&D. Like in the case DuPont, it has invested an average of $2.1 billion in its R&D over the past few years. However, the cash flow is still expected to drop about $500 million from the last year.

These companies are facing regulatory pressures to attest the impact assessment of their products on environment and people's health. The environmentalists are of the opinion that the agrochemical giants do not reveal their research findings in the name of confidentiality which could be detrimental to the environment.

Hence, in order to boost their margins, lower the cost & development time, streamline their workflows and increase the efficiency of the R&D process, the agrochemical companies are vying each other's strengths to capitalize on.

Impact of Mergers

Now, while the mergers have enabled these six companies to re-organize their operations and expand their businesses, it is believed that it will also reshape the industry and have a prolonged impact in various ways:

Lower Competition & Innovation

If only top 4-6 firms will control the market, it will have an adverse bearing on the competition. It will act as an entry barrier for the new or smaller companies which want to introduce new technologies, data science and products in agriculture. Consequently, it will also stifle innovation and advanced developments which will again lead to sluggish improvement in the crop yield and quality. It may be also possible that they concentrate only on making products for the most blockbuster crops, thereby ignoring smaller markets and less profitable crops.

Higher Cost of Input for Farmers

As the number of players reduces in the industry, they will be able to monopolize the prices and variety.The funnel of the products will be quite narrow. The farmers will be left with limited choices of seeds, fertilizers, chemicals and other agri products. They will have to spend more on supplies and pass the cost totheir customers. Due to higher commodity prices, customers may not buy more, eventually resulting in lesser income for the farmers. Moreover, farmers will have to overtly depend on a single crop production, which could be sensitive to ecological changes

and may not yield high produce during certain months or a year.

Wield More Political Power

The behemoths will influence the government and lobby for changing the farming and food production policies to favor their personal interests.They may bring the corporate style of working in the business. They will bring more money and capture power to win over public interest groups and lawmakers. The farmer unions as well as the smaller and independent farmers will have a lesser say in these policies. There are more than 570 million farms in the world. More than 90% of farms are run by an individual or a family and rely primarily on family labor. Their livelihoods may be threatened. The global food supply chain may become unbalanced.

Layoffs in the Pipeline

The mergers will bring synergies in several areas, but not in employment. The companies believe that there could be duplication of skills. This is of course a bad piece of news for the employees working there. For instance, DuPont is planning to cut down its global workforce size by 10% after the merger. It is estimated that more than 6000 U.S. workers could be jobless after Bayer-Monsanto merger. The most severe impact could be on R&D professionals. They may start looking for greener pastures to

save themselves from the cloud of uncertainty looming over their jobs. If the exodus happens, the R&D efforts of agrochemical companies will take a bad hit.

More Mergers on the Horizon

Since these giant companies will make the survival difficult for the smaller players, the industry will witness more mergers and consolidation. The bigger entities will eat the smaller ones, while the large business groups will merge to tap into technical advantage and resources.

Impact of Mergers on the Indian Agrochemical Industry

The nation which has to feed more than 1.2 billion people and is the fourth largest producer of world agrochemical products, is keeping a watchful eye on these mergers. The Indian agrochemical industry is estimated to grow at a CAGR of 12% annually to become $7.5 billion industry by FY19. But, these mergers could put the growth in a downward spiral.

In fact, after the proposed merger of DuPont-Dow Chemical, the Competition Commission of India (CCI) reflected that it was likely to have an adverse impact on the competition in seeds, agrochemicals and material science in India. It was also of the opinion that a corporate driven agro-industrial model could put small, marginal and rural farmers in trouble. India may have to adhere to the Intellectual Property (IP) protection and enforcement requirements as per the wish list of these global MNC agrochemical companies. As a result, they may get exclusive rights, which would further enhance their monopoly power in India.

Organic farming is another reason why the Indian agrochemical industry would be averse to these mergers. On the lines of 'Make in India' and 'Skill India', the ruling government is actively encouraging the Indian farmers to cultivate organic produces. An increasing number of the Indian customers are ready to pay higher prices for organic food, which could enhance the income of farmers. However, the agrochemical corporates could stifle this initiative to promote their products.

On the positive side, the Indian agriculture is opening up to technology. The merged entities could take innovative farming and crop protection techniques to a new level.

The full impact of these mega mergers is yet to be known and realized. But, so far, there has been angst and lots of hullabaloo among the farmers and other stakeholders. Let's wait and watch how the agrochemical industry shapes up in the wake of consolidation.

Sanjay Bansal, Founder and MP at Aurum Equity Partners LLP

ICFA Working Group on Eco Agriculture and Bio Products launched

Dr. Ramesh Chand, Member, NITI Ayog and Sh. P. Rupala, Minister of State for Agriculture launched 40 Member "ICFA Working Group on Eco Agriculture and Bio Products" at New Delhi at the National Conference, participated by global CEOs, heads of businesses, national institutions, VCs, farmer leaders and top experts. The meeting was chaired by Mr. Jalaj Srivastava, Additional Secretaryy Agriculture, Government of India and co chaired by Dr.Shyam Khadka, FAO chief for India.

ICFA hosted CEOs dinner

ICFA hosted CEOs dinner at India International Centre, New Delhi and discussed policy issues concerning agricultural growth. Prominent among those participated were Mr. Jean Paul Deveau, President, Acadian Sea Plant from Canada; Mr. Roger Tripathi, global CEO, Acadian Plan health; Mr. Ravi Verma, MP; His Excellency Mr.Srehin, Secretary General, AARDO; Mr. Salil Singhal, Chairman, PI Industries; Sunil Khairnar, Chairman, ISAP; Dr. Vineet Malviya, CEO Horti, Reliance Retail; Vijay Sardana, CEO - F&A, UPL; Dr. AK Rajput, ED, AIPBA;Tushar Pandey, President, Yes Bank; Dr. Vibha Dhawan, ED, TERI and Dr. Anis Ansari, Chairman, CARD

ICFA receives Veteran journalist Prabhu Chawla

Veteran journalist Prabhu Chawla was received today at ICFA office for discussions on farmers' issues and the role of media. Mr. Chawla expressed his concerns on farmers' agitations and suicides in the states of MP and Maharashtra. He lauded the idea of conclave of farmers bodies in Delhi by ICFA affiliated All India Farmers Alliance on Aug 12 to set the agenda for farm growth and farmers welfare. Chairman Dr. MJ Khan was joined by senior ICFA directors, Kunal Tiwari, ED, CARD and Dr. Dinesh Chauhan, Director, IACG.

ICFA hosted a National Convention of Farmers

Dr MJ Khan, Chairman, ICFA along with ED, Mr NS Randhawa and Director, Mrs Mamta Jain, met with Mr NS Tomar, Union Minister for Rural Development, and discussed critical farm, farmers and rural development issues in view of the current farmers agitation in many states that have the nation gripped in agony and despair on the pathetic state of its farming community. We also discussed the strategy for doubling farmers incomes. The Minister agreed to participate and address the National Convention of Farmers which ICFA is organizing in New Delhi to declare Farmers Charter.

EVERYBODY NEEDS FOOD, NOBODY WANTS TO GROW IT

"Everybody needs food, nobody wants to grow it", said Nana Patekar, recently, from a public platform. The actor-turned farmers' activist was voicing a concern that we all need to think about. A doctor's son wants to be a doctor, a lawyer's son wants to be a lawyer, and an actor's son wants to be an actor, but there's hardly a farmer whose son wants to be a farmer. They are all heading, instead, to cities in search of work. Why? What can be done to make things better? We need to take a close look at the agriculture sector to come up with answers.

Twenty-five-year-old Satwinder Singh, from Punjab, decided to take up a 10-to-6 job as a business executive with an MNC in Gurgaon after completing his Masters from Delhi University. Going back to his village near Ludhiana where his family has been doing farming for generations was not even an option worth considering. He is happy with his job and the amenities of city life which he cannot dream of getting back home in the village. Satwinder is not the only one! His choice reflects a growing mindset —farming is not a career option for the country's youth. It's ironic considering that no other job can provide the same security as farming because people will always need food so there is always money to be made. But the farming sector in in India is not attractive.

Current Scenario and Challenges

This is sad considering India is predominantly a rural economy. But, stark shortage of talent and manpower in the agriculture sector has become a matter of grave concern. Low productivity back-breaking work and

quality of life in the villages dissuades youngsters to take up work and settle down there.

The average per capita food grain production in our country has seen a steady decline in the recent years. India currently tops the charts when it comes to the number of farmers' suicides, which is again an indication of the poor state of agricultural economy. Limited artificial irrigation facilities, high cost of agricultural inputs (such as HYV seeds, fertilizers, crop enhancers, etc.) and modern technology-based machineries, and small and fragmented landholdings are the major problems that plague the Indian agriculture, forcing farmers to be dependent mostly on outdated technologies.

Moreover, India's more than 50 agricultural universities churn out thousands of graduates every year who are either taking up jobs in the government agencies, financial institutions, NGOs, or the private sector, but hardly look upon agriculture as a profession worth pursuing. One reason for this is the rise of aspirations of the rural consumer since the opening up of the Indian economy. We are unable to deliver essential good/services/facilities to our villages. No wonder, farming fails to attract talent and may continue to do so, if necessary steps are not taken. Agriculture must be transformed so that it offers young people an appealing alternative to urban life.

The Solutions: What needs to be done

Clearly, development of the agricultural economy is crucial for dealing with the problem of talent crunch. Here are a few holistic solutions to resolve the crises and deal with the dichotomies that exist at almost every level of the agribusiness value chain:

Farmer Education: Community

participation is indeed the cornerstone of rural development, and implementation of community measures can become successful with enhanced levels of farmer education at the grassroots level. There are probably two ways to do this—one, the Government through its agencies must educate farmers on the latest techniques of seed, agrochemical, and water usage for best yield outcomes, and two, a renewed focus must be put on vocational courses and skill education for people from remote villages, which will help in the creation of a bunch of future ready and progressive rural micro-entrepreneurs to make rural India self-sustainable. Improvements in rural infrastructure such as electricity supplies and access to subsidies and credit could go a long way to support older farmers and encourage their children to stay in farming.

Use of ICT: Leveraging Information and communication technology (ICT) has the potential to create a revolution in the agriculture industry. Be it customized messaging services for weather forecast or use of GPS-based technology for farm-to-folk tracking or renewable energy for power tillage, embracing the right balance of smart, sustainable, and futuristic technologies can make agriculture a viable career option for young Indians. Value added services like Dial for FM or soil testing apps can make farming more interesting and less secluded occupation.

Building Research Capacity: With ever-increasing supply-side constraints in agriculture, Research & Development (R&D) holds the potential to offer long-term solutions for Indian agriculture. Research & Development is surely associated with agricultural productivity. It can also help in overcoming other issues such as seed problems, pest and disease problems, crop sustainability, climate change, irrigation problems, soil erosion, and so on. In fact, adoption of scientific farming practices can revolutionize the dynamics of the whole sector, and once the sector comes to realize this, participation from youth innovators is bound to increase.

Way Forward

Indian agriculture has transformed significantly post-Independence. Multiple factors such as growth in household income, expansion in food processing markets, and increase in agricultural exports has facilitated double digit growth in the sector. But somewhere down the lane, the thrust to project agriculture as an attractive and rewarding career for the youth is still missing, which is leading to the widening talent shortage. Very often, people from the rural areas are somewhat forced to move to cities in the search of better opportunities. In recent times, we have seen efforts in the right direction to mitigate the inadequacies in infrastructure in the rural markets. Technology, coupled with right education and innovation can pave the way for a better outlook for this sector.

Goverment, corporates, agricultural research institutions, and all other stakeholders must come forward together to portray the empowerment of the modern day Indian farmer and move past the rural development agenda which only focuses on poverty alleviation. If agriculture is to be attractive, it has to change. If the PM's recent pronouncements and the Union Budget are any indication, it is happening. Farmers and rural development figured high in this year's Budget speech and the allocation for these sectors is up by 24%. A host of new schemes with generous central allocations, aimed at revitalising the rural economy, will hopefully give farming the much need turnaround and make it worthwhile for the youth.

Ankur Aggarwal, Managing Director, Crystal Crop Protection

GROWTH PERFORMANCE OF MAJOR FLOWER CROPS IN GUJARAT STATE

Over the years, horticulture has emerged as one of the potential agricultural enterprises in accelerating the growth of economy. Its role in the country's nutritional security, poverty alleviation and employment generation programmes are becoming increasingly important. It offers not only a wide range of options to the farmers for crop diversification, but also provides ample scope for sustaining large number of Agro-industries, which generate huge employment opportunities. On account of significant production increases in horticultural crops across the country, a Golden Revolution is in the offing and India has emerged as a leading player in the global scenario. India has now emerged as the world's largest producer of coconut and tea, and is the second largest producer and exporter of tea, coffee, cashew and spices. The exports of fresh and processed fruits, vegetables, cut flowers, dried flowers have also been picking up. As a result of a number of thoughtful research, technological and policy initiatives and inputs, horticulture in India, today, has become a sustainable and viable venture for the small and marginal farmers.

Rising incomes and growing consumers' interest in a variety of fresh fruits and vegetables year-round is stimulating international trade in horticulture. India has several advantages in this sector. It is one of the world's biggest producers of horticultural products. The production costs are less than half of those in other parts of the world. Despite these advantages,

India's share in the global market is insignificant and accounts for only 1.7 per cent of the global trade in vegetables and 0.5 per cent in fruits. India is the second largest producer of fruits and vegetables contributing 10 per cent and 14 per cent, respectively in the world fruit and vegetable production.

Horticulture crops have inherent advantages of providing higher productivity per unit of land compared to other crops in Gujarat as well, resulting in higher income and higher rural employment generation. The horticulture sector is labour intensive providing more employment and because of value addition potential, it gives higher income. Fruits and vegetable cultivation can provide sustained income and work to small and marginal farmers. Horticultural crops include major four groups viz., Fruits, Vegetables, Spices and Flowers with its shares in 2012-13 to the tune of 26,36,37 and 1 percent of the total horticulture area, respectively in the state. The total estimated area under horticultural crops had increased from 5.89 lakh ha during the year 1998-99 to 15.03 lakh ha during the year 2012-13. Similarly, the estimated production of horticultural crops had increased from 59.49 lakh tonnes during 1998-99 to 204.55 lakh tonnes with an average productivity of 13.61 tonnes per ha during the year 2012-13. Gujarat is occupying 4th, 6th and 3rd places in India in production of fruits, vegetables and spices, respectively. The horticulture area is 16.5 per cent of the total agricultural area, while the value of production of horticulture crop is Rs.11000 crores with its share of 23 per cent as against Rs. 48000 crores of total agriculture production.

The area under fruits, vegetables and flowers has been estimated at 3.98 lakh ha, 5.38 lakh ha, and 0.17 lakh ha in the state for the

Compound growth rates and instability index for area, production and yield of Flowers (2002-03 to 2012-13)

Sr. No.	Region	Compound Growth Rates (%p.a.)			Instability Index (I.I.)		
		Area	Production	Yield	Area	Production	Yield
1	Gujarat	13.61	18.64	04.43	03.77	09.71	08.70
2	Saurashtra	15.59	20.39	04.15	12.03	13.11	06.43
3	North Gujarat	07.71	10.60	02.68	06.07	04.44	04.30
4	South Gujarat	17.89	27.89	08.48	05.97	16.75	15.73
5	Middle Gujarat	11.75	12.84	00.98#	05.42	09.52	10.64

*(Note: * indicates significant at 5% level and # indicates non significant. All remaining CGRs are significant at 1% level.)*

year 2012-13, showing an increase of 4.21, 3.87, and 8.27 per cent over the previous year 2011-12, respectively, whereas area under Spices crops have decreased marginally from 5.71 lakh ha in the year 2011-12 to 5.49 lakh hain the year 2012-13. The production of fruits, vegetables, spices & flowers has been estimated at 85.31lakh tonnes, 105.21 lakh tonnes, 12.54 lakh tonnes, and 1.49 lakh tonnes, in the state for the year 2012-13, showing an increase of 9.89, 4.69, 7.27 & 9.56 per cent over the previous year 2011-12, respectively. The productivity worked out to be 21.41, 19.57, 2.28 and 8.64 tonnes per hectare, for fruits, vegetables, spices & flowers in the state for the year 2012-13, respectively.

Gujarat has a wide variety of soils, rainfall pattern, temperature regimes, and irrigation availability. This diverse agro-climatic situation across the state holds promise for development of the horticulture sector in a big way. Gujarat has tropical climate, with temperature ranging from a minimum of 13°C to 27°C in January and a maximum of 45°C in May-June. However, there is a wide annual variation in rainfall,affecting the productivity of the crops. The investment in fruit and vegetable processing units increased in the state which shows shining future of horticulture in the Gujarat State.

Flower crops remained more stable (3.77) as compared to production and yield in Gujarat. The region-wise results showed the highest rate of increase in area (17.89% / annum), production (27.89%/annum) and yield (8.48%/ annum) was observed in South Gujarat region during the same period as compared to other three regions of the state. The region-wise instability showed that the area remained more stable in Middle Gujarat, while the production as well as Yield of flower crops remained more stable in North Gujarat region. The district-wise result showed that the highest rate of increase in area and production of flower crops was observed in Surendranagar district, while that of was observed in yield in case of Amreli district. The area under flower crops remained more stable in Porbandar while production and yield was found more stable in Gandhinagar district.

The highest increase in area, production and yield of flowers at the rate of 13.61, 18.64 and 4.43 per cent per annum was observed in Gujarat during 2002-2003 to 2012-13. The cultivation of flower crops also increased in the Saurashtra region during the last decade and it remained at the second position among the four regions of the state with the 15.59, 20.39 and 4.15 per cent per annum increase in area, production and yield of flower crops, respectively. The region of South Gujarat remained at the top among four regions of the state in the rate of increase in area and production of flowers. The rate of increase in yield was the highest in South Gujarat in case of flowers. The area of flowers remained more stable as compared to production and yield. The stagnation of productivity of crops like mogra in Gujarat needs appropriate technological options.

Daya Suvagiya, Shilpa V. C., Shah Parth, Ardeshna, N. J. JAU, Junagadh

KNOW YOUR
LEADER

SKILLING INDIA SKY HIGH

An Academician, a teacher of Economics,a Legal Counsel and an Aviator, Mr. Rudy effortlessly fits into all these roles with grace and charisma. The Minister of one of the newest Ministries, Skill Development and Entrepreneurship, Shri Rudy within three years into his inception has upped the skill potential of the country and most importantly has laid a roadmap to streamline the skillset of Crores of Indians.

More than 1.17 crore people were skilled under MSDE programs and 26.5 lakh trained under Pradhan Mantri Kaushal Vikas Yojana (PMKVY). About 162 Pradhan Mantri Kaushal Kendras (PMKK) were established.

Rajiv Pratap Rudy, representing Bharatiya Janata Party, and a Member of Parliament representing Saran (Lok Sabha constituency) in Bihar, is the Minister of State (Independent Charge) for Skill Development and Entrepreneurship in Narendra Modi's government, since November 2014. He also shares Parliamentary Affairs department jointly with another Minister of State, Mukhtar Abbas Naqvi.

Born to Vishwanath Singh and Prabha Singh on 30 March 1962 in Patna, Bihar, Shri Rudy hails from a Bihari Rajput family. He completed his education from St. Michaels High School, Patna (Bihar) Government College and Panjab University, Chandigarh. A postgraduate in Economics, Shri Rudy had also earned his LL.B. degree and holds a Commercial Pilot

License. He started his professional journey as a lecturer of Economics in A.N. College, Patna.

He was politically active during his student days while at Panjab University Campus. His political aspirations bore fruition at the age of 28, when he was first elected in 1990 as a Member of the Bihar Legislative Assembly on Janata Dal ticket from Taraiya. After serving as the National Vice President of the BJP's youth wing – Bharatiya Janata Yuva Morcha, he was elected to Parliament from Chhapra in 1996 and re-elected in 1999. He was made Union Minister of State for Commerce and Industry in 2001, and subsequently elevated as Civil Aviation Minister with independent charge in Vajpayee government in 2003. His tenure in Civil Aviation had witnessed comprehensive Aviation reforms in India in a big way and its footprints can be observed even today. He was a General Secretary and member of the BJP National Executive.

In 2004, Rudy tasted defeat when he lost to Lalu Prasad Yadav in General elections in Chhapra. In 2010, he was elected to Rajya Sabha from Bihar. He contested the 2014 Lok Sabha Elections from Saran and defeated former Chief Minister of Bihar, Rabri Devi. He was sworn-in as Minister of State on 9 November 2014 and became Minister of State (Independent Charge) of Skill Development & Entrepreneurship, a key ministry in view of Modi's slogan of 'Make in India' and associated attempts to make India a production hub.

Under the Ministry of Skill Development and Entrepreneurship, the government is making an attempt to coordinate all the skill development efforts in the country. "The ministry aims to make the broad policies for skill development and market requirements, match the demand and supply of the skilled workforce. We intend to build an institutional framework in the sector for more formalised ways of imparting skill training, and also establish private partnerships to create linkages between industry and institutes. As far as entrepreneurship is concerned, the ministry aims to foster entrepreneurship education among youth through formal partnerships with educational institutions, business communities, mentorship networks, incubation centers and successful entrepreneurs. The Ministry will also focus on promoting entrepreneurship in the field of science and technology. Ultimately all the above mentioned objectives converge to make India the skill capital of the world," believes Mr. Rudy.

Rudy is also credited with flying a Sukhoi 30-MKI, a fighter aircraft in the Indian Air force. He is in Limca Book of Records for being the only parliamentarian to fly a commercial aircraft having flown Airbus-320 and Indigo airlines.

Under Mr. Rudy's leadership, the Ministry was successful in enhancing the skill potential of the country. Sharing the achievements of the Ministry of Skill Development and Entrepreneurship (MSDE) as the NDA government completes three years in office, Rudy said more than 5.9 lakh candidates have registered for the National Apprenticeship Promotion Scheme. More than 1.17 crore people were skilled under MSDE programs and 26.5 lakh trained under Pradhan Mantri Kaushal Vikas Yojana (PMKVY). About 162 Pradhan Mantri Kaushal Kendras (PMKK) were established. He also re-energised ITI ecosystem and more focus was laid upon modernisation of Industrial Institutes. 5.9 lakh youth were engaged in Apprenticeship through NAPS.

Rudy is credited as the only Parliamentarian on globe operating Airbus-320 Jets, flying with one of the largest private airlines in India as a Senior First Officer. He is also credited with flying a Sukhoi 30-MKI, a fighter aircraft in the Indian Air force. Rudy is in Limca Book of Records for being the only parliamentarian to fly a commercial aircraft having flown Airbus-320 and Indigo airlines.

"Our priority is to empower farmers… we are investing in these efforts. We have invested in soil cards, neem-coated urea and crop insurance. We want their income to go up. That is the reason we have invested in allied industries, such as boosting productivity of bovine population to raise per capita milk availability… We want to reduce their cost of production"

RADHA MOHAN SINGH
Union Agriculture Minister

"The government has been responsive and reactive to assessments of output and concerns by importers as well as food prices for consumers. The issue with regard to import duty on wheat took place over a period of eight months, between the effects of a drought on prices and assessments of a bumper crop in the next year"

SMT. NIRMALA SITHARAMAN
Union Minister for Commerce

"There is no question of backtracking on the debt waiver promise and the government will soon take over the loans of the farmers. It will also ensure that their mortgaged land/ property is not confiscated"

SHRI AMARINDER SINGH
Punjab Chief Minister

"Past episodes have shown that when there are significant fiscal slippages, they do permeate through inflation sooner or later. Farm loan waiver is a path that we need to tread very carefully before it gets out of hand"

URJIT PATEL
RBI Governor

"As both the Centre and the states have to play a role in agriculture, it is advisable that both sides sit together to discuss issues related to agriculture"

VIRENDRA SINGH MAST
President, Kisan Morcha