₹80/-

MAY 2019

# AGRICULTURE TODAY

The National Agriculture Magazine

VOLUME XXII | ISSUE 4 | PAGE 60 www.agriculturetoday.in

# SEEDING INDIA'S FUTURE

An outlook on how seeds have influenced Indian agriculture

MAY 2019 | VOLUME XXII | ISSUE 5

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Publisher & Printer – Dr. MJ Khan on behalf of M/s Concept Agrotech Consultants Limited, Published from 306 Rohit house Tolstoy Road New Delhi-110001 and printed by Everest Press E-49/8, Okhla Industrial Area-II New Delhi-110020 Phone No. 011-23731129 Fax No.011- 23731130

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Pages in the magazine: 60

From the Editor's Desk

# BETTER SEEDS BETTER FUTURE

The Kharif season is full of hopes as the country gears itself to receive the first monsoon of the year. The fate of millions of farmers depends on a bountiful kharif season. Supply of quality seeds are also another determining factor.

Seed sector is an industry which constantly represents an upswing in terms of present growth and prospective growth. This probably can be explained by the enormous stress on the production of improved seeds. The phenomenon is not exclusive to India but globally. But India with the world's largest arable land is an important player in the seed sector. The Indian seeds market reached a value of US$ 3.6 Billion in 2017, exhibiting a CAGR of around 17% during 2010-2017. The Indian seeds market is further expected to grow at a CAGR of 14.3% during 2018-2023, reaching a value of more than US$ 8 Billion by 2023.

India has emerged as a major seed hub in Asia as 18 companies out of 24 leading firms have invested in breeding and production activities in the country. Both global and regional seed industry players have invested in a big way to boost crop yields of smallholder farmers in India.

High yielding varieties and hybrids have emerged as important factors in Indian agriculture. Biotechnology has also swept agriculture world wide. Micropropagation has gained immense popularity in India especially in high value crops which demand uniformity in quality and consistency in yield.Genetically engineered crops also became an important part in Indian agriculture. Bt cotton cultivation began in 2002, and its acreage shot up from 0.29 million hectares in 2002 to 9.4 million hectares in 2011-12. By this time, the Bt variety accounted for 90% of cotton acreage. Cotton yield rose to 362 kg per hectare in 2005-06, and then increased further with fluctuations to 510 kg per hectare in 2010-11.

Despite the introduction of Bt cotton which revolutionized India's cotton production scenario, transgenics has never caught hold of any other crop category.After the introduction of the I and II series of Bt cotton, the much awaited III in line is yet to be introduced in India. There is also a long wait for the Herbicide Tolerant series as well. Bt Brinjal came close to execution, but it was widely opposed on the grounds of safety of trasgenics in food crops. Although the transgenic varieties have never been proved unsafe scientifically, the public has chosen caution over science.

India needs to focus on research that would positively focus on raising yields of the rainfed regions. This will also help in raising the income of small and marginal farmers who are the largest benefactors of rainfed agriculture. As agriculture is deeply dependent on climate, our production systems must be geared to face the challenges arising out of climate change. We need to invest more on research catering to development of climate resilient seeds. In years to come, we will be in more need of drought tolerant, salinity tolerant and submergence tolerant varieties.India should also make its policy on GM technology clear. A consensus must be arrived upon by removing all the ambiguities existing in the regulatory mechanism for GM and should promote research in this promising area.

**Anjana Nair**

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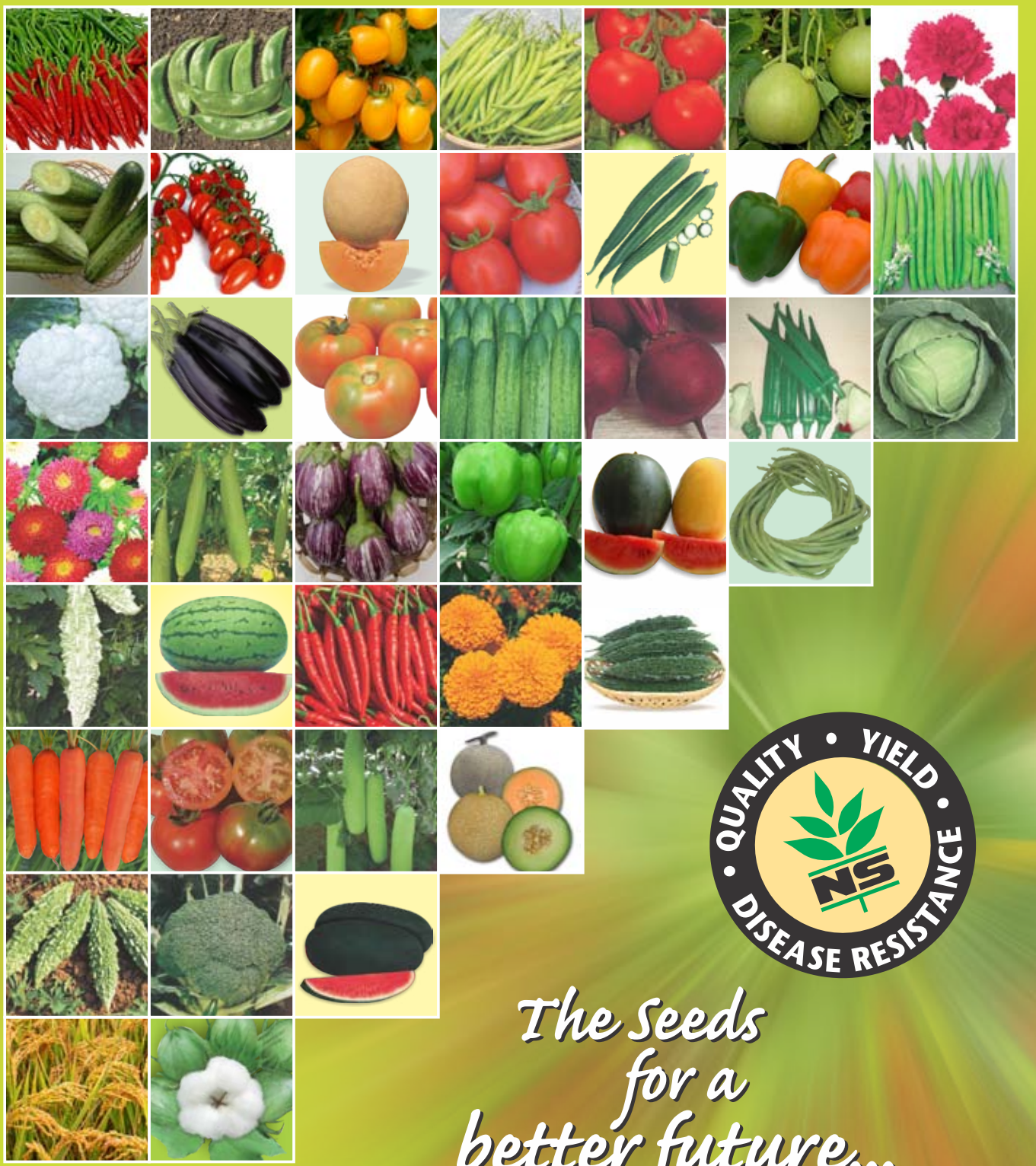

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*Editorial Comments*

# Deepening Food Crisis

*Food crises is going to be a serious concern*

Famines, which were once the vestiges of the past, threatens to soon resurrect. Wars, conflicts and climate change would force millions into a state of food emergency.

According to the annual report of Global Network against Food Crises, food crises will affect tens of millions of people across the world this year, after war, extreme weather and economic woes in 2018 left more than 113 million in dire need of help.Conflict and insecurity were responsible for the desperate situation faced by 74 million people, or two-thirds of those affected, in 2018.

Global food scenario is fragile. People on the verge of food deficit stares at a near possibility of famine. The report analysing 53 countries, used a five-phase scale with the third level classified as crisis, fourth as emergency and fifth as famine/ catastrophe. The margin that separates the different classes are so thin, that a catastrophe may push more people into the fatal categories of famine. In that sense, millions more are now at the risk of reaching level three and above. A drought or conflict may make another sizeable population, about 143 million, vulnerable to food crisis.

When the famines of the yore stemmed from food shortage, the food crisis of today are the result of inaccessibility. Human factors have considerably influenced the availability of food to the marginalized sections. Of countries that suffered food crises in 2018, the worst affected was Yemen, where nearly 16 million people needed urgent food aid after four years of war, followed by the Democratic Republic of Congo at 13 million and Afghanistan at 10.6 million.This is the third year running where the number of people in food crisis hit more than 100 million, but it is slightly lower than in 2017, when 124 million were in need of help. The decrease is mainly because in 2018, countries did not experience the same levels of drought, flooding, erratic rains and temperature rises they did in 2017.However, climate shocks and conflicts would continue to cause hunger in 2019 as per the report.Dry weather and El Nino conditions are likely to affect southern Africa, Latin America and the Caribbean, while the needs of refugees and migrants in Bangladesh and Syria would remain high. The study excluded 13 countries and territories including North Korea, Venezuela and Western Sahara due to a lack of recently validated data.

Hunger is emerging as a serious concern in world today. The number of hungry people in the world is growing, reaching 821 million in 2017 or one in every nine people, according to 'The State of Food Security and Nutrition in the World 2018'. Besides hunger, malnutrition is another serious concern and the problem has remained so affecting millions. Climate variability affecting rainfall patterns and agricultural seasons, and climate extremes such as droughts and floods, are among the key drivers behind the rise in hunger, together with conflict and economic slowdowns.

Climate change is an important factor that has been continually interfering with the food systems around the world. If we have to align ourselves on the path of achieving the Sustainable Development Goals on food security, we need to accelerate our efforts on developing climate resilient technologies in agriculture. Analysis in the report shows that the prevalence and number of undernourished people tend to be higher in countries highly exposed to climate extremes. The harm to agricultural production contributes to shortfalls in food availability, with knock-on effects causing food price hikes and income losses that reduce people's access to food.

The focus of agriculture must also shift towards nutrition from the conservative approach of augmenting yield. Such systems of agriculture must be encouraged in vicinities of vulnerable and marginalized sections of the society. Policy support can play an important role in popularizing these farming systems. Immediate and concerted efforts at a global level is required in this direction.

# Farmers Will Decide

***This election farmer's choice will be the deciding factor***

Caste, religion and communal fault lines have conventionally ruled the poll strategies. Corruption and patriotism too have managed to sneak into the fray this election. However, a strong determinant in this election would be farmers. They are an important decisive factor who are strong enough to swing the results in their favour. The election results would speak volumes about this government's hits and misses.

The past few years have seen the farmers rise in unison to voice their concerns in agriculture sector. Although doubling farmers' income remained an important prerogative of the government, the means to achieving that end scarcely bore any tangible result. Instead, the income factor of the farmers persistently went down seriously inviting introspection by the government regarding their schemes. Most of the schemes of the government were robust and were kept in mind bearing the farmers and their problems. They were all meant to positively address the farmers' concerns and long term development of agriculture sector. The MSP increments and PM AASHA have upped the hope of the farming community, but couldn't provide any immediate relief to the farmers. Probably in this context, Prime Minister had to introduce something drastic and radical that showed immediate benefits. And PM KISAN had its genesis. However, the timing of the unveiling of the scheme, closer to election definitely made many question the real intention behind its implementation.

Direct income schemes are success stories. Getting cash in hand is much better than to wail for subsidies that are often late or absent. The direct incomes spur spending capacity and improve rural incomes. Beyond giving an assured income every month, it will be of immense benefit to the farmers in supporting their families and in enhancing the productivity of agriculture. The extra amount can be used in investing in better inputs, technology and innovation.Besides, increasing the production of current farming operations, this will also help in investing in ancillary enterprises and expanding the income of the farmers. Thus it will increase the avenue of farmers to derive income. The same can also be used to obtain training in specialized operations or that which is intended in skill development. This again will create more avenues for income generation. In general this direct income support positively will influence in increasing the living standards directly and indirectly.

This is also the logic behind the Congress Party's promise of 'Minimum Income Guarantee Scheme' (MIGS), formally called Nyuntam Aay Yojana (NYAY), to five crore 'poorest families' covering 25 crore people by assuring them a guaranteed minimum income of Rs.6,000 per month or Rs.72,000 a year. This scheme also assures minimum income to the people. The loan waivers also indirectly act as direct incomes. Through loan waivers, farmers are spared the burden of repaying the loans. The promise of loan waivers are already flying high in the election scene.

In the diverse canvas of politics, one thing is clear. All the parties have one thing in common. Neither one of the parties believe in addressing the real challenges of Indian agriculture. They are not yet ready to augment the storage capabilities for agriculture produce. They are unsure if farmers would get the prices they deserve in the markets. They lack the will to introduce new technologies and innovation in the field of agriculture. They have conveniently forgotten that India once rose from the shackles of famine to the freedom of food security.

Income of the farmers need to be raised. They deserve a life with dignity. The food producers of the country should not go to bed hungry. So while increasing income to the farmers are important, it should also mean that they should have a job to look forward, a land to till, a granary to fill and a market to sell. Direct incomes may help the farmer in short run, but agriculture will suffer in the long run.

# Seed Sedition

***India should create awareness among farmers regarding seed patents and rights.***

Growing certain plant varieties are prerogative of certain recognized entities. Growing them without any conferred rights might end up in court proceedings and legal battles. The proposition might seem odd and anomalous. But it is true.

Three farmers from Gujarat ended up in court as the US food and beverages giant Pepsi-Co sued them for illegally growing and selling a variety of potato exclusively registered by the company. PepsiCo claimed it has sole rights to grow them to manufacture chips of its brand - Lay's. Accordingly, the court had stayed the farmers from growing and selling the potatoes. The court has also sought reply from the three over company's claims of infringement on its rights.

PepsiCo India Holdings Pvt. Ltd uses the registered variety of potatoes called FL 2027, which is a hybrid of FL 1867 and Wischip varieties, for manufacturing chips for its brand. The company is the registered breeder of FL 2027 under the Protection of Plant Varieties and Farmers' Rights Act, 2001.In India, this variety was first put to commercial use in 2009 and is traded under the trademark FC5. It has granted license to some farmers in Punjab to grow the variety on the buyback system. Growing these potatoes without license, meant violating its statutory rights.

PepsiCo's relationship with farmers in India goes back 28 years and they have been working along with 24,000 farmers across 14 states through various agri programs. PepsiCo India was the first corporate to introduce collaborative farming of process-grade potatoes in India in 2004-05. PepsiCo presently works with farmers, spread across West Bengal, Maharashtra, Punjab, and Gujarat, UP, Karnataka, Bihar, Haryana and Chhattisgarh. More than 45 percent of these are small and marginal farmers with a land holding of one acre or less. Under the collaborative farming model, Pepsico procures around 45 per cent of its current total annual requirement of 2.40 lakh tonnes of potato by working with farmers and the rest 55 per cent from the open market.The company works with farmers throughout the crop lifecycle and this includes the supply of planting material, offering plant protection programmes and assistance in securing soft loans under the collaborative farming model.

However, the inputs provided to the farmers who are associated with them in the collaborative farming are meant for their use and the permission to cultivate the plant variety was theirs' alone. The three farmers therefore has surely transgressed the company's territory and in doing so has invited legal proceedings.

Farmers illegally growing varieties is not new in India. The recent controversy regarding farmers raising Herbicide Tolerant (HT) varieties too is another example, although on a different note . Situations as these arise mainly due to the ignorance of the existing laws in the country. More than that, it stems from the time honoured practices of growing crops and exchanging varieties and planting materials among farmers. With globalization and entry of multinationals, the scenes have radically changed. Although India opted the sui generis option that gives WTO member countries a way out if they do not want to allow patents on plants in their national jurisdiction, it only allows farmers to save, use, sow, resow, exchange, share or sell his farm produce. He does not enjoy the freedom to practise the same with seeds of others.

The Protection of Plant Variety and Farmers Right Act, 2001 (PPVFR Act) was enacted to provide for the establishment of an effective system for protection of plant varieties, the rights of farmers and plant breeders, and to encourage the development and cultivation of new varieties of plants.To avoid situations such as these, the government machinery must create awareness of these laws among farmers. It will avoid situations such as these, and in future may help farmers to protect their own varieties from being hijacked by others.

# Soil Free- Guilt Free

***With diminishing resources, it is time for India to explore non conventional farming***

Diminishing resources are increasingly becoming a concern for agriculture. The pressure of producing more from less have become the norm of today's agriculture. The developing technologies have thus been emphasizing on methods that emphasize this principle.

Urban farmers are becoming suitable candidates for trying these technologies. Hydroponics are slowly and steadily emerging as a powerful technology in this category as it efficiently utilise space and water. Hydroponics, a method of growing plants without soil in which plants get their nutrients from a mineral solution, has been gaining more acceptance in the last few years due to its low water usage — about 20 per cent of conventional method. World over, the technology has been gaining grounds. Around 50,000 acres are estimated to be under hydroponic production around the world, according to Green Acres Foundation. India is yet to capitalize on this technology on a larger scale. However, there are certain companies catering to this technology on a grandiose manner for raising certain 'foreign greens'. It requires less labour, and yields are said to be much higher as plants grow faster (due to direct access to required nutrients) compared with regular farms. The most alluring aspect to urban farmers and entrepreneurs is it is feasibility in smaller space. However, on the financial front, things are towards the pricier side. The recovery depends on the crops grown. Currently only high value crops are feasible.

Soil less cultivation has some inherent advantages. There is minimal environmental impact as controlled agriculture is less resource-intensive. In terms of water consumption too, there is considerable reduction as eighty percent of water is recycled. Since precise quantity of nutrients go into raising these crops, the produce is believed to be of improved health and nutritional value. Moreover, there will be limited chemical interventions in managing diseases and pest, and hence the yields can easily be categorized under organic produce. Since space is not a constraint, the agricultural operation can be scaled up to any size of facility making it ideal for practicing urban agriculture. But most importantly, the whole operation sans soil.

India, which has over 17 per cent of the world population with limited land resources, warrants immediate attention and urgent remedial measures to sustain agriculture. India is also facing another challenge of deteriorating soil quality that has the potential to affect future of agriculture. India has varied geology, climate and vegetation, which gives it different soil types. It takes thousands of years to make one metre depth of soil. It is estimated that about one millimeter of top soil is being lost each year with a total loss of 5,334 million tonnes annually due to soil erosion. Having said that, soil has thus emerged as precious natural resource. The continued cycles of agriculture with scant regard to the health of the soil has destroyed the vitality of the soil. Even repeated application of fertilizers have been not able to guarantee good results. Even though India is a major agricultural producer excelling as the major produce in different crop categories, we are still tight on the productivity front. Our yield per unit area is probably lowest in the world. Hence it becomes important in investing in technologies that utilize minimum resources and produce maximum yield.

Soil less farming although in the near future may not change the way India is farming, but can possibly generate interest among agri entrepreneurs. With better technology and improvisation, soil less farming may be able to create many low cost options. It is definitely an avenue to look forward to for India, albeit it needs some serious fine tuning and significant amount of research.

# Trimble to Expand Precision Agriculture Footprint in India

Global Precision Agriculture leader Trimble Inc. said that it is committed to the Indian government's mission of doubling farmers' income and is pursuing a three-pronged strategy to increase the adoption of Precision Agriculture in India in order to boost farm productivity. The company said it is in discussions with tractor Original Equipment Manufacturers (OEMs) to bring its precision auto-steer and auto-guidance technologies to Indian farmers. Trimble's auto steer and auto guidance technology uses GNSS-based navigation to accurately guide a tractor's movements in the field, which leads to better sowing of seeds and harvesting of crops; in turn increasing crop yields of cash crops like potatoes by as much as 30%. Under the second element of its strategy, Trimble is exploring rental and pay-per-use models with select in-country partners for its precision agriculture tools. These innovative business models make it much more affordable for Indian farmers who typically have small farm holdings (less than 2 Hectares) and are unable to make capital investments in cutting-edge Precision Agriculture technologies. Furthermore, the company aims to expand its distribution of laser-levelling solutions to cover major Indian states by 2020. Currently, Trimble has presence in five states across the country, including Punjab, Haryana, Western UP, Rajasthan and Maharashtra.

## Rare ISO certification for FarmLink

FarmLink, a fruits and vegetables (F&V) supply chain company, receives a rare 'ISO-22000' certification from TUV-NORD, a reputed international provider of quality accreditations. It is very uncommon in India for an agri-startup to receive such validation for its F&V distribution centre near Mumbai. The certification further strengthens the company's quality assurance and publicly demonstrates a commitment to food safety.Ravish Chavan, COO of FarmLink, said, "The accomplishment is a significant step for FarmLink. Efforts of the team at Vashi (near Mumbai) distribution centre have paid off well with the recognition, adding further credibility to the company. It confirms our best-in-class food safety management system and assures safe and high-quality fruits & vegetables for consumers."FarmLink procures fresh produce from farmers through its network of collection and service centres and delivers the produce to industrial scale off-takers such as Hotel-Restaurant-Cafe (HORECA) chains, big retail stores, industrial processors and emerging e-commerce platforms.

# Mahindra first Indian brand to roll out 3 million tractors

Mahindra & Mahindra Ltd., part of the USD 20.7 billion Mahindra Group, announced that it had become the first Indian tractor brand to rollout 3 million tractors. Mahindra is currently the world's largest farm tractor manufacturer by volume and India's leading tractor manufacturer for over three decades. The company achieved this manufacturing milestone during March 2019. This has further cemented Mahindra's leadership in the Indian market. It is also the first Indian tractor manufacturer to have produced over 2,00,000 tractors in 2018-19, the highest-ever by an Indian tractor brand in a single financial year. Having rolled-out its first tractor back in 1963 through a joint venture with International Harvester Inc, Mahindra & Mahindra crossed it's 1-million units production mark in 2004. The company then went on to become the world's highest selling farm tractor brand by volume in 2009. The Mahindra Farm Division then completed its 2-million units production mark 9-years later in 2013, achieving the next million units in just 6 years in 2018-19, inclusive of exports, reinforcing the trust that millions of farmers repose in the brand. To celebrate the 3-million production milestone, Mahindra & Mahindra will roll out a 360-degree campaign titled "AapkaAabhar 30 Lakh Baar" for customers in India. Through the campaign, Mahindra will extend special consumer offers, service benefits and finance offers to new and existing customers of Mahindra branded products.

## Dürr and Patvin enter into a partnership for the Indian market

Painting technology as a common strength: Dürr has brought on board a competent distribution partner for the Indian market in Patvin. Together, the two companies provide application technology and robotics for the 2-wheeler/3-wheeler and agricultural machinery industries. A partnership agreement between Dürr andPatvin was signed. Dürr is a worldwide leader in automotive painting and sealing. As in the automotive sector, Dürr also covers the entire spectrum of paint application in general industry with its application products. Customers and integrators can meet their component needs from a single source. The focus here is on the five product categories 'pumping and fluid handling equipment', 'conventional application technology (spray guns)', 'two-component systems', 'solutions for electrostatic application', and "paint robots/ paint machines'. The solutions on offer are specifically designed to increase production efficiency and reduce VOC emissions and material consumption. The installed systems therefore increase productivity, improve quality, save material, and at the same time consume less energy and reduce environmental emissions. Patvin was established in 1987 and is a leading provider of systems for paint circulation, paint application, highly viscous materials such as sealants and adhesives, and lubrication equipment for general industry. Under the partnership concept, Dürr supplies the application technology and Patvin integrates the products and systems at the customer.

## Gujarat farmers sued for copy-farming

The US food and beverages giant Pepsi-Co has sued three farmers in Gujarat complaining that they have been illegally growing and selling a variety of potato exclusively registered by the company. PepsiCo claimed it has sole rights to grow them to manufacture chips of its brand - Lay's. Looking at the company's registration of the potato variety in country's Plant Variety Registry, the commercial court here last week stayed the farmers –Chabilbhai Patel, Vinod Patel, Haribhai Patel – from growing and selling the potatoes till April 26. The court has also sought reply from the three over company's claims of infringement on its rights. On company's request, the commercial court judge MoolchandTyagi appointed advocate Paras Sukhwani as court commissioner to conduct an inquiry into the dispute and prepare a report. PepsiCo India Holdings Pvt Ltd has informed the court that it uses the registered variety of potatoes called FL 2027, which is a hybrid of FL 1867 and Wischip varieties, for manufacturing chips for its brand. The company is the registered breeder of FL 2027 under the Protection of Plant Varieties and Farmers' Rights Act, 2001. In India, this variety was first put to commercial use in 2009 and is traded under the trademark FC5. It has granted licence to some farmers in Punjab to grow the variety on the buyback system. By growing these potatoes without licence, these farmers in Gujarat are violating its statutory rights.

## Basmati exporter GRM now plans to tap domestic market

GRM Overseas Ltd, the third largest exporter of basmati rice from India, has drawn up plans to enter the domestic market as there is an increasing potential for branded basmati, Managing Director AtulGarg said. "In the first five years we are looking at a turnover of Rs 1,000 crore. In the first year, we intend to generate a revenue of Rs 150-Rs 200 crore," said Garg, adding that the firm hopes to clock a turnover of Rs 1,100 crore from its export business in the just concluded year. India produces roughly 20 million tonnes (mt) of basmati rice annually, of which nearly 5mt are exported. With growth being sluggish in the export front, the company wants to focus on the domestic market for topline growth. The 30-year-old listed company, with headquarters in Panipat, currently sells its branded basmati rice in 1,800 departmental stores in 30 countries. Europe and the Middle-East have been its major markets, followed by the US. As part of its expansion plan, GRM recently acquired a plant with a capacity of 400 tonnes per day at Gandhidham, close to Mundra port in Gujarat, for Rs 13 crore. "This facility would take care of our export requirements, while Panipat facility will focus on the domestic market," Garg told BusinessLine. Currently the domestic basmati market is a little more than Rs 45,000 crore. But the branded basmati market is just around Rs 13,500-Rs 14,000 crore. GRM sees an opportunity to get into this branded segment of the Indian market, currently led by brands like India Gate and Dawat. "We see a lot of space in this segment," he said. Till a few years ago, basmati rice sold was mainly in the range of Rs 25-Rs 40 a kg. Now, it has shifted to Rs 50-Rs 70 and Rs 50-Rs 120 a kg range.

## India to launch coffee consumption drive

India will plan and roll out a coffee consumption campaign on behalf of global coffee growers who have suffered huge financial losses on account of falling prices and soaring labour cost. The context is that coffee growers around the globe are staring at poverty. As per the International Coffee Organization (ICO), Rs 2.5 crore farmers, including more than 3 lakh in India, produce coffee in 60 counties. Over 90% of these growers are smallholders and are forced to sell their coffees at a price much lower than the cost of production. This scenario has led to socio-economic issues. These growers and their families have gone deep into debt. Many have even abandoned their farms and migrated to cities. To bring world coffee producers, including Indian growers, out of this appalling situation, The World Coffee Producers Forum has decided to reach out to coffee-consuming countries around the world. As a precursor to this, India, which has a domestic consumption of more than 5 million bags (of 60 kg each) will kick off a five-year coffee consumption campaign in collaboration with top global roasters, including Nestle and Starbucks, cafe chains, other stakeholders and the Government of India.

## Certification norms for small organic-food producers relaxed

In a move that is expected to bring relief to small organic food producers, the Food Safety and Standards Authority of India (FSSAI) has decided to relax certification norms for small original producers or producer organisations with an annual turnover of up to Rs 12 lakh, till April 1, 2020. According to the regulations, all organic food sold in the country needs to be certified either under National Programme for Organic Production (NPOP) or Participatory Guarantee System for India (PGS-India). The food safety authority has now directed State food safety officers to consider the organic food regulations as "Enabling Regulations" and not for prosecution — particularly for small original producers and producer organisation during the initial phase of its implementation till April 1, 2020. "Provision of direct sales of organic food to the end consumer by the small original producer/producer organisation having an annual turnover of organic produce of not more than Rs 12 lakh is permitted. They may be allowed to sell organic food without any certification i.e NPOP/PGS-India," FSSAI said.

## Govt Plans to Offload Excess Rice, Wheat in Open Market

The government plans to offload excess stocks of rice and wheat in the open market during the fresh procurement season to flour millers and other bulk consumers. The Committee of Secretaries (CoS) met a couple of days ago to decide on the course of action for the open market sale. Once the proposal gets through the CoS and the finance ministry, it will be vetted by the Election Commission of India. The government normally initiates an open market sale for bulk buyers after procurement. This time, an e-auction is likely to be held during the procurement season ending in June as the Food Corporation of India, the agency that buys foodgrain for the government, is grappling with a paucity of storage space. "Our godowns are inundated with rice and wheat and we are procuring more in the current season. To make way for the new crop, we need to liquidate wheat stocks in the open market at above the reserve price, which is the sum of the minimum support price of the foodgrain and its procurement cost," a senior food ministry official said. The FCI currently holds 26.3 million tonnes of rice and 20.1 million tonnes of wheat, according to data on its website. The government expects to procure 45 million tonnes of rice (kharif and rabi) and 35.7 million tonnes of wheat in the current season. The government had targeted the sale of 10 million tonnes of wheat and 2 million tonnes of rice in the open market in the previous season.

## Agri exports Govt lays out norms for claiming sops under TMA scheme

The commerce ministry has laid out a detailed procedure for claiming benefits under the Transport and Marketing Assistance (TMA) scheme, which aims at boosting agricultural exports. In March, the government announced this scheme for providing financial assistance for transport and marketing of agriculture products to boost exports of such commodities to certain countries in Europe and North America. Under the TMA plan, the government will reimburse a certain portion of freight charges and provide assistance for marketing of agricultural produce. "Procedure and Aayat Niryat Form to avail TMA for specified agricultural products are notified," the Directorate General of Foreign Trade (DGFT) has said in a notification. The scheme covers freight and marketing assistance for export by air as well as sea (both normal and refrigerated cargo). As per the procedure, application for claiming assistance can be filed online by a registered and eligible exporter having a valid RCMC (Registration Cum Membership Certificate), issued by export promotion councils or commodity boards. "The application shall be filled up online on DGFT's website along with the application fee. The application for claim on TMA will be made on quarterly basis. Online claims should be filed within a period of one year from the completion of quarter in which exports have been made," the notification said. The documents which are required to file the application includes shipping or airways bill, commercial invoice, on board bill of landing, and proof of landing. The assistance will be paid only to the exporter shipping the cargo and in whose name payment is realised through normal banking channels, it added.

## Centre Forms New Tea Board Sans Representatives of Small Growers

Small tea growers, who contribute nearly half of the tea production in the country, have not found any representation in the newly constituted Tea Board of India.The Union Commerce Ministry constituted the new Tea Board on March 9 through an official notification. From Assam, RupeashGowala, general secretary of the Assam ChahMazdoorSangha and Sunil Kirwai of the Bharatiya Mazdoor Sangha Karyalaya have been included in the new board.The disappointing development has come despite the fact that

the Tea Board of India last month had written to the Union Commerce Ministry requesting it to include representatives from the Confederation of Indian Small Tea Growers' Association and All Assam Small Tea Growers Association in the new board."Even though we hoped that the Union Commerce Ministry will positively respond to our request, we could not help since it was a government decision. Going by contributions being made by small tea growers, the board should have their representatives," a Tea official said.Disappointed with the development, the Confederation of Indian Small Tea Growers' Association has decided to write to Prime Minister Narendra Modi and the Union Commerce Ministry demanding inclusion of representatives of the association in the new board.

## Govt to Hire Pro Team to Monitor KISAN Scheme

The government is planning to hire senior professionals and support staff to monitor and implement PM KISAN scheme in which BJP-ruled states have taken the lead, sending names of small and marginal farmers eligible to receive Rs 6,000 annually in three equal instalments. "Initially, we are going to hire six professionals, who can deal with data analytics, ground monitoring and supervision of the implementation. Since, the scheme is a continuous year-long programme, it will need trained professionals and experts to deliver the results," said a senior agriculture department official, who is dealing with PM KISAN scheme. The scheme is being monitored by a project monitoring unit (PMU) at the centre led by a joint secretary Vivek Agrawal, designated as the chief executive officer. The states and union territories may also set up a dedicated PMU for the effective implementation of this scheme. "The centre can transfer 0.25% of the amount earmarked for the first instalment and 0.125% for the subsequent instalments to state governments to cover the expenditure of PMUs, if established, and for meeting other related administrative expenses including cost incurred on stationery, field verification, certifications and data uploading," the official said. The government so far has received data of 47.6 million eligible beneficiaries. First level validation of 40 million beneficiaries has been completed and payment of first installment of Rs 2,000 each has been made to around 27.6 million farmers.

## Grameena bank to fund agri-tourism projects of farmers

In its efforts to provide additional revenue to farmers and to boost agri-tourism under its area of operation, the Dharwad-headquartered regional rural bank Karnataka VikasGrameen Bank (KVGB) is planning to finance agri-tourism projects taken up by farmers. Stating that the bank operates in nine districts of Karnataka, S Ravindran, Chairman of KVGB said, coastal Karnataka has arecanut and coconut plantations, while northern districts such as Belagavi, Dharwad and Vijayapura have coconut plantations, mango groves, and pomegranate orchards, among others. These agricultural activities and the landscape provide scope for taking up agricultural tourism in these areas. Urban tourists prefer to visit and get an experience of such places. The tourists can go to the farmers home, stay like a farmer, engage in farming activities, and enjoy the rural cuisine. However, he said, there is a need to educate farmers on the potential of agri-tourism projects. Ravindran said the bank is planning to finance at least 50 such projects during the current fiscal. The cost of the project is based on factors such as room capacity at the farmer's place, area, and the availability of pick-up vehicles for tourists. Under this scheme, the purchase of vehicles to pick up and drop customers will also be financed. The minimum loan under this scheme is Rs. 5 lakh, he said. The bank has 636 branches in Dharwad, Gadag, Haveri, Bagalkote, Vijayapura, Belagavi, Uttara Kannada, Udupi and Dakshina Kannada districts of Karnataka.

## 2.18 crore farmers covered under PM-Kisan scheme

A total of 2.18 crore small and marginal farmers have so far benefited from the newly-launched PM-Kisan scheme and a sum of Rs 4,366 crore has been distributed to them in the first instalment, said an official statement. According to details available till Thursday evening, Uttar Pradesh, followed by Andhra Pradesh and Gujarat, led Statesin implementing the scheme. While UP, where Prime Minister Narendra Modi launched the scheme on February 24, has so far disbursed the first instalment of Rs 2,000 to 74.7 lakh farmers, Andhra Pradesh has distributed it to 32.2 lakh farmers and Gujarat has covered 25.6 lakh farmers. Under the scheme, farmers with holdings smaller than two hectares, are to be given Rs 6,000 annually to take care of agriculture and allied activities. The sum will be released in three equal instalments over the year, with effect from December 2018. The government estimates that 12.5 crore farmers are eligible for the scheme.

## SC strikes down RBI circular on insolvency proceedings

The Supreme Court today quashed an RBI circular, directing banks to initiate insolvency proceedings against companies having bad debts of Rs 2,000 crore or above within 180 days, failing which the corporate debtor would have to be taken to National Company Law Tribunal for insolvency proceedings. "We have declared the RBI circular ultra vires," said a Bench headed by Justice Rohinton F Nariman. The Circular mandated that banks will have to disclose defaults even if the interest repayment is overdue by just one day, and will have to put a resolution plan in place within 180 days. However, during the pendency of the matter, the top court had on September 11 last year asked banks to maintain status quo and not to initiate insolvency proceedings against loan defaulting companies. The verdict — which will have a bearing on bad loans running into lakhs of crores of rupees — came on a batch of petitions by companies from various industries — power, fertiliser and sugar — challenging February 12, 2018 circular issued by the central bank. The regulated sector companies of fertiliser, power and sugar had contended that their prices are regulated by the government and they don't get paid on time and thus they are not able to pay the banks on schedule and they are not wilful defaulters and can't be treated as such. The circular was challenged by petitioners such as the Association of Power Producers and Independent Power Producers Association of India which said it failed to distinguish between genuine and wilful defaulters. They said the circular suffered from non-application of mind and failed to draw a distinction between various forms of "stressed assets" from different industrial sectors. They contended that under IBC the resolution plan gives then 270 days but the RBI circular had reduced it to 180. The circular, if upheld, would have taken several power, sugar and shipping companies to insolvency.

## Mahagovt pays Rs 100 cr to MSC bank to settle loans

Top officials of the Maharashtra government said an amount of Rs.100 crore was paid to Maharashtra State Cooperative Bank (MSC) by the government on March 31 through the Consolidated Fund (which is considered an emergency fund) since March 31 was the last date for making the payment. The Maharashtra government has given an undertaking in the Supreme Court that it will pay a sum of Rs.100 crore to MSC as part of the fulfilment of the guarantee made years ago to sugar cooperatives that it would settle their loans in case they defaulted in payments. MSC Bank is considered to be the apex cooperative bank of the state. The state government had extended guarantee to loans issued to millers from the state cooperative bank and the said loans turned bad and remained unpaid. MSC Bank then approached the SC for the recovery of this loan from the state government. Sugar cooperatives in Maharashtra owe the bank nearly `2,000 crore. The government had assured them that it would repay their dues in case they defaulted in payments but they failed to do so. This prompted the bank to filed a writ petition in 2011. According to a report prepared by the MSC Bank's claims committee, the government owes the bank `1,050 crore. At the previous hearing, the SC had ordered the state to deposit `250 crore promptly. The state argued in court that `1,000 crore was too enormous an amount to be paid. It said since there was no provision made in the budget to make such a payment to the bank, it would require the approval of the state legislature, which will meet next only in June. The bank had stated `1,049.49 crore had been found to be payable by the claims committee from an amount of `2,238.20 crore which was claimed by the appellant bank. The counsel for the bank said that no amount had been paid by the government of Maharashtra, as a result of which the appellant bank, i.e MSC Bank, is likely to be declared as a non-performing asset. Being the apex bank for cooperative societies in Maharashtra, this situation is likely to affect the entire cooperative movement in the state. The MSC Bank is an apex body for 31 district co-operative central banks which have about 3,746 branches, with a third tier of around 21,085 Primary Agriculture Credit Societies (PACS) which directly lend to farmers and the rural population. In 2011, the Reserve Bank of India suspended the board of MSC Bank after the bank's net worth turned negative.

## Farm loan waivers kill credit culture: Raghuram Rajan

India needs to focus on the resolution of farm distress rather than loan waivers which kill the credit culture, former RBI governor RaghuramRajan said. "First we need to worry about why people are so distressed and angry. There is a lot of agriculture distress. I personally believe that farm loan waivers are not the answers. But there are other answers," he said when asked about what should be the focus for the upcoming elections. The other focus area should be creation of jobs which the people want, he said here at the launch of his book -- 'The Third Pillar - How Markets and the State leave the Community Behind'. "I would say that one is start creating those jobs people want. Take care of the distress, but whatever measures you put, put them as a pathway for people to get those jobs rather than standing in the way of getting those jobs...We can talk about the economic reforms that are needed, but jobs are task one," Rajan emphasised. Several state governments have announced loan waivers for farmers. Referring to the issue of farm distress, he said loan waivers cover only those farmers who have taken loans from the formal system. "I do worry about waiving loans because it only targeted to those farmers who have taken loans from the system, not the poorer farmers who have loans from the money lenders or an agricultural worker who never got a loan in the first place. So I would rather have a better-targeted system," he said. "That is why I have always said that farm loan waivers are problematic and various bankers have also opined that it kills the credit culture. It's very difficult to lend to those people once again. So they also suffer in credit down the line even though they may get some short-run benefit. So those are my objections," he added. He further said targeted transfers to the very poor have become a staple of capitalism and that is a part of the safety net.

## Irdai asks insures for easy crop insurance claim settlement, use of vernacular language

The general insurers will have to provide details about crop insurance claims to farmers in vernacular languages, apart from Hindi and English, regulator Irdai has said.The Insurance Regulatory and Development Authority of India (Irdai) said it has been receiving various complaints and suggestions in respect of crop insurance claims.Irdai, in a circular, said there is a need for effective implementation of crop insurance schemes.Insurance companies should put in place a robust system to register all the requests of individuals loss assessment, and if an individual loss assessment is rejected, a written rejection letter mentioning the reason should be sent to insured, Irdai said."Insurers should ensure that all call centres/toll-free numbers responses should be available in state's official language other than Hindi and English. Wesbites of insurers should disclose crop insurance related details in the vernacular language for the benefit of farmers," it said.Among others, widespread awareness programmes should be conducted for educating farmers on scheme guidelines, claim settlement process and grievance redressal process, it further said.

## Odisha's financial assistance for small farmers fails to pay off

The Odisha government's much-publicised KALIA scheme, offering financial aid to distressed farmers struggling under high input costs and low returns, has not yet benefited a large number of share-croppers as poor record-keeping may have led to the exclusion of several names. The Krushak Assistance for Livelihood and Income Augmentation (KALIA) scheme promises financial aid of Rs 25,000 per farm family over five seasons to small and marginal farmers, including share-croppers, to purchase inputs. It was launched in the rabi season (2018-19). A greater challenge for the cultivators though is the low minimum support price (MSP) for paddy — the main crop grown in Odisha — as the State's refusal to give an additional bonus is making it difficult for land-less and land-owning farmers to make ends meet. Share-croppers account for more than 70 per cent of paddy cultivators in Odisha. Many share-croppers in Odisha haven't benefited from KALIA because no criteria have been fixed to identify their names.

## Maharashtra APMC's income down 50 per cent — what triggered the fall

The fall in onion prices has led to a 50% drop in income of the Agriculture Produce Market Committees (APMCs) in the Nashik district, one of the main onion producing belts in Maharashtra, this fiscal. Lasalgaon APMC, the largest wholesale onion market in the country, reported revenues of Rs 3.50 crore in 2018-19. Last year, the market committee's turnover was Rs 6.15 crore. Similarly, the neighbouring PimpalgaonBaswant reported revenues of Rs 10.63 crore as compared to Rs 16.77 crore the previous year. Yeola APMC saw its income drop from Rs 6.01 crore to Rs 2.90 crore this year. Other market committees besides Lasalgaon and PimpalgaonBaswant, including Niphad, Kalwan, Manmad, Nandgaon and Chandwad, that also deal in foodgrains in addition to onions, had to bear losses of nearly Rs 75 crore this fiscal, according to market committee officials.

## Maharashtra sugar mills pay 76% of fair and remunerative price to ryots

Even as the cane crushing season comes to an end, sugar mills in Maharashtra have not paid the full Fair and Remunerative Price (FRP) to farmers and sugar barons across party lines are promising to pay arrears before the end of the poll season. In all, 193 sugar mills in the State have crushed over 90,523 lakh tonnes (lt) of sugarcane, producing over 101 lt of sugar. Out of Rs 19,623 crore payable as FRP, mills have paid Rs 14,881 crore, while farmers are demanding immediate payment of arrears of Rs 4,742 crore. FRP is the minimum price to be paid by sugar mills to the cane growers who provide cane to the mills. The Sugarcane (Control) Order, 1966, stipulates payment of the cane price within 14 days of supply, failing which interest at the rate of 15 per cent per annum on the amount due for the delayed period beyond 14 days is payable. Sugarcane farming is the source of livelihood for nearly 2.5 crore people living in rural Maharashtra.

## Kashmir's kesar takes hit due to drought, rain

Once hailed as the world's costliest spice, Kashmir's delight, saffron, was majorly hit last year. A drought-like situation, leading to lack of irrigation during flowering season and untimely rains has hit the saffron hard, with farmers suffering over Rs 100 crore financial loss last year. Official figures reveal that the saffron production dropped to 1.74 kg per hectare in 2018-19 as against the 4.5 kg per hectare some years ago. "Lack of irrigation during flowering time was the main reason for drop in the yield," said AltafAijazAndrabi, Director Agriculture Kashmir. Saffron sells at over Rs 1 lakh per kg and its mogra variety sells between Rs 1-1.60 lakh per kilo. In Jammu and Kashmir, around 3,715 hectare of land is under the cultivation of saffron, with Pampore in the Pulwama district leading the charge (3,200 hectares under saffron cultivation). "This year the production was not even five percent. We have suffered huge losses this year. There are two major reasons for the fall in production: One there was a drought-like situation, second, there was heavy rainfall in March which ruined the crop. In nutshell, it was a natural calamity that has ruined saffron," said GM Pampori, president J&K Saffron Growers and Dealers Association.

## Farmers on warpath across Punjab

Restive farmers in Punjab have launched agitations across the state, forcing all political parties in the fray for the May 19 General Election to sit up and take note. Their agitation, launched just as the poll scene begins, is likely to force political parties — the ruling Congress, SAD-BJP, AAP and Punjab Democratic Alliance to commit to fulfilling some of their demands. While the Opposition parties — both SAD- BJP and AAP — have been extending their support to the farmers, the latter are venting their ire against the ruling Congress, for most of their troubles, be it a complete loan waiver or farmers being forced to give blank cheques as security for loans. But they are equally blaming the Centre (BJP-led NDA government of which the Akali Dal is a constituent) for the rise in costs of all farm inputs, poor remuneration of crops and not implementing the recommendations of the Swaminathan Commission report.

## UP, Maharashtra, Gujarat lead in PM-Kisan rollout

Among themselves, Uttar Pradesh, Maharashtra and Gujarat have uploaded data of an additional 1.19 farmers for the PM-Kisan income support after the Election Commission (EC) allowed the government to extend the benefit to all the farmers details about whom were on the designated website as on March 10. The governments in these three states are therefore in a position to provide the first and second tranches of Rs 2,000 each to these farmers too, apart from some 1.44 crore in these states who have already received the first tranche and can get the second instalment The Centre had transferred the PM-Kisan sums to about 2.75 crore farmers as of March 10, the day the Model Code of Conduct became effective. According to the EC's code of conduct, the works on projects could continue by the government agencies without reference to it if "specific beneficiaries have been identified, by name, before coming of Model Code into force". In case of Pradhan MantriKisanSammanNidhi (PM-Kisan) scheme, 2.01 crore more farmers are eligible to receive the first tranche by March 31 while the second instalment, effective for April-July period, can cover all the 4.76 crore farmers, whose names have been submitted by states, the poll panel said last week. "There is a challenge of data validation with Aadhaar or its enrolment number as well as bank accounts. As the Centre needs to validate Aadhaar of over 75 lakh farmers during this election period, the total number of beneficiaries could be even fall further," an official said.

## Madhya Pradesh rolls out Bhavantar scheme for kharif 2018, to spend Rs 1,000 crore

While procurement of kharif 2018 crops under PM-AASHA — the reinforced price support scheme for pulses and oilseeds — continues to be quite low, Madhya Pradesh is the only state keen on implementing a price deficiency support scheme for the kharif 2018 crop. It has announced a plan to ensure the minimum support price (MSP) benefit for about 48 lakh tonnes of soyabean and maize sans procurement. Though not a single rupee has been paid yet to farmers under even MP's Bhavantar scheme (the crop arrivals started five months ago), the price support for such crop volume would entail a payout of over Rs 1,000 crore. While the state has approved payment of over Rs 560 crore for maize farmers, a panel has been asked to work out the payment to be made to soyabean farmers. The Congress, which won the Assembly election after a gap of 15 years on the back of its farm loan waiver promise, cannot ignore the resentment at a time when the Lok Sabha election is due in April-May. The state is waiting for the release of the Central share of about Rs 320 crore before disbursing the payment to soyabean farmers, while maize growers are likely to get the differential amount by month-end, according to sources. The state government has decided to pay at Rs 250 per quintal to 2.85 lakh farmers who sold 22.6 lakh tonne of maize in different mandis since October 1, 2018, an official said, referring to a notification on March 5. Before the state Assembly election last year, then chief minister Shivraj Singh Chouhan had announced a flat amount of up to Rs 500 for each quintal of soyabean and maize sold by farmers to compensate them for selling their crops below MSPs. The MSP of soyabean was increased 11% to Rs 3,399 per quintal and that of maize 19% to Rs 1,700 per quintal for the 2018 kharif season to meet an electoral commitment of the BJP for fixing the benchmark prices at 50% over the cost of production.

## Bangladesh Tops as Indian Sugar Importer

Bangladesh has emerged as the biggest importer of Indian sugar, buying in a fifth of the country's total sugar exports of 1.74 million tonnes in the current sugar season, which began on October 1, 2018. Sugar mills contracted 2.17 million tonnes (mt) of sugar till April 6, of which 1.74 mt has been successfully shipped, All India Sugar Trade Association (AISTA) said. India exports sugar to around 50 countries. "We have shipped 3.56 lakh tonnes of sugar to Bangladesh, followed by Sri Lanka (2.87 lakh tonnes), Somalia (2.12 lakh tonnes) and Iran (1.35 lakh tonnes)," said Praful Jagjivandas Vithalani, chairman at AISTA. "The remaining quantity is in transit or with Indian sugar refineries." The government has fixed the sugar export target for the current season at 5 mt sugar by allocating mill-wise minimum indicative export quotas (MIEQ). This year, total sugar production is projected to be 30.7 mt as against 32.5 mt in the previous sugar season. "Export demands are coming. We are still left with around six months where we expect to export more sugar," food minister Ramvilas Paswan said. With low global prices, sugar export is not picking up despite several measures taken by the government like compensating expenses towards internal transport, freight, handling and other charges.

## Rice export prices dip on poor demand

Rice export prices in top exporter India edged lower this week due to sluggish demand, while fears of a drought this year supported up domestic buying in Thailand. India's 5 per cent broken parboiled variety was quoted around $387-$390 per tonne this week, down from last week's $390-$393. "Demand is very poor at current price level. The appreciation in the rupee has limited scope to cut prices," said an exporter based at Kakinada in the southern state of Andhra Pradesh. A strong rupee dents exporters' returns from overseas sales. India's rice exports for April-February fell 9.4 per cent from a year earlier to 10.57 million tonnes, as major buyer Bangladesh trimmed its purchases due to a bumper local harvest, a government body said. Farmers in Bangladesh have planted the summer rice variety on 4.9 million hectares of land, exceeding the target of 4.8 million hectares, Mir Nurul Alam, head of the country's Department of Agriculture Extension.

## India gives China a list of 380 items whose exports can be increased

India has given China a list of 380 items which have the potential to increase exports, provided Beijing lowers non-tariff restrictions. The list include items from agriculture, horticulture, pharmaceuticals, textiles, chemicals sectors besides tobacco and some engineering products. The Commerce & Industry Ministry in a meeting with stakeholders this week had asked various export promotion councils, including the ones for spices, agriculture, engineering goods, pharmaceuticals, IT and organic chemicals, to prepare China-specific export strategy so that pointed action could be taken, a government official said. "The Chinese leadership has already acknowledged that the growing imbalance in bilateral trade can be bridged mainly through increased exports from India. A beginning has been made with export protocols being signed between General Administration of Customs of China (GACC) and the Indian government for items such as fish, fish oil, rice and tobacco. But a lot more targeted efforts have to be made," the official said.

## Agri, processed food products' exports dip 2.27% in Apr-Feb 2018-19

The country's exports of agricultural and processed food products have dipped by 2.27 per cent to $16.27 billion during the April-February period of 2018-19, on account of contraction in shipments of buffalo meat, wheat and non-basmati rice, according to data from APEDA. The Agricultural and Processed Food Products Export Development Authority (APEDA) was established by the government under a law. During the corresponding period of 2017-18, exports of these items stood at $16.65 billion. Buffalo meat, wheat and non-basmati rice exports dipped by 11.32 per cent, 48.79 per cent and 19.33 per cent, respectively, during the 11-month period of 2018-19. The other products that recorded negative growth include fresh fruits and vegetables, processed fruits and juices, sheep and goat meat, ground nuts, cereal preparations, and alcoholic beverages. However, floriculture, fruits and vegetables seeds, pulses, processed vegetables, processed meat, dairy products, guargum and basmati rice recorded positive growth. Pulses exports grew 28.46 per cent to $235 million during the period under review.

## Soymeal exports to Iran surged to over 5 lakh tonnes in 2018-19

A sharp jump in demand from the Iranian feed industry post-US sanctions has brightened the prospects for India's soymeal exports. According to the latest data released by the Solvent Extractors' Association of India (SEA), soymeal exports to Iran for the year 2018-19 stood at 508,050 tonnes, far higher than 22,910 tonnes reported in the previous year. With this, Iran emerges as the third largest importer of Indian oilmeals after South Korea (738,795 tonnes) and Vietnam (615,403 tonnes). "The Iranian market has once again opened up for Indian soybean meal. It seems again Iranian feed industries are looking at India for their requirement of soybean meal, supporting export of oilmeals from India," SEA said in its note. The trade with Iran got a further boost after it revised its payment mechanism for India and started accepting payments from India in rupee and used that fund to pay for its imports from India. Opening up of an export market has lifted India's overall soymeal exports from 11.87 lakh tonnes in 2017-18 worth Rs 2,909 crore to 13.37 lakh tonnes valuing Rs 3,831 crore in 2018-19. According to the SEA data, rapeseed meal exports jumped by about 58 per cent to 10.51 lakh tonnes worth Rs 1,654 crore for the year under review from 6.64 lakh tonnes worth Rs 992 crore in the previous year. "The export of rapeseed meal is sharply increased and was mainly exported to South Korea, Vietnam and Thailand," said SEA. The overall oilmeal exports during April 2018 to March 2019 is provisionally reported at 3,205,768 tonnes against 3,026,628 tonnes in the year-ago period -- up by 6 per cent. Groundnut meal exports reported at 8,673 tonnes worth Rs 13 croreagainst 7,931 tonnes worth Rs 16 crore reported last year. The exports of castor seed meal and rice bran extract stood at 367,084 tonnes and 440,927 tonnes respectively.

## January-February tea exports tumble, output declines

Country-wise tea exports in January and February this year fell to 41.60 million kilograms from 44.72 million kilograms during the same period last year, according to Tea Board data. Exports to CIS countries during the first two month period of 2019 fell to 9.20 million kilograms from 11.36 million kilograms in the same period in 2018. Exports to Iran during the period touched 11.37 million kilograms, rising from 5.13 million kilograms in the same period of 2018, it said. Exports to Pakistan fell marginally to 2.35 million kilograms during the period in 2019, from 2.68 million kilograms in the same period in 2018. The value of exports during the two-month period of 2019 increased to Rs 934.08 crore, as compared to Rs 858.47 crore in the same period in 2018. The unit price per kilogram during the period increased to Rs 224.34 per kilogram in 2019 as compared to Rs 191.97 per kilogram in the same period in 2018. During the 11-month period from April 2018 to February 2019, country-wise exports stood at Rs 231.75 million kilograms, as compared to 236.07 million kilograms from April 2017 to February 2018.

## Maharashtra targets to export 2,500 tonnes of Alphonso, Kesar mangoes

The Maharashtra State Agriculture Marketing Board (MSAMB) has said it targets to export 2,500 tonne of the famed Alphonso and Kesar varieties of mango from the Konkan and Marathwada regions of Maharashtra, senior officials of the board said. The total export of mangoes from the state would go beyond 50,000 tonne, Sunil Pawar, managing director, MSAMB, said. Last year, about 1,200 tonne were exported from these regions. "Here, we are specifically talking about mango exports from the facilities run by MSAMB. We have three facilities for vapour heat treatment, irradiation and hot water treatment and we expect some 2,500 tonne to be exported from these facilities," Pawar said. There are over 44 treatment facilities across the country. MSAMB has established export facilitation centres at Ratnagiri, Sindhudurg, Jalna, Latur, Beed and Vashi. The board had been holding regular workshops with both farmers and buyers to encourage exports, he said, adding that the board had taken huge efforts to ensure that more mango growers register their orchards with MangoNet. Maharashtra agriculture department, Maharashtra State Agriculture Marketing Board (MSAMB) and Agricultural and Processed Food Products Export Development Authority (Apeda) are coordinating to ensure that there are no traceability issues and no hurdles in exports. Government agencies had worked to put in place MangoNet — an online traceability system that registers mango growers and exporters and enable importers and supermarkets in the European Union to check complete details of their shipments — on the lines of the successful 'Grapenet'. There are some 25,000 mango growers in the state and of these, 8,500 are registered on MangoNet. Apeda has made it mandatory for exporters to pick mangoes for export only from growers registered on MangoNet. Maharashtra is the largest mango exporter in the country and accounts for 90% of the total export of the fruit from the country.

## CFTRI scientists chance upon oil crop rich in omega-3 fatty acids

Scientists working on oils and fats at the Mysuru-based Central Food Technological Research Institute (CFTRI) — a lab affiliated to the Council of Scientific and Industrial Research — may have hit upon a potential oil crop that can match fish oils in nutritional value. This plant, currently grows in the wild in the higher elevations of the Jammu & Kashmir such as Pampore, can be adapted to other agro-climatic conditions in the country, the CFTRI scientists, led by RV Sreedhar, said in a recent paper published in the Journal of Oleo Science. The seeds of this plant, called corn gromwell or field gromwell (Buglossoidesarvensis), are rich in poly unsaturated fatty acids (PUFA), including nutritionally-important omega-3 fatty acids. More importantly, they contain stearidonic acid (SDA), which is generally absent in regular oilseed crops, according to Sreedhar. Omega-3 content of the oil is found to be 18-20 per cent in lab studies. SDA is a key pre-cursor in the bio-synthesis of those omega-3 acids that are commonly found in fish oils. While health benefits of fish oils are well-accepted, those who do not eat fish, often do not get these benefits from their diet. In addition to SDA, corn gromwell also has copious amounts of gamma linolenic acid and alpha linolenic acid, which are other two major omega-3 fatty acids, the scientists found. According to them, though oils extracted from chia and flax seeds, too, are rich in omega-3 fatty acid, they contain only alpha linolenic acid, one of the three types of omega-3 fatty acids. Research in humans and animal models has showed that consumption of oils rich in SDA increases the tissue eicosapentaenoic acid (EPA) levels more efficiently (2.2-4 times) than oils rich solely in alpha linolenic acid. Increased EPA levels are known to protect people against different types of cancers and neuro-degenerative disorders like Alzheimer's.

## ITA to launch social media campaign to promote tea

The Indian Tea Association (ITA) is looking at launching a social media campaign to target the 'young population' in the age bracket of 15-35 years. The campaign will aim to boost tea consumption among 'coffee drinkers' which, in turn, will strengthen demand for the beverage and enhance prices. According to Vivek Goenka, Chairman, ITA, the campaign will be rolled out on social media platforms such as Facebook, Instagram and YouTube. "We are already in talks with some marketing companies for designing the campaign. We are hopeful of rolling it out this year and it will run for at least 6-12 months," Goenka told on the sidelines of the launch of TRINITEA, a self-assesment app for small tea growers to enable compliance locally and internationally. The estimated budget for the campaign could be upward of Rs 50 lakh. ITA is also in talks with the Tea Board of India to extend funding support to the campaign, besides holding talks with Central and State governments. While tea consumption and penetration is quite high among people above the age of 45-50 years, it has not really "made a mark" among the younger populace, Goenka observed. CTC prices for the first flush crop opened lower by Rs 20-30 a kg at the auction this year, as compared to the same period last year. This is despite the fact that production was estimated to be lower following the early closure directive of the Tea Board. The industry was hopeful that around 40-50 mkg of teas would be out from the system, leading to low carryover stock for this season. This would, in turn, help prices of the first flush open on a firm note.

## Students make eco-friendly water purifier and app for farmers

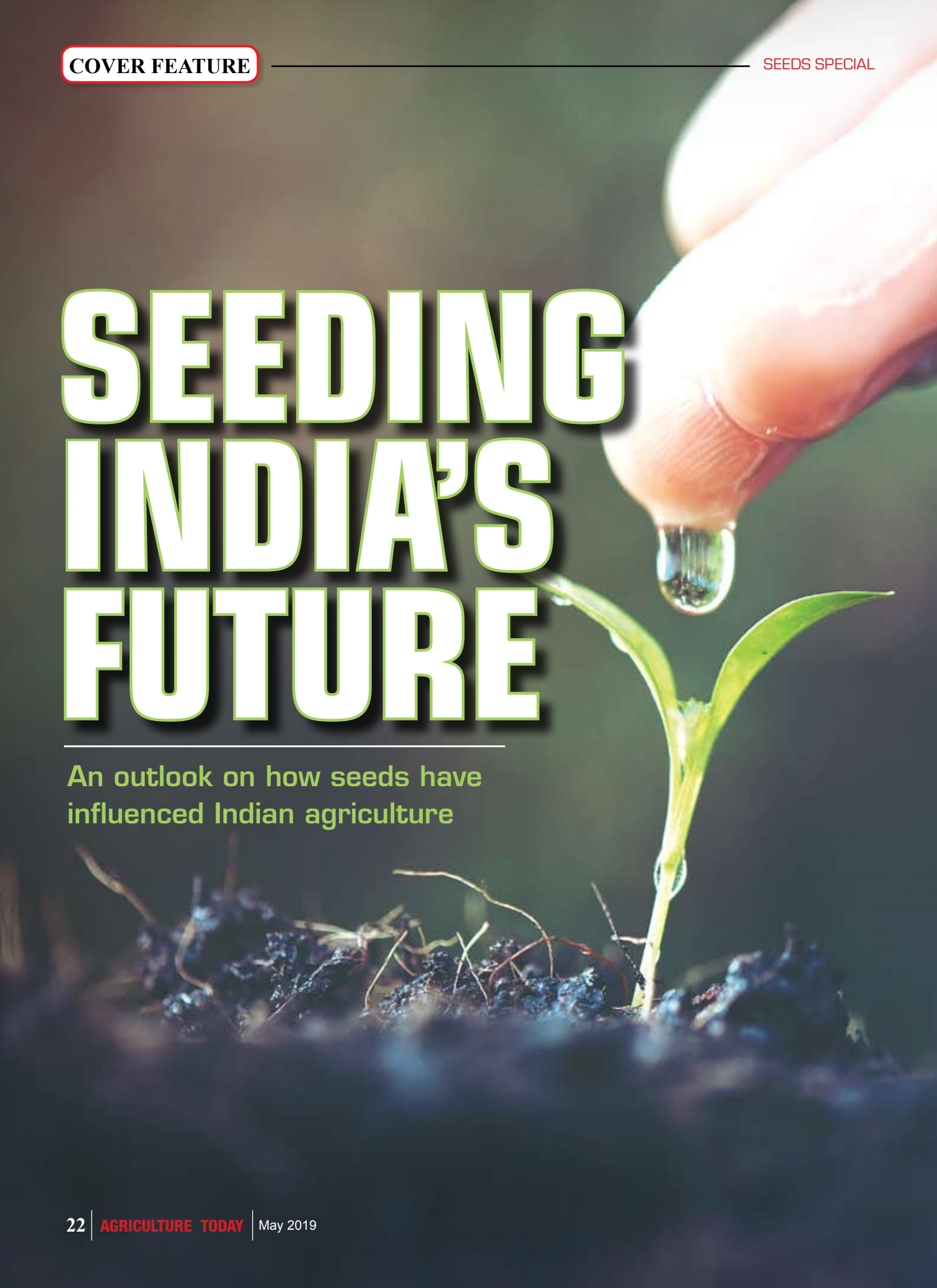
In the wake of drinking water crisis faced by large population and plight of farmers facing pest attack on their crops, two school students from Delhi and Bangalore respectively, have created an eco-friendly, affordable water purifier and an innovative app to deal with the crisis. Aryan Mehra, a class XI student of Modern School Barakhamba Road, New Delhi, was felicitated for making an eco-friendly and affordable, sustainable and easy to make water purifier called 'Aqua Renew'. Kaushik Kunal Singh, a class XI student of Inventure Academy, Bangalore, realised the plight of farmers after he lost all papaya plants in the small kitchen garden in his backyard, due to an infectious disease last year. "We lost all papaya plants in our small yard to an infectious disease. I saw my father struggling with several unsuccessful treatments. I wondered if we are unable to get expert help to treat our plants in a big city, what must be the conditions of farmers in villages, whose livelihood depends on crops but have no means to save them," says Kaushik. "The farmers need immediate assistance to identify the crop diseases and get instant solutions," says Kaushik. "Crop diseases are a major threat to farmers, consumers, environment and the economy. In India, 50% of the crops are lost to pathogens and pests that cause severe losses to farmers," adds Kaushik. "The app, currently available to select users as it is still in the pilot phase, allows automated diagnosis and tracking of plant diseases using a novel technique, a type of AI that facilitates an instant and accurate diagnosis of crops," adds Kaushik, who received guidance from experts from the agriculture and technology domain while developing this app. Kaushik plans to make this app available to farmers in villages, after making a few more changes so that it can help to support more crops. These students were felicitated at the annual Pramerica Spirit of Community Awards held in Gurugram recently. These awards are given to young students with exceptional abilities to innovate.

## NSE to launch eight new agri-commodity contracts

The National Stock Exchange (NSE) will plunge into agri commodity trading with eight new contracts that are not traded on any other exchanges. The proposed new contracts for which the exchange has sought SEBI permission include almonds, castor oil, soya degum, urad dal, toor dal and pulses. NSE's rival BSE, which started agri commodity trading in February, has launched trading in guar seed and guar gum. BSE claims to have cornered more than 30 per cent market share in guar seed trading. SEBI has allowed exchanges to offer financial incentives on commodities not traded on other exchanges. NSE may be able to use market incentive schemes for the new contracts. Though the entry of NSE and BSE into agri commodity has created a buzz, the space has seen lacklustre growth for a while, as 90 per cent of commodity trading volumes in India is concentrated in the oil and metal space. The physical sale of agricultural produce is still administered by States, with each following its own regulations. Both BSE and NSE are trying to develop agri commodity trading, as there is no transaction tax in this segment. This may attract traders as they can generate arbitrage and jobbing volumes, experts say. An NSE spokesperson said: "We are in the process of examining several agri commodities products. All products will be launched as per regulatory guidelines and procedures."

## Ban on distance learning courses in Agriculture

Universities can no longer provide degree programmes in Agriculture through distance learning mode following a restriction imposed by the University Grants Commission (UGC). The rule, however, will not restrict distance learning diploma, certification and postgraduate diploma courses. The decision to ban degree programmes in agriculture was taken on the ground that the course work is technical in nature as it requires practical projects or laboratory courses. "The blanket ban is only on degree programmes through Open and Distance Learning (ODL). It is not applicable on certificate, diploma and PG diploma programmes that are being offered by Indira Gandhi National Open University (IGNOU) and other institutes," said MK Salooja, director, School of Agriculture, IGNOU. He adds that the short-term courses are crucial to impart skillbased education and are used for knowledge enhancement by students. "The need of distance education is high in our country as students in the interiors have limited access to resources. However, it is important for the institutes to maintain the quality of these courses," says Salooja. According to the UGC Open and Distance Learning Regulations, 2017, professional programmes such as medicine, engineering, architecture, nursing, dental, pharmacy and physiotherapy, are not permitted to be offered in distance learning mode since the courses require exhaustive laboratory training.



# SEEDING INDIA'S FUTURE

## An outlook on how seeds have influenced Indian agriculture

Seeds represent the starting point of crop production. So when the projections and forecast predict an enormous food demand in the future, the onus directly falls upon the seeds. Seeds thus become the conduit of research and innovations to not only further the food production but to address other major challenges in crop production. Right from yield increments to varietal improvements, crop protection to crop production, climate change to sustainability, seeds dictate the character and nature of agriculture production. Thus seed sector becomes a crucial element in today's agriculture.

## Seed Industry Outlook – World and India

Seed sector is an industry which constantly represents an upswing in terms of present growth and prospective growth. This probably can be explained by the enormous stress on the production of improved seeds. The phenomenon is not exclusive to India but globally.

The global seeds market reached a value of more than US$ 62.1 Billion in 2017, exhibiting a CAGR of around 7% during 2010 – 2017. One of the major trends which has influenced the seeds market is the significant shift in farming practices worldwide. Nowadays, an increasing number of farmers buy commercially produced enhanced seed varieties as opposed to using seeds from the last harvest. This has been a result of the various advantages offered by enhanced varieties of seeds such as high yield, improved nutritional quality, reduced crop damage, disease resistance, etc. Moreover, the increasing global population and the consequent rise in demand for food, coupled with the expanding biofuel production have also stimulated the demand for enhanced seed varieties worldwide. Owing to these factors, the global seeds market is further expected to grow at a CAGR of more than 6% during 2018 – 2023, reaching a value of more than US$ 86 Billion by 2023.Currently, grain seeds represent the largest seed type accounting for nearly half of the total global production. North America represents the largest producer accounting for around a third of the total market share.

India with the world's largest arable land is an important player in the seed sector. The Indian seeds market reached a value of US$ 3.6

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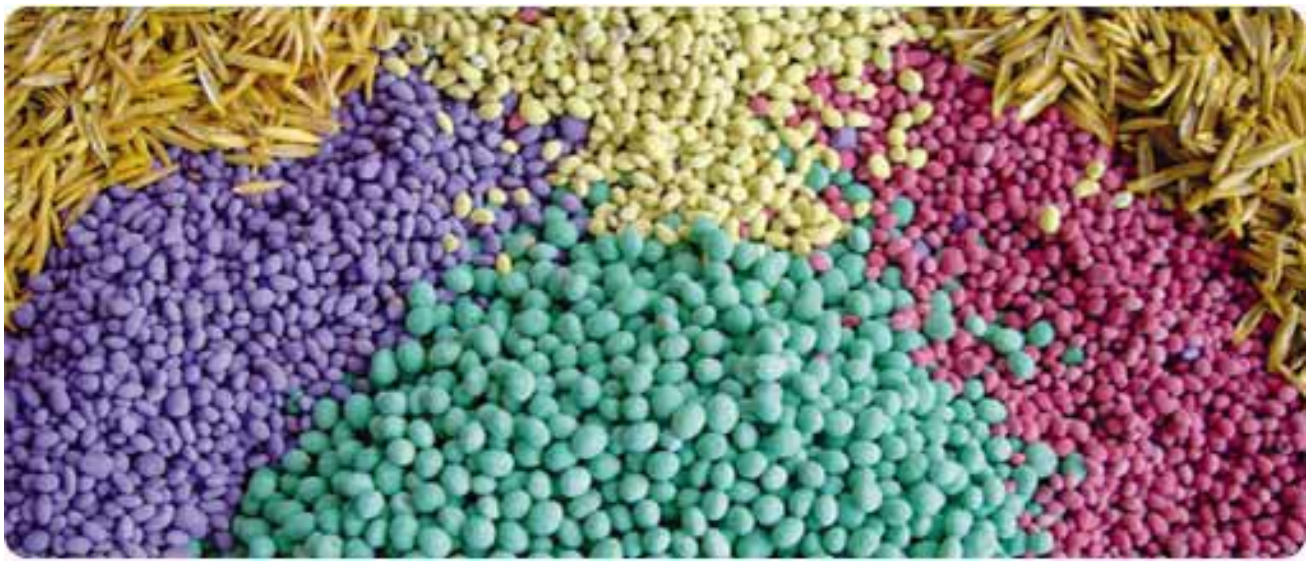


Billion in 2017, exhibiting a CAGR of around 17% during 2010-2017. The Indian seeds market is further expected to grow at a CAGR of 14.3% during 2018-2023, reaching a value of more than US$ 8 Billion by 2023.

The Indian seeds market has witnessed a major restructuring as a result of the implementation of some progressive policies by the government. Seed Development, 1988 and National Seed Policy, 2002 have helped in strengthening the Indian seed industry in the areas of R&D, product development, supply chain management and quality assurance. Owing to this, India has emerged as the fifth largest seed market across the globe. The active participation of both, public and private sectors has also played a vital role in laying a strong foundation of the industry. Growth in income levels, commercialization of agriculture, patent protection systems and intellectual rights over plant varieties, have given a great push to the market. In the Indian segment too, grain seeds represent the largest seed type, accounting for more than a half of the total seed production. Other major seed types include oil, vegetable and fruit seeds. Amongst the different states, Uttar Pradesh represents the largest producer, accounting for around 12% of the total market share.

Cotton holds the maximum share of revenue when the market is segmented by row crop. The large-scale adoption of Bt cotton seed in India has been the driving force behind this large share. Vegetables and maize are also crops with high hybridization and seed replacement rates, and hence have high shares among all the

crops. Bt cotton remains the only transgenic crop that is approved and that is being cultivated in the country. In a period of 14 years, the Bt cotton cultivating area has increased accounting for about 95% of the total cotton acreage, and has led to a surge in the Indian cotton production. Although there have been incidences of resistance in Bt cotton to pink bollworm in the recent years, the adoption rate of Bt cotton is expected to sustain.

The seed replacement rates for almost all the crops in India have considerably improved in the recent times. Over a ten-year period, from 2002 to 2012, the seed replacement rates of key cereal crops have more than doubled, with that of rice experiencing a 111% jump, wheat increasing by 154%, and maize 238%. Increasing seed replacement rates are a result of increased farmer extension and marketing activities of seed companies, as well as the general perception among farmers about yield improvements that can be achieved through replacement of seeds every year.

The Access to Seeds Foundation has released in its first Access to Seeds Index which has reported that at the global level, seed companies are active in most countries with the exception of western African region. The report found that Colombia, Kenya, India, and Thailand have the highest concentration of global seed companies. Bejo, DuPont Pioneer, and East-West Seed have the largest footprint, operating in more than 30 countries across the four study regions.

Quite recently the international seed sector has witnessed acquisitions and mergers. The DowDuPont merger in 2015, the ChemChina's acquisition of Syngenta in 2017 and Bayer's acquisition of Monsanto in 2018, were some of the major events that happened

in the global seed sector. Monsanto continues to occupy the prime position globally. In 2017, backed by its GMO advantages, Monsanto's field crop sales reached $10.098 billion, 9.9% up year on year. After the Dow DuPont merger, its new agricultural brand that shows up in the name of CortevaAgriscience has also emerged as a prominent player. Syngenta is also a significant player. Limagrain, Bayer, KWS (Germany), Sakata Seed, DLF (Denmark), Long Ping High-Tech (China) and RijkZwaan (Nederland) are other important players globally.

India has emerged as a major seed hub in Asia as 18 companies out of 24 leading firms have invested in breeding and production activities in the country, according to a latest study. Both global and regional seed industry players have invested in a big way to boost crop yields of smallholder farmers in India. According to the Index's first ever ranking, four Indian seed companies -- Advanta, AcsenHyVeg, Namdhari Seeds and Nuziveedu Seeds -- have made it to the top 10 seed

According to the Index's first ever ranking, four Indian seed companies -- Advanta, AcsenHyVeg, Namdhari Seeds and Nuziveedu Seeds -- have made it to the top 10 seed companies in South and Southeast Asia on their efforts to support smallholder farmer productivity

Vegetables and fruits were also benefactors of hybrid technology. Development of high yielding varieties and hybrid fruits and vegetables have contributed to a phenomenal growth of 11.2% and 5.6% respectively during 1991-96 period.

companies in South and Southeast Asia on their efforts to support smallholder farmer productivity. The list was topped by the Thailand-based East-West Seed. In addition, 83 per cent of the companies present in India provide some form of extension service. One of the many examples of capacity building in India, comes from Nuziveedu Seeds, which has signed a memorandum of understanding with the Uttar Pradesh government to carry out collaborative extension work on rice and maize production with 40,000 farmers in 25 districts. Namdhari Seeds' business arm, Namdhari Fresh, is a leading example of how a company can connect smallholder farmers to domestic and international export markets.

## The leading Breed of seeds

India's gamble with food production in yester years have made high yielding varieties an integral part of agriculture. Our staples such as rice and wheat changed the agricultural fortunes of the country through improved varieties. Another crop that received considerable mettle with the introduction of high yielding varieties was cotton. So were many vegetables, fruits, plantation crops and spice crops.

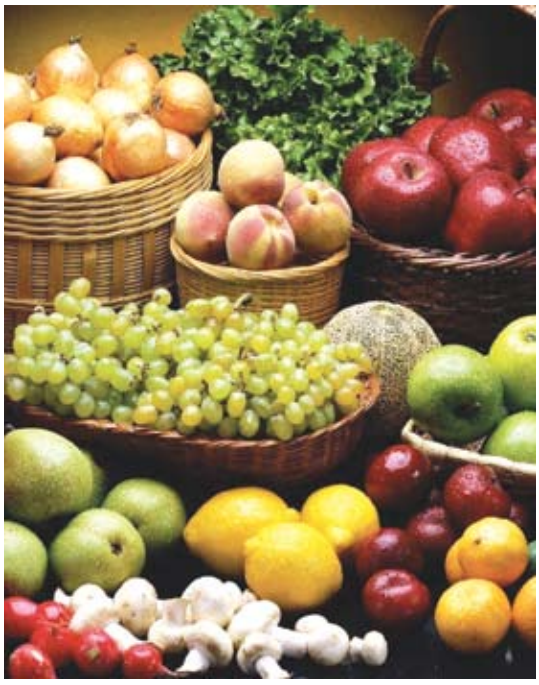
While the high yielding varieties are still the favourite of the farmers, hybrids emerged a notch higher in terms of rendering uniform quality in the yields, notwithstanding higher yields and better quality attributes. However, unlike the farm saved seeds, hybrids entailed recurrent purchases. Despite this marked departure from Indian farmers' conventional farming wisdom, hybrids gained major foot hold in Indian agricultural scene.

Although the adoption of hybrids have not been uniform across all crop categories, the deepest impact was left on the cotton production segment. India became a pioneer country for commercial cultivation of cotton hybrids, which covered more than 50% of the cotton area. Cotton hybrids gave fifty percent higher productivity than conventional varieties. Their wider adaptability, high degree of resistance to biotic and abiotic stresses and better fibre quality made them a favourite of the Indian farmers. The first intra-hirsutum hybrid cotton Hybrid - 4(H-4) was released in 1970 from Main Cotton Research Station, Surat of G.A.U. by Dr. C.T. Patel. This was followed by the development of world's first inter-specific hybrid Varalaxmi in 1972 from U.A.S., Dharwad by Dr. B.H. Katarki. India has the distinction of being the first country to have developed and grown hybrid cotton commercially.

India was also the first country to develop hybrids in pearlmillet (bajra) which resulted in an increase in production from 2.84 million tonnes in 1950 to nearly 8.72 million tonnes in 1995. The newly developed hybrids were predominantly suitable for drought prone areas of Rajasthan. The crop, however, suffers from a serious downy mildew disease. Good progress has been made in developing extra early heterotic mildew resistant hybrids and composites to mitigate the losses caused by this disease.

Vegetables and fruits were also benefactors of hybrid technology. Development of high yielding varieties and hybrid fruits and vegetables have contributed to a phenomenal growth of 11.2% and 5.6% respectively during 1991-96 period. India is the largest producer of mango, banana, sapota and acid lime. In grapes India has recorded the highest productivity per unit area in the world. Among the vegetables India occupies the first position in cauliflower and second position in onion and third in cabbage.A singular achievement has been the development of dwarf and regular bearing hybrids in mango through extensive breeding work carried out at IARI, New Delhi and IIHR, Bangalore. These hybrids can be planted in close spacing in high density orchards, accommodating 1600 plants/ ha, which yield more than ten times per unit area than the conventional varieties.

Coconut palms are also the crops that



## SEED INDUSTRY SEEKS POLICY SUPPORT

*Rajendra Barwale, Chairman Mahyco Grow*

Our Farming community is awaiting the breakout of Kharif 2019 with optimism as always, and equally awaited is the result of national election in the last week of May 2019 when the new Government would takeover reigns of policy direction of the country for the next five years.

As is well-known, Indian agriculture holds enormous potential given that our productivity is less than half of global averages for most crops. A set of prudent policies to encourage agricultural productivity improvement would reduce cost of our agriculture production, enabling improvement in competitiveness in the global market. This in turn can help improve our exports, expanding markets for our farm produce,and increasing the income of our farmers.

Some of the key areas of focus for crop productivity improvement would be Seed technology, Irrigation, low cost automation, and better soil nutrition. In addition, improved market access to farm produce will help to minimize the systemic inefficiencies to improve farmers share in consumer rupee. While we have made progress in all of these areas in the past, there exists an opportunity to speed up the policy thrust in areas like seed technology to enable access to globally competitive innovations for our farmers. During the last few years, Indian seed Industry is encumbered with policy imbroglio related to IP protection and regulatory processes, resulting in fast diminishing investments in Seed research by the Industry. In the longterm interest of our farmers, this aberration needs correction through novel policy direction from the new Government.

have found relief in the hybridization technique. The first coconut hybrid in the world was developed in India in 1930s with West Coast Tall (WCT) as female parent and Chowghat Green Dwarf (CGD) as male parent. The hybrids yielded better with favourable crop characterisics. The popular hybrids reigning south India are Chandra Sankara, KeraSankara, Chandra Laksha, Laksha Ganga, Kera Ganga. Ananda Ganga, KeraSree, KeraSowbhagya, VHC-1, VHC-2 and Godavari Ganga. Some hybrids such as Chandra Sankara and KeraSankara can yield more than 210 nuts per palm in a year. They yield high quality copra with oil content exceeding 68 per cent. The other hybrids, which yield between 116 to 186 nuts per palm in a year, are Chandra Laksha, Laksha Ganga, KeraSree and KeraSowbhagya, and they are also released for commercial cultivation in Kerala. They also produced high quality copra with oil content ranging between 65 to 68 per cent. Ananda Ganga and Kera Ganga are two hybrids with average yields hovering between 95 to 100 nuts per palm in a year. VHC-1 is a hybrid released for cultivation in Tamil Nadu. It yields about 98 nuts per palm in a year, and it produces good quality copra with an oil content of 70 per cent. VHC-2 is another hybrid suitable for cultivation in Tamil Nadu. This hybrid with a potential to yield 107 nuts per palm in a year, also produces high quality copra with 69 per cent oil content. Godavari Ganga is the hybrid developed for growing in Andhra Pradesh, and it has a potential to yield 140 nuts per palm in a year. It produces good quality copra with an oil content of 68 per cent.

Biotechnology has also swept agriculture world wide. Micropropagation has gained immense popularity in India especially in high value crops which demands uniformity in quality and consistency in yield. In India, there are about 100 commercial plant tissue culture units with a minimum production capacity of about 1 million plants per year from each of the units. Among these, at least 20 of the units have larger production capacities, with 5 to 10 million plants/year. In addition, there are more than a dozen smaller units with 0.2 to 0.5 million plant production capacities where single crops are being produced. The Government of India has identified micropropagation industry as a priority area for further research, development and commercialization. The growth in demand for tissue culture banana has increased at a high rate of 25-30%. In sugarcane also micropropagation has been widely explored. To overcome the problem of 'seed' quality, micropropagation technology has been developed to produce nearly 78000 plantlets (in vitro) from a single explant in less than six months. There is growing awareness of superiority of tissue cultured plants, and demand for crops like banana, grapes, papaya, ginger, turmeric, cardamom, vanilla, potato, Jatropha is increasing.

Genetically engineered crops also became an important part in Indian agriculture. Bt cotton cultivation began in 2002, and its acreage shot up from 0.29 million

hectares in 2002 to 9.4 million hectares in 2011-12. By this time, the Bt variety accounted for 90% of cotton acreage. Cotton yield rose to 362 kg per hectare in 2005-06, and then increased further with fluctuations to 510 kg per hectare in 2010-11. In 2001, India was a large importer of cotton. But within seven years of Bollgard's introduction, India became the world's second-largest producer and exporter of cotton. Today, India's share of world cotton production is up 68%, and exports are at an all-time high.

Despite the introduction of Bt cotton which revolutionized India's cotton production scenario, transgenics has never caught hold of any other crop category. After the introduction of the I and II series of Bt cotton, the much awaited III in line is yet to be introduced in India. There is also a long wait for the Herbicide Tolerant series as well. Bt Brinjal came close to execution, but it was widely opposed on the grounds of safety of trasgenics in food crops. Although the transgenic varieties have never been proved unsafe scientifically, the public chose caution to science.

## Conserving Varieties

With the obligation of catering to the agricultural community there came the immense responsibility of protecting the rights of the stakeholders involved. The entry of private segments and with the entry and exit of the planting materials from and to India, it became all the more pertinent to protect the biodiversity and breeders' rights.

India, signatory to World Trade Organization (WTO) was required to introduce an "effective system" for the protection of plant varieties. In compliance to the TRIPS Agreement, India established Protection of Plant Varieties and Farmers Rights (PPV&FR) Authority, under the Protection of Plant Varieties and Farmers Rights Act, 2001. PPV & FR Authority became operational from 11th November, 2005. The Authority favours establishment of an effective system for protection of plant varieties, the rights of farmers and plant breeders and to encourage development of new varieties of plants. The authority strives to accord recognition and protection of the rights of farmers in respect to their contribution in conserving, improving and making the available plant genetic resources for the development of new plant varieties. It also has the potential to accelerated agricultural development in the country

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Use of good quality seeds can increase India's agricultural productivity by 15-20%. So all the attempts to turn around India's productivity is positively dependent on higher seed replacement rate of better varieties and hybrids

by stimulation of investment for research and development both in public and private sector, and facilitate growth of seed industry to ensure the availability of quality seeds and planting material to the farmers.

Under this act, farmers who have developed or bred a new variety shall be entitled for registration as a breeder of a variety. They are also permitted to save, use, sow, re-sow, exchange, share or sell his farm produce including seed of a variety protected under this Act in the same manner as he was entitled before coming into force of this Act.

Farmer who is engaged in the conservation of genetic resources of land races and wild relatives of economic plants and their improvement and preservation shall be entitled to recognition and reward from the Gene Fund provided the material so selected and preserved has been used as a donor of genes in varieties registered under the PPV & FR Act. Any person or group of persons (whether actively engaged in farming or not) or any other Governmental or Non-governmental organization may stake a claim on behalf of the village or local community.

## Navigating Challenges

India obviously has emerged as an important seed industry. Counted as the fifth in the world, India's seed market has emerged as one of the strongest pillars on which Indian agriculture rests. But the growth and development has not been comprehensive and inclusive.

Post the introduction of seed policy of 1988, many private players entered the seed market. This raised the bar of seed production and the seed sector expanded. But the private seed sector has only been interested in multiplying high value seeds. On the other hand, the public sector is inundated with the massive task of supplying high volume low cost seeds across the nation with their intention to mainly secure food security of the country. Having said that it is mainly concentrated on major food crops. Considering the obvious limitations of the public sector, this is a huge task sometimes increasing the gap between the supply and demand. Apart from this India is facing a huge deficit in fodder requirements. Fodder cultivation is not where it is needed and one of the reasons is the lack of availability of quality seeds. Similarly traditional millets and pulses are neglected. India religiously imports a good amount of pulses to meet its protein requirements. To effectively navigate through India's diversified needs, the country should also focus on other crops which have been left out considering its lesser economic value.

Another significant factor that has affected India's productivity is seed replacement. Use of good quality seeds can increase India's agricultural productivity by 15-20%. So all the attempts to turn

# 'IMPROVED SEEDS ADDRESSING THE ENVIRONMENT ARE THE NEED OF THE HOUR'

**Avesthagen Limited, an integrated systems biology platform company headquartered in Bangalore, India, was founded in 1998 by Villoo Morawala-Patell. In an interview with Agriculture Today, Dr. Villoo Morawala-Patell, Chairman & Managing Director, Avesthagen Limited discusses the current trends and challenges faced by the Indian seed sector.**

### What is the market share of Avesthagen in Indian seeds market?

Avesthagen has carved out its Agri R&D portfolio in a subsidiary AVA Seeds Pvt. Ltd. The company's Environment Adjusted Crops TM technology would be addressing a significant portion of the Indian seed market once the technology is embedded into seed varieties through partnerships and co-development with Indian and International seed companies.

### How important is improved seeds in addressing the current challenges such as climate change, drought, flooding etc., faced by agriculture?

Improved seeds addressing the environment challenges are the need of the hour. Ava Seeds is one of the most advanced technologies today and we believe that we have a significant roles to play.

### How has the quest for quality attributes influenced the research and development in seeds?

Well, it depends on what you are looking for in Quality. In my opinion, both go hand in hand. You can have high Quality and new traits in the same seed bundled together.

### Among breeding for productivity, biotic and abiotic stress, which segment according to you would have tremendous scope in the future? How poised is the seed sector to take advantage of this?

I believe both biotic and abiotic stress need to be addressed. However, after my years of research and development experience, they have different paths. To achieve biotic stress tolerance, one needs Biomarker Aided selection and for abiotic stress, it is bio-engineering with identification of the gene and splicing it in using any of the modern genetic tools like CRISPER- cas. We have some way to go to incorporating these technologies with common sense and logic and less emotion. It will have to be done.

### Are you satisfied with the current seed replacement rate in India?

We need to think big, smart and integrating technologies, and I don't think there is any will at the moment. Its slow.

### What are the challenges associated with seed industry?

Challenges are many, small holdings, inclement, unpredictable weather patterns,.....it goes on. We need to move on collectively by integrating multidisciplinary technologies and bringing the farmer into the technology and also bringing processing and storage to the village.

### How can global cooperation in seed segment improve the prospects of Indian agriculture?

Global cooperation through shared data and open source. The time has come to end the control over Intellectual property. In my opinion there are very few people in the world capable of converting IP into Product. So open the doors.

around India's productivity is positively dependent on higher seed replacement rate of better varieties and hybrids. Unfortunately, seed replacement rates are below the optimal levels. So is the case of varietal replacements. Newer varieties are constantly appearing in the market, but the rate at which newer varieties are replaced is quite low. There are many reasons for the low varietal replacement as it is difficult to convince the farmers of the apparent benefits of a new variety when they are already satisfied by their existing varieties. Field demonstration involves time and money both of which may not be easily forthcoming. However, varietal replacement is important for the health of the agriculture system as quite often the cultivated varieties become less productive and more prone to newer threats like epidemics, droughts or other forms of stresses, Timely updation with varieties can save them from these losses.

India ranks first in the areas under rainfed irrigation. The rainfed agriculture accounts for 56.0 per cent of total cropped area, 48.0 per cent of the area under food crops and 68.0 per cent of that under non-food crops. But ironically, we are interested in developing varieties that are high yielding and hence requiring more water and fertilizers, a total antithesis of rainfed requirements. India needs to focus on research that would positively focus on raising yields of the rainfed regions. This will also help in raising the income of small and marginal farmers who are the largest benefactors of rainfed agriculture.

Climate change is yet another threat to modern day agriculture. Climate changes have already been noticed and agriculture is coping with last 2 back to back droughts. The recent heat waves are also indications of the same. As agriculture is deeply dependent on climate, our production systems must be geared to face the challenges arising out of climate change. We need to invest more on research catering to development of climate resilient seeds. In years to come, we will be in more need of drought tolerant, salinity tolerant and submergence tolerant varieties. Not only research but seed production of these varieties of adequate quantities are essential. The Indian crop improvement programme has released a number of varieties which are tolerant to various abiotic stresses and the real impact of these varieties will be realized only if their seeds are made available to the farming community.

India should also make its policy on GM technology clear. A consensus must be arrived upon by removing all the ambiguities existing in the regulatory mechanism for GM and should promote research in this promising area.

Seed enhancement is a very promising area that has been neglected in the Indian context. Seed quality enhancement involves the elevation or improvement of one or more aspects of seed performance (e.g. germination, emergence) above the level set by inheritance and achievable under natural conditions. It encompasses not only physiological treatments and conditioning (e.g. priming), but also improvements or alterations in physical seed properties that enhance plant ability and facilitate achievement of optimal stand geometry (e.g. coatings, hulling), and chemical/ biological treatments that protect seeds in the soil and regulate germination (e.g. fungicides, plant growth regulators). Presently, in the name of seed enhancement technologies only seed treatment with fungicides and/or pesticides are being used by public sector seed supply system, while highly sophisticated technologies i.e. seed coating, seed pelleting and solid matrix priming etc. are applied by the private seed sector in case of hybrids, vegetables and flower seeds. During the past three decades, the global seed industry has made tremendous progress in terms of technology marketing and regulation. India should invest more in these technologies.

India should also make its policy on GM technology clear. A consensus must be arrived upon by removing all the ambiguities existing in the regulatory mechanism for GM and should promote research in this promising area. GM technology is a promising area and India should not evade its farmers of this useful technology.

In the past, public - private collaborations have often worked well – India's public research system is typically credited with producing the upstream research on hybrid parent line development that has led to a vibrant private sector-led market in hybrid seed for pearl millet, sorghum and cotton. Yet, despite increasing public expenditure on agricultural research in recent years in India , the public sector's contribution to crop improvement remains constrained by factors including top-heavy organization and management structures, and a lack of incentives to encourage public researchers to rapidly release viable technology products or collaborate with the private sector. Greater policy attention must be given to improving management systems and innovation incentives in India's vast public research system, and to strengthening the public-private interface in the areas of crop improvement.

# **With respect** for nature

Together with our partners
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# PUBLIC-PRIVATE PARTNERSHIP

## TO PLAY A SUBSTANTIAL ROLE IN INDIA'S AGRICULTURAL SET-UP

In the wake of developing a long-term productive strategy to cut down vulnerability of farming community and extending healthy support from governments, policy makers, research and development centres, scientific institutions and civil society members, a one-day 'National Conference on Agriculture Extension' was organised by the Federation of Indian Chambers of Commerce and Industry (FICCI) on April 23rd, 2019 in New Delhi.


Delegates from across various organisations, societies, non-government bodies and associations showed their active solidarity to promote the cause of the farming community.The prominent personalities who attended the event included Deputy Director General of India Meteorological Department, Government of India, Dr. S.D. Attri; Deputy Director General (Agricultural Extension), Indian Council of Agricultural Research (ICAR), Dr. A.K. Singh and Vice-President-Sales and Marketing, JU Agri Sciences, Mr. Satyajeet Singh.

Two consecutive comprehensive sessions on: 'Innovation by Industry in Agriculture extension services' and 'Success stories in Agriculture extension'hooked upon extensive thoughts and opinions from major industrial leaders, agro-based organisations and farm-tech firms to bring ineffective and voluminous policy guidelines in favour of farming community were conducted.The sessions were moderated by Shri Pravesh Sharma, IAS (Retd.), CEO Kamatan Farm Tech Pvt. Ltd. and Adviser-Agriculture Division, FICCI and Shri V.V. Sadamate, Agriculture Extension Specialist & Former Addl. Commissioner Extension, Ministry of Agriculture & Farmers Welfare and Advisor Agriculture Planning Commission, GoI.

Speaking at the conference, Dr.A.K. Singh said, "In order to contain resourceful agriculture extension system for a healthy agricultural growth, public and private sectors must come forward and work together extensively."Highlighting the need for a focused and strategically designed policy reforms, he stressed that a long-term productive strategy would enhance in transcending the extension agents benefitting the agriculture population heftily.

Although, Public Private Partnership (PPP) model has its presence inagri extension, it is yet to be explored on a major scale for it is hundred percent utility for the availability of the extension agents for the farmers, where private sector can play an extensive role in minimising the gap.

Further, stressing on the necessity of the use of technology and tools to benefit farming community with respect to agro-eco region-based land use and weather-based agro-met advisory services, Dr. S. D. Attri emphasised on - how farmers can be benefitted through the application of such services and eventually would cut down their weather-based losses. He added that IMD is in the process of rendering its weather forecast based Agromet Advisory Services (AAS) at district level through 130 Agro-Met Field Units (AMFUs) located in different Agro-Climatic Zones.

Agro-meteorological service is an innovative tool adhered to provide real time crop and location specific agro-met data and information having a village level outreach. Mounting weather and climate predicaments toss India's food security at a major risk and likely to have an adverse impact on food production in near future. Consequently, agro-met services are an essential prerequisite to handle such forthcoming uncertainties.

According to a survey report conducted by the National Council of Applied Economic Research (NCAER) in the year 2015,farmers have been considerably benefitted. The net economic profit up to Rs. 3.3 lakh crores were generated when AAS was applied on 22 principal crops throughout the country.

Furthermore, he also highlighted the benefit of distribution of accurate weather-forecast based information under extreme weather conditioncould help in curtailing crop losses and could save valuable inputs by procrastinating the operations. But then again, there is a further need to enhance the accuracy of weather forecasts with the use of innovative tech-tools. Awareness programmes under various disciplines of agriculture and active participation from both the advisory group and the farming community could be a valuable step towards sustainability.

India has made remarkable developments on the agricultural front in the last three decades because of the several million farming communities that form the mainstay of Indian agriculture and economy. Further, long-term productive policy support, strategies based on production, public investment in infrastructure, extensive research and useful extension for crop, livestock and fisheries could significantly help in increasing the food production, its availability and security.

# ALLEY CROPPING CREATES A DYNAMIC AND VERSATILE AGRI-SILVICULTURAL SYSTEM

Alley cropping is an agroforestry exercise related to the production of agricultural or horticultural yields in alley between line of trees or shrubs. It is an agroforestry practice where agricultural crops are grown in the alleyways between widely spaced rows of woody vegetations. Alley Cropping can diversify farm profits, enhance crop production, develop landscape aesthetics, improve wildlife habitat and give protection and conservation profits to crops. By mixing annual and perennial crops that yield several products and profits at diverse times, a landowner can utilizevacant space, time and resources more successfully. Alley Cropping can be utilized for other reasons like short-rotation woody plants of fast growing woody species that are combined with forage or row crops to produce fuel wood and fodder. Plantings to enhance wildlife and pollinator habitat also can be planned with suitable species. Alley cropping is a significant system to enhance whole-farm yield in the long term. Alley cropping is used in conversion from one farming system to another. Such conversions are made easy by the improved shade and changes in microclimate that occur as trees and shrubs grow. The annual crops grown in alleys can supply short-term annual income until the trees are mature.The trees control as hedge rows are grown in wide rows and the crop is planted in the interspace or alley between the tree rows. In the cropping phase, the trees are pruned and the pruning is used as green manure or mulch on the crop to enhance the organic matter status of the soil and to supply nutrients mainly nitrogen to the crop. There are unlimited planting combinations for alley cropping systems. The main purpose of alley cropping is to increase crop yields by development of the soil and microclimate and weed control. Farmers may also obtain tree products from the hedge rows including fuel wood, building poles, food, medicine and fodder and on sloping land, the hedge rows and pruning may help to control erosion. Alley cropping generally works best

## BENEFITS OF ALLEY CROPPING

- Improved crop performance due to the addition of nutrients and organic matter to the soil and plant system.
- A decrease of the use of chemical fertilisers.
- A development in the physical nature of the soil environment.
- The addition of mulch can lower soil temperatures, reduce evaporation and improve soil fauna activity and soil structure resulting in better infiltration, reduced runoff and improved water use efficiency.
- On sloping land, the tree rows act as a physical barrier to soil and water movement resulting in significant reductions in erosion losses.
- The provision of additional products such as forage, firewood or stakes when a multipurpose tree legume is used as the hedgerow and improvement in weed control.
- During the fallow period shading of the interspaces may reduce weed growth, while in the cropping phase the mulch may inhibit germination and establishment of weeds.

in places where people feel a need to intensify crop production but face soil fertility problems. This situation is often characteristic of crowded, densely populated regions but may also occur wherever some farmers wish or are forced to enhance production on a plot of limited size.

**General Considerations:** The tree and crop species should be suited to the soils, climate and the site. Species and spacing should ensure accessibility for timely management activities such as spraying, pruning or harvesting. The size of available equipment used for the alley cropping will in part dictate the width of the alleys. Take into account growth in both height and width of trees and shrubs on either side of the alleys. Optimal tree row orientation depends on the specific alley crop and alley width. Tree rows planted on contours or aligned in a key line system can help reduce soil erosion. Managing the light for crops is important. As trees and shrubs grow, they will create more shade on the companion crops. To address this change trees can be thinned or crops can be planted that are more shade-tolerant or have a complementary growing season with the trees. Try to choose plants that have root structures that are less likely to compete for valuable resources. Understand the producer's goals for the system.

## SPECIES FOR ALLEY CROPPING

- It should have a sparse, small crown to permit sunlight penetration or should resprout rapidly after pruning, cropping, pollarding or lopping.
- It should form a deep taproot system with few lateral root branches near the surface so as not to compete with crop roots.
- It should have shallow lateral roots that are easily pruned by ploughing along the hedgerow without serious damage to the plants
- The leaf litter or some portion of it should decompose at a rate that makes nutrients available when they are needed in the cropping cycle.
- Ideally trees and shrubs used for alley cropping should fix nitrogen and should also produce wood, food, fodder, medicine or other products used by farmers or other local community.
- The species selected should grow well under the specific limitations of the site such as saline or acid soils, drought flooding, heavy winds, insect pests or other hazards.

Most producers have other goals beyond optimizing or maximizing income. Wildlife and water quality are also common interests of producers.

**Economic Considerations:** The producer should consider the value of the tree and crop products as well as their primary markets. Alley cropping takes advantage of the beneficial interactions between

crops. As a result the yields from growing two crops together can be greater than growing the same crops in monocultures or pure stands.

**Tree Arrangement:** Alley cropping designs are highly diverse and can range from simple to complex. The growth characteristics of trees and companion crops as well as the goals of the producer will help determine whether trees should be planted in single or multiple rows and whether single or mixed species should be used. Some trees have a stronger response to light than others. Producers also need to understand growth characteristics of juvenile trees. Growth rates of different species may conflict especially when species are mixed in the same tree row. If not properly designed one or more species may dominate the site and have a negative effect in mixed species plantings.

**Management Considerations-** While the alley cropping system is getting established, there are a number of management needs are to be considered:

- Fencing or other mechanisms to protect tree seedlings from grazing and browsing
- Weed control during initial years until trees reach adequate size to survive on their own
- Fertilizer application when soil tests indicate the need
- Regular inspection of crops for insects and diseases along with the use of Integrated Pest Management (IPM) practices
- Inspection of trees and shrubs for damage along with corrective pruning if needed
- Root pruning to reduce root competition between trees and crops.

As the alley cropping system grows, tree and shrub forms will change potentially affecting alley width and shade. Changes occur below ground as well with the potential for root competition developing between the rows and the alleys. Root pruning which involves subsoil ripping at the outer edge of the tree canopy during tree development may reduce root competition. Producers may shift crops grown in the alley to those more suited to new alley width and shade levels. While understanding markets for unfamiliar crops can be challenging, the ability to shift crops may also provide an opportunity to take advantage of new markets.

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# TRANSFORMING THE AGRI-MARKET ARCHITECTURE: GRAMS

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The period after independence was a time of uncertainty for India, including from an inefficient agricultural system. With demand outstripping supply, those farmers who could produce more, earned more. In fact, higher production equalled higher income. Promoting welfare of the citizens meant amongst others, ensuring food security, while triggering agricultural growth as a major intervention to address rural poverty. What followed was new production technology buttressed by foodgrain procurement mechanism. This transitioned agriculture from one of subsistence to one that got hooked to markets.

The success of intensive production system is seen in the large marketable surplus ratios in the hands of farmers. Paradoxically, this did not translate into matching returns for the farmers, implying price disequilibrium at farm-gate markets. Simultaneously, in several commodities it did not always mean that prices favoured the consumers. The root cause of such a piquant situation, combining deflation at source of production and inflation at consumer end, lay in poor market structure, where producer-consumer connect remained multi-layered and weak.

The current problems can be traced to the earlier times of food deficiency, which was responded to by a system of control & regulation. Also, bereft of an organised marketing structure, states enacted APMC Acts to promote primary wholesale agricultural markets. Majorly dominated by small & marginal farms having small lots of marketable surpluses, the producer-farmers were not always able to reach out to the distantly located APMCs. Compounding the challenge was the regulatory marketing environment that restricted free choice of trade, debilitating transaction efficiency.The Committee on Doubling Farmers Income (DFI)identifying this as a core structural weakness, recommended a new market architecture, with particular focus on the needs of the country's small and marginal producers.

A new market architecture was advocated, with a three-tiered structure comprising retail agricultural markets, wholesale agricultural markets and agricultural export market. Further, holding that markets are not merely locations to effect an immediate exchange, but also facilitate an exchange at a distant location, over space and time, the DFI Committee suggested nation-wide de-regulated market environment.

At base of this new architecture was a large number of decentralised transaction centres located within a radius of 5-6 kms from the farm gate, to facilitate aggregation of farmers' produce for efficiency in market transactions. The country would need to have a grid of such market facilitation centres, to encourage a hub-and-spoke distribution model. Located close to production regions, these centres would also serve to modernise the local retail level exchange between farmers and nearby consumers. In result, these newly conceived market centres would serve dual purpose, ie. to organise local periodic retail and also to organise the much needed direct connectivity between farm-gate and distant higher paying consumption points. The corollary was to set up associated infrastructure including weighment, assaying, primary-processing, pre-conditioning, transport and online trade platform, apart from an institutional arrangement for market operations.

In response to DFI recommendations, the Union Budget 2018-19, announced the setting up of 22,000 number of Gramin Agricultural Markets (GrAMs) preferably at the already existing periodical weekly/ fortnightly markets. The decision was also to keep them outside the purview of market regulation. The roll out process commenced soon thereafter and by end of 2018, Guidelines for establishment and operation of GrAMs were shared with the states.

The key functions at GrAMs would be to aggregate the local production, prepare it for transit to other markets, store to buffer the supply, provide logistics services for connectivity and link to a nationwide e-market platform. The first mile activities, to coordinate the flow of goods from source-to-consumers, both in immediate proximity and distantly located, would vary depending on the type of produce handled. For example, in horticulture regions the GrAMS

would undertake preconditioning activities such as trimming, sorting, grading, retail packaging, labelling and pre-cooling so that viable unit loads are prepared for connecting with markets afar. In case of foodgrains, the GrAMs would again aggregate, assay for quality, process where needed, bag and prepare to supply or store for subsequent trade. Apropos sheep rearing, activities would include shearing and wool handling; in case of fishing it could incorporate ice flake packaging or even blast freezing, and so on. In all cases, the GrAMs would also cater to local consumer footfalls and benefit them through a disintermediated direct connect.

Retention of GrAMs outside the ambit of market regulations (under APLMC or APMC Acts) allows the source to directly connect with any market of choice, and users are not restricted to sell at the wholesale market in whose jurisdiction they come under. Thereby, the farmers are allowed the freedom to transact at markets that offer optimal price points. This hub-n-spoke model empowers the sources of production with physical services to communicate their value to any terminal destination. The GrAMs will aid market expansion and facilitate the Indian village to directly link with the global village. Importantly, located at village level, GrAMs will enable the farming household to take part in secondary level activities, post the core activity of production, while simultaneously allowing the primary activity to capture higher value. The services undertaken at GrAMs will also encourage secondary agricultural activities and addto employment generation in the rural sector.

The Operational Guidelines on GrAMs list both on-market and off-market infrastructure needed to meet the vision.While a dedicated Corpus Fund of Rs.2000 crore facilitated by the Union Budget will enable on-market facilities, there exists room for building various civic amenities at the market complex, and connectivity to the markets from hinterlands by tapping MGNREGA, PMGSY, and so on.

An institutional mechanism for management of GrAMs is expected to come from gram panchayats, urban local bodies and the like, as also from the private players, farmer producer organisations, etc. The alternate management windows suggested in the Guidelines will promote a competitive environment at operational level.

The contemporary problem of high magnitude food loss, depriving the farmers the value of their labour, will also see substantive resolution in GrAMs. This decentralised post harvest management will for sure prove another firm step towards doubling farmers' income.

# INTERNATIONAL FUND FOR AGRICULTURAL DEVELOPMENT (IFAD) TO SUPPORT AND PROPAGATE UN's AGENDA FOR 'DECADE OF FAMILY FARMING'

The United Nations has acknowledged the years 2019 - 2028 as the UN Decade of Family Farming, highlighting the need to reduce hunger and strengthen food security, posing a mammoth task for the international community to contemplate and create a reinvigorated political obligation towards family farmers and shaping effective farming policies. The declaration of the Decade safeguards the continuity of the accomplishment of 2014's International Year of Family Farming.

Building on the success of the International Year of Family Farming of 2014 and on the improved knowledge about the multiple contribution of family farmers to sustainable rural life, the Decade will aim at focusing the efforts of the international community to work collectively on the design and implementation of comprehensive economic, environmental and social policies in order to create a conductive environment and strengthen the position of family farming.

Family farming is an approach of organising agricultural, forestry, fisheries, pastoral and aquaculture production, managed and operated by a family. It is primarily reliant on family labour (both men and women). Approximately, 500 million of the world's (estimated) 570 million farms are operated and managed by families. Family farmers run diversified agricultural systems and preserve traditional food products, contributing to both a balanced diet and the protection of the world's agro-biodiversity. Safeguarding local cultures, they spend their incomes mostly within local and regional markets, thus generating many agricultural and non-agricultural jobs. Family farmers, thus, hold a unique potential to improve the sustainability of agriculture and food systems, for which an enabling policy environment supporting them becomes imperative.

International Fund for Agricultural Development (IFAD) has always recognised the importance of family farming. Awareness of the wide-ranging potential returns of investing in smallholder family farmers was one of the main rationales behind the establishment of IFAD in 1977.

## Significance of Family Farming and its dynamic role in controlling hunger and food insecurity

Family farming is critical to promoting food security and better nutrition, because more than 70 percent of the food consumed in the world, is produced by family farmers. They are also among the most impoverished communities in the world, and therefore, need targeted attention and assistance for improving their own livelihoods. In particular, investment in smallholder family farmers improves local food affordability and availability, nutritional outcomes, and acts as a spur to wider inclusive rural and structural transformation.

Smallholder family farmers, despite producing the majority of the world's food, are among the most vulnerable groups to food insecurity and malnourishment globally. Despite the enormous contribution, family farmers make to global food security, they tend to be disproportionately represented among the numbers of the food insecure globally, with poverty a major driver of hunger and malnourishment among this group. An estimated 63 percent of the poor globally work in agriculture, the overwhelming majority on small landholder farms, implying relatively high levels of food insecurity among this group.

Rising incomes and urbanization are contributing to expanding demand for smallholders' products. This represents a significant market opportunity for smallholders and for other performers in food systems partnering with them. The actual estimates in figures are:

- Usual estimates of the increase in aggregate demand for food to 2050 are in the range of 50 to 60 per cent (though estimated up to 98 per cent have been recorded in different studies).
- Total food and beverage markets in Sub-Saharan Africa are projected to reach US$ one Trillion by 2030 (up from just over US$313 billion currently).

Family farmers are integral to the fabric of communities, therefore, when their livelihoods are enhanced, knock-on social and economic benefits are significant. Increased incomes and productivity of family farmers not only has direct impact on improved food and nutritional security among those vulnerable to hunger, but has the potential of generating demand for upstream and downstream services. As producers invest in their farms, the demand for inputs, machinery, packaging, storage, transport, and of on non-food products increases, which is vital to kick-start a vibrant rural non-farm sector.

This is why, significant increases in productivity and incomes among smallholders has been observed to be a key component (particularly in the early stages) of many country-level processes of structural transformation and associated large-scale reductions in hunger and poverty - as observed in many of today's fast transforming countries as well as in historical experiences from East Asian, Latin American and Europe.

## Institutionalization of Family Farming and obligatory public policies for its augmentation

Mandatory public policies are required to improve the productivity of family farmers by including more investments in research and development, especially in the context of climate change. Family farmers are among the most vulnerable to climate change. So specific actions are essential to help them introduce climate resilient varieties. Policies are also needed to help them access inputs and markets for achieving better incomes.

Investing in local food systems and, in particular, the livelihoods of local food system performers, operating across agri-food value chains, is key to boosting resilience and leveraging territorial development and food security. These performers are all too often invisible, operating in informal systems, and not benefiting from investments and development processes, despite the important roles they play.

Investments in rural women offer high returns in improving food security and nutrition at household level, as women are shown to devote additional income to the health and nutrition of children. Rural youth

emerge as a key demographic group for achieving zero hunger and driving progress in achieving Sustainable Development Goals (SDGs) considering the fact that their energy and dynamism helps in transforming agriculture and food systems across the globe.

## Contribution of IFAD in strengthening rural funding

IFAD has historically promoted inclusive rural finance, by investing in rural financial institutions, helping introduce diversified financial products that rural poor people can access, building capacity of rural poor for savings and credit, and linking family farmers to formal financial institutions.

Over the past 30 years, the development of financial systems has had an enormous impact on rural livelihoods. Ground-breaking institutions and new instruments have allowed financial services to grow and broaden their reach. Technology has allowed clients in remote communities to access a wider range of financial products. But there is still much to be done. In a changing global economy, amidst financial crises, volatile food and agricultural commodity prices, and the perils of climate change, inclusive rural finance remains a crucial element in rural transformation. Investments, partnerships and policies are needed that focus on reducing the risk of lending to rural people and developing the capacities of rural people to manage their financial affairs, on the one hand, and financial institutions to adapt their operations to the needs of rural clients and to lower transaction costs, on the other hand.

For instance, IFAD's Platform for Agricultural Risk Management (PARM) is a comprehensive risk management approach, where risks in agriculture are assessed, prioritized, and tackled in a structured and well-coordinated way. The various platforms entitled under PARM are:

- Rigorous risk assessments through a holistic approach enabling policy makers and producers to prioritize and manage a wide variety of agriculture risks with a particular focus on production, market and climate change.
- Demand-driven approach for integrating agricultural risk management into national agricultural policies and investment plans.
- Investments to mainstream the use and application of agricultural risk management tools and methods aimed at building resilience at farm level, and
- Strengthening the local capacities and knowledge on agriculture risk management through strategic partnership with macro and meso level key stakeholders (research, universities, farmers' organizations, extension services and private sector players such as micro-finance institutions).

## Improvisation for better accessibility of markets and role of private sector in optimizing it's potential:

Reliable market access boosts productivity, increases incomes and strengthens food security. It can contribute to reducing poverty and hunger for farming families and their communities, if appropriate measures are taken to reduce market risks and unequal market power.

From IFAD's experience, there are tested approaches to partially mitigate the exclusion effects of the agri-food system transformation and expand opportunities for smallholders. For example:

- Some of IFAD's projects support infrastructure development to improve the physical access to markets. Others support segments of (mostly production, primary processingand marketing)

or the entire value chain.

- IFAD is dedicated to promoting a more systematic and pro-poor way of doing business with the private sector working in value chains by developing the public-private-producers partnership (4P) approach, which ensures smallholder producers get equal and respected partners in value-chain partnership arrangements.

The IFAD-supported Value Chain Development Programme in Nigeria takes a holistic and demand-driven approach to address constraints along the cassava and rice value chains through an inclusive strategy, strengthening the capacity of actors along the chain as well as public and private institutions, service providers, policy-makers and regulators. At the same time, the programme strongly emphasizes on the development of commodity-specific Value Chain Action Plans at the local government level, which serve as the basis for rolling out sustainable activities to reduce poverty and accelerate economic growth. The objective is to sustainably enhance rural incomes and food security.

## Key resolutions to overcome critical challenges faced by family farmers

Nonetheless, we can't overcome, most of the perilous challenges faced by the family farmers until there is a strong political will among the world leaders. However, various key agencies like IFAD are coming forward to bring in some good amount of changes to mitigate the issues faced by the family farming community. For instance:

- Access to new and traditional knowledge and innovations, markets, and land, complemented by the provision of relevant and accessible skills and training (agricultural, financial, and entrepreneurial) through the use of ICTs, can enable youth to drive solutions to poverty eradication and promote long-term prosperity in rural areas.
- IFAD is the incubation centre for young, socio-economic entrepreneurs; Centre Songhai is a research and training ground for young African farmers to learn aquaculture and crop and livestock production. Even more importantly, young people learn how to apply different dimensions of sustainable development to their own lives. Young people also learn how to participate in socio-economic reconstruction, and contribute to developing their own communities.

The Centre is an economic as well as a social institution which carries out training, production and research by combining traditional and modern learning methods. The Songhai model presents an integrated system of production where agriculture, animal husbandry and fish farming interact with agro-industry and services. Values such as creativity, taking initiative, competitiveness and organizational capacity are stressed.

## IFAD's contribution in proliferation and implementation of UN Decade of Family Farming

The UN resolution on the Decade of Family Farming calls for FAO and IFAD to lead implementation of the Decade through the Joint Secretariat. Through the Secretariat, FAO and IFAD will oversee the implementation of the Decade. IFAD will work towards promoting a better policy environment and greater investments in family farming through the implementation of the Global Action Plan. The Decade supports IFAD's investment in rural people and enables inclusive and sustainable transformation in rural areas, notably through its emphasis on smallholder-led agricultural and rural growth. The Decade has dedicated activities detailed in the Global Action Plan to mainstream support for climate action, improved nutrition, youth opportunities and gender equity. The other contributions defined by IFAD are:

- Develop an enabling policy environment to strengthen family farming.
- Improve socio-economic inclusion, reliance and well-being in rural households and communities.
- Promote sustainability of agriculture, forestry, and fisheries.
- Strengthen the multi-functionality of family farmers and their capacities to promote climate change mitigation and food systems that safeguard biodiversity, environment and climate.
- Strengthen family farmers' organizations and their capacities to generate knowledge and to provide inclusive services in rural areas by improving family farmer's productivity, livelihoods and incomes.

Global cooperation, like 'Decade of Family Farming' appears to be an important aspect to raise awareness and attention to the cause of family farmers. Such cooperation can help advocate for more investments in family farming as well as improved enabling policies. A future where smallholder family farming is at the centre of agricultural, economic, environmental and social agendas is key for promoting equitable and sustainable development and consequently, IFAD is consistently building its efforts in achieving the vision and mission of SDGs.

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# REVIVAL OF THE ANCIENT CROP FOR A SUSTAINABLE FUTURE - STORY OF HEMP

Hemp has been grown across India since before Indian culture blossomed in the subcontinent. It has witnessed the rise and of fall of empires since the birth of civilization, and over centuries, workers extracted from hemp materials that made ordinary lives idyllic. Hemp is mentioned in a positive light in the Indian Vedas. Today this ancient crop has the potential to grow into a trillion dollar industry.Many countries including Canada and China grow hemp to extract materials that can be used to makeclothing, paper, medicines, biofuel, bioethanol, pulp, oral consumption pharmaceutical products and much more. Farmers in these countries live comfortable lives unlike farmers in India.

Canada and China are among the largest countries in the world in terms of land mass. Both countries have robust economies, an abundance of natural resources, plentiful agricultural land, and huge tracts of woodland. India shares such similarities with China and Canada; it has a large land mass, a large and growing economy, and is rich in many natural resources particularly woodland. Importantly, just as Canada and China can cultivate hemp so too, can, and does India. For the reasons mentioned below, it's more important than ever before to cultivate hemp.

## The Felling of Trees Is Leading to Ecological Disaster

The paper and pulp industry is one of the biggest consumers of wood fibers. It is also among the largest industries in the world. In the US alone the revenues of the forest, paper, and packaging industry are

almost100 billion dollars annually. Globally, the size of the paper and packaging industry is estimated to be 266 billion dollars and it is expected to grow to 384 billion dollars by 2025. Furthermore, the logging industry is responsible for cutting millions of acres of forested woodland every year globally. It is estimated that nearly 78 million acres of forests in the Amazon, in South America, are cut every year, and nearly 333 acres of forest land is encroached upon every day in India.

Canada has one of the largest logging industries in the world. This is no surprise as 40% of the land in Canada is covered by forests and it is the second largest country in area in the world. However, while Canada made news a few months ago because it legalized marijuana for recreational use, equally important is the fact that Canadian farmers have been cultivating hemp for years. Despite the fact that Canada has 30% of the world's forests, it is cultivating hemp, doing so partly to preserve the longevity of its forests and extract from hemp materials, such as paper that would otherwise be extracted from wooded trees. Clearly, when an industrialised country like Canada recognises the benefits of hemp cultivation, India can look at them as a benchmark.

The timber industry in India is largely unorganized, and reliable estimates show nearly 333 acres of forest land is encroached in India every day. Much of the lost forest cover can be balanced by cultivating hemp. Not only is felling of trees leading to ecological distress, but it is also increasing the amount of carbon dioxide in the atmosphere and causing numerous species to go extinct. Hemp cultivation in India will lower the amount of carbon dioxide in the atmosphere, improve the quality of air, and allow people to live healthier lives. It will also help preserve wildlife. The cultivation of hemp to manufacture paper will reduce emissions and prevent large scale deforestation. India has the dubious distinction of having 22 cities among the 30 most polluted cities in the world; hemp cultivation on large scale will improve air quality and certainly help lower pollution levels across Indian cities.

## Hemp Cultivation Can Be a Boon to India

Hemp is an ancient crop and human beings have known how to use it to manufacture products for centuries. Its use today should not be imagined as a bold new step, but rather as a rediscovery of a past when human beings and hemp shared a more intimate relationship. In the past human beings lived in greater symbiosis with nature and hemp played a part in maintaining this symbiotic relationship. It produced topical ointments for various illnesses and, in India, was even purported to have a divine origin. By cultivating hemp and reincorporating it into our culture, society can once again take steps to live in harmony with nature.

Changes are sweeping Indian society as millions migrate from villages to towns or large cities. Indians, who have always cherished their relationship with motherland and nature, are migrating by the millions to urban concrete jungles. Indian history proves that mother Earth is for everyone. Throughout history, in most parts of the world land could be owned by people, but in ancient India, land could not be owned by anyone. Hence Indians, nearly all of whom lived in village's centuries ago, held land and nature in the highest esteem and believed it was too precious to be owned. Farmers tilled the land for the benefit of their communities. Under this economic system, famines in India were unheard of. The mechanism in place in India centuries ago ensured people had a relatively high standard of living and no one went hungry. This mechanism was possible because our ancestors believed mother earth belonged to everyone.

Millions of Indians are accustomed to living in rural settings in harmony with nature as it appeals best to Indian sensibilities. The mechanism that enabled such a lifestyle was gradually put in place thousands of years ago, over centuries. The sudden disruption of this mechanism is causing chaos. Millions have been uprooted from villages across India and live in abysmal urban conditions. The impact has been so devastating

that large regions in Uttrakhand and other states are home to abandoned ghost villages. Residents of such villages have migrated to cities because it's impossible for them to earn a livelihood in villages. Hemp cultivation can allow lakhs of farmers to return to a lifestyle that is conducive to the ecosystem and suitable to their sensibilities.

For a sustainable future, resources should be used optimally and as many as possible should enjoy the highest possible standard of living. Millions across India who migrate from villages to cities realise too late their lives were far better in their villages. Furthermore, massive migration to urban centres leads to catastrophic levels of pollutions from which no Indian in urban India is immune. Hence cultivating hemp will not only allow useful material to be extracted from hemp but also lower pollution. The materials extracted can be used in numerous industries and lead to balanced development that allows people to prosper without being uprooted from their villages. Eventually, hemp cultivation will allow more industries to penetrate India's interior and create wealth for many living there while lowering pollution in urban centres and promoting balanced economic development. It will restore balance to the ecosystem.

It is also important to note that after fossil fuels, the fashion industry produces the most pollution. Fast fashion's share in the global carbon footprint is 10%. The production of synthetic fibres, pesticide use, and wastage of water during fabric production contribute to the fashion industries, carbon footprint. Thankfully, public awareness about the harm caused by the fast fashion industry is leading many to adopt sustainable fashion practices. Leading designers anticipate hemp will soon play an important part as a resource from which fabrics can be extracted in an environmentally benign manner. Hence hemp's potential to create new industries is being acknowledged by fashion industry insiders as public awareness of fabrics made from hemp is growing.

Cultivating hemp will create industries that process raw materials derived from hemp, this will allow modern industries to penetrate the interior of India, create jobs and opportunities in the interior and raise standards of living. Hemp cultivation will lessen the burden under which urban Indian cities are becoming less liveable because it will incentivise migrants to move back to villages by creating greater economic opportunities there.

Certainly, hemp cultivation is not a magic bullet that will curb all the adverse ecological and social harm that's being done, however, it is a step in the right direction and its cultivation can be but one step among several that bring about a harmonious relationship between human beings and the planet.

**By Rohitt Sharrma,**
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**IIHA**

# DHANUKA ADVT

# GRASSES - ENERGY SOURCE OF FUTURE?

Can you believe that grasses laying around the yard could actually be used as fuel for your motor vehicle and other engine types? Believe or not, the actual name for this biofuel is called **'grassoline'** and it has caught the interest of environmentalists all over the world now. As the World now faces fuel crisis, biofuels remain one of the most technically promising alternatives to oil.

In 2009,a combined research from University of Massachusetts and Michigan State University of U.S. successfully developed a new technology to produce biofuel from grasses.The key to convert cellulosic biomass into fuel.In 2017, Dr.Way Cern Khor from Ghent University in Belgium investigated on new sustainable energy sources and concluded that grasses are the perfect source of energy. Later, scientists concluded, **'grassoline' – a biofuel derived from grass that could one day power aircraft.**


Cymbopogan caesius

The cellulosic biomass comprises woods, grasses and inedible stems of plants.Fuel made out of this biomass-grassoline-could also come from wood residues such as sawdust and construction debris, to agricultural wastes such as a maize(Zea mays) or sugarcane (Saccharum officinarum) culms. All fast growing perennial grasses can be used as "energy crops". Huge amounts of cellulosic biomass from wasteland grasses can be sustainably harvested to produce fuel.

Cellulosic biofuel could replace the trust on petroleum without the problems associated with ethanol from corn or sugarcane.Ethanol is environmentally safer than gasoline and diesel, and is currently being used and tested to fuel vehicles and other engines. Instead of producing ethanol from corn or sugarcane (edible part) via., fermentation, the new technique could produce grassoline from cellulosic (non-edible) biomass.

Researchers say, using grasses and other natural vegetation in order to power engines is something that is being done to lower the amount of greenhouse gases being leaked into


**Ethanol is environmentally safer than gasoline and diesel, and is currently being used and tested to fuel vehicles and other engines. Instead of producing ethanol from corn or sugarcane (edible part)via. fermentation, the new technique could produce grassoline from cellulosic(non-edible) biomass, so far used as an animal feed.**

the atmosphere.

According to them, the cellulosic biomass could produce more than biomass than that can be converted to any type of fuel-ethanol, ordinary gasoline, diesel, or even jet fuel. Projections estimate that the global supply of cellulosic biomass has an energy content equivalent to between 34 billion to 160 billion barrels of oil per year, numbers that exceed the world's current annual consumption of 30 billion barrels of oil.

## Grass pellets,the source of alternative renewable energy!

Burning grasses for energy has also been a well-accepted technology in Western countries. 'Grass pellets' have great potential as low-tech, small-scale, renewable energy system that can be locally produced, locally processed and locally consumed, while having a positive impact on rural communities. Burning grass pellets as a biofuel is economical, energy-efficient, environmentally friendly and sustainable. Grass biofuel pellets are much better for the environment because they emit up to 90 percent less greenhouse gases than do oil, coal and natural gas.

Any mixture of grasses can be used,cut in mud-to late summer, left in the field to leach out minerals, then baled and pelleted.Drying of the hay is not required for pelleting, making cost of processing less than with wood pelleting. It is true that


Phragmites karka

pelleted grass has the potential to be a major affordable, unsubsidized fuel source capable of meeting home and small business heating requirements at less cost than all available alternatives.

Some promising perennial grasses of India, which can be used as 'energy crops' are *Arundo donax,* Bamboos, Chrysopogon spp.(origin: India), *Coix* spp. (Origin:India), *Eleusine coracana* (origin: Africa and India), *Heteropogon* spp. (origin:India), *Miscanthus* spp., *Pennisetum* spp, *Phragmites* spp., *Thameda* spp. (origin:India), *Triticum* spp., *Zea mays*, etc. In the country, the productive level of energy from these grasses needs to be well studied. Right now, the amount of biofuel that can be made from grass is still limited to a few drops. The current process is very expensive, and engines should be adapted to this new kind of fuel. **"If we can keep working on optimising this process in cooperation with the business world, we can come down on the price and maybe in a few years we can all fly on grass!**

***ASWINI M. S***
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# FOOD FRONT FOR INDIA

## SHAPING MINDSET FOR INCLUSIVE AGROBUSINESS DEVELOPMENT

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Agriculture sector in India is all set to internalize and acclimatize with many new, inclusive development and welfare catalysts. These initiatives are severally aimed at- farmers' empowerment (schemes providing direct monetary support, introduction to banking, and crop insurance) to enhance farmers' incomes;skill development; enhancing soil health and water resource use efficiency; widening of procurement support price array of crops; agribusiness development, and promoting agri-incubators, etc. It is high time for all stakeholders to capitalize on the opportunities and contribute to the new dynamic agrarian change.

Agriculture worldwide is continuously transforming upward. It is a vital economic sector, severally evolved from improvised subsistence-farming practices by early settlers. There are well-defined international laws in place that influence agri- production strategies, trade and business. Agribusiness is the business of production, processing and supplies of food and agriculture commodities, and it includes the supplies and services on both input and output sides. Agri-startups look forward to establishing and settling into innovative, disruptive businesses that are profitable and sustainable broadly; meet the market demand, and also earn the goodwill of consumers.

Agricultural trade and business are solemnly governed by - public interest, domestic laws and policies, and international agreements.Their awareness, and also the knowledge of new, relevant schemes of Government of India is important for new start-ups to develop and flourish their competitive businesses. For example, a scheme for promoting agri-startups is operated by Union Ministry of Commerce and Industry (https://www.startupindia.gov.in/ startup-registration.php) and at present Agriculture and Farmers' Welfare Ministry is also supporting sectoral rejuvenation through remunerative approaches (https://rkvy.nic.in/static/download/pdf/ RKVY_14th_Fin._Comm.pdf).

It is also important to understand that India is a big domestic market for all Indian commodities and goods. A new agro-industry in location-specific mineral mixtures for animal feed or biofertilizers or biopesticides, etc., for example, can potentially attract large volume business in Indian market itself to begin with. Therefore, new agri-start-ups can take the risk of enterprising in any area, from production to consumption or services, including those areas where multinational companies may not initially show much interest. A recent denotification of bamboo from minor forest produce list, and promotion of agroforestry for achieving national afforestation targets under climate-change commitments, for example, provide new start-ups the opportunity to build up profitable business in bamboos and agroforestry tree species. They may simultaneously profit from consequent reduction in carbon footprint.

Law is light. It guides us to perform in orderly manner. Whereas, ignorance of Law also is no excuse! It may pose difficulty at times for a real innocent person to escape liability. To illustrate this, many marginal and small farmers may not be well aware of the implications of unauthorized re-use of proprietary seeds that they once purchased from open market. Nevertheless, the spirit of law is itself against punishing an innocent. This is why there are safeguarding clauses incorporated in the Protection of Plant Variety and Farmers' Rights (PPV&FR) Act, 2001 in Chapter VI on Farmers' Rights. Such sui generis provisions of PPV&FR Act are aimed at inter-alia protecting innocent, marginal

and small farmers who may not be able to (a) foresee legal implications of using farm-saved seeds that infringe proprietary rights of breeder, and the magnitude of liability they may face if proved guilty,and (b) bear high costs of fighting court cases. It may appear to young agripreneurs and new start-ups to be a trivial or remote observation in so far as their planning is concerned.

However, knowledge of such peripheral developments in agribusiness ecosystem, together with an understanding of 'the will of law-makers' in the enactment of world's first sui generis legislation on farmers' rights may help new start-ups develop their out-of-the-box agri-businesses strategies. They can surely contribute in nation building through their business approach. The win-win outcomes may include; profits with good standing of new businesses, safeguarded welfare of farmer conservers and producers, goodwill of consumers or end-users, and credibility of the sovereign welfare State- India.

In this context, for a pro bono facilitation activity, specifically to help the farmers, farmer groups or farming communities get national awards or rewards from the gene fund established under PPV&FR Act for having evolved and conserved credible genetic resource materials over the time, which can be potentially used as donors in developing new plant varieties, please have a look at the webpage, <http://plantauthority.gov.in/PGSCANNOUNCEMENT2019.htm>. Applications can be filed with the PPV&FR Authority up to June 28, 2019.

In recent times when concerns for deteriorating soil health and depleting bioresources are rising, agriculture is also seen as a rule bound engagement for access to genetic resources and equitable sharing of returns from the commercial use of such resources or their derivatives. Therefore, new start-ups in agriculture sector need to similarly acquaint themselves with provisions of the environment protection and biodiversity laws, and genetic modification and biosafety rules.

Role of contracts and licenses in building new businesses is paramount. Start-ups need to develop that mindset. To cite a notional example, in today's scenario dominated by climate change, technology, and IPR concerns, agriculture may be seen as a 10,000+ years old goodwill contract between humans and nature!In the implicit terms of contract with settlers, nature allowed humans to freely use its resources for sustainably utilizing various biological and natural resources, for food and agriculture production. On the other side,it also required that humans must preserve and foster the ecosystem functions responsible for maintaining clean air and water, and soil health, etc., in agricultural ecologies for the benefit of sustained and healthy life on earth. However, with over-exploitation of resources and disequilibrium caused in ecosystems because of uneven developmental interventions, humans could not fully honour the contract with nature! Contracts need to be reviewed, and it is healthy to carry out mid-course corrections in mutual agreement between the contracting parties. The Human-Nature relationship will carry on anyway!

** Views expressed are that of the Author*

# REDUCING SALT
## A CHALLENGE FOR THE FISH PROCESSING INDUSTRY

Around the globe, about 11 million deaths a year are linked to poor diet. Sodium reduction is in the spotlight. News regarding awareness about salt reduction is picking-up through newspapers and governmental interventions. World Health Organization recommends reducing salt intake by 30% by 2025. South Africa became the first country to implement mandatory salt targets for staple foods. Fishes are perishable by nature and require protection from spoilage during their preparation, storage, and distribution to reach final consumers as safe and high-quality products. Although improvement of the technologies applied for preservation has stimulated the industry, traditional methods such as salting alone or in combination are still applied and have a large impact on sensory and quality properties of fresh fish and seafood. As an alternative or in addition to those techniques, fish products can be reformulated by the incorporation of active ingredients, as additives, coatings or as part of the packaging of the fish product. Brine is the most common additive in canned fish products. Ingredients used to compensate for salt reduction in a new way to make fish and seafood products with less sodium chloride; the consumption of which has been a tied to adverse health outcome is being discussed.

### Salt Content Products and Associated Safety Issues

The main source of sodium in the human diet Sodium chloride (NaCl), commonly known as salt, is essential to maintain cellular membrane potentials, maintain blood volume and osmotic pressure, and for nutrient absorption in the small intestine. But, high salt consumption has been recognized as

**SODIUM CONTENT OF FISH PRODUCTS**

| Food group | Range (mg/100 g) | Mean (mg/100 g) | Reference |
|---|---|---|---|
| Fish and fish products | 32–6000 | 512 | Webster et al. 2010 |
| Canned fish | 32–6000 | 501 | |
| Tuna | 130–950 | 405 | |
| Salmon | 47–1170 | 453 | |
| Sardines | 57–740 | 342 | |
| Anchovies | 500–6000 | 5607 | |
| Other | 32–3000 | 568 | |
| Chilled fish | 350–1170 | 789 | |
| Frozen fish | 185–590 | 370 | |
| Salmon | | | Liem et al. 2011 |
| Raw, steamed | | 110 | |
| Canned | | 570 | |
| Smoked | | 1880 | |
| Tuna | | | |
| Raw | | 47 | |
| Canned in oil, drained | | 290 | |
| Canned in brine, drained | | 320 | |

*(Source- Lienqueo et al., 2017)*

The World Health Organization recommends a daily salt intake of 5 g per day, which is estimated to reduce 23% of strokes and 17% of CVD. Moreover, a further reduction to 3 g salt per day would improve those numbers even better


detrimental to health. Its adverse impacts include elevated blood pressure and cardiovascular disease (CVD), as well as in kidney disease, osteoporosis, and stomach cancer.

The World Health Organization recommends a daily salt intake of 5 g per day, which is estimated to reduce 23% of strokes and 17% of CVD. Moreover, a further reduction to 3 g salt per day would improve those numbers even better. However, sodium intake around the world exceeds the physiological and recommended needs. In India, this type of study lacks, although natural food products contain salt. More than 75% of dietary salt is received from processed food products. For example, processed salmon and tuna contain up to 10 times more salt than the unprocessed one. Salt in processed food is used to improve flavour, texture, colour, and shelf life. In particular, it is being used historically to preserve food due to its antimicrobial qualities, derived from its ability to lower water activity in foods, creating an unsuitable environment for bacteria growth while improving taste and being low cost. Different salting levels are used for fish preservation, from soft salting that still requires refrigeration of the product, to high levels of salting, where usually the fish is dehydrated too.

Replacement of NaCl partially with KCl, MgCl2, CaCl2, LiCl has been recommended. However, enzyme activity, protein extractability and aggregation, water-holding capacity (WHC), sensory properties and texture of fishes are affected with these types of replacements.

Natural ingredients are a rich source of active components and have been studied to compensate for salt reduction at least in a laboratory or small industrial scale. A large concentration of alternative ingredient can produce changes in the colour, texture, taste, and flavour of the fish, affecting the quality of the final product. The most recommended salt to replace NaCl is KCl. Also, only a few studies study the synergies or antagonistic effects among different ingredients with the food matrix. Validation at industrial-scale must be performed that includes consumer validation in terms of food safety, quality perception, and organoleptic approval. All final ingredients must fulfil specific regulations in terms of safety, stability, labelling, and information to the agencies and the consumer.

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# STRAW FORTIFICATION FOR LIVESTOCK FEED

Feed and fodder scarcity has been one of the limiting factors for improvement of livestock productivity in India. Dairy production is mainly based on use of agricultural by-products and crop residues such as cereal straws, stover, husks, etc. These agricultural residues are low quality fodder with low nitrogen and high lignin contents. These two factors are responsible for dairy animal's poor digestibility and low intake and consequently low productivity of livestock. Expensive concentrates and milling by-products are forcing farmers to rely more upon crop residues as source of energy. India's livestock population is512.05 million (as per the 19th livestock census) with a share of about 10.7% of world's total livestock population. It was estimated that, the shortfall of dry fodder is 163 Mt and the inadequacy of green fodder is 79 Mt. This shortage of fodder is due to growing importance of food crops and other cash crops to meet the needs of the growing human population.

The rice and wheat straws are the main crop residues which farmers usually store and use as ruminant feed in India, especially during the long dry season whereby natural forages are limited in supply. These straws are characterized by low crude protein (2-5%), high lignin (NDF > 50%) and crude fibre (34%) contents with low available energy content (digestibility:< 60%) resulting in low intake and utilisation by the livestock. Fibre contains high energy but is not available to animals due to its highly indigestible nature. Therefore,several treatments have been proposed for upgrading the nutritional value of poor quality roughages.

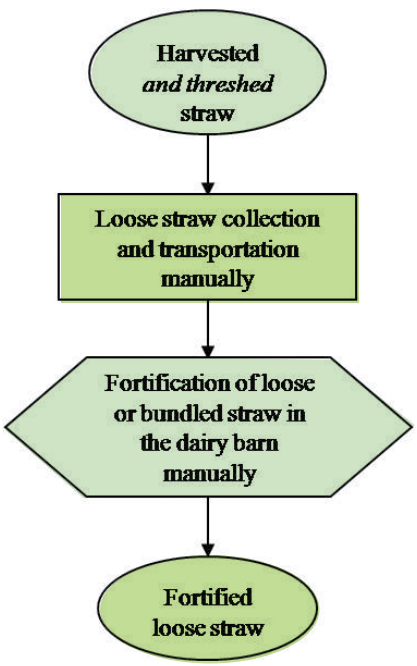
## Straw fortification by various treatments

Various treatment methods are being used to improve the nutritive value of rice straw; those include physical, biological and chemical treatment.

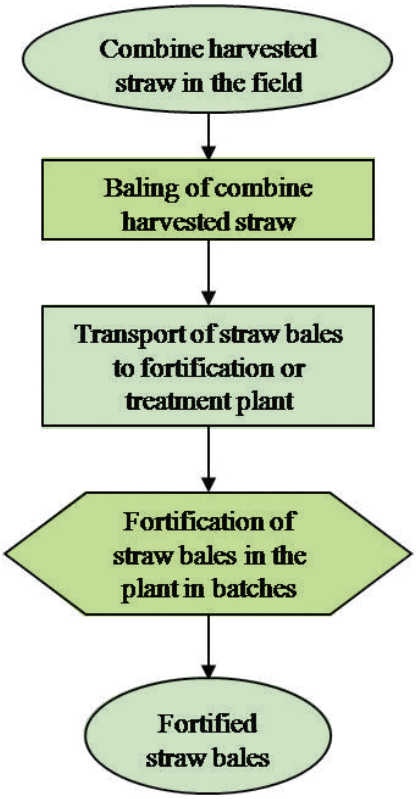
Among these methods chemical, physical and/or combination of physical-chemical methods of straw fortification is being widely practiced as a method of improving intake and digestibility.

In physical treatment methods, crop residues can be ground or chopped to reduce particle size or can be treated with steam/pressure or soaked. These methods improve the quality of cellulosic feedstuffs for animals by freeing digestible materials from lignin or silica. But these treatments are not practical for use on small scale farms because they require machines or industrial processing.

The use of fungi and/or their enzymes that metabolize lignocelluloses is a potential biological treatment to improve the nutritional value of straw by selective delignification. The potential of biological treatment would be explained by the ability of certain microbes to disrupt plant cell by partial breakdown of the lignin-carbohydrate complex thus improving their utilisation in the rumen by increasing the availability of fermentable energy to rumen microbes.




*Schematic flow chart of loose straw fortification method*




*Schematic flow chart of baled straw fortification method*

In chemical treatment methods, chemicals are used to improve the utilization of crop residues by ruminants by improving their feeding value. The chemicals may be alkaline, acidic or oxidative agents. Among these, alkali agents have been most widely investigated and practically accepted for application on farms. Basically, these alkali agents can be absorbed into the cell wall and chemically break down the ester bonds between lignin and hemicellulose and cellulose and physically make the structural fibres swollen. The most commonly used alkaline agents are sodium hydroxide (NaOH), ammonia (NH3), lime and urea.

The fortification/treatment of crop residues with ammonia can increase digestibility of dry matter by 20-40%, crude protein content

by 2- 3 fold and increase voluntary consumption by 20-35%. Use of a cheap source of nitrogen such as urea to improve the nitrogen makes it a technically feasible method to improve the nutritive value of straw. The fortification of straw from lime can also improve the utilization of straw by the livestock and supplement the ration with calcium, which has been found to be in a negative balance in cattle feed like rice straw.

The acid detergent and neutral detergent fibre content of high moisture hay will be reduced by treating it with urea and that will increase the digestibility of their fibre components. The daily gain of animals fed by anhydrous and aqueous ammonia fortified rice straw also improves at least by 20 and 30% respectively. Addition of anhydrous ammonia into the high-density round bales of rice straw improves palatability to cattle and conditions of straw to withstand for long periods of outside storage. Researchers concludes that the voluntary feed intake is also significantly higher on urea treated rice straw rations stored either as stack or bale compared to untreated rice straw ration stored either as stack or bale. The lactating goats fed by urea-treated wheat straw would significantly increases the percentage of fat, solid not fat, casein and decreases pH of milk compared to those fed on wheat straw alone. Molasses is another such fortification ingredient that increases the palatability of the straws due to its high sugar content. It also acts as a binder for the densification of straw.


*Various loose straw fortification methods*
*(a indicates straw chopped to small pieces for fortification, b&c shows non chopped loose straw fortification and d represents fortification by spraying and stacking of bundled straw layer by layer).*

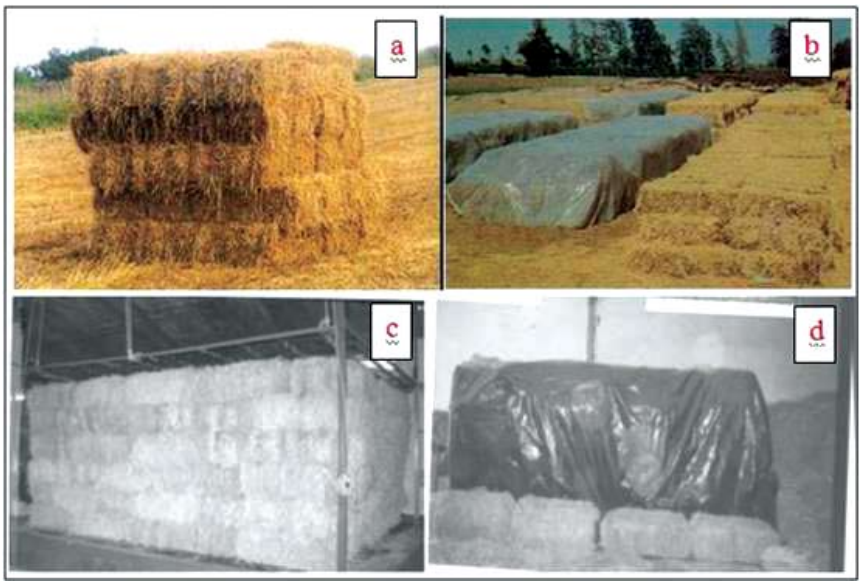
Among the chemicals being used for straw fortification, ammonia and urea have gained considerable attention because these chemicals make the treated material palatable by solubilizing the hemicellulose fractions, thus improving the DM digestibility and daily DM intake. In India, use of urea for straw fortification is common because of its easy availability, safety and ease to handle as it is soluble in water.

Two types of chemical treatment methods are being practiced in India for straw fortification.

One is fortification of loose straw near to dairy barn or cowshed and other being fortification of baled straw in treatment plant. The loose straw fortification method involves collection of straw from the field manually and transporting the collected straw near to the cowshed.

The straw will be chopped and spread on the clean and hygienic floor near to cowshed or dairy barn. The required amount of fortification chemical will be sprayed on to the spread straw layer by layer. The sprayed straw will be mixed thoroughly in order to ensure uniformity of spraying. In this method, collection of straw from the field and transportation to the cowshed or barn, preparation of urea solution, sprinkling of solution on straw and pressing the straw during treatment process are the steps involved. This requires more number of labours and also more time to fortify per unit weight of straw.

The second method of straw fortification involves baling of straw in the field, carrying the bales from field to treatment plant. In treatment plant, the bales will be stacked by placing one above the other up to a three to four bale height. The pre calculated amount of fortification chemical will be dissolved in known quantity of water to form a solution. Then the fortification solution is sprayed or dripped on the stack of bales in plant with the help of sprayer or dripper. After fortification, the fortified bales maybe left on the treatment plant for an hour in order to drain the excess flow of fortification solution from the bales before it get shifted to incubating place. This method of fortification is well suited for large scale whereas loose straw fortification method is best suited for small scale requirements. This method is better as compared to first method in terms of saving time and labour expenses. But still it requires considerable number of labour for loading and unloading bales to and from the plant, aligning the dripping or spraying system to the stacks of bales in plant and covering the treated bales off-side the plant. Because of these reasons, the total cost of fortification per unit weight of straw will increases.




*Fortification of baled straw in treatment plant (a & c and b&d represents the straw bales in batch type treatment plant before and after fortification respectively).*

In these traditional fortification methods, the fortification of straw will be done in number of steps. Because of this, the traditional fortification methods become more time consuming and labour intensive process. To reduce the number of operation i.e., baling operation and later fortification process, a simultaneous in-field fortification cum baling operation is needed. So that the separate process of bales or straw fortification can be eliminated and which results in saving of time and labor expenses leading to cost for fortification.

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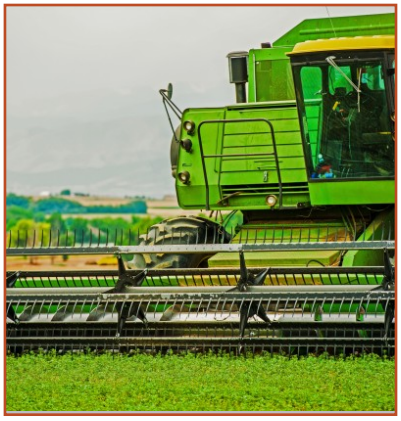

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"I have always said loan waiver shows backward agriculture. It shows non-viable agriculture. When politicians talk of loan waiver, they are accepting that agriculture is not economically viable. They are giving a wrong signal that farming is not economically viable"

**PROF. MS SWAMINATHAN**
**Eminent Agriculture Scientist**

"Modi has destroyed the farmers of this country. He came to power making false promises. I will not say we will deposit Rs. 15 lakh in everyone's bank account. I will give you a practical number. We will deposit Rs. 72,000 in the bank accounts of the poor people"

**RAHUL GANDHI**
**Congress President**

"We will solve the problems of farmers once the Congress and NCP's UPA comes to power. We will also give complete loan waiver to farmers as well as 1.5 times support price. We don't just make announcements"

**SHARAD PAWAR**
**NCP Chief and Former Union Agriculture Minister**

"I do worry about waiving loans because it only targeted to those farmers who have taken loans from the system, not the poorer farmers who have loans from the money lenders or an agricultural worker who never got a loan in the first place. So I would rather have a better-targeted system"

**RAGHURAM RAJAN**
**Former RBI Governor**