



SEEDING *India's Agricultural Growth*

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Seeding India's Food Security

eeds have spurred India's green revolution. From improved seeds to hybrids to genetically modified varieties, Indian farmers have had the fortune to dabble with different genres of seed sectioning Indian agriculture into different phases. Notably, each of these phase was engendered by 'a set of seeds' that changed the course of history of Indian agriculture. Seeds in fact were responsible for many revolutions and transformations that this country had witnessed. The famed' Green Revolution' that took India's agriculture to new heights was also based upon the seeds



that produced good yields. Seeds of high yielding varieties of wheat sowed the seeds of green revolution in India. The most recent in that series would be 'Bt cotton' which transformed India's cotton economics. Good yields coupled with resistance to pest attack gave the cotton farmers in India better returns. Invariably good seeds produced good results.

But arriving upon a good seed is a herculean task. It involves years of research and standardization before it reaches the farmers. Today, most of the farming in India depends upon these seeds that are released by research bodies or private companies.

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. Although the private players flooded India's seed sector, they are more interested in high value low volume seeds. The responsibility of supplying seeds of food staples still rests with the public sector. Use of good quality seeds can increase India's agricultural productivity by 15-20%. 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.

India ranks first in area 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 emphasize 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. Seed enhancement is a very promising area that has been neglected in the Indian context.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.

Seeds are central to India's food security. They sow the seeds of prosperity in the lives of farmers and nation. India should take bold measures to address the inefficiencies or gaps in the system.

Anjana Nair

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The Lively Crop Insurance Segment

Agriculture segment drives Non life insurance business

he realization that agriculture is a risky proposition and the possibilities of the vocation running into losses has spurred the insurance segment of the country. For the first time, agriculture have driven the insurance growth in the country and the non life insurance segment recorded 32% growth the last fiscal and crossed the Rs 1-lakh-crore mark for the first time.

Data released from the Insurance Regulatory and Development Authority of India (IRDAI) for the year 2016-17 for nonlife insurance companies has recorded that the total premium income jumped to Rs 1.27 lakh crore from Rs 96,376 crore in FY16. Backed by the Pradhan Mantri Fasal Bima Yojana (PMFBY), Crop insurance for the first time has emerged as the third largest line of business after motor insurance and health insurance.

This kind of growth usually depicts the growth in the economy or new investments or sale of automobiles. This year, the industry has managed to record its highest growth since liberalisation, despite absence of any new projects, due to the opening up of crop insurance. Of the 32% growth, nearly 16% has been clocked by crop insurance.

The Pradhan Mantri Fasal Bima Yojana was launched a year ago replacing the pre existing National Agricultural Insurance Scheme (NAIS) and Modified NAIS. The scheme offered the lowest premium rate of only two per cent of the sum insured from farmers for all kharif crops and 1.5 per cent for rabi crops. For horticulture crops, the annual premium was fixed at five per cent of the sum insured. The balance premium would be paid by the government to the insurance companies. In 2016, the number of farmers opting for crop insurance in the kharif season has increased by over 22% compared to 2015. According to the Agriculture Ministry data, over 3.77 crore farmers have enrolled in PMFBY in Kharif 2016 against 3.09 crore farmers who had opted for crop insurance in kharif 2015.

Besides offering low premium rates, PMFBY also covers pre harvest losses i.e., if the damage occurs while seeds have been planted. So were be the post-harvest losses. The insurance amount covered was also not capped and so were the premium rates. What made the scheme more welcoming was that the data for crop cutting experiments could be uploaded through smartphones, mobiles, drones etc. to speed up the claim process. The unit of assessment has been kept as individual farms, against villages as was in the earlier insurance schemes. It was a demand driven scheme, therefore no targets were fixed.

The fact that the agriculture insurance segment has gathered momentum is a good sign. Indian agriculture in the past two years was reeling under the effect of drought. Farmer suicides were rampant and the fact that agriculture entails instability and unpredictability was assertively demonstrated. Insurance against this volatility is a proactive step and that the farmers are embracing it is reassuring. The increase in the number of farmers opting for insurance each year, shows the acceptance level of this method to vouch for safety. When every state is competing with each other to waive massive amounts of loan in the name of helping and protecting agriculture, there are very few political leaders who opt for this line of security. Crop insurance prepares the farmers for hard times at their own expense and it creates a good credit culture among farmers unlike loan waivers.

By bringing farmers' life center stage through projects like PMFBY, the government has brought soul back into agriculture. Farmers have become more than engines of food production. Although crop insurance is covered under non life business in insurance jargon, if rightly executed they are life insurance for farmers.

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Indexing Agricultural Assets

Government to geotag nation's every piece of agricultural land

sset creation, although a significant factor deciding the development of agriculture, has not always yielded the desired result. Part of this discrepancy has been the result of a marked departure of reality from the records. To harmonise this incongruity and to ensure accountability the government has decided to geo-tag all the agricultural assets in the country.

An MoU has been signed between Ministry of Agriculture and National Remote Sensing Agency (NRSA), ISRO for geo-tagging every piece of agriculture land created under Rashtriya Krishi Vikas Yojna (RKVA) in the country. An exercise that guarantees better land and crop management, will tag geographical identification parameters like latitude and longitude to various media such as a photo or video which eventually help users to find a wide variety of location-specific information from a device. It provides users the location of the content of a given picture.

National Remote Sensing Agency (NRSA)'s software platform, Bhuvan, allows users to explore a 2D/3D representation of the surface of the Earth. It also acts as a platform for hosting government data. Bhuvan Application Services that are diversified and relevant for many ministries have already been released. The assets created under RKVY could be monitored by geotagging them using BHUVAN, a geoplatforn of National Remote Sensing Centre (NRSC) of ISRO, Hyderabad. In future, the location of the infrastructure created and distances from each other could also be utilised for arriving at distribution of assets and optimum number of that particular asset required in a district or state. The process involves development of a mobile app for mapping the assets through photographs and geo-tagging before hosting on to DAC –RKVY platform that would be specially created for RKVY monitoring.Since 'Bhuvan' is an open-source mapping platform, these assets will probably be visible for public viewing as well. Geo-tagged assets will not only ease identification and monitoring; it can also be implemented to perform additional developmental works on existing assets like creating watershed and drought-proofing irrigation facilities through terrain mapping.

Geotagging holds immense potential in scientific planning of infrastructure projects. Several assets have been created in the states under various schemes of the Ministry of Agriculture. Under RKVY also, states have been utilizing substantial amount of funds for creation of infrastructure/assets in agriculture and allied sectors such as soil testing labs, pesticide testing labs, bio fertiliser setting units, custom hiring centres, vaccine production units, veterinary diagnosis labs, dispensaries, milk collection centres, fish production units, godowns, cold storage, shade nets, pandals for vegetable cultivation etc. Monitoring of such wide spread activities is of paramount importance to states and Government of India to understand flow of funds, inventorising the assets, bringing in transparency, planning of assets for future, and finally informing the farmers about the facilities available.

The technology would provide crop-wise details as evidence in case of crop damage and enable officials to verify claims. In terms of land management, satellite imagery would be used to cross check with the details on the ground. Ultimately, there would be data base of all lands under the Ministry.

Geotagging has already been successful with some departments in the government ministry. Ministry of Rural Development has very well utilized this method for monitoring of assets for MGNREGA and Department of Land Resources for monitoring of watershed activities in the states. Postal department has also geotagged the post offices using NRSC Bhuvan Platform.

More than 1.5 lakh assets have been created/ developed under RKVY in agriculture, horticulture, livestock, fisheries and dairy sectors. It is high time a system is put in place to monitor them, index them and eventually understand them. This progressive step has immense potential in agriculture not only in creating transparency in the existing schemes but also for formulating development schemes in the agriculture sector.

MMMENI

Introducing a New Fertilizer Regime

From June government to introduce DBT in fertilizers

his June, Government of India is attempting one of its biggest subsidy reforms across the country. Enthused by the success of Direct Benefit Transfer (DBT) of fertilizers implemented in pilots districts, where fertilizer subsidies were transferred to manufacturers on the basis of actual sales, the pan India roll out of the scheme is expected to pave the way for implementation of the direct benefit transfer (DBT) system in this sector with a potential to save up to Rs 7,000 crore by plugging leakages.

A variant of the actual DBT scheme, subsidies for fertilizers are not transferred to the actual end users – the farmers. Instead, the difference between the actual value and the subsidized price of fertilizer is deposited in the companies' bank account after actual details of sales through the Point of Sale (PoS) is furnished. Implementation of DBT in the strict sense is difficult to be materialized in the fertilizer segment, atleast not in the near future as the beneficiaries and their entitlement is not clearly defined. Multiple subsidized products, urea and 21 grades of Phosphatic & Potassic fertilizers have different subsidy rates. The subsidy rate in respect of urea varies from company to company due to different production processes, energy efficiencies of plants, vintage etc. As the amount of subsidy in some fertilizers, particularly urea is more than double the MRP, it will be a huge financial burden on the farmers to pay the MRP and subsidy upfront and receive the subsidy amount subsequently.

Apart from this, DBT scheme for fertilizers also differ with other subsidy schemes in terms of the quantity delivered to the end users. Unlike other subsidy schemes as in the case of LPG or food grains, where subsidy is capped for certain quantity per household or individual, the government has chosen to adopt the "no denial" policy in the case of fertiliser sale. Anyone who presents his Aadhaar number will get the fertilizer at subsidized rate.

To ascertain the actual quantity of fertilizers required, the retailers have the added responsibility of recording the quantity sold to farmers whose authentication is done through Aadhaar cards, voter IDs or Kisan credit cards. This requires the mammoth task of installing PoS machines across the entire registered fertilizer retail stores in India which runs to around 2 lakhs in numbers. So along comes with it the inherent difficulties associated with the working of PoS - network failures in PoS operations and biometric authentication glitches. Besides this, the perennial issue of delay in payment of subsidies to the manufacturers after the companies have incurred all cost upfront will affect the program to roll out smoothly.

The scheme apart from plugging the leakage of subsidies and diversion of fertilizers to non-agricultural uses, can also assess the fertilizer quantity that is actually sold across the country. Beyond this, the quantity can be linked to the soil health card scheme to ascertain the actual need of fertilizer. However, the soil health card scheme has by far achieved only 40% of its target. Once it attains completion, the country's actual fertilizer need can be assessed and the fertilizers can be delivered accordingly. Apart from saving subsidies, the DBT scheme in the future can regulate the fertilizer sale per farming unit in an attempt to contain the malaise of overuse and hence bring in a balance of nutrients in the soil. Against an ideal combination of 4:2:1, NPK national average of 7:3:1 has resulted in drastic reduction in crop yields over the years. To ensure nation's food security, it is imperative to scale down this ratio and bring in a more economical and efficient fertilizer usage.

The month of June and subsequent months of introduction of DBT is sure going to be laced with difficulties and criticisms. But this is one reform that can modify India's agriculture scene for good.

Ammending APMCs

Revamped model APMC Act looks promising

gricultural Produce Market Committee (APMC) Act is still a sore point between the Center and the State. Despite its conceptualization more than a decade ago, the actual realization on ground hasn't happened yet. Despite its benefits for farmers, many states have abjectly rejected the modified APMC act in favour of the preexisting one.

Recently Niti Ayog has taken the initiative to bring all states on board for addressing anomalies in the existing Agricultural Produce Market Committee (APMC) Act and to boost farmers' income. The revamped model APMC Act, would likely include provisions for single-point levy of taxes, uniformity in mandi taxes, delisting of fruits and vegetables out of the APMC ambit, electronic trading and allowing private players to have their own market yard. The new proposed act would likely remove the concept of notified market or mandi area which will enable farmers to sell their produce to highest bidder. The entire state would likely be treated as one market for promotion of contract farming. At present states, such as Punjab and Haryana levy 14% taxes, including VAT, mandis taxes etc., on the grain purchased from the farmers which drives away private procurers of the commodity.

Agricultural Markets in most parts of India are established and regulated under the State APMC Acts. The whole geographical area in the State is divided and declared as a market area wherein the markets are managed by the Market Committees constituted by the State Governments. Once a particular area is declared a market area and falls under the jurisdiction of a Market Committee, no person or agency is allowed freely to carry on wholesale marketing activities.

Over a period of time, these established markets became restrictive and monopolistic markets, providing no help in direct and free marketing, organised retailing and smooth raw material supplies to agro-industries. Exporters, processors and retail chain operators cannot procure directly from the farmers as the produce is required to be channelised through regulated markets and licensed traders. There is, in the process, an enormous increase in the cost of marketing and farmers end up getting a low price for their produce. Monopolistic practices and modalities of the state-controlled markets have prevented private investments in the sector.

The system of APMC, which forces farmers to sell only at mandis has outlived its utility. The Model APMC Act 2003 which was circulated to all states for adoption, failed to address monopolistic and uncompetitive practices in inter- state trading of agricultural products. Some states have introduced barriers to trade within the country through taxation and technical requirements. As many as 18 states and union territories, including Andhra Pradesh, Gujarat, Maharashtra, Karnataka, Rajasthan, Madhya Pradesh and Uttar Pradesh have fully or partially modified their APMC laws for allowing electronic trade within the mandi premises. However, Odisha, Tamil Nadu, West Bengal, Assam, Bihar, Kerala and Manipur is yet to follow suit.

Removing market distortions will create greater competition in markets and will promote efficiency, growth and facilitate the creation of a national agriculture market. By introducing modified APMC, the focus of the government is to bring greater transparency and competitiveness in price discovery for bringing benefits to farmers. A barrier-free market - coupled with removal of controls, licensing system, intermediaries and state-imposed levies on farm commodities - will benefit both sellers and buyers. It will lead to the smooth flow of food items from surplus to deficit areas, easing supply-side constraints and softening food inflation.

Creating a national market for agriculture across India's 7,000-odd APMC market yards will help remove market distortions, improve price discovery, create a level field for stakeholders and promote efficiency. It will widen the supply pipeline, reduce artificial shortages, and allow processors and consumers to procure from across the country, thus helping farmers realise increased returns.

Agrium-PotashCorp deal may impact competition

• The CCI has sought public scrutiny of the proposed merger of Canadian firms Agrium and PotashCorp after "prima-facie" concluding that the deal might adversely impact competition. This is the second time in a span of a month that the Competition Commission of India (CCI) has sought public scrutiny of a mega deal after the proposed Dow Chemical Company-DuPont transaction. Agrium Inc and Potash Corporation of Saskatchewan Inc are Canada-based companies. Agrium is a producer of crop nutrients and a direct-to-grower distributor of crop inputs, services and solutions.



PotashCorp produces and supplies fertilisers and related products. "The Commission is of the prima-facie opinion that the proposed combination is likely to have an appreciable adverse effect on competition," an official release said. Already, the two entities have made public details of their proposed deal as part of the scrutiny process directed by the CCI. The public notice is to bring to the "knowledge or information of the public and persons affected or likely to be affected by the proposed combination", the release said. While both firms do not have a physical presence in India, they are shareholders in Canpotex -- which sells potash to Indian purchasers.



Fertiliser cos to get subsidy only after PoS retail sale

• Moving a step closer to introduce DBT in fertiliser sector, the government has decided to pay from June onwards fertiliser subsidy to manufacturers only after sale of soil nutrients via PoS devices at retail level. The move will help reduce the government's fertiliser subsidy bill by up to 20 per cent through plugging diversion and leakages. The Centre has provided over Rs 70,000 crore for subsidy payment for this fiscal. At present, the subsidy is paid to manufacturers after they submit receipt-at-district or dispatchfrom-plant. "From the kharif season of this year, the subsidy will be transferred to the company the moment fertiliser gets sold via the point of sale (PoS) machines," Fertiliser Secretary Bharathi Sivaswami Sihag. The government has decided to introduce this system from June this year in a phased manner after the success of its pilot study 'DBT in fertiliser sector' conducted in 17 districts across the country.

Jain Irrigation Announces Investment in United States' Largest Micro Irrigation Dealers - Avi & Idc

● Jain Irrigation Systems Limited ("JISL") through its multi generation Wholly Owned Subsidiary in United States of America agreed to acquire 80% stake in 2 US entities. Two of the United States' largest microirrigation dealers - Agri-Valley Irrigation, Inc. ("AVI") and Irrigation Design and Construction, Inc. ("IDC"), have entered into an agreement to merge ownership of their businesses into a newly formed distribution company. The new organization is an un-paralleled leader in design, construction, service, and innovative Ag Technology. This entity will provide a unique platform to help growers implement state-of-the-art irrigation technology and achieve "More Crop Per DropTM". JISL already has a presence in U.S. micro irrigation market through its wholly owned subsidiary Jain Irrigation, Inc., (JII) which is headquartered in Fresno, California. California drought has now eroded with significant rains over the last few months. Therefore, now there is strong irrigation business opportunity in the next 18-24 months for the merged distribution company as well as JII.

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NFL registers record output, sales in FY 17

National Fertilizers Limited (NFL) has recorded its best-ever operational performance by producing 38.10 Lakh MT (LMT) of urea with an overall capacity utilization of 118 per cent during 2016-



17, surpassing the previous best production of 37.99 LMT achieved during 2015-16. The company has also made record production and sale of industrial products including nitric acid and ammonium nitrate worth around Rs 189 crore. In addition to urea, NFL also imported and sold DAP and bentonite sulphur to farmers during 2016-17 with the objective of providing all agri inputs to farmers under a roof. NFL has set an ambitious target of achieving a turnover of Rs 15,000 crore in coming years to realise its vision. With Urea being its core business, the company is making successful forays in other fertilizers like DAP, MOP, NPK, Bentonite Sulphur in addition to providing Seeds and Crop Protection Products to farmers.

Agro corpn ties up with ITC for potato supply

The Punjab Agro Industries Corporation (PAIC) has tied up with ITC to supply it 3 lakh bags of processing grade potato from them. Potato will be procured for Rs 500 per quintal besides the cost of the gunny bags and loading. Revealing this, Managing Director of the Puniab Agro K. S. Pannu said. He said mainly farmers grow table varieties but in some districts like Patiala. Fatehgarh Sahib, Ludhiana and Bathinda, processing grade potato was also grown. The ITC would accept tubers containing sugar up to 12 per cent and not beyond this limit. Likewise, Mahindra and Mahindra would procure 40, 000 bags of potato. PAIC has already 20,000 bags of potato for the ITC.

Emami takes its edible oil pan-India with Rs 200 cr investment

● Emami Agrotech, part of Kolkata-based Emami Group, plans to launch its edible oil brands across the country with investment of Rs 200 crore. The company will launch range of edible oils, including sunflower, mustard, soyabean and rice bran, under its Healthy and Tasty brand in Maharashtra, Delhi, Uttar Pradesh, Haryana, Punjab, Bihar and Odisha in the first phase, and take it up in Chhattisgarh, Madhya



Pradesh, Rajasthan, Jharkhand followed by rest of India. The company has one of the largest port-based edible oil refinery of 4,000 tonnes per day at Haldia in West Bengal, besides another 1,300 tonnes at Krishnapatnam Port in Andhra Pradesh. This apart, the company plans to invest Rs 100 crore in setting up an oil mill at Jaipur in Rajasthan to process 500 tonnes of mustard seed into oil. The plant is expected to be commissioned in eight months. To further strengthen its port-based edible oil refining capacity, it recently acquired land near Kandla Port in Gujarat, and expects to put up an oil refinery in 15 months. It is also in final stage of discussion to buy land near JNPT near Mumbai.

Delhi High Court stays reinstatement of contract between Monsanto, Nuziveedu

● The Delhi High Court stayed its single judge's order reinstating a sublicence between US-based agro major Monsanto Technology and three Indian seed companies, which the foreign entity had terminated. A bench of Justices S Ravindra Bhat and Yogesh Khanna issued the interim direction on Monsanto's appeal against the single judge order of March 28. The March 28 order had held as "prima facie

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illegal" the US company's decision to terminate its sub-licence with Nuziveedu Seeds Ltd, Prabhat Agri Biotech Ltd and Pravardhan Seeds Private Ltd. Appearing for Monsanto, senior advocates Kapil Sibal, Pratibha Singh and Sandeep Sethi argued that the court cannot restore a contract terminated by either of the parties.Monsanto had terminated the agreement in November 2015 with the three Indian companies over the issue of payment of a 'trait fee' under the sublicence. The single judge had said that the US company "was duty- bound" to consider the seed companies' request to modify the terms of the sub-licence with regard to the trait fee. The judge had said that since Monsanto had not adhered to its obligation, its demand for a fee higher than what was permitted by law, was "not lawful".

Dhanuka Agritech finishes its Rs 80-cr share buyback

• Dhanuka Agritech said in a regulatory filing that it has bought back 9.41 lakh shares for R 80 crore. The bought back shares constituted 1.88% of the pre-buyback paid-up capital of the company. The buyback was made from all the existing shareholders of the company on a proportionate basis under the tender offer route. The buyback was subscribed by 3.59 times with investors returning 33.77 lakh shares in response to the offer. Emkay Global was the manager to the buyback. Post buyback, the promoters' holding in the company has increased from 74.99% to



75.09%. In CY2016, firms spent more than Rs 26,853 crore on buybacks, the highest since 2011. Recently, the board of Tata Consultancy Services (TCS) approved the proposal to buyback 5.61 crore shares worth Rs 16,000 crore. On March 15, Mphasis announced a buyback of shares worth Rs 1,103 crore. And last week, the board of HCL approved the proposal to buyback for an amount of Rs 3,500 crore, for 3.5 crore shares. Buyback is the process by which a company repurchases its own shares from its stakeholders. The bought back shares are extinguished and the company's equity base shrinks. Buybacks have become the preferred route over dividends, as dividend income in the hands of all residents, domestic companies, trusts or funds except those established for religious, educational or charitable purposes, attracts an additional dividend tax of 10 % dividend income over Rs 10 lakh a year.

Centre to buy one lakh tonne potato from UP farmers

In a move that will give relief to Uttar Pradesh farmers forced to sell potatoes at a loss due to a bumper harvest, the Agriculture Ministry has approved the procurement of up to 1,00,000 tonnes of the tuber in the State for the 2016-17 crop season. The procurement will be carried out by a State agency under the Market Intervention Scheme (MIS), at Rs 4,870 a tonne, according to an official release. The Ministry will provide an additional Rs 1,217.50 per tonne or the actual amount, whichever is less, for overhead expenses, such as transportation charges, mandi tax, and godown charges, the release stated. "Purchase centres/areas will be decided by the state government in consultation with the State agency. The potatoes will be purchased from cooperative societies, farmers' organisations or directly from farmers to eliminate the possibility of middlemen taking advantage of the scheme," the release added.



Govt to rev up farm growth plan with 'Raftaar'

Turning its focus on post-harvest infrastructure, the Centre has planned to completely revamp the existing 10-year-old Rashtriya Krishi Vikas Yojana to take farming in India to a new level. The revamped plan, which has already been vetted by the department of expenditure of the finance ministry and the government's think tank Niti Aayog, will be known as RKVY-Raftaar (Remunerative Approaches for the Agriculture and Allied Sector Development). For the next two years, emphasis will be given to development of agriculture infrastructure, specifically post-harvest infrastructure and promotion of private investment in agriculture across the country in a big way. "Idea is to fast-track agriculture development and take this to a new level of annual growth trajectory, beyond 4%. The agriculture ministry will soon take the revised version of the RKVY to the Cabinet for its approval," said a senior ministry official. RKVY was launched during 2007-08 to achieve 4% annual growth in agri sector by ensuring a holistic development as per a resolution of the National Development Council (NDC). The Centre had allocated Rs 25,000 crore for this scheme during 11th plan period (2007-12) and Rs 63,246 crore during 12th plan period (2012-17). It is being implemented as a 'special additional central assistance' scheme to incentivise states to draw up comprehensive plans taking into account agroclimatic conditions and natural resources for ensuring more inclusive and integrated development of agriculture and allied sectors.



Raw jute MSP hiked

The government on hiked the minimum support price (MSP) for raw jute by Rs 300 per quintal to Rs 3,500 to boost farmers' income. The Cabinet Committee on Economic Affairs has given its approval for the increase in the minimum support price for raw jute for 2017-18 season in order to protect the economic interests of the farmers, an official statement said.

Govt allows duty-free import of raw sugar up to 5 lakh tonnes

• The government allowed duty-free imports of raw sugar up to 5 lakh tonnes to keep domestic supplies steady amid a drop in production. However, such imports will be allowed only until June 12 under a tariff rate quota, according to a notification in Parliament. This is the first time since 2012 that imports of sugar under the open general licence (OGL)

will take place at zero duty, albeit in limited quantity. Imports of raw sugar beyond the stipulated quantity and the deadline will, however, attract the 40 per cent duty that has been imposed since April 2015. The Directorate General of Foreign Trade is expected to soon notify the modalities of such imports.



4 more may be added in drought-prone-State list

A severe water crisis is looming large over most part of the country with four more States - Punjab, Uttarakhand, Himachal Pradesh and Kerala - likely to be included in the list of drought-prone States for 2017, taking the total to 12. Last year, eight States were declared drought hit and they continue to retain the tag for this year, too. These are Chhattisgarh, Gujarat, Jharkhand, Karnataka, Madhva Pradesh. Maharashtra. Telangana and Uttar Pradesh. Though Haryana was not declared to be drought hit, it had reported severe water crisis from various parts across the districts. In January this year, the Tamil Nadu Government declared its all 32 districts drought-affected with the rainfall deficit ranging from 35 per cent to 81 per cent. Fifteen irrigation



reservoirs in the state are said to be at 13 per cent levels at the end of 2016. In the absence of both the southwest and northeast monsoons except for a few occasional showers, Kerala is forecast to witness its hardest drought in 115 years, and the worst since the State's formation in 1956.

New APMC Act likely to allow private mandis

• The new proposed act would likely to remove the concept of notified market or mandi area which will enable farmers to sell their produce to highest bidder. The entire state would likely to be treated as one market for promotion of contract farming. At present states such as Punjab and Haryana levy 14% taxes, including VAT, mandis taxes etc on the grain purchased from the farmers which drives away private procurers of the commodity. An agriculture ministry official said that the government has been providing greater emphasis on improving post-production infrastructure — storage, transportation, food processing and marketing of the agricultural produce, which will ensure remunerative returns to farmers. The official stated that the focus of the government is to bring greater transparency and competitiveness in price discovery for bringing benefits to farmers, The official acknowledged that the implementation of model APMC act of 2003 had been rather 'patchy' and 'uneven' across the states.



Cabinet approves changes to New Urea Policy

The Cabinet Committee on Economic Affairs approved amendments to the New Urea Policy–2015. The said amendments will protect the production beyond re-assessed capacity by the urea units and are expected to boost indigenous production. An official communication said, "After the amendment, the ceiling imposed on production beyond RAC during 2016-17, has been raised so as to enable all urea units to produce additional production which otherwise were not able to do so due to low import parity price." In another decision, the CCEA approved amendments to the Mega Power Policy 2009 for Provisional Mega Power projects. After the amendment, the projects will be allowed to avail tax relief by furnishing 'Mega certificates to tax authorities' for 120 months, from 60 months earlier. CCEA also approved the removal of quantitative ceilings on individual organic products. This allows the unrestricted exports of all organic agricultural and organic products. However, the quantitative ceiling on exports of organic pulses and lentils will continue, but enhanced to 50,000 mt per annum from 10,000 mt per annum.



Telangana CM announced Rs 4,000 per acre for farmers to buy fertilizers

• Telangana Chief Minister K Chandrashekhar Rao announced a bonanza for the state's farmers, declaring financial assistance of Rs 4,000 per acre every year to the farmers to buy fertilisers. The amount will be deposited in the accounts of farmers before the Kharif season in the last week of May, from the next financial year. "There are about 55 lakh farmers in the state who are using 25 lakh tonnes of fertiliser... This programme will be implemented with total transparency. For this, farmers should form associations at the village level. These farmers associations should monitor all issues related to farmers and agriculture, "Rao said.

Bengal, Tamil Nadu might soon join national e-agri platform

• West Bengal and Tamil Nadu are expected to be the next two big states which could become part of the Centre's electronic National Agriculture Market (eNaM). The Centre could also direct states to end all forms of physical trading in the 400-odd wholesale markets (mandis) where eNAM has been set up. The Centre's nine-point list of ushering needed reforms in agricultural marketing comprises the allowing by states of private markets, facilitating direct marketing of produce, allowing setting up of farmer-consumer markets, allowing contract farming, e-trading in farm commodities, single point levy of market fees across a state, single trading licences, delinking the provision of compulsory requirement of shops and spaces in mandis, and delinking of fruit and vegetables from mandis run by Agricultural Produce Marketing Committees (APMCs). The Centre is also pressing states on quicker adoption of model land lease laws, exempting all kinds of tree species grown on private land from felling and transit regulations, and adoption of new model APMC and Contract Acts.



Mamata waives agriculture land tax



• Bengal chief minister Mamata Banerjee announced a waiver of agricultural land tax that is expected to cost the government Rs 200 crore in revenues annually and advised the Centre to follow the example to write off farm loans. The tax waiver is expected to benefit farmers who own agricultural land less than 24.2 acres. Officials at Nabanna said the amount that used to be levied was " negligible" and assessed on the basis of factors such as productivity of the plots and their proximity to resources such as irrigation facilities.

Assam rice production projected at 75 lakh mt this year

Assam is expected to have a rice harvest of 75 lakh MT this year, 23 lakh MT more than previous year's production, state Agriculture Minister Atul Bora has said. "Rice production of Assam was 52 lakh MT last year and this year our expectation is to have a harvest of around 75 lakh MT," Bora said at the 52nd Annual Rice Group Meeting. "Our production curve is on upward trend despite the attack of caterpillar at initial stage," he said here. Production was not affected by the caterpillar attack due to prompt measures taken by the state government as well as favourable environment, Bora said. He said that the government wanted to employ organic farming system for which a foolproof organic rice production package was required.



In Madhya Pradesh, market rates for wheat soar past govt's support price

● Food Corporation of India (FCI) faces stiff competition from private entities in Madhya Pradesh on wheat procurement. The market price is presently above the government's Minimum Support Price (MSP). This has led the government-owned entity to set up camps near major harvesting centres, to ease farmers' transport and sale issues. "There is neck-and-neck competition between FCI and private players in Madhya Pradesh, where procurement started. We believe only half the quantity offered by farmers has come to us," said a senior FCI official in the state. The agency has procured about 500,000 tonnes till now. FCI says it had procured 3.99 million tonnes of wheat from MP in the 2016-17 rabi marketing season (RMS), 17.4 per cent of the 22.96 mt from across the country. For the RMS of 2017-18, the government's target for FCI in the state is 8.5 mt. This, the official felt, would not be achieved, with private agencies offering a higher price.



L.D. Mittal Chairman Sonalika International Tractors Ltd. Honored with 'Punjabi Icon' Award



Mr. L D Mittal, Chairman Sonalika International Tractors Ltd. was commemorated with the "Punjab Icon" award on Baisakhi by the Punjab Cultural Heritage Board, an organization active in promoting Punjabi cultural outside the state. The awards ceremony took place in Mumbai. The event is held every year to honor eminent Punjabi industrialists, corporate honchos, actors, performers, singers and other high achievers in their respective fields. Among the top achievers, Mr. Mittal was also recognized for his excellence and was chosen as the "Man of Influence". With a clear vision to set up a successful and impressive business empire, Mr. Mittal along with his two sons built Sonalika ITL, which today is the third largest tractor manufacturing company in the country. The brand itself is a testimony to its success as it has become one of the most loved brands across the globe by farmers. Under Mr. Mittal's leadership, today Sonalika's tractors are sold in more than 80 countries including America, Europe, Africa and Asia Pacific. Mr. L. D Mittal, Chairman Sonalika International Tractors Ltd, delighted with the recognition said, "I am honored to receive the award and appreciate the board's effort in promoting Punjabi culture across. It feels as if I have could pay the gratitude to my birth place in the true sense. Going forward our efforts will continue to help farmers in India prosper

After RBI, Nabard says farm loan waivers a bad idea



The National Bank for Agriculture and Rural Development (Nabard) described farm loan waivers as a "moral hazard" and said such facilities should be targeted only to the needy. "Debt waivers create a moral hazard from a credit repayment perspective and we cannot have omnibus waivers, "Nabard chairman Harsh Kumar Bhanwala said, after the UP government announced a Rs 36,000-crore farm loan waiver package. With demands for similar measures on in other states like Haryana, Maharashtra and Tamil Nadu, Bhanwala said there is a need to look at the moral hazards which such schemes create. He said every time a debt waiver is announced, it is taxpayers' money which is used to help bail out farmers. The comments come days after RBI governor Urjit Patel also expressed strong displeasure over such

measures. Nabard reported a 4.24% increase in its post-tax net for 2016-17 at Rs 2,631 crore, and a 16.27% expansion in its outstanding loans at Rs 3.08 lakh crore. Bhanwala said the development finance institution, which primarily refinances banks' agri loans, feels that the financial sector is set to surpass the Rs 9-lakh-crore agri loans target for fiscal 2017 set by government and will repeat the performance in fiscal 2018 by exceeding the Rs 10 lakh-crore target.

Post note ban, Nabard sanctions Rs 20k cr more to coop banks, societies

• Post demonetisation, agricultural lender Nabard has sanctioned an additional amount of Rs 20,000 crore to cooperative banks and societies, to provide farmers with better access to loans. Out of this additional sanction, an amount of Rs 17,774 crore has been disbursed to cooperative banks. This ensured availability of credit at concessional rate during the 2016-17 Rabi Season, Harsh Bhanwala, chairman, National Bank for Agriculture and Rural Development (Nabard) said. "To address the cash flow problems of farmers due to demonetisation, interest for two months (November-December 2016) on short-term crop



loans sanctioned and disbursed by Cooperative Banks during the Kharif season 2016 was waived. An amount of Rs 458.28 crore has been credited to the accounts of 154,07,473 farmers as on 31 March 2017". Refinance for long-term loans, which is an established indicator of long-term capital formation, touched a new high at Rs 53,504 crore. Significantly, this vertical has recorded a CAGR of 35% over the last three years.

Rs 7.57 L cr farm credit disbursed in April-Dec of FY16

Farm credit worth Rs 7.57 lakh crore was disbursed by during the first nine months (Apr-Dec) of the 2016-17 fiscal which is likely to surpass the target. The agri-credit target for 2016-17 fiscal is Rs 9 lakh crore, while for the current year it is Rs 10 lakh crore. "The actual achievement of ground level credit flow has surpassed the targets in 2014-15 and 2015-16. In 2016-17 as well, the achievement as in December 2016 is Rs 7.57.311 crore and likely to suprass the target," Minister of State for Agriculture, Parshottam Rupala said in the Lok Sabha. The government announces annual farm credit targets towards production credit (shorter term crop loan) and investment credit (term loan), he said in a written reply. Farmers get short-term crop loans of up to Rs 3 lakh at subsidised interest of 7 per cent per annum. For prompt repayment, they get additional incentive of 3 per cent, making the effective interest rate 4 per cent.

Adityanath govt writes off Rs 36K-cr farm loans

• The BJP-led government in Uttar Pradesh has decided to waive off crop loans of up to Rs 1 lakh of small and marginal farmers in the state, a relief the party promised before the February-March assembly elections. About 21 million farmers will benefit from this decision of chief minister Yogi Adityanath's cabinet during its first sitting. About 86.68 lakh of the state's farmers in the small and marginal categories will benefit from the waiver. Besides, the cabinet also decided to

write off Rs 5,630 crore in nonperforming assets (NPAs) of 700,000 farmers. The twin waivers — among nine decisions the cabinet took would together cost the government Rs 36,359 crore. The



cash-strapped government would float farmer relief bonds, called KisanRahat Bond, to generated funds to implement the loan waiver.

Agri Loan Waiver will Add to Heap of Farm NPAs

The Uttar Pradesh government's Rs 36,359 crore farm loan waiver has turned the spotlight on the steadily rising non-performing assets (NPAs) from this sector over the past few vears as it has revived concerns about possible vitiating of the credit environment in rural India with other state government's also likely announcing similar waiver. NPAs from agriculture and related activities have steadily increased from 3.3% of the total banking loans to the sector in March 2011 to 6% in September 2016, according to the RBI's Financial Stability Report released in December 2016.Some bankers attribute this rise to the periodic loan waivers by politicians which have vitiated the repayment culture in rural areas. They pointed out that the steady rise in agriculture NPAs started after the



then finance minister P Chidambaram announced a massive Rs 60,000 crore waiver for small and marginal farmers in the 2008-09 union budget. Indeed agriculture NPAs for all large state-owned banks have risen in the past six years. SBI's NPAs have risen from 3% of loans in March 2010 to 6% in March 2016, while Canara Bank's NPAs from the sector have increased to 3.21% in March 2016 from 1.84% in March 2010. Punjab National Bank's NPAs have increased to 6% from 3.65%, while Bank of Baroda's NPAs have risen the sharpest to 10.74% from 3.33%.Fears are that other state governments may also follow the UP path.

Crop insurance drives non-life biz

Crop insurance has helped the non-life industry record 32% growth the last fiscal and cross the Rs 1-lakh-crore mark for the first time. From nowhere, crop insurance has emerged the third largest line of business after motor insurance and health insurance following the launch of the Pradhan MantriFasalBimaYojana (PMFBY) last year. Business figures for nonlife insurance companies released by the Insurance Regulatory and Development Authority of India (IRDAI) for the year 2016-17 show that total premium income jumped to Rs 1.27 lakh crore from Rs 96,376 crore in FY16. Usually, the growth in the non-life segment reflects the growth in the real economy, new investments and sale of automobiles. This year, the industry has managed to record its highest growth since liberalisation, despite absence of any new projects, due to the opening up of crop insurance.

Nabard to raise Rs 32,000 cr this year to meet govt's agri-lending target

Nabard, the country's apex development financial institution, said it will raise Rs 32,000 crore this fiscal. After surpassing the government target of Rs 9 lakh crore agricultural credit, it hopes to meet and even cross the Rs 10 lakh crore target set for the current fiscal. "We have seen an uptick in ground level credit flow to agriculture by banks, primarily because of the government push and demand for loans for allied activities," said Harsh Kumar Bhanwala, chairman, Nabard. He said agriculture saw a jump in repayments initially during demonetisation, but credit flow fell subsequently. Terming farm loan waivers a moral hazard, Harsh said, "Loan waivers create a moral hazard from a credit repayment perspective and we cannot have omnibus waivers." According to him, Nabard's outstanding borrowing increased to Rs 80,000 crore from Rs 60,000 crore last year and there will be an increase of Rs 15,000 crore in the outstanding borrowing this fiscal. Of the Rs 32,000 crore for dairy projects. About one-third of the total loans were towards long-term (over 18 months and more) irrigation projects, while the rest were short-term crop loans. The lender has seen a rise in demand for agricultural loans even as banks have been struggling to see any loan demand in general.

Onion exports triple over FY16 after govt sales push

Onion exports almost Ø have tripled in 2016-17 following the government's decision to push sales of the vegetable overseas at higher prices. The Agricultural and Processed Food Products Exports Development Authority (Apeda) estimates onion exports at 2.39 million tonnes in April-December 2016, Aiit Shah, president of the Horticulture Exporters Association, said 150,000-200,000 tonnes were exported every month thereafter, taking overall onion exports to a record 3 million tonnes in 2016-17. "The Merchandise Exports from India Scheme (MEIS) was initiated when onion prices were Rs 2-2.5-a kg in the Lasalgaonmandi in Maharashtra. Farmers were not harvesting onion at that price. The MEIS arrested the fall and onion prices recovered to Rs 5-5.50 a kg. This price covers the cost of production, farmers need more to sow onion in the next season," said HansarajPatil, a farmers' representative in Lasalgaon. Faced with a sharp decline in onion prices on expectations of a bumper output, the commerce ministry extended the MEIS to onion. The scheme allows exporters to obtain

a 5 per cent credit on the free on board (FOB) value of onions. The MEIS was initiated for onion in August and extended periodically. According to a notification dated March 31, the MEIS benefit will be available till June 30. India is exporting onions to Sri Lanka, the Far East, the Middle East and other markets where prices are higher than in local mandis. According to Apeda, the per unit value realisation for onion in the country was Rs 14,109 per tonne in 2016-17, 36 per cent lower than the previous year's Rs 22,691 per tonne.

Vietnam lifts India's groundnut exports

Exports of groundnuts have jumped by over a third on robust demand from countries such as Vietnam and Indonesia and a bigger domestic crop. However, exporters are apprehensive of sustaining the growth in groundnut shipments, especially

after the Government opened up shipments of groundnut oil in bulk quantity as overseas buyers may find it cheaper to import oils. As per the provisional estimates, shipments were up 34 per cent for the April-February period at 6.53 lakh tonnes over the yearago period's 4.88 lakh tonnes.



In rupee value terms, the exports for the period were up 35 per cent at Rs 4,910 crore as against Rs 3,652 crore in the yearago period. In dollar terms, the shipments registered 31 per cent growth at \$728.62 million for April-Feb as against \$557 million in the same period last year. Exporters attribute the rise in groundnut exports to multiple factors, including increased availability of the seeds, competitive prices in the international market and globally acceptable quality.

Indonesia says no to rice deal with India

Indonesia has decided not to enter into any rice purchase agreement with India. The south-east Asian country has conveyed the message to India early this year as there was an expectation of a trade agreement between the two countries on rice, sources said. During the visit of Indonesian president President Joko Widodo in December last year, Prime Minister Narendra Modi had expressed India's readiness to supply rice, sugar and soybean. Bilateral trade between India and Indonesia dropped 16 per cent to about \$ 16 billion in 2015-16 from about \$19 billion in 2014-15. India was eying to close a deal to sell 1 million tonnes of rice worth about Rs 3,000 crore with Indonesia as it had enquired to buy rice between 1.5 million tonnes and 2 million tonnes after local prices increased there last year. In 2003-04, India had exported 27.75 lakh tonnes of rice from the central pool stocks maintained by the Food Corporation of India (FCI). The shipments dropped to 65,000 tonnes the following year as the government decided not to export from official stocks.

Indian grape export faces Chile obstacle in European market

Indian table grapes export hit with a setback in the European market due to the heavy arrivals from Chile and other countries. The prices have also been dropped in the international markets, according to JagannathKhapare, president of Grape Exporters Association of India (GEAI). "There are several factors responsible for the slowdown in exports. However, we still have exported more grapes compared to last year. We have exported 84,400 metric tons (MT) compared to 84,174 MT on 5 April 2016," Khapare said. The yield and quality of most crops are based on the current monsoon. However, in the case of grapes, the last year's monsoon is the deciding factor. "The likely factors are there were reports of drought-like conditions in Indian grape growing regions last year, which may have impelled other countries to increase production" he said. "Secondly, the dollar rates plunged and European markets may have appeared more lucrative," he added.

EU's stringent norms to hit basmati rice exports

> The European Union's stringent norms bringing down tolerance level for tricyclazole in basmati rice imports are likely to severely hit exports of grains from India. Tricyclazole is a fungicide used to protect the crop from a disease called 'blast'. The EU may bring down the Maximum Residue Limit for tricyclazole to the default level of 0.01 parts per million. Currently, the level approved by the EU is 1 parts per million and level in Indian consignments are much lower. "We are trying to convince EU... even the current level of tricyclazole do not pose threat for consumer's health and the level is much lower than 1 parts per million," a senior government official said. India is the leading exporter of the basmati rice in the global market. The country exported 4.05 million tonne of basmati rice worth Rs 22,727 crore during 2015-16. Of the total exports, around 0.38 million tonne worth Rs 1,930 crore were to EU, according to the data from the Agricultural and Processed Food Products Export Development Authority. India exported 2.92 million tonne of basmati rice during April-December in the current financial year, out of which 0.26 million tonne were shipped to EU, the data showed. "95% of the exports would be affected... but we are trying our best so that we can get extension," a leading exporter said. The EU is likely to make an announcement regarding this in July. Usually, the norm becomes applicable after six months of the announcement. "For basmati rice, we have got a margin up to a year. So, by the end of calendar year 2018, we can export... we are talking to the members of the EU bloc" the exporter said. Some officials, however, believe that basmati rice exports to EU would not be affected. "Basmati rice exports to EU would not be down... its just that the cost of testing would increase... The level of tricyclozone varies, its not the same," an official with APEDA said. India accounts for over 70% of the world's basmati rice production. Basmati rice constitutes a small portion of the total rice produced in India.

Veg oil imports dip 8% in first 5 months

India's vegetable oil imports have dropped by around eight per cent in the first five months of the oil year 2016-17 (November-October) on robust the domestic production of oilseeds rising output of edible oils. According to latest data released by the Solvent



Extractors Association of India (SEA), India's vegetable oil imports for the period November-March stood at 5.79 mt as against 6.31 mt reported in the corresponding period last year, thereby indicating a drop of 8 per cent. "Due to higher production of oilseeds, lead to rising domestic production of edible oil, slow down in consumption growth and reduction of stock resulted in to decline in import of vegetable oils in last two months," SEA noted in its report. India's oilseeds output is projected at a record 33.60 mt for 2016-17, much higher than the preceding twoyear lows of 25.25 MT and 27.51 MT respectively. According to SEA report, the veg oil imports for the month of March fell by 7 per cent to 1.10 mt as against 1.19 mt . The report also revealed that during the five-month period, palm oil imports fell to 3.5 mt from 3.6 mt during the same period of last year. "However, overall share of palm oil products increased to 63 per cent from 57 per cent as RBD Palmolein imports surged," stated SEA in its statement.

Horticulture exports jump in Apr-Feb

India is stepping up horticulture (fruit and vegetables) exports with improvements in quality and a focus on a marketspecific approach. The data compiled by the Agricultural and Processed Food Products Export Development Authority (Apeda) show India's exports of fresh fruit have jumped 20.95 per cent in volumes and 17.4 per cent in value during the period between April 2016 and February 2017. This shows a sharp reversal in trends until last year, when importers overseas were monitoring the quality of horticulture products from India. Many buyers in the European Union and West Asia had suspended imports of fruit and vegetables from India on grounds of quality. Horticulture has a 10 per cent share in India's agri and processed food exports recorded by Apeda. "India has become quality-conscious. Indian horticulture products like fruit and vegetables were not allowed in a number of countries earlier. For example, grapes and mangoes from India were not exported to the European countries. But, market access has been provided now. Most importantly, Indian exporters are focusing on organic products, which have greater demand overseas and also fetch higher realisations. All these have helped India perform well. Still, India is nowhere near its potential and we can look forward to a big jump in horticulture exports," said Ajay Sahai, director-general and chief executive officer, Federation of Indian Export Organisations (FIEO). India's exports of fresh vegetables declined to 699,600.34 tonnes in 2015-16 from 953,731.22 tonnes in 2013-14.



A mobile app that ensures grapes are safe

Scrape Mundo, an open source app freely downloadable on Google Play Store developed by Rta Technologies Pvt Ltd, a Nashik-based software consultancy firm., helps farmers chalk out a schedule for application of inputs, based on best practices followed by progressive growers in the Nashik belt. The schedule prescribes the quantum and application date of each input, specified in terms of 'pre-harvest interval or PHI days'. "Every chemical or pesticide has a PHI, which is the period after an application when the residues still remain on the crop or fruit. The app tracks these intervals so that each spray is done at the right time, after the PHI for the previous chemical has lapsed," explains Samir Pandit, director of Rta Technologies. Grape Mundo is an interactive app, which also ensures that farmers adhere to the prescribed schedule. "Alerts have been set up at the start date of each application and an inbuilt alarm keeps on ringing until the farmer attends to it. The only way to silence the alarm is to tick one of the three options: Completed, Cancelled or Postponed," he adds.

Agri-mkt Ninjacart raises \$5.5m

● B2B agri-marketing platform Ninjacart said it has raised Rs 37 crore (\$5.5 million) in series B funding from investors, including Accel Partners, Nandan Nilekani's NRJN Trust, Mistletoe, Qualcomm Ventures and M&S Partners. Ninjacart, which about 1,000 farmers sell fruits and vegetables to shops and restaurants in Bengaluru, aims to



use the funds to step up hiring and look at increased automation of its supply chain. Ninjacart, which picks up produce from farmer's fields and delivers it to the doorstep of businesses, pegs its USP on freshness and quality of the more than 80 fruits and vegetables on its platforms. "We want to build cost efficient, reliable supply chain that can handle more than 300 tonnes a day. Currently, we are moving 60 tonnes of produce a day from farm to store in less than 14 hours at a cost lower than traditional supply chains," said Thirukumaran, CEO & Cofounder of Ninjacart.

Kanan Devan gears up for online sale of premium teas

• Come April, super premium speciality teas from Kanan Devan will be available online, thanks to surging demand from upcountry buyers. The Kanan Devan Hills Plantations Company, South India's largest tea producer with an annual production of 25 million kg, launched an



e-commerce portal on April 1. The date marks the beginning of the 13th year of the company's operations in Munnar since it took over operations from the erstwhile Tata Tea Ltd on April 1, 2005. K Mathew Abraham, Managing Director and CEO, informed that some Kanan Devan teas are available on Amazon, and the clientele response to its single-origin teas such as Green Tea classic, White Tea, Rose Tea Premium under the Ripple Tea brand has been very good. Marketing these super premium speciality tea products through the e-portal www.kdhptea.com will help the company reach customers across geographies. As an introductory offer, it will offer attractive discounts.

Wheat to be bought online this season



● Haryana is all set to start e-procurement of crops in all grain markets of the state from the coming wheat purchase season starting from April 1. The electronic national agriculture market (e-NAM) will also start functioning in 54 out of 108 mandis. While the e-procurement of crops is end-to-end computerisation in the purchase system and aims at eliminating corruption and evasion of market fees and taxes, e-NAM is an online national trading forum where a farmer in one part of the country can sell his produce to a trader in any other part for better price.





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We at PI, are constantly in search of new answers. For more than 60 years, our line of products for rice crop such as Foratox[®], Biovita[®], Nominee[®]Gold, Osheen[®], Vibrant[®] Kitazin[®], Fluton[®], Sanipeb, Bunker[®] etc. have been aiding farmers in improving their crop

quality, increasing productivity and protecting their crops from insects, weeds and fungi. Today, we are helping to feed millions of hungry mouths while improving the farm income. Our comprehensive solution to enable the adoption of Direct Seeded Rice (DSR) has helped increase the farm income, conserving the precious natural resource, water. It is this technology that is helping us in building a better tomorrow.



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SEEDING INDIA'S AGRICULTURAL GROWTH



Indian seed sector has vividly supported India's agriculture aspirations. From public sector to private entities, seeds have flown at a steady pace to Indian farmers who diligently sowed them and ensured a steady supply of food for the country. Seeds were developed to meet specific requirements of the agro climatic conditions and prevailing demands of agriculture. High yielding varieties, hybrids, GM seeds have been able to leave a permanent imprint on the Indian agriculture. With a spirited approach from the government, seeds from organized segment has invaded the Indian farms. Today India's seed industry is ranked fifth in the world with a promising future ahead of it.

eeds - the starting point of agriculture _ have consistently influenced the course of India' food security. The years of intensive technology updation has perfectly upgraded the seed potential to feed a vehemently multiplying population of the country. From the clichéd begging bowl, India's ascent to being the power center of agriculture was mainly at the behest of improved seeds. The high yielding varieties of wheat and rice that kickstarted India's green revolution is the perfect example of seeds changing the agriculture fortunes of a country. With incorporation of better technology, seeds have been modified to suit the varied agro climatic zones of the country, to combat specific pest and diseases, to expand the yield potential, to survive the oddities of the climate and to ingraining specific qualities to the final produce. Seeds have become a potential instrument that decides the direction of agriculture. It has become the carrier of not only the rudimentary plant itself but also the technologies that decide the output. India's agricultural history can be sectioned according to the type of seed each respective generation entrusted its thrust upon.

India's precarious food economy before sixties instilled perennial anxiety and evoked a sense of dread among the administrators. The fledgling democracy was faced with the daunting task of meeting the food demands of its population with very meager resources at hand. While United States of America's Public Law 480 (PL-480) scheme guaranteed our food supply, it was an expensive affair as far as a newly developed nation was concerned. The alternative was to raise our own food. Given that the conventional seeds were not yielding enough to meet the demand, the option of high yielding varieties were explored. The fairly inexistent domestic agriculture

Seeds have become a potential instrument that decides the direction of agriculture. It has become the carrier of not only the rudimentary plant itself but also the technologies that decide the output





research system revved up with the arrival of varieties, Sonora 63, Sonora 64, Mayo 64 and Lerma Rojo 64 along with 613 segregating lines from CIMMYT, Mexico. This provided the base material for development and commercial release of another five important varieties namely PV 18, KalyanSona, Sonalika, Chhoti Lerma and Safed Lerma thereby ushering in the Green Revolution in India. These dwarf wheats were highly responsive to inputs, were non-lodging types and possessed desired levels of disease resistance. Due to these qualities, the dwarf wheat varieties could yield exceptionally high under best management production conditions especially in Indo-Gangetic Plains. India became second largest wheat producing country during 1997-98, and achieved a record production of 76.4 million tons during 1999-2000. The total production increased to the magnitude of more than six folds from roughly 12.3 million metric tonnes in 1964-65 to an estimated all-time high of 96.6 million tonnes (mt) during 2016-17. This feat was achieved as a result of a strong research back up that facilitated the development of improved high yielding varieties of wheat resistance to diseases with stable performance.

At around the same time, rice a very important crop of the country- also received attention by the researchers. The introduction of 'IR8' a new variety of rice in November 1967, by the International Rice Research Institute (IRRI) in Manila, pioneered the green revolution in rice. The arrival of IR8 in the Indian agricultural scene was a boon since the variety requires nearly about 130 days to get mature, whereas the traditional ones took around 160 to 170 days yielding 10 times more. Later, IR8 became a base material for the development of different varieties of rice - IR 20,



IR 36 and IR 50. To date, more than 50 IRRI breeding lines have been released as varieties in India. Some of them, such as IR36 and IR64, are still widely grown. Rice production increased from 34.6 million tonnes in 1960 to 105 million tonnes in 2013-14. The country is expected to see a record rice production of 108.86 MT in 2016-17.

Another crop that received considerable mettle with the introduction of high vielding varieties was cotton. The varietal improvement work in cotton started as early as in 1904 when Agricultural Departments were established in various states. It was further strengthened in 1923 when Indian Central Cotton Committee (ICCC) was constituted. The varietal improvement work got momentum with the inception of All India



Coordinated Cotton Improvement Project (AICCIP) in April, 1967. After inception of AICCIP, 90 varieties of upland cotton were developed.

Some pioneering research has also been carried out in sugarcane in India leading to the development of a series of improved varieties raising the productivity from 34 tonnes/ha to 63-100 tonnes/ha making India the largest producer of sugar in the world. Our current production of sugar is more than 13.4 million tonnes.

The Promise of Hybrids

Hybrids were another category of seeds that captured the fancy of Indian farmers. A notch higher than open pollinated varieties, hybrids are uniform in quality, yields more and are endowed with enhanced 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 intrahirsutum 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 interspecific 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. Supported by the high yielding varieties and hybrids and IPM practices the production of cotton in the country has grown from 2.75 million bales in the fifties to 33.8 million bales in 2015-16.

Hybridization also gripped the rice fields in India, albeit at a slower pace. Research programme was initiated during 1970 to develop hybrid rice variety in the country. There was no success in this programme during the subsequent two decades. However, the research programme was accelerated and intensified from 1989 with a mission mode project. With this concerted research efforts, a remarkable success was achieved within a short span of 5 years and half a dozen rice hybrid rice varieties were developed



from public and private sectors. The first four hybrid rice varieties were released in the country during 1994. Subsequently, two more hybrid rice varieties were also released. By the end of 2001, a total of 19 hybrid rice varieties were released.During the year 2007, around 1.1 million hectares were estimated to be planted under hybrid rice. The "National Food Security Mission" has specifically placed significant thrust on hybrid rice. However, Indian farmers have been reluctant to fully exploit the potential of hybrid rice as the cooking qualities of hybrid rice were not acceptable by the Indian palate.

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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 hybrid benefactors of 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 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, Kera Sankara, Chandra Laksha, Laksha Ganga, Kera Ganga, Ananda Ganga, KeraSree, Kera Sowbhagya, VHC-1, VHC-2 and Godavari Ganga. Some hybrids such as Chandra Sankara and Kera Sankara 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 of 140 nuts per palm in a year. It produces good quality copra with an oil content of 68 per cent.

The Era of Biotechnology

While the conventional breeding techniques supported agriculture well enough, the advent of biotechnology brought about a radical change. From the tissue cultured plants to transgenic crops, agriculture has moved past beyond cumbersome and time consuming conventional breeding techniques and has started to effectively utilize procedures that favour precise silencing or enunciation of a particular trait.

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 consumption of plants for 2002-03 has been approximately 45 million plants with banana constituting 41% share followed by sugarcane at 31% and ornamentals at 14%, spices at 6% and medicinal plants at 4%. Micropropagation of banana in vitro has helped in establishing high density plantations supported by drip irrigation giving higher economic returns. Viral diseases, particularly banana bunchy top virus are serious problems. Sensitive diagnostic techniques based on monoclonal antibodies and c-DNA probes have been developed to index and provide healthy planting materials of uniform quality. 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.

time, when At а cotton production in India was facing a major threat from boll worm - a pest that severely reduces the boll quality and quantity, Bt varieites of cotton were introduced. The genetically engineered variety with borrowed genes from a bacteria Bacillus thuringienisis produced a protein in the plant itself that killed the pest boll worm. The technology reduced the expenses incurred upon pest management and also increased the vield manifold. India's cotton vield was 225 kg per hectare in 1990-91. It fell to 190 kg per hectare in 2000-01, a bad monsoon year. 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.ln 2001, India was a large importer of cotton. But within seven vears 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. 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.

Policy Matters

Introduction of high yielding varieties to India during sixties was the result of long sighted vision and the complete trust in science by the leaders of the time. The vision to make India self reliant was materialized by policies that exhorted and elevated India's domestic agriculture.

In 1963, National Seed Corporation (NSC) was established. The objective was to undertake production of foundation and certified seeds. Now it has grown into a Schedule 'B'-Miniratna Category-I company wholly owned by Government of India under the administrative control of Ministry of Agriculture and Farmers Welfare. At present, NSC is undertaking production of certified seeds of nearly 600 varieties of 60 crops through its registered seed growers. There are about 8000 registered seed growers all over the country who are undertaking the seed production programmes in different agroclimatic conditions. The turnover of the Corporation for the F.Y. 2014-15 was Rs. 890.03 crores. The Government of India enacted the Seeds Act in 1966 to regulate the growing seed industry. The Seeds Act stipulated that seeds should conform to a minimum stipulated level of physical and genetic purity and assured percentage germination either by compulsory labelling or voluntary certification. Further, the Act provided a system for seed quality control through independent State Seed Certification Agencies which were placed under the control of state departments of agriculture.

The eighties were also impressive for seed sector as it witnessed two more important policy developments for the seed industry, viz. granting of permission to MRTP/FERA companies for investment in the seed sector in 1987 and the introduction of 'New Policy' on seed development in 1988. Besides this, the time saw launching of the World Bank aided National Seeds Programme (1975-85) in three phases leading to the creation of State Seeds Corporations, State Seed Certification Agencies, State Seed Testing Laboratories, Breeder Seed Programmes etc. Seed Control Order (1983), Creation of the Technology Mission on Oilseeds & Pulses (TMOP) in



New policy on Seed **Development** opened the doors for import of vegetable and flower seeds in general and seeds of other commodities in a restricted manner and also encouraged multinational seed companies to enter the seed business

- SEED SPECIAL

COVER FEATURE



1986 now called The Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM), Production and Distribution Subsidy, Distribution of Seed Minikits and Seed Transport Subsidy Scheme were also enacted during the same period.

Seed sector garnered further support in the beginning of nineties. Under the 1991 Industrial Policy, seed production was identified as a 'high priority industry'. In line with India's larger liberalization and privatization policies during the same period, the new policy on Seed Development opened the doors for import of vegetable and flower seeds in general and seeds of other commodities in a restricted manner and also encouraged multinational seed companies to enter the seed business. As a result more than 24 companies initiated research and development activities.

Further to strengthen the seed sector and to address certain unattended areas in Seeds order, National Seed Policy 2002 was initiated. The aim was to provide intellectual property protection to new varieties; usher this sector into planned development; protect the interest of farmers and encourage conservation of agro-biodiversity. This policy had 10 thrust areas Varietal Development and Plant Varieties Protection, Seed Production, Quality Assurance, Seed Distribution and Marketing, Infrastructure facilities, Transgenic Plant Varieties, Import of seeds and planting materials, Export of seeds, Promotion of Domestic Seed and Strengthening of monitoring system. Under the policy a Plant Varieties & Farmers' Rights Protection (PVP) established Authority was to undertake registration of extant and new plant varieties through the Plant Varieties, A National Gene Fund was also established for implementation of the benefit sharing arrangement, and payment of compensation to village communities for their contribution to the development and conservation of plant genetic resources and also to promote conservation and sustainable use of genetic resources. The National

Seeds Board (NSB) was established in place of existing Central Seed Committee and Central Seed Certification Board which was entrusted with the responsibility of executing and implementing the provisions of the Seeds Act and advising the Government on all matters relating to seed planning and development.

The Seeds Bill seeks to regulate the production, distribution and sale of seeds. It requires every seller of seeds (including farmers) to meet certain minimum standards. The Standing Committee has recommended that farmers selling or exchanging seeds from other farmers be exempt from this requirement. The Bill has been pending since December 2004. After assembly elections to five states are over, the government may revive the Seeds Bill. The Bill, revived by this government after 10 years in November 2014, was put on hold in 2015 after backlash against an enabling provision for genetically modified (GM) crops.

With ample support from the government India's seed industry has flourished. Currently, ranked as the fifth in the world, the domestic seed industry will continue to grow at a double-digit growth rate in the medium-term driven by improved seed replacement ration (SRR) and rising adoption of improved hybrid seeds, according to ratings agency ICRA. The profitability of private seed companies will remain healthy while investments in R&D and working capital to maintain a strong product pipeline will keep private sector's indebtedness at moderately high levels, the ICRA said in a statement. The studies suggest the favourable policy environment generated through National Seeds Plan and National Food Security Mission (NFSM) has augured well for the industry.

'INDIAN SEED INDUSTRY IS PASSING THROUGH LEARNING CURVE'

Incotec Group, founded in 1968, has been contributing significantly to the development of sustainable agriculture worldwide by providing key solutions in vegetables and field crops. Incotec's Coating and Seed Technology Companies around the world provide products and services for seed coating, pelleting, seed enhancement and analytical services for genetic analysis and quality inspection. Headquartered in the Netherlands and production facilities spread across the USA, the Netherlands, France, Italy, Brazil, Japan, India, Australia, China, South Africa, Malaysia and Argentina, Incotec joined the Croda Group as part of their Life Sciences business in December 2015. In an interview with Agriculture Today, Mr.



Manish Patel, Managing Director, INCOTEC India Ltd., discusses the relevance of seed enhancement technology in seed performance.

How was the performance of the seed industry in last fiscal?

Last fiscal year was very good for vegetable seed sector but average for field crop seed sector in the country. Overall, in vegetable it was almost double digit growth except downward trend in coriander and onion seeds. In field crops, Maize and Paddy (rice) was in very good shape, while Cotton lost its acreage. In nut shell, last fiscal was an average year for seed industry.

What is the effect of seed enhancement technologies on the yield of the crops?

Indian seed market, when viewed from genetic performance point of view, is almost at par and in most of crop segments, available genetics are the best of its genetic potential. With this status, market is becoming quite competitive as well and only difference in performance is possible with 'Real value addition' to genetics through use of novel Seed enhancement technologies. This helps seeds for better performance in field conditions under inconsistent growing situation. Indian market has reached an era utilizing the power of seed enhancement as genetic enhancement has almost attained a plateau. Further value addition for better germination, better vigor, healthy plant establishment, synchronized flowering and maturity, controlling pest and disease with less or minimal use of pesticide or fungicide through innovative seed treatments is possible through seed enhancement technologies. Global warming is affecting Indian agriculture too and to escape from any negative effects of such global warming , seed enhancement technologies are best sustainable solutions to seed industry.

What is the share of 'enhanced seeds' in the Indian market?

Hard core seed enhancement technologies are still in commercial push phase in India, but 'Generic value Addition' on seed through novel seed coating concept are very common in India, and in that sense market share of such 'enhanced seeds' is in the range of 100% to 35% depending on crops. For example, in Cotton and in high value hybrid vegetables, it is almost 100%, in Millet, Corn, Rice, Sorghum etc it's in the range of 25 to 35%. In years to come, it is going to be 100% since seed treatments are becoming essential and farmers in coming days are not going to use any untreated seeds for sowing.

How is the policy environment for seed companies in India?

It is pro-industry currently, and a lot of changes would come as soon as Seed Act 2004 comes into force. In our opinion, harmonized Seed Act throughout the country is very much required instead of having state wise. Government of India really need to make new provisions in Seed Act to facilitate fastest commercial adaptation of novel technologies in seed sector for bringing next revolution in country.

What are the challenges faced by the seed industry in India?

I am not a right person to answer this since I am not a hard core seeds man but still from our background and working relations with seed industry we must say biggest challenge is current decentralized Seed Act in country offering enough freedom to each of state to decide their own way of Seed related regulations and norms. Policy framework in the country need to be harmonized on top priority in order to encourage seamless growth opportunities to SME seed companies in country. Special provisions or facilitations need to be offered to foreign seed players entering Indian market. Indian seed industry is passing through learning curve and it's full of challenges I believe where healthy seed policy environment can bring a lot of value to seeds men in country and finally to farmers of India as well.



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'MAINTAINING QUALITY AT FIELD LEVEL IS KEY TO GOOD SEED PRODUCTION'

Nu Genes Pvt. Ltd., formerly known as "Nitya seed sciences Pvt. Ltd. is a seed company engaged in hybrid development, seed production, seed processing and seed marketing. Promoted by a team of technically qualified people with several years of pooled up experience in the seed industry, the company has been sculptured into a full - fledged "research driven" company. With a humble beginning in the year 2004, Nu Genes has evolved into a trusted "Support-base" of suppliers with efficient sales network in 12 states of India. The company has established "Stateof-the-art" seed processing and quality operations. within a relatively



short span of time. PN REDDY, MANAGING DIRECTOR, NU GENES PVT. LTD in conversation with Agriculture Today discusses the important aspects associated with seed sector.

What is the share of improved seeds for field crops in the Indian market?

Improved seeds are Open Pollinated (OP), Resistant Variety or Hybrid seeds that are produced in scientific manner following technical norms, processed, packed and branded. Essentially improved seed is any branded/labelled seed that farmer purchases instead of reusing his/her own seed. The share of improved seed varies from crop to crop. Amonafield crops, in millets improved seed share is around 80-90%, in pulses share is around 75 -80%, in oil seeds share is around 90%, in cereals like paddy and wheat share is 60 -70% and maize share is 90-95% and cotton share is 95%.

How significant is seed processing?

Seed processing is a very significant step in improved seeds. The key steps in seed processing include Drying, Cleaning & Grading and Chemical Treatment. Seed processing improves physical purity, uniformity, germination, vigour and shelf life of the seed.First, the raw seed received from the production field is either sun dried or machine dried (in case of corn) to

bring down moisture to desired levels. This enhances germination. Next, the seed is processed to remove foreign material, graded to bring uniformity by removing light seed and treated with chemicals to control any seed / soil borne diseases and to improve the visual appearance and bring all seeds to uniform color. This step if properly done results in high physical purity and germination. Physical purity is the first quality assessment done by the farmer as this is immediately visible upon purchasing and opening the seed packet. Physical purity gives farmer confidence on genetic purity of the seed also. Genetic purity can be assessed by the farmer only after the seed is sown and the crop reaches proper vegetative state. Seed processing done properly can result in longer seed shelf life and higher germination rates. Therefore, it is very critical that these steps are done very carefully and accurately.

How do you ensure quality at field level?

Maintaining quality at field level is key to good seed production. Quality of production begins with quality of foundation seed. Foundation seed should be produced with utmost care and under high technical supervision. Seed production should be taken up in fields ensuring proper isolation distances among various varieties as any wrong pollination will result in production failure. Next, rouging should be done at appropriate stages of crop growth to remove any off-type plants and any disease affected plants. In hybrid seed production, at the appropriate flowering stage of plant and at right time of the day, female parent has to be carefully pollinated with the desired male parent. In certain hand pollinated crops, all the flowers pollinated with the desired male parent are to be tagged to identify any flower that is missed or not yet cross pollinated. The male parent should be harvested separately and prior to female harvesting to prevent any seed mixing from male parent harvest. The harvested material should be properly dried before threshing and thresher also needs to be cleaned thoroughly to prevent any mixing of seed from previously threshed variety.The threshed seed needs to be organized and stored separately in well labelled gunny bags to prevent mixing with other varieties. The labels should



identify the lot number and variety name clearly. These steps should be followed as per technical norms stipulated for each of the crops to obtain pure and high quality seed in seed production. Technical staff of the company visit production fields from time to time at various stages of these above steps and monitor the activities. Organizers should be experienced personnel who take utmost care in executing all the above steps.

What is the relevance of seed enhancement techniques in today's Indian agriculture?

Seed enhancement techniques include Seed Treatment and Coating, Seed Pelleting and Seed Priming. These steps are done as part of seed processing. Seed treatment and coating is very valid for the current Indian market and is already in wide use. Seed treatment helps in preventing any seed and soil born diseases and seed coating is used as a carrier for retaining chemical on the seed apart from improving uniformity and visual appearance of seeds. Seed Pelleting facilitates uniform sowing of seeds as it adds additional casing around the seed and is currently an expensive and a high technology involved procedure that is mostly outsourced at third party facilities. This is better suited for high value crops and nursery grown crops such as tomato or hot pepper. Currently, very few companies in India opt for this. Seed Priming leads to faster and better germination of the seed and is also a high technology involved step that is presently outsourced. This is slowly being adopted in Indian market.

What are your views on policies directed towards seed industry?

Currently, each state either has or is coming up with its own seed policy and the central seed bill 2004 is still pending for approval. With every state having its own approval mechanism, a company has to go through the regulatory approval for the same variety at each state instead of obtaining regulatory approval in one instance for all the states. Multiple authorities and different process at each state makes obtaining approval a very tedious and a time consuming process. There is a need to bring about one uniform policy across all the states in the country and a single regulatory authority to improve ease of doing business. This will help in shortening the time taken to introduce an improved variety in the market.

What is the share of hybrid seeds in Indian market?

The share of hybrid seeds varies from crop to crop and is growing across crops. Among field crops, certain crops like Maize, Bajra and Cotton have higher than 90% hybrid share and Jowar is close with a share of almost 70% whereas crops like Wheat, Soybean and Pulses are mostly OP. Most popular commercial vegetable crops like tomato, chilli, bhindi have a hybrid share higher than 60%. Few crops like watermelon and muskmelon have 90% hybrid share, whereas crops like beans and peas are mostly OP.

What is the scope of transgenics in Indian market?

The scope for transgenics in Indian market is very high as they can significantly improve the yields and productivity and therefore improve food security of the country. Indian farmers are open to shifting to cultivation of transgenic seeds. However, introduction of transgenics in Indian market is closely tied to regulatory approvals which evaluate the transgenic for potential environmental and health risks. Presently, BT Cotton is the only transgenic seed approved for Indian market.

SEED SPECIAL

'SEEDS ARE THE MEANS OF PACKAGING KNOWLEDGE'

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), a non-profit, non-political organization that conducts agricultural research for development in Asia and sub-Saharan Africa with a wide array of partners throughout the world, covers 6.5 million square kilometers of land in 55 countries, the semi-arid tropics have over 2 billion people, and 644 million of these are the poorest of the poor. ICRISAT innovations help the dryland poor move from poverty to prosperity by harnessing markets while managing risks – a strategy called Inclusive Market-Oriented Development (IMOD). ICRISAT, a member of the CGIAR System Organization, is headquartered in Hyderabad, Telangana, India, with two regional hubs and six country offices in sub-Saharan Africa. In an interview with Agriculture Today, David Bergvinson, Director General. ICRISAT discusses the relevance of coarse cereals, millets and grain legumes in ensuring food security.



What is the role of coarse cereals and millets in ensuring food security and nutrition?

The concerns around food security and nutrition haven't adequately included coarse cereals and millets, which are an often-overlooked staple for millions living in the harshest, food-insecure regions of the developing world. They are rich in micronutrients and extremely resilient in the face of drought and other abiotic stresses, making them valuable food security crops for millions in marginal environments. At the same time, this conversation cannot afford to leave out grain legumes, which are an important source of protein and oil (as in the case of groundnut) and help maintain soil health. Currently, pulse self-sufficiency is one of the biggest challenges to food security in India. Nutrition is a very complex subject – and any conversation on nutrition should really be a conversation on diversified diets, which are central to preventing non-communicable diseases (like heart disease and type 2 diabetes) and are crucial to child development and health.

What is the amount of research happening in developing superior seeds of coarse cereals and millets?

Right now, the amount of research undertaken to improve the seeds of these crops is rather modest, especially when compared to crops like maize, rice and wheat. Therefore, it is important to create awareness around their role in ensuring food security and improving nutrition so that there is a market that incentivizes both the public and the private sector to push this research. Given the realities of climate change and these crops' suitability for dryland agriculture, the task of preserving dryland natural diversity becomes even more urgent. The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)has developed several improved cultivars and preserves a number of accessions of these crops in its genebank; but more needs to be done to develop improved varieties for smallholder farmers and increase adoption.

How practical is developing and cultivating biofortified seeds?

Biofortified seeds draw on natural genetic diversity to further enhance the nutritional value of crops. A seed bred to concentrate certain micronutrients such as zinc, iron, phosphorus, and vitamin B will often combine these with nutrients that help their absorption and make these bioavailable (in addition to a diversified diet). With a view to combat acute iron and zinc deficiencies worldwide, scientists working on the CGIAR program HarvestPlus have developed several biofortified millet varieties in conjunction with public and private partners. These varieties have also seen good adoption rates; for example, the high-iron, high-zinc pearl millet variety Dhanashakti has been adopted by over 65,000 farmers in India; and the high-iron, high-zinc, high-yielding pearl millet variety Shakti 1201 has been adopted by over 35,000 farmers in India. These adoption rates speak for themselves, though greater support from markets will increase profitability for farmers and encourage further research.

What is your opinion on introducing transgenics in food crops?

Currently we use approximately 1% of the natural diversity of lines preserved in our genebanks. We need to assess existing natural diversity to help develop seeds that allow us to isolate useful traits to deliver better nutrition to consumers and improved crop resistance to farmers. However, in cases where we don't have adequate diversity, GM technologies that are safe both from a human and environmental "Seeds are the means of packaging knowledge that harnesses genetic diversity to empower farmers to be commercially successful and to produce nutritious food"

perspective can prove useful, offering considerable benefits to both farmers and consumers. For instance, insect resistance in grain legumes can reduce the number of pesticidesprays required, making such technologies cost effective for farmers and safer for consumption. There is a need to have open and scientific conversations around such technologies.

What should be the strategy for a developing country like India in terms of seed research?

There is a need to develop innovative approaches to seed systems that integrate the formal seed sector with public and private seed producers with informal seed systems that have been used by farmers for centuries. This will allow us to accelerate the development and delivery of appropriate seeds adapted to local environments and farming systems, and is especially important for crops that have traditionally been underinvested in.

What are the challenges associated with seed research?

One is the limited availability of funding, especially since there isn't a strong incentive for the private sector to invest in this area. Equally significant is the need to understand the drivers of adoption of technology. Producing improved seeds is only one part of the challenge -- there is a need for effective communication to drive their use amongst farmers. We call it the anthropology of adoption - to understand what motivates farmers to adopt a new variety or cropping practice. Here, the role of lead farmers and organizations in local communities cannot be overstated. Equally important is the role of the market that incentivizes these crops for farmers, so that not only do farmers increase their productivity, they also benefit from their profitability, and in so doing, help realize PM Narendra Modi's vision of doubling farmer incomes by 2022.

'SEEDS ARE VERY IMPORTANT INPUT'

Daftari Agro Private Limited started taking seed production of improved varieties and parental lines of hybrids of different crops since 1976.. During the course of certified, foundation and parent seed production, the company expanded the base of research activities. Currently engaged in development of new varieties of cotton pulses, oil seeds and vegetable crops suitable for different agro climatic conditions, the company has developed several hybrids, varieties and germplasm of various crops and licensed some of them for commercialization. In a conversation with Agriculture Today, Mr. Ravindra Daftari, Managing Director, Daftari Agro Pvt. Ltd., discusses issues associated with India's seed segment.



n agriculture, seed input is very important since quality seed results in more productivity. The resistant variety gives more yield while reducing the cost of cultivation and imparting higher benefits. The private seed companies have strengthened their resources to cater to large quantity of quality seeds to the farmers and joined hands in the campaign of national seeds productivity mission. To meet the food requirements of growing population and to combat environmental hazards like global warning and drought, time has come to adopt new breeding techniques i.e., biotechnological tools, use of GM crops, and mutation breedina through radiation and chemical mutagenic agents which forms important methods of crop improvements.

At present 95% area of cotton is under Bt hybrids.This undisputedly proved that such hybrids have higher productivity and inbuilt potential of bollworm resistance. Production of Bt hybrids was largely adopted in India to reduce the use of chemical pesticides against boll worm.Thus the scenario of Indian cotton cultivation was quietly modified due to large scale adoption of Bt hybrids which drastically reduced the dangerous chemical usageand stabilized the cotton productivity in India. However, recently sporadic occurrence of pink boll worm has been reported in several cotton growing tracts. This is obvious probably on account of development of resistance against the toxic cotton proteins produced by Bt. factors.Search for new genetic factors against pink boll worm and its transformation in cotton (GM technology) is a challenge before the biotechnologists. The govt. should have liberal policy to allow new Bt technology which are likely to control pink boll worm.

India depends upon imports for meeting edible oil demand

At present, yield level of oil seed crops is very poor compared with the yield of other countries. Introduction of soybean crop has partially reduced the gravity and seriousness of oil demands for local consumption. Among the important oilseed crops, Groundnut, Mustard, Sunflower, Safflower, Linseed, Sesamum and Soybean occupy important place in cultivation of oil seed crops. Although cotton oil is not directly consumed in human diet due to presence of gossypol, its utilization is indirectly done in hydrogenated oil (Dalda) but only under reservation. Import of oil seeds is detrimental way of meeting the local requirements. It imposes harmful effects on the farmers leading to insecurity and economical imbalance on the life of farmers. The recent example of red gram reveals that the farmers have increased the area due to higher prices. In order to get better production, the farmers have paid more attention and better package of practices for higher productivity and more benefits in pigeon pea cultivation. This has resulted in bumper production of red gram. However, due to import policy of pulses on a very large scale, the prices of red gram has drastically reduced below the minimum support price. This will discourage the cultivation of red gram in India during Kharif 2017. In order to encourage the farmers to increase the area under oil seed, the Govt. should declare attractive minimum support price of oil seed crops. Simultaneously maximum attention should be paid to develop high vielding oil seed crops with higher oil content.

Another serious issue concerning India's seed segment is the presence of spurious seeds in the market

Government of India (GOI) through seed act 1966 prevented the use and spread of spurious seeds in agriculture. To regulate the seed quality, GOI has published the minimum seed standards to be implemented in the country and supervised the activities by seed legislation and law enforcement. This prevented the supply of sub standard seeds to the farmers. The seed of the notified varieties and kind are brought under the preview of seed Act 1966. However, the Govt. has imposed the seed control order, 1983 which regulates all kinds and seeds and therefore no substandard and spurious seed is allowed to sell in the market. Under the seed control order 1983, every seed producer and dealer has to take seed license from state seed licensing authority. Some of the state seed licensing authorities are over exercising the power under seed control order, 1983. They are imposing stringent rules and regulations to persons involved in seed industries. New unemployed Agril. graduates/post graduates and progressive farmers can't chose the seed industry for career development. Thus the existing rules/Laws created a monopoly of multinational companies and established seed companies. Moreover, the presently operating consumer's forum act enables to protect the interest of farming community or discourage the sale of spurious seeds. The licensing authorities justify the stringent seed regulations as an important cause behind farmers' suicide. However, the fact remains that the incidents of suicide are more in states implementing stringent rules. In my opinion "It is only the "competition which ensures quality". The best example is development of automobile industries which has progressed with the release of quality vehicles after decontrol and liberalization.

Indian Agriculture is ancient and it has vast area spread in different climatic conditions. The nature preserves/eliminates the biotypes adhering to the principle of survival of fittest and struggle for existence.Supported by this the farmers have undertaken cultivation of crops only after civilization and imposed artificial selection to suit the requirements of cultivation. The process of formation of new genotypes in nature is a constant phenomenon being controlled by environmental factors. Thus, the traditional varieties are the mixture of different biotypes possessing tremendous genetic variation which attracts the scope for selection and improvement.Introduction of new varieties is the outcome of genetic source preserved in nature since long period of cultivation. Thus the role of traditional varieties is unlimited since it can contribute for long term preservation of valuable genetic material governing drought resistance, disease and pest resistance etc. The SAU should collect and study their genetic variability in breeding programs so as to exploit it's possibilities in recombination breeding. Thus the role of traditional varieties cannot be ignored.

"Moreover, the presently operating consumer's forum act enables to protect the interest of farming community or discourage the sale of spurious seeds. The licensing authorities justify the stringent seed regulations as an important cause behind farmers' suicide"



'GOOD SEED IS THE BASIS OF GOOD AGRICULTURE'

Noble Seeds, one of fastest growing vegetable seeds company in India, has a presence across the country almost in every state. The journey of Noble seeds started a decade back in October 2004 in India with a dedicated pursuit of innovation & excellence powered by the vision of Lakshminarasimhaiah M.N. whose contribution to agriculture has ensured a better future to the Indian Farmers. Providing gamut of holistic solutions to the farmers for instance, High yield, earliness, disease tolerance, Quality assurance, Tolerance to biotic & abiotic conditions vegetable hybrid seeds, Noble seeds swiftly built a significant competitive presence in the Indian Seed Industry. In an interview with Agriculture Today. Mr. Laxami M. Narasimha, Managing Director, Noble Seeds Pvt. Ltd., discusses the general scenario of India's seed sector.



eed industry in India has now emerged as one of the important sectors in Indian industry. The growth rate of Indian seed industry is promising and it is about 15-20%. In future there will be tremendous demand for food, fiber and animal feed. This will directly impact the growth of seed industry. Due to increase in Indian population and increase in industrialization and decrease in agriculture land availability, demand for high yielding hybrids/ varieties will exert tremendous effect on seed industry growth. Indian vegetable seed industry growth is fast and it comprises about 16-18% of the Indian total seed sector. Now majority of vegetable farmers prefer high quality F1 seeds rather than OPs. All Indian and Multinational companies are investing heavily on Research and Development. There are significant developments that have been made in crops such as Tomato-ToLCV resistance, Small seeded watermelon, Virus resistance in Hotpepper, High color value peppers, Powdery mildew resistant Bitter Gourds and Cucumbers, Poly house Tomato ,Cucumber and Peppers. The vegetable seed industry however is facing major problems in quality seed production and security of parental seed issues. The area of seed production is decreasing and there is considerable shortage of skilled laborers also. There will be tremendous scope for Seed industry if we focus on intellectual property, quality and quantity seed production and advanced research in biotic and

abiotic stress.

Indian agriculture's success depended to a large extent on organized seed industry?

As per Prof Swaminathan ``Indian agriculture is fortunate to have the strong support of a dynamic seed industry. Without such support the transition from a ship to mouth existence of the 1960s to the right to food with the home grown food commitment of 2013, could not have taken place". Our country has well organized public and private seed sector, in addition to high quality researchanddevelopmentprogramme. Maior contribution to Indian agriculture comes from organized seed industry through technical and technological developments coupled with availability of seeds.Today

farmers are aware of quality seeds and their importance in productivity and their income. We firmly say Seed industry has played major role in Indian agriculture success.

Good seed is the basis of good agriculture. Yield is a function of varied inputs such as seed quality, fertilizer usage, irrigation facilities, and mechanization. Among all the inputs, seed play vital role in farmer income. As per the cost estimates provided by the Directorate of Economics and Statistics under the aegis of Ministry of Agriculture, seeds constitute about 8%-12% of cost of production for most major field crops. The quality seeds play a major role in vegetable yield and farmer income i.e., more than 20 percent.The spurious seeds affect farmer income considerably and even some times farmers would not get anything!! Supply of spurious seeds issue can be solved through strict Government laws and vigilance. Government should support seed industry for R and D, seed quality lab infrastructure.

Despite demonstrating potential, Genetically Engineered (GE) crops have faced opposition in many countries across the globe. They have been perceived by a section of society to be detrimental to environment, human health and socioeconomic parity. However, scientific data to support these perceived fears need to be generated. On the other hand, successful cultivation of large number of GE crops across the world indicates the farmer's acceptance. While earlier GE crops heavily relied on genes of bacterial origin, such genes for improving agronomic traits are now rapidly being identified from plants. With improvement in technology, GE crops are now becoming more precise and free from the baggage of any irrelevant DNA insertions in the genome. In the last two decades, GE crops have been largely targeted for resistance against herbicides/pesticides or insects. Now, the time is ripe to shift the focus towards engineering plants for drought tolerance, efficient nutrient use and increased crop yield. An appropriately streamlined regulation of GE crop cultivation and educating the public on GE technology should pave the way for acceptance of GE crops. However, the cost of regulatory release should be within the limits of public sector institutions so as to have a larger impact. As per one estimate, product development, biosafety assessment, commercialization and public acceptance



(after discovery research/proof-of-concept) may require an investment of 80 million rupees over seven years. Internationally, the cost is estimated to be about USD 75 million over a period of 10 years. This demands more financial assistance from government or public-private partnership.

With intensive cultivation using hybrids, the average yields under open field condition in India has been steadily increasing and the yield difference with the developed countries is getting narrower. It is not uncommon to see growers achieving yields of 100 tonnes/ha in tomato, 50 tonnes/ha in watermelon, 70 tonnes/ ha in eggplant and 35 tonnes/ha in chilli pepper. The advantage conferred by hybrids include higher yields, increased harvesting period, better adaptability, better shelf-life and transport quality favoring growers and occasional disease resistance. The consumers are benefited by superior quality of hybrids in terms of eye appeal, better keeping quality and sometimes hidden and vet all important nutritional value.Realizing the benefits in terms of higher productivity and enhanced income, hybrid vegetable cultivation has become popular in traditional vegetable belts and there is an increasing trend.

Inventory management, Production-Quantity and Quality seed production-handling contract production farmers, Climatic factors, Seed polices, laws, registration process in several states, Protection of Hybrid and parents, Price of Fresh vegetables and Unhealthy competition are some of the challenges faced by the Indian seed segment which need to be effectively dealt with.

'AVAILABILITY OF GOOD QUALITY SEEDS CONTINUES TO BE A PROBLEM FOR THE FARMERS'

ndian seed sector has being transformed from predominantly public until 90's to one of the mature and vibrant domains comprising both equally strong public as well as private sectors. The seed trade has acquired a new dimension in view of intellectual property rights.Public seed sector includes various organizations, viz., National Agriculture Research System (NARS) comprising 64 ICAR Research Institutes, 6 Bureaus, 15 National Research Centres, 13 Project Directorates, 79 All India Coordinated & Network Projects and 11AgriculturalTechnologyApplication Research Institutes, 3 Central and 61 State Agricultural Universities and 4 Deemed Universities having Faculty of Agriculture, 10 other research projects, 661 Krishi Vigyan Kendras (KVKs), National Seed Corporation Limited, New Delhi; 15 State Seed Corporations and 24 State Seed Certification Agencies. Private seed sector has experienced rapid growth under liberalized government policy which resulted in the establishment of around 500 seed companies including several multinational companies (MNCs) across the country. Public has large infrastructure sector and manpower resources and very well developed intensive and systematic crop varietal development programmes employing both conventional as well biotechnological approaches whereas, the private sector has excellent seed production and marketing skills and infrastructure with increasing emphasis on research and development activities. However, only a few Indian seed companies have systematic and strong seed research and development programme.

Besides improved seeds, the seed efficiency can be increased through



J. S. Chauhan, FNAAS Ex.Asstt. Director General (Seed) Indian Council of Agricultural Research

seed enhancement techniques such as physiological seed enhancement (pre hydration for seed fortification and seed infusion), seed priming (hydro, halo, bio, osmo, nano and matrix conditioning), mechanical enhancement (polishing off or rubbing off and sorting in to defined seed size), seed coating(film coating) and pelleting. Now-a-days, nanoparticle based techniques along with array of new chemicals are gaining ground for efficient congregation of seed based delivery practices wherein carbon nanotubes and biodegradable nanofibres are employed for development of seed coating technologies. Controlled release and smart seed mechanisms are widely used in high value low volume crops like vegetables which offer delayed delivery for extended period of protection of crop for reducing the phyto-toxicity and minimizing the environmental hazards.

I am very positive about the potential of GM technology as it is a science led technology. Globally, GM crops occupies about 180 million hectares equivalent to more than 10% of the total cropped area with no credible scientific evidence to show harmful effects on human beings, livestock and soil fauna and flora. Many of the traits like resistance to insects (bt) and herbicide resistance (glyphosate tolerance) have already brought revolution in production and productivity in cotton, soybean and corn globally. The technology has been gaining acceptance among more and more countries including developing ones. In India, more than 95% cotton cropped area has been under GM cotton in recent year. Since commercialization of GM cotton in 2002, yield/ha of cotton has increased substantially with reduction in insecticide usage resulting in higher economic gain to the farmers. Presently, sorghum with stem borer resistance (cry1B), castor with insect pests resistance (cry1Aa), pod borer resistance chickpea (cry1Ac) and pigeonpea (cry1B) are ready for Bio-safety Research Level (BRL) I trials. BRL II trial of Indian mustard hybrid, DMH 11, was conducted during 2014-15 after the permission of Genetic Engineering Appraisal Committee, as a consequence of biosafety evaluation and BRL I trials. Government of India placed the entire data of GM mustard in public domain for opinion of various stakeholders. Despite the fact that that India is prepared to embrace this technology as evident by prevalent guidelines to test and evaluate the agronomic value of the GM crops so as to protect the interests of the farmers, generation of relevant bio-safety information, its elaborate analysis to ensure food,

feed and environmental safety, no success has been made to commercialize any other GM crop.Many prestigious agriculture research organizations deliberated issues like economic gains, safety to environment and human consumption of GM crops and recommended the use of GM technology. Only Government of India has to take a final view and decision on the commercialization of GM crops.The issue has also been pending in Hon'ble Supreme Court of India. And also agriculture being a state subject, the decision to adopt this technology also rests with state policy planners. So, India may not embrace GM crops uniformly in near future.

In the event of opposition to GM technology in India by some quarters of the society, I am of the opinion that we should continue to support this technology as it only complements the conventional approaches of crop improvement and does not necessarily substitute it. Whatever the apprehensions of the opponents regarding the technology should be cleared by creating awareness among the masses and also backed by science led research. Programme on CRIPSR technology which is advancement in GM technology should be adequately supported. But it does not mean excluding investment on other alternative approaches like exploitation of primary and tertiary gene pools of crop plants in crop improvement. There are many such examples in rice, wheat, maize and many other crops where spectacular success has been achieved. No doubt, conventional breeding contributed phenomenally to the crop improvement programme as evident by many fold increase in yield/ha of almost all the crops during the last six decades. But, despite all out efforts, conventional approaches of crop improvement did not yield any success in finding out solutions to many problems such as stem borer in sorghum; stem borer and sheath blight in rice; aphids and Sclerotinia in rapeseed-mustard; Alternaria blight in agri-hortcultural crops; pod borers in cotton, chickpea and pigeonpea; insect pests in castor, etc.. Under such circumstances, any new technology offering promise to provide solution should be encouraged. Keeping this fact in view, NARS has already prioritized crops and traits for the development of GM crops. So it is not the question of investing on any technology at the expense of others, it should be case-bycase, as both approaches are complementary.

Traditional varieties and land races have been co-evolved with abiotic (edaphic factors, temperature extremes, drought, salinity, etc.) and biotic (diseases, weeds, insect pests, etc.) stresses and have a long history of cultivation. They are highly climate resilient and the reservoirs of useful resistance genes for various stresses as well as possess genes for nutritional/ cooking/ eating qualities and played an important role in new seed development. Some of the traditional cultivars of Assam (for tolerance to acidic soils, low input efficiency, high protein content and good cooking quality); Kerala (PT 10, 27, 30 for brown plant hopper resistance and Pokkali for salinity tolerance and navara rice for nutritional quality & medicinal value); Tamil Nadu (TKM 6 for stem borer resistance), Odisha (FR 13 A for submergence tolerance);N 22 from Uttar Pradesh for drought tolerance and basmati rice (Basmati 370) of Dehradun valley of Uttarakhand have



been extensively utilized for allele mining as well as in national and international rice improvement programmes and led to development of several high yielding and multiple-stress resistant/ tolerant mega varieties. Similarly, Kharchia local of wheat possess a rich wealth of salt tolerance genes and used in the development of high yielding wheat varieties and Varuna of Indian mustard has also been widely used in Brassica breeding programme. These are some of the illustrative examples of potential of traditional cultivars. However, almost in each and every crop such examples are in abundance. Replacing all together the land races, traditional cultivars and farmer's varieties by newly developed high vielding varieties would lead to irreparable loss of genetic variability so essential for mitigating challenges of climate change and prevailing as well as emerging biotic and abiotic stresses.

The National Agriculture Research System has also developed varieties with increased nutritional quality like rice with high protein and high zinc content, quality protein maize, rapeseed-mustard with low erucic acid in oil and / or low glucosinolate content in seed meal;



high iron lentil, trypsin inhibitor free soybean, lathyrus with low ODAP content and zinc rich wheat. Efforts should be made to create awareness among the stakeholders including farmers so that demand of seeds of such varieties may be created and they should find place in seed chain. The government should also encourage cultivation of such varieties by providing incentives and linking with public distribution system and mid-day meal scheme for school children. Adoption and cultivation of such varieties may provide nutritional security by eliminating malnutrition.

Despite a huge institutional framework for seed production both in the public and private sector, availability of good quality seeds continues to be a problem for the farmers. The desired SRR is 33% and 50% for self- and cross pollinated crops, respectively. Considering the national food and nutritional security, sustainable supply of quality seeds is most critical. The level of indents is declining in many crops. Further, issues of non-lifting of seed needs to be seriously addressed as it can be the most important factor of demotivation for breeder seed producing agencies for taking up such privileged activity. The states are the major stakeholders in the seed chain as its initiation depends on their indents for the breeder's seeds. They should prepare at least five year seed rolling plan phasing out old and obsolete varieties with latest released varieties and place timely indents. Appropriate MoUs should be developed with the different stakeholders for firm commitments of procuring the seed thus mitigating the problem of nonlifting. Introduction of bar / QR code is desirable for traceability of breeder seed source in multiplication chain for quality seed production. Development of variety specific molecular markers to enable rapid genetic purity testing, management of nucleus seed and its maintenance to either replace or supplement grow out test and a network on developing



national database of crop varietal DNA profile (finger printing) should be created to facilitate quality breeder seed production. Seed production chain involves several stakeholders both from public and private sectors thus their cooperation, needs to be strengthened for efficient conversion of breeder seed into downstream classes to achieve higher output. In recent years, the climate changes had adversely affected the seed production programme especially of soybean and chickpea. Therefore, there is an urgent need to identify alternate areas or new niches in season/areas non-traditional for compensatory seed production and National Seed Banks or similar facilities should also be created for emergent situations. Potential of ricefallows for seed production of oilseed and pulses be systematically explored. Unemployed youths can be trained in the field of seed quality assurance and with financial support and seed quality assurance laboratories, "seed clinic" may be established in major seed growing areas.Establishing crop-wise advisory body/referral lab for implementation of quality control system and identification of suitable seed provenance to form 'National Seed Grid' will play an important role for energizing the quality seed production.Seed science research should focus on seed enhancement techniques like seed coating and pelleting, especially second generation (intellicoat, molecular impulse resonance, electronic and magnetic treatment) and third generation (nanotechnology) technologies that offer ample scope for improved seed delivery. Research focus should also be on advanced seed quality assurance techniques, flowering & pollen biology and pollinators' biodiversity, seed packaging materials and storage conditions to prolong seed longevity. Seed laboratories in India should have state-of-the art infrastructure, adequate qualified and well trained personnel and be motivated to participate in ISTA proficiency testing and get accreditation. This will create an enabling environment for seed export.Inherent strengths of India are being the 2nd largest arable land with 46 soil types across 15 agro climatic zones favouring seed production of diverse crops. India, being one of the predominant players in South Asian Association for Regional Cooperation (SAARC) seed market, should also explore feasibility of quality seed production of common varieties in other SAAR Ccountries. OFCD seed schemes and ISTA standards are developed per se for promoting global seed business, IMSCS, OECD and ISTA standards be harmonized to facilitate seed export to the global market.

'SEED SECTOR IS HELPING AGRICULTURE TO GROW IN INDIA'

Dr. Kalyan Goswami, Executive Director,

ndia constitutes the fifth largest seed market measured in value terms in the world. The share of Indian seed industry in the global seed production is 4.7 percent preceded by the US (28.1 percent), China (21.2 percent), France (8.4 percent), and Brazil (6.2 percent). In terms of overall demand-supply scenario, the Indian seed industry appears to be self-sufficient in a number of seeds categories such as flower, fruits, vegetables and field crop. The future scenario also seems bright.

The Indian Seed Industry has shifted from being a public sector being led sector to be dominated by private sector. A major re-structuring of the seed industry by Government of India through the National seed Project Phase-I (1977-78), Phase-II (1978-79) and Phase-III (1990-1991), was carried out, which strengthened the seed infrastructure that was most needed and relevant around those times. Today Indian Seed sector has come up in big way in terms of global outreach. By and large, the Indian Seed Industry has played the role of ensuring affordable quality seeds reach the farmers.

The private sector has started to play a significant

role in the seed industry over the last few years. The main focus of private seed companies has been on the high value low volume seeds and market for low value high volume seeds, seeds of cereals, pulses and oilseeds is still dominated by the public-sector seed corporations. Today the private seed sector contributes to high quality seeds in Vegetable segment, fiber segment and field crop segment as well.Today the private seed sector has matured to a level where it's presence is there across India in form of registered seed producers and dealers. NSAI has its presence in about 18 states across India through its member companies. It has 10 State Seed associations and 413 registered seed companies as its members. The seed sector has not only strengthened its presence but has adequate level of specialization and competence in handling and managing various segments of seed improvement on scientifically sound and commercially viable terms which is helping agriculture to grow in India.

In terms of the quality standard for seed quality, Government of India regulates the seed quality standard under the Seeds Act. Under which Central Seed Certification Board has notified Indian minimum seed certification standards for around 199 crops seeds and propagating material. Central Government amend the standards of seed quality after consultation with central seed committee time to time.

Like farmers too, the Seed Industry is affected by changing climate and monsoons. There is issue of inadequate facilities and Skilled Manpower shortages for Seed Certification and Testing. Additionally, there is a subject of states asking seed companies to compulsorily register/ list their varieties in state based on one year/ two year/ three-year university trial. Apart from these there are numerous issues but we are working closely with Government of India for resolving them.



SEEDS HOLD THE KEY TO BOOST PRODUCTION

Life Science company with a more than 150-year history and core competencies in the areas of health care and agriculture, Bayer aims to be able to produce enough food, feed, fiber and renewable raw materials for a growing world population on the limited land available. Its Crop Science Division is a worldleading agriculture enterprise with businesses in seeds, crop protection and nonagricultural pest control. The Crop Protection Seeds operating unit markets a broad portfolio of high-value seeds and innovative pest management solutions, while at the same time providing extensive customer service for sustainable agriculture. In an interview with Agriculture Today, Mr. Peter R. Mueller, Head of Bayer Crop Science Division, South Asia discusses various issues associated with seed sector.



How was the performance of the seeds sector last fiscal?

2016 was another challenging year for the Indian Hybrid Seed Industry. arowth Market was impacted adversely due to a reduction in Cotton area by $\sim 10\%$ due to a crop shift to Corn & Soybean. Additionally, cotton Seed Price control order by Central Government impacted the overall market size to the tune of $\sim 14\%$. However increased Corn acreages and modest growth in Rice, Other Cereals and Mustard partly compensated the impact. The hybrid seeds market in India is expected to grow at a CAGR of ~12% during 2016 - 2020. In terms of key crops, the hybrid cotton seed segment accounts for the largest share of the market. However, going forward hybrid cotton will consolidate its dominant position and may grow slowly as it has almost attained maturity in terms of penetration. Intense growth is expected in the largely under-penetrated Rice market with the various Government programs, ongoing industry efforts and increasing awareness among the farmers about the benefits of hybrid

seeds. Additionally, the introduction of new traits in Corn and Cotton may also fuel the growth. From a vegetable seeds perspective, the market is growing in the same pace of field seeds: 13 -14 % per annum. Owing to an increased awareness about health and nutrition, the per capita vegetable consumption is also growing slowly. The fresh vegetable exports are increasing, especially to the Middle East and European countries. 2016 was one of the best years for vegetable seeds industry in India barring a few southern states which were impacted due to poor monsoon. Due to intensive cultivation in some of the vegetable growing pockets, the outbreak of diseases are increasing and expanding. The demand for value added traits are ever increasing and because of this, companies with a strong R&D focus are encashing available opportunities. Seed production is becoming a challenge for the industry especially in vegetable seeds. Because of this, the industry is facing a short supply in seeds for Tomatoes, Chillies and

Gourds in 2017.

What was the effect of demonetization on the seed sector?

Seeds is the starting point for the farmer when sowing takes place. When demonetization came into effect in November 2016, most of the seeds business in the major crops had been completed for the year, except vegetables. Demonetization definitely impacted the liquidity in the market which in turn affected the receivables for all the players in the seeds sector. If we analyze it from a macro perspective, the effect of demonetization on the seed sector was not very significant.

What are your expectations from the new seed bill?

Seeds hold the key to boost production and productivity of any crop. The new Seed Bill will ensure uniformity of seed regulation at an all-India level. It will also serve as an important tool to contribute to the Indian Government's vision of doubling farmers' income by 2022.

Our expectations from the Seed bill are as below:

- Create a level playing field for the public and private sector for access and exchange of germplasm
- Encourage introduction of new seeds, allied technologies and traits
- Safeguard investment on research & development by seed companies
- Allow market forces to determine the prices of seeds and technologies
- Provide improved IPR protection for new technologies in seeds
- Have stronger enforcement mechanism at state level against suppliers of spurious seeds
- Enable conducive policy environment for the growth of the seed sector including private players

What are the challenges of introducing a new seed into the market?

Indian agriculture faces several challenges such as increasing population, declining arable land, reducing fresh water availability, climate change and declining productivity. These factors can impact farmers' income considerably. Some of the recent moves by the Government of India on price control of seeds & traits and draft licensing guidelines on traits, may negatively impact the availability of new innovative technology and products, which is the need of the hour for Indian Agriculture. Instead, seed prices should be determined by fair competition and market forces. Another challenge while introducing a new seed into the market is the lack of uniform testing mechanisms, increasing requirements for testing and commercial approval of new seeds at the state level, all of which makes the process time consuming and cumbersome.

What are the new trends in seed technology?

Seed Technology has undergone an evolution process from mass selection products to genetically modified (GM) seeds. The past decade has seen many researchdriven improvements in seed genetics and technology that have been responsible for dramatic increases in crop productivity worldwide and the same has been the trend in India in some of the crops. India has witnessed results of mass selection, varieties, synthetics, hybrids, hybrids with value addition and GM seed at various stages. Recently, seed technology is deploying all the available tools such as genetic engineering, genomics, new plant breed innovations, precision farming for proactive and innovation based research on abiotic and biotic stress traits to produce quality products which can address adverse climatic conditions and delivering profits to farmers.

Where does India stand in terms of seed research and development?

India has taken several policy and regulatory initiatives to address focus areas such as variety development, plant variety protection, transgenic products, import and export and quality assurance. Scientists are working on most of the seed technology to boost seeds production in India and the results are encouraging. But, we still have a long way to go in comparison with developed countries. India's R&D and business environment is continuously changing in various aspects due to unbalanced policies and regulatory obligations which are imposed from time to time. Despite the challenges the R&D at Bayer is committed to cater to the needs of a growing global population with fewer, environmentally-damaging resources. Bayer is geared up to bring to the market, various value added hybrid rice seeds through advanced breeding techniques. We are also investing in cotton,mustard & millet to enable introduction of new high performing hybrids to capture the opportunities and emphasis remains on –

- **I** Greater yield enhancement
- Safer growing conditions and safer foods
- Reduced environmental and ecological impact
- It is pertinent to note that diffusion of technologies is critical in sustaining agricultural growth.

The organized vegetable seeds sector is giving greater focus on R&D to develop the varieties which will provide solutions to the needs of the growers and consumers. The government is also giving a lot of impetus to vegetable seed research in India through policy frameworks. Of late, companies have realized the importance of seed research & development and hence there are increased investments in vegetable seed research as well. Bayer is also fully geared up for R&D investments in Vegetable Seeds. Apart from conventional breeding, we are now fully focused on an integrated breeding approach; where in breeding technologies will support the activity to a great extent to release the hybrids with value added traits faster. Along with R&D of hybrids with required traits, Bayer has also developed a very good mechanism for product testing and releasing wherein hybrids will undergo stringent evaluation methods in all the potential geographies to ensure their adaptability to different climatic situations.

What are the added responsibilities of the seed segment to guarantee food for the future?

Indian agriculture will go through a transition in future and we are very well prepared to handle this transition. Increasing Food Safety awareness will drive the usage of hybrid seeds, safer products and biologicals. It is important to ensure both food and nutritional security for India's growing population. Seeds is one of the key inputs that can deliver innovative solutions to address India's agricultural challenges. Bayer is making suitable investments in the areas of agri-extension, educating farmers on good agronomic practices, offering comprehensive solutions and digital farming. Bayer is the market leader in the Hybrid Rice Seeds business and a significant player in Cotton, Mustard and Millet seeds.

Rising middle class population and exports will drive quality and farmers will invest in better farming practices and solutions. Taking all this into account, we are investing in various technologies to produce better and safer products, agricultural solutions for farmers and digital touch points to deliver these solutions.

QUALITY SEEDS FOR BETTER FOOD PRODUCTION

n view of increasing population particularly in our country, it is imperative to increase crop production to ensure adequate food supply at reasonable cost to all the citizens. Agricultural land is shrinking, part of it is being used for developmental activities. Therefore, the millennium challenge is to produce more food from less land. This can be achieved by using improved high vielding varieties and in turn by the use of quality seeds of those improved varieties. Seed is the basic and most critical input in crop production. It carries the genetic potential of the improved variety. It acts as catalyst in boosting the food grain production and also determines the ultimate productivity of other inputs.The investments made on all other inputs will go waste if the seed is not of good quality.It is reported that the mere use of quality seed alone can increase the vield by 15-20 per cent and it can be raised by 35-40 per cent when combined with efficient management.The quality seed also offers to integrate the technologies for production, protection and quality enhancement in agricultural produce. Thus, the quality seed is of paramount importance for sustainable growth of agricultural production. The main role of other inputs and management practices in agricultural production is to harness the genetic potential of the seed to the maximum extent. Therefore, quality seed will be the basic prerequisite of any country's food security scheme.

The Indian seed market has grown rapidly in the past one decade due to increased use of seed technologies and marketing efforts. Thus, the Indian seed industry is vibrant, one of the fastest growing seed industry in the world. For instance, GM cotton which was commercialized in India, was widely



Dr. K. Keshavulu Director, Telangna State Seed and Organic Certification Authority, Hyderabad

accepted and 93% of the cultivated area under cotton was converted into GM cotton and it contributes to a close 35% of seed industry. Although, significant progress has been achieved by the Indian seed industry, it is far away from realizing its actual potential as a major power in global seed industry with respect to International seed trade. Some of the technologies like dwarfing gene technoloav (wheat & rice), Hybrid Technology (maize, cotton, rice & other crops), Biotechnology particularly cry genes in cotton, Seed quality enhancement technologies: seed coating, Agronomic technologies: Row-Plant Spacing, Minimum tillage etc. have helped in changing our country from food deficit to being self sufficient.

The formal seed system is a well organized and bounded system to maintain varietal identity and purity; and to produce seed of optimal physical, physiological, and sanitary quality. Whereas, the informal seed system (also known as farmer, local, traditional) embraces most of the other ways in which the farmers themselves produce, disseminate, and access seed: directly from their own harvests; through exchange and barter among friends, neighbors, and relatives; and through local grain markets. Varieties may be landraces or mixed race populations. In addition, the seed is of variable quality (of different purity, physical and physiological quality). In most of the cases farmers depends on their own saved seed from the informal system; they plant, exchange and sell a wide range of varieties that fall outside the production and distribution functions of the formal sector. Under these situations, the programmes which are intended to improve and maintain the quality of the farm saved seeds (seeds from informal system) or trainings to farmers on quality seed production, processing, storage and seed treatment are the ways to improve the seed efficiency and in turn helps in achieving seed self sufficiency among the farmers.

Some other steps that need to be taken to improve the quality of seeds used by farmers are:

- Creating community Seed Banks in producing areas can reduce dependence on market for seeds. Proper storage of seeds is essential to get satisfactory germination.
- Adequate-quality storage infrastructure according to agroclimate conditions and specific seeds to be stored, needs to be created to save the seeds from damage.
- Regulatory measures for quality seed production have to be tightened so as to discourage the sales of spurious seeds to farmers.

World hunger and food insecurity is a recurring problem in most parts

of the developing world. Among the many potential technologies that are available, and the different ways in which they can be applied, genetic modification (GM) of crops demands particular attention. Genetically modified crops possessing genes from different species, could possibly relieve global food shortages. Although initial excitement surrounded the use of GM crops that they will provide bigger and better harvests for farmers there are still questions about the benefits of such crops. In India, the public may not welcome the GM technology as a viable option in improving the productivity of the food crops.Other new technologies like, hybrids in vegetables, system of rice intensification, precision farming and farm mechanization, hi-tech cultivation of fruits and vegetables and flowers, resource conservation technologies and many off-farm activities related to mechanization, primary and secondary processing, organic farming, and other improved farming practices are some areas where we can invest upon. Further, Seed is the basic input in agriculture; high quality seeds of improved varieties play a crucial role in enhancing the production and productivity. It is of paramount importance to maintain seed quality during production, processing, packaging, marketing etc., to attain sustainable agriculture. In tropical and sub tropical climates, high temperature and relative humidity combine to cause rapid deterioration of seeds in open storage, resulting in loss of value, poor stand establishment, lower productivity and disincentive to invest in improved seeds. Generally, seeds harvested before or during the rainy season need to be dried and stored until the next planting season. Therefore, quality seed supply system need to be devised.

To check the spread of spurious seeds, Government of India had framed and brought out different legislations to protect the quality of seeds and planting materials. Since most of Indian farmers are illiterate or semi- literate, it is the responsibility of the Government to frame rules that govern the production and distribution of quality seeds to the farming community. In 1966, the Seed Act was formed and was followed by Seed Rules in 1968. Both were adopted during 1969 for the whole of India, as per the act the seeds intended to sold to farmer should be either certified or truthfully labeled. With newer varieties coming into the agricultural scenario, Seeds (Control) Order, 1983, under the Essential Commodity Act, 1955 regulates the seed quality at market level. This order envisages a person carrying on the business of selling, exporting and importing of seeds needs to have a license and regulated by the seed enforcement authority in the state. To help Multinational Corporation in utilizing the manpower and knowledge base of our country, the Plants, Varieties and Fruits Order was passed during 1989 this order was revised by another order,

Plant Quarantine (Regulation of import into India) Order in 2003. Signing of WTO in 1995 paved the way for private research and development of varieties. In order to regulate such varieties, the protection of Plant Varieties and Farmers' Right Act was passed in 2001 which was followed by National Seed Policy, 2002 and Seeds Bill, 2004.These laws are framed in order to check the spread of spurious seeds and make available quality seeds to a common farmer and equip him to approach authority for justice.

In India Phytoquality standards of seeds are referred as Indian Minimum Seed Certification Standards which are checked by well organized quality control system. This system relies on testing of four principal components of seed quality, i.e. genetic (variety) purity, physical purity, germination and moisture. This evaluation of the seed crop can be performed at field and laboratory and processed seed by the seed producer while seed testing is performed by seed analyst. This constitutes the basic mechanism of quality control system in our country.

Seed quality control system is a critical part of the seed industry's challenge of feeding the world. The methods of seed testing are evolving constantly. For example, traditional genetic and trait purity methods are being replaced with new molecular methodologies. One of the biggest advancements is the use of DNA instead of protein in checking that seeds are true to variety. Electrophoresis has been used for many years and has been effective, but single nucleotide polymorphism or SNP testing allows more efficient testing. Despite the limited introduction of new tests, seed testing continue to move forward. Several significant advancements in seed testing have been made in the last few years.

Traditional varieties are the varieties which have domesticated, improved and conserved by the farmers using their traditional knowledge. The diversity of traditional varieties sustained by farmers around the world is increasingly valuable for adaptation as climate changes, particularly as modern agriculture relies on a very limited number of crops and varieties. In addition, traditional varieties or landraces are more genetically diverse than modern varieties and so are better able to withstand environmental stress such as lack of water or nutrients which will also provide a valuable source of germplasm for species that can tolerate the current extreme weather and soil conditions including drought, salt, pest and disease tolerance. Development, seed production and storage of seeds of these varieties by farmers under local conditions, and seed exchange mechanisms are the principal components of a dynamic system that forms the most important seed source of food crops for small farmers in developing countries. These approaches in varietal development, seed production and distribution show to have promising potential for improving seed supply for small farmers.



ICFA hosts CEOs Round Table on Food Safety, Quality and Supply Chain

With increasing soil and water pollution and aflatoxin levels, the quality of food and health safety is becoming major concern, which needs to be addressed with a sense of urgency. In this context, ICFA hosted CEOs Round Table on Food Safety, Quality and Supply Chain in New Delhi. The meet was chaired by Prof. MS Swaminathan and co-chaired by Mr. Ashish Bahuguna, Chairman, FSSAI and Mr. JP Meena, Special Secretary-Food Processing. A host of dignitaries including Chairman, Cargill, Mr. Siraj Choudhry; Vice Chancellor Niftem; Dr Ajeet Kumar; DG ICFA, Mr Alok Sinha and 40 plus CEOs from food processing industry participated. ICFA announced the launch of Working Group on Eco-Agriculture for safer food production and also GAP Certification Program. ICFA chairman Dr. MJ Khan said that consultations are being held for launching a nation wide Healthy Food Initiative project.



ICFA meets Union Agriculture Minister

Indian Council of Food and Agriculture team led by Executive Director Mr NS Randhawa met Union Agriculture Minister, Mr. Radha Mohan Singh and submitted a note on Agriculture growth agenda. The team briefed him about various Round Table meets hosted by ICFA. The Minister appreciated role of ICFA and asked for set of detailed recommendations. The ED was joined by Ms Mamta Jain, Director ICFA; Dr Priyanka Sarkar, VP and Kunal Tiwari, ED, CARD.



ICFA hosts a National Round Table on Farm Subsidies and Soil Health

With the increased focus on organic agriculture and ambitious national soil health program of the Modi Government, the mammoth subsidies on fertilisers have often been the subject of intense debate among the concerned stakeholders. Questions are raised about the purpose of the subsidy and whom has it actually benefitted. Interestingly fertiliser industry has been seeking to free itself from the load of the subsidy. A healthy soil is critical to healthy harvest. Looking into its importance, ICFA hosted a National Round Table on Farm Subsidies and Soil Health in New Delhi, which was joined by top industry CEOs, Govt officials, experts and farmers leaders.

INTERNATIONAL AGRICULTURE CONSULTING GROUP

Indian initiative towards food and agriculture solutions

Vision

Our vision is to be a leading provider of Indian regional expertise in food and agriculture and to outstand as key advisory partners on food security concerns, policy planning and strategy framework for sustainable development through agriculture.

Mission

Our mission is to initiate and support micro and macro level changes in agriculture by providing Indian expertise and solutions for research, extension, education, training, institutional frame, policy planning, agribusiness and project consulting so as to address their major agricultural concerns relating to farm production, food security, environment sustainability, rural employment, economic growth and human resource development.



Objectives

- Provide Indian expertise to deliver solutions to agricultural issues and concerns through formulation of agro and rural development projects, farming solutions, micro and macro level national agriculture planning, policy support, organized research, extension infrastructure and institutional set-ups, value addition and market linkage services.
- Manage short terms management programs, training and entrepreneurship course for farmers, research & extension personnel, officials and professionals of various countries while recognizing and understanding ecological, technological, social and economic concerns related to their food and agriculture sector.
- Facilitating students from different countries in enrolling in food and agricultural degree programs; management and entrepreneurship courses offered by various institutes and recognized universities of India, so as to help various countries in developing human resource for creative and productive change at ground level.
- 4. Organizing delegation level visits from India to various countries and of different countries to India for participation in agri and business summits, learning and exposure at technology institutions, agri universities, model farms etc., and discussing possibilities for joint ventures, collaborations and promoting better understanding in agriculture and agribusiness.
- Facilitating Governments, Corporates or Institutions to venture globally and act as total solutions providers in implementation of foreign agriculture projects by providing research structure, technical assistance and investment planning in food, farming, agribusiness or agriculture development programs.







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DIGITAL INDIA A NEW PREVAILING INITIATIVE FOR EMPOWERING FARMING COMMUNITIES

overnment of India has initiated "Digital India" project on 1st July 2015 that foresees empowering citizens with e-access to government services and livelihood related services, among others. The

related services, among others. The project has three core components, viz. digital infrastructure, digital services and digital literacy. The main objective of Digital India is to connect rural areas with high speed Internet networks and improving digital literacy. The main aim of Digital India is inclusive growth of rural people in the areas of Digital filed as electronic services, products, manufacturing and job opportunities. These aims are centered on three main areas:[1] Digital Infrastructure as a Utility to Every Citizen, [2] Governance and Services on Demand and [3] Digital Empowerment of Citizens.

Problems of Rural Community

Agricultural problem

As stated by "Situation Assessment of Indian Farmers" any kind of agriculture related information that is available on different ICT channels is being used by only 28 per cent of all farmers. Total 72 per cent of farmers have no access to ICT channels to take the Information and adopt the new and innovative technologies. They do not have any source of information that can help them adopt latest technology. Most of the farmers are unable to access credit, insurance, marketing services from the established institutions. This is prime reason of farmer's low crop productivity and profitability. As per the report of ICAR, there is a big gap between the vield of demonstration plots in farmers' fields and the average yield of the area. With the use of integrating agricultural credit with technology and production inputs, farmers can increase wheat and rice production in India.Proficient agricultural extension agency and support from service providers can bridge the existing gap between the actual crop yields at field level and the potential yields.

In India small and marginal farmers constitute 85.9 per cent of the farming community. The common problems faced by them are economic viability, sustainability and producing marketable surplus. Small farmers are concentrated in rain-fed areas and cultivate crops under a high risk environment and they are confronting frequent droughts, floods and soil erosion.

In India more than 57 per cent land comes under degraded land. This land is degraded due to soil erosion and about 8.4 million hectares are affected by soil-salinity and waterlogging problems. Annually India is losing about 0.8 million tonnes of Nitrogen, 1.8 million tonnes of Phosphorus and 26.3 million tonnes of Potassium impacting adversely soil fertility and crop productivity.

Social Problems

According to rural household survey report there are 73.5 per cent rural households in which less than 50 per cent people are engaged in agriculture as a main occupation. In case of 74.5 per cent of rural households, the highest-earning member earns less than US \$75 per month 36 per cent of the 884 million people are illiterate; of the 64 per cent literate, more than 20 per cent have not even completed primary school, only 5.4 per cent have completed high school and 3.4



per cent have graduated from college; 23.52 per cent rural families have no literate adult above 25 years 122.4 million [68.32 per cent] have mobiles which suggests mobile connectivity has become a basic service.

Mobile penetration in rural areas

India hasabout 69 per cent rural population. In India more than 90 per cent has mobile ownership. This Mobile phone can be used effectively for disseminating agriculture related information. Farmers can easily access to all type of information related to agriculture from selection of seeds for planting to marketing of produce in domestic and international markets. As of March 2015, the national teledensity was 79 per cent and rural teledensity 46.5 per cent. Telecom Policy aims to increase rural teledensity to 60 per cent by 2017 and 100 per cent by 2020. Mobile telephony penetration is playing a lead role in disseminating the information and helping digital empowerment to the rural population.Urban mobile subscriber share stands at 58 per cent as compared 42 per cent of rural subscribers. Rural mobile subscriber base is growing twice as faster compared to urban subscriber base.

Potential of ICT

ICTs have the capacity to transform Indian agriculture through dissemination of Information and Knowledge on time. Today several web portal and mobile apps are available to provide the agriculture related information to the rural people. We can develop many more apps and low cost web portals so that farmers can access authentic, accurate and timely information related high-vielding variety to & seeds. production-enhancing cost-minimizing farming practices, efficient use of water including microirrigation system, integrated nutrient and pest management, post-harvest management practices, measures to mitigate adverse impact of climate change and marketing of farm produce in domestic and international markets.

ICT initiatives for rural India

Previous research studies revealed that ICT initiatives have had positive impact in disseminating the information on details of locationspecific crop production technology economics of crop, livestock and fish farming authorized sources of timely availability of standard quality inputs [seeds, fertilizers, pesticides etc.] farm equipment, sprinklers, drippers, among others, along with costs postharvest management technology and facilities including transport, storage, processing, preservation, packaging and marketing commodity prices, weather, measures to minimize impact of drought and climate change detailed procedure for availing bank credit, crop and livestock insurance cover, government subsidies, land records etc. Government's programs providing subsidy and other facilities to develop irrigation potential, rainwater harvesting, soil and water conservation measures, soil and water testing facilities, prevention and control of pests and diseases, bio-gas, minimum support prices contract farming, value chain system, warehouse receipt reclamation of degraded, saline and alkaline land mechanism to redress grievances.

Digital India

Government of India has initiated "Digital India" a new and innovative programme in 1 July 2015. The Government of India entity Bharat Broadband Network Limited(BBNL) which executes the National Optical Fiber Network project will be the custodian of Digital India (DI) project. BBNL with United Telecoms Limited will connect 250,000 villages through GPON to ensure FTTH based broadband. Digital Literacy mission will cover six crore rural households. Digital India wouldconnect 550 farmer markets in the country through the use of Digi-technology. Out of 10 per cent English speaking Indians, only 2 per cent reside in rural areas. Rest depends on their

vernacular language. However, email addresses can only be created in English language. Government of India has encouraged email services provider giants including Gmail and Rediff to provide email addresses in regional Languages. This is necessary to connect rural India with the Digital India. However, the email provider companies have shown positive sign and are working in the same line.An Indian based company, Data Xgen Technologies Pvt Ltd has launched world's first free linguistic email address under the name 'DATAMAIL' which allows to create email ids in 8 Indian languages, English and 3 foreign languages: Arabic, Russian and Chinese, Over the period of time the email service in 22 languages will be offered by Data XGen Technologies.

Journey of Digital India

Citizen centric services were started in mid 90s. The journey of Digi India was started from there. These were e-Government services and have lesser impacts. Thus, Government of India has launched National e-Governance Plan (NeGP) in 2006. Total 31 Mission Mode Projects covering various domains



were initiated.Despite the successful execution of many e-Governance projects country, across the e-Governance as a whole has not been able to make the desired impact and fulfill all its objectives. It has been felt that a lot more thrust is required to ensure e-Governance in the country promote inclusive growth that covers electronic services, products, devices and job opportunities. Moreover, electronic manufacturing or the digital competency in the country needs to be strengthened. In order to transform the entire ecosystem of public services through the use of information technology, the Government of India has launched theDigital India programme with the vision to transform India into a digitally empowered society and knowledge economy.

The Government of India hopes to achieve growth on multiple fronts with the Digital India Programme. Specifically, the government aims to target nine 'Pillars of the Digital India' that they identify as being: [1] Broadband Highway [2] Universal access to Internet [3] Public Internet Access Programme [4] e-Governance – Reforming Government through Technology [5] e-Kranti - Electronic delivery of services [6] Information for All [7] Electronics Manufacturing [8] IT for Jobs [8] Early Harvest Programmes.

The vision of Digital India programme is inclusive growth in areas of electronic services, products, manufacturing and job opportunities etc. It is centered on three key areas: [1] Digital Infrastructure as a Utility to Every Citizen [2] Governance & Services on Demand and [3] Digital Empowerment of Citizens. With the above vision, the Digital India programme aims to provide Broadband Highwavs, Universal Access to Mobile Connectivity, Public Internet Access Programme, E-Governance: Reforming Government through Technology, eKranti - Electronic Delivery of Services, Information for All, Electronics Manufacturing: Target Net Zero Imports, IT for Jobs and Early Harvest Programmes.

Some of the facilities which will

be provided through this initiative are Digital Locker, e-education, e-health, e-sign and national scholarship portal. As the part of Digital India, Indian government planned to launch Botnet cleaning centers.[1] DigiLocker: Digital Locker facility is an innovative initiative by Hon Prime Minitsre and this will help citizens to digitally store their important documents like PAN card, passport, mark sheets and degree certificates. Digital Locker will provide secure access to Government issued documents. It uses authenticity services provided by Aadhaar. It is aimed at eliminating the use of physical documents and enables the sharing of verified electronic documents across government agencies. Three key stakeholders of DigiLocker are Citizen, Issuer and requester.[2] Attendance.gov.in:Attendance.gov. in is a website, launched by PM Modi on 1 July 2015to keep a record of the attendance of Government employees on a real-time basis. This initiative started with implementation of a common Biometric Attendance System (BAS) in the central government offices located in Delhi. [3] MyGov.in:MyGov.in is a platform to share inputs and ideas on matters of policy and governance.It is a platform for citizen engagement in governance, through a "Discuss", "Do" and "Disseminate" approach. [4] SBM Mobile app:Swachh Bharat Mission (SBM) Mobile app is being used by people and Government organisations for achieving the goals of Swachh Bharat Mission.[5] eSign framework:eSign framework allows citizens to digitally sign a document online using Aadhaar authentication. [6] e-Hospital:The eHospital application provides important services such as online registration, payment of fees and appointment, online diagnostic reports, enquiring availability of blood online etc.[7] National Scholarship Portal:National Scholarship Portal is a one step solution for end to end scholarship process right from submission of student application, verification, disbursal sanction and to end beneficiary for all the scholarships

provided by the Government of India. [8] Digital India Week: At the launch ceremony of Digital India Week by Prime Minister Narendra Modi in Delhi on 1 July 2015, top CEOs from India and abroad committed to invest 224.5 lakh crore (US\$3.3 trillion) towards this initiative. Digital Technologies which include Cloud Computing and Mobile Applications have emerged as catalysts for rapid economic growth and citizen empowerment across the globe. Digital technologies are being increasingly used by us in everyday lives from retail stores to government offices. They help us to connect with each other and also to share information on issues and concerns faced by us. In some cases they also enable resolution of those issues in near real time. The objective of the Digital India Group is to come out with innovative ideas and practical solutions to realiseHon'ble Prime Minister Narendra Modi's vision of a digital India. Prime Minister Modi envisions transforming our nation and creating opportunities for all citizens by harnessing digital technologies. Digital India Week has been launched with an aim to impart knowledge to people and to empower themselves through the Digital India Programme of Government of India. Digital India comprises of various initiatives under the single programme each taraeted to prepare India for becoming a knowledge economy and for bringing good governance to citizens through synchronized and co-ordinated engagement of the entire Government. This programme has been envisaged and coordinated by the Department of Electronics and Information Technology (DeitY) in collaboration with various Central Ministries/Departments and State Governments. The Prime Minister as the Chairman of Monitoring Committee on Digital India, activities under the Digi-India initiative is being carefully monitored. All the existing and ongoing e-Governance initiatives have been revamped to align them with the principles of Digital India.

The effective implementation of digital India project would enable the country to increase agricultural

growth rate by 4 per cent in three vears. It can also generate annually 50,000 to 70,000 employments for rural youthswho are trained in agriculture & computer technology by state agricultural universities. For this attention should be focused on following points: [1] Need of Evaluation or impact analysis: This is necessary to assess the impact of ICTs initiatives for the welfare of rural communities. Government has initiated many portals and Mobile app. It is necessary to assess the impact of these portal in term of feedback from users about content, utility, timeliness. satisfaction, changes required, their grievances increase in productivity, output and income of benefitted farmers increase in price realization in farm commodities sold, direct sellina without dependence on middlemen reduction in costs of transactions mechanism to redress grievances. [2] Higher user Satisfaction: For high user satisfaction, there should be some qualities on all the web portals or mobile apps as ease of access updated content layout, consistent themes easy design, navigation higher interactivity access through multiple media (particularly voice) higher use of non-textual information language options lower cost of transaction. [3] Public Private Partnership: Some private organizations have also created some web portals. They should align with the Public organization so that the high quality information should be reach among the rural communities. [4] Mobile First approach: Mobile First Approach is a approach is which more and more ICT initiatives should be started. As this is an ICT era and 21th century and people want to use these ICTs initiatives to take information related to farming etc. A professionally managed ICT platform should be initiated so that valid and reliable information can be reach among the rural community.

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REDUCTION OF CROP LOSS BY USING BIOACOUSTICS

n addition to crop loss by pests and diseases, bird and animal depredation occupies a significant percentage in rain fed/irrigated agriculture in India. More than 63 species of birds and more than 20 species of animals depredate on crops and are pre-adapted to feed on them. Major depredatory birds like Rose-ringed Parakeets damage up to 90% and animals like Wild boars up to 70% in orchards, grain crops, and vegetables. Invaluable research seed material is lost in breeding experiments to damage by Parakeets, House Crows, Wild boars and Nilgais.

Unlike many developed countries, India, including South-East Asia, has been lagging in introducing new technologies for protection of crops. For example, in US, Australia, Europe, and Israel, bioacoustics is chiefly employed for protection of crops including that of horticulture. This technology is almost four decades old in these countries. In South-East Asia, birds and animals are chiefly being deterred using traditional methods like Mylar ribbons, scarecrows, beating drums, flickering torches in the night, shouting, fire, gas cannons, tying up old sarees, sprinkling hair along the boundaries of field etc. At best, these technologies protect the crop for a maximum of one week and pests acclimatise quickly. A conservative estimate of the effectiveness of these technologies is at best between 10-40%.

There is an opportunity to scale up food production in India using bioacoustics. Employment of bioacoustics for protection of crops by Canada Geese in US resulted up to saving 99.45%. Experiments were done by Punjab Agricultural University on the playback of Roseringed Parakeet distress calls in 1975



to disperse Parakeets from Guava orchard. Apart from this, no research has been done in India since then.

What is bioacoustics? How could it help in increasing crop production?

Bioacoustics is sounds of biological origin. Sounds produced by birds and animals vary in frequency widely. But, sounds in the frequency of human audible range i.e., 20 Hz to 20,000 Hz are of vital importance in the day to day communication of most depredatory birds and animals. Peak sensitivity of hearing/reception and response in these animals range between 2,000 Hz to 8,000 Hz.

Bioacoustics or communication is employed by birds and animals for various purposes. For example, a House Crow would employ a set of vocalisations to call fellow Crows when the food is found i.e., Food Announcement Call. On the other hand, a male Crow would employ Breeding Calls for attracting female Crow during the breeding season. Mobbing calls, territorial defence calls, morning chorus, evening cacophony all have different meanings in the daily life of birds.

The most important bioacoustics is the one that is produced and used for survival of the species. Primarily, birds and animals produce alarm calls and distress calls to announce the presence of danger. For example, when a troop of monkeys spot a tiger

in the forest, they raise alarm calls. Such calls are heard by other herbivores, and flee from the danger spot. Distress calls are produced when a predator captures the prey. Distress calls are important in dispersing flock forming birds and animals. Third kind of useful sounds are Predator calls. Predator calls elicit fleeing behaviour from depredatory birds and animals. Together, these three types of calls are most important for protecting agricultural crops.

This new approach to mitigate the problem of bird and animal depredation can be successfully employed to convey 'danger' signals where wildlife is not desired. The sound signals are mostly specific to species, but some are general. Indigenous species respond better to sounds of their own or other species that share the area. However, the technology is not simple. For example, Rock Pigeons are known to respond only to their geographical dialects.

 ${\sf A sequence of bioacoustic sounds interspersed}$





with silence periods when broadcast in the field (with the help of an electronic equipment), it elicits fleeing behavioural response from birds and animals. The effect is long lasting compared to other techniques, animals without becoming acclimatised. In the experiments conducted at Haryana Agricultural University, the sequences were found to be effective for more than five months continuouslyagainst Nilgai, Wild boar, Spotted Deer and Blackbucks. The equipment used for testing was produced by a private company in Bengaluru, GrusEcosciences, and had 110 dB sound output, covering 7-22 acres of agricultural area.

Inter quartile range analysis of the experimental results showed that bioacoustics was able to prevent loss to the tune of 95% in Wheat and Sugarcane crops.

Dr Vasudeva Rao, who is working on prevention of crop loss under All India Network Project on Vertebrate Pest Management has successfully tested bioacoustics technology in Telangana. He reports 85-89% reduction of crop damage by wild boars. Recently, Prof. JayashankarTelangana State Agricultural University (PJTSAU) adopted bioacoustics technology in their package of practices, and released a calendar.

India needs to adopt newer technologies for prevention of crop loss, crop migration, and protection of rain fed crops, oilseeds, pulses. Bioacoustics is one of them.

Mahesh, S. S. GrusEcosciences Bengaluru

PRODUCING SAFE, HEALTHY AND QUALITY FOOD

Poland is an important **European and global producer** of a number of agricultural and horticultural products as well as products of animal origin. More than sixty percent of Poland's total area is taken up by farming. The most important crops are grains, of which the highest yields came from rye, wheat, barley, and oats. Other major crops are potatoes, sugar beets, fodder crops, flax, hops, tobacco, and fruits. **Agriculture employs almost** one third of the total Polish work force. In an interview with Fariha Ahmed of **Agriculture Today, Deputy Minister of Agriculture of** Poland, H.E Mrs. Ewa Lech shares crucial insights into the form of agriculture practiced in Poland and the trade interests of the country.

Please brief us about agriculture in Poland

Agriculture in Poland has always been an important part of the country's economy and contributes to the development of rural areas. Since our accession to EU we have become an important European and global producer of a number of agricultural products of animal and plant origin. We are ranked high in production of many agriculture commodities. The most important crops are grains, of which the highest yields came from rye, wheat, barley, and oats. Other major crops are potatoes, sugar beets, fodder crops, flax, hops, tobacco, and fruits. Farms all over Poland



raise dairy cows, beef cattle, pigs, poultry, and cultivate fruits. We are number one producer and exporter of poultry products in Europe. The accession to EU was very important as it facilitated rapid growth and technological progress. Also, we have made huge progress in terms of hygiene and sanitary standards. It is really spectacular progress and can be called civilization leap in food processing.

What is the share of agriculture in Poland's foreign trade?

Agriculture represents 13 percent of the total exports and 30 percent of all the volume of

agriculture production generated are exported. About 75 per cent of the agricultural and food exports are absorbed by the very demanding European market.

Which are the biggest trading partners of Poland in agriculture segment? How significant is India as trade partner for Poland?

Our major agriculture trade partners are EU member countries like Germany and Czech Republic but we are also

exporting to non European countries like India. We are trying to have pork, processed pork and poultry approved for the Indian market. For the development of our exports we have 13 priority countries and India is one of them and these are the markets we will be working hard to develop our exports. Indian market is very important to us as the general quality of living is improving and GDP is increasing at an impressive pace, so this market in our view has very good potential. We have put lot of efforts into drafting of our mutual trade agreement in agriculture and hopefully the MOU will be signed during the visit of Vice President of India to Poland. We have been very consistent in our efforts in concluding this MOU. The agreement covers exchange of information between the two countries on various aspects of agriculture and allied sectors including agri food trade, plant health and phytosanitary regulations as per international trade requirements, participation in fairs, exhibitions, seminars related to agriculture and agri-food processing.

What is the current trade volume

Indian market is very important to us as the general quality of living is improving and GDP is increasing at an impressive pace, so this market in our view has very good potential

between India and Poland in agriculture segment?

We import Euro 139 million of Indian agriculture products and we only exported Euro 33,000 this year. This is dramatic decrease of our exports but potentially India shall be a very important partner in future. We understand the problem is in the import license. There are some conditions that have not been matched by the Polish exporters. The requirements regarding the certificate are more strict here, so it is difficult for our exporters to fulfill them. This is the reason our exports have rapidly decreased. But we are in the final stages of arrangements for the certification of

> poultry and pork meat. We are happy with the small steps we are taking into the Indian market. We have success with apples so far as we have agreed with Indian phytosanitary services on so called cold treatment of apples that will make possible for polish exporters to enter the Indian market. We will try to convince phytosanitary services to approve other methods of treatment as well. Before we started with apples our primary export products to India were cookies, cocoa, chocolates, which is not our typical production. In

2016 our exports declined dramatically, the exports declined by as much as 74 percent, which make our trade balance negative. We are trying to rectify the situation and improve the trade balance. We like to export commodities that we are really good at producing.

How does the Polish government support producers who cater to global trade?

We have many instruments to support agriculture and producers. We have rural development program which focus to large extent on investment in modern technology and processing. The rural development program is multifaceted and extends support for all sorts of activities. We support all farmers but depending on the market situations we specifically target certain sector and certain specific products. For example, we have subsidies for export of male bovine animals. We have wide range of payment system as well. We have direct payment system and payments supporting animal production. In direct payments, farmers receive annual payments to help stabilize farm revenues in the face of volatile market prices, unpredictable weather conditions and variable input costs. To benefit from these payments, farmers must respect rules and practices concerning environmental standards, animal welfare, food safety and traceability. Many of these requirements are stricter than those facing our global competitors. To avoid distorting markets, payments are not based on how much a farmer produces, but on how much land he uses and how he uses it. But in general this system of payment is not to support development but to support income, keep the certain level of production and to stabilize the income in relation to certain reference period. We would like to introduce couple payment for huge producers to give them maximum level of payment. It is enshrined in our constitution that the foundation of Polish agriculture should be family farms not the large investor farms.

What is the importance of family farming in Polish agriculture system?

We still have many family farms in Poland. Despite the number of them, we as Ministry of Agriculture want to not only retain the level of family farming we have now but want to develop it further. In processing sector we try to do the same and support small processing companies. Also, we try to develop the system of direct sales that is direct selling of agriculture products from processors to people in urban areas. This is to supplement the income of small farmers. If they could produce the food and process it in the farm that would bring higher margins and help them to supplement this income. The small farmers will sell internally to the domestic market while technologically advanced larger farms with processing facilities will sell both locally and internationally.We are trying to support small processers to make them able to compete with the large ones. We have recently introduced the possibility for farmers to sell directly their produce and this is something new to Polish agriculture. The essence of the concept is that there should be no go in between, so the value chain is shortened and margins are higher for the producers. Apparently the people from the cities are more interested in this mechanism as people want to buy fresh produce directly from the farms. We will see how the farmers will live up to this as this is something new and we don't know the results yet. We have traditional large retailers, middlemen and traders but as an alternative we have now this new opportunity for people to buy directly from farms.

What is the scenario of dairy and livestock farming in Poland?

There are certain limits for production for each individual member state and each individual farm in EU. If the farmer exceeds the limit they have to pay the penalty. That is to stabilize the prices of milk. Last year EU has departed from this system and they freed the production entirely which practically translated into sudden collapse of prices, which are now again stabilizing. The prices are returning to normal and profitable but we have to see the development in coming months. The production of pork has decreased. We now have 9 million pigs which is half of what we had few years ago. So we are importing both live animals and meat when it comes to pig. But the trade goes both ways and we export as well as import lot of meat. The direction of trade need is dictated by the current level of prices but when it comes to the poultry we are cheapest in the Europe. We are number one producer and exporter of poultry in Europe. For prices level to be profitable and competitive you have to generate very high turnover, so only poultry production at large farms can sustain themselves in Poland.

Besides trade in agricultural commodities, which are the other areas in agriculture segment where the two countries can cooperate?

We have lot to offer in agriculture apart from just produce. We have know how, technology, machinery, seeding material, genetic material etc. There is whole range of products and services we could offer to India. We are aware of opportunities the concept of mega Food Park offers and we have been discussing it with Indian Ministers. For us it is opportunity to sell equipments and machinery but also it is an opportunity for direct investment. Also, there is possibility of scientific cooperation between the two countries. We have scientific institutes that are interested in cooperation on topics like environmental impact of agriculture and research in the area of food safety. Using Polish technologies to enhance food processing capacity in India could be a win-win formula for companies on both sides. The food produced in Poland is safe, healthy and of the highest quality. This is another window of opportunity for Poland and India to come together in agriculture sector.



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THE MONK MINISTER

jay Singh Bisht or popularly known as Yogi Adityanath, a priest turned politician and Hindutva firebrand has assumed the role of Chief Minister of Uttar Pradesh consequent to the recently concluded assembly election. BJP's victory in the UP assembly poll paved the way for the yogi's ascent of power in India's most populous state. He has been the Member of Parliament from the Gorakhpur constituency, Uttar Pradesh for five consecutive terms since 1998.

A fiery orator, intrepid in expressing his opinion and fearlessly embarking on his missions, Yogi Adityanath has become the talk of the nation in a short span of time. Clad in a conspicuous saffron robe and shedding the characteristic diplomacy of politicians, the new Chief Minister of Uttar Pradesh has already started to shake things in the state. From clearing the law and order situation to waiving farm loans, Yogi Adityanath has touched upon a myriad of problems that **Uttar Pradesh faces, within** days of coming into power.

KNOW YOUR

Born as Ajay Singh Bisht into a Garhwali Rajput family in 1972 in the village of Panchur, in Pauri Garhwal district of Uttarakhand to Anand Singh Bisht, Yogi Adityanath completed his bachelor's degree in Mathematics from the Hemwati Nandan Bahuguna Garhwal University in Uttarakhand. Drawn to join the Ayodhya Ram temple movement in 1990s, young Bisht left home and accepted the tutelage of Mahant Avaidyanath, the chief priest of the Gorakhnath Math. Subsequently, he was given the name 'Yogi Adityanath' and was designated as the successor of the Mahant Avaidyanath.

Adityanath, the Mahant or head priest of the Gorakhnath Math, is also the founder of the Hindu Yuva Vahini. Adityanath was the youngest member of the 12th Lok Sabha at 26. He has been elected to the Parliament from Gorakhpur for five consecutive terms (in 1998, 1999, 2004, 2009 and 2014 elections). Although Adityanath won from BJP tickets, his relationship with the party was strained at times. He differed on party's line especially on its dilution of the Hindutva ideology. However, he established his own independent powerbase in Eastern Uttar Pradesh, with the support of the Hindu Yuva Vahini and the Gorakhnath Math. This managed to get him the requisite attention from BJP leadership and he became a prominent campaigner for the BJP in the 2017 assembly elections in the state of Uttar Pradesh. He was appointed Chief Minister of the state on 19 March 2017 after the BJP won the assembly elections. After becoming the CM of UP, he kept around 36 ministries to himself including Home, Housing, Town and country planning department, Revenue, Food and Civil Supplies, Food Security and drug administration, Economics and statistics, Mines and Minerals, Flood control, stamp and registry, administration, secretariat prison, general administration, vigilance, personnel and appointment, information, institutional finance, planning, estate department, urban land, UP state reorganisation committee, administration reforms, programme implementation, national integration, infrastructure, coordination, language, external aided project, Relief and Rehabilitation, Public Service Management, Rent Control, Consumer protection, weights and measures.

In his first cabinet meeting held on 4 April 2017, decision was taken to waive off loans



Adityanath was the youngest member of the 12th Lok Sabha at 26. He has been elected to the Parliament from Gorakhpur for five consecutive terms

of nearly 87 lakh small and marginal farmers of Uttar Pradesh, amounting to ₹363.59 billion. About 92.5% of the state's farmers fall in the small and marginal categories.To balance the fiscal deficit, a "Kisan Rahat Bond" would be introduced for raising money to fund the farm loan waiver scheme. The plight of Potato farmers

at times of bumper crops has also caught the attention of the new Chief Minister. The Yogi Cabinet has therefore decided to set up a threemember committee headed by Deputy Chief Minister Keshav Prasad Maurya to see how the potato farmers can get adequate remuneration for their produce. In the meantime, Yogi Government has also fixed a target of procuring 80 lakh metric tonnes of wheat produce from farmers. In the first stage itself, the government is expected to procure 40 lakh metric tonnes of wheat. 5000 wheat procurement centres in the state have been instructed to be monitored by the agriculture ministers. All district officials have been asked to set up new centres for crop procurement as per demand. Along with the MSP, each farmer will get Rs 10/kg MSP extra. Besides, the money will be transferred to farmers' accounts directly.

Immediate to his ascension to power, the Yogi has been able to take some radical decisions in favour of the farming community. His commitment to his ideologies and an unwavering stand in ushering in development are qualities that can make him lead the largest electorate with ease. "There is an increasing demand by farmers for loan waivers since their crops have suffered due to drought or other natural calamities. Credit is a key input and a healthy credit system cannot be based upon loan waivers. Therefore, while shortterm problems of farmers need to be addressed through immediate help, what is important is a longterm policy to make agriculture economically viable and stable"

DR.M.S. SWAMINATHAN





"Loan waiver is not the ultimate solution but one of the many. The CAG report states that the farm loan waiver of 2008 barely helped 30-40 per cent farmers. The most distressed farmers received no benefit"

DEVENDRA FADNAVIS Chief Minister, Maharashtra

"We need to create a consensus that such loan waiver policies are eschewed. Otherwise, sub-sovereign fiscal challenges in this context could otherwise affect national balance sheets"

URJIT PATEL Governor, Reserve Bank of India





"Debt waivers create a moral hazard from a credit repayment perspective and we cannot have omnibus waivers,"

HARSH KUMAR BHANWALA Chairman, NABARD