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CROP PROTECTION



**Striking a balance between Food Safety
and Food Security**

Chief Editor Dr. MJ Khan
Editor Anjana Nair
Asstt. Editors Sanjay Kumar
 Fariha Ahmed

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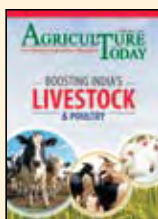
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Editor Dr. MJ Khan

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



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From the Editor's Desk

Ensuring Safe and Sustainable Agriculture



Pesticide industry has come a long distance since the establishment of a plant for the production of BHC near Calcutta in 1952. Today India is the second largest manufacturer of pesticides in Asia after China and ranks twelfth globally. The crop protection market has experienced strong growth in the past and is expected to grow further.

Indian agrochemicals market is supported by strong growth drivers. Current low consumption of crop protection products in India, 0.6 kg/ha compared to world average of 3 kg/ha, offers immense opportunities for future growth. Availability of cheap labour and low processing costs offers opportunity for MNCs to setup their manufacturing hubs in India for their export markets. The sector is also driven by huge opportunity for contract manufacturing and research for Indian players due to large availability of technically skilled labour.

Despite the strong growth drivers, Indian agrochemicals industry faces challenges in terms of low awareness among farmers. With large number of end users spread across the geography, managing inventory & distribution costs is a challenge for the industry players. The prevalence of spurious pesticides is also dampening the growth prospects of pesticide industry in India. Effectiveness of current supply chain management (SCM) practices in agrochemicals is another area of concern for the industry. Companies face issues due to seasonal nature of demand, unpredictability of pest attacks and high dependence on monsoons.

Recently India's agriculture has received wide criticism both abroad and locally for the amount of pesticide residues in many of the farm produce deemed fit for human consumption. Unscientific use of pesticides has tarnished the reputation of pesticides in India. Food safety has emerged as a biggest concern today. The fear of the rampant use of pesticides and their long lasting health effects have forced people to look for alternatives like organic farming and bio pesticides. Demand for organic food products is growing rapidly across the globe and in India. Raising organic food is more complicated than merely excluding the pesticides and other chemicals from the growth regime. Converting conventional farms into organic farms is a step by step process and the certifications are costly. The guidelines laid out by certification agencies must be stringently followed. We need stringent measures to ensure that only certified organic products reach the market and the safety of the food be ensured with regular food inspections.

Promotion of IPM, zero budget farming and usage of bio-pesticides by Indian Government and NGOs is gaining momentum. With increasing demand for organic food, farmers in certain states like Karnataka have reduced chemical usage and have adopted organic farming. Agrochemical companies will have to tackle the rising environmental awareness and address concerns on negative impact of pesticide usage.

In years to come, pesticide usage will increase counting on the pressing need to increase food production and changing pest dynamics. Although chemical free options exist, for a large country like India ditching pesticides will not be a viable option. But safer chemicals, scientific usage of pesticides and proper awareness can maintain a balance between food safety and food security.

Dr. MJ Khan

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Know Your Leader
Ram Vilas Paswan

*Every morning 35 lac women
across 17,000 villages bringing
in milk worth ₹55 crores,
are now celebrating
their economic independence
Thanks to the co-operative
movement called Amul.*

Amul

The Taste of India



Ensuring Insurance

Agri insurance schemes needs an overhaul

Agriculture is a risky affair. A steady outcome is not a guarantee and in some instances an outcome itself is wiped away due to inclement weather. Under such circumstances it becomes imperative that the farmers be linked to an insurance scheme that atleast can protect their income to some extent.

Already there are two types of insurance products in India. The Crop Yield Based (in-directly, these products are income based products), mainly Modified National Agriculture Insurance Scheme (MNIS), wherein claims, if any, are settled based on estimation of average yield in a particular area. But in this scheme settlement of claims take time even more than a year. Also, lack of authentic yield data and authenticity of reports from 'Patwari' are big challenges. On the other hand, under Weather Based Crop Insurance (not linked to the yield and are mainly undertaken by the Private sector agencies), claims get settled very fast. But the challenge is, there are very less weather station density on ground. Premium is also very low. Both the schemes thus suffer from some inherent challenges. The schemes do not cover lessee farmers even though they are more vulnerable. Despite being mandatory to have agricultural insurance compulsory especially for farmers availing any loan from commercial bank / owning KCC, the coverage under insurance is very poor. There are approximately 80% Plus KCC holder farmers in the country but Agri-insurance coverage is about 26-28%.

In general, there is lack of awareness amongst farmers about the agriculture insurance, its mechanism of functioning and how to get claims etc. As of now, there is no direct connection of agriculture insurance companies with the farmers. All the insurances are processed by the bank officials only and for bank officials, this is not the primary function. Also, banks do not have any mechanism of verification of crops grown (only report of patwari is enclosed), but in many cases the actual crop grown and the crop mentioned are different.

The system should change for the benefit of the farmers. Agriculture / Crop Insurance should be compulsorily done for all the farmers (own land or lease land). Instead of selecting one agri-insurance player through bid system for a district, all the districts should be made open to all the players (government or private). Mechanism should be developed to pay the government share of premium based on performance of each company. For the purpose of settlement of claims, feasibility of technology should be assessed. Role of government should be restricted to monitoring the scheme and working of insurance players in the field, instead of executing the scheme. Government may propose a separate Agriculture Insurance Regulatory Authority, which should facilitate participation of large number of insurance companies in agriculture, not only one Government owned – AIC. There should be a national campaign to enhance awareness of agriculture insurance amongst the farmers. Similar to the Jan-Dhan Yojana, campaign should be launched for agriculture insurance and agri-insurance companies should be engaged directly, instead of running the campaign through banks. Media, NGOs, KVKs, private companies should be involved to execute promotional and reach out campaigns. Initially, government shall consider higher subsidy on payment of premium to promote the use of insurance product, however, over period of time as the market matures, this may be reduced in phased manner. (In some of the developed countries, Insurance Premium subsidy from the government is as high as 95%). There is need to develop PPP models for increasing the support infrastructure, such as density of Weather Stations etc. A Toll Free Agri Insurance number should be launched and extensively popularised (as success already seen in Kisan Call Centres). On failure of crop, a farmer may call up this number, and based on his information National Remote Sensing Agency may take satellite pictures of the field and share the same with the district authorities, bank and the concerned company for physical verification. The claim disbursement may be done within 3 days with the use of this technology system.

Insurance products are mandatory for a risky profession like agriculture. It should not be for namesake; instead it should completely meet the objectives for which it has been designed effectively and productively.

AI is not well

Indian agriculture is struggling on and the signs are worrying

Agriculture in India is highly unstable. Agriculture performance in India is tightly linked to monsoon and hence these instabilities are inherent in our farming system. A good monsoon year is always followed by a good agriculture year and vice versa.

When the irrigated area in India just comprise of about 36 per cent of the net sown area, the rest of the area finds solace in the monsoon. So it will not be pessimistic to assume that this year is not going to be a good year for agriculture especially when Indian Meteorological Department (IMD) has downgraded its monsoon outlook for the June-September season to 88 per cent of the 50-year average. If the prediction plays out, then the year 2015 will officially be a drought year, declared when monsoon rainfall shortfall exceeds 10 percent.

Although, nearly quarter of the country's area faced drought-like conditions last year, 2014 was not considered a drought year. The last time IMD declared a drought year was 2009, when nearly 60 per cent of the districts in India received deficient rainfall. A failed monsoon this year would mean a third consecutive crop failure for India's farmers. Due to adverse weather conditions during the 2014-15 crop season, foodgrain production is estimated to drop 5.3 per cent and growth in agriculture is expected to nearly vanish—0.2 per cent in 2014-15 compared with 3.7 per cent in the previous year.

Already India has imported record quantities of wheat- a sign of strained wheat availability. Wheat output and overall crop quality is seen taking a hit this year following heavy, unseasonal rain in the northern and central grain-growing regions of India just before the harvest. Unseasonal rains caused crop damage and a farm crisis this year, forcing wheat imports from Australia. India has reportedly purchased some 80,000 tonnes of Australian wheat in recent deals, the biggest such imports in five years. India's wheat imports since 2010, when it imported around 200,000 tonnes of wheat, have been low owing to bumper domestic production.

Since last few years, India's agriculture growth has been diminishing. This is a cause of concern as agriculture is a notable contributor to country's GDP. The sector contributed over 16 per cent of India's GDP in 2014-15 and provided employment to 55 per cent of its population.

Although foodgrain production increased 32 percent over the past two decades, the population has increased by roughly 42 percent over the same period. Per capita availability of foodgrain has increased marginally, from 471 gm in 1994-95 to 511 gm in 2013-14.

Despite India's growth in food production, the country is still home to many malnourished and starved people. Our productivity is still not the best and our production is largely the result of production from large areas with minimum technologies and innovation. Farmer suicides - another distressing signal from Indian agriculture - have recently flared up confirming the insecurity of the sector.

The inability in securing an assured flow of income has forced many farmers to leave their profession and migrate to urban areas. Over the years, farm labourers have outnumbered the cultivators. They have lost their land to debt and now depend on wages.

The signs from India's agriculture are worrying especially when the trend of diminishing growth remained persistent in the last few years in a row. Our dependence on monsoon to raise food for 1.2 billion people is not going to augur well in coming years as the planet itself will be bracing for more climate linked anomalies arising out of climate change. What is worrying is that we haven't still designed a method to convert millions of our low productive landholdings to sustainable production units. It is time our farming systems be delinked from the uncertainties of weather and a more sustainable methods designed for the welfare of the sector and the country.

Agriculture Rehabilitation

India can lend the Kutch Model to Nepal to recuperate their Agriculture

The earthquake that shook Nepal consumed the life of many people and has changed the landscape of the region forever. More than 8,800 people have lost their lives and more than 23,000 have been injured. The tremors that shook the region were the ones which left hundreds of thousands of people homeless reducing many villages into sheer memories. Once Nepal's pride, centuries-old buildings were destroyed at UNESCO World Heritage sites. The days to come will be difficult for Nepal as they have to draw up plans to pull their hilly terrain back to normalcy. Plans have to be drawn up to restore the lives of those who are left behind. Rehabilitation should not only be restricted to accommodating the homeless but also in restoring dignity to their lives by restoring their means to livelihood.

Agriculture is an important business in Nepal, and the farmers would be the ones who have suffered the most in this tragedy. They have lost their homes, family and their farm lands. One of the objectives of the government should be to resuscitate the farming in the area. Although a hard task, the country can borrow ideas from India, as we went through a similar tragedy in 2001 when an earthquake of massive proportions shook Gujarat especially Kutch and Saurashtra regions. Timely intervention by experts like Dr. M.H.Mehta, the then Vice Chancellor of Gujarat Agricultural University helped the farmers to reinvent their profession and helped them to survive this tragedy. 'Kutch Model' can be emulated in Nepal considering the familiarity that already exists with respect to Green House Technology.

The temporary and permanent shelters that become the shelter for the displaced during the earthquake can be later transformed into very good sources for livelihood for people to grow vegetables, fodder, agroforestry planting material etc. In most situations like these, where people affected are from the rural areas, agriculture should be recognized as the priority sector for rehabilitation. These kinds of agricultural activities can be planned and implemented which not only aids in empowerment but also help in attaining self-sufficiency. Agricultural rehabilitation has to be worked out by considering the local situation - crop patterns, availability of seeds and other agro inputs. Massive immunization drive should be carried out for the Livestock. A comprehensive program including Biocontrol agents, low cost green houses, mixed cropping system can be drawn out and given as a package to groups of farmers. A complete package of Eco-Agri / Organic Farming can be adopted for such units. Biocontrol, Bio Composts and Bio Fertilizers packages can be adopted quickly and the extra produce can be marketed under a common brand (organic) for marketing. An integrated farming model - involving Agri - Horti - Livestock translates into as the most optimum model for small / marginal farmers. It may also be viewed that a catastrophe like this can also be considered as an opportunity to come out of inertia, generate new ideas and fresh thinking and planning and introducing new technologies on a large scale.

As the post Kutch experience and similar other projects such as - Bioshield (Post Tsunami in Kalpakam - Tamil Nadu), and Uttarkashi (Post Landslides) - have proved, several new and useful developments can emerge in these situations which can stay for the greater good of the community in the future. Low cost Drip Irrigation System can be popularized in these areas as they begin rebuilding their water supply systems and irrigations canals. The community can follow Sustainable Integrated Agriculture model and Eco Agriculture i.e., low cost Agri Bio Inputs - The 20 : 20 model of higher Farm Production that can maximize production without compromising on the ecological balance. Agro Waste / Farm Waste can be recycled back in to the system as Bio Composts through Multi-Microbial Technology. Similarly, Seed Ball Technology i.e., pelleting the seeds with Agri Bio Products to different patterns of hilly areas to prevent land slide, greening, etc. can be another innovation Nepal can experiment with. Co-operative Agro Processing Models can aid the farmers in postharvest operations in securing better economic dividends.

India has displayed stupendous solidarity with Nepal during the harrowing times. As an empathetic neighbour we can extend out help during their rehabilitation process by lending our experience and experts and take the camaraderie to the next level.

Deepening Debt

A deficient monsoon this year will drive farmers into more debt

A failed monsoon can be a farmer's nightmare. It will not only kill his hopes for a good crop, but also mars the prospects of sowing crops for the next season. This is the story that has been playing in India after one failed monsoon season is followed by another one.

With Indian Meteorological Department (IMD) downgrading its monsoon outlook for the June-September season to 88 per cent of the 50-year average, the year 2015 is all set to be declared as a drought year; when monsoon rainfall shortfall exceeds 10 percent the year will be declared as a drought year.

The aftermaths are the expected ones - Decline in farm output, price rise and debt. The debt series has already consumed the lives of many gullible farmers. Despite the backing of institutional finances, farmers end up preys to money lenders who charge exorbitant interests which ultimately farmers pay with their lives. Is 2015 in the process of becoming a debt year?

Apparently, the repeated attempts by the government have not yielded favourable response from the farmers when it comes to depending on banks for their financial needs. Many banks are also seen not too keen on granting the farmers fresh credit, in defiance of Reserve Bank of India (RBI) rules and government promises.

Small and marginal farmers are the ones who end up in debt traps. 85 per cent of India's farmers are small and marginal, and 65 per cent of farming is rain-fed. But high input costs, low returns, the consequent inability to repay farm loans, and general neglect have made agriculture unviable for the small and marginal farmers. This year they are going to find it even more difficult to access crop loans from banks for the ongoing kharif season. Their financial needs would be then met by private moneylenders who charge higher interest rates. Banks offer crop loans at seven per cent annually, while private moneylenders charge 20-30 per cent, if not more. The woes of farmers may be compounded by a monsoon that's expected to be below normal for the second year in a row. The RBI has allowed banks to convert short-term production loans to term loans for calamity hit farmers, extend fresh loans to them or reschedule their repayment period for up to seven years. The central bank has relaxed norms for compensation, enabling farmers with 33 per cent crop damage to get it now instead of 50 per cent previously. The Modi government has also increased the compensation amount 1.5 times. But yet, the benefits are yet to percolate to the needy.

According to a preliminary government report, about 27 lakh hectares of crop area was affected due to unseasonal rains and hailstorm during March in the country's northern and central regions. In the rabi season of the 2014-15 crop year, food grains were sown on 535.35 lakh hectares and oilseeds on 79.34 lakh hectares.

As a continuation, if this year turns out be a drought year, there could be serious repercussions. Debts of the farmers will rise and so will the suicide rates. This is a very serious situation. Official records reveal that more than 2.96 lakh farmers have ended their lives over the last two decades. This year has been particularly bad because of damage to the rabi crop caused by rain and hailstorms. Extensive damage to cash crops and horticulture has brought even some prosperous farmers to the brink of ruin. Climate change, non-remunerative prices, lack of adequate irrigation facilities, absence of assured income and paucity of crop insurance are worsening the position of Indian farmers.

This year more farmers are going to get trapped in the debt trap. Suicide rates are going to shoot up and a widespread agrarian distress will blow up to catastrophic positions. To avoid such a meltdown, government should gear up to providing easy access to credit especially for the smaller categories of farmers whose credit needs are smaller and crucial.

Vodafone mobile services to push smart farming

▶ Vodafone Group is hoping its mobile technology will improve agriculture productivity, by delivering real time information directly to farmers. The company identified various agriculture related mobile services for information and payments, smart phone enabled services for local market access, field audits, etc, to benefit 70 million farmers in the country by 2020. This was published in the company's "Connected Farming in India" report which concludes that the introduction of simple mobile services, designed to help small scale farmers in emerging markets, could boost the farm gate income in the next five years. The report, based on research commissioned from Accenture Strategy with support from Vodafone Foundation, said that the future of agriculture lies in bringing digital services to the farm as agriculture is increasingly becoming more and more knowledge-intensive. As the average farming household lives on less than ₹250 per day, simple mobile services could enhance earnings of almost two-thirds of such farmers. It has been pointed out that increased investments in agriculture by the government and private sector have helped to stimulate productivity. It is being estimated that 200 million people will be working in agriculture by 2020, and the focus will be mainly on cash crops like fruits and vegetables with an eye on export opportunities. Given the situation, the report said that mobile technologies have the potential to improve agricultural productivity in emerging economies, thanks to the rapid spread of mobile phones in rural areas. Vodafone has also announced the expansion of its Farmers Club initiatives in the emerging markets of Ghana, Kenya, New Zealand, Tanzania, and Turkey, including the KisaanMitr in India for helping farmers to enhance crop yields and increase farm gate income. Farmers club is a social business model which offers a range of mobile services to help boost productivity.



Deficient monsoon casts cloud over agro-chemicals sector

▶ Since April 23, the day after the Indian Meteorological Department (IMD) first announced its long-range forecast for the South-West monsoon, stocks of agro-chemicals companies have been mixed. BASF India, Insecticides (India) Ltd (IIL) and Bayer CropScience have fallen 11.2 per cent, 8.8 per cent and 2.5 per cent respectively over the period on the BSE. However, others such as Dhanuka Agritech, Rallis India and Excel Crop Care have gone up 0.72 per cent, 1.1 per cent and 14 per cent. The sentiment has been affected badly, said industry sources, adding that different predictions on the quantum of rainfall are making it difficult to make any assessment for this Kharif season.

Lohiya group to set up Rs. 500-cr edible oil plant

▶ Edible oil maker Lohiya group with its flagship brands Gold Drop and Gold Plus is setting up a new refinery plant in Nellore in Andhra Pradesh with an investment of Rs. 500 crore. "We are expecting land allotment from Andhra Pradesh Industrial Infrastructure Corporation and hope to start operations in the first phase of the proposed plant in about 10 months from now," Mahaveer Lohiya Managing Director of the group said. While the first phase of the plant will involve Rs. 100 crore investment to create 500 tonnes new capacity, the total investment in the subsequent phases will go up to Rs. 500 crore in next two to three years, he said. The Rs. 2,200-crore company, which commands over 55 per cent share in the branded market in Andhra Pradesh and Telangana, is present in 10 States including those in the north. "We will go pan-India once the new capacity adds up from the Nellore plant," he said.

Monsanto woos Syngenta investors

➤ Monsanto is hosting meetings across Europe to woo shareholders in Syngenta after the Swiss seed and crop chemical firm rejected a second takeover approach from its US rival on Monday. Monsanto's initial approach was rebuffed by Syngenta in May partly on the grounds it did not address regulatory concerns. The US firm said it had offered to pay Syngenta \$2 billion if the merger failed to get approval from regulators, but this was rejected as "wholly inadequate".



Aspada commits Rs 20 cr to EM3 Agri Services

➤ Aspada Investment Company, a venture capital firm that provides early-stage risk capital, has made a commitment of ₹20 crore (\$3.3 million) to Delhi-based EM3 AgriServices. EM3 provides pay-per-use agricultural machines and services for small-hold farmers. Small farmers cannot afford machines and equipment that can increase yields and productivity. EM3's goal is to eliminate the need for ownership by providing access to technologies that increase yields. According to Rohtash Mal, Chairman and Managing Director, EM3 AgriServices, pay-for-use service models are the only solution to meet the challenge of increasing farm productivity without the farmers having to invest in machinery. So far, investors have been interested only in cold chains and warehouses and EM3 is one of the few investments in core Indian agriculture aimed at positively enhancing a small hold farmer's P&L account. Adwitiya Mal, Executive Director, EM3, said the company delivered the services under the Samadhan brand through its services centres. Each centre delivered a complete suite of basic and precision agri operations from soil to the farm gate. EM3 had been operating in Madhya Pradesh for over a year and with Aspada's investment, it would create a pan-India network of service centres. Kartik Srivatsa, Managing Partner, Aspada Investment Advisors, said Aspada believed that EM3 could become India's first organised small-hold agricultural services platform at scale and would materially improve farm processes and productivity among small farmers.

Ruchi Soya in pact with Solidaridad to boost palm oil production

➤ Soya food major Ruchi Soya and international civil society organisation Solidaridad have entered into an agreement to scale up palm oil production in the country. The agreement worth €4.5 million was signed in the presence of Dutch Prime Minister Mark Rutte. According to the agreement, Ruchi Soya will share 55 per cent of the investment and Solidaridad the rest. India consumes 19.65 million tonnes of edible oil, of which 13.5 million tonnes are imported; palm constitutes 8.8 million tonnes of the total import. The five-year project envisions making palm oil available and sustainable for the Indian market, saving at least 1.5 trillion litres of water in palm oil production. Solidaridad has in a release said that the project will work on the principle of Make in India and More Crop per Drop. The Founder and Managing Director of Ruchi Soya Industries Dinesh Shahra said, "Our endeavour is to ensure that the Indian farmers get the best quality of inputs and modern technology that can help them scale their productivity to global standards".

FCI silo project fetches response from 21 firms

➤ The Food Corporation of India's (FCI) attempt to create state-of-the-art foodgrain storage facilities — silos — through private sector participation has evoked interest among various companies. 21 private players, including Adani Agri Logistics, L T overseas and OM Metals, have evinced interest in setting up silos on behalf of FCI at six locations spread across Punjab, Delhi, Bihar, Assam and Karnataka. Silos with a capacity of 50,000 tonne each at four locations and 25,000 tonne grain capacity each at two locations would be created through private sector participation at Sahnewal and Kotkapura (Punjab), Narela (Delhi), Katihar (Bihar), White-field (Karnataka) and Changsari (Assam). Sources also said that in all 92 tenders have been received from various private sector companies. At present the tenders are being evaluated by the FCI. The FCI would provide guarantee of rentals for 30 years for silo operation by the private companies. There is also a provision for 20% viability gap funding (VGF) from the government as per infrastructure projects norms. Under the Design Build Finance Operate Transfer norms, private developer is responsible for development of the project and FCI will provide land for building the silos. "Silos take much lesser area than the conventional storage facilities," an official said. Benefits expected from the creation of silos through private sector participation are timely delivery, optimum capital cost and efficient operations of project with minimal risk and involvement of implementing agency, the official said.

Cabinet approves Rs 6,000-crore interest-free loan to sugar mills

► The Union Cabinet approved an interest-free loan of Rs 6,000 crore to enable sugar mills pay arrears to farmers. The Cabinet at its meeting chaired by Prime Minister Narendra Modi also gave clearance for the continuation of urea production from three plants that use naphtha as feedstock till availability of gas through pipelines or any other means, Ministry of Shipping's proposal for India to join the Bunker Convention to ensure compensation for damages caused by spills of oil when carried as

fuel in ship bunker and bringing an ordinance to amend the Negotiable Instruments Act, which provides for filing of cheque-bounce cases in place where the cheque was issued. The Cabinet's decision to provide interest-free loan to the



sugar mills would go a long way in helping the farmers, who have been waiting to get their arrears. Sugar companies had earlier sought government's intervention, saying they were struggling to pay huge cane arrears estimated at over Rs 21,000 crore. Interest will not be charged from this loan for a year, and the interest will be borne by the government from sugar development fund. The money will go directly to farmers through their Jan Dhan accounts, Transport Minister Nitin Gadkari said after the Cabinet meeting.

Farmers to be charged 10.35% interest for loan conversion

► Reacting to the news report about costly pay-off offer to farmers, the Haryana government has clarified that the existing loan will be treated as a fresh medium-term loan and farmers will be charged interest at 10.35 per cent. The official release said the recovery in villages where crop loss is 50 per cent or more due to natural calamities had been totally suspended by the cooperative banks. Farmers have been told that their crop loans can be converted into medium-term loans for three years. There would be no penalty on interest on the conversion of loan to medium term. Moreover, these farmers would be eligible to avail fresh short-term loan for sowing their kharif crops this year. A fresh short-term loan will be provided interest subvention at 3 p.a. by the Centre and at 4 per cent by the state government on the timely repayment of the kharif loan, thus paving the way for distressed farmers to avail ST crop loan for kharif at 0 per cent interest rate if they repay it on time. In fact, the farmer who opts for re-scheduling of his loan is treated as a timely payer and no interest is charged till the date of conversion, i.e. up till June 15, his loans will be rescheduled and there will be no penalty. "Crop loan advanced during rabi 2014-15 will be converted into medium-term loan at 10.35 per cent p.a. and not 12. Furthermore, farmers will be able to avail fresh loan for raising their kharif crops and the same will be issued at 0 per cent interest if paid on due date i.e. February 15, 2016. The state government is committed to providing short-term crop loans to the farmers through cooperative banks at 0 per cent rate of interest. The government has also, for the first time, announced the scheme, whereby individual farmers, whose crops have suffered more than 50 per cent loss can also avail the benefit of conversion of their short-term loan into a medium one, it said.

Fin Min: Step up lending against warehouse receipts

► With the prospect of a bleak monsoon looming in the horizon, the finance ministry has instructed all banks and financial institutions to step up lending against negotiable warehouse receipts (NWRs) in a bid to curb distress sale by farmers. The NWRs permit the transfer of ownership of an agri commodity deposited by farmers in registered warehouses without having to deliver it physically and are issued in negotiable form, thereby making them eligible as collateral for post-harvest loans. They are seen as a key instrument in curbing distress sale by farmers at peak harvest season, when prices could be at the lowest. In a missive issued



by the department of financial services, banks have been specifically asked to extend pledge finance to goods kept in the registered warehouses against the NWRs issued to farmers. With the prospect

of a bleak monsoon looming in the horizon, the finance ministry has instructed all banks and financial institutions to step up lending against negotiable warehouse receipts (NWRs) in a bid to curb distress sale by farmers. The NWRs permit the transfer of ownership of an agri commodity deposited by farmers in registered warehouses without having to deliver it physically and are issued in negotiable form, thereby making them eligible as collateral for post-harvest loans. They are seen as a key instrument in curbing distress sale by farmers at peak harvest season, when prices could be at the lowest.

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Breather for three units

► In order to ensure a smooth supply of urea to the southern States, the Cabinet Committee on Economic Affairs has approved the continuation of production of urea using naphtha or any other means in three plants — Madras Fertilizers Ltd. (MFL), Mangalore Chemical and Fertilizers Ltd. (MCF), and Southern Petrochemicals Industries Corporation (SPIC). “The decision has been taken to ensure smooth supply of fertiliser in the southern States. The total requirement of Karnataka, Tamil Nadu and Kerala is 23 lakh tonnes, and the annual production of these three units is 15 lakh tonnes per annum,” said Fertilizers Minister Ananth Kumar. Apart from these three urea plants, the entire southern region of the country only has two other plants. The closure of these three plants would

have meant that the entire southern region’s urea requirement would have had to be imported. India’s urea imports are already far higher than they were last year, according to data from the Department of Fertilizers. Urea imports grew almost six-fold to 9 lakh tonnes in March 2015 compared to the amount imported in the same month the previous year. The continuation of urea supply from these three plants will substantially ease the problems of urea supply in the southern States during the ensuing kharif season. In an earlier meeting of the CCEA in December, it was decided that the State governments concerned — that is, the governments of Tamil Nadu and Karnataka — will not charge VAT or entry tax on the naphtha that enters their state.

Centre okays large-scale pulses imports

► With prices of pulses rising as much as 64 per cent over the last year, the Centre has approved large-scale imports. “The Cabinet discussed rising prices of pulses and express concern...to keep domestic prices under check it has been decided to import pulses in large quantities,” informed Nitin Gadkari, the Union Transport Minister. The Centre has also directed States to take strict action against hoarding to keep in supply and prices in check. No canalising agency has been decided as yet. The production of pulses is estimated to have fallen to 17.38 million tonnes (mt) in the 2014-15 crop year (July-June) from 19.25 mt during the previous year.

Raise short-duration crops to counter poor rains, farmers told

► To deal with the possibility of a deficit monsoon, the agriculture ministry has suggested sowing of short-duration varieties of paddy, pulses, oilseeds and other less water-intensive crops in the northern India regions for curbing possible crop losses. In its first advisory for the northern Indian region, Indian Agricultural Research Institute (IARI), a premier institute under the ministry of agriculture, has suggested transplanting of short duration paddy varieties of Pusa Basmati 1509 and Sugand 5 which could be sown in the later part of the July in the irrigated areas. Besides the advisory has also asked farmers to take up cultivation of corn, bajra, oilseeds and pulses such as mungbean (green gram) and arhar (pigeon pea) in areas with limited irrigation facilities in place of paddy so that the crop losses could be minimised. According to A K Singh, a rice breeder with IARI, the 1509 Pusa basmati variety which was introduced for cultivation in 2013, takes only about 120 days to mature against more than 140 days required for popular Pusa 1121 rice variety. “The Pusa 1509 basmati variety is suitable in case of deficit rainfalls in the northern Indian regions,” Singh said. In case of rainfed areas also, the advisory



suggests, growing of pulses and oilseeds. While the India Meteorological Department (IMD) in the prediction has stated that the monsoon rains (June– September) would be 88% of Long Period Average (LPA) for the entire country, for the north-western region, the rainfall is expected to be only 85% of LPA. On the method of cultivation, the advisory recommended adoption of direct seeding in the case of paddy as it would cut down on water requirement for the crop.

Centre plans national agri market to bust trader cartel

► In a bid to end the monopoly of a few licenced traders in agriculture mandis, who often manipulate prices and resort to unfair practices, the agriculture ministry has moved a proposal seeking Cabinet approval to set up a National Agriculture Market. The scheme, to be implemented by creating e-market platform for 585 regulated wholesale markets in three years, will start with 50 Agriculture Produce Marketing Committees in five states. According to the Cabinet note, which has been circulated for inter-ministerial consultation, the objective of this move is to create a barrier-free efficient market for marketable surplus items available in mandis across the country. The scheme will involve a Rs 200 crore investment. Sources said the scheme aims to create appropriate common e-market platform that would be deployable in almost all regulated wholesale markets.

Centre allots Rs 300 cr for organic farming; 3 NE states included

► Union government is implementing a cluster based programme called Paramparagat Krishi Vikas Yojana (PKVY) to encourage organic farming, Ministry of Agriculture said. An amount of Rs 300 crore has been earmarked for the scheme for the year 2015-16. Under it, 50 or more farmers will form a cluster having 50 acre land to take up organic farming. By three years, 10,000 such clusters will be formed covering 5.0 lakh acre area. There will be no liability on the farmers for expenditure on certification, the Ministry said in a statement. Every farmer will be provided Rs 20,000 per acre in three years for seed harvesting of crops and to transport produce to the market. Organic farming will be promoted by using traditional resources and the organic products will be linked with the market, it said. It will increase domestic production and certification of organic produce by involving farmers. Cultivated area under certified organic farming has grown almost 17 fold in last one decade (42,000 ha in 2003-04 to 7.23 lakh ha in 2013-14). The Centre had implemented the National Programme for Organic Production (NPOP) in the year 2001. The national programme involves the accreditation schemes for certification agencies, norms for organic production, promotion of organic farming etc. States like Uttarakhand, Karnataka, Madhya Pradesh, Maharashtra, Gujarat, Rajasthan, Tamil Nadu, Kerala, Nagaland, Mizoram, Sikkim have been promoting organic farming. The government is promoting it through various programmes like National Mission for Sustainable Agriculture (NMSA), Paramparagat Krishi Vikas Yojana (PKVY), Rashtriya Krishi Vikas Yojana (RKVY), Mission for Integrated Development of Horticulture (MIDH), National Mission on Oilseeds and Oil Palm (NMOOP), Network Project on organic farming of ICAR.

Centre makes changes to tea marketing control order

► The Centre has notified a new Tea (Marketing) Control (Amendment) Order, 2015 after effecting amendments to some clauses of the Tea (Marketing) Control Order, 2003. The major amendments include compulsory registration of manufacturer or producer of tea, obtaining a "no Objection Certificate" or grant of permission for enhancement of capacity from the Tea Board, sale of tea through public auctions with particular reference to Bought Leaf Factories, Fixation of price sharing formula and its compliance and so on. It said that no manufacturer shall carry on the activities of manufacturing tea after 90 days of publication of the Order in the Official Gazette without obtaining an NOC in respect of each factory to be set up by the manufacturer. On sale of tea through auction, the new order states that every registered Bought Leaf Factory shall sell not less than 70 per cent of the total tea manufactured in a calendar year through public auctions. However, any tea marketed directly by the Bought leaf Factory (BLF) in the form of packet tea, instant tea, tea bags, aromatic tea, green tea, quick brewing black tea, organic tea and direct exports (excepting those sold through auctions abroad) shall be excluded while computing total production.



Cabinet may look at higher MSP for paddy

► The Cabinet is likely to consider higher minimum support price (MSP) for paddy and a relief package for the beleaguered sugar industry to help tackle farm distress. The interest free loan to the sugar industry will enable the producers to pay the dues of farmers, which is estimated at about Rs 19,000 crore. The higher MSP for paddy comes at a time when there are doubts about the strength of the June-September southwest monsoon rains, sources said. The government is keen to portray its farmer friendly image and dispel criticism about its perceived pro-corporate stance. Sources said that the agriculture ministry was asked to work out higher MSP for paddy after the weather office predicted patchy monsoon. The earlier stance of the government has been to raise the MSP marginally due to fear of stoking inflation. There were reports that commission for agricultural cost and prices (CACPC), the entity which recommends the support price had proposed an increase of about Rs 50 per quintal.

Despite losses & suicides, Maha cultivation picks up

➤ Maharashtra has witnessed a large number of farmers committing suicide over the past few years. If farmer lobbies are believed, about 4,200 farmers killed themselves in Maharashtra last year, which includes a significant number of cotton growers who are said to have taken the step due to losses, as global cotton surplus has sent prices tumbling. However, despite losses and cases of suicide, cotton cultivation has increased in the state by 35% in the past 10 years. In 2005-06, cotton was being cultivated in 28 lakh hectares of land, which has gradually increased to 41 lakh hectares by 2013-15, as per the statistics of Cotton Corporation of India Limited (CCIL), Ministry of Textiles. Although the cotton acreage had declined by 7% in 2013-14 (38.72 lakh hectares from 41.46 hectares) after a steady increase for a decade, which was attributed to the fact that many cotton farmers in Vidarbha had switched to other crops like groundnut, jawar and soybean hoping for better profit, it touched 41.46 lakh hectares in 2014-15, according to CCIL data released in May.

Haryana to promote direct paddy sowing

➤ The Haryana government said it will promote direct sowing of paddy in the state as crop plantation through this method saves water and reduces cultivation cost. "In Haryana, the Agriculture Department will set up demonstration plants over an area of 32,000 acres to promote direct sowing of paddy during 2015-16," Agriculture Minister OP Dhankar said. Dhankar said farm scientists have advised farmers to do direct sowing of paddy up to June 15 and through transplanting till July. He added that direct sowing of paddy reduces the cost of cultivation and also results in greater yields. Apart from this, it saves 20-25 per cent of water and also lowers the electricity consumption by 20-30 per cent. Besides, adopting this method for paddy farming increases the production of next crop. The



Agriculture Minister said grant would be given to farmers by the central and state governments under National Agriculture Development Scheme (NADS) and National Food Security Mission (NFSM) to reduce cost on cultivation of paddy and to save water.

TN announces Rs 40-crore package for delta farmers

➤ The Tamil Nadu government has announced Rs 40 crore rescue package for delta farmers to help them cultivate Kuruvai crops this season. According to the package, farmers would get Rs 315 per acre to use organic fertilizer that would boost paddy output. The government would incur Rs 7.87 crore additional expenditure due to the package. The financial aid is one of several measures the government announced, including 12-hour three-phase daily electricity that would allow them tap into the excess groundwater for irrigation. Farmers will also be encouraged to use equipments to help widen paddy cultivation in terms of area with minimum water usage.

Campaign launched to promote carbide-free mangoes in Visakhapatnam



➤ The sight and taste of a fully ripened mango is one of the joys of summer, but there also lurks danger, as the fruits are ripened by farmers using calcium carbide. The Horticulture Department has taken up a drive to educate the farmers and the public about the health hazard and the necessity for cultivating and consuming carbide-free mangoes. A three-day mango mela is being organised at the MVP Colony rythu bazar to sell naturally ripened mangoes and to spread awareness about the need for shunning carbide. Mostly, farmers from Nakkapallimandal have brought the fruit to the rythu bazar and the response of the public on the first day was lacklustre. The department has fixed the prices for different varieties – Banganapalli (₹40/kg), Suvarnarekha (₹40), Rasalu (₹45), Imam Pasand (₹50) and Kottapalli Kobbari (₹80). "We have come from far, nearly a 100 km, and these rates are not remunerative for us," said P Siva and S Ramesh, farmers. They said it was much easier and economical for them to sell the fruit using carbide and "the people are also used to it, as they like the colour and the taste of the fruit. Unless the consumer preferences are changed, this will only be a token exercise." Venkateswara Rao, selling carbide mangoes outside the rythu bazar, said his business would be hit for three days and then it would be back to normal. He said carbide-free mangoes would be slightly costlier, "but that is not the main factor. We have all grown used to carbide – the farmers, vendors and the public." The horticulture department officials, however, are making efforts to wean the farmers away from carbide by offering subsidy to use ethylene gas for ripening the fruits.

State govt arranges Rs 354 crore for paying sugarcane growers' dues

➤ The Haryana Government has made arrangements to pay the pending dues totalling Rs 354 crore to cane growers for the sugarcane purchased by three private sugar mills in the state. These three private sugar mills are: Saraswati Sugar Mills Ltd; Yamunanagar; Naraingarh Sugar Mills Ltd, Naraingarh; and Bhadson Sugar Mills Ltd, Bhadson (Karnal). The government will ensure that cane growers get their payment by June 30. Chief Minister Manohar Lal Khattar said that under this arrangement 50 per cent of the pending cane payments will be made by the sugar mills and the rest 50 per cent would be made by availing an interest-free loan from HARCO Bank. The State

Government would bear the interest liability of the mills on this loan. The state government will repay this loan to Haryana State Cooperative Bank (HARCO) Bank out of its first supplementary bud-



get provisions, Khattar added. The Chief Minister said Saraswati Sugar Mills Ltd Yamunanagar, had pending payment of Rs 200 crore, followed by Rs 92 crore of Naraingarh Sugar Mills Ltd, Naraingarh, and Rs 62 crore of the Bhadson Sugar Mills Ltd; Bhadson (Karnal). As per directions of the state government, HARCO Bank had sanctioned a soft loan of Rs 100 crore to Saraswati Sugar Mills Ltd; Yamunanagar; Rs 46 crore loan to Naraingarh Sugar Mills Ltd. and of Rs. 31 crore to Bhadson Sugar Mills to make the payments. The Cane Commissioner Haryana would ensure that the sugar mills clear all pending payments of cane growers by the stipulated period.

Dutch experts to help state with agro-tech

➤ The state government will sign an MOU with Netherlands seeking that country's help in the development of the farming sector and in introducing the latest technology to the farmers of Maharashtra, agriculture minister Eknath Khadse informed. "The MOU signed and will include the popularisation of technology amongst the farmers of Maharashtra, making available post-harvesting technology, knowhow on tackling natural calamities, development of green houses etc," Khadse said. The MOU between the agriculture, animal husbandry, dairy development and fisheries department of Maharashtra and the agriculture and commerce ministries of Netherlands would be signed at a joint meeting of Khadse with Dutch ministers Lilianne Ploumen and Sharon Dijksma. The agreement aims at providing latest agricultural technology to Maharashtra, along with high-quality seeds and newer harvesting techniques. The MOU is also aimed at developing five agro-based quality enhancement centres in the drought-affected areas of the state.

UP sugar mills to pay Rs 2,400 cr by June 15

➤ Uttar Pradesh's sugar mills have to pay about Rs 2,400 crore to the state's farmers by June 15, according to an order of the Allahabad High Court. It asked the mills to clear 25 per cent of total arrears by this date. Private mills have to clear Rs 2,166 crore, with the remaining amount to be cleared by the cooperative and government-owned mills. Private millers collectively owe about Rs 8,666 crore to farmers, based on the state sugarcane price of Rs 280 per quintal for the 2014-15 crushing season. The major sugar companies operating in UP are the major defaulters, with total dues of Rs 7,356 crore. They have been told to pay Rs 1,839 crore by June 15. Standalone mills with arrears of about Rs 1,310 crore have to pay Rs 327 crore by June 15. Recently, UP Cane Commissioner Subhash Chandra Sharma had told the millers to abide by the HC order else a First Information Report would be lodged and action would be taken under Sugarcane Control Order. Hearing a petition, the HC on May 27 had ordered the cooperative and government mills to settle their part of cane arrears in the ratio of 25 per cent each by June 15, June 30 and July 15. The next date of hearing in the case is July 28, when the court would decide on the remaining portion of the dues. Likewise, private mills were directed to settle 25 per cent dues by June 15 and 75 per cent dues by July 15, while observing the state government had enough powers to deal with defaulters.



The emergence of agricultural NBFCs in India

► A new breed of non-banking financial companies (NBFCs) is emerging in India: Agricultural NBFCs. As agricultural marketing and warehousing companies look to expand their businesses, a number of them are seeking to provide financial services to farmers and farm-related businesses, many of whom would be existing clients. Agricultural warehousing companies such as Star Agri warehousing and Collateral Management Ltd, Shree Shubham Logistics Ltd and Sohan Lal Commodity Management Pvt. Ltd have already started such NBFCs, while National Bulk Handling Corp. and National Collateral Management Services Ltd are exploring the option. The intent of agricultural NBFCs is —providing finance across the value chain in the farm sector, which in turn, will help the core warehousing business. Star Agri Finance, a wholly-owned subsidiary of Star Agri warehousing, acquired Raylight Leasing and Finance Ltd, which was registered with the Reserve Bank of India (RBI) as an NBFC. It has plans to offer finance against agricultural assets such as land and crops, along with loans for agri-equipment, machinery and tools and working capital. Sohan Lal Commodity Management, whose investors include Nexus Venture Partners and ICICI Bank, has similar plans. Having commercialized its agri-NBFC Kissandhan in March 2014, the company is now offering agri-financing solutions to farmers, traders, small agro processing units and joint liability groups.

Farmers Pin hope on Agri Startups

► An increasing number of startups are developing much-needed and affordable solutions for farmers across the agricultural cycle -- for eliminating pests, smarter irrigation, precise weather forecasting, and improving yields -- that could help three-fifths of India's 1.2 billion people who are dependent on monsoon rains. Devara uses Bengaluru-based FlyBird Innovation's irrigation technology that senses soil temperature and moisture level and regulates water flow. Based on a specific plant's requirement and the size of the field a farmer can programme the device to let flow the exact amount of water needed for irrigation. "Our solution for precise irrigation also increases crop yield and gives farmers higher returns by 10-15%," said Satish KS, founder of FlyBird. At a price of Rs 16,000-28,000, the firm's technology costs about one-third of similar US and Israeli variants, he said. For Devara, the savings are more fundamental. "A coconut plant requires 100 litres of water a day. With the earlier flooding system I would overuse water by as much 1,000 litres. Now this extra water can be used for other crops." Farmers like him can also look up to Skymet Weather Services for a more accurate forecast of the weather. The private forecaster -- using a system that is a combination of historical data and high speed computing -- has been closer to actual rainfall in the past three years than the Meteorological Department.



Community Nurseries Likely Solution for Paddy if Rains are Poor

► Paddy farmers in the country may have to opt for community nurseries and direct seeding in case of insufficient rains, said Central Rice Research Institute (CRRI). Monsoon rains, which started a little late in Kerala on June 5, are yet to arrive in eastern India, the main area for rice cultivation. To review the crop situation, a team from the agriculture ministry will meet agricultural department officials of the seven eastern states that come under the Bringing Green Revolution to Eastern India (BGREI) scheme on June 11 to prepare a contingency plan if rains are delayed or insufficient for preparing



paddy nurseries and transplantation of saplings. West Bengal, Bihar, Assam, Odisha, Jharkhand, eastern Uttar Pradesh and Chhattisgarh come under the BGREI scheme, under which they produce an average 55 million tonne, or over half the rice produced in the country. The average was 42.6 million tonne before the scheme was introduced.

These sheets save many a crop

► In an effort to keep water usage optimum, farmers in districts including Kancheepuram and Villupuram are opting for plastic mulch sheets. Such sheets, when laid over drip irrigation lines, limit water evaporation and prevent the growth of weeds. De-weeding is quite expensive if farming is not family-based and weeds also use up the nutrients in the soil, explained sources in the Agriculture Department. The advantage is that water usage is very minimal.

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GREAVES AGRI

'Agriculture a key area in Delhi-Colombo ties'

➤ Sri Lanka has identified agriculture, logistics and textiles as potential areas of "economic engagement" with India, according to Ravi Karunanayake, Finance Minister. Mr. Karunanayake told reporters at an event organised by the Foreign Correspondents' Association of Sri Lanka night that the visit of Indian Prime Minister Narendra Modi in March showed "warmth" between the two countries. "It is for us to encash it into investments and move forward," he said, describing the level of engagement as "super." Shipping and open-aviation policy were among the other areas of cooperation. Currency swap On the currency swap agreement with India, the Finance Minister said his



country had so far used \$ 400 million. It could go up to \$ 1.5 billion. [Announced by Mr Modi during his visit, the agreement is between the Reserve Bank of India and the Central Bank of Sri Lanka. It is meant to keep the Sri Lankan rupee stable]. On taxation, he said his government was for lowering of taxes, better

compliance and more equitable distribution of resources. To another query, the Minister said the government's plan was to develop Sri Lanka into a "mini-financial centre" as neighbouring countries such as India, Pakistan, Maldives and Bangladesh would find the country an ideal place. No rift between leaders On the equations between Sri Lankan President and the Sri Lanka Freedom Party's chairman Maithripala Sirisena and Prime Minister and the United National Party (UNP)'s leader Ranil Wickremesinghe, the Finance Minister said there was no "absolutely no difference of opinion" between the two leaders even though some attempts were being made to create an impression of rift.

Australia eyes India for export of agri-products

➤ Australia is looking into exporting pulses and oilseeds to India. Australian High Commissioner to India Patrick Michael Suckling told that Australia was seeking greater access to Indian market for its agricultural commodities and processed food products. "Pulses and oilseeds could be among such items," he said. He, however, said that the Australian agriculture was not subsidised. "Australian agricultural products are of high quality and costlier, too. We are seeking premium segment of the Indian market," he said.



Australia, which is negotiating a free-trade agreement, is appreciative of India's sensitivity to opening of its doors for agricultural products. "What we are saying is – don't close doors on everything (agricultural)," he said. The Down Under is currently preparing two of its provinces – Northern Territories and Western Australia – for enhanced agricultural export baskets. "We are even ready to tailor made supplies of agricultural items. Earlier, we had faced similar resistances from the Japan and China regarding agricultural produce exports," he said. However, Australia established greater access to these markets for its agricultural items and eventually entered into free-trade agreements.

Basmati exports to Iran will pick up after October

➤ First quarter numbers for basmati rice exports to Iran – the biggest buyer, accounting for a fourth of sales overseas – are yet to be released, but industry sources say that volumes are likely to pick up only after October even if issuance of import permits may be undertaken from July. The current delays are due to the Iranian government's policy of Indian units and exporters being required to be registered with the Tehran's Health and Medical Education Ministry. The process can only be initiated by an Iranian importer, who has to furnish a list of intended exporters. "The main factor is the initiation of a new process which requires Indian mills to be assessed for good manufacturing practices. They will be eligible to export to Iran and it's a slow process, since few units have got themselves registered so far," said R Sundaresan, Executive Director, All India Rice Exporters' Association (AIREA). "Exports to Iran are on, but not at the same quantity or speed as the same time last year. We expect sales to pick up after October, since their own produce is available currently," he added. While there is no guarantee of basmati sales gathering pace, the issuing of import licenses should begin next month. "A resumption of issuing import permits will take place after Ramadan, which is in July," said AK Gupta, Director, Basmati Export Development Foundation, APEDA. Iran stopped issuing authorisations last October which saw India's basmati rice exports slide from \$1.4 billion in 2013-14 to \$600 million last fiscal. By volume, exports fell from 1.44 million tonnes (mt) to 0.94 mt over the same period.

Global glut in cotton to persist

► Cotton traders are staring at excess stock, as supplies from the world's biggest growing regions such as India and the US are set to rise amid declining demand from China, a major importer of the commodity. The fall in Chinese demand has been so sharp that it will result in less planting of the crop in FY16. However, there will still be a glut in the market. In 2011-12, Chinese imports doubled from the previous season to 5.3 million tonnes. This is expected to be 1.6 million tonnes in 2014-15. According to an International Cotton Advisory Committee (ICAC) report, cotton planting in 2015-16 is expected to be much lower and the global crop could be 8.5 per cent lower at 23.9 million tonnes. However, global consumption is expected to increase 2.33 per cent to 24.93 million tonnes. In a recent analysis, RaboBank said world consumption would exceed production by six million bales (of 170 kg each). "Prices are expected to be 72 US cents / pound in September 2015 quarter and new crop price through following December quarter to be 72 US cents/pound." In India, the scenario is not very different. While the Cotton Association of India has cut its crop forecast for cotton season 2014-15 to 6.5 million tonnes (38.2 million bales) from last year's 6.9 million tonnes. ICAC forecasts India's crop in 2015-16 to further fall to 6.4 million tonnes. According to ICAC, world cotton area will decline seven per cent to 31.3 million hectares in 2015/16 owing to low prices in 2014/15. World cotton production is projected down nine per cent to 23.9 million tonnes. China is expected to see



12 per cent decrease in area to 3.8 million hectares. Production in China could fall to 5.4 million tonnes in 2015/16. Last year, the Chinese government ended its three year-long programme to stockpile raw cotton to support local growers and, instead, started offloading its reserve stock in the local market.

Cotton area in the US is forecast to fall 15 per cent to 3.3 million hectares due to low international prices and adverse weather conditions. Assuming a yield of 912 kg per hectare, production in the US is projected down 14 per cent to three million tonnes. However, the estimated 2.27 million-tonne fall in global cotton crop next year will not reduce cotton glut.

Mango exports pick pace, 500 tonne reach Europe

► Mango exports have picked up, with more than 500 tonne finding their way to markets in Europe. Mango prices have fallen by nearly half compared to last month, with farmers from different states looking to sell their stock before the monsoon begins. The production of mangoes in Maharashtra was initially low, because of unseasonal rains, but as the weather gets warmer, the produce is getting better, traders said. According to earlier estimates given by the Agricultural & Processed Food Products Export Development Authority (APEDA), mango exports could be to the tune of 30-40% because of rains. Last year, mango exports touched 41,230 tonne. This year, there have been restrictions from other countries in addition to the vagaries of the weather, officials said. Besides the Alphonso, the Kesar from Andhra Pradesh are also finding export markets. The export season should continue till the end of June, officials said. In addition to Europe, other markets have opened up. While Mauritius has already granted market access to Indian mangoes subject to phytosanitary certification, Switzerland has also lifted the ban on Indian mangoes. A delegation for South Korea recently visited Mumbai and was satisfied with the quality. However, we are waiting for final approval. According to Sudhansu, who holds charge of the western region of Apeda, the Japanese quarantine inspector is expected to visit Mumbai on June 9 to inspect the available facilities. Indian exporters will now have to give their products 'hot water treatment' before exporting them to the European market. NPPO has made it mandatory for mangoes to undergo this treatment before they are given phytosanitary certificates. At least three tonne of mangoes are being treated at the vapour heat treatment facility on a daily basis.



CROP PROTECTION

Striking a balance between Food Safety and Food Security



Crop pests have been endemic to agriculture worldwide. The species of pests attacking the crops and their range have risen over the years. Commercialisation of agriculture, changing climate, movement of plants/planting materials across borders etc. have brought about this change. With the changing dynamics of the pest population, the extent of damage on the crops has also exponentially increased.

A study released by industry body Assocham and Yes Bank in 2014 has pegged the crop loss due to pest and disease infestation at Rs 50,000 crore annually in India.

Around 30 per cent of crop is lost to the elements of pest and diseases. India, being a tropical country is prone to attacks by pest and diseases. But to bear damage to this extent despite having enough protection options are unthinkable, especially when the efforts are to produce more food from lesser resources. To realize the motto of 'More from less', the produced crop must be protected from succumbing to losses from pest and diseases and hence crop protection assumes significance especially in this context.

India's pesticide Industry

Pesticide industry has come a long distance since the establishment of

a plant for the production of BHC near Calcutta in 1952. Today India is the second largest manufacturer of pesticides in Asia after China and ranks twelfth globally. There has been a steady growth in the production of technical grade pesticides in India, from 5,000 metric tons in 1958 to 102,240 metric tons in 1998. In 1996-97 the demand for pesticides in terms of value was estimated to be around Rs. 22 billion (USD 0.5 billion), which is about 2 per cent of the total world market.

Indian crop protection market was estimated at \$ 3.8 billion in FY12 with exports constituting about 50 per cent of the market. The crop protection market has experienced

Crop Protection has become crucial during these times. Not only did the extent of damage due to pest infestation increase, the demand for food grains has also risen sharply putting an immense pressure on the dwindling resources. We are not left with many options but to ensure food to the teeming billions.

Chemical pesticides have been able to contain some of the damage. But decades of chemically intensive agriculture has disfigured the environment. The future agriculture will have to thus strike a balance between food safety and food security and hence the years to follow will be more challenging for crop protection industry.



strong growth in the past and is expected to grow further at approximately 12 per cent per annum to reach \$ 6.8 billion by FY17. About fifty per cent of the pesticides produced in India are meant for export. So naturally, this growth is driven by export demand which is expected to grow at 15-16 per cent per annum, while domestic demand is expected to grow at 8-9 per cent per annum. Biopesticides,



another segment of the industry currently represent only 4.2 per cent of the overall pesticide market in India and is expected to register an annual growth rate of about 10 per cent in the future.

Indian crop protection industry is largely dominated by insecticides. They form about 65 per cent of the industry. Other segments like herbicides, fungicides and other (rodenticides/ nematocides) form 16

Integrated Pest Management (IPM) – The Long Term Solution

Challenges and opportunities of sustainable food supply for the next 35 years are critical in terms of biotic stresses, environment, water and energy for the Nation and across the globe. Keeping in view the losses in food production due to biotic stresses, the role for integrated pest management (IPM) is well cut out to ensure sustained rise in food supply while minimizing use of chemical pesticides and ensuring safety to water and environment. Injudicious use of chemicals for pest management in certain crops have resulted in the development of pest resistance to pesticides, pest resurgence, development of secondary pests into major ones, an increase in production costs, and uneconomic crop production. IPM provides a long-term solution to these problems by employing as many pest management techniques as possible for using chemical pesticides rationally. The National Research Centre for Integrated Pest Management (ICAR) in cooperation with other ICAR institutes, SAUs, State Agriculture Depts., NGOs, etc. is working on developing and implementing nationwide IPM programmes and other related activities of increased agricultural productivity, sustainability taking rapid strides to address the emerging challenges for the benefit of the farming community.

In the past year, IPM technology in Basmati rice in and around Bambawad (Dt Gautam Budh Nagar, UP) in farmers' participatory mode significantly reduced incidence of insect-pests, diseases coupled with higher yield. By the efforts of our scientists, adoption of IPM technology in onion crop resulted in reducing number of chemical pesticide sprays by three and increased yield, cost-benefit ratio by 25% over non-IPM fields. At Panjkosi village (Abohar, Punjab) IPM technology resulted in 36% reduction in use of pesticides. Promotion of IPM in rice and vegetable crops involving 200 farm families were initiated in Tripura and Sikkim under Tribal-Sub Plan. On Line Pest Monitoring and Advisory Services (OPMAS) has been implemented for cotton

across 23134 ha involving 19956 farmers of 216 villages from 24 districts in nine States. User-friendly software for recording cotton pests and issue of advisories was customized for implementation of ICT-based Pest Surveillance in Malawi (Africa). Several forecast models developed for predicting the population levels of some sucking pests have been web-enabled. CROPSAP was implemented by the State Department of Agriculture, Govt of Maharashtra across 39 lakh hectares with ICT-based pest monitoring by NCIPM that has been recognized at the National level with PM's award.

With concurrent development of knowledge base in all areas of crop protection and by strengthening the efficiency of linkages with stakeholders connected to pest management, promotion of IPM in our country is expected to get a major fillip in the current decade to respond to multi-dimensional needs of sustainable food security and market policy across domains. Investigations on changing pest scenario vis-à-vis climatic change, describing distribution of pests across crops and for a crop across pests over states of the country would be an enriching approach for evolving a national pest management policy that enables governance arrangements to meet the needs of safeguarding crops from losses due to biotic stress as per guidelines for IPM. The Centre envisions enhanced IPM implementation across the Nation through collaborative pest surveillance and advisory programs for major crops for a wider and speedy realization of impacts thereof.



Dr. C Chattopadhyay
Director, National Centre for
Integrated Pest Management,
ICAR

per cent, 15 per cent and 4 per cent, respectively. This is the reflection of the consumption pattern across India.

The Indian market is different from the global industry in terms of consumption patterns. Globally, herbicides constitute about 44 per cent of the crop protection market followed by fungicides at 27 per cent, insecticides at 22 per cent and others at 7 per cent. Favourable climatic conditions in North America and Europe drive herbicide consumption in those areas. Insecticides usage has also gone down in developed markets with increased usage of genetically modified (GM) crops. Tropical climatic conditions and production of crops like paddy, cotton, sugarcane and other cereals in India have driven the consumption of insecticides. Availability of cheap labour for manual weed picking also contributed to low consumption of herbicides in India. However, the trend is expected to change in future as herbicides, now, are the fastest growing segment due to increasing farm labour wages in India.

Indian agrochemicals market is supported by strong growth drivers. Current low consumption of crop protection products in India, 0.6 kg/ha compared to world average of 3 kg/ha, offers immense opportunities for future growth. Availability of cheap labour and low processing costs offers opportunity for MNCs to setup their manufacturing hubs in India for their export markets. The sector is also driven by huge opportunity for contract manufacturing and research for Indian players due to large availability of technically skilled labour.

Despite the strong growth drivers, Indian agrochemicals industry faces challenges in terms of low awareness among farmers (only 25-30 per cent of the farmers are aware of agrochemical products and their usage). With large number of end



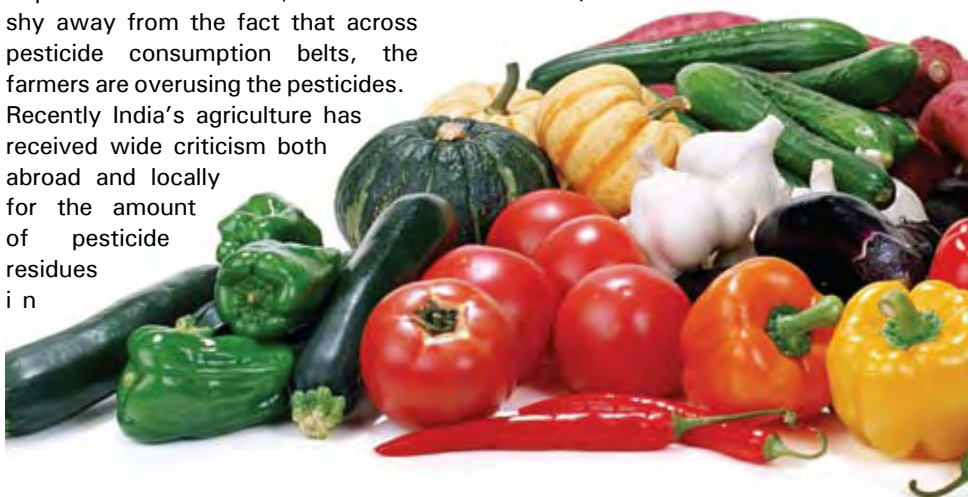
users spread across the geography, managing inventory & distribution costs is a challenge for the industry players. The prevalence of spurious pesticides is also dampening the growth of pesticide industry in India. Effectiveness of current supply chain management (SCM) practices in agrochemicals is another area of concern for the industry. Companies face issues due to seasonal nature of demand, unpredictability of pest attacks and high dependence on monsoons. Month end skews and high inventory across the channel is a perennial problem for the industry.

Pesticide residue – A curse

While statistics assert the immense possibility of extending the benefits of pesticides across India, one cannot shy away from the fact that across pesticide consumption belts, the farmers are overusing the pesticides. Recently India's agriculture has received wide criticism both abroad and locally for the amount of pesticide residues in

many of the farm produce deemed fit for human consumption.

The most recent farm product in news was the famed tea gardens of India. A 2014 study undertaken by environmental NGO Greenpeace over a year has allegedly found the presence of harmful pesticide residues including toxic dichlorodiphenyl trichloroethane (DDT) in tea sold by leading brands across India. Out of 49 samples tested by the non-profit organization, around 34 (94 per cent) contained residues of at least one pesticide and 29 (59 per cent) of the samples contained a cocktail of more than 10 different pesticides in them. Also 29 (59 per cent) of the samples contained residues of at least one pesticide above the maximum residue limits set by the





The JNU study tested in particular a category of toxic pesticides known as organochlorine pesticides (OCPs) over a year in winter and summer in seven agricultural areas in Delhi-NCR. Most vegetables exceeded limits set by different international regulatory agencies — meaning vegetables are in fact a daily health hazard

European Union (EU). The issue had rocked the country as India is one of the largest tea consumers and globally an attested tea exporter.

A recent study by JNU's School of Environmental Sciences is the latest among many to establish there is contamination from pesticides in vegetables grown and consumed in Delhi-NCR. The JNU study tested in particular a category of toxic pesticides known as organochlorine pesticides (OCPs) over a year in winter and summer in seven agricultural areas in Delhi-NCR. Most vegetables exceeded limits set by different international regulatory agencies — meaning vegetables are in fact a daily health hazard. OCPs are included under a group of toxic compounds called persistent organic pollutants (POPs), which cause cancer and other health risks, including symptoms like vomiting and dizziness, according to many studies. The United Nations Environment Programme, through the Stockholm convention on POPs, listed 12 organochlorine pesticides as POPs. All of these were tested in the latest JNU study and found to exist beyond maximum residual

levels in Delhi's vegetables.

Kerala is another state which has been grappling with the issues of pesticide residue in vegetables. A couple of years ago, the Kerala Agricultural University has found "dangerous levels" of pesticide residue in key vegetables like cabbage, cauliflower, vegetable cowpea, amaranthus red, small red onions, tomatoes, green chillies and curry leaves, among others. The residue belonged to the banned Profenofos, which falls into the yellow category (second level of pesticides in the toxicity classification) and which has translaminar action (the toxin entering the plant system primarily by roots, and transported to locations throughout the plant, where it can affect those who consume the vegetables). It has been banned in Kerala for nearly three years now. The pesticide is allowed in India only in cotton and tea and in other parts of the world, it is used only in cotton. The results came from tests carried out by the Pesticide Residue Research and Analytical Laboratory, Vellayani near Thiruvananthapuram.

When pesticide residues become an omnipresent problem in the country, it is natural for people to look for alternatives. In cities, people have turned to vegetables and fruits marketed as 'organic'. The pertinent question is how organic are these 'organic products'. Crop Care Federation of India (CCFI) late last year had found pesticide residues in one-third of the organic products retailed in New Delhi that are marketed as chemical pesticide-free. Of the 150 samples across a range of vegetables, including cauliflower, cabbage, brinjal, green pea and okra, 50 were found to have chemical pesticide residues while 10 were above the maximum residue level (MRL). Acetamiprid, Chlorpyrifos, Cypermethrin



and Flubendiamide were among the pesticides detected. The outlets that promote organic products do so from different sources carrying certification from different agencies. Some even market the product based on the trust. Raising organic food is more complicated than merely excluding the pesticides and other chemicals from the growth regime. Converting conventional farms into organic farms is a step by step process and the certifications are costly. The guidelines laid out by certification agencies must be stringently followed. We need stringent measures to ensure that only certified organic products reach the market and the safety of the food be ensured with regular food inspections.

Organic Cultivation – The new trend

Organic farming has recently developed many followers. There are certain farms in India which are organic by default, although non-certified, such as the north east. Also, there are other group of farmers who are certified and do it for the niche market. Non certified farmers are also there, who are recent converts, but

practising organic farming without the consent of authorized bodies.

Demand for organic food products is growing rapidly across the globe and amounted to \$64 billion in 2012. Commercial organic agriculture is now practised in more than 164 countries in an area of about 37.5 million hectare representing approximately 0.9 per cent of total farmland along with 549 certification bodies and 732 affiliates of International Federation of Organic Agriculture Movement (IFOAM) from 113 countries. The leading producers are Australia, European countries, Argentina and the US. Organic agricultural methods are internationally regulated and legally enforced by many nations, based on the standards set by the IFOAM established in 1972.

Organic farming also presents a good market opportunity. During 2013-14, India exported 135 products, realisation from which was to the tune of \$403 million including \$183 million contributed by exports of organic textile. Major destinations for organic products from India are the US, EU, Canada, Switzerland, Australia, New Zealand, South-East

Asian countries, West Asia, South Africa, etc. Soyabean (70 per cent) lead among the products exported followed by cereals and millets other than basmati (six per cent), processed food products (five per cent), basmati rice (four per cent), sugar (three per cent), tea (two per cent), pulses and lentils (one per cent), dry fruits (one per cent) and spices (one per cent).

Total area under organic cultivation in India in 2013-14 is estimated to be 4.72 million ha with 15 per cent are certified and the rest under forest area. India has the highest number of organic producers in the world (5,97,873), mainly due to small holdings. The country has internationally acclaimed certification process for export, import and domestic markets which is regulated by National Programme on Organic Production. There are at least 18 accredited certification agencies which are responsible for the certification process. Though Government initiatives such as National Project on Organic Farming, Horticulture Mission for North-East & Himalayan States, National Horticulture Mission, National Project on Management of Soil Health and Fertility, Rashtriya Krishi Vikas Yojana and also Network Project on Organic Farming of Indian Council of Agricultural Research aims at promoting organic agriculture in the country.

A number of State Governments have already made significant strides in organic farming and some are inching towards the goal of including organic farming in their yearly plans. Gujarat government will spend about Rs 10 crore in a year to promote organic farming in the state under the organic farming policy. The government had announced the policy in April this year. "The state government is committed to promote organic farming and has allocated Rs 10 crore in the current financial year for this purpose," said B R Shah, managing director of Gujarat organic product certification agency and director of horticulture department, Gujarat.





Gujarat is the ninth state to declare a policy for organic farming after Kerala, Karnataka, Andhra Pradesh, Sikkim, Mizoram, Madhya Pradesh, Himachal Pradesh and Nagaland.

The Tea Board of India is giving a big push to organic tea production in the country for the first time by providing 25 per cent more subsidy than the normal subsidy of 30 per cent. This has for the first time been incorporated in the Twelfth Plan by the board to give a boost to organic tea, which has been gaining momentum in the country. It takes a minimum of three years for a garden to become organic and it will have to be certified as organic by an accredited certifying agency. Organic tea constituted two per cent of the total organic products exported in India in 2012-13.

Genetic Modification – Another Alternative

As technology continues to open new ways to improve the crop performance, farmers each day are confronted with newer and

better research products. Lately, the one which have drawn maximum attention from the stakeholders in agriculture is the Bt technology. Indian farmers have been quite receptive to this technology especially – Bt cotton.

The Bt crops, which carries a gene engineered in it to produce a toxin rendering the plant toxic to pests, is the one that has attracted many farmers world wide. The idea of not applying any pesticides without sacrificing the crops and environment got many takers in India as well. India went ahead with rapid adoption of Bt varieties in cotton. In 2009-10, Bt cotton spread to



85 per cent of the country's cotton area. It was claimed that this took the country's production to new heights.

A study jointly undertaken by the Council for Social Development (CSD) and Bharat Krishak Samaj, has reported that the overall production of cotton has grown by 9.25 per cent since the introduction of Bt cotton in 2002-03 and farmers' income has gone up by nearly 375 per cent. The study titled 'Socio Economic Impact Assessment of BT Cotton in India' indicated that high-yield hybrid cotton seeds resulted in lower pesticide use and have helped cotton farmers get better yields.

Even then, there are several detractors of this technology, who consider the claim made by Bt supporters as farce. Recently, Bt cotton has been at the receiving end as many allegations against the genetically engineered cotton variety has surfaced. The spate of suicides along the cotton belts of India and stagnant cotton yields has been



pointed out as reasons to doubt the efficacy of Bt cotton hybrids. In the past five years, cotton yield has risen only marginally from 470 kg per ha to 481 kg per ha. Many areas have suffered crop loss and these crop failures are being attributed to the increasing number of pests found to be attacking Bt cotton hybrids. The state government estimates in Andhra Pradesh show that 34 lakh acres out of the 47 lakh acres planted with Bt cotton during the Kharif 2011 season faced crop failure with almost 21 lakh farmers having lost around Rs 3071 crores. In Maharashtra, 209 farmers have committed suicide in the Vidarbha cotton growing belt region in 2011.

It has been ten years since the introduction of Bt cotton and no other Bt product has been approved for commercial cultivation so far. Even the field trials have been met with hostility from the public and environmental activists. A classic case is that of Bt brinjal, the introduction of which is still pending today owing to the differing positions of state governments, the lack of consensus among the scientific community, the incompleteness of tests and lack of independent professional mechanism to instill confidence in the general public.

The genetically engineered crop varieties offer a promising direction as it combines the qualities of pesticides without polluting the immediate environment with harmful chemicals. But the lack of confidence in the genetically manipulated technologies and the lingering doubts about the crossover of these 'foreign' genes to local varieties has marred the prospects of this technology.

The Snags

Indian consumption of pesticides per hectare may be low when compared to the rest of the world. With the continuous rise in the demand for food grains from limited resources,

it becomes imperative that we save the crops from pests and diseases. Under such circumstances the use of pesticides are bound to increase. But the popularity of pesticides have come under serious threat from the rising sale of spurious pesticides in the country. India produces about 80,000 tonnes of pesticides annually and the total market for pesticides in the country is estimated to be around Rs.7,000 crore. According to an estimate, the spurious pesticides market is estimated to be around Rs. 3,000 crore and its adverse impact on crops is yet to be ascertained by the government agencies. Makers of spurious pesticides usually imitate popular and expensive brands from multi-national and leading Indian manufacturers that have better acceptance among the farmers. Some counterfeit pesticides do not contain any active plant protection ingredient and largely comprise materials like talcum powder, chalk powder, any odd solvent or just kerosene. Others may contain some active ingredient but only a fraction of that mentioned on the label. Inadequate checks and controls are propagating such a phenomenon. This needs to be urgently addressed.

Despite advances in pest control, 20 to 30 percent of crops in India are still lost to pests and diseases every year. Some of the pests come from across borders and invade the crops here. Several examples exist of weeds, pest and diseases that have travelled across borders to become highly invasive. Parthenium weed, coffee rust, late blight of potato, golden nematode of potato, woolly aphid of apple etc. reassert our vulnerability to exotic pests. From 2008-2010, the Papaya Mealybug—an invasive species of insect native to Mexico—ravaged crops in the state of Tamil Nadu, wiping out an estimated \$93 million worth of papaya, mulberry and tapioca crops, eventually spreading to other Indian

states and crops. By 2010, nearly \$319 million in crop losses could be attributed to the Papaya Mealybug infestation, and the pest threatened to spread even farther throughout India. Our plant quarantine measures need to be strengthened to avoid such outbreaks and crop losses.

Newer challenges like new pests, pesticide resistance, pesticide residue among others call for new and improved molecules. R&D to develop a new agrochemical molecule takes an average of 9 years and a cost of approximately USD 180 Million. Indian companies typically have not focused on developing newer molecules and will face challenges in building these capabilities, while continuing to remain cost competitive.

Since, the number of end users is large and widespread, effective distribution via retailers is essential to ensure product availability. Lately, companies have been directly dealing with retailers by cutting the distributor from the value chain thereby reducing distribution costs, educating retailers on product usage and offering competitive prices to farmers.

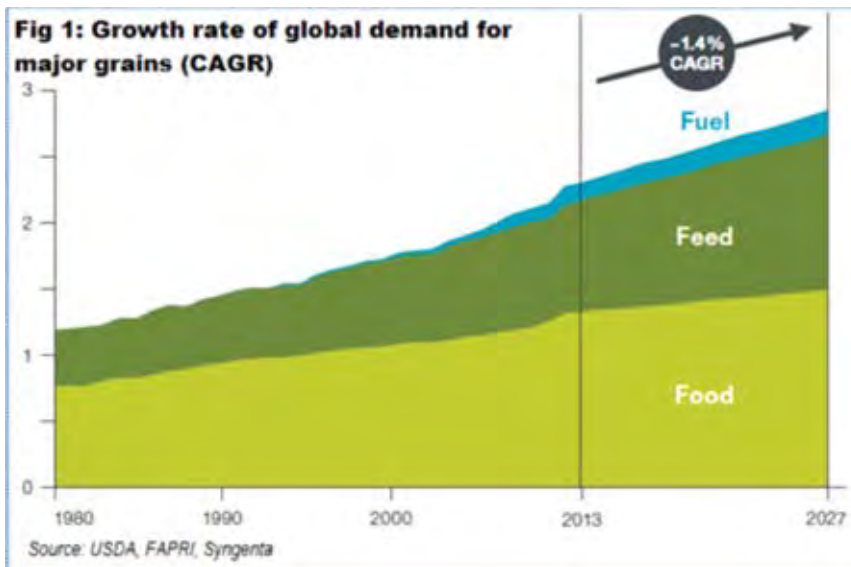
Promotion of IPM, zero budget farming and usage of bio-pesticides by Indian Government and NGOs is gaining momentum. With increasing demand for organic food, farmers in certain states like Karnataka have reduced chemical usage and have adopted organic farming. Agrochemical companies will have to tackle the rising environmental awareness and address concerns on negative impact of pesticide usage.

In years to come, pesticide usage will increase counting on the pressing need to increase food production and changing pest dynamics. Although chemical free options exist, for a large country like India ditching pesticides will not be a viable option. But safer chemicals, scientific usage of pesticides and proper awareness can maintain a balance between food safety and food security.

Crop Protection - An Overview

Global Perspective

According to estimates from the United Nations, there has to be a 70% increase in agricultural productivity as the global population is estimated to increase to nine billion by the end of 2050. Experts are of the opinion that this huge target of agricultural productivity can only be met and global food security be ensured only if farmers adopt modern practices and improved plant technologies. Crop protection assumes a huge significance in the backdrop of this necessity. Currently, it is estimated that 40% of global crop production is lost due to pest and disease attacks (according to Croplife America). Crops are subject to threats from a number of external agents like fungi, bacteria, viruses, insects, nematodes, viroids and oomycetes. Food crops that are grown worldwide continuously compete with 30,000 species of weeds, 3,000 species of nematodes and 10,000 species of plant-eating insects. Apart from direct losses incurred in crop production due to pests and diseases, the diversity of crop pests is also continuously increasing and expanding with new strains evolving on a regular basis. The cumulative losses of major crops to fungi, and fungi-like microorganisms are so significant that the amount lost is sufficient to feed nearly nine percent of today's global population.



The significance of crop protection in today's global scenario assumes further strength when one considers the ever shrinking natural resources required for successful crop cultivation in the form of water, agricultural land, arable soil, biodiversity, the availability of non renewable energy, human labour, fertiliser etc.

The global crop protection market involves three principal categories of agro chemicals namely: herbicides which occupies approximately half of the global agrochemicals industry revenue, followed by insecticides that occupies approximately a quarter of global agrochemicals industry's

income followed by fungicides, occupying most of the remaining portion of global agrochemicals turnover along with some quantity of bio pesticides that various companies have been promoting in the recent years. On the global front, the agrochemicals industry is relatively consolidated with the leading crop protection companies like Syngenta AG, Bayer AG, Monsanto Company, BASF AG, DuPont all together sharing approximately 70 percent of the global agrochemical industry sales. The next tier of agrochemical producers include FMC, Makhteshim-Agan Industries Ltd., Sumitomo Chemical

Global Warming Leading to Spread of Crop Pests towards North and South Poles

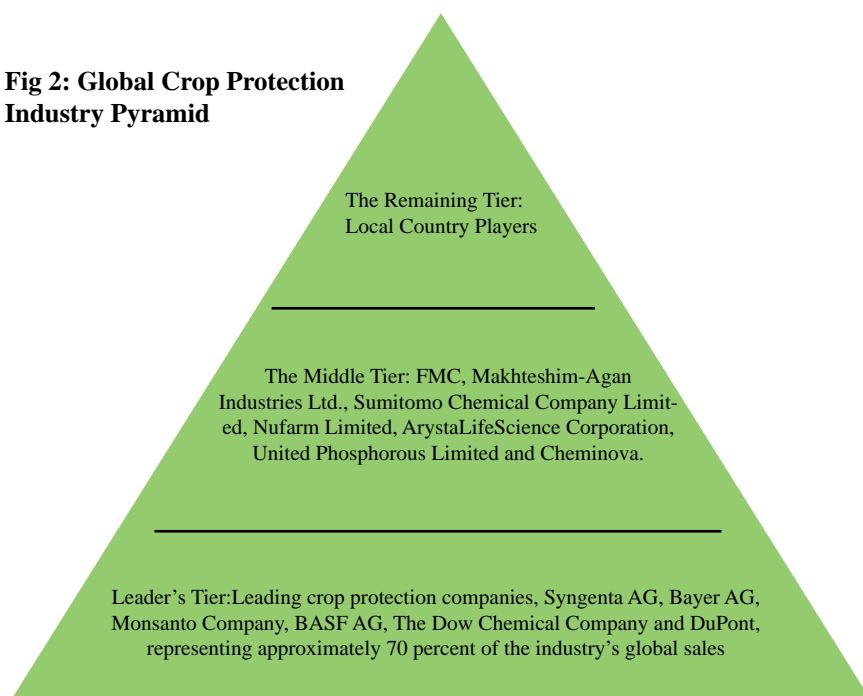
- A recent study carried out by researchers at the University of Exeter and the University of Oxford reveals that global warming is causing crop pests to move towards the North and South Poles at a rate of nearly 3 kilometers a year
- Warming climate is allowing pests to become established in previously unsuitable regions
- Pests like the Mountain pine has destroyed

large areas of pine forest in the US Pacific Northwest where they were not a problem earlier

- Rice blast fungus which cause considerable economic loss to the crop in over 80 countries, currently has now moved to wheat and causing wheat blast that is sharply reducing wheat yields in Brazil

The study used published observations of the distribution of 612 crop pests collected over the past 50 years

Fig 2: Global Crop Protection Industry Pyramid



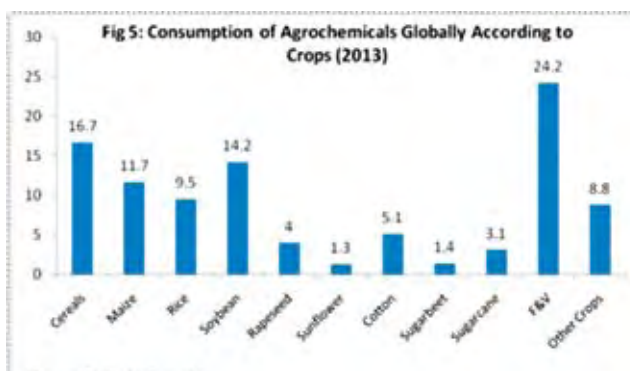
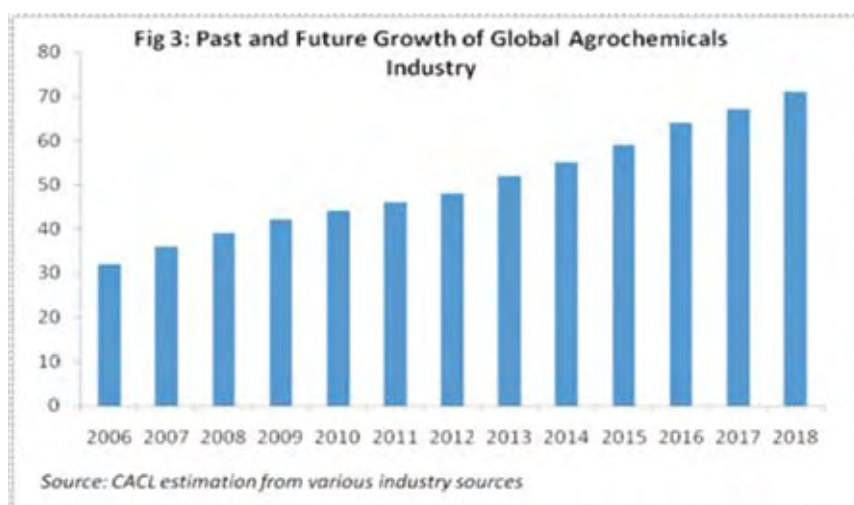
Source: CACL compilation from Industry Sources

ranging from 2006 and 2012. By the end of the financial year of 2012, the global crop protection industry was valued at USD48 billion. Driven by factors like increasing demand for food and fuel, the industry is expected to grow at a robust pace of CAGR 5.4% and reach USD 71 billion by the end of 2018. Also, increasing awareness associated with the benefits of fertilizers and pesticides in crop production would be a decisive factor. Amongst various regions, Asia-Pacific has been growing faster and will continue to dominate the global agrochemicals market, accounting for major share in overall market.

The crop protection market when studied according to various geographic regions, one finds that the rate of growth in Asian region is substantially higher and more consistent as compared to the other regions. The European region, though a huge consumer of agrochemicals,

Company Limited, Nufarm Limited, ArystaLifeScience Corporation, United Phosphorous Limited and Cheminova with the remaining being made up of local small and medium players in various countries (Fig 2). The leading players adopt various differentiated strategies and compete through unique technologies focusing on certain crops, markets and geographies, and competitive pricing based on low-cost manufacturing positions.

The crop protection industry on a global scale had registered a Compound Annual Growth Rate (CAGR) of 6% between the period



has shown fluctuating trend in the recent years, owing to unstable economic conditions in many European countries. The share of Latin American Countries (LAM) was quite low during the early nineties but since then, has shown dramatic increase in the use of agrochemicals in the region. Currently, LAM countries have a substantial share in the total agrochemicals market of the world. The North American Free Trade Agreement (NAFTA) group of countries consisting of the United States, Canada and Mexico has been showing decreasing trend of agrochemicals market between the late nineties and the early 2008, but in the recent years, the market has shown trends of recovery and is growing.

Globally, the consumption pattern of agrochemicals according to different crop segments reveals that fruits and vegetables (F&V) consumes the greatest share of pesticides. In 2013, the share of F&V in global agrochemicals market was 24.2%. Different cereals consume 16.7% of agrochemicals. Soybean consumes 11.7% of the total global agrochemical sales. Cotton, a major cash crop worldwide consumes 5.1% of the total agrochemicals worldwide whereas crops like rapeseed, sunflower, sugarbeet, sugarcane consumes 4%, 1.3%, 1.4% and 3.1% respectively.

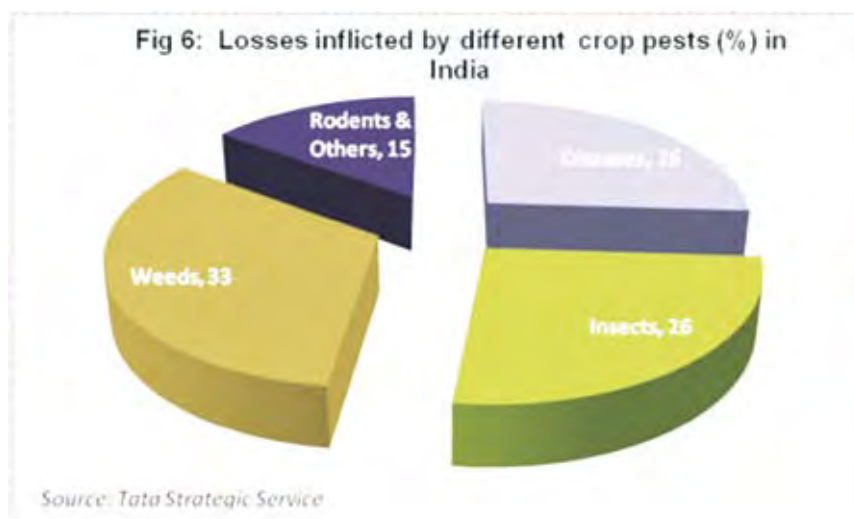
Biotechnology and Crop Protection
Biotechnology based crop protection or genetically modified (GM) crops are emerging as effective methods of crop protection globally. In 2014, the total area under biotech crop was more than 181 million hectares which is 3.5% year on year growth as compared to 175 million hectares in 2013. This was brought about by over 18 million farmers in 28 countries in 2014. Globally, it is estimated that on an average, adoption of GM crops has reduced chemical pesticide use by 37%, while increasing crop yields by 22%, and farmer profits by 68%.

On a global scale, it's seen that nearly 50% of the global biotech crops are grown in the developed countries.

Major Stored Grain Pests

CROP	PEST
Cereals	Rice weevil
	Paddy moth
	Rice moth
	Red flour beetle
Pulses	Bruchids
Groundnut	Groundnut bruchid

Crop technology in the form of GM crops becomes important in terms of adoption in different developing countries when we observed that Asian countries like China and India, Latin American countries like Brazil and Argentina and African countries like South Africa together feed about



Global Area of Biotech Crops in 2014

Rank	Country	Area (million hectares)	Biotech Crops
1	USA	73.1	Maize, soybean, cotton, canola, sugarbeet, alfalfa, papaya, squash
2	Brazil	42.2	Soybean, maize, cotton
3	Argentina	24.3	Soybean, maize, cotton
4	India	11.6	Cotton
5	Canada	11.6	Canola, maize, soybean, sugar beet
6	China	3.9	Cotton, papaya, poplar, tomato, sweet pepper
7	Paraguay	3.9	Soybean, maize, cotton
8	Pakistan	2.9	Cotton
9	South Africa	2.7	Maize, soybean, cotton
10	Uruguay	1.6	Soybean, maize

Source: ISAAA

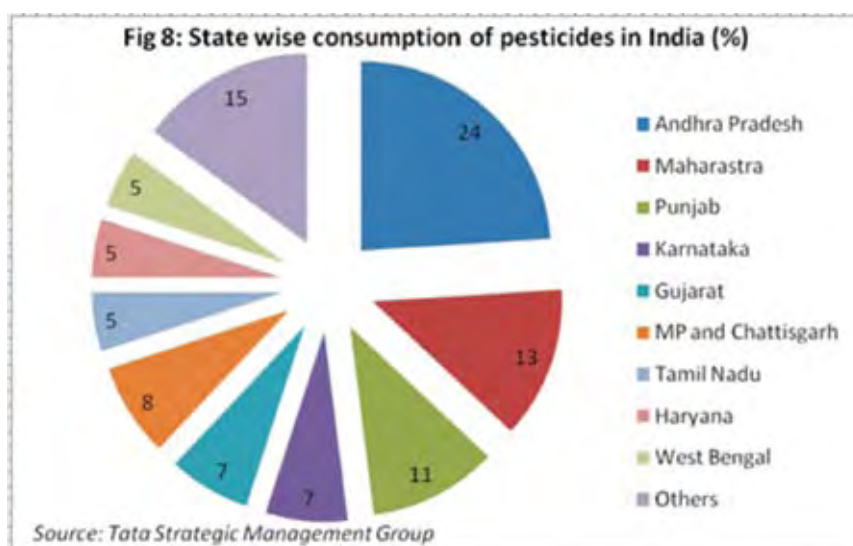
40% of the global population and these countries need crop technologies like GM crops for increasing production of food grains. Further, farmers of these agriculturally important countries mostly small land holding farmers with poor resources and these farmers need improved crop protection technology like GM crops. Though USA is still the leader in GM crops globally, Brazil in the recent years have exhibited increased enthusiasm in adopting GM crops and currently the second largest country in terms of cultivating GM crops. In China, over 7 million small farmers with averageland holding of 0.5 hectare are growing BT cotton in over 4 million hectares of total land.

Similarly, in 2013, Mexico planted 114,000 hectares of biotech crops comprising of 102,000 ha biotech cotton and 12,000 ha of soybean.

Crop Protection in India

In India, according to a study by ASSOCHAM and Yes Bank in 2014, nearly Rs 50,000 crore worth of crops were lost due to the attack of various pests and diseases annually. In 2002, Standing Committee on the Petroleum and Chemicals noted that almost Rs 90,000 worth of crops were damaged annually due to pests and disease attacks across the country. This loss is attributed to low pesticide consumption (less than two per cent of the global consumption) and confined to a fourth of the country's arable land.

The consumption of pesticides in India is still very low (about 600 gm/ha) and over the past years has witnessed a marginal growth. The global crop protection chemical use on the contrary has displayed phenomenal growth. Another difference in pesticide use pattern in India is the dominance of insecticides over herbicides and fungicides. However, in the recent years, share of insecticides are steadily declining while use of herbicides and fungicides are increasing. The important drivers behind this emerging trend are shortage and increasing cost of farm labour and the cost-effectiveness of chemical herbicides in weed control.

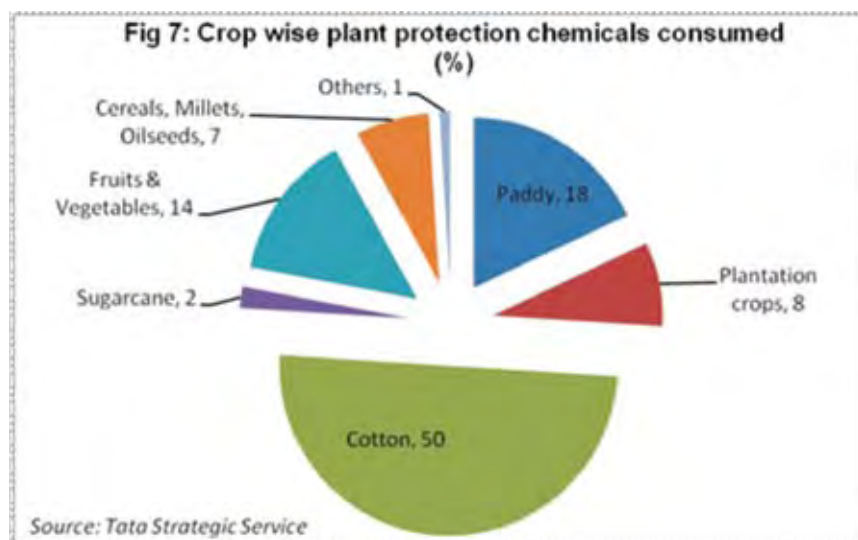


As far as increasing use of fungicides are concerned, growth of horticulture as a result of increasing demand for good quality fruits and vegetables, and the mounting export of fruits and vegetables are the major drivers. In the recent years, bio-pesticides have also created their own market riding on their increasing popularity in terms of their environmental safety, low toxicity, lower chance of resistance development and non-polluting production process.

In India, a host of pests and diseases attack crops and reduce production. Unfortunately, in India the existing system of reporting, compilation and distribution of data on pest surveillance is weak and not efficient enough. It varies from

one agency to another resulting in inadequate convergence of data. This in turn results in incomplete and multiple advisories in adopting pest management strategies. The system needs to improve and the present system of pest surveillance needs to adopt more application of latest tools of Information Communication technology (ICT), utilising input devices like Global Positioning System (GPS) etc. Apart from increasing the pest surveillance system, another important aspect of crop protection in the country is the timely seed treatment with bio-pesticides or fungicides to combat the seed borne disease problems. The government agriculture machinery in India has developed Pest Disease Monitoring Information System (PDMIS) on the lines of NIC for reporting and updating latest pest situation by the various States and union territories, but the system needs to be made more robust and functional.

Different states in India shows a lot of variation in the consumption of pesticides. In 2012, Andhra Pradesh registered the highest consumption of pesticides in the country, sharing almost one quarter (24%) of the total pesticides sold in the country. Maharashtra was the second largest consumer of pesticides in the country in the same year with 13% of the total market share, with Punjab as the third largest state in terms of



pesticide consumption at 11%. Karnataka and Gujarat each shared 7% of the total pesticide sales in the country. While Madhya Pradesh and Chhattisgarh together consumed 8% of the total pesticides sold in the country, states like Tamil Nadu, Haryana and West Bengal shared 5% each in the total sales.

Responsible Use of Crop Protection Chemicals

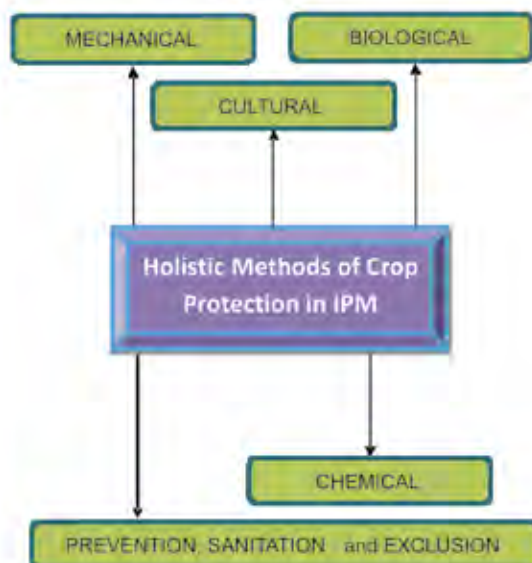
In the recent years, there has been a lot of debate and deliberations from various quarters, be it the environmentalists, or the agro-chemical industry or the government regulatory bodies and scientists about many of the observed harmful effects from applying chemical pesticides. This includes excess application than the recommended dose, repeated application of the same pesticide leading to resistance, poor application technology, not maintaining proper protection during spraying etc. Many experts are of the opinion that along with the focus on new technologies such as biological control and Integrated Pest Management (IPM), it is also necessary to make sure that pesticides are used properly, and farmers and other stakeholders are properly educated about this. It is important that the small and marginal farmers needs to be educated on the importance of improving application technology and sprayers, the condition and quality of the sprayer, (especially the nozzle) and various other related aspects. It is not always easy for farmers to apply a fixed volume of chemical spray evenly over a fixed area. If the application technology is poor, farmers tend to apply far too much pesticide than what is actually sufficient. To tackle the problems of high mammalian toxicity and mitigating the risk on the environment, scientists have been actively engaged in developing newer molecules which are easily biodegradable. Scientists are also engaged in developing target-specific pesticides with very low mammalian toxicity. Over a period of time, a distinct area of analytical chemistry has evolved that sought to decide whether to go for bio-based products or for using synthetic chemicals for protecting the crops based on pesticide residue analysis to judge the residue level of various harmful chemicals in food grains. Now a



days, scientist are developing safer molecules which undergo rapid photo-degradation, microbial degradation as well as chemical degradation leaving very less amount of residues in the environment. All these activities are centered around the prime motto of providing protection to the crops along with safety to the natural enemies of different pests and safety to environment. Monitoring for pesticide residues attained significant importance across the globe in different countries including India as a result of which an efficient monitoring system has emerged which regularly tests food items for pesticide residues helping farmers to use chemicals wisely.



Fig 10: Methods of Pest Management and Crop Protection in IPM



Timely identification of contaminated crops has helped farmers in knowing or to be aware of whether the produce they are selling contains pesticide residues.

Integrated Pest Management (IPM)- A Holistic Approach to Crop Protection

The excessive and indiscriminate dependence on chemical pesticides

monitoring and intervention, all in a synchronised and timely manner. While preventing the pest and disease infestation on crops, it is essential to understand the conditions, select right varieties and manage crops properly. Monitoring involves regular inspection of the field and in the process identifying losses and deciding on suitable action. Finally, one goes for

over a long period of time has led to development of resistance in pests to pesticides, outbreaks of secondary pests, pathogens and biotypes along with alarming occurrence of residues in food chain. To overcome such situations and minimize damage to human and animal health, several organizations have started advocating the concept of IPM for sustainable and profitable agriculture. IPM stands on three basic pillars of prevention,

intervention by choosing the right method, planning the approach and intervening in a responsible manner so that agriculture is sustainable and environment is protected.

IPM is not any fixed package of practices or any specific set of recommendations but is actually a concept that is farmer based, location specific, tailor made for specific cases going even down to the field level or crop growth stage. It is a combination of all suitable techniques that minimise pest levels and must be considered as an integral part of crop production together with all agronomic techniques including Integrated Crop Management (ICM).

Biological Control- The Environment Friendly Method of Crop Protection

Use of biopesticides has been steadily increasing in India as an important vehicle for environmentally friendly methods of disease and pest control in crops. However, the rate of increase is felt by many to be below expectation due to a number of socio-economic, technological and institutional constraints. Bio-pesticides are derived from animals, plants and micro-organisms such as bacteria and viruses and offer certain distinct advantages:

Biopesticides, their manufacturing and utilization in India

Bio Agent	Manufacturing process	Utilization
<i>Trichogramma</i> spp. (egg parasite)	Mass multiplied by using stored grain pest as a host. Production involves the multiplication of host insect on sorghum grains, which is allowed to be parasitized by <i>Trichogramma</i> . Then eggs are clued in cards as 'tricho cards'	Used for control of sugarcane early shoot borer, cotton boll-worms, sorghum stem borer
<i>Crysoperla carnea</i> (Chrysopid predator)	Mass multiplied in the laboratory on the eggs of stored grain pest	To control larval pest in pulses, vegetables and fruits
<i>Cryptolaemus montrouzieri</i> (Ladybird beetle)	Mass multiplied on mealy bugs with the help of pumpkin as under laboratory conditions	To control mealy bugs especially on fruits
NP Virus of <i>Helicoverpa armigera</i> & <i>Spodoptera litura</i>	Production starts with raising pod borer and tobacco caterpillar larvae (host culture) on semi-synthetic diet. NP Virus is smeared on cultured larvae. Then the diseased larvae are collected to obtain virus suspension by blending, filtration and centrifuging	Used against bollworms in cotton and pod borers
<i>Trichoderma</i> spp.	Multiplied in labs and formulated in a powder form with the help of carrier material (talc powder)	To control root rot and wilt diseases especially on pulses
Pheromone lures for <i>Helicoverpa armigera</i> & <i>Spodoptera litura</i>	Sex pheromones are filled into plastic traps at required concentration with the help of micro-pipettes and placed into rubber septa. The septa is fixed to the trap	To trap productive male of gram pod borer and tobacco caterpillar
Source: Ecoideaz		



Use of Neem for Crop Protection- A Snapshot

- Growing awareness about benefits of neem as a natural pesticide
- The estimated market size of neem-based pesticide in the country is Rs 100 crores and is growing by 7-9 per cent annually (according to EXIM Bank Study)
- There are about 20 million neem trees in India and over 60 per cent of the entire global neem population is found in India
- Neem bears 3.5 million tonnes of kernels every year, and from this, around 7 lakh tonnes of neem oil can be obtained
- Total neem oil produced in India is about 2.5 lakh tonnes, which is only 30 per cent of the total potential
- Neem based products exports by India in 2012 was at USD 5.73 million, including neem seeds
- USA and Italy are the leading importers of neem extracts from India
- Japan was the largest importer of neem oil cakes from India, valued at USD 0.28 million in 2011-12
- Spain the largest importer of neem seeds from India

• They are comparatively less harmful than chemical pesticides in terms of environment safety and residual level of toxicity • They do not destroy friendly insects, birds and mammals along with crop pests. Biopesticides are very specific in killing the target pest only

• They are often required in small quantities, decomposing quickly

Biopesticides in the country are currently estimated to be occupying a small part of the pesticide industry, about 3%, and till 2013, there were 12 different types of biopesticides registered in India. Biopesticides like *Trichoderma*, *Gliocladium*, *Paecilomyces*, *Pseudomonas*, *Trichogramma*, NPV and *Bacillus* has found increasing use in the crop protection scenario and witnessed greater standardization of production techniques in India.

Feeding the mammoth world population of over 7 billion calls in for an arduous task of crop production along with crop protection against losses from pests and diseases. With the challenge of producing more food from ever decreasing cultivable land requires a judicious and holistic crop protection approach. The future years to come needs sustainable agriculture and for this, scientists are working tirelessly to develop crop protection technologies and chemicals that poses lower mammalian toxicity, developing new chemistry with ideal molecular weight and which are less soluble in water. The future also calls for more biotechnological innovations to be directed in the form of transgenic plants along with more innovations required for new neo-nicotinoids.

Future also requires further extensive training and awareness creation in safe and responsible use of pesticides, proper application of pesticides with special care on the nozzles, sprayer or applicator with an intention to minimize the loss of applied pesticide or target organisms. Future will also see increasing emphasis in bio-control agents with research emphasis on innovations of more plant derived biopesticides.





Bringing Innovations to Farmers...



PI Industries Ltd

Udaisagar Road, Udaipur - 313001, Rajasthan

Website: www.piindustries.com, Email: mktg@piind.com

'PROTECT CROPS WITH RIGHT CROP PROTECTION PRODUCTS'

Pesticides Manufacturers & Formulators Association of India (PMFAI) is a National Association comprising of 200 Members across the country committed to manufacture Better, Safer & Eco-Friendly Agrochemicals and helping India **to become self-sufficient in food grains through safe and judicious use of Agrochemicals**. The mission of PMFAI is to include basic technical grade manufacturers of pesticides to foster the interest of general public & PMFAI'S members by promoting innovation and environmentally sound use of crop protection/public health products so as to ensure high quality, abundant food, **fibre and maintenance for growing population in Indian sub-continent**. In an interview with Agriculture Today, Mr. Pradip Dave, President, PMFAI discusses the activities of PMFAI and the general scenario of pesticide industry in India.



How did Pesticides Manufacturers & Formulators Association of India (PMFAI) come into existence?

PMFAI came into existence in the year 1967 to unite generic industrialists and other manufacturers and formulators for the purpose of increasing agricultural production and competitiveness throughout the country. PMFAI represents the pesticide industry on national level and its members include large, medium and small scale manufacturers. PMFAI members include basic manufacturers, Formulators and the manufacturers of intermediates required for pesticides.

What are the objectives of PMFAI?

PMFAI seeks to enhance agriculture competitiveness by supporting the national generic pesticide industries as well as the commercial activities sensitive to the regional needs. PMFAI supports creative initiatives and endeavours of its members through following objectives:

- To protect and promote interests of pesticide formulators engaged in small scale sector by protecting section 9(4) "me too" registration.
- To promote improvement or innovation in technologies of pesticides formulation and quality control.
- To develop technical research in the methods of application and use of pesticides and associate closely in the national programme for increasing food production in the country.
- To promote cooperation and exchange of information between its members.
- To promote harmonious relationship between members of the Association.
- To keep members informed and to promote their common interest in connection with the Central Government, State Government or other legislation pertaining to the industry whether enacted or proposed.

What are the activities of PMFAI?

It is due to the efforts of PMFAI, Section 9(4) registration for Technical and Formulation is in existence and operative in spite of strict opposition from importers, MNCs and large-scale manufacturers to abolish Section 9(4) from Insecticides Act or make it non-operative. PMFAI is defending/fighting for Section 9(4) "me too" registration for last 30-40 years on account of which today Indian exports of pesticides have reached approximately Rs.9,000 crores and to meet domestic requirement of almost Rs.16,000 crores worth pesticides. PMFAI is also involved in on-going cooperation and liaison with national Regulatory & Registration authorities and various Ministries and other central and state Government authorities; organising training programmes, conferences/seminars for the benefit of Indian Pesticide Industry; organising International Conferences & Exhibitions abroad & in India and taking Trade Delegations to promote exports of agrochemicals from India; keeping members informed of recent developments with regard to regulatory and registration affairs and promoting safe and judicious use of crop protection products.

What is the status of crop protection in India?

With increasing population, demand for food grains is increasing at a faster pace as compared to its production. In addition to that, every year, significant amounts of crop yield is lost due to non-usage of crop protection products. India is losing nearly one fifth of its crops to insects pests, diseases and weeds every year, and the value of the crop losses is estimated at a staggering Rs.90,000 crores as per Government statistics. India has 16% of the world population and less than 2% of the total land mass. Scope for bringing new area under cultivation is severely limited with urbanisation and need for more and more homes for the increasing population. Therefore the

need of the hour is to protect crops with right usage of crop protection products and we need to increase our food production to feed the ever growing population. Use of crop protection needs to be improved in India. Pesticide usage in India is one of the lowest in the world at 0.58 kg/ha against the global average of 3 kg/ha. Pesticide usage in Korea is 16.5 kg/ha, Japan 10.8 kg/ha, USA 4.5 kg/ha and Europe is 3 kg/ha. Presently in India, Insecticides form the largest segment of domestic crop protection chemical market accounting for 65% of the total market, used in rice and cotton crops, followed by Herbicides 16%, Fungicides 15% and others 4%.

How has been the government support for pesticide industries in India?

We are extremely sorry to inform that Government of India has never supported Indian Pesticide Industry. For last more than 7 years we are fighting to stop imports of readymade pesticide formulations without registering its Technical Grade Pesticides (active ingredient) in India. In spite of Gujarat High Court Orders, dated 5.9.2013, the Registration Committee continues issuing such illegal registrations allowing imports of readymade pesticide formulations to India, resultantly farmers are looted by importers charging exorbitant price for the imported pesticides. With regard to registration under Section 9(4) under Insecticides Act, 1968 i.e. "me too" registrations, lately CIB&RC brought more hurdles for granting registrations asking to obtain Consent Affidavit/Letter from Technical Grade Pesticide manufacturers. This will bring back license raj and the formulator will be at the mercy of technical manufacturers, who may or may not be willing to give Consent or Certificate for non-commercial reasons. The Registered manufacturers of Technical will also be a formulator of similar products, which will also restrict them to give such certificates for 9(4) registrant. This will defunct Section 9(4) and "me too" registration will be inoperative. It is on account of "me too" registrations that India has become exporters of agro-

chemicals worth Rs.8000 crores to global market and catering domestic market with pesticides worth Rs.16,000 crores. If section 9(4) becomes inoperative, Indian Pesticide industry will collapse. Ministry of Agriculture, Ministry of Chemicals & Fertilizers and Ministry of Commerce & Industry are unhelpful and ignoring various problems faced by Indian Pesticide Industry. We have also made several representations to Hon'ble Prime Minister Shri Narendra Modi during the period June 2014 to March 2015, but they have also gone ignored with no action being taken to help Indian Pesticide Industry.

Will the new clause 'Data Exclusivity' be detrimental to the interests of smaller pesticide companies?

PMFAI strongly oppose "Data Protection" or "Data Exclusivity" in Pesticide Management Bill (PMB) wherein 5 years period of Data Protection is proposed for Pesticides. As such, earlier there was a proposal for Data Protection for a period of 3 years. But the scenario has now completely changed. Now, the molecule owners already enjoy Patent Protection of 20 years period. As India is signatory to Patent Protection regime which has been operational since 2005, now there is no need to give extra protection after the Patent period of 20 years is expired. Data Protection in Pesticides Management Bill will only lead to monopoly and hence this provision must be removed from the Pesticides Management Bill 2008. No Data Protection be given to any agrochemical product.

What is your take on pesticide residues in the wake of green peace's recent allegation on the high levels of the same in tea?

India has a well organised system and project under Indian Agricultural Research Institute (IARI) viz., All India Network Project on Pesticide Residues (AICRP), Delhi. Dr. K.K. Sharma, Principal Scientist of IARI is the Network Coordinator of the project. Under the project, research on pesticide residues for agricultural produce and food commodities is carried out at all India level on continu-

ous basis. Pesticides residues are rigorously monitored and regulated in India to address domestic food safety and trade issues. The allegations by Green peace and other agencies are not supported by facts, as Indian agricultural produce and food commodities have never shown pesticide residue levels above legal limit.

How can we tackle spurious pesticides widespread in the market?

On the matter of Spurious Pesticides, several times PMFAI has suggested that CIB&RC should not entertain any application of companies without having the membership of one of the national pesticide industry associations and their endorsement. This will help in establishing the credential of the applicant for registration. But the same was not considered. Spurious Pesticide is also due to the mischief played by importers. The Registration Committee is wrong in granting registrations for imports of readymade pesticide formulations without registering its Technical Grade Pesticides in India, which leads to import material from anywhere in the world as the Technical Grade is not registered in the country. To stop spurious pesticides entering the market, this registration needs to be stopped.

What will be the future of pesticide industry in India in terms of growth and newer products?

Future of Pesticide Industry largely depends upon Ministry of Agriculture and Central Insecticides Board & Registration Committee (CIB&RC). Their actions are working totally against Indian Pesticide Industry and registration process is becoming very stringent as many hurdles as mentioned above are put up by RC to curb Indian Pesticide industry's manufacturing activities. They only promote imports of readymade pesticide formulations. Unless and until Prime Minister's office and Ministry of Agriculture give strict instructions and warning to CIB&RC, progress of Indian Pesticide Industry will be in danger.

'INDIA'S GREATEST ASSET IS THE TALENT POOL OF QUALIFIED SCIENTISTS'



PI is a leading Agri Input and Custom Synthesis & Manufacturing company in India. With over 5 decades of brand, experience in working with millions of Indian farmers and vast marketing & distribution set up in India, PI markets innovative Agri Input products in India. With highly accredited R&D, laboratory and manufacturing set up for fine chemicals, PI offers support in the process research and contract manufacturing needs of the newly discovered molecules. PI Industries Ltd (PI) was incorporated in 1947 (as Mewar Oil & General Mills Ltd.) with its registered office in the lake city of Udaipur, Rajasthan. PI Industries currently operates three formulation and two manufacturing facilities as well as five multi product plants under its three business units across Gujarat (Panoli and Jambusar) and Jammu . These state-of-the art facilities have integrated process development teams with in-house engineering capabilities. PI has a strong rural reach and brand equity with millions of Indian farmers duly backed by a robust pipeline of products, for sustained growth in the sector. In an interview with Agriculture Today, Mr. Salil Singhal, Chairman & Managing Director, PI Industries Ltd. discusses the services offered by PI industries and the general crop protection scenario of the country.

What is the market share of PI industries in crop protection chemicals sector?

PI Industries Ltd (PI) operates with relatively smaller product portfolio of around 25 products in the domestic crop protection segment but it enjoys leadership position in most of these product segments with substantial market share. This business has been built on the Company's enviable reputation for the quality of its products and its business dealings and ethics.

In its custom synthesis model, what are the services offered by PI Industries?

In its Custom Synthesis business, PI provides services in areas such as Contract Research, Process Development, Analytical Method Development, Synthesis of high purity Product and Impurities for analytical reference standards, 5 batch analysis under GLP conditions, Scale up studies, Process detailed engineering and Commercial scale production. This business has grown through years of experience and the in depth understanding of customer requirements. And this is backed by time tested business processes, state of the art R&D Centre, kilo lab, pilot plant and manufacturing & analytical facilities, excellent and really well experienced and dedicated team of people.

What are the opportunities for the Indian companies to evolve into production hub for active ingredients and

intermediates of global chemical companies?

As a country, our greater asset is the talent pool of qualified scientists who are capable of producing complex products at economical cost by adopting innovative processes. With lots of uncertainty around outlook of chemical industry in China in terms of change in policy goals of government, industry consolidation, environmental regulations tightening, reach, demographics, etc., there are certainly much greater opportunities for India to evolve into a production hub for a.i.s and intermediates of global chemical companies particularly for the complex molecules. The policy ambivalence pertaining to IPR with many adverse judgements to the intellectual property holder, and yet the public pronouncements to strengthen and respect patents, along with prolonged litigation time does hamper rapid growth in this area.

Is our policy environment conducive for such arrangements?

Not really!! The government will have to do lot more to provide conducive conditions with regard to ease of doing business, simpler & uniform tax regime, consistency in policy & regulatory environment (SEZ regulations/tax are one example), substantially improve local infrastructure, make available low-cost feedstock, energy etc. to achieve the objectives of its 'Make in India' initiative. While India is a "low cost" economy, most regrettably it is not a "cost efficient" economy; and this is a challenge we have to meet.

What are the products developed by PI to be released into the Indian market?

We have around 10-12 products in pipeline at different stages of development and registration. Product development and registration is a 4-5 year process and we are expecting to introduce atleast 1-2 products every year in the Indian market. Our key emphasis is to introduce technologies that will support sustainable agriculture.

What are the advantages of granular formulations over the other types of formulations?

Key advantage of granular formulation is the ease of application, high safety to the applicator and low or no drift hazard. Today the focus is to develop formulations that are safe to use and environment friendly as well.

How effective are bio pesticides under Indian condition?

Bio pesticides technology has till date not reached a scale where bio pesticides can substitute chemical pesticides. They can at best supplement or be a part of IPM/IRM. The Bio pesticides business in India is already a major disaster: over 2000 registrations have been granted by the Registration Committee (R/C), but with no mechanism in place to ensure that only quality products are sold to the farmers. As a result, hundreds of fly by night operators manipulate to get the registrations and then the farmers with all sorts of concoctions, and at the cost of both environment safety and efficacy: nullifying the very purpose of bio pesticide use! Regrettably, we have failed to learn from experience. Under Section 9(4) of the Insecticides Act, R/C has issued over 200,000 registrations resulting in a huge spurious pesticides market of few thousand crores rupees, and the same is happening to bio pesticides: and the government looks helplessly at the situation!

How does PI maintain contact with the farmers?

PI follows a mix of various approaches of agri-extension viz., individual contact, group contact and the mass connect depending on the objective. With the advent of newer communications technologies, we are now able to very effectively connect with the farmers. We have created a large pool of farmer data base to reach and service them better. We also keep conducting regular farmer meetings/demos etc. in the beginning of season or launch of new molecules, etc.

What are the future products and services that we can expect from PI Industries?

We are currently developing new products that will provide innovative solutions in current farming practices. We monitor new emerging agri related problems and work to find the right solutions and proactively plan to introduce the same in the Indian market. We also continue to work with global innovator partners on newly discovered molecules to help them in custom synthesis, scale up and then commercialization of these molecules on global scale. We have around 20 products in our R&D pipeline and we expect to commercialize 2-3 products every year.



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INDIA – AN ATTRACTIVE MARKET

DCM Shriram Ltd. is a leading business conglomerate with a group turnover of Rs. 5650 crores. DCM Shriram's division, Shriram Farm Solutions Business, has built considerable strength in agribusiness domain, ranging from manufacturing capabilities to the delivery of agri-solutions. It has a pan India presence covering North, West & East India with regional marketing offices at 22 locations. Supported by a robust and extensive network to make the products and services available to the rural customers, DCM's Farm Solution division has been serving farmers for over four decades through an extensive network of around 3000 channel partners and 30000 retailers. In an interview with Mr. Sovan Chakrabarty, Executive Director & Business Head, Shriram Farm Solutions discusses the crop protection scenario in the country and role played by DCM Shriram.



What is the market share of DCM Shriram in crop protection chemicals sector?

DCM Shriram has a wide range of crop protection chemicals, which are marketed in key markets of North, West, Central and East India. At an All India level, our market share would be about two per cent, but the share would be higher in markets where we are present.

What is the status of crop protection in India?

Crop Protection is critical for India to be able to meet its food needs. India has a very low pesticide consumption at 0.6 kg / ha. As compared to this, pesticide consumption is 13 kg / ha and 7 kg / ha in China and USA, respectively. Over Rs. 100,000 crores worth of agricultural produce is estimated to be lost every year in India due to insects, pests, weeds and rodents. On the other hand, due to lack of education, farmers are, not using crop protection chemicals in the right doses at the right time, in several areas. In summary, educating farmers on usage of crop protection products needs to improve a lot.

How are the market conditions in India for the growth of crop protection industry?

It is estimated that on an average one rupee spent on pesticide use gives an ROI of approximately five rupees to the farmer. On the other hand, India has the potential to become the manufacturing hub to the world. Exports are already growing at double the rate of growth of the domestic usage. Therefore, market conditions

indicate that Crop protection industry is expected to grow at 12 per cent for the next 4-5 years. (Exports growing at 16 per cent and domestic sales at 8 per cent)

Is India a good market for future crop protection companies?

Given the above, India is an attractive market for future crop protection companies.

The new clause on Data Exclusivity' for agrochemicals would delay the entry of affordable generic products in the market, while the multinationals get exclusive rights. What is your take on this?

Unfortunately, this will not be in the interest of farmers. We need to create a balance between the need for R&D companies to generate enough revenue to continue research and the need to make new generation molecules affordable to ensure higher agricultural production.

How is the policy environment in India for the growth of crop protection industry?

The policy is fairly robust, in terms of evaluating new molecules. However, we need to make it simple for new entrants and encourage competition. Getting new sources approved itself is a long haul, today.

How can we tackle the menace of spurious chemicals?

We need to strengthen and simplify the process of drawing samples in the field.

Field testing should be outsourced to accredited third party agencies to avoid misuse of laws and to tackle spurious chemicals.

Can GM crops be an alternative for pesticide free agriculture?

We do not need pesticide free agriculture just as we don't need medicine free human health. What we need is residue levels within limits and less toxic molecules.



Educating farmers, building checks at the time of procurement, scientific research to evolve less toxic chemicals is the way forward. GM is part of the solution but not the only solution.

What are the future challenges of crop protection industry?

The key challenges are - Farmer education; Building in-house R&D, Simplifying approvals to encourage manufacturing and tackling the unfair negative propaganda against use of pesticides per se.

Rising Animal Husbandry Market

Livestock Sector (LS) is a key component of agriculture growth in India and contributes 25.6% to agriculture GDP. It not only plays vital role in providing nutritive food rich in animal protein, but also supplement family income and generate employment in rural sector. Today India with largest livestock population (512 million) is producing 133 million tonnes of milk, 59.8 billion eggs and 6.3 million tonnes of meat. Food demand in India is expected to rise by 40% by 2030 and double by 2050. LS have to play crucial role to meet this demand. Moreover due to rising demand of animal products and changing food preferences of next generation consumers, the Indian LS has to get amake over and dynamicity in coming future. This can be met by enhancing the productivity per animal, improving feed quality & utilization efficiency, adopting better reproductive strategies and improving health coverage based on newer generation vaccines and drugs. The Indian LS is primarily focused on Dairy and Poultry which have large potential to grow and compete globally. Poultry is more or less organized sector and moving towards integration. However, "Operation Flood" initiatives allowed the modernization of dairy sector with cooperative networks allowing small farmers to sell milk for processing, which was able to meet growing urban demand. This initiative allowed India to attain self-sufficiency in dairy products and now has potential to become key exporter with viability of small farmers.

Matching the pace with LS, today Indian Animal Health (AH) Industry has taken a big leap forward and now estimated to be approximately Rs. 36,000 million (domestic market) in 2014 and is expected to reach Rs.



The Indian LS is primarily focused on Dairy and Poultry which have large potential to grow and compete globally

60,000 million in 2018 at CAGR of 11-13%. It is playing vital role in realizing the objective of prevention and control of diseases of major economic importance, improving health and productivity and newer and cost effective solution in diagnosis and disease management. Dairy is the major segment contributing 52% of total market followed by poultry which is 34%. With economic development of the country and social obligation of nuclear family the need of companion animal is also increasing and so market is also looking at a positive growth in coming days.

In the product segment, nutrition products / feed supplements is a major segment (35%) followed by antimicrobial (22%) and parasiticides (20%). However due to emphasis on prevention and control of diseases, biological is set to become key segment in future. Growth potential of In-

dian dairy sector is the major driver of Indian AH industry. Government economic plans to focus on genetic improvement, immunization program and creation of disease free zones, strengthening the infrastructure for quality and clean milk production, strengthening infrastructure in dairy sector. Although overall cattle population is expected to fall, increased productivity will drive production increases, and there will be increased number of muscled animal receiving veterinary inputs. On the other hand limiting factors are rising animal feed cost and increased competition from food crops, heavy dependence on climatic condition, poor animal health & husbandry infrastructure and inadequate technological back up.

Leaving apart all limitations, the opportunity arising from globalization of economy as well strong domestic consumption is going to keep Indian AH market attractive in near future and has the potential to figure in 10 AH market globally.

Satish Pasrija
Managing Director
Virbac Animal Health India Pvt. Ltd



Small Farmers Big Gains

One year of the NDA government, in its own idiom, is characterized by Saal Ek, Shuruat Anek. The subject of this article is not to discuss any of the new schemes initiated by this Government, but to highlight its efforts to seamlessly build upon earlier initiatives to bring big gains to small farmers through the instrumentality of Farmer Producer Companies (FPCs).

Small and marginal farmers constitute the largest group of cultivators in Indian agriculture. A significant number of them struggle to survive. Reflective of their distress is the spate of suicides. While indebtedness is often cited, there are deeper issues which make smallholders vulnerable to risks. These include the small size of landholdings, inability to create scale economies, low bargaining power on account of small quantities of marketable

surplus, poor linkage with extended markets and consequent exploitation by intermediaries in purchasing inputs and selling farm produce, inadequate infrastructure to transport their output to market and often, harsh methods of loan recovery. The hardships of smallholders are further compounded by the ecological degradation of the production base – depleting soil fertility, water stress, dwindling biodiversity, climate change and the constant threat posed by extreme weather.

A variety of approaches have emerged in response to the problems faced by the small and marginal farmers. Collective action through farmer groups can be an important strategy for smallholders to hold their own and remain competitive in a world of rapidly changing backward and forward markets. Farmer collectives were seen as a way to foster decentralized, inclusive, equitable

and self-reliant growth, as they are democratic member-based organizations that enable small producers, consumers

and service-providers to transcend various structural barriers. Agricultural cooperatives, formed under the Co-operative Credit Societies Act 1904, have long been the dominant form of farmer collectives. However, the experience with cooperatives points to many limitations -- of leadership, member commitment, lack of professionalism, vulnerability to political influence, -- that prevent effective collective action.

The concept of producer companies was introduced in 2002, as an alternate institutional model, by incorporating a new Part IXA into



Dr. Rita Sharma

the Companies Act, 1956. The new legislation ensures that producer companies maintain unique elements of cooperatives while the regulatory framework is similar to that of other company types. Described as the new generation farmer organizations, FPCs borrow much from the cooperative idea. Farmers are shareholders in the FPCs, but these institutions are designed to prevent political hijack and are professionally managed to ensure economic viability. In the early years, however, FPCs did not gain much momentum for want of support and handholding.

The impetus was provided a decade later in 2011-12 when the Small Farmers Agri-business Consortium (SFAC) began to support the State Governments in the formation of FPCs. The 2013 guidelines of the central government enabled States to utilize Rashtriya Krishi Vikas Yojana (RKVY) funds for this purpose. A further fillip was provided in 2013-14 with the announcement of an equity grant fund of Rs. 50 crores for strengthening the capital base of FPCs to leverage working capital from financial institutions. Moreover, a credit guarantee fund of Rs. 100 crore was established in the SFAC to cover loans upto Rs. 1 crore extended by banks to FPCs without collateral. The NDA government recognized the potential of this farmer-empowering institution and provided

further support of Rs 200 crore to NABARD, in their budget 2014-15, for facilitating 2000 producers organisations over the next two years.

FPCs are emerging as the most appropriate institutional form around which to mobilize farmers and build their capacity to collectively leverage their production and marketing strength, reduce risks and engage in agri-business at various tiers of the value chain. FPCs help in augmenting the bargaining power of small producers to access financial and non-financial inputs, reduce transaction costs, tap high-value markets and enter into partnerships with private entities on more equal terms. Through FPCs, profits which otherwise would be siphoned off by middlemen are captured by the farmers themselves.

There are at present nearly 880 FPCs (registered and in process) identified by the SFAC with the potential to reach out to about nine lakh farmers. NABARD will further facilitate 2000 such organizations. The top three states are Madhya Pradesh (144), Uttar Pradesh (95) Maharashtra (89).

In Madhya Pradesh, the Government in partnership with NGOs and SFAC has created an enabling environment for the growth of FPCs. Action for Social Advancement (ASA), an NGO, has contributed significantly towards nurturing the FPC movement over the past decade,

through facilitation, advocacy and hand-holding. Small and marginal farmers, operating under rainfed conditions, are the major beneficiaries of the agri-business activities of the FPCs. ASA has reported that merely through timely purchase of inputs in bulk has led to incremental benefits of Rs. 3000 – 4000 per hectare for the members. In FPCs involved in composite crop seed production, farmers have reaped an additional benefit of Rs. 20,000 – 30,000 per hectare. The more enterprising of the FPCs engaged in hybrid seed production have harvested a bonanza of about Rs. 50,000 per hectare.

Experience from the nascent FPC movement indicates that small farmers can achieve big gains through these farmer collectives. The promise exhibited by the FPCs needs to be fostered and boldly championed by government, private sector and civil society, alike. The challenges faced by the fledgling FPCs -- developing governance and administrative capacities, accessing financial capital, leveraging resources from ongoing programmes, penetrating newer markets, mobilizing ICT, honing the institutional architecture, federating upwards into state and national level bodies -- need to be skillfully addressed.

As the world prepares to move from the millennium development goals (MDGs) to sustainable development goals (SDGs), the focus will shift to building a sustainable planet on the three pillars of environmental sustainability, social inclusion, and economic development. In this post-2015 agenda, which advances a broader vision, FPCs will acquire greater meaning and importance.

Rita Sharma is former Secretary to Government of India, Ministry of Rural Development; former Secretary to the National Advisory Council; Currently, Member, Board of Trustees of the International Rice Research Institute and World Agroforestry Centre. Email: sharmarita2015@gmail.com





LITCHI PERICARP BROWNING

CAUSES AND MANAGEMENT

Litchi is a fruit of the tropics much sought after for its attractive appearance and pleasant aroma. India is the second largest producer of litchi in the world with a production of about 5,75,000 MT in 2012-13. Bihar is the leading litchi-producing state in India and contributes about 45% of total production. 'Shahi' and 'China' are the most important and popularly-grown litchi cultivars. Being non-climacteric (fruit that does not ripen off the tree), litchi is harvested at visual and organoleptic optimum. At full maturity, the litchi pericarp (skin) is red due to the presence of anthocyanins (plant pigments). Red skin pigmentation is the most important quality parameter for successful marketing and consumer

acceptance of litchi. However, the fruit is highly perishable and deteriorates rapidly if proper handling techniques are not employed. Browning of the pericarp after harvest and fruit decay are the most important limiting factors to successful handling and marketing of litchi. The pericarp turns brown within 48 hours of harvest under ambient conditions. Although the eating quality is not undesirably affected at all, browning reduces the consumer appeal and generates unmarketable produce. Therefore, major share of the produce is traded within the place of production in most countries. Exports to distant markets are impaired by fruit quality beyond legal requirements due to fast pericarp browning. Therefore, maintaining the attractive red colour of

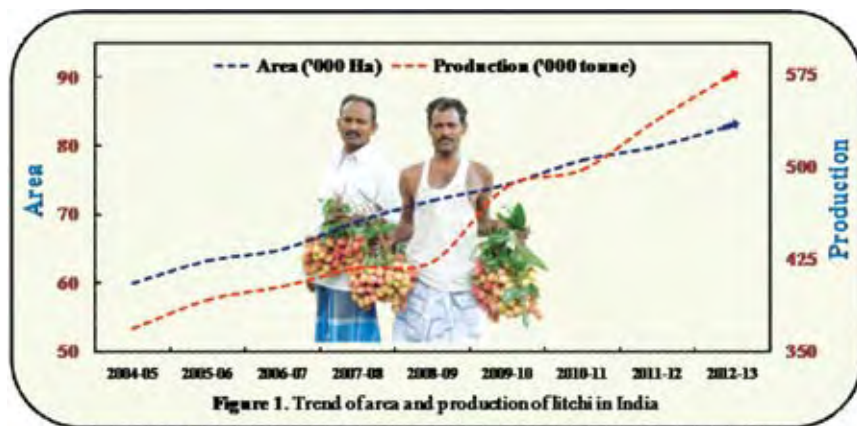


Figure 1. Trend of area and production of litchi in India

fruit along with freedom from decay and insect-pests becomes the primary objective of every stakeholder in the litchi supply chain.

Physiological basis of pericarp browning

Browning in fruits and vegetables is a result of pigment degradation due to enzymatic or non-enzymatic reactions. Anthocyanins in litchi pericarp are localized within the vacuoles. Due to low pH conditions prevalent in the vacuoles, the stability of anthocyanins is maintained. Anthocyanin-oxidative enzymes (such as polyphenol oxidase, peroxidase, anthocyanase) are located in the chloroplasts and other plastids, meaning that in intact hydrated cells the substrate-enzyme contact is avoided and fruit remains red-coloured. Once the fruit is harvested it loses its source of water and nutrients, and has to depend on its own internal reserves. Loss

of moisture from the harvested fruit is not replenished and this results in desiccation. Desiccation has an adverse impact on the membrane integrity resulting in disruption of cellular compartmentation. Desiccation also brings the fruit under stress with the generation of reactive oxygen species. The subsequent rise in pH and disruption of cellular compartmentation activate the oxidative enzymes and bring them into contact with phenolic substrates, ultimately leading to browning. Any process that affects membrane integrity and cellular compartmentation, has bearing on browning of litchi pericarp. Therefore, litchi pericarp browning is associated with water loss, mechanical injury, fruit senescence, fungal infection, and temperature abuse.

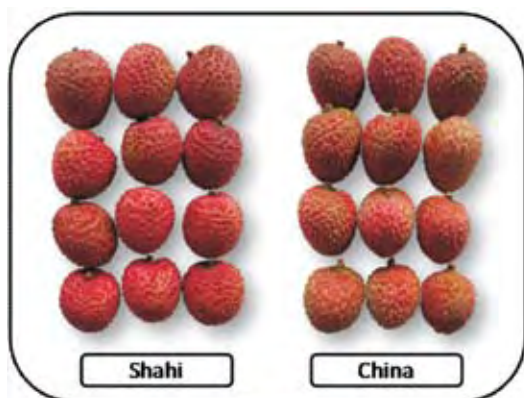
Management strategies

Proper temperature management is the single most important factor to reduce postharvest deterioration and maximize post-harvest life

of litchi. In India, litchi fruit matures during the hot summer months of May and June when atmospheric temperature averages around 35°C. Immediate and fast pre-cooling of harvested fruit removes the field heat and provides the basis for effective temperature management during subsequent storage or shipment. Out of several pre-cooling techniques, hydrocooling (using iced-water) and forced-air cooling are commonly employed. However, unless the operation is maintained at 85% relative humidity forced-air cooling may lead to fruit desiccation. Therefore, hydrocooling becomes a preferable technique to that of forced-air cooling in postharvest handling of litchi. Commercial hydrocooling has been progressively adopted in Australia, Thailand, and China. After pre-cooling, the fruit should be stored (or maintained) at a temperature of 2-5 °C and 90 ± 5% relative humidity. Litchi fruit under such conditions has a shelf-life of 3-5 weeks.

Sulphur dioxide treatment

Sulphur dioxide (SO₂) fumigation has been the most effective, and commercially followed, postharvest treatment for control of pericarp browning in litchi fruit. This is achieved by placing boxes of fruit in a gas-tight sulphitation chamber where fumes of burning sulphur is introduced to the desired concentration. Normally, about 400-450 g of sulphur is sufficient for a tonne of fruits. Alternatively, SO₂ can also be introduced into the chamber



Most popular litchi cultivars - 'Shahi' and 'China'





ber through pressurized cylinders and treated @ 1.2% for 10 min. However, fumigated litchi fruit has a bleached-yellow appearance. Although the colour will partially recover, the degree of colour recovery depends on the rate of subsequent SO₂ release. The red colour of skin can be completely recovered by dipping the fumigated fruit in dilute acid solution (for example, 0.1 N HCl for 5 min). Treating litchi fruit with SO₂ not only prevents pericarp browning but also effectively controls postharvest decay. Despite effective management of pericarp browning, there is increasing objection to use of sulphur owing to sulphite residue in skin and aril, and development of off-flavour. Sulphur residues decrease rapidly during the first few days after fumigation, yet apprehensions remain due to legal and health concerns ranging from mild wheezing to severe life-threatening asthma in sulphite-sensitive individuals. Additionally, sulphiting agents are not considered as GRAS (Generally Regarded as Safe) and

Fruit dipping in diluted hydrochloric acid is commercially practiced to restore the red colour of litchi skin bleached during SO₂ fumigation.

require labeling where residue levels exceed permitted levels. The United States FDA and EU stipulate that sulphite residue in edible portion of litchi should not exceed 10 ppm. These concerns about SO₂ have prompted research towards finding safer alternatives to address pericarp browning in litchi. Chemical fungicides such as thiabendazole, iprodione, and prochloraz can effectively control decay and improve shelf-life of litchi fruit. However, the use of synthetic fungicides

has faced limitations and restrictions owing to their acute residual toxicity, long degradation period, and other effects on human health and the environment. Therefore, non-chemical means to control decay is being increasingly advocated due to growing consumer concerns. Some promising alternatives to SO₂ fumigation are discussed briefly.

Acid treatment:

Use of acids to overcome pericarp browning in litchi is based on the knowledge that anthocyanins are stable at low pH and acidification might be responsible for inhibiting the activity of polyphenol oxidase. The inhibitory effect of acids on pericarp browning is due to resultant lowering of pH. Fruit dipping in diluted hydrochloric acid is commercially practiced to restore the red colour of litchi skin bleached during SO₂ fumigation.

Modified atmosphere packaging:

The composition of atmosphere surrounding the produce has consider-

able influence on the rate of respiration and metabolic activities. Modifying the atmosphere content by reducing the oxygen content (below 8%) and increasing the carbon dioxide content (above 1%) forms the basis of controlled atmosphere (CA) storage and modified atmosphere (MA) packaging. Packing within plastic bags and sealed containers can reduce the rate of pericarp colour change in litchi through reduction in the rate of moisture loss. In addition, modifying the atmosphere within the package by ensuring about 3-5% O₂ and 5% CO₂ reduces the rate of product respiration and metabolism. Modified atmosphere packaging in combination with temperature management can reduce pericarp browning and increase storage life of litchi. However, care should be taken to ensure that excessive build-up of humidity inside the package is avoided otherwise rotting may aggravate.

Use of chitosan coating:

Surface coatings are generally effective in extending the fruit storage life but their use in litchi has not shown much benefit. Microcracking in the pericarp due to desiccation is thought to induce cracks in the coating, thereby undoing its effect. However, chitosan coating @ 1-2% is found to be effective in reducing moisture loss and pericarp browning in litchi. Since chitosan is soluble in 2% acetic acid, dipping in acidic chitosan reduces

pericarp browning by inhibiting the activity of oxidative enzymes.

Heat treatment:

Hot water treatments have been used especially against insect infestations in fresh produce. Temperature abuse can induce pericarp browning in litchi, and heat treatment alone aggravates browning. However, heat treatment in combination with acid treatment reduces pericarp browning in litchi due to reduction in activities and gene expression of anthocyanin degradation enzymes. Hot water brushing (55 °C for 20 seconds) followed by acid treatment (HCl) maintains the fruit quality of litchi.

Irradiation:

Ionizing radiation is also known to inhibit physiological changes that results in extension of postharvest life in several tropical and sub-tropical fruits. Irradiation of litchi has also been followed as a quarantine measure against insect pests for trade in Australia, Vietnam, and Thailand. Radiation treatment (0.5kGy) of 'Shahi' and 'China' fruits in combination with low temperature storage (4 °C) has been found effective in reducing pericarp browning.

Biocontrol:

Postharvest infection by decay and spoilage pathogens is one of the factors for pericarp browning in litchi. Harnessing the efficacy of biological antagonistic agents in control of postharvest pathogens has been an important facet of the search for safer alternatives. The antifungal activity of *Bacillus subtilis* against postharvest litchi rot caused by *Peronophythora subtilis* has been successfully demonstrated. Bacteria such as *Lactobacillus plantarum* can produce lactic acid which can acidify litchi pericarp and reduce browning.

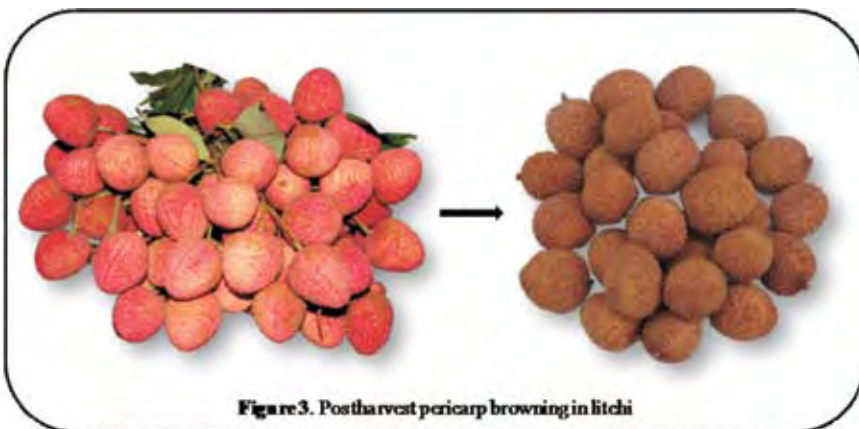


Figure 3. Postharvest pericarp browning in litchi

It is clear that any strategy aimed at containing pericarp browning must prevent the substrate-enzyme contact. Interventions for retarding browning of litchi fruit after harvest must ensure:

- o Prevention or reduction of moisture loss and desiccation
- o Maintenance of membrane integrity and protection of membranes from lipid peroxidation
- o Maintenance of low pericarp pH
- o Delay of fruit senescence
- o Reduction in activity of oxidative enzymes
- o Control or inhibition of microbial decay

Concerted efforts with these approaches would result in postharvest concepts that efficiently retard pericarp browning throughout the litchi supply chain.

Vishal Nath*, Alemwati Pongener, and S.K. Purbey

***Director, ICAR-National Research Centre on Litchi, Muzaffarpur, Bihar**

Minimizing Incidence & Impact of Drought

Addressing Serious Issues of Irrigation

For India, the year 2015 may be a drought year since the India Meteorological Department has projected 88% of normal monsoon rainfall. The year is officially declared drought when monsoon rainfall shortfall exceeds 10%.

Rainfed Agriculture

Drought in varying magnitude is a regular annual feature in one or the other parts of India since rainfed agriculture covers almost 55% of net sown area which is characterized by low level of input use and productivity. Further, significant variation and erratic rainfall [onset, distribution, quantity and cessation] result in wide variation in yields. While the rainfed agriculture has profound impact on country's agricultural productivity per unit area and total output, the serious problems inhibiting the farm growth include [i] country's inability to fully exploit and utilize irrigation potential [ii] unequal availability of irrigation across the country [iii] small and marginal farmers'

access to irrigation [iv] inefficient use of water resources[v] increasing stress on the available irrigation resources. Maximum rainfed area needs to be brought under irrigation in order to increase crop yields [by 100% to 400%] and facilitate cultivation of a variety of high value crops, minimize the adverse impact of drought and increase farmer's income.

As against potential of 140 million hectares, around 102.8 million hectares [73.43%] of irrigation facilities are created and of this 85 % is being utilized.

Currently only 63 million hectares [45%] of net cropped area is irrigated. The wide gap between gross cropped area and gross irrigated area has not





improved much since the First Plan period. There has been inadequate commitment to areas of serious concern viz., water legislation, water conservation, water use efficiency, water harvesting and recycling and infrastructure development. Current scenario exhibiting 557 incomplete projects accompanied by low utilization of irrigation potential created and time and cost over-run ranging from 138% to 1000% for 12 and more than 24 projects respectively shows that return on capital invested in creating irrigation facilities is inordinately delayed or almost lost.

Groundwater through wells irrigates 60.86% of area. It has manifested following problems. Although about 70% of groundwater potential has been utilized there are serious problems of over exploitation of groundwater. Inadequate and untimely availability of electricity and costly diesel are concerns associated with it. Existing irrigated areas have been experiencing serious water stress as reservoir and groundwater resources have been depleting in several parts. Excessive withdrawal of groundwater, besides rendering huge private investments

infructuous by depleting water tables and drying up tube wells, has also been the cause of water salinity and extracting hazardous chemicals in some parts.

Canal water carrying toxic chemicals/heavy metals pose a serious source of soil contamination. Soil erosion has been causing land degradation. Indiscriminate use of canal water has resulted in water logging of 2.46 million hectares and 3.4 million hectares suffering from surface water stagnation which, if left uncorrected, eventually leads to salinization. Although irrigation and drainage should go hand in hand, the drainage aspect has been neglected in major and medium irrigation projects. In Japan, drainage is an integral part of irrigation system, called *irrinage*.

Need for Strategic Actions:

Water scenario is now fast changing in India as a result of increasing population, rising demand for irrigation to raise high-yielding varieties of crops, rapid urbanization and industrialization, electricity generation, impact of global warming and erratic rainfall. Besides, in the context of frequent droughts and

water scarcity each year and competing demands for fresh water and steady increases in the generation of the wastewater in India, country needs to seriously demonstrate the political commitment and administrative skill and initiate following strategic actions.

Incomplete projects: There has been an increase in the number of projects awaiting completion since the end of IV Plan. The backlog has remained between 500 and 600 projects since then. The backlog declined at the end of VII Plan but increased again to the present level. Currently, there are 557 irrigation projects yet to be completed. Andhra Pradesh has completed only 17 projects out of the allotted 105 projects, followed by Karnataka [33/305], Maharashtra [94/186] and Madhya Pradesh [90/242] projects. Major factors responsible for this include, inter alia, improper synchronization of project components and delayed tendering and contract management, land acquisition, delays in construction of railway/highway crossing.

Time and Cost overruns: Worst part of the inordinate delay in completion of projects has been the time and cost overruns. A study by the Planning

Commission on cost overruns found that for a representative 12 projects, there was an escalation of the order of 138% over the original cost [i.e. escalation of 1.38 times the approved cost]. There was a very high cost escalation of the order of 1,000% and more for 24 out of the 151 major projects taken up earlier than 1980 and the average escalation is around 200% for major projects starting from 1985. In the case of medium projects, there are 24 projects with a cost escalation of 500% or more.

Underutilization: The gap between the irrigation potential created [IPC] and the irrigation potential utilized [IPU] is steadily increasing from the First Plan. Currently IPU is 80 million hectares [73.39%] as against IPC of 109 million hectares. Factors responsible for low utilization of irrigation as studied by Indian Institute of Management [Ahmedabad, Bangalore, Kolkata and Lucknow] focus on lack of proper operation and maintenance, incomplete distribution systems, non-completion of CAD works, changes from the initially designed cropping pattern and diversion of irrigable land for other purpose, among others. Inadequate provision of budget for operation and maintenance of the irrigation system is significantly responsible for underutilization followed by non-completion of distributaries, minors, field channels and on-farm development.

Management: Integrated Water

Resource Management [IWRM] in agriculture is a concept of sustainable development, allocation and monitoring of water resource and its use in agriculture. IWRM has also a role to meet social, economic and environmental objectives. This concept has been successfully applied more in areas relating to domestic and industrial use in several countries like Australia, Mexico, and Korea. In India, notwithstanding a full-fledged river-basin approach is yet to be developed and used extensively, existing sources of water availability for agriculture [rains, surface and groundwater in particular] have to be sustainably developed, judiciously allocated and their equitable distribution and efficient use monitored rigorously. Operationalization of the concept necessitates initiation of water reforms, enactment of laws and establishing institutions to enforce them, through consultations with the farmers. In this process, Government has to assume the responsibility of a regulator and facilitator and transfer its current role of implementing irrigation projects to autonomous water services management organizations, community-based organizations and the private sector. Policy interventionists and planners of water resource development and management should invariably seek participation of farmers as ultimate water users who can be organized into legal bodies called "Water Users Associations". Women

have been found playing effective role in the provision, management and safeguarding of water for agriculture and non-agriculture purpose.

Other measures: Other important measures need to include [i] The policy and programs related to water should focus on equitable sharing of water; integrated management of surface water, soil water and groundwater; intra-basin and inter-basin water transfer; participation of enlightened public in decision making and welfare of socially, economically and politically weak segments of society, among others.[ii] Irrigation accounts for 83% of the water consumed. As per estimates of the National Commission for Integrated Water Resources Development Plan, the irrigation sector will consume about 79% of the available water resources in 2050. To improve significantly the efficiency of irrigation system of the Government and private irrigation projects from the current level of 40% and 65% respectively. Even a 10% improvement in the efficiency of agricultural water use is likely to result in the availability going up by 40%. This calls for focused attention to promote improved water management practices in irrigation projects suffering from operational deficiencies and integrated water resources development and management approach [iii] Declining per capita availability and threat of river basins turning 'water scarce' necessitate well-coordinated and planned measures for storing run-off water during the rainy season. In view of this, widely acceptable and area-suitable water conservation measures have to be explored and adopted. Also it is necessary to strengthen existing irrigation infrastructure, increase water use efficiency and productivity, raise crops requiring less-water, make rainwater harvesting mandatory for all and provide shading with trees the banks of canals and other reservoirs.[iv] Despite getting fairly a good rainfall at about 46 inches per annum, almost 50% of it falls in a span of 15 days and 90% of the rainwater is lost due to run-off in just four months. Only about 15% of





the annual rain water is used for irrigation. If this water is properly stored and efficiently used for sustained surface irrigation, it can enhance agricultural productivity at low cost and reduce excessive pressure on groundwater.

Over the years, there has been a manifested lack of attention to water legislation, water conservation, water use efficiency, water harvesting and recycling and infrastructure. Current scenario exhibiting number of incomplete projects accompanied by low utilization of irrigation potential already created shows that return on capital invested in creating irrigation facilities is inordinately delayed or almost lost. All incomplete projects need to be completed by 2017-18 by drawing a suitable road map indicating specifically the role, responsibility and accountability of officials, department and ministry concerned.

Selection and capacity building training of waster users' association [WUA] can be on lines of selection, promotion and nurturing of Self-Help-Groups as developed by NABARD. There is need to rationalize water rates based on cost delivery and women's involvement in participatory irrigation management [PIM] and their capacity building training. States which have yet not enacted Act to facilitate participation of stakeholders in PIM program should indicate the current status of the PIM implementation and should formulate the roadmap

for enactment and implementation of PIM.

Regular monitoring and evaluation of performance of WUAs is necessary for effective implementation of the PIM program. The success and failure of the WUAs could provide useful lessons and help initiate corrective steps in formation and sustainability of WUAs at other places. India has a weak framework for sustainable irrigation management. States can consider policy, regulatory and institutional framework for the efficient, sustainable and equitable allocation of water.

Other key priorities include [i] reorganization, strengthening and capacity building of irrigation and drainage

departments that can successfully seek participation of farmers and other agencies in PIM [ii] improving cost delivery [iii] allocating sufficient resources for operations and maintenance, sustainability of investments and arresting rapidly deteriorating existing irrigation infrastructure.

Micro-irrigation System

A campaign should be launched to create awareness among farmers about the importance of micro-irrigation system through effective demonstrations to make them believe what they see themselves and learn from other farmers who have successfully adopted and benefited. Some resourceful farmers from Rajasthan, Gujarat and Maharashtra who have visited Israel to study the micro-irrigation system can answer If Israel can do it why our farmers cannot?

State Agricultural Universities in each agro-ecological region need to assess the potential of micro-irrigation and demonstrate to farmers gains in terms of productivity, water saving, water use efficiency, viability of the investment, payback period to convince farmers and bankers. It is necessary to reduce capital cost of the system by researches, ensure provision of technical support for operation after installation, relaxation of farm size





limitation for providing subsidies taking into account water saving and using it to expand area under irrigation, water use efficiency, increase in farm output etc.

Use of Wastewater

Policy makers should formulate an economic framework for the assessment of the use of reclaimed wastewater in agriculture as a part of comprehensive planning process in water resource allocation strategies to provide for a more economically efficient and sustainable water utilization. Source of wastewater for using as irrigation in agriculture entails significant changes in the traditional framework for water allocation, funding structure, fixing of water quality standards, regulatory framework and institutional mandates. It involves good governance at all levels in order to develop a holistic approach and sets of consistent policies for water allocations and efficient utilization to yield expected objectives. The technical feasibility and economic analysis of the wastewater treatment need to consider the financial, social and environmental burdens of effluent disposal to the environment which can reflect the true value of reclaimed wastewater.

Municipal authority in each city should formulate water conservation plans specifically emphasising on treatment of wastewater for

agriculture for which the Government should provide technical, financial and management support including public education programs. Financial incentives can include tax incentives, tax credits, grants and low interest loans. Financial incentives must focus to improve environmental performance by incentivising users to innovate for reducing the water use.

India needs efficient water management strategies and techniques [conservation, reuse and recycle]. Awareness among farmers and general public has to be created and continuously followed up for minimum water use and efficient water management, improved water treatment technologies and access to good sanitation and drinking water, rainwater harvesting [capture and store rainfall and use it efficiently]. Water and environment related knowledge should be offered right from primary schools to colleges, universities and all educational institutions.

Often wastewater is a source of pollution and can affect the health of users, consumers and the environment, if safe practices are not applied. Sharing available knowledge and exchange of experiences on best practices among wastewater users must be an on-going process. In most countries including India, use of wastewater is an unregulated but common

practice. Lack of implementation of guidelines of safety standards can lead to health risks that could result in significant secondary impacts. Safe use of wastewater in agriculture is need of the hour which calls for a framework of national policies and implementation of safe use guidelines and practices. When wastewater is a valuable resource, key word is "safe". Many countries do not have access to the technology of collection and treatment, human capacity, financial means to operate such treatment plants efficiently in order to treat all effluents prior to discharge into environment and reuse. This calls for immediate action on putting in place policy and programs including infrastructure that aim at [i] developing national capacities for the promotion of the safe use of wastewater in agriculture [ii] enhancing knowledge and skills on the safe use of wastewater among staff, organizations and users [iii] increasing the understanding of the link between wastewater and health, ecosystem functioning and the potential benefits of wastewater reuse to country's socio-economic development.

According to the FAO report [2012] rapid growth in population, urbanization, industrialisation and agriculture accompanied by increased water scarcity and stress, among others, are key interacting factors whose interdependencies influence current and future management of wastewater production, treatment and use in agriculture. Agriculture accounts for 70% of ground withdrawals and 86% of world's total fresh water consumption. Global agricultural water consumption [both rainfed and irrigated] is expected to increase by 19%. It is estimated that 10% of world's population relies on food grown with contaminated wastewater. For India, it is now time to put in place appropriate institutional mechanism to collect information on quantity of wastewater generated, treated and used [currently and future] at State, agro-ecological regions and national level which must be collected for developing strategic

action plans aimed at wastewater treatment and its productive use in agriculture, aquaculture, agroforestry that include environmental conservation and health protection measures.

The use of scientifically treated wastewater has beneficial effects on country's economy and the environment contributing to enhancing food security, social equity and inclusive growth in rural areas, whereas the use of untreated wastewater in agriculture has impacts on food safety, human health, quality and substantially of land use. There is, therefore, need to conduct periodically systematic assessment of the use of untreated wastewater on these effects, particularly on the health benefits versus health risks at the national level as also State-wise. For example, subsistence levels of farmers who benefit most in terms of food

security are also at risk of ill effects on health when untreated wastewater is used for irrigation. Health protection measures should be adopted to ensure adequate protection to various exposed groups viz. consumers, farm workers, their families and nearby communities. These include wastewater treatment, crop restrictions, techniques of wastewater application [such as drip irrigation], withholding watering periods to allow pathogens die-off after last wastewater application, adoption of hygienic practices at food markets and during food preparation/cooking, washing/disinfecting farm produce, use of personal protective equipment, access to safe drinking water and sanitation facilities at farms, control of disease- vector and intermediate hosts, restricted access to irrigated fields, hydraulic structures, among others.

Today's need is to educate and train promising farmers and rural youths to manage their farms as business entities with sharp focus on resource planning including the use of treated wastewater to optimize profitability of farming enterprise in the long-term.

Water for Life Decade [2005-15] and the annual World Water Day being held on March 22 every year should create awareness among all stakeholders that water is finite, scarce, costly and precious and, therefore, should be efficiently managed for country's sustainable development. On this day the electronic and print media should discuss and publish the policy, programs, performance and issues identified during the year and present the framework to pursue the unfinished tasks to accomplish the mission.

Dr Amrit Patel

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GLOBAL PRODUCE EVENTS
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Veterinary sector in India

Emerging concerns and way forward



Livestock has remained a major contributor to agrarian economy of India, endowed with the largest number of animals in the world. Nevertheless, management of health and productivity of such huge animal wealth remains an overwhelmingly challenging task. The livestock development strategy in India primarily relies on the public provision of subsidized or free animal health services to millions of farmers across the country. However, the number of state-run veterinary institutions has grown from about 2,000 in 1951 to only 59,159 at the end 2013-14 for providing these services. Moreover, the quality of service provided continues to be poor for the want of necessary support in terms of trained manpower, infrastructure and facilities, as most of these are very old and very few are equipped

with enough clinical diagnostic facilities. Further, the public health services, such as zoonotic and food-borne disease control, hygiene, food safety and environmental control remain insignificant and in many regions non-existent. Many of the states are

severely crippled by acute shortage of doctors contrary to the National agricultural commission's recommendation of one veterinary doctor for every 4,000 animals. Moreover, lesser jobs in government sector, poor pay and service structure has



been forcing emigration of veterinary professionals. The market for veterinary services in India remains small at less than 0.1% of GDP although it showed 48% increase over 2007-2012. Despite these limitations, successful control and eradication of important livestock diseases like Dourine (1920-21), achieving Rinderpest-free (2006) and CBPP-free (2007) status for the country, global Rinderpest eradication (2011), and recent freedom from African Horse Sickness (2014) are some of the commendable achievements of the profession. In present context, with ever-increasing human population in India, the demand for crop and livestock foods is also increasing and likely to become double in 2050. On an encouraging note, the Livestock Sector expanded by 5.5% during 2013-14 against the total agriculture, forestry and fishing sectors' growth of 3.7% during the same period. The milk production also peaked at 137.69 MT, thereby making it an important secondary source of income for 70 million rural households engaged in dairying. Likewise, meat production and exports increased tremendously during last decade, with a total value of buffalo meat export recorded over Rs 25000 crores.

Since women are important resource persons for livestock production, their empowerment and skill development could be achieved by imparting them relevant training in cost-effective techniques and technologies viz., production of low-cost feeds from crop residues and biomass, formulation of concentrate mixtures from locally available or leftover byproducts, efficient value addition and strategic supplementation of macro and micro-nutrients to available fodder resources, and adoption of mitigation strategies to cope up with negative impact of climate



change on livestock; and thereby, influencing their effective participation and decision making.

Presently, livestock sector accounts for only 4% of total institutional credit in agricultural sector and about only 6% of the animal head (excluding poultry) are covered with insurance. Even at the turn of the century, over 50% of farm level credit for smallholder dairy production in India comes from traditional moneylenders. Therefore, improving the quality and access to farm level credit will enable the lower 30% among the smallholder spectrum to move up from subsistence farming to progressively viable crop-livestock farming with higher outputs and farm incomes. Feed and fodder is one of the most important contributing factors for the growth of livestock sector. It is estimated that the 60-70% of total cost in livestock production is due to feed and fod-

der. As per the estimates, the deficit of dry fodder, concentrates and green fodder by 2020 is likely to be 11%, 35% and 45%. Adequate availability of livestock feed and fodder both quantitatively as well as qualitatively would be one of the key inputs in the growth of livestock sector in future, which can increase milk production by at least 20% with the current genetic resources

available.

In the current era of liberalized global trade policies, livestock products are increasingly being accepted as an important factor in the strategy to mitigate and reduce poverty; however, the quality assurance of livestock and their products has become need of the hour. Accordingly, privatization in animal health delivery system is being widely advocated on account of public finance rationalization, economic efficiency, equitable social distribution of services and domestic resource mobilization. Therefore, there is an urgent need to strengthen and implement improved veterinary services as per international norms so as to address the pertinent issues related to core domains of food security and one-health.

**R. K. Singh, Director
Indian Veterinary Research Institute
Izatnagar (UP)**

GI tag for Ten Horticultural products from North East - NERAMAC's initiative

GI is a form of intellectual property right, which provides exclusivity and legal protection to a product in a defined geographical area. It helps a community of producers to differentiate their products in the market and build goodwill, which often fetches a premium price. For the consumers, GIs act as a stamp, which help them to identify genuine quality products. India enacted the Geographical Indications of Goods (Registration & Protection) Act, 1999 and the act came into force on September 2003. North Eastern Region of India is the hub of organic and exotic agro-horticultural



produces. The region comprises of eight states and is a basket full of opportunities for the unusual and the special spices and herbs. NERAMAC Ltd, a Government of India Enterprise initiated GI registration of ten horticultural crops of these states with the GI registry authority at Chennai. Horticulture being a

state subject, it took the nominations of the horticultural crops from the respective states and initiated the move during the fiscal year 2011-12. During March - April this year, ten north east horticultural products got the coveted GI tag. These products include Naga tree tomato from Nagaland, Arunachal orange from

Arunachal Pradesh, Sikkim Large Cardamom from Sikkim, Mizo chilli from Mizoram, Assam Karbi Anglong Ginger & Tezpur Litchi from Assam, Khasi Mandarin & Memang Narang from Meghalaya, Tripura Queen Pineapple from Tripura and Kachai lemon from Manipur. These GI tags will help the farmers and producers of the region in a big way not only for branding, marketing and protecting the exclusive, special local crops to identity of the products; it will also help in further propagation of GI for many more such crops. Role of NERAMAC is intervention in marketing by assisting and hand holding in of fresh produces of the farmers and producers. It also supports the first generation entrepreneurs of the region who are in the manufacturing of processed products. With the GI tag available now for the ten crops of north east, it will enable to widen the marketing network and thereby supporting the producer clusters of these crops more vigorously. This instant initiative of NERAMAC Ltd in getting GI tag for



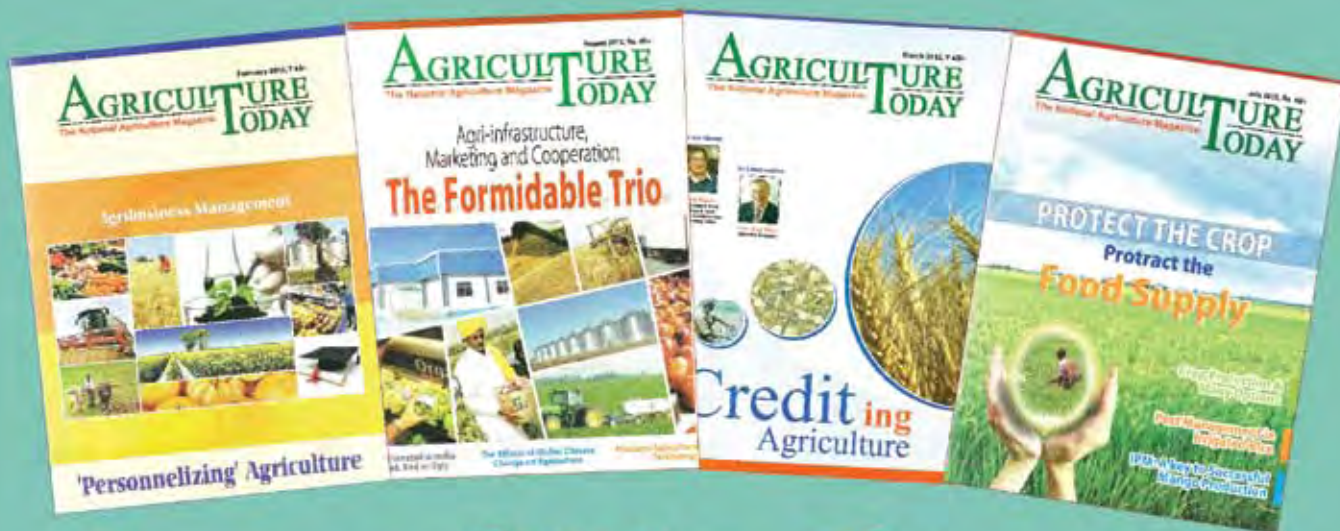
ten horticultural crops from the north east has motivated to draft a definite proposal in the form of a road map meant for necessary augmentation and improvement in the agricultural marketing management of these products from the north east. As a post registration follow up, there is a need for promotion & continuous awareness building particularly among consumers. NERAMAC is presently initiating proposal for promotion, branding and marketing of products for which GI is obtained so as to organize road shows in India and even abroad, special events, theme based events and meet of trade counsellors of many countries etc. Marketing and promotion efforts may need sustained commitments of resources as there is a constant need for capacity building and awareness about GIs among various stakeholders including consumers etc.

NERAMAC Ltd being a Corporation with no fixed budget has to get these initiatives funded either through the Ministry of DoNER (Development of North Eastern Region), Govt. of India or through the NEC (North Eastern Council) in order to facilitate and bring up phenomenal change in the commercial horticulture in the north eastern region. As the ten items of

farm produce unique to locations in the north east region won the GI tag, it will facilitate and allow the farming clusters to go for more production by increase in the volume of production, thereby increase in earnings both in fresh as well as value added forms. It will also help the producers substantiate their claim in fetching remunerative price and increase their volume of production thereby raising the economy. First North East Mega Food Park has been inaugurated recently near Nalbari in Assam. This North East Mega Food Park will be able to give huge support to the entrepreneurs of the region to make value addition of the GI tagged products resulting in increase in demand and thereby boosting the production of these products in the region. In the north east, most of the productions are in pockets. Due to difficult logistics and terrain, end to end marketing is a huge problem even today. Many a time, one finds produces of north east in different mandis and markets and are named as produces from regions other than the north east. With the GI tag available now, there will be a full stop to all these. Moreover, by creating Pack Houses in the clusters of the growing areas of these GI tagged crops, considerable employment can be created in every activity

of pack houses like sorting, grading, packing etc. LOGOS of the GI tags approved by the GI registry authority will allow these clusters reap benefits both in getting value for their produce but also in involving the rural mass with better employment opportunity. Government of India's latest initiative for an Organic Farming Mission in the north east under it's make in north east program will go a long way in taking forward the advantage of the GI registration of ten horticulture crops of the north east received through NERAMAC's initiative. Under the Organic Farming Mission, it is proposed initially to go for production of few exotic fruits and large cardamom, and market them to neighbouring countries. This will help export of GI registered products & enrich farmers & producers of the region. With the growing demand of organic food market on one side and north eastern region producing naturally organic products which now complimented with GI tag on the other side, will bring about sustainable development of agro-horticulture in the north east.

S Bhattacharjee,
Executive Director,
NERAMAC Ltd., A Govt of India
Enterprise, Guwahati



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AGRICULTURE
TODAY

MINISTER OF ALL SEASONS

India's Minister of Consumer Affairs, Food and Public Distribution, Ram Vilas Paswan hails from Bihar and is the president of the Lok Janshakti Party. A nine time Lok Sabha member, Paswan is perhaps the only leader to serve as a Union Minister under six different Prime Ministers – Vishwanath Pratap Singh, H D Devegowda, I K Gujaral, Atal Bihari Vajpayee, Manmohan Singh and Narendra Modi.

Paswan who holds a Bachelor of Laws and a Master of Arts degree started his political career in 1969 when he was elected to the Bihar Legislative Assembly as member of Samyukta Socialist Party. In his next stop in the political journey, he joined Lok Dal upon its formation in 1974 inspired by Raj Narayan and Jayaprakash Narayan, and went on to become its general secretary. He strongly opposed the emergency, and was arrested during the period. He entered the Lok Sabha in 1977 where he debuted with a margin of 4.24 lakh votes that took him straight to the Guinness Book of World Records. He was re-elected to the 7th Lok Sabha in 1980 and 1984 from Hajipur constituency. In 1983, he established the Dalit Sena, an organisation for Dalit emancipation and welfare.

Paswan was re-elected to the 9th Lok Sabha in 1989 and was appointed Union Minister of Labour and Welfare in the VP Singh government. In 1996 he even led the ruling alliance or Proposition in the Lok Sabha as the Prime Minister was a member of the Rajya Sabha. This was also the year when he first became the Union Railway Minister. He continued to hold that post till 1998. Thereafter, he was the Union Communications Minister from October 1999 to September 2001 when he was shifted to the Coal Ministry, the portfolio he held till April 2002. In 2000, Paswan broke from the Janata Dal, to form the Lok Janshakti Party (LJP). Following the 2004 Lok Sabha elections, Paswan joined the United Progressive Alliance government and was made the Union Minister in Ministry of Chemicals and Fertilizers and Ministry of Steel. His party the Lok Janshakti Party was not able to win any seats in

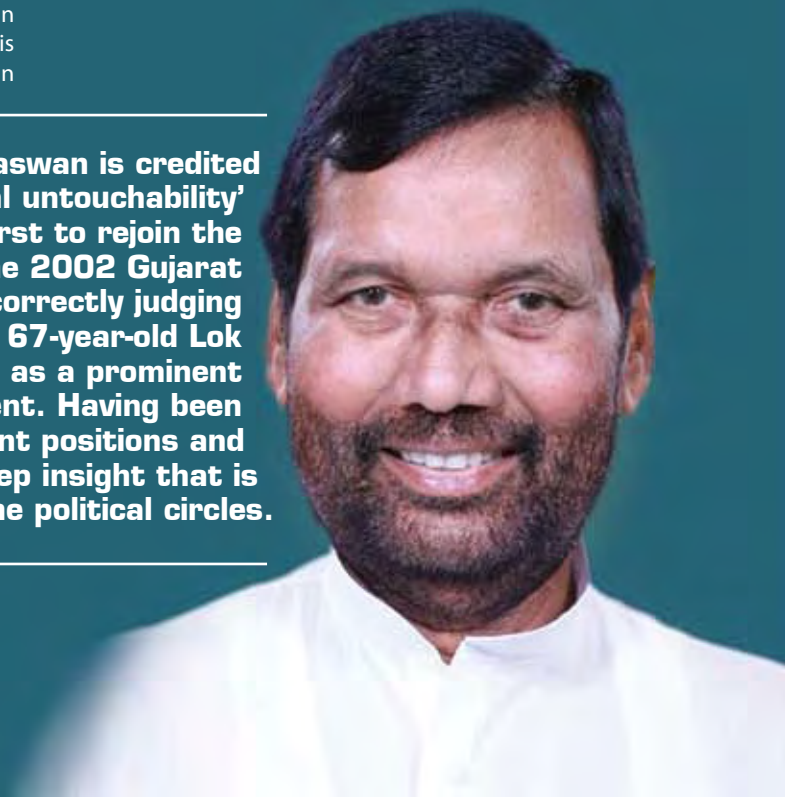
the 15th Lok Sabha. He was elected as member of 16th Lok Sabha after the 2014 Indian general election from Hajipur constituency.

Paswan has served as a Union Minister under five different Prime Ministers and holds the distinction of continuously holding on to a cabinet berth in all the Council of Ministers formed since 1996. He also holds the distinction of being part of all the national coalitions (the United Front, the National Democratic Alliance and the United Progressive Alliance), which have formed the Indian Government from 1996.

Being from a Schedule caste family, he had constantly lent his support and has worked towards the welfare of the oppressed and less fortunate members of the community. After being appointed as the Minister of Consumer Affairs, Food and Public Distribution in the Modi cabinet, Paswan said that his priority is to ensure efficiency in public distribution system and consolidate the functioning of the Food Corporation of India. He attaches high priority to the protection of consumers and promotion of responsible consumer movement in the country as the post liberalisation and globalization has posed many challenges for protection of consumers. With a view to modernize the Targeted Public Distribution System (TPDS) and to check leakages/diversion, government under his ministry is implementing a Plan Scheme on 'End-to-end Computerization of TPDS Operations' on cost sharing basis with the States/UTs which would facilitate digitization of ration cards/beneficiary and other databases, computerization of supply-chain management, setting up of transparency portal and grievance redressal mechanisms.

Paswan's political career which grew through different political climates has made him a strong and valued administrator. His continued presence in several divergent ministries prove his political clout and is the result of his continuous engagement with people's causes.

A seasoned politician, Ram Vilas Paswan is credited with removing the tag of 'political untouchability' from Narendra Modi by being the first to rejoin the NDA which he had quit following the 2002 Gujarat riots. Known in political circles for correctly judging which way the wind was blowing, the 67-year-old Lok Janshakti Party leader has emerged as a prominent Dalit face of the new government. Having been able to serve India under different positions and government, Shri Paswan has deep insight that is unparalleled in the political circles.



“Today, the country has to import pulses. Let’s resolve that by 2022 we will no longer have to import pulses. Our agricultural universities should take up each variety of pulses, how to do research on it, how to do genetic engineering, how to increase productivity, how to increase protein content so that farmers get good prices”

NARENDRA MODI

Prime Minister



“When we came to power, we faced drought-like situation. Everyone was worried. But our ministry worked hard to minimise the damage. There were losses in production but the losses were not that huge. This time, we will face the situation based on our earlier experience”

RADHA MOHAN SINGH

Agriculture Minister

“A decision on creation of a buffer stock for surplus sugar was referred to the Prime Minister’s Office, which felt that it could be a temporary solution and not a permanent one. Therefore, there is no immediate plan to create a buffer stock of sugar”

RAMVILAS PASWAN

Food Minister



“We are launching the flagship North-East Organic farming mission, our prime minister and our government has been able to keep its promise to the people of Northeast India and within a year we have delivered”

JITENDRA SINGH

Union Minister for Development of North-Eastern Region (DoNER)