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#### From the Editor's Desk LIVESTOCK, POULTRY AND FISHERIES — THE TRIO FOR RURAL EMPOWERMENT

he allies of agriculture – the trio of Livestock, Poultry and Fisheries- have had a significant impact on extending the income of farmers. With time, these subsectors have emerged from the shadows of agriculture to successfully establish as independent profitable ventures.



Today India is the world's largest producer of dairy products by volume, accounting for more than 13% of world's total milk production, and has the world's largest dairy herd. However, the livestock sector in India faces a

big shortage of feed and fodder. Climate variations like increasing temperature and decreasing rainfall are reducing the yield of pastures and changing land use patterns, especially that of common and traditionally pasture lands, is diverting a significant amount of the grazing pressure to forests. Diseases are another important factor fiddling with the productivity of animals. Foot and Mouth Disease (FMD) alone leads to economic losses of more than Rs. 20,000 crore per annum. Most of these losses can be prevented through timely immunization. Lack of credit for livestock farmers is another limiting factor for its growth.

Poultry is one of the fastest growing sub-sectors of animal husbandry; the annual growth rate of eggs being pegged around 6 per cent. India is the third-largest egg producer in the world. Rising incomes, urbanization, customer exposure have all played a pithy role in increasing the demand for meat in the country. The production facilities and methodologies followed by the poultry farmers in India, however, are not in line with international standards. Climate controlled farm houses, automated feed lines etc. can be a solution to this problem. Lack of storage, cold chain and transport have also affected the Indian poultry segment. There is shortage of quality feed in the market and lack of knowledge about the benefits of using quality feeds. In the domestic market, there is a lack of comprehensive regulating authority to maintain hygiene. Processing machineries that are clean and hygienic, coupled with waste treatment plants are the need of the hour. Disease outbreaks have also been the bane of the poultry segment.

Indian fisheries and aquaculture are now an important economic activity catering to livelihood and nutritional security. Engaging about fourteen million people in different allied activities, this sector has been thriving due to India's diverse resources ranging from deep seas to lakes. As the second largest country in aquaculture production, the share of inland fisheries and aquaculture has also gone up. Fish and fish products have presently emerged as the largest group in agricultural exports from India. Shortage of quality fish seeds, lack of resource-specific fishing vessels, reliable data, inadequate awareness about nutritional and economic benefits of fish and absence of standardisation and branding of fish products are factors ailing the sector.

Livestock, Poultry and Fisheries are important players in rural economic development and employment generation and hence will play a significant role in the future.

Aniana Nair

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LIVESTOCK, POULTRY AND FISHERIES DRIVING RURAL DEVELOPMENT & PROSPERITY



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#### **Cashew Crisis**

Kerala's cashew sector facing threat of shut down



ashew industry, once the money spinning industry of southern state of Kerala, has gone from bad to worst. Utterly in shambles, the state is vehemently searching for strategies to keep the industry up

and running.

Kerala, a decade ago, accounted for 85% of the country's cashew production. The strong presence of processing industries which was a source of employment to nearly 3 lakh cashew workers are facing the threat of closure. Out of the 865 cashew processing factories, more than 700 have already been closed, and nearly 2.5 lakh cashew-workers have been rendered jobless. The bad fortune of the state has also affected the country's cashew economy. Once a major exporter of cashew to the world by contributing 60% to the trade, India has now become a major importer, in the process losing out to smaller countries like Vietnam that are cashing in on the opportunity. The Indian production of cashew nut for the year 2016-17 was 7.79 lakh million tonnes which is not sufficient to run the processing factories available in various states, having a processing capacity of 17 lakh MT per annum. Hence, India has to depend on import of raw cashew nut from other countries. The cashew produced domestically costs more than the imported cashew. The situation is much worse in Kerala.

Kerala's cashew sector has been witnessing a rise in cost of production and processing. In 2014, the state government increased the wages by an unprecedented 35 per cent. This has increased the cost of production to Rs 3,200-3,400 per bag of 80 kg as against the other states with Rs 1,000 - Rs 1,800 per bag. This is almost five times as much as in Vietnam, where the cost is the equivalent of Rs 700 per bag. For an enterprise entirely dependent on manual labour, this wage hike sounded the death knell of the industry. The crisis deepened when in 2016, the Union government imposed an import duty of 9.36% on raw cashewnuts. The time that followed saw the rise in the price of raw cashew nuts without any corresponding increment in the price of processed cashew nuts. Vietnam emerged as a significant producer of processed cashew which was cheaper. Their automated processing units churned out cheaper processed cashew in vast numbers. Although the center slashed the import duty to 2.5% this year, it was too late.

Kerala's cashew industry has now pinned their hopes on a revival package. But before considering the package, efforts must be directed towards creating a suitable environment in the state to absorb the goodies in the package. Despite the existence of automation and mechanization options, the state is highly reluctant to endorse them due to the fierce resistance from the politically strong trade unions. The state should think about bringing in automation in the processing sector otherwise, the sector will not be competent and will be reduced to a namesake sector incurring losses of gigantic proposition. Instead of reducing the industry to be dependent on regular sops, the sector should work towards bringing in sustenance and stability.

Besides, the state can think of reducing its dependence on imports and encourage extending cashew plantations. Sick plantations can be revived and replaced with high yielding varieties. Automation is a crucial factor that determines the profitability of the sector. Along with that a suitable package must be developed for rehabilitation of the displaced cashew workers in the event of automation. Exploring the possibility of enrolling the cashew workers under the National Rural Employment Guarantee Scheme would be a good start.

The state should strictly adhere to principles that have a potential to increase the profitability of the sector. That might include some stringent measure that may not appease certain sections. Profitability and productivity must be the guiding principles in shaping a revival package.

#### India US Subsidy Tango

The US complaints about India's Support to Wheat and Rice at WTO

midst the government's plans to raise the Minimum Support Price for agricultural commodities to placate the farmers, the American government has alleged that India is offering massive subsidy

supports to wheat and rice. The US government has notified the World Trade Organization (WTO) that Delhi under-reports its level of farm subsidies and submitted a counter notification in the World Trade Organization Committee on Agriculture (COA) on India's market price support for wheat and rice. This is the first ever COA notification under the WTO Agreement on Agriculture regarding another country's measures.

US contends that India's apparent MSP for wheat appears to have been over 60 per cent of the value of production in each of the past four years for which India has notified data, whereas for rice, it appears to have been over 70 per cent. According to current rules, food subsidies are limited at 10 per cent of the total value of foodgrain production for a country in a year. Policies which amount to domestic support - both under the product specific and non-product specific categories at less than 10% of the value of production for developing countries - are excluded from any reduction commitments at the WTO.The US has identified several areas of potential concern with India's notification of its market price support for rice and wheat. These include issues with the quantity of production used in market price support calculations, the exclusion of state-level bonuses from calculations of applied administered prices, exclusion from India's notifications of information on the total value of production of wheat and rice and issues with currency conversions.

But these allegations are misplaced and illogical. For instance, the WTO Agreement on Agriculture defines subsidies on the total value of agriculture production, while the US has challenged India on the basis of support given to individual products, namely wheat and rice.Similarly, the agreement doesn't state the currency in which countries have to report their subsidy dole-out. The US wants India to report in rupee terms, while India submits dollar-denominated numbers to the WTO. The agreement also excludes any reference to state level support in calculating the subsidies. Moreover, the quantum of subsidy is computed after taking into consideration, prices from the reference period of 1986-88. India had already suggested an amendment to this and had proposed either amending the formula to calculate the subsidy cap or allowing such schemes outside the latter's purview. Following India's agreement with the US on the issue in 2013, the Bali Ministerial Conference of the WTO came up with the 'peace clause' that permitted uninterrupted implementation of India's food security programme until a permanent solution was found. This allows India to procure and stock foodgrain for distribution to the poor without being penalised by WTO members even if this breaches the subsidy cap. However, to use the peace clause, India has to give information to WTO about the size of its food subsidy bill till the year before. So in case a dispute arises India can very well invoke the Bali peace clause.

Indian subsidy programs had always been a matter of contention for the US. Their arguments drawing a parallel between US farmers and Indian farmers are illogical and unfair. US farmers by virtue of their larger areas are better placed, technologically and economically. The Indian farmers, by large, due to their dependence on climate and unscientific ways of cultivation hardly make a living out of agriculture. Subsidies are a boon to them and help them navigate through a highly volatile market. Moreover, the Market support prices help the government to raise a buffer stock that is most often directed through the public distribution system to ensure food and nutritional security to the underprivileged.

#### **Sugar in the Red Zone**

FSSAI draft suggests red coding high calorific foods

inally, India has a policy that would give the consumers the power to distinguish between healthy and unhealthy food choices. The draft policy issued by the Food Safety and Standards Authority of India (FSSAI)

mandates displaying a red colour coding on frontof-the-pack labels on packaged food products with high fat, sugar or salt levels. The labelling has also been extended to Genetically Modified Foods and the draft also states that the company must make a declaration on the label in case it's food product has 5 per cent or more of ingredients which are genetically engineered or genetically modified.

Taking cue from many European countries, the latest intervention in the labelling space is a welcome move as far as the customers are concerned. When many packaged foods in India rarely declare the ingredients, the label that divulges the nutrient status is a huge step. The proposed draft Food Safety and Standards (Labelling and Display) Regulations, 2018, makes it very clear that the packaged food companies declare nutritional information such as calories (energy), total fat, trans-fat, total sugar and salt per serve on the front of the pack. The food labels will also declare, per serve percentage contribution to RDA (recommended dietary allowance) on the front of the pack.In the case of High Fat, Sugar and Salt (HFSS) packaged food products, the percentages of dietary energy values will be highlighted in red colour on the labels. Food Authority has also plans to introduce colour coding system in addition to marking of foods as 'Red' within the specified thresholds from time to time. It has also proposed prohibiting advertising of HFSS food products to children in any form. The draft regulation also intends to prohibit exaggerated health-benefit claims on products such as packaged drinking or mineral water products and edible refined oils.

The proposals, however, has also invited

criticism from some guarters, especially country's sugar sector. The country's sugar millers already suffering from the impact of falling prices and piling inventory, considers this as an assault on them as they believe that the labelling would equate sugar to unhealthiness and reduce its consumption. Considering the fact that sugar is the cheapest source of energy for a large section of Indian populace, they say this move will have some far reaching consequences. The sugar industry has opposed the FSSAI's move, saying there is no scientific evidence that proves that consumption of sugar is harmful for health.Falling in the same line, commodity market experts also feel the policy of colour coding on packaged food items will harm the industry. They believe that if this (red) colour coding is implemented there would be an impact on consumption pattern of sugar. If the consumption pattern of sugar goes down especially at times of a good production year, the ensuing glut would considerably bring down the prices and hence remuneration of farmers.

However it is hard to believe that a mere colour coding would drastically reduce the sugar consumption of the world's largest sugar consuming nation. This is only directed towards the packaged food industry. There is a disturbing development in the packaged food segment where indiscriminate sweetening of food products are seeing a phenomenal rise. Most often they use non sugar sources to sweeten the products. These are not only calorific but are widely believed to have some deleterious effects on health. Although a significant proportion of sugar produced is consumed by the packed food segment, the rest of the consumption is in the safe zone. If the processed food segment fails to procure sugar for fear of being snubbed by the consumers the surplus can be directed towards export.

Labelling is definitely good for the producers and consumers. This is a chance to exercise ones' choice and hence be condoned.

#### **Boosting Biofuel Production**

The National Biofuels Policy set to boost ethanol production

ndia is all set to enter a new dimension once the country formalizes and implements the latest National Biofuels Policy 2018. The highlight of the policy is the expansion of the scope of raw materials to food substitutes and foodgrains as feedstock for production of ethanol meant for blending with petrol in a major departure from the earlier practice of using nonfood feed stocks besides molasses for blending. The move will considerably help in increasing the biofuel production in the country.

Currently the ethanol production has not been able to meet the ethanol blending targets. The earlier national policy on biofuels had set a target of 20 per cent blending of biofuels over the next few years, both for biodiesel and bioethanol. However, India has achieved an average blending rate of close to just 4 per cent (ethanol blended petrol) by the end of 2017. India's constant inability to produce the requisite amount of ethanol needed to fulfill the blending target stems from the restrictions placed on the use of food based feed stocks. With the new policy in place, ethanol production is bound to increase.

The new policy also brings good news to the farmers. The policy allows the use of Sugarcane Juice, Sugar containing materials like Sugar Beet, Sweet Sorghum, Starch containing materials like Corn, Cassava, Damaged food grains like wheat, broken rice, Rotten Potatoes, unfit for human consumption for ethanol production. The Policy encourages setting up of supply chain mechanisms for biodiesel production from non-edible oilseeds, Used Cooking Oil and short gestation crops. Marginal lands can take up such crops and can generate extra income for farmers. This will protect the farmers from price falls at times of bumper harvest and to an extent can take care of the damaged and decayed agricultural produce that are unfit for human consumption and contribute to waste accumulation.

The effect on environment is another

advantage offered by this. The production of ethanol and their consequent blending with fuel will reduce our fossil fuel consumption and the associated carbon emissions. The total ethanol production for fuel blending in 2017-18 is expected to be 150 crore litres, leading to forex savings of Rs 4,000 crore. The use of 1 crore litre in fuel blending reduces CO2 emission by 20,000 tonnes. Also, by utilizing the crop residues and other waste products for biofuel generation, toxic emissions resulting from decay and burning will be further cut down. Muncipal solid waste is another area of concern. It is estimated that, annually 62 MMT of Municipal Solid Waste gets generated in India. There are technologies available which can convert waste/plastic, MSW to drop in fuels. One tonne of such waste has the potential to provide around 20% of drop in fuels which can be utilized in biofuel generation.

The policy also features a viability gap funding scheme of Rs 5,000 crore for 2G biorefineries, to be deployed over six years. The scheme will be in addition to other incentives and higher purchase prices available to 2G biofuels (ethanol, Municipal Solid Waste (MSW) to drop-in fuels) as compared to 1G biofuels (bioethanol and biodiesel).Oil marketing companies are in the process of setting up 12 2G bio refineries at an investment of around Rs 10,000 crore. These 2G ethanol refineries will improve infrastructure in rural areas and create thousands of jobs in plant operations and supply chain management, in addition to promoting village level entrepreneurship.One 100klpd 2G bio refinery can contribute 1200 jobs in Plant Operations, Village Level Entrepreneurs and Supply Chain Management.

Globally tremendous emphasis has been placed on biofuel production and consumption. However, the competing demands of land for food production has so far deterred India's presence in the ethanol production and utilization map. This policy however, has opened a new chapter in clean fuel production and consumption for India.

#### NCDEX gets SEBI nod to set up clearing corporation

The National Commodity and Derivatives Exchange of India (NCDEX) has received in-principle approval from commodity market regulator SEBI to set up a standalone clearing corporation, to be called National Commodity Clearing Ltd (NCCL). The exchange plans to invest Rs 100 crore in the clearing corporation, which is being set up in line with a SEBI directive to de-mutualise commodity exchange operations and promote transparency. The exchange will transfer all its existing technology for clearing trades to the newly formed wholly-owned clearing corporation. "The work on constituting board members and other required infrastructure is currently under process," Vijay Kumar, Managing Director, NCDEX, said. The exchange will use internal accruals to fund the clearing corporation, he said. NCDEX has to increase the net worth of the clearing corporation to Rs 300 crore by September 2019, per SEBI guidelines.



#### IBM, NITI Aayog tie up for crop-yield forecasts

• Policy think tank NITI Aayog on Friday signed a Statement of Intent with information technology firm IBM to develop a crop-yield prediction model using Artificial Intelligence (AI) to provide real-time advisories to farmers in backward districts. The partnership aims to use technology to provide insights to farmers to improve crop productivity, soil yield and control agricultural inputs with the overarching goal of improving farmers' incomes, an official release said. The agreement was signed in the presence of NITI Aayog CEO Amitabh Kant and Karan Bajwa, Managing Director, IBM India. "Bringing future technologies like Artificial Intelligence into practical use will have tremendous benefits for the practice of agriculture in the country, by improving efficiency in resource-use, crop yields and scientific farming," Kant said. In the first phase, the project will focus on developing the model for 10 Aspirational Districts in the States of Assam, Bihar, Jharkhand, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh, the release said.

#### Monsanto CEO to step down after Bayer deal



• Monsanto Co. said has informed that chief executive officer Hugh Grant will step down after the seeds company completes a deal to be acquired by Bayer AG. Grant, a company veteran, took over as chief executive in 2003. Along with Grant, other senior executives including chief financial officer Pierre Courduroux and chief technology officer Robert Fraley will also leave following the deal's close, the company said. German conglomerate Bayer is preparing to close its \$62.5 billion takeover of Monsanto this quarter in a deal that will give it control of more than 25% of the world's seed and pesticides market. Bayer has also been divesting significant assets to win over antitrust regulators for its proposed takeover of Monsanto.

#### Court dismisses Monsanto plea to enforce BT cotton seeds patent

• The Delhi High Court dismissed the US-based agro major Monsanto Technology's plea to enforce the patent for its BT cotton seeds in India. A Bench of Justice S Ravindra Bhat and Justice Yogesh Khanna partially allowed the counter-claims of three Indian seed companies that Monsanto did not have a patent for its BT cotton seeds, a genetically modified variant that resists bollworms. Monsanto has expressed its disappointment over the high court order. The court also upheld the decision of a single judge on the issue of trait fee payable to Monsanto by the three Indian companies — Nuziveedu Seeds, Prabhat Agri Biotech and Pravardhan Seeds — under a sublicence. The single judge had said the three companies would pay trait fees to Monsanto according to government-set rates. Monsanto wanted to charge a higher trait fee under the sub-licence given to the Indian companies to use its seed technology. Both sides had challenged the single judge's order before the division bench. After the verdict was pronounced, Monsanto sought that the decision be kept in abeyance for a few weeks so that it could file an appeal in the Supreme Court. The high court declined to keep the operation of its decision in Bench, but granted the US company a certificate of fitness to file an appeal in the apex court.

## Monsanto moves SC over GM cotton seed patents

Description Monsanto Co has appealed to the Supreme Court against a ruling by the Delhi High Court which decreed last month that the world's biggest seed maker cannot claim patents on its GM cottonseeds, a company spokesman said. The Delhi High Court had concurred with Indian seed company Nuziveedu Seeds Ltd (NSL), which argued that India's Patent Act does not allow Monsanto any patent cover for its genetically modified (GM) cottonseeds. Monsanto has appealed to the Supreme Court, said a Monsanto India spokesman. "In the Supreme Court, we'll maintain our stand that agricultural products, including seeds, cannot be patented in India," said NarneMurali Krishna, a company secretary for NSL. "The judgement of the Delhi High Court has already vindicated our stand." The Centre approved Monsanto's GM cottonseed trait, the only lab-altered crop allowed in India, in 2003 and an upgraded variety in 2006, helping transform the country into the world's top producer and second-largest exporter of the fibre. Monsanto's GM cottonseed technology went on to dominate 90 per cent of the country's cotton acreage. But, for the past few years, Monsanto has been at loggerheads with NSL, drawing in the Indian and US governments. The fate of the industry rests on the decision of the Supreme Court, said Ram Kaundinya of the Federation of Seed Industries of India, an industry body formed by the local units of foreign companies such as Monsanto, Bayer, Dupont Pioneer and Syngenta.



### NFL to invest Rs 1,250 crore in 2 years on new plant, energysaving projects

State-owned fertilizer firm NFL will invest Rs 1,250 crore over the next two years on energy-saving projects in its five existing plants and setting up a new factory in Madhya Pradesh to produce di-nitrogen tetroxide, CMD Manoj Mishra said. Besides, he said, National Fertilizers (NFL) is reviving a closed

urea plant at Ramagundam, Telangana, in a joint venture with EIL, FCIL and the State government at an estimated cost of more than Rs 5,300 crore. NFL is also exploring the possibility of setting up a di-ammonium phosphate (DAP) plant in Algeria through a joint venture and under buyback arrangements, he said. "We have posted a record turnover of Rs 8,928



crore during the last fiscal. Urea production and sales were also at all-time highs," Mr. Mishra said. NFL, which has five plants at Haryana, Punjab and M.P., produced a record 38.1 lakh tonnes of urea in 2017-18 fiscal with 118% capacity utilisation. Urea sales stood at 39.16 lakh tonnes. It imported 4.47 lakh tonnes of non-urea fertilizers like DAP and muriate of potash (MoP) and sold 3.93 lakh tonnes in the domestic market. Total sales of fertilizer was a record 43.09 lakh tonnes. The company has taken up energy-saving scheme at Nangal, Bathinda and Panipat units at an estimated cost of about Rs 650 crore, he said, adding that Rs 220 crore would go towards energy saving schemes at two plants -- VijaipurI & II -- in M.P. with a capex of Rs 220 crore. Mr. Mishra highlighted that the company achieved the lowest energy consumption at all its plants during the last fiscal and targets to bring energy cost further. Stating that NFL had bagged an order from ISRO to supply di-nitrogen tetroxide (N2o4), Mr. Mishra said the company would set up a plant at Vijaipur in M.P. at an investment of Rs 350 crore. The annual capacity of this plant would be 1,000 tonnes.

#### Harrisons Malayalam bags 5 awards at TGLIA

• Harrisons Malayalam Ltd bagged five awards in the 13th edition of 'The Golden Leaf India Awards' (TGLIA). The final screening was done in Dubai by a panel of international tea tasters from the buying community. The five awards include two for Lockhart estate (Munnar), two for Wentworth estate (the Nilgiris) and one for Pattumalay estate (Vandiperiyar). After shortlisting, the teas underwent stringent tests for pesticides and heavy metal residue, followed by a benchmark process which makes these teas the best of its kind on an international level. "This is a testimony to our quality, capabilities and commitment to sustainability and product safety," said N Dharmaraj, CEO and Whole-time Director, HML SBU-A. The TGLIA awards competition is jointly conducted by the United Planters Association of Southern India and the Tea Board of India since 2005.

#### Bill to free farmers from debt burden to be introduced soon

• In order to liberate farmers of the country from the scourge of indebtedness and to ensure remunerative prices for their produce, the All India Kisan Sangharsh Coordination Committee (AIKSCC) has demanded an early debate on and the passing of two Bills in Parliament that seek to address the issue. Titled 'The Farmers' Freedom from Indebtedness Bill 2018' and 'The Farmers' Right to Guaranteed Remunerative Minimum Support Prices for Agricultural Commodities Bill 2018', the two Bills have been formulated based on a nation-wide consultative process involving 193 farmers' organisations. The two Bills contain provisions for seeking debt waiver for farmers and payment of a price that is 50% above the cost of production as per the M.S. Swaminathan Commission report.

## More restriction on urad, moong imports

• The Union government has extended the restriction on import of urad and moong dal across all varieties to cover split and other forms to stabilise domestic prices. "Import policy of urad and moong in split and other forms.....are also restricted in addition to urad and moong ....with annual import quota of 3 lakh tonne for all," said a notification by the Directorate General of Foreign Trade. While the government had restricted import of raw or whole moong and urad in a notification dated August 21, 2017, no such restriction on splits or dal (milled) was specified. This allowed traders to import the split variety of the pulse without any restrictions. However, with the fresh notification traders will have to stick to the import quota of 3 lakh tonne for all kinds of imports. The restriction will, however, not apply to government's import commitments under bilateral/regional agreements or MoUs, the notification clarified.





## Central govt extends assistance to clear dues of sugarcane farmers

• Central government has issued orders for extending assistance to clear the dues of sugarcane farmers. In a statement, Consumer Affairs, Food and Public Distribution Ministry said government has decided to provide financial assistance of 5.50 rupees per quintal of cane crushed in sugar season 2017- 18 to sugar mills to offset the cost of cane. The assistance shall be paid directly to the farmers on behalf of the mills and be adjusted against the cane price payable due to the farmers against Fair and Remunerative Price (FRP) including arrears relating to previous years. The total assistance would be about 1540 crore rupees, which will directly benefit a large number of farmers and will help the sugar mills in a long way in discharging their liabilities on account of cane price dues of farmers. The decision has been taken to clear the dues of sugarcane farmers that have accumulated to over 20,000 crores rupees.

#### Regulator wants GM label on food products

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• Seeking to introduce GMO labelling for the first time in India, the food regulator has proposed all packaged food products containing genetically modified (GM) ingredients must clearly state it on their labels. Food Safety and Standards Authority of India (FSSAI) also suggests mandatory declaration by food manufacturers about nutritional information such as calories, total fat, trans fat, sugar and salt per serve on the front of the pack. Since the country has no provision for GM labelling in its regulatory mechanism, consumers are clueless whether packaged food items they buy have genetically engineered (GE) ingredients. In absence of clear labelling, consumers are clueless about GM ingredients, amid 'unproven' concerns among some about their adverse effects. The FSSAI had last month released a 42-page draft notice — Food Safety and Standards (Labelling and Display) Regulations, 2018 — making labels amndatory for products containing 5% or more GM ingredients.



#### Govt to allocate quota for pulses imports on June 1

• After capping imports of tur, urad and moong last year, the government has released norms for such shipments, restricting the imports to only millers and refiners in 2018-19. Millers and refiners with own processing capacity that intend to import pulses have been asked to submit application during May 12-25, according to a government notification. "The allocation of quota to each eligible applicant shall be notified on June 1," it said. Traders will have to complete their imports by August 31. The government will distribute the available quota on the basis of annual processing capacity of applicants. The government has capped imports of tur at 200,000 tonnes for 2018-19. The cap for urad and moong is 150,000 tonnes each. The imports were restricted after domestic tur prices plunged due to bumper production last year.

#### Cabinet okays Rs.38K-cr plans for farmers and minorities

• The Union Cabinet approved a host of schemes worth Rs 38,000 crore for farmers and minorities. Prime Minister Narendra Modi's government cleared an umbrella scheme, "Green Revolution — Krishonnati Yojana", with a Central share of Rs 33,269.976 crore, besides announcing special assistance to sugarcane farmers. The Centre also renamed and restructured a Multi-sectoral Development Programme for minorities for better implementation at the cost of Rs 3,972 crore.

#### Govt wants commission agents to be farm-tech savvy

• The Union government is toying with the idea of insisting commission agents in mandis have sound knowledge of agricultural inputs as it grapples with the problem of spurious products and high pesticide residues in foodgrains. Last month, a meeting of agricultural officials from the Centre and Haryana, Punjab and Uttar Pradesh explored the possibility of making agricultural mandis single window facilities for the sale of inputs such as seeds, fertilisers and pesticides for better regulation of input quality. The meeting chaired by Ashok Dalwai, CEO of National Rainfed Area Authority, also suggested the Central Insecticides Board and Registration Committee may explore the possibility of considering changes to ensure that "packages of various pesticide formulations are appropriate for use by farmers having small holdings." The meeting decided to take basmati as representative crop to begin with and based on its performance to extend it to other crops. It asked the All India Rice Exporters Association



(AIREA) to identify 25 to 30 blocks, maybe one block per district, where basmati is grown in Haryana, Punjab, Uttar Pradesh and other States where the aromatic rice has a GI tag.

#### Kerala rubber likely to be added to export cluster list

Rubber from Kerala is likely to be added to the Centre's crop export cluster roster. Earlier, rubber from Kerala, which produces 85% of the country's supply, was excluded from the list of 50 districts identified for export crop clusters, under the draft national crop export policy. Commerce secretary Rita Teotia has told Kerala officials, who pointed out the omission, that this decision will be reviewed. Rubber from Kerala is likely to be added to the export cluster, if the state government writes to ministry of commerce, seeking this review, she said. Meanwhile, state cabinet, has decided to write to Prime Minister Narendra Modi and commerce minister Suresh Prabhu seeking that four districts — Kottayam, Pathanamthitta, Ernakulam and Kannur - should be included in the export cluster for rubber. When the Rubber Board of India had sought Rs 220 crore as outlay for rubber, Niti Aayog provided only Rs 132 crore. In the last two years, the funds for the Board has been tight-reined, with the result that subsidy for rubber farmers had to be stopped from 2015. From Kerala, only pineapple from Vazhakkulam and ginger from Waynad had found place in the list of export crop clusters. The draft crop export policy has proposed export clusters for 22 crops. The Kerala government has demanded that as a crop with international market, cashew export cluster should be considered in Kasargode.



Clusters for pepper, tea and coconut will also be urged in Wayanad, Idukky and Kozhikode, respectively. Looking at the production side, banana clusters in Thiruvananthapuram, Thrissur and Wayanad and turmeric and mango clusters in Wayanad have been proposed. 

#### Punjab, Haryana wheat procurement 195L tonnes



Wheat procurement of nearly 195 lakh tonnes has been made in food grain states Punjab and Haryana this season, food and supplies officials in both states said. In Punjab, the wheat procurement was nearly 116 lakhtonnes till April 30 as compared to 110.24 tonnes procured in the same period last year. Over 115.23 lakh tonnes (99.6%) has been procured by government agencies. In Haryana, over 79 lakh tonnes of wheat has been procured so far this season. A Punjab government spokesman said that Rs 16,170.47 crore has been disbursed to the 'arthiyas' (commission agents) and farmers, which is 93% of the total due amount. Despite reports of wheat not been lifted in grain markets, the spokesperson claimed that over 75.36 lakh tonnes has been lifted from grain markets so far.

#### Delhi farmers will get trained in new agricultural tech

Ocome August and farmers in the national capital will learn new techniques of crop production. Under the 'Smart Krishi Yojna' scheme, the government plans to develop three demonstration farms where farmers will be taught new cultivation techniques using the latest technology and machinery. In Delhi, agriculture and horticulture contributes about 1% of the state gross domestic product (GDP). According to census 2011, Delhi has 20,000 farmers and 30,000 hectares of land is under agricultural activities. "The cropping pattern of Delhi includes wheat, paddy and mustard. There is a good scope for their market value, hence, intensification of their cultivation is required to meet the domestic consumption. Under this scheme, a first in Delhi, farmers will be provided technology to adopt highyielding, high-quality varieties of agricultural and horticultural crops," an official from the government's development department, said. According to the proposal, the demonstration farms will have training halls, godowns, mushroom cultivation labs, bee-keeping trainingcum-production units, solar pumps, and a packaging house with grading and packing machines. The aim is to make farmers capable of enhancing their income and reduce supply dependency on neighbouring states, she said. A budget allocation of Rs 10 crore has already been made against an estimated project cost of Rs 85 crore.

#### Kheti Kosh to strengthen farm sector

• The Punjab government has initiated the process for customisation of the Farmer Producer Organisation (FPO) scheme and set up 'Kheti Kosh' to receive funding from corporates to strengthen the agricultural sector. Punjab Agricultural University (PAU) has been roped in to constitute a committee for formulating a customised FPO policy. A dedicated fund, 'Kheti Kosh', is also being set up to receive funds from corporates wishing to donate under the Corporate Social Responsibility (CSR). A sum of Rs 50 crore has been approved for the PAU to set up an incubation facility for young farmers and graduates in agriculture, who form their FPOs. The university will train them and help in their capacity building to run collective farmer companies. Since FPOs having a turnover of up to Rs 100 crore have a five-year

tax holiday, it is a good business model to be pursued in Punjab. The idea for having a customised FPO policy, based on broad guidelines of the Ministry of Agriculture, germinated during a meeting on agriculture sustainability held in Amritsar recently. Farmer groups, PHD Chamber of Commerce and Industry and other stakeholders felt that the FPO policy, which was announced in the year 2008, was not suitable for the state. It was felt that the policy was made according to the needs and the agricultural eco system of Baramati in Maharashtra. "Since this collectivisation of small and marginal farmers into producer organisations is regarded as the most effective way to address the challenges of agriculture - improved access to investment, technology, inputs and markets, Punjab can lead young farmers and graduates in agriculture to set up their FPOs," said Suresh Kumar, Chief Principal Secretary to the Chief Minister.





#### Mission Organic progresses steadily in Meghalaya

About 46,951 hectares of farmlands in Meghalaya have been brought under organic production even as the conversion target of 2lakh hectares by 2020 hinges primarily on the availability of funds under central and state government schemes. Currently, the land conversion process is being carried out through three schemes - Meghalaya Mission Organic, Mission Organic Value Chain Development for North East Region (MOVCD-NER) and Paramparagat Krishi Vikas Yojana (PKVY). The conversion process, which involves selection of land area-wise, observation and finally certification, takes at least three years. While Mission Organic is into its third year in Meghalaya, MOVCD-NER has been implemented since 2015-16, sources in the horticulture department informed. As many as 35,924 farmers have been brought under the purview of the schemes so far. Meghalaya Mission Organic has four key pillars which comprise: Mini Mission 1 (Facilitation and Convergence), Mini Mission 2 (Post Production Facilitation), Mini Mission 3 (Certification and Market Linkages) and Mini Mission 4 (Research and Development). Under each of these mini missions, several key activities have been designed and incorporated to build Brand Meghalaya as a source of certified organic produce, organic food as well as projecting the state as a destination for eco-tourism. As many as 12 farmer producer companies (FPCs) across the state have been formed under MOVCD-NER so far. The horticulture directorate is putting up a stall to showcase products under Meghalaya Mission Organic, Urlong and Meg brands at the event aimed to bring farmers and stakeholders under a single platform and make them aware of the central government schemes. Currently, six organic service providers empanelled by the agriculture department are motivating farmers to adopt organic farming, help in registration of growers, help farmers in maintaining and verifying records, and build farmer capacity through training.

#### Co-op banks reassessing farm loan limit

• In the wake of banking crisis and rural indebtedness, cooperative banks are reassessing the credit limit of farmers. Studies by various universities and NGOs have shown that the limit has been misused by beneficiaries for non-farm activities, leading to an ever-increasing percentage of farmers being caught in the vortex of debt. However, the limit has been revised from Rs 27, 000 per

acre to Rs 30,000 per acre from this season. Sources in the Cooperative Department said cooperative banks/societies across the state had asked the farmers to submit fresh copies of "jamabandi" (ownership record) so that the limit could be lowered or hiked based on the ownership record. There have been instances where the farmers sold off



their land before clearing their account. Another way to prevent the misuse of loans is by doing away with the practice of giving cash to the farmers for purchasing fertilisers and pesticides. They can be rather issued ATM cards.

# 'Growth in farm loans dips sharply in FY18'

Growth in bank loans to the farm sector declined significantly in the financial year 2017-18 while overall non-food credit growth remained unchanged, from the previous fiscal, latest data from the Reserve Bank of India (RBI) showed. Credit to agriculture and allied activities rose 3.8% for the year ended March 2018 as compared with a 12.4% in the previous year. The farm sector is in distress in several parts of the country with many State governments announcing loan waivers to farmers in the last few years. Retail credit such as home and auto loans grew 17.8% for the year to March 2018 compared with a 16.4% rise. Overall non-food credit growth of commercial banks in 2017-18 remained at 8.4% as in the previous year.

#### Easier credit norms for farmers

• The government has streamlined lending norms in schemes such as the Kisan Credit Card to boost institutional credit flow to small and marginal farmers who make up over 90% of people engaged in agriculture and, as a class, are highly vulnerable to risks. The aim is to cut their dependence on usurious informal private lenders, an official said. Under revised guidelines, standard security requirements, such as hypothecation of crops, now do not apply to loans of up to Rs 1 lakh. The change is also applicable to loans taken through the Kisan Credit Card, which allows landholding farmers to meet shortterm credit requirements. "Banks have been advised to waive security requirement for agricultural loans and Kisan Credit Card limits of up to 1 lakh," the official cited above said on condition of anonymity. Institutional credit in the agriculture sector refers to all loans disbursed through scheduled commercial banks, cooperatives and regional rural banks. Farmers rely on agricultural credit to purchase various inputs, from fertilizers to irrigation equipment. The 2018-19 Union budget raised the target for farm credit by 10% to Rs 11 lakh crore. Under the Kisan Credit Card scheme, small farmers can also avail of a "flexible limit" of between Rs 10,000 and Rs 50,000 for post-harvest warehousing needs and setting up of small-scale dairy and poultry farms. For this, branch managers, "based on their assessment," have now been empowered to disburse the amount "without relating it to the value of land owned by the farmer," the official added. Small and marginal farmers as well as share-croppers, defined as non-land-owning cultivators, will also not be required to submit a "no dues" certificate by district authorities for new loans of up to Rs 50,000. The step makes farmers already having an outstanding loan eligible for new small loans.

#### Telangana doles out agriculture credit assistance; farmers get Rs 4,000/acre

About 58 lakh farmers in Telangana will get a financial assistance of Rs 4,000 each for every acre of land they own under a programme launched by the Chief Minister K Chandrasekhara Rao. The State government has allocated Rs 12,000 crore for the scheme in the Budget for 2018-19. The farmers will get Rs 4,000 each an acre in the kharif and in the rabi cropping season to support their credit needs. Addressing a gathering at the formal launch, Rao demanded that agriculture should brought under the NREGA (National Rural Employment Guarantee Act) to share the farmers wage burden for farm labour. The State has cleaned up the land records recently to identify the right owners and is in the process of distributing pattadar pass books for farmers. The passbookscome with several security measures. These include anti-copying feature, a QR code that helps in ascertaining the profile and transactions held and a barcode with a unique transaction ID. However, farmers' unions are demanding the inclusion of over 11 lakh tenant farmers in the scheme and issue of Loan Eligibility Cards. "It should cover all actual cultivators, and the two lakh acres farmed by adivasis on podu lands and farmers with sadabainama (land titles on plain papers)," said Kiran Kumar Vissa of Rythu Swarajya Vedika.

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# HEAD OFFICE

2 ங்கள் ஒவ்வொரு தீனத்தையும் பண்ழகை தீனம் ஆக்குங்கள்! ஆவினுடன் கொண்டாருங்கள்!





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# New US complaints at WTO on India's farmer subsidy

> The American government had notified the World Trade Organization (WTO) that Delhi under-reports its level of farm subsidies. This comes at a time when the government here is planning to raise the Minimum Support Price (MSP) for farm produce by 50 per cent over the cost of production. Other nations fare much worse when it comes to notifying their subsidies, a top Indian trade diplomat said. Adding: "We do not know where the US got its figures from. During the last ministerial conference in Buenos Aires as well, only due to the strong position of the US against agricultural reform did a deadlock arise without any outcome on agriculture or even a work programme for the next two years." Ashok Gulati, former head of the Commission for Agricultural Costs and Prices, said the US objection had 'no meaning', having calculated the breach on 1986-88 reference prices in rupee terms. India gives its submission in dollar rates, which should be the norm. He also discounted any big impact of the US move on the government's reported move to raise MSP to fulfill earlier poll promises. India, he said, would not be crossing the relevant limit. "WTO's methodology of calculating the external reference price also should be updated in line with international practices," said Gulati. Subsidies provided to Indian producers of rice and wheat are vastly above the levels allowed under WTO rules, the office of the United States Trade Representative (USTR) said on Wednesday. In the first ever counter-notification filed to the WTO's committee on agriculture, the US said its data was based on 'publicly available information'.

#### Cashew Exports Value Hit a Record High

Indian cashew nut export revenue peaked to an all-time high for 2017-18 with unit value realisation, though volumes rose marginally. Provisional data from Cashew Export Promotion Council of India (CEPCI) showed cashew nut export clocked 84,352 tonnes valued at Rs 5.871 crore. While the quantity rose by 2%, the value went up by over 13% from a year ago. The unit value realisation for the year was up by 11% from the earlier year at Rs 696 per kg. "The export value has gone up because cashew kernel prices were at historical high of \$5.30-5.40 per pound during the earlier months. The average for the year worked out to about \$4.75 per pound," said Pankaj N Sampat, director of Mumbaibased Samson Traders. Export volumes have been declining for the last couple of years with domestic production stagnant and import of raw nuts falling due to high prices. "The export quantity used to hover around 1-1.20 lakh tonnes in earlier years," Sampat said. It has improved only marginally in 2017-18. He doubts if exports will exceed 1 lakh tonnes as the domestic consumption has increased. Meanwhile, rupee depreciation and strict monitoring of credit limit have forced cashew exporters to go slow on imports of raw cashew even as prices eased. India imports over 60% of its raw nut requirement for cashew kernel exports. Prices of raw nuts from West African countries have dropped by 15% to 20% from some months ago to range between \$1800-1900 a tonne.



#### Iran sanctions could swell India's urea import bill

With the new US sanctions on Iran, our urea import cost is likely to rise. In 2017-18, our import was 6 million tonnes (mt) and a third of this was from Iran, which supplies 4.5 mt annually to the world market. If, due to sanctions, these supplies don't come to the market, global prices will shoot up. India was importing urea via the UAE route and making payment in dirhams (the latter's currency) during the earlier sanctions period. Now, global urea traders are worried if the UAE would oblige this time, say sources. Urea prices have already been on a rise for a year. "Iran was an important source for import and its share had increased to 34 per cent in 2017-18, compared to 27 per cent the previous year.. It's very early to assess the impact on import and prices. Presently, we are expecting prices to remain soft over the next few months," said Deepak Chitroda, an analyst from London-based CRU. Two months earlier, the Government of India floated a tender to import a million tonnes of urea through Indian Potash, a canalising agency. Part of these consignments have already landed here but those yet to arrive "could be in trouble because making payments for these will now be a contentious issue", said a source Of cheer is an expected rise in domestic production capacities, with one mt expected to come on stream this year. The government is also trying to to limit consumption. Some months earlier, it had told fertiliser companies to pack urea in 45-kg bags, instead of the earlier 50-kg ones.

#### High raw coconut prices shred exports of value-added products

• The high price of raw coconuts have made a dent on India's coconut product exports and the figures are unlikely to cross the Rs 2,000-crore mark this year against Rs 2,300 crore registered in FY17. Export of value-added coconut products as

on February was only Rs 1,600 crore — a 20 per cent drop, CDB officials said, citing the rising price of raw coconuts in the domestic market as reason for the decline in export competitiveness. Though the higher prices of raw nuts were remunerative for farmers, low production across the growing regions have dampened their hopes. The high prices also hit exports of desiccated coconut products and coconut oil. Coconut oil exports last year was around 35,000 tonnes and this was reduced by one-fourth this year. The export of DC powder, which was around 15,000 tonnes in 2016-17, has also come down considerably. Overall, there has been a 50 per cent drop in export quantity of all products except coconut shell based activated carbon. The loss of competitiveness in the export market also affected several coconut based industries and only a select few — who are concentrating in coconut oil shipments — have taken advantage through copra imports under Advance Authorisation Scheme. Pinning hopes on a policy change, oil millers sought



permission to import copra on actual user condition (for industrial purpose). However, a meeting at the secretary level in New Delhi came with a rider to get feedback from producing States before moving ahead. As such a move could hit farmers, it would be a challenging task for governments to take.

#### **Record tea export**

India's tea export during the last fiscal had hit a historic peak in volume terms despite a near no-show from the hills of Darjeeling that faced long closure due to political strife. Total export during the period reached 256.57 million kg, surpassing the previous best recorded more than four decades back. The previous best was in 1976-77 when India had exported 242.42 million kg, a release from the Tea Board of India said. Export buoyancy was driven by global market dynamics as production from two competing countries Kenya and Sri Lanka were down. As a result, India could sell more CTC teas to Pakistan and Egypt and more orthodox teas to Iran. "There has been a concerted effort from the industry and the government to drive export and this is the result. However, the industry is not happy with this. We want to touch 300 million kg in export," AzamMonem, chairman of the Indian Tea Association, the largest body of organised tea planters, said. On a year-on-year basis, export, in volume terms, was up by 12.71 per cent from 227.63 million kg in 2016-17. In terms of value, tea exports fetched \$785.92 million, registering a growth of 13.78 per cent. While Egypt, Iran and Pakistan led the pack in growth, China, which is a predominantly green tea market, sprang a surprise. Monem said the country has been buying Indian tea, especially from Assam because of extraction of polyphenol. The stellar show came despite the production of second flush, the most expensive tea exported from India, being hampered in the Darjeeling gardens due to the closure.

#### Basmati regains top slot in agri products' exports

After three years, basmati has regained the top slot in the exports of agri and processed food category in 2017-18, surpassing buffalo meat. During the year, basmati contributed 22.60% to the country's total agricultural and processed food products' exports (value-wise), followed by buffalo meat (21.86%). Buffalo meat has been the highest agri-related export item from India for three consecutive years i.e in 2014-15, 2015-16 and 2016-17. In 2013-14, basmati was the top agri export item from the country. According to Agricultural and Processed Food Products Export Development Authority's (APEDA) provisional data, basmati worth Rs 26,841 crore was exported in 2017-18 as compared to Rs 21,605 crore in 2016-17. Basmati exports for 2017-18 stood at 40.52 lakh tonnes as compared to 39.85 lakh tonnes during the corresponding period of the previous year. Though the volume-wise growth was not significant, the value-wise growth was around 25%. The rise in exports is attributed to increased buying from Iran and the UAE and higher per-unit realisation. As against per-tonne realisation of around \$805 during 2016-17, basmati commanded an average price of \$1,028 per tonne in 2017-18. Punjab and Haryana account for nearly 70% of the total basmati production in the country. On the other hand, the total value of buffalo meat exports was Rs 25,988 crore in 2017-18 as compared to Rs 26,303 crore in 2016-17. Industry sources said low realisation and almost flat growth were the main reasons for decline in value. They added that because of ban on trade of cattle for slaughter in certain states, the volume growth was less than 2%, which attributed to decline in value.



#### Exotic pest casts its shadow on pomegranate crop

• Just when pomegranate farming was getting popular with dry farmland cultivators in North Gujarat and Kutch using drip irrigation, an exotic pest, Lopholeucaspis japonica, has begun infesting pomegranate plants. A team of scientists from Indian Council of Agricultural Research-National Research Center on Pomegranate (ICAR-NRCP), Solapur, had discovered the first L japonica infestation in a farm in Nakhatrana in Kutch district. The problem was immediately reported by the ICAR-NRCP scientist team that included Mallikarjun Harsur, Sunil Joshi and Ram Krishna Pal. The researchers observed L japonica, during March 2016, on a single pomegranate plant. "In a span of 9 to 10 months, the insect had spread to 58 five-year-old plants causing yellowing of the leaves, stunted growth and poor fruit. Its incidence gradually increased



during July and August," states their report. The pests first appear as white specks and then slowly and completely covers the stem, branches and twigs with insect colonies containing males, females and its immature stages. The averages length of an adult female is between 1.3mm and 1.5mm while it is 0.55 to 0.65 mm in width. L japonica have small microducts. The pest first infests the bark on the branches and trunk of its hosts. Heavy infestations causes senescence — where the plant cell loses its power of division and growth — and causes die-back of infested branches, resulting in premature leaf fall.

#### Agripreneurs of Tamil Nadu peel European market for bananas

• The first of banana exports to Europe will start in a couple of months through separate private initiatives in Tamil Nadu. This will eventually open the doors to markets in the West for the local varieties. One, the Trieste Port Authority in Italy is funding a project by the Tamil Nadu Banana Growers Federation, which is working with the Tamil Nadu Agriculture University, to standardise harvesting and post-harvest facilities for banana exports. Through another project, a buyer based in Vienna, Austria, keen on Indian varieties for the local markets there, is supporting Tirupur-based fruits exporter KaVeEzhilan of Greeneers Agro Products India. The exporter is partnering with the National Research Centre for Banana (NRCB) and a consultant in IIT-Madras for a cable conveyor for moving harvested bananas to the pack house. This equipment has been demonstrated to the buyer who has approved the idea, he said. Theni in Tamil Nadu is a major banana cultivation centre but exports are primarily restricted to Gulf countries and South-East Asia, targeting overseas Indians. But now, exporters are targeting developed markets in Europe. While initially, the Cavendish banana will be shipped, he plans to popularise local varieties including Red Banana, Poovan and Kathali. G Ajeethan, General Secretary, Tamil Nadu Banana Growers Federation — who is backed by the Trieste Port Authority — says, as of now, there is no common infrastructure facility meeting European norms for banana exporters in the State. The Port Authority is funding the Federation and the Agriculture University about Rs 1.25 crore to establish a rope conveyor facility in a selected banana farm. The major challenge is to minimise human handling during harvest and post-harvest to maintain the freshness of the fruits at destination.

#### Coimbatore agri engineer grows crops out of thin air — and very little water

• PrabhuSankar, an agricultural engineer based in Coimbatore, was deeply concerned about the dwindling returns of farmers. That, coupled with a desire to get a toehold in the corporate scene, prompted this engineering graduate from the Mahatma Phule Krishi Vidyapeeth in Pune to look for innovative ideas in corporate farming. Thanyas Organic Pvt Ltd, the start-up he founded with a few friends, has perfected farming techniques that can increase the productivity of a piece of land by at least 10 times with substantially less water and nutrients. The start-up is being incubated at the Tamil Nadu Agricultural University's (TNAU) Agri Business Directorate in Coimbatore. "The beauty is that the entire farm can be managed remotely using the internet of things (IoT)," says R Murugesan, Director of Agriculture Business Development at TNAU, who heads the incubation centre. The technique can be used to grow vegetables, flowers, medicinal plants and spices, he says. Thanyas' 30,000 sqft experimental farm, which the start-up uses to test out various protocols, is located at Palladam, in Tirupur district. Using a cloud-based server, Sankar, sitting 40 km away in Coimbatore, can not only schedule a fertigation session, but also actively monitor the plants every day. "We will use similar procedures for a 10,000 sqft pilot farm that we are putting up for Rallis India, a Tata concern, in Lonavala, near Pune," says the 45-year-old Sankar. Thanyas' Palladam farm produces nearly 80 types of vegetables. The farm is based on aeroponics, an advanced version of soil-less agriculture, in which water and nutrients are sprayed on the suspended roots of the plants. While the technique has been evolving since the 1970s in the West, developing similar protocols for the tropics and sub-tropics is a tough job, says Sankar. The plants are grown on raised beds that stand a few feet from the ground, making it possible to cultivate several rows on either side of the bed.



#### GI tag to Alphonso mango from Konkan next year

• The Maharashtra State Agricultural Marketing Board (MSAMB) has applied for the Geographical Indication (GI) tag for the popular Alphonso or Hapus mango from Konkan region so that its original identity is retained. The GI tag is allotted by a Chennai-based organisation to protect uniqueness of products. A geographical indication is a sign used on products that have a specific geographical origin and possess qualities or a reputation that are due to that origin. In addition to the qualities, characteristics or reputation of the product should be essentially due to the place of origin. MSAMB



officials have made it clear that the application for GI is expected to be cleared within a few months so that no other state will be able to use the 'Alphonso' tag henceforth. MSAMB and the Agricultural and Processed Food Products Export Development Authority (APEDA) have also joined hands with the Konkan Bhumi Pratishthan (KBP).

#### India's sugar output seen hitting record 32 mn tonnes in 2017-18

Sugar production in India, the world's second largest producer after Brazil, could touch a record 32 million tonnes in 2017-18, trade lobby Indian Sugar Mills Association (ISMA) informed. If the estimates hold, it would be a staggering 55% increase in production from the previous year. ISMA's latest estimates indicate that the sugar glut is likely to worsen in the coming months, since India's annual consumption of the sweetener is estimated at 25 million tonnes. Due to a steep fall in wholesale prices, mills are unable to pay sugarcane farmers on time —currently, these dues are estimated at over Rs19,000 crore. In Uttar Pradesh, sugar mills owed farmers Rs10,372 crore till 27 April, showed numbers from the Uttar Pradesh Sugar Mills Association. Going by ISMA's estimates, sugar production in India is likely to be between 31.5 and 32 million tonnes in the 2017-18 season (October to September), compared to 20.3 million tonnes produced the year before. Current estimates by the trade body are a sharp upward revision from its January forecast of 25.1 million tonnes production. The food ministry does not formally release sugar production estimates.

## New variety of seed doubles castor output

• A project on castor farming in Gujarat has yielded double the output over conventional farming, without any major changes in farm practices or additional expense. The experiment was conducted over 160 hectares in six districts, using the GCH-7 variety of higher yielding seed, developed by Sardarkrushinagar Dantiwada Agricultural University (SDAU), Palanpur. The output per hectare reported, from most areas, is an average of four tonne. Conventional means have not given more than two tonne per hectare. The Solvent Extractors Association of India (SEAI) had done an exhaustive study by comparing productivity across 200 model castor farms in the last 2 years, when compared to control farms using traditional methods across six districts of Gujarat such as Banaskantha, Patan, Sabarkantha, Aravalli, Junagadh and Kutch. The result of the project could revolutionise the lives of thousands of farmers across Gujarat, Telangana, Rajasthan and other major growing states, according to top officials of the association. "Farming was done under our guidance and continuous monitoring, which doubled farmers' income without significant change in farm practices or additional input cost," Atul Chaturvedi, president, SEAI said. The new seed doubles castor output without additional cost or change in farming. SEAI plans to expand the model farming area this year to 200 hectares across Gujarat, Telangana and Rajasthan, with the same variety of seed and farm practices. The GCH-7 variety withstands adverse climatic conditions. SDAU is working to develop seeds to withstand worm and pest attacks as well, Chaturvedi added.



## Rental drones take off in Kerala's farm landscape

• A group of young entrepreneurs in Kerala has developed drones that can be rented to farmers for a variety of activities such as spraying fertiliser and checking crop health. From saving time to making farming more economical, these emerging engineering talents vouch that drones could play a key role in improving the prospects of the farmers. " Besides using it for sowing of seeds, fertiliser and pesticides application , the in-built spectrum camera could help assess crop health, water deficiency, detection of plant diseases," said Swathin Sidharth, CEO of Trekonik, a start-up venture by these engineers based at Chalakkudy. Seeking grants for its commercial development, they have approached the Kerala Startup Mission, which short-listed their idea for the finals. According to him, the payload of drones are specially designed with a 15 kg capacity. By using the equipment, a farmer could complete sowing of seeds in half a day on one-acre plot without going for any refilling as in the case of manual labour.

# LIVESTOCK, POULTRY AND FISHERIES DRIVING RURAL DEVELOPMENT & PROSPERITY

Indian livestock sector and poultry have evolved over the years into lucrative and rewarding enterprises for the farmers. An engine for rural prosperity, they have also played a cardinal role in ensuring nutritional security. Sometimes called as 'bank on hooves', dairy industry has emerged triumphantly in India as we are the largest producers of milk and we host the largest population of cattle in the world. Poultry sector too has emerged as a significant industry in India as many organized players have started their operations.



nce harnessed for draught power in agriculture, cattle also complemented the agriculture sector by way of organic manure supply. The livestock sector and poultry on the other hand supplemented the farm incomes handsomely. Mainly contained as a backyard activity, these sectors outgrew from the shadows of agriculture segment with the changing dynamics of Indian economy and demographics. Operation Flood and Cooperative

movement in dairy, spurred an unprecedented growth in the dairy segment. However, with the expansion of the industry, challenges such as scarcity of good feed, loss of traditional cattle breeds, inadequate infrastructure, contribution to global warming and outbreak of zoonotic diseases have rattled the sector.

#### **Daring Dairy**

India is the world's largest producer of dairy products by volume, accounting for more than 13% of world's total milk production, and it also has the world's largest dairy herd. India has 75 million dairy farms, about half of all dairy farms in the world. With only 2.29 per cent of the land area of the world, India is maintaining about 10.71 per cent of the world's livestock.The livestock sector contributed 4.11 per cent to the national GDP during 2012-13. According to latest livestock census, the total animal population was 512.05 million.

India's milk production has seen a phenomenal rise since fifties. During 1950-51, the milk production





#### **Species-Wise Milk Contribution in 2016-17**

The milk production has increased form 155.5 million tonnes in 2015-16 to 165.4 million tonnes in 2016-17 registering a growth of 6.4%. This has also been reflected in the per capita availability of milk that rose from 130gm/day in 1950-51 to 355gm/ day in 2016-17. Milk in India is contributed mainly by cattle, buffalo and goat. **Indigenous buffalo** has the largest share closely followed by crossbred cattle

stood at 17 million tonnes. A slew of government initiatives and policies helped in increasing the milk production over the years. The milk production has increased from 155.5 million tonnes in 2015-16 to 165.4 million tonnes in 2016-17 registering a growth of 6.4%. This has also been reflected in the per capita availability of milk that rose from 130gm/day in 1950-51 to 355gm/day in 2016-17. Milk in India is contributed mainly by cattle, buffalo and goat. Indigenous buffalo has the largest share closely followed by crossbred cattle. The indigenous cattle contribute



11.3%, milk whereas non-descript cattle and non-descript buffalo contribute 9.5% and 13.8% respectively. Whereas, goat meekly donates 3.5% of the share. The milk production has registered an annual growth rate of 6.4%. Among the different states, Uttar Pradesh has the largest share of milk production in the country followed by Rajasthan.

The cooperatives and private dairies, handle around 25 percent of total milk production. This is further processed and marketed as packaged fluid milk and other value added dairy products. Dairy farmers sell around 60 percent of milk produced to the commercial value chain and unorganized dairies, while retaining 40 percent for household consumption. The cooperatives and private processors purchase milk from the farmers through their milk collection centers established close to the dairy farms at village level. The government estimates demand for milk to increase to 200 MMT by the year 2021-22, requiring a 20 percent increase in milk production.

India's processed dairy segment is also growing considering the increasing demand for packaged fluid milk and diversified dairy products. According to NDDB, the total installed processing capacity of the dairy



cooperative sector is approximately 43 million liters per day, while the total registered processing capacity of private dairy sector is 73 million liters per day. According to industry estimates, around 70 percent of the processed milk is sold as fluid milk with the remaining used in manufacture of value added products. The packaged milk in India is mostly marketed as pasteurized milk in various variants depending on the fat content such as full cream milk (6 percent fat and 9.0 percent solid not fat (snf)), standardized milk (4.5 percent fat and 8.5 percent snf), toned milk (3. 0 percent fat and 8.5 percent snf), double toned milk (1.5 percent fat and 9 percent snf) and skim milk (not more than 0.5 percent fat and 8.7 percent snf). Most of the private and cooperatives dairies do not have separate collection system for cow and water buffalo milk; therefore the packaged milk is mostly a mix of cow and water buffalo milk. However, there are a few dairy processors which also market exclusive cow milk. With rising health conscientious consumers, the demand for packaged milk is increasing. Similarly, the demand for ultra-high temperature (UHT) milk sold in aseptic packaging is rising owing to its long shelf life and perceived high quality. Consumption of value added dairy products are experiencing significant annual growth rates of around 15-20 percent. Products



such as dairy whitener, butter, ghee (clarified butter), paneer (cottage cheese), flavored milk, ice cream, cheese, yogurt, butter milk, and milk based sweets have been experiencing this growth trend.

Despite having the world's largest milk production, India is a very minor player in the international market due to high domestic consumption. Nevertheless, India consistently specialty products exports such as casein for food processing or pharmaceuticals. The major export destinations for the Indian dairy products are Bangladesh, Middle East, US and Egypt. India's dairy imports are insignificant. The major dairy product imports include milk powder, fats and oils, casein, butter, whey, cheese and lactose. The imports of milk powder and butter are irregular and depend on the domestic supply situation.

The government schemes such as "National Programme for Bovine Breeding and Dairy Development", National Dairy Plan (Phase-I) and

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Presently there is a big shortage of feed and fodder for dairy sector. The present shortage of feed and fodder in the country is as much as 40 per cent. According to IGFRI's estimates, by 2020, India will require 850 million tonnes of green fodder

"Dairy Entrepreneurship Development Scheme" have been helping to increase the profitability and productivity of the dairy segment. The restructured Scheme National Programme for Bovine Breeding and Dairy Development (NPBBDD) was launched by merging four existing schemes i.e. Intensive Dairy Development (IDDP), Programme Strengthening Infrastructure for Quality & Clean Milk Production (SIQ&CMP), Assistant to Cooperatives and National Project for Cattle & Buffalo Breeding with the budget provision of Rs.1800 crores for implementation during 12th Plan. Dairy Entrepreneurship Development Scheme (DEDS) was launched in September



2010 to promote private investment in the dairy sector to increase milk production in the country and create selfemployment opportunities and, therefore, help in reducing poverty. This scheme is being implemented through NABARD, which provides financial assistance to commercially bankable projects with loans from commercial, cooperative, urban and rural banks. National Dairy Plan Phase I (NDP I) is a Central Sector Scheme for a period of 2011-12 to 2018-19 to help increase productivity of milch animals and thereby increase milk production to meet the rapidly growing demand for milk and to help provide rural milk producers with greater access to the organised milkprocessing sector.

The livestock sector in India faces many challenges. Presently there is a big shortage of feed and fodder for this sector. The present shortage of feed and fodder in the country is as much as 40 per cent. According to IGFRI's estimates, by 2020, India will require 850 million tonnes of green fodder, 520 million tonnes of dry fodder (edible crop residue) and 90 million tonnes concentrates. The area dedicated to fodder cultivation has remained constant at 4.7 per cent of the total cultivable land since independence. Climate variations like increasing temperature and decreasing rainfall are reducing the yield of pastures and changing land use patterns, especially that of common and traditionally pasture

lands and is diverting a significant amount of the grazing pressure to forests.

Diseases are another important factor fiddling with the productivity of animals. Foot and Mouth Disease (FMD) alone leads to economic losses of more than Rs. 20,000 crore per annum. Most of these losses can be prevented through timely immunization. India has a total of 8,732 veterinary hospitals and polyclinics and 18,830 veterinarv dispensaries against the requirement of about 67,000 institutions. Most of these have poor infrastructure and equipment. Livestock production also comes at an environmental cost. Though the sector contributes less than 2 per cent of global GDP, it produces 18 per cent of the global greenhouse gas emissions. In addition, the increasing geographic concentration of livestock production means that the manure produced by animals often exceeds the absorption capacity of the local area resulting in pollution. The Planning Commission also cites lack of credit for livestock farmers as a limiting factor for its growth.

#### Prospective Poultry and Meaty Meat Industry

Intensely pursued as a backyard activity, today the face of poultry



**B Soundararajan** Chairman of CLFMA of India

"In the next decade, nutritional security must be given top priority by the policy makers beyond just

increasing food production and the livestock sector is poised to play a major role in it. The time has come for us to focus on holistic nutrition and health of the billion-plus population and make concerted efforts towards reducing malnutrition particularly among children. They are our future and we need to ensure they remain our top priority while making policies at the Central and State levels. Eggs are packed with essential nutrients and are one of the wholesome and healthiest foods especially for children. By including an egg in the mid-day meals every day, the problems of under-weight, wasting and stunting among school children can be addressed effectively. We are surprised as to why there are many other States that are yet to include eggs in their mid-day meal schemes. Animal protein (meat, milk and egg) is one of the easiest and most affordable means to achieve wholesome nourishment. They perfectly compliment plant proteins as our country has such a unique culinary heritage of over thousands of years that combine both vegetarian and non-vegetarian foods perfectly while not compromising health for taste or vice versa. While children that belong to the poorer sections of the society need nutritious diets, the wealthier ones need to be educated about healthy eating and balanced nutrition."

is changing in India. Poultry is one of the fastest growing sub-sectors of animal husbandry; the annual growth rate of eggs being pegged around 6 per cent. India is the thirdlargest egg producer after China and USA, and the fourth-largest chicken producer after China, Brazil and USA.

The egg production in the





country was 1832 million during 1950-51. There has been a steady increase in the production till 1999-2000. From then onwards, the production of egg increased substantially and reached 88139 million in 2016-17. From the per capita availability of 5 eggs per annum during fifties, it shot up to 69 eggs per capita in 2016-17. Among the







different states in India, Tamil Nadu is the largest contributor of eggs providing 18.0% of the egg production followed by Andhra Pradesh and Telengana contributing 18% and 13.4 % respectively.

Poultry is the most organised sector in animal agriculture in India, worth Euro 14,500 million. Production of broiler meat has increased to 4.2 million tonnes per annum in 2015-16. Demand for processed chicken meat has been growing by 15- 20% per annum. Total layer production in India has gone up to reach 80 million eggs per annum.

In India, Poultry Production is spread among three segments: Layers, Broilers and Backyard / Family Production (Both eggs and chicken). 70% of the layer birds are being raised in the states of Andhra Pradesh, Telangana, Tamil Nadu, Karnataka, Maharashtra and Haryana. Broilers Feed (65%) and chicks (25%) account for 90% of the broiler inputs and consolidation

> is being observed in the market. Smaller producers engage in 'contract farming'. At one time, 30% of the eggs produced in India were produced in the backyards. Improved varieties of 'Low technology input birds', which are dual purpose, i.e., producing eggs and meat, are new being bred in India for the purpose of backyard/ family production. As per Agriculture and Processed Foods Products Export Development Authority (APEDA), India has exported 659,304 MT of poultry products for the worth of INR 7,680 million during 2015-16. Majority of the exports are destined for the Middle East. Each year, India exports around 5000 MT of poultry products into Europe, the largest chunk of which is



destined for Germany, although the share of the Netherlands has grown significantly over the last few years.

large group of poultry Δ companies are based in and around Hyderabad. Andhra Pradesh and Telangana (erstwhile Andhra Pradesh) account for majority of the birds and eggs produced in India. Hyderabad in Telangana is the epicentre for the poultry industry in India owing to the presence of large producers as well as the existence of organisations such as the Directorate of Poultry Research (DPR), Indian Council of Agriculture Research (ICAR) institute and Indian Poultry Equipment Manufacturers Association (IPEMA). Sneha Foods Limited, Telangana; Srinivasa Hatcheries (SH Group), Telangana; Balaji Hatcheries, Andhra Pradesh; V S N Hatcheries, Andhra Pradesh; Mulpuri Group, Andhra Pradesh; Venky's (V H Group), Maharashtra; Suguna Foods, Tamil Nadu; R M Group, Haryana; Skylark Foods, Haryana; Komarla Group, Karnataka; I B Group, Chattisgarh and Bharati Poultry, West Bengal are some of the famous groups.

Rising incomes, urbanization, customer exposure have all played a pithy role in increasing the demand for meat in the country. The total meat production in the country for 2016-17 was pegged at 7.4 million tonnes. Cattle, Buffalo, Sheep, Goat, Pig and Poultry are the main meat contributors in India. About half of the meat produced in the country is contributed by poultry segment. The highest annual growth rate of 7.87% was observed in 2012-13. However, the annual growth rate dropped to 5.21% for the year 2016-17. Among the different states, Maharashtra has reported the highest growth rate of 25%. Uttar Pradesh is the largest meat producing State in India contributing 18.23% to the total meat produced in the country. Maharashtra and West Bengal occupies the third position with 11.44% and 9.56% respectively.

However, the surging poultry sector is held back by several factors. The production facilities and methodologies followed by the poultry farmers in India are not in line with international standards. Open poultry farms with no climate control or quarantine mechanisms expose the birds to various potential diseases and epidemics and affects their productivity and profitability. Climate controlled farm houses, automated feed lines etc. can be a solution to this problem. Lack of storage, cold chain and transport have also affected the Indian poultry segment. More than 60% of broiler birds produced in India are produced in 6 states (Andhra Pradesh, Telangana Karnataka, Maharashtra, Punjab and), similarly more than 60% of eggs produced in India are produced in these six states and hence the poultry products have to be transported between the states. Birds are currently transported alive between the states, which causes them to be transported in inhumane and sometimes unhygienic conditions. Poultry produce neither are transported using refrigerated trucks nor are specialized equipment used for packing or transporting poultry

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produce.

Indian farmers mostly depend on sova bean and maize as the main feed. These help only in fulfilling minimum nutritional requirements, and do not help in raising high quality, healthy birds. There is shortage of quality feed in the market and lack of knowledge about the benefits of using quality feeds. Also, there are no quality standards in poultry farm management in India, prescribed either by the Government or by self-regulating industry bodies. For export market, APEDA has imposed strict quality standards and regular audits to ensure quality is maintained to international standards. up However, in the domestic market, there is a lack of comprehensive regulating authority to maintain hygiene in farms, processing and transportation. Licensing of farms is done on municipality level, who often lack the knowledge, expertise and human resources to strictly enforce quality standards.

There is a lack of dry processing capabilities in the Indian domestic poultry market. For lack of knowledge and awareness, Indian consumers prefer to go for freshly culled birds which are not processed in clean and hygienic conditions. Wet processing machineries pose serious environmental concerns owing to



poorly managed waste disposals. There exist limited storage facilities which can conserve the products without loss in quality. Processing machineries that are clean and hygienic, coupled with waste treatment plants are the need of the hour in Indian poultry market.

Disease outbreaks have also been the bane of the poultry segment. Owing to repeated outbreaks of the Avian Influenza virus, India's poultry exports have declined over the last two years. After sustaining above \$100 million for two years, exports declined to \$79.31 million in 2016-17. This year Saudi Arabia had imposed a temporary import suspension on all live birds, hatching eggs and chicks from India due to avian influenza outbreaks. This was in response to an outbreak reported from Bengaluru

in January, 2018. Experts suggest to segregate the country's poultry industry into separate zones to enable exports from other regions in case of outbreaks.

#### **Flourishing Fisheries**

Indian fisheries and aquaculture have become an important economic activity catering to livelihood and nutritional security. Engaging about fourteen million people in different allied activities, this sector has been thriving due to India's diverse resources ranging from deep seas to lakes. Constituting about 6.3% of the global fish production, the sector contributes to 1.1% of the GDP and 5.15% of the agricultural GDP. The total fish production of 10.07 million metric tonnes presently has nearly 65% contribution from the inland sector and nearly the same from culture fisheries. India is home to more than 10 percent of the global fish diversity. Presently, the country ranks second in the world in total fish production with an annual fish production of about 9.06 million metric tonnes.

As the second largest country in aquaculture production, the share of inland fisheries and aquaculture has gone up from 46 percent in the 1980s to over 85 percent in recent years in total fish production. Freshwater aquaculture showed an overwhelming ten-fold growth from 0.37 million tonnes in 1980 to 4.03 million tonnes in 2010; with a mean annual growth rate of over 6 percent. Freshwater aquaculture contributes to over 95 percent of the total aquaculture production. The freshwater aquaculture comprises of the culture of carp fishes, culture of catfishes (air breathing and non-air breathing), culture of freshwater prawns, culture of pangasius, and culture of tilapia. In addition, in brackishwater sector, the aquaculture includes culture of shrimp varieties mainly, the native giant tiger prawn (Penaeus monodon) and exotic white leg shrimp (Penaeus vannamei). Thus,



#### Naveen Chander, COO, Fish Chain

"Consumers have become increasingly aware of the relation between diet and good health, and hence the consumption of seafood products will most likely increase. The consumer recognizes that seafood is nutritious. Today's consumer is changing rapidly. Instead of singleincome households, it is increasingly more common to have both man and woman working. The size of the family is decreasing. As many as one-fourth of all households are occupied by one person. This means more shoppers and diners, most with little time for home preparation. The consumer demand for convenience, gourmet foods, and other services is increasingly evident in the food service and retail food industries. As the number of working women and single dwellers increases, the consumer base continues to change. With reduced leisure time, consumers who once spent two hours per day in the kitchen now spend less than a half hour. Convenience stores, fastfood restaurants, specialty food service outlets, and prepared items in the supermarket are food industry responses. Seafood, like other foods, will be placed in a competitive consumer environment. Fish and shellfish must continue to taste good if they are expected to attract more consumers. Further, seafood must stay within the budget of the new consumer. If the industry can respond to the changing consumer base, the opportunity to expand per capita consumption appears very positive. The processing, distribution and merchandising of Seafood will require more emphasis to reduced cost to be competitive in the market."

the production of carp in freshwater and shrimps in brackishwater form the bulk of major areas of aquaculture activity. The annual carp seed production is to the tune of 25 billion and that of shrimp about 12 billion, with increasing diversification. Along with food fish culture, ornamental fish culture and high value fish farming are gaining importance in the recent past. With over 2.4 lakh fishing crafts operating in the coast, six major fishing harbours, 62 minor fishing harbours and 1511 landing centres are functioning to cater to the needs of over 3.9 million fisherfolk.

Fish and fish products have presently emerged as the largest group in agricultural exports



India, with 10.51 lakh from tonnes in terms of quantity and Rs.33,442crores in value. This accounts for around 10% of the total exports of the country and nearly 20% of the agricultural exports. More than 50 different types of fish and shellfish products are exported to 75 countries around the world. The main challenges facing the fisheries sector include shortage of quality fish seeds, lack of resourcespecific fishing vessels, reliable data, inadequate awareness about nutritional and economic benefits of fish and absence of standardisation and branding of fish products.

Livestock, Poultry and Fisheries play significant role in rural economic development and employment generation. Their profitability has been driving the growth of these very strong segments and has immense scope in the future.

# **'INDIAN POULTRY HAS UNDERGONE PARADIGM SHIFT IN STRUCTURE AND OPERATION'**

SR Group, a growing conglomerate based in Hyderabad. Telangana was founded by Dr. A. Tirupathi Reddy and Dr. G. Ranjith Reddy after serving the poultry sector for over 6 years. Within a relatively short span of 20 years, the group has diversified into various activities such as the sale of **Broiler Chicks, Poultry feed, Commercial Layer eggs, Broiler** Hatching, eggs and Broiler live birds. The group boasts of being the highest seller of broiler chicks and poultry feed in South India and is also extensively penetrating into the Western and Eastern India markets. The group has also taken its operations abroad by entering the poultry industry in Uganda, Africa, as part of diversification into other industries. The poultry business forms the heart of the SR Group and is ever evolving. All the hatcheries under the SR Group maintain high levels of bio-security and hygiene. Known for the largest and expansive reach of chick sales. SR Group relentlessly strives to extend quality goods all over the country. In an interaction with Agriculture Today, Dr. G. Ranjith Reddy, M.V.Sc., Managing Director, S R Group, Hyderabad discusses the poultry segment in India and the challenges associated with it.



#### How has the poultry segment in India evolved over the years? What are the major growth drivers of the segment?

The poultry segment has evolved from being a backyard activity to now being the third in the world Egg production and 4th in world Broiler meat production. The egg production is estimated to be 75 billion eggs and Broiler DOC placement is 3.5billion per annum. Indian Poultry industry contributes to about INR 90,000 crores to National GDP. The sector also provides direct and indirect employment to 3 million people in the country. India's agri based economy ensured the availability of raw materials for the growth of the poultry segment. Low water requirement when compared to agriculture, internationally known breeds with best performance and poultry technology development such as top quality vaccines, latest equipment have positively influenced the Poultry growth and large scale expansion.Contract farming helped small farmers to take up broiler farming in integration model for a stable income, in addition to their agricultural income. Besides, poultry manure is used as organic fertilizer and a potential avenue for enhanced earnings.

#### Has India achieved self-sufficiency in the poultry segment? Can we meet the future demands with the current state of affairs?

The Indian Poultry has undergone paradigm shift in structure and operation. Indian Poultry has grown largely due to initiative of private enterprises with huge investments in breeding, hatching, vaccine manufacturing, feed milling and equipment. India has developed its own pure lines from world renowned breeds by reducing dependency on imports. Now our productivity is at par with that of advanced countries.We have achieved self sufficiency in terms of production, but we have to strengthen our marketing system for further expansion to meet the future demands. Our per capita egg consumption is 68 eggs and Broiler meat is 3.8kg only against National Institute of Nutrition recommendation of 180 eggs and 11kg meat.

#### Use of antibiotics and hormones in the poultry segment has been a dampener. Can't the poultry industry do away with this practice altogether? Broiler bird is attaining a growth of 2 Kg in five weeks due to genetic engineering and best management practices. Disease incidence is very low due to standard preventive measures such as timely vaccination. Hormones are not at all used, and use of antibiotic is limited to treatment in emergencies only. Poultry Associations have always advocated judicious and responsible usage of all inputs including antibiotics. The media has great responsibility to ensure consumers are not misled by vested interests making untruthful

claims without scientific data, as India still has malnourished population with protein deficiency.

#### How is the Indian feed industry poised to meet the demands of the poultry segment?

Most modern poultry feed production units are established by top poultry players across the country for crumble/pellet feed. Also, latest technologies are used in the processing of feed. We are largely dependent on domestic production of agricultural commodities and watchful as our prices are aligned with global trends, especially for key raw materials like maize and soya. The poultry sector has to adopt smart agricultural techniques to increase yield and to meet growing demand. Modern grain storage and processing facilities are the need of the hour. Our dependence on imported feed additives needs to be changed.

#### What is the level of processing in the poultry segment today in India?

The current processing levels in Poultry are 9% which is sold as chilled, frozen and further processed out of 5.6 million tonne annual production of broiler meat. A growth rate of 18-20% is seen in processed chicken demand. Growth of chicken processing industry requires conscious phasing out of wet market with policy decision

# What can other states learn from Telengana and Andhra Pradesh in poultry segment?

Strong association activity during crisis management in situations like AI declaration and market coordination for implementation of movable price for Eggs and Live broiler birds have been the strong points of these states. Incentives from state governments in power tariff and releasing Maize or Cereals from MARKFED during short supply seasons has also helped in the growth of poultry segment.

#### What are the challenges associated with the poultry segment?

Demand-Supply mismatch during seasonal consumption variations resulting in heavy fluctuation of prices is a big challenge for the poultry industry. A regulatory intervention is required to promote chilled or frozen chicken consumption. The government of India should stock eggs during lean seasons to help Layer farmers, as followed with most agricultural commodities.Vaccines for some prevalent diseases is the need of the hour. Another big challenge is the scarcity of raw materials when monsoon is not favorable. The government is not permitting the import of genetically modified raw materials is also a bottleneck. The presence of Poultry Board like NDDB is strongly felt especially for coordinating marketing of Poultry products.

# FODDER CONSERVATION THROUGH HAY MAKING

airy is growing very fast, but our farmer is not moving with the same speed. The requirement of nutritients for obtaining high yield is very high, because of the expected high milk yield and environmental stress on the our dairy animals. The cheaper and easily available sources of nutrients to lactating animals are green fodder

which is abundantly available in our farmer's field. But the major problem in today's dairy farming is that the supply of green fodder is not regular for the whole year. So, we have to develop different techniques in our dairy units to ensure that the nutrient product is available around the clock.

The cost of dairy farming especially for milk production is very high, if we are rearing animals alone on feed/grains. Dairy feed costs 70-75% and the green fodder's contribution is significant. Animal husbandry is an old business, but new techniques and research work can help in making this profession work better. The present number of cattle in Punjab is about 81.2 lakhs, which has 62.4 lakh big animals. There is a need for substantial increase in the current yield of green fodder to provide complete and good quality feed to the animals. One animal gets 30.65 kg of fodder per day, which is very low. If 40 kg of green fodder is found in a large livestock farm daily, then there is an annual requirement of 911 million tonnes of green fodder. Hay making not only conserves the abundant supply, but also ensures the regular supply of nutritious product for the whole year.

#### Details about green fodder crops used for making hay

Fodder crop (legume)	Sowing time	Seed rate	Seed inoculation
Berseem	September (24-30) to October (1-7)	8-10 kg	Rhizobium
Lucern	Mid October	6-8 kg	Rhizobium
Cowpea	March to mid July	CL367= 12 kg	
Cowpea 88=20-25 kg	-		
Ryegrass	September(24-30) to October (1-7)	4 kg	-

#### The nutritive value (on dry matter basis) of fodders (hay)

Fodder crop	Protein (%)	Total digestible elements (%)
Berseem	18.0	60.5
Lucern	22.0	59.5
Cowpea	22.5	61.2
Ryegrass	16.0	63.5



During November-December and Mav-June months, there is a severe shortage of green fodder for cattle which can be fulfilled by taking precaution or by applying silage. Dried green fodder is called as hay.In March-April, when there is an additional fodder of bersem, lucern or oats, it maybe used for making hay. Various sources of protein and cereals are expensive. Legume crops such as berseem, lucern, guara and cowpea are very good for making hay. In addition to mineral and vitamins in dried legume fodder crops, protein is also available in good quantity, which is why it is important to dry the fodder used in ration. There is a special way to cut and store different fodder crops. Hay is made only from leguminous crops which are very rich in protein and minerals. Hav serves as a one important part of conservation of nutrients for use at the time of lean period.

The green fodder crops which are soft, are suitable for making hay, such as berseem, cowpea, lucern and ryegrass. The amount of moisture in green fodder crops is generally 80-90%, but in order to be able to store them, the moisture should be below 15. In March-April months, when berseem and lucern are ready for harvesting for fodder purpose in 20-25 days, and if these are not cut timely, fodder nutrients decrease. This is the best time to prepare hay and consequently the full use of the crop's nutrients. Hay making is very easy and the product obtained after this technique is very rich in protein, minerals and vitamins. Any farmer can easily adopt this technique. The only thing to keep in mind is the proper time of cutting, stage of cut and size of chaff fodder.

#### Indices of good hay:

Good hay color remains green in colour and the leaves and branches stay connected. This can be assessed by taking the material in the hands. If it feels dry, then hay is ready for feed and high nutrient is available in the hay. But in some cases, moisture content in the leaves as well as

#### The following are the important points of making hay (dry fodder):

- The fodder should be dried in the field for about 3 days.
- Chop 5-8 cm in size of green fodder crop.
- Spreadchopped fodder on a pucca floor and dry it in the sunlight in a set of 10-15 cm thickness.
- Stir the drying forage every 2-3 hours during the day to speed up the drying processunder exposure to the sun and the air.
- By repeatedly stirring the fodder, it dries in 3-4 days.
- When thoroughly dry (usually) after 3-4 days, depending on the frequency ofstirring, the intensity of the sun light and air movement of the air, gather the mixtureof dried stems and leaves to store or market. When the leaves become cramped, carry the dry fodder up and store it.
- If dry fodder is easily broken, the amount of moisture is correct and it is ready to storage. Dried fodder can be stored in a chap or strawed room. Normally drying green fodder reduces to 15-20% weight and 10-12% quality.
- Feeding of 10 kg of dry fodder on the basis of 85% dry matter is equivalent to feeding 35-40 kg green fodder. Feeding of animals with non-leguminous fodder, feeding with leguminous dry fodder, reduces the normal distribution of food.



branches is too high, then there is need of more drying for producing good quality hay.

Hay can be utilized during the shortage of green fodder. At the time of shortage of green fodder, there is excessive use of feed/ration which increases the cost of milk. Hay making is thus a unique initiative where we can conserve the green fodder by making it dry. This can reduce the cost of milk production and increases the net profit of dairy farming. Every dairy farmer must start this new initiative in their dairy unit, so that balanced diet to the dairy animals can be maintained. Hay making also reduces the daily labour cost of harvesting and chopping.

Dr. Balwinder Singh Dhillon, Dr A.P.S. Dhaliwal and Dr J.S. Brar Krishi Vigyan Kendra, Bathinda (Punjab)

# **DEHAAT** – BRINGING THE AGRI STAKEHOLDERS CLOSER

adhav Nayak Ji, a tribal farmer hailing from Badbil village of Jashipur block of Mayurbhanj of Odisha is a content man now. His daughter rides a scooty to the college. Madhav Ji is a proud farmer cultivating maize in his farm land. It was not so a few vears ago. He has been growing Paddy during Kharif season which hardly earned him anything. In 2016 he had been encouraged by DeHaat team to cultivate Maize at less than 2 acres and supported him end to end right from quality seeds, mechanization support, advisory and last but not the least, market support. He earned a net income of INR 40,000 from his Maize farming from 1.75 acres. Encouraged by the profit he is getting ready to grow Maize in 10 acres of land.

DeHaat, an ICT based platform connecting small farmers to their various needs - seeds, fertilizers, equipment, crop advisory & market linkage through network of trained micro entrepreneurs, is an answer to the gaps existing in India's agricultural value chain services. It all started in 2012, when a group of youngsters decided to change the existing scene with an aim of maximizing profit per unit area of Indian farmers. "After graduating from IIT Delhi in 2008, I worked with management consulting firm for 3 years where I learned the gaps in the supply chain for various bulk buyers. Belonging to a farming community of Bihar, I needed no introduction to the difficulties faced by farmers. This was the trigger point to create a sustainable business model in agriculture and around small farmers," says Shashank Kumar, an IIT, Delhi alumnus,

With 35 Lakh rupees from his savings, Shashank and his friend Manish Kumar, post graduate form IIT, Kharagpur instituted DeHaat. He was soon joined by like minded



Amrendra Singh with a people. background in Computer Engineering from NIT Jamshedpur joined DeHaat in its founding year itself. Next year, 3 more friends - Shyam (B.Tech from IIT Kharagpur & MBA from IIM Ahmedabad), Adarsh Srivastav (B.Tech from IIT - ISM Dhanbad) & Abhishek Dokania (MBA from IIPM) joined the team. "Shyam believes in data, technology and processes to improve the efficiency of agri supply chain, and Adarsh and Abhishek have an amazing understanding of agri output industry, post harvest management. Initially, we experimented with various agricultural models related to contract farming, agri extension, farm produce aggregation, introducing new crops, FPO formation through our not for profit organization. Farms and Farmers (FnF) Foundation. Based on grassroot learnings, we derived DeHaat model in 2012 which is about offering complete end to end agri services to farmers in a sustainable way", explains Shashank.

As a team, with more than 20 years of grassroot level experience of agri supply chain, agri technology & extension, DeHaat was able to bring transparency in the agri value chain

through technology. Recognitions and appreciation poured in from all the directions. DeHaat was recognized at multiple forums such as NASSCOM, Vodafone Mobile for Good, Millennium Alliance, NitiAayog. Shashank Kumar was featured as Ashoka Fellow in 2013 & in Forbes 30 under 30 in 2014. He was also part of "Champions of Change" in 2017 at Niti Aayog to meet PM – India on 2 days policy making subjects. Today, DeHaat has 46 Professionals from institutes like TISS, BHU & other agri universities in their team.

"Currently we are focusing on selective value chain services such as Input, Advisory & output and we have successfully established strong collaboration with various institutions. However, DeHaat aims to become one stop solution for farmers. DeHaat is already offering end to end agri services to 40,000 + farmers through 75 + last mile service providers and targeting to create network of 350+ DeHaat micro entrepreneurs to serve 200,000 farmers by March'19. Since technology has been deployed at each level - Farmers, DeHaat microentreprenuers and Node, we have



100% visibility on the entire value chain. Based on historical and current transactions and communications between farmers and DeHaat, we have derived a unique farmers' rating mechanism to avail credit or other value added services too," says Shashank.

DeHaat benefits farmers by reducing cost of cultivation while buying inputs, improving farm productivity due to timely and customized advisory and by availing better farm gate price. Consequently, farmers have earned more than 50% increment in their net income from agriculture.In return, DeHaat earns revenue from sales of farm produce to institution and sales of agri inputs to farmers. Crop advisory for farmers are not charged. 72% of overall revenue for DeHaat comes from the market linkage of farm produce and remaining from agri input. The platform has also been a source of rural entrepreneurship.

Gautam Singh had been working as a driver in Delhi, away from his family, for the past 12 years at a monthly salary of INR 10,000 only. He came to know about DeHaat and it's micro-entrepreneurship plan and in July 2016, he started DeHaat in his village Jaitipur, Vaishali, Bihar. Currently he is serving 726 local farmers through DeHaat Jaitipur and an annual transaction of INR 62 Lakh passes through his center. Today, he earns INR 12000-INR 17000 on monthly basis in his own village. There are 75 other such micro-entrepreneurs who are running DeHaat in their respective panchayats in a self sustainable way. It has become a technology for rural youth to offer 360 degree agri services to local farmers and a way to stop them from migrating from villages.

Catering to farmers in Bihar, U.P. & Odisha for their

various agri demands related to Input, Information & Market linkage, DeHaat platform has already listed 350+ different agricultural inputs from companies like UPL, IIL, IFFCO, DuPont, Tata, Bayer & Yara. More than 65 institutional buyers are also associated for their agricultural raw material procurement directly from farmers. DeHaat also has feature to capture farm level queries of farmers & to send to technical person on real time basis.

"Farmers can place the order related to any of their agri need through DeHaat help line (1800 270 1420), through mobile application – DeHaat or simply they can go to their closest DeHaat physical centers. The demand from farmers is transferred to respective DeHaat micro entrepreneurs and fulfilled on same day. Each DeHaat micro-entrepreneur caters to 600-800 farmers in a radius of 3-5 km. These microentrepreneurs also use our "DeHaat for Business" application to enroll farmers, to aggregate various demand, to visit farm, to capture crop based query and to aggregate the farm produce," clarifies Shashank.

Direct accessibility of the farmers to various agri stakeholders – input companies, output buyers and others – has been the main mantra of DeHaat. As a farmers' network, DeHaat platform has proved to be competent to serve the customized requirement of any bulk buyers to grow specific varieties or to grade right at farm gate. This also applies to availing specific input product at right farming area with 100% visibility for any input companies. Their internal data creates enough visibility on the yield projections, estimated harvesting time and quality for other stakeholders.Currently 40,000 + farmers of Bihar, UP & Odisha growing crops like Corn, Wheat, Chilli, Litchi, Banana, Lemongrass & Mint are being benefitted through DeHaat.

#### Anjana Nair

# COPING WITH CLIMATE CHANGE



or the past some decades, the gaseous composition of earth's atmosphere is undergoing a significant change, largely through increased emissions from energy, industry and agriculture sectors; widespread deforestation as well as fast changes in land use and land management practices. These anthropogenic activities are resulting in an increased emission of gases, viz., carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O), popularly known as the 'greenhouse gases' (GHGs).The global mean annual temperature at the end of the 20th century, as a result of GHG accumulation in the atmosphere, has increased by 0.4–0.7°C above that recorded at the end of the 19th century. The past 50 years have shown an increasing trend in temperature @ 0.13 °C/decade, while the rise in temperature during the past one and half decades has been much higher.The Inter-Governmental Panel on Climate Change has projected the temperature increase to be between 1.1 °C and 6.4 °C by the end of the 21st Century (IPCC, 2007).

#### Impacts of Climate Change on Agriculture

Global climatic changes can affect agriculture through their direct and indirect effects on the crops, soils, livestock and pests. An increase in atmospheric carbon dioxide level will have a fertilization effect on crops with C3 photosynthetic pathway and thus will promote their growth and productivity. The increase in temperature, depending upon the current ambient temperature, can reduce crop duration, increase crop respiration rates and alter photosynthate partitioning to economic products.

#### **Reduction in Crop Yield**

Rise in the mean temperature above a threshold level will cause a reduction in agricultural yields. A change in the minimum temperature is more crucial than a change in the maximum temperature. Grain yield of rice, for example, studies have reported a decline in yield by 10% for each 1°C increase in the growing season at a minimum temperature above 32 °C

#### **Shortage of Water**

The increased temperature would result in more water shortages and the demand for irrigation water would rise. Increase in air temperature will lead to more potential evapotranspiration. Likewise, water shortage due to climate change would result in about 20% net decline in the rice yields in India.

#### Irregularities in Onset of Monsoon, Drought, Flood and Cyclone

Indian agriculture is highly dependent on the onset, retreat and magnitude of monsoon precipitation, particularly in the rainfed areas of east, north-east and south India. Expansion of area under irrigation, droughts, caused by inadequate and uneven distribution of rainfall, continue to be the most important climatic aberrations, which influence the agricultural production in India. Intense and frequent floodings due to climate change would be a major problem in the Indian subcontinent.

#### **Decline in Soil Fertility**

Soil temperature affects the rates of organic matter decomposition and release of nutrients. At high temperatures, though nutrient availability will increase in the short-term, in the long-run organic matter content will diminish, resulting in a decline in soil fertility.

#### Loss of Biodiversity

Species of animals and plants are estimated to disappear at a rate which would be about 100-times faster than the historical record, largely as a result of human activities. Loss of biodiversity have been mostly due to hunting, habitat loss and climate change.

#### **Pests, Weeds and Diseases**

As temperature increases, the insect-pests will become more abundant through a number of inter-related processes, including range extensions and phonological changes, as well as increased rates of population development, growth, migration and over-wintering. The climate change is likely to alter the balance between insect pests, their natural enemies and their hosts. The rise in temperature will favour insect development and winter survival. Rising atmospheric carbon dioxide concentrations may lead to a decline in food quality for plant-feeding insects.

#### **Impacts on Livestock**

Heat waves, which are projected to increase under climate change, could directly threaten livestock. A number of states have each reported losses of more than 5,000 animals from just one heat wave. Heat stress affects animals both directly and indirectly. Over time, heat stress can increase vulnerability to disease, reduce fertility, and reduce milk production. Drought may threaten pasture and feed supplies. Drought reduces the amount of quality forage available to grazing livestock. Climate change may increase the prevalence of parasites and diseases that affect livestock. The earlier onset of spring and warmer winters could allow some parasites and pathogens to survive more easily. Increases in carbon dioxide (CO2) may increase the productivity of pastures, but may also decrease their quality.

#### **Impacts on Fisheries**

Many fisheries already face multiple stresses, including overfishing and water pollution. Climate change may worsen these stresses. In particular, temperature changes could lead to significant impacts. The ranges of many fish and shellfish species may change. Many marine species have certain temperature ranges at which they can survive. For example, cod in the North Atlantic require water temperatures below 54°F. In this century, temperatures in the region will likely exceed both thresholds. Many aquatic species can find colder areas of streams and lakes or move northward along the coast or in the ocean. However, moving into new areas may put these species into competition with other species over food and other resources. Changes in temperature and seasons could affect the timing of reproduction and migration. Many steps within an aquatic animal's lifecycle are controlled by temperature



and the changing of the seasons. For example, in the Northwest warmer water temperatures may affect the lifecycle of salmon and increase the likelihood of disease.

#### Adaptation Strategies to Climate Change

To deal with the impact of climate change, the potential adaptation strategies are: developing cultivars tolerant to heat and salinity stress and resistant to flood drought, modifying crop and management practices, improving water management, adopting new farm techniques such as resource conserving technologies (RCTs), crop diversification, improving pest management, better weather forecasting and crop insurance and harnessing the indigenous technical knowledge of farmers.

Development of new cron varieties with higher yield potential and resistance to multiple stresses (drought, flood, salinity) will be the key to maintain yield stability. germplasm Improvement in of important crops for heat-stress tolerance should be one of the targets of breeding programme. Similarly, it is essential to develop tolerance to multiple abiotic stresses as they occur in nature. The abiotic stress tolerance mechanisms are quantitative traits in plants. Improvement in water-use and nitrogen-use efficiencies is being attempted since long. These efforts assume more relevance in the climate change scenario as water resources for agriculture are likely to dwindle in future. Farmers need to be provided with cultivars with a broad genetic hase

Diversification of crop and livestock including varieties. replacement of plant types, cultivars, hybrids, and animal breeds with new varieties intended for higher drought or heat tolerance, is being advocated as having the potential to increase productivity in the face of temperature and moisture stresses. Diversity in the seed genetic structure and composition has been recognized as an effective defense against disease and pest outbreak and climatic hazards.

Designing and implementing good overall development policies and programs also can help in climate change adaptation. Given the current uncertainty about location-specific effects of climate change, good development policies and programs are also the best climate-change adaptation investments.

Even without climate change, greater investments in agricultural science and technology are needed to meet the demands of a world population expected to reach 9 billion by 2050. Many of these people will live in the developing world, have higher incomes, and desire a more diverse diet. Crop and livestock productivity-enhancing research. including biotechnology, will be essential to help overcome stresses due to climate change. Research on dietary changes in food animals and changes in irrigation-management practices is needed to reduce methane emissions. Higher yields and more cropped area require maintaining and increasing the density of rural road networks to increase access to markets and reduce transaction costs. Investments in irrigation infrastructure are also needed. especially to improve the efficiency of water use, but care must be taken to avoid investments in places where water availability is likely to decline.

in Investment laboratory scientists and the infrastructure they require is needed. Partnerships with other national systems and international centers are part of the solution. Collaboration with local farmers, input suppliers, traders. and consumer aroups effective is also essential for development and dissemination of locally appropriate, cost-effective techniques and cultivars to help revitalize communications among scientists, and other farmers. stakeholders to meet the challenges change. of climate Recognize that enhanced food security and climate-change adaptation go hand in hand. Hence, any activity that supports agricultural adaptation also enhances food security. Conversely,

anything that results in increased food security will provide the poor, especially the rural poor, with the resources that will help them adapt to climate change.

Crop and livestock productivity, market access, and the effects of climate all are extremely location specific. International development agencies and national governments should work to ensure that technical, financial, and capacity-building support reaches local communities. Thev should also encourage community participation in national adaptation planning processes. Community-based adaptation strategies can help rural communities strengthen their capacity to cope with disasters, improve their landmanagement skills, and diversify their livelihoods.

At least \$7 billion per year in additional funding is required to finance the research, rural infrastructure, and irrigation investments needed to offset the negative effects of climate change on human well-being.

It is estimated that India needs 320 MT of food grains by the year 2025. For a country like India, sustainable agricultural development is essential not only to meet the food demands, but also for poverty reduction through economic growth by creating employment in non-agricultural opportunities rural sectors. But climate change is expected to have a serious impact on Indian agriculture and food supply. The ongoing agrarian crisis in rural India could be catalyzed by climate change into a migratory rout, driven greater monsoon variability, bv endemic drought, floodina and resource conflict. The role of Science & Technology cannot be ignored. Right kind of technologies and policies are required to strengthen the capacity of communities to cope effectively with both climatic variability and changes.

Arun Kumar, Akash Singh and Jitendra Kumar, S.V.B.P.U. A&T Modipuram, Meerut

## Neospark



# RAISING GREEN GOLD Hydroponically

nspite of having the largest cattle population, highest milk produce and bumper food grain produce, more than 95% of all chronic diseases are caused by toxic food ingredients, and nutritional deficiencies. This is perfectly true for most of the population across the world and especially for our younger generation who are not keen on consuming fresh fruits, vegetables and leafy vegetables. They are more inclined towards fast foods which are readily and easily available. This has further affected the level of vitamins, minerals and antioxidants support to the body.

Serious concerns have been expressed all over the world about the hazardous effects of chemicals, chemical fertilizers, and pesticides that are currently used in agriculture. Due to globalization, the area of arable land is reducing, and the health of plants and soil has taken a back seat. In this direction, hydroponics,



#### What is Wheatgrass?

Wheatgrass is a young grass of the wheat plant; *Triticum aestivum*. Its leaf portion is edible and has major health benefits. Wheatgrass is rich in nutrients, like iron, calcium, magnesium, amino acids, chlorophyll, and vitamin A, C & E.Wheatgrass is rich in chlorophyll which has structure similar to "Haem"-which is a red organic pigment present in haemoglobin. Therefore the consumption of wheatgrass increases hemoglobin levels and enhances blood circulation and is popularly known as Green Blood. Wheatgrass contains antioxidant which helps to slow down ageing process. It is an excellent skin cleanser, also helps in treating various skin problems like pimples, psoriasis.It is certainly far tastier and more nutritious than any other grass.

a science of growing plants without soil can be a very effective and ecofriendly technique. In this technique, plants are grown not in soil but in water that has been enriched with mineral nutrients. Hydroponics crops can be grown indoors, in polyhouses and in greenhouses. It can be grown year - round, regardless of the outdoor climate. Sometimes, the roots system is supported by inert medium such as perlite, rockwool, clay, pellet, or vermiculite. The basic idea behind hydroponics is to allow the plant roots to come in direct contact with the nutrient solution, having access to oxygen, which are essential for proper growth.

#### Expansion of Hydroponics technology in India

In India, Hydroponics is a comparatively new technology; however all the developed countries have already adopted this technology at commercial level. Ayurvet is one of the pioneers in developing Hydroponics technology in India. Ministry of Agriculture, Government



of India had given the commercial test report to Ayurvet's Hydroponic machine which is the first Indian machine to get the same.

Livestock in India is an important part of our agricultural economy. Livestock sector contributes 4.11% GDP and 25.6% of total Agricultural GDP. However, feeding livestock is still a big challenge especially green fodder. Feeding of greens has been traditionally and scientifically accepted for improving animal health and productivity. However India faces an acute shortage of about 60 million tonnes of fodder.Ayurvet is working effectively in the field of animal health care from the last 25 years and produces 100% natural and safe products. Hydroponically produced green feed offers a sustainable and viable option in this direction.

#### Ayurvet Pro green Wheatgrass-A Wonder Grass (Green Gold)

Ayurvet Hydroponics technology is applied in producing green fodder such as maize, barley, oats, sorghum, as well as producing Wheatgrass which has enormous number of health benefits for human beings. Wheatgrass consumption can boost the immune system and is helpful in improving the conditions of pa-



tients suffering from various lifestyle diseases like heart ailment, indigestion, cancer, diabetes, obesity, etc. Since Ayurvet's Progreen Hydroponics Wheatgrass consists of higher antioxidant value and several other health benefits, it popularly known as "Green gold"

#### Better than conventional one

Hydroponically grown Wheatgrass is anytime superior to the conventional one.

- Herbal solutions are used for the growth as compared to the chemical fertilizers used in conventional farming
- No pesticide usage as cultivation is monitored in enclosed hygienic

Wheatgrass consumption can boost the immune system and is helpful in improving the conditions of patients suffering from various lifestyle diseases like heart ailment, indigestion, cancer, diabetes, obesity, etc.



Ayurvet Pro Green Hydroponics machine

Internal view of the machine

environment.

- No exposure to environmental pollutants
- Less time required for supply chain and hence distributed fresh.
- Harvesting is done on day 7 thereby nutrition composition in produce is high.
- No seasonal impacts
- Consistent quality available throughout the year.
- Less amount of water used (0.05% of water used in conventional) which is supplied in fixed proportions at regular intervals. Furthermore, water is recycled in the system
- Saves space (1/15th part of the land used in conventional)
- Significant increase in the amount of Vitamins and various essential minerals of hydroponically grown Wheatgrass when compared to the conventional one. An increase of upto 131% was observed in vitamin C levels and 59% increase in Iron levels of hydroponically grown Wheatgrass as compared to the conventional method of growing Wheat

#### Hydroponics Whe growth protocol

#### Wheatgrass

Ayurvet's Progreen Hydroponics machine is an environmentally controlled chamber, where crop can be grown irrespective of weather conditions. Multilayer shelves are used for growing wheatgrass. The amount of light entering in the chamber is controlled by glazed windows. Specially prepared nutrient solution is sprinkled at regular intervals to fulfill highly nutritious wheatgrass can be grown continuously. Wheatgrass is converted to 4-5 inch long grass needles in just 7 days. Wheatgrass : A magic grass Wheatgrass Juice is one of the best

all the nutritional requirements. With

Ayurvet's Pro green hydroponics

luscious,

and

green,

machine

sources of living chlorophyll available today. However, to get the full benefit, the chlorophyll must come fresh from a living plant. Wheatgrass iuice is an effective healer because it contains all minerals known to man, and vitamins A, B-complex, C, E, I and K. It is extremely rich in protein, and contains 17 amino acids, the building blocks of protein.Wheatgrass juice contains up to 70% chlorophyll, which is an important blood builder. It increases hemoglobin and enhances blood circulation, thereby helps in fighting against anemia which is one of the major health threats known women.Wheatgrass specially in contains a full spectrum of vitamins and minerals, including the thirteen essential vitamins and minerals, combined with dozens of trace elements and enzymes.

It also contains antioxidants (free- radical scavengers) which help to slow down the aging process. Wheatgrass juice helps in removal of harmful toxins like heavy metals, metabolic wastes etc., and thereby detoxifying blood.

Wheatgrass has been shown to improve blood sugar levels in people with diabetes. This is, in part, because wheatgrass has compounds

- Day 1: soaked grains kept on the hydroponics trays.
- Day 2: sprouting initiates
- Day 3: initial shoots starts appearing
- Day 4: 0.5 1 inch shoots growth
- Day 5: 2-3 inch shoot growth
- Day 6: 3-4 inch shoot growth
- Day 7: 4-5 inch long grass, ready to harvest

**Temperature** – 18-25°Celsius Humidity - 60-70% **Water** – 3-4 litres against 50-70 liters of conventional **Land** – 1/15th part of the land used in conventional that have an effect similar to insulin. It lowers the glycemic index of foods, which has a positive effect on blood sugar levels.

The grass is also anticancerous. When used alongside conventional cancer treatment, wheatgrass can boost the immune system, which is thought to keep the body healthy and free of disease. Studies found that people with breast cancer undergoing chemotherapy reduced their toxicity levels by taking wheatgrass juice. This may be because of its high chlorophyll content. Wheatgrass may also lower myelotoxicity that is caused by chemotherapy. **Myelotoxicity** reduces bone marrow function and can increase your risk for infection.

Wheatgrass has high level of enzymes that aid in digestion by helping your body to breakdown food and absorb nutrients, therefore by improving digestion.lt is beneficial for good vision and eliminates minor eye irritations. It also helps in eliminating dandruff.A small amount wheatgrass juice in human of diet helps prevent tooth decay. Drinking wheatgrass can boost your metabolism and aid in weight loss.lt is an excellent skin cleanser. It can also fight against skin conditions such as eczema and psoriasis.

The anti-inflammatory properties of wheatgrass may ease some of the symptoms of arthritis, such as stiffness, pain, and swelling. This may result in less discomfort and improved function. Wheatgrass is also known to lower cholesterol levels. It controls blood pressure – reduces risk of cardiac diseases. It supports tissue growth and is helpful in wound healing.

Wheatgrass may improve overall mental function and relieve anxiety. Its neuroprotective effects allow for better cognitive function and can help ward off and treat Alzheimer's disease. It helps to prevent memory loss and can be used to improve hand-eye coordination.

Abha Saxena, Deepti Rai, Preeti Tiwari, Anup Kalra and M.J.Saxena

n order to address the issue

Mills; RoshanTamak from DCM Sugar; representatives from policy making bodies like the cane commissioner of Maharashtra and Andhra Pradesh, industry experts like Vijay Sardana, Professor Moni and Dr. M.J. Khan, Chairman, Indian Council for Food and Agriculture.

While a large number of speakers endorsed the Rangarajan Committee formula of FRP (fair remunerative price), several opined that since the Rangarajan Committee formula is be roped in to disburse the payment to farmers and later recover the same from the mills. Several farmers from Haryana also recommended that mills can disburse payment to farmers in fixed installments so that farmers are able to sustain themselves. Farmer leader Dr Krishan Bir Chaudhary added, "Ethanol will save sugarcane farmers. 20% blending of ethanol in petrol should be compulsory and ethanol should be exempted from GST."

Some of the several recommendations put forth by the panel were implementation of Rangarajan formula, introducing MSP for sugarcane, increasing ethanol production, reducing input cost of sugarcane production, introducing compulsory reserve price for buffer stock and improving production forecast models. Imposing compulsory regulatory procurement prices for the organized sector which consumes 60% of the sugar produced was also recommended.

of accumulating arrears of the sugarcane farmers that have climbed to over Rs 2000 crores, along with the difficulties currently being faced by sugar mills, the Indian Council for Food and Agriculture organized a round table on Sugar in New Delhi on 1st May at the India International Centre. The conference was attended by industry leaders like Tarun Sahni, MD, Triveni Sugar on

based on models like Brazil where sugar mills own sugarcane farms or are linked to farmers by long term lease, the formula must be adapted to Indian conditions. Farmer leaders like Krishan Bir Chaudhary and Pushpendra Singh were of the opinion that if the sugar mills are unable to pay the farmers within fourteen days, banks should

#### **EVENT**

## **ROUND TABLE CONFERENCE ON SUGAR** 1st May, India International Centre, New Delhi



# FROM VERTICAL TO HORIZONTAL



armer's income is still pitiful in our country. Our government is hard selling the vision of doubling the farmers' income by 2022. It in fact appears that doubling farmer's income is an ambitious task. Reports suggest that extreme weather conditions are expected to adversely impact crop yields in 2018-19 by 15 to 25%, especially in rainfed areas.

While weather is not in our control, other factors that influence the profitability of farmers -such as improved technology, subsidy and commodity price- can be addressed. These factors severely affect the subsistence of farmers and their ability to continue to farm.

#### SURVEY REPORT

According to a recent survey report by the National Sample Survey Office (NSSO), the average monthly income of an agricultural household in India is Rs.6,426, with an expenditure of about Rs.6,223, which leaves only Rs.203 in the hands of the farmer. This profit will not be sufficient even to meet emergency needs. This is the main driver for the declining number of farmers and increasing farm labourers. In the past decade, there was a decline of about 9 million farmers and an increase of about 38 million agricultural labourers. This trend paralleled with the loss of fertile agricultural lands to urbanization.

#### **4 Ps OF MARKETING**

It is now time for the Indian government to re-build its agriculture with 4 Ps of marketing: product, price, place and promotion. Let's consider the 'product' first. Economists recommend that India should specialize in crops where it is most competitive, export these massively to global markets and thereby help finance the import of crops in which India is not competitive. This could be the first step in our attempt to double farmers' income. Second, the 'price' of agricultural commodity should be proportional to the investment made by farmers on the particular crop. The government should take

measures to help improve grading and market value of the agricultural produce. The third factor is the 'place'. Agricultural commodities are typically priced based on the demand and supply balance. In this regard, the 'place' plays a major role in determining the value of the product. For example, an apple grown in Kashmir will fetch more value far south in Tamil Nadu than in Kashmir. Thus, distribution and marketing networks are critical nationally and internationally to improve the value of the products and profitability. At last, 'promotion 'is an important strategy to elevate the value of the commodity to next level. A notable example is 'Virupakshi banana', which is mainly grown in Palani hills of Tamil Nadu and has long secured a specialty market for the production of 'panchamrutham'. This variety of banana is particularly promoted for this purpose and no other variety could snatch its place. This is just an example, but farmers can creatively develop a specialty market for their produce based on their uniqueness.

#### **MODERN 4 Ps**

In addition to the above mentioned Ps, four more modern Ps have the potential to greatly improve the performance of Indian agriculture and profitability of the farmers. These include: people, process, program and performance. Food processing is an important area where improvements are needed. The current budget allotted for food processing is Rs.1,400 crores only. More investments and providing infrastructure and training to growers in this area will help transform farmers into agri-entrepreneurs.

#### FARMER'S DISCOVERY

Farmers can increase production by adopting modern agricultural technologies and participating in allied agricultural activities. There is an increasing trend among white-collar professionals to turn towards farming. This shows that agriculture still has future in India and implementation of modern technologies can provide new avenues for improving production, market opportunities, and ultimately increasing profitability. Farmers themselves involve in the development of new technologies on a need-basis. There are several such examples of farmer- invented technologies. A good example is the development of hundreds of Crossandra flowers and Casuarina varieties by a progressive farmer Padma Shri. T.Venkatapathi Reddiyar from Kodappakkam of Pondicherry, India.

#### **PROPOSED SOLUTION**

Another solution was proposed by renowned economist Swaminathan Anklesaria Aiyar to subsidize farmers, rather than crops. This approach will provide more support to poor farmers. Future government programs could consider this approach for improving the livelihood of small and marginal farmers, who comprise the majority of farming population of India and subsequently keeping this in mind, the government also allocated Rs.11 lakh crores for agriculture in 2018-19 Union Budget. Further, providing flexibilities in credit repayment by the banks will benefit farmers, especially in years where losses occurred due to weather, market and other forces. Currently, farmers are forced to repay the loans even when they are at a total crop loss.

Almost half of the population of India depends on agriculture. Even when the incomes are low, most farmers continue to toil because they don't know anything else to do. The government has been coming up with various programs to improve their status, but more emphasis should be placed on program implementation and impact evaluation. Moreover, subsidies should be provided to needy farmers.

> S.Sarath, PG Scholar, Department of Agricultural and Rural Management, Tamil Nadu Agricultural University



### 5–7 Sep 2018 ASIA FRUIT LOGISTICA

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#### www.asiafruitlogistica.com

# **'RIGHT POLICY ENVIRONMENT NEEDED FOR AGRICULTURE PROGRESS OF THE COUNTRY'**

Maharashtra Hybrid Seeds Company Private Limited (Mahyco), founded in 1964, is the pioneer of high quality hybrid and open pollinated seeds. Through the use of cutting edge technology and intensive research activities, Mahyco has revolutionized the agrarian face of the country. Focused on research and development, production, processing, and marketing of seeds for India's farming fraternity, Mahyco, was the first seed company worldwide to successfully commercialize F1 hybrid cotton based on GMS/CMS system. It was also the first private enterprise in India to produce and market hybrids in sorghum, pearl millet, wheat and sunflower. With the presence in Asia, Africa, USA, Middle East and Europe, Mahyco nurses the vision to empower the farmers with the best of seeds and to enhance the agricultural productivity of the Country. In an interview with Agriculture Today, Shri Rajendra Barwaleji, Chairman, Mahyco discusses the role played by improved seeds in Indian agriculture.

## How has improved seeds sown the success of Indian agriculture?

Seed is the genetic material from which the plant grows, and thus, it is the critical input for crop cultivation. Improved genetic materials have contributed immensely to help improve both the quality and yield of our crops over the years to meet the growing demand for food and nutrition. A couple of conspicuous examples in India are availability of improved wheat and rice germplasm leading to the green revolution, a heartening growth in vegetable production in the last decade largely due to hybridization and the immense progress that we have achieved in the cotton sector during last one

and half decades, thanks largely to biotech cotton.Another example is that of significant improvement in the production of maize in the country after the introduction of single cross hybrid maize seeds during the last decade.

## Where does Indian seed industry stand in terms of innovation?

The Indian Seed Industry has been progressive in terms of bringing in innovation through research. Research based companies have been committing a good amount of resources in research and development, helping to bring more seed innovations to market. Industry can accelerate such efforts, if the policy environment is supportive to intellectual property rights protection. Recent judicial rulings will further seriously dampen the efforts for innovation in the Seed Industry.

#### What are the challenges in front of the private seed sector? Any suggestions to improve the same?

Indian agriculture will increasingly face the challenge of producing more with fewer resources. Our changing demographics, with increasing per capita income and changing food consumption pattern, will require us to produce more for food and feed purposes. Declining arable land with dwindling fresh water availability,

along with climate change, are compounding the challenge of increasing the productivity of crops. The seed sector will need to intensify its research efforts for meeting these challenges, which can happen in a conducive policy environment which is lacking currently.

#### Indian vegetable production has increased considerably in the recent years. What was the role played by hybrid seed in materializing this fete?

Hybridization in vegetables has been the critical contributor for the rapid increase in vegetable production and quality during last couple of decades. Today, the use of hybrid vegetable seeds in most crops, have a penetration of over 80%. leading to increasing the productivity dramatically, minimizing seasonality, and improving the guality to meet the customer expectations. This has also helped farmers to improve their income which has seen significant increase after use of such seeds.

#### Are hybrid seeds economical to Indian and small marginal farmers?

Hybrid seed is the most cost effective and scale neutral agri input. The cost of the same ranges between 2 to 5% of revenue in most crops. Given these factors, i.e.

**Declining arable land** with dwindling fresh water availability, along with climate change, are compounding the challenge of increasing the productivity of crops. The seed sector will need to intensify its research efforts for meeting these challenges, which can happen in a conducive policy environment which is lacking currently.

be it green revolution, pre-eminent position in vegetable production, or being the leading producer of cotton globally. Given the criticality of seed innovation, there is a need to encourage the same in the larger interest of our farmers and the country. However, recent developments in respect of policy related to crop biotech have been inconsistent with this need. Weak intellectual property protection mechanism, administered pricing regime and the unpredictably long regulatory process are not only discouraging any new private

> investments in this sector, but also reducing the resourcing in the current projects. Such a policy situation is hurting the interests of our farming community, limiting the availability technologies for crop productivity improvement.

> will the recent How royalty issue of Bt crops affect Indian agriculture? Payment of royalty is a mechanism to reward innovation. The recent position taken by the policy makers on this issue, along with other related issues intellectual of property protection, will impact Indian agriculture adversely in the long run as the motivation to innovate to address current issues is lacking.

#### What are the future seed technologies?

relatively low cost and scale neutrality, any farmer, irrespective of farm size, can use better quality hybrid seeds and gain the advantages. For instance, Bt Cotton hybrid seeds are being used by over 75 lakh cotton farmers in the country. Over 80 percent of these farmers are small and marginal farmers, with a land holding of less than a hectare.

#### What are your thoughts on the government's stand on GM technology in crops? Is it favourable for Indian agricultural development?

As is well known, seed innovation in India has been pivotal in crop productivity improvements,

Precision breeding technologies are rapidly progressing globally. These technologies combine the new knowledge of breeding and science of genetics, with digital technologies, to improve the accuracy and speed of breeding. Another interesting new area is seed as a vehicle to deliver biological formulations for improving crop productivity. As these are opening multiple possibilities in improving crop production through seed science, the seed industry is excited. We would need the right policy environment to ensure that our farmers have access to fruits of such cutting edge technologies.

# **SPEED BREEDING** THE NEW GLOBAL GREEN REVOLUTION



s the global warming is unfurling its multifarious hues of damaging impacts on our ecology and environment, the resulting climate change is taking a heavy toll on agriculture, thereby pushing the ever increasing population, especially belonging to the Afro-Asian countries, to the brink of hunger and malnutrition. The scenario appears more daunting with the recent warning of a team of scientists from the University of East Anglia (UK) and the Southern University of Science and Technology (China). In a paper published in the journal Nature Climate Change (December, 2017) they have claimed

that even if we succeed in halting the global mean temperature at 2°C above the pre-industrial era, as the target set by the Paris Agreement on Climate Change, the catastrophe cannot be averted, which may have serious adverse impacts on water quality and water availability, rainfall and biodiversity and 20% to 30% of the world's land surface is very likely to turn arid, critically affecting agriculture. Therefore, unless miracles happen by the year 2030, it may be hard to provide a vast population of about 30 million with two meals a day, predicts the Food and Agriculture Organization (FAO), which according to it may double in number by the year 2050.

Under such circumstances, today the most challenging task before the community of scientists is to identify those miracles and to transform those into reality. One of the avenues that leads towards the direction may be the "speed breeding", which according to a team of Anglo-Australian researchers belonging to the University of Queensland and the University of Sydney (Australia) and the John Innes Centre, Norwich (England), can provide the technology to boost the productivity of certain crops as it can make it possible to grow several generations of those in a year, instead of only one under the field conditions. It is likely to herald an era of new Global Green Revolution.

In a paper published in the journal Nature Plants (January 1, 2018), they have indicated that the idea has been borrowed from the NASA's (National Aeronautics and Space Administration) a decade old experiment in successfully growing wheat in space, by using a special type of greenhouse in which the crop was grown at the rate of 6 generation in a year. The green house was kept lighted for 22 hours per day by specially - tuned LEDs (Light Emitting Diodes), emitting the far- red spectrum at high intensity to accelerate photosynthesis. In conventional greenhouse high а pressure sodium vapor lamps are used, which are not only energy intensive, but also, less efficient and can grow only 3 generations of wheat per year. On the other hand, LED light systems are far superior from these points of view. The researchers have demonstrated that various varieties of wheat such as, spring wheat (Trticumaestivum) and durum wheat (T.durum), barley (Hordeumvulgare), chickpea (Cicerarietinum) and pea (Pisumsativum) can be grown for 6 generations and canola (Brassica napus) for 4 generations in a year in such green houses. The crop densities in these cases can be as high as 900 plants per square meter.

According to the lead author of the paper Dr. Brande Wulff of the John Innes Centre, usually raising plants this fast comes with significant downsides, leading to frailness. However, unexpectedly those grown by him and his associates using the above technology were looking better as well as healthier and yielded more as compared to those grown under the standard conditions. Although the nutritional qualities of the grains produced by speed breeding are yet to be studied extensively, the initial work assures that those cannot be in anyway inferior.

At present, this technique has remained by and large confined to the laboratories only. Applying it extensively to grow enough crop commercially may take time, because, although LED lighting systems used in it is cheaper than sodium vapor lamps, as it consumes less energy, the process is still not cheap enough. That has to be overcome before the technique becomes acceptable for mass use. Besides, it should also be tested rigorously to evaluate its efficiency in large scale production and farmers, the real crop-growers, must be trained in it. All these may take time. However, as per Lee Hickey, another author of the paper, the immediate benefit that can be derived from the technology is to use



it in plant breeding and genetics to develop new types of crops that can be resilient to changing environment like climate change and global warming as well as to pests and diseases.

Since speed breeding greatly reduces the time period of a crop making it possible to derive several generations of it in a year and is practiced in a controlled environment, it can accelerate the process. experimenting the technology again and again for crop improvement. At present, the traditional crops are at a great risk due to climate change, aridification of land, water scarcity and many such other environmental factors including persistent drought, severe heat or heavy rainfall. Therefore, the scientists are now engaged in a race against time to breed staple crops that can survive these and to yield more. The speed breeding technology can help them in hastening towards the goal.

Besides, speed breeding is a "non-GM" (non-Genetically Modified) method. It is only meant to accelerate the cropping time of a number of widely cultivated crops. So those may not attract any controversy for their adoption. However the GM technology is very compatible with speed breeding and if necessity arises, then both can be combined to obtain even more outstanding results. The researchers are of the opinion that the greatest benefits from it will be the successful integration of the two and other plant breeding technologies. They also believe that it may lead to a new Global Green Revolution to make the world free from hunger and malnutrition and may even open doors for undertaking farming in the Moon and the Mars or elsewhere, when we succeed in establishing extraterrestrial colonies.

> Prof. (Dr.) Ramesh Chandra Parida, Retired Professor, Odisha University of Agriculture and Technology, Bhubaneswar

# GREEN REVOLUTION TO 'EVERGREEN REVOLUTION'

A world scientist of rare distinction and a living legend Professor M.S. Swaminathan obtained his Ph.D. in Agriculture from University of Cambridge. He has had a distinguished research, teaching, and administrative career. Professor M S Swaminathan has been described by the UN Environment Programme as 'the Father of Economic Ecology'. He was Chairman of the UN Science Advisory Committee set up in 1980 to take follow-up action on the Vienna Plan of Action. He has also served as Independent Chairman of the FAO Council (1981-85) and President of the International Union for the Conservation of Nature and Natural Resources (1984-90). He currently holds the UNESCO Chair in Ecotechnology at the M S Swaminathan Research Foundation in Chennai, India. He is recipient of numerous national and international awards (including the first World Food Prize in 1987), sixty honorary doctorate degrees from around the world, author of over three hundred research papers and several books.

Prof. Swaminathan is known as a world leader in sustainable food security, and as the catalyst of the green revolution movement in India from 1960-1982 that moved the country from having the world's largest food deficit to producing enough grain to feed its people.

of the Green ather Revolution in India and renowned scientist Prof. M S Swaminathan has given the call for 'evergreen revolution', which implies productivity improvement in perpetuity without ecological and social harm. The evergreen revolution involves the integration of ecological principles in technology development and dissemination. He has made these observations while delivering lecture at Cambridge University in London.

"The major problems associated with the Green Revolution are related to environmental factors like depletion and pollution of groundwater, soil erosion and loss of biodiversity. It is these deficiencies that can be remedied through the 'evergreen revolution' pathway. Therefore now we should work for a transition from the green to an 'evergreen revolution', leading to an enhancement in productivity in perpetuity without ecological harm," Prof. Swaminathan mentioned in his lecture.

Prof. Swaminathan highlighted the fact that the land for agriculture is shrinking with the infrastructure development, "The world would require 50 per cent more rice in 2030 than what we need now, with approximately 30 per cent less arable land of today. We have to produce more from less, less land, fewer pesticides, less water. We should start working on three main areas in support of this revolution, better disease resistance in crops, better soil health and fertility without having to resort to chemical fertilisers and the use of biological controls to reduce damage caused by pests. Hence, the need for a sustainable development goal set towards providing nutrition



and food security", mentioned Prof. Swaminathan. He emphasised the need to work towards evergreen revolution in wheat producing 150 million tonnes of wheat from 30 million ha by 2030. Soil and plant health care and remunerative market are prerequisites for achieving it.

Highlighting the importance of sustainable food production, Prof. Swaminathan said, "The initiation of exploitative agriculture without a proper understanding of the various consequences of every one of the changes introduced into traditional agriculture and without first building up a proper scientific and training base to sustain it, may only lead us into an era of agricultural disaster in the long run rather than to an era of agricultural prosperity". He gave examples of Irish potato famine of 1845 and the Bengal rice famine of 1942. Therefore, he encouraged conservation farming with the help of integrated pest management, integrated nutrient vlague and integrated natural resource management.

He further stated that agriculture, nutrition and health should be brought together in terms of design and delivery systems relating to public health and agriculture production. Anticipatory research for climate change adaptation and mitigation, participatory research for integrating farmers' wisdom with modern technology and translational research to fill the gap between knowledge and its application are all important for global food security.

Though there has been an extraordinary economic growth in South Asia, Prof. Swaminathan said that the population in this region has been largely dependent on agriculture. "Yet, two out of five children are stunted, 39% of children are stunted in South Asia. Women and children from this region suffer more from under and malnutrition," he said. He also explained about zero hunger challenge and calorie deprivation, deficiency, protein micronutrient

deficiency as three major dimensions of hunger. "Zero hunger challenge can be tackled through biofortification by using naturally occurring biofortified plants like moringa, sweet potato, nutri millets, fruits and vegetables, as well as milk, eggs and other forms of animal protein. Examples of Biofortified varieties selected bv breeding and selection example are iron rich pearl millet and zinc rich rice, and genetically biofortified crops like golden rice and iron rice", said Prof. Swaminathan. He also gave examples of genetic garden of biofortified crops and the role of orange flesh sweet potato in combating child malnutrition by Dr. Maria Isabel Andrade.

Prof. Swaminathan stressed for legislation on the lines of Norwegian model of national biosafety authority. He stated, "At least 97 per cent of world's water resource is sea water. We should think of sea water farming." Adding that with genetic modification, rice could be cultivated that has the ability to elongate with the rise of water levels where it could be carefully harvested.

Climate change is likely to exacerbate the problems, as scientists estimate that for each 1 degree Celsius rise in mean temperature, wheat yields in India drop about 6 million tonnes a year.

"We need to promote climateresilient farming. Biodiversity is the feedstock for climate resilient farming. Gene banks and Biofortified multiple cropping systems are necessary for a warming planet", he added. He gave various examples of National Gene bank, Svalbard-global seed vault and biofortified multiple cropping systems of Kolli hills.

He stressed the need for preparing for the climate change and sea level rise. As the ocean warms, and glaciers and ice sheets reduce, global mean sea level will continue to rise, but at a faster rate than that have been experienced over the past 40 years. He presented the Kuttanad model for below sea level farming which is globally important agricultural heritage site.

In his lecture, he emphasised that mainstreaming ecology in technology development and dissemination is the road to sustainable agriculture. He added that information technology is a transformational technology and it has to be used towards sustainable development. "Technology is neutral to people. It depends whether the technology is relevant. If you really want to have technology for the poor it has to be done on the basis of public-good research. We must ensure economic viability and ecological sustainability. These should be the two pillars of our approach. We should be pro nature, pro poor and pro women for the dissemination of technology and knowledge", said Prof. Swaminathan.

To ensure global food security amid climate change and price volatility, the world must undergo transition from the Green Revolution to an evergreen revolution. Some of the challenges ahead are monsoon "For and market management. monsoon management, we need to develop Good weather code, Drought code and flood code. For market management, government should ensure an attractive MSP, public procurement at the announced MSP and public distribution through programmes connected with food and nutrition security", said Prof. Swaminathan.

Indian agriculture is at crossroads. At one end, is the problem of ecologically unsound public policies which have led to deep ecological distress. On the other, despite large number of nutrition safety net programmes introduced by Central and state governments, India still remains the home for the largest number of malnourished children and adults in the world. The need of the hour is to convert the green revolution into an 'evergreen revolution' by mainstreaming the principles of ecology in technology development and dissemination.

# OPINION LEADERS



ransferring the technologies relevant is the main job of an extension personnel. But also opinion leaders have to play a prominent role in dissemination of agricultural information among their followers and farmers and in a way, are responsible for bringing desirable changes in the community for its overall development. Leadership in rural areas functions amidst of small groups. The human relations approach is also important, as most of the villagers are ignorant, innocent, needy and sensitive. Various writers have tried to define the term 'leadership'. Leadership has different meanings to different authors. Harry Truman, former American President, said that leadership is the ability to get men (women) to do what they do not like to do and like it. Or leadership is defined as influence, that is, that art or process of influencing people so that they will strive willingly and enthusiastically towards the achievement of group goals.

Opinion leaders are those individuals who have a greaterthan-average share of influence within their community because they modify the opinions of others in an informal manner. Opinion leaders usually conform closely to the norms of their social system. They make use of unbiased and technically accurate sources of information, and they are better equipped than their followers, in terms of knowledge, insight and judgment, to put innovations to practical use. Opinion leaders are usually cosmopolitan in their They mix well with attitudes. other people, are of relatively high social status and tend to be more innovative than their followers. The personal influence of opinion leaders is very important in the persuasion stage of the innovationdecision process. Opinion leaders are perceived as expert and trustworthy precisely because of their relative objectivity regarding innovations. Indeed, most of their iudaments about innovations are negative. One implication of this tendency is that innovations perceived as radical are especially likely to be rejected by opinion leaders and, thus, are better targeted first to innovators who are sources of information for the opinion leaders question.

#### The role of opinion leaders in diffusion of knowledge:

Knowledge management systems are effective when the innovations are pioneered by organizations. Apart from the innovations themselves, they have to be diffused throughout the organization to benefit the employees. This is where the roles of the opinion leaders and the change agents are important as their certification and ranking of the articles would lend credibility and importance to the artefacts.

The utility of rural leaders is essential because of the following reasons: Extension has a long tradition of using leader in extension work. Extension worker as an outsider may not have complete knowledge about different aspects of village community nor they are supposed to have similar perceptions and feelings about village problems as local people may have. Thus, there are good reasons to use such people who belong to the community. Leaders by virtue of their influences can convey messages of development more convincingly in the people's language. They can use arguments and styles of presentation most appropriate for the target population. Besides, they can also serve as mouthpiece of people before extension workers they can explain elaborately the needs and aspirations of people. Number of extension workers is proportionately far less than required. Thus use of leader can help to multiply effects of extension work conveniently and convincingly. Leaders can help in enlisting participation of people in programmes of their own development. It is possible to organize people around concrete problems. Leaders can use their influence and skills to bring people together and empower them to take action for their development. Villages in India are still haunted by deep rooted beliefs, customs, superstitions and ignorance which influence development negatively. Leaders, if positively inclined, can play prominent roles in master minding development in right earnest.

#### **Characteristics of Opinion Leaders**

#### **External Communication:**

Opinion leaders have greater exposure to mass than their followers. The original conception of the two-step flow hypothesis stated that opinion leaders have greater exposure to communication channels.

Opinion leaders are more cosmopolite than their followersopinion leaders have a certain degree of cosmopolites in that they bring new ideas from outside their social groups to its members.

Opinion leaders have greater contact with change agents. Change agents try to utilize opinion leaders to leverage diffusion activities.

#### **Accessibility:**

Opinion leaders have greater social participation than their followers. For opinion leaders to spread message about an innovation, they must have extensive interpersonal network links with their followers.

#### **Socioeconomic Status:**

Opinion leaders have higher socioeconomic status than their followers. Invention can start from the lowest ranks of the people, but its extension depends upon the existence of some lofty social elevation. Leaders can also serve as mouthpiece of people before extension workers they can explain elaborately the needs and aspirations of people. Number of extension workers is proportionately far less than required



#### **Innovativeness:**

Opinion leaders are more innovative than their followers. However opinion leaders are not necessarily innovators. Sometimes they are, but usually they are not.

#### Diffusion Theory an Approach used in Opinion Leadership Research

Diffusion research goes one step further than two-step flow theory. Diffusion is the process by which an innovation is communicated through certain channels over a period of time among the members of a social system. An innovation is an idea, practice, or object that is perceived to be new by an individual or other units of adoption. "Communication is a process in which participants create and share information with one another to reach a mutual understanding. Diffusion research centres on the conditions which increase or decrease the likelihood that a new idea, product, or practice will be adopted by members of a given culture. Diffusion of innovation theory predicts that media as well as interpersonal contacts provide information and influence opinion and judgment. The nature of networks and the roles opinion leaders play in them determine the likelihood that the innovation will be adopted. Opinion leaders exert influence on audience behaviour via their personal contact, but additional intermediaries called change agents and gate keepers are also included in the process of diffusion.

Five adopter categories are: (1) Innovators- very, little innovators adopt the innovation in the beginning (2.5%) (2) Early adopters- early adopters making up for 13.5% a short time later (3) Early majoritythe early majority 34% (4) Late majority- the late majority 34% (5) Laggards- laggards make up for 16%. These categories follow a standard deviation-curve.



Fig: Adopter categorization on the basis of innovativeness



#### Social Network and Opinion Leadership:

The foundations of both opinion leadership and social network theory have often been used together in literature related to the diffusion of innovation. Opinion leadership is seen as a relational model of innovation diffusion. while social networks are seen as a structural model1 to describe the phenomenon. Network analysis can be used to understand the flow of personal influence by enabling researchers to define who influences whom in a social system. This definition clearly talks about influence through communication, which relates to the definition of opinion leadership. The role of interpersonal relations in the flow of information and influence, as revealed by [previous] studies, caused a growing interest in personal networks and in key these networks'. positions in

Interestingly enough, although 'countless studies have attempted identify the to characteristics of opinion leaders in terms of demographic and socio-economic variables, media exposure, social positions, and personality traits' the relationship between opinion leadership and the structural properties of networks has not been pursued.

Opinion leaders play a very important role in the agricultural extension where, Opinion leaders, who are also local farmers, are sufficiently heterophilous to be good sources of new information and advice. They usually enjoy considerable influence on the way other locals think and behave.

Amit Kumar (Research scholar), Dr. S. K. Metha Department of Extension Education, CCS Haryana Agricultural University, Hisar

# A CONNUNDRUM?

An endless array of musings cross the mind as one read the various reportings by the electronic media, not to mention political charges traded to and fro, on the health of the farming sector in the Country and also the plight of the farmers across the length and breadth of this vast Country.

nnumerable reasons and causes for the state of affairs have been put forth by many and refuted too.However,they bv manv all seemingly lack coherence do not suggest alternative and paradigm to better the status of farmers.We do note the views of political personalities and those from agribusiness segment, Institutions, financiers amongst others but hardly ever a clear picture emerges on the possible role each layman as a consumer of farm produce can constructively play. How his efforts can also clean up the pollution levels.

Patience in Agriculture is needed to be able to see that farming is the riskiest business in the world. It is so intrinsically linked to a complex livina system comprising soil, plants and nature in all forms, that it becomes possible to Imagine that the sum of all these activities is not necessarily akin to characteristics of many components but more so as the interactions amongst each has made possible derivatives which are changed .On scaling up the particular components to a general level, the particular characteristics are hidden.

There is a crying need to see that health of the soils needs restoration and this implies all the soil organisms that contribute towards building soils have to be taken as partners. Thus what is that is being done to make soils weak has to be put up for all to learn.A country that loses its soil health stands to harm it's population.

The fact that soil health

improvement means mitigation of climate adversities is well known, but it is not a standalone prescription though. It is very heartening to note that recently it has been so acknowledged in climate change talks at Paris.

Tough questions for farmers to ask themselves are painful and given mindsets calibrated over decades also beg attention. The fact is starkly true that as a country we were subsistence farmers and not truly commercial. The population increments provided an impetus for industrial and intensive farming. And that continues, having gained momentum and impetus provided to / by governments by way of grants, subsidies, incentives not only to farmers but to the agri business around the main function of farming. This may have pushed the many small individual farmers to the outer fringes. Do they sense helplessness now is to be introspected. Not knowing where to turn for solutions, the farmers have come to see what is debilitating them....People have to eat and the price is paid for farm products, thence where is the lacuna? Simply this thinking plus introspection maybe a self scan of sorts !

The costs of farming has risen. Are all inputs essentially essential when soils taken into consideration as living? Do all inputs benefit soils and increase soil lives. Take this line of thinking further.....Are there benefits to other sectors around farming which may have pushed farm centred viability to the fringes to sustain these other sectors ?

This in a wider spectrum would show out that all farming risks are eventually transferred to the tax payers of the country. Subsidies, loans, health costs that arise for the population are going round and round and borne by people and tax payers.

Now would the population care to see that if they paid a little more for healthy food, all around there will be a little saving? A real stance against the vested interests developed over years..... rightly or wrongly is another point. No blame can be ascribed either to anyone. But a simple suggestion is to look at agriculture holistically.To become profitable for farmers and ecologically friendly, an intersection will have to be discovered.

This is no easy task considering we should train our thoughts for an alternative way to farm. And mind you, there is no 'one size fits all' solution considering the existence of huge variations in climate, soils, cultures within the country. Nonetheless, farmers have to invest and reinvest in themselves all the while to disarm fixations over fringes which are made to seem highly important but may be serving interests other than their own ....Lifting the veil somewhat will prove beneficial in long run !

Contrarian view but its worth a try when backs are to the wall.

wall. ■ Ashok Trivedi Tea Farmer "Advances in the agriculture sector will be helpful in the welfare of farmers. Along with the Green and White Revolution, we should also focus on organic revolution, water revolution, blue revolution and sweet revolution. It will increase the income of farmers"

#### NARENDRA MODI Prime Minister





"Dairying is an important economic activity which contributes to about 67% of the value of output of Livestock sector. Income from dairying contributes to about 25% of the income of small and marginal farmers. Dairy Development is therefore a very important developmental intervention in rural India for achieving agricultural growth with equity."

#### **DILIP RATH**

Chairman, National Dairy Development Board



"The farmers are our original producers and they should be given due credit as they work the whole year round to yield the crop."

MADHAV BHANDARI Union Relief and Rehabilitation Minister



"Model Agriculture Produce and Livestock Contract Farming and Services (Promotion & Facilitation) Act, 2018 is a major move which has been taken to safeguard the interest of farmers. In the new Act major focus has been given to resolving disputes of farmers."

> **RADHA MOHAN SINGH Union Agriculture Minister**