

LAND BANK JOURNAL

VOLUME 57 • JUNE 2018 • ISSUE I



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LAND BANK JOURNAL (QUARTERLY)

Managing Editor
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SUBSCRIPTION RATES

Annual

₹60/- (For Members)

₹200/- (For Others)

Price per copy

₹15/- (For Member)

₹50/- (For Others)

Published by

**National Co-operative Agriculture and
Rural Development Banks' Federation Ltd.**

701, BSEL TECH PARK, 7th Floor, A-Wing,
Opp. Railway Station, Vashi, Navi Mumbai-400 703

Phone No. (022) 27814114, 27814226, 27814426

E-mail : nafcard.org@gmail.com

Website : www.nafcard.org

Printed by:

ACHSA PRINTERS

Shop No. 39, Maruti Paradise, Sector - 15,

CBD Belapur, Navi Mumbai - 400 614.

Tel.: 27571209 / 27571210

The opinions/views expressed in the Land Bank Journal are not necessarily the official views of the National Cooperative Agriculture & Rural Development Banks' Federation.

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News

India has 140 Million Ha net sown area, of which about 50 Million Ha are cultivated more than once in a year, making the gross cropped area about 190 Million Ha. 53% of net sown area remains unirrigated with huge impact on per hectare yield of crops. Low level of investments and technology application is another constraint in enhancing productivity. Indian agriculture is yet to experience technology revolution. Information technology and biotechnology transformed agriculture in the developed world. Information technology enables access to vital information on weather patterns, need for crop rotation and switching of crops and fertilizer use. Biotechnology helps to develop high yield crops and improved pest management. These are big investment opportunities for Corporates as well as public sector in partnership with corporates. With crop yields just 30-60% of sustainable optimum yield levels in developed and many developing countries, India offers tremendous scope for investment in the farm sector. Public investments in the farm sector mainly consist of investments in major and medium irrigation projects and other infrastructure which enhance the rate of return on farm level investments. Farm level investment is basically a private initiative by the farmer. It is estimated that 84% of private sector capital formation in agriculture since 2000 was funded by bank loans. There has been substantial growth in agricultural credit since 2000s. The annual growth in credit during 15 years since 2000 was about 18% compared to 8% in the 90s. But the share of long term credit for capital formation in agriculture in the total direct loans given to farmers has been steadily declining during this period. This share has declined from nearly 2/3 of the total in 1991-92 to less than 1/3 at present. Availability and cost of long term agricultural credit and expected rate of return on investments are the main factors affecting private capital formation in agriculture. Public policies including policies of Central and State Govts and that of institutions like RBI and NABARD have huge impact on these factors. The Central Govt has taken a number of steps in recent years to ensure higher returns to farmers including special schemes for increasing irrigated area, launching national e-market for better market access and price stability. Govt in 2018-19 budget announced fixing of Minimum Support Prices (MSP) of major crops at 1.5 times of cultivation cost including implied wages for family labour. Govt has now fixed MSP of 14 kharif (summer sown) crops. The current year outlay for compensating farmers for the gap between realised price and MSP was initially estimated at ₹12000 - 15000 crores. However, it is reported that annual cost of implementing MSP could go upto ₹1.75 lakh crores at an average price gap of

20% as early signs in key markets indicate, giving rise to fears about the efficacy of MSP in ensuring higher returns to farmers in the absence of required funds. Nevertheless, recent steps taken by the Govt including higher MSP have a positive impact on the rate of return on farm investments. However, the policy environment is not so favourable from the perspective of cost and availability of long term agricultural credit. Availability of long term loans has come down drastically in many States with the weakening of cooperative long term credit structure. Investment credit to agriculture is a specialised product requiring long term funds and technically qualified credit specialists to carry out technical and financial appraisal and post disbursement monitoring. In the absence of long term funds and high overheads involved, the long term agricultural credit is not a preferred area of lending for commercial banks. Commercial banks generally have a higher comfort level in advancing crop loans which have lower credit risk compared to long term loans as repayment/recovery is automatic at the time of renewal. There is also huge imbalance between the cost of short term and long term agricultural credit. Crop loan is available at not more than 4% p.a. generally and even at 0% in some States, thanks to interest subvention schemes of Central and State Govts. However, no such schemes are available to reduce the cost of long term credit used for capital formation in agriculture. Presently, NABARD's interest rate on refinance against long term agricultural loans is in the range of 9 - 9.5% p.a. which translates to interest rates in the range of 14 - 15% at farmer level. Inaction on the part of Govt to implement the revival package for LTCCS recommended by Vaidyanathan Task Force II, reluctance of RBI to evolve a policy for giving banking licence to SCARDBs as recommended by various committees, continuing stipulation of govt guarantee for giving NABARD's investment credit refinance to ARDBs in spite of increasing difficulties in getting such guarantee, lack of govt intervention to reduce the cost of long term agricultural credit with above 5 year tenure as was done in the case of crop loans, exclusion of long term agricultural credit from the purview of loan waiver schemes of State Govts etc., are some of the policy aberrations acting as disincentives for private investments in the farm sector. Governments and other agencies concerned need to address these issues on priority to provide enabling environment for stepping up private capital formation in agriculture.

K K. Ravindran

Managing Editor



ENSURING RIGHTFUL BENEFITS TO FARMERS

Co-operatives in India have the potential to transform agriculture into profitable business venture through well-coordinated collective action.

Dr. K.K. Tripathy*

Co-operatives are democratic, self-supporting and voluntary community based legal entities. These have been treated as catalysts for socio-economic advancements and grass-root level self-governing change agents throughout the history of Indian approach to planned economic development. Co-operatives are expected to realize social, economic and political objectives ranging from self-help and grass-root participation to production, distribution and social control over resource allocation and mobilization. Pre-independent India witnessed the enactment of the Cooperative Credit Societies Act 1904 within an aim to combat rural indebtedness by providing a formal and legalized institutional status to co-operative credit societies. The excessive reliance on co-operatives prevailed because of inappropriate institutional arrangements for formal finance to agriculture and rural enterprises during the post-independent period. This led to the government consider and facilitate promotion of the co-operatives as its essential instrument of social and economic policy for bringing in appreciable changes in the fields of agriculture and rural enterprises.

In the 1990s, India revisited her economic strategy and opened up the economy by carrying out a number of policy measures. Several events led to the varied growth of co-operatives covering diverse sub sectors of the economy viz. co-operative credit societies, multi-purpose co-operative societies, sale/purchase societies, co-operative farming, industrial co-operatives, co-operative marketing, co-operative processing, consumer co-operatives, labour and construction co-operatives etc. These were the specialized sectoral co-operatives which offered special opportunities for the overall development by enabling co-operation amongst various strata of our society. It was also presumed that these grass-root level self-governed institutions would create a vivid environment to obtain and realized the advantages of economies of scale just by coming together at the community level and by utilising locally available physical and financial resources for ensuring sustainable business activities with better remuneration to the members of the co-operatives concerned.

Assertions of India's planners and co-operators about the country having witnessed the world's largest and most diverse co-operative movement are not disputed. However,

*Director, VAMNICOM Pune (Source: The Cooperator June 2018 Issue)

certain inherent weaknesses and constraints within the co-operatives have led to their below benchmark performance. The age-old problem of mass poverty and unemployment has remained alive even after almost two and half decades of economic reform and globalization efforts.

So, what is the significance and potential of co-operation in India? How best can the co-operatives become reliable change agents of the government towards making agriculture and rural economy vivacious and remunerative?

Co-operative Development: Issues and Challenges

co-operation is a philosophy of life and an important guiding principle for all round development of a community. Co-operation brings together people on the basis of equality for the promotion of their economic interest. Members of co-operatives have a common socio-economic interest and they use this democratic organization to pool their resources by making self-help effective through mutual aid and by strengthening the bonds of moral solidarity between them. Co-operation assumes the interaction between the economic and socio-cultural and political power in a specified region. While none can refute the socio-economic benefits of the co-operatives in India, a number of structural, operational and governance related issues have restricted appropriate growth of this community led business entities.

A few major issues which limit the growth of co-operatives are:

- Absence of a well laid-out policy for ensuring active membership within a co-operative
- Lack of recognition of co-operatives as economic institutions with capability to bring in economic change in rural areas.
- Lack of effective and efficient unit level leadership in co-operatives creating confusion in devising and implementing clear policies to carry out programs and activities.
- Lack of transparency and accountability in the co-operatives (It needs to be given foremost priority and the co-operatives should not lose their unique identity for the sake of getting easy money or patronage of facilities offered by government or any other third party).
- Absence of clear, well defined roles and functions including code of conduct of elected officials in a co-



operative set up.

- Lack of focus on the basic values and co-operative principles in the operations of co-operative units.
- Lack of professional and management competency in different tiers of co-operatives.
- Political and bureaucratic influence over the co-operative system.
- Low recovery rates, lower corpus strength and non-availability of adequate capital to finance co-operatives.
- Lack of technology adoption by cooperatives.
- Inflexibility in operation restricting the co-operatives to diversify their products.
- Absence of proper linkages with other business units and accord of low priority to market competitiveness.
- Lack of professional training to co-operative staff.

CO-OPERATIVES AND AGRICULTURE & RURAL DEVELOPMENT

In the pre-independence India, It was perceived that the cooperation could successfully remove agricultural distress and discontent by ensuring timely and adequate finance to agriculturists. The Famine Commissions of 1880 and 1901, while indicating deep rural indebtedness due to wide-spread non-institutional money lending in India, prompted the then British Government in India to take a few legislative initiatives for eliminating the agricultural misery. Following the recommendations of the Edward Law Committee, the then government enacted the Co-operative Credit Societies Act, 1904. Gradually, depending upon the demand for co-operatives in sectors other than agriculture, the then government facilitated development of co-operation in the areas of animal husbandry, fishery agri-marketing, food processing, agricultural credit, labour and civil construction, consumer urban credit, housing etc.

Post-independent India witnessed rapid growth of both credit and non-credit co-operatives. The credit co-operative had a three-tier structure for the distribution of rural credit with Primary Agricultural Credit Cooperatives (PACs) at the village level, District Central Cooperative Banks (DCCBs) at the district level and State Co-operative Banks (SCBs) at the State level. The urban areas were served by urban credit co-operatives. The non-credit co-operatives included producers' societies, consumer co-operatives and others like housing, transport, insurance, labour, farming cooperatives, etc.

Indian Agriculture and Cooperatives

Two-thirds of India's people live on agriculture and allied activities and reside in rural areas. There are about 650 rural

districts in India covering 727,911 villages which has 106 million land holdings with the average size of the holding being only 0.88 hectare. Government of India's policy initiatives for strengthening the rural credit delivery mechanism has, therefore, laid emphasis on enhancing the flow of credit at the grass-root level through an effective credit planning, adoption of region-specific strategies, rationalization of lending policies and procedures and the reduction of cost of rural borrowings. The number of branches of scheduled commercial banks in India as in 2015 stood at 1,25,672 out of which 39% (48,732) were rural branches. The co-operatives, on the other hand, have 1,07,949 rural outlets including 93,042 PACs.

About 13 crore members are active in 93,042 PACs out of which 4.81 crore (37%) are borrowing members. Around 52% of loans outstanding of co-operative banks is towards agri-credit out of which 90% is towards crop loans only. Thus, a large number of Indian farmers avail credit support from the cooperatives for seasonal agri-operations. Further, PACs in most parts of the country are engaged in seed and fertiliser distribution activities. Similarly, share of agri-credit in the total credit portfolio of SCBs and DCCBs stood at 63% and 52%, respectively, by 31st March 2015. The co-operatives registered a major role in disbursing agri-credit in the country, especially the crop loan through Kisan Credit Cards (KCCs).

Government Policy and Action on Investment and Income in Agriculture

The planners and policy makers of India have underscored the importance of adequate investment in agriculture and allied sectors of the economy. In addition to emphasizing a strong and sustainable capital formation mechanism in Indian agriculture, the government has taken several initiatives with a view to reviving the price discovery mechanism for farm products so that the farmers can realise higher price for their produce and can actualize appropriate returns on their investments.

Recently, the Government has suggested in its Budget Announcement 2018-19 the implementation of a number of measures to increase production, productivity, farm profits and income of farmers. Prominent of these are directed towards (a) increasing Minimum Support Price of farm products by 1.5 times, (b) connecting more mandis through National Agriculture Market Scheme (e-NAM), (c) developing rural haats into Gramin Agricultural Markets (GrAMs), (d) creation of Agri-Market Infrastructure Fund, (e) linking rural markets through PMGSY roads, (f) developing cluster based agri-products, (g) promoting organic farming, (h) launching an 'operation Green' to promote Farmer Producer



Organisations (FPOs), agri-logistics, processing facilities and professional management, (i) extending Kisan Credit Card facility to fishery and animal husbandry farmers, (j) setting up dedicated funds for fisheries and aquaculture and animal husbandry, (k) enhancing credit target to ₹ 11 lakh crore.

The Budget 2018-19 has also assumed to remove the adverse impact of de-monetisation on input availability, market arrivals, market price fluctuations and demands of farm produce and increase in acreage under agriculture by targeting mitigation of production risk and price risks in agriculture. Keeping in view the uncertainties and risks in agriculture, the budget promises tireless efforts towards reforming risk mitigation instruments like crop insurance and livestock insurance schemes, modernisation and provision of better agro-logistics, marketing avenues with adequate warehousing facilities nearer to the agri-markets.

Remunerative Farming and Co-operatives

The policy action of the Government for improving overall investment in agriculture is notable. However, this has not translated investment into income and wealth in the rural areas. This is because the Indian farming still suffers from lower returns on investment as the products have been non-remunerative.

Co-operatives in India have the potential in transforming the agriculture into a profitable business venture through a well-coordinated collective action. The following are the possible interventions by which the co-operatives can help improve farm income in the near future:

Contract Farming through Cooperatives: Contract farming enables small and marginal farmers to participate in new high-value and diversified product markets and helps in improving quality standards so as to ensure remunerative prices for the products of contract growers. Since agri-markets are largely buyer-driven and vertically integrated, contract farming through community based farmer co-operatives would offer the best possible income stream to the farmers by reducing labour-related transaction costs, costs of other inputs, technology and innovation. In comparison to individual farmers, co-operative producer organizations can reap the benefits of lower input costs, stability and longevity of contract farming arrangements and can deliver a fair and sustainable distribution of profits amongst the member farmers. Further, co-operative producer organizations have the desired potential for balancing the complicated dynamics between firms and farmers through collective bargaining, creation and maintenance of long-term relationships with input vendors and logistic support providers and through timely mitigating risk and uncertainties faced by the farmers.

Co-operatives and Agri-marketing: Agri-marketing ensures a vital link between the farmers and consumers. Co-operative agriculture marketing has immense potential in resolving the complex and complicated problems faced by the present agri-marketing system. The strengthening and revival of existing co-operative marketing system in agriculture would not only eliminate excessive dependence on agents and intermediaries in the organized wholesale markets (APMC Mandis) and unorganized rural periodical markets (Village Agricultural Markets), but also ensure appropriate price discovery by resolving issues of effective information dissemination, use of digitized means of marketing, management of transportation costs by joint transportation of commodities and establishment of network of warehouses for effective and timely storage of perishable and semi-perishable agri-commodities. Setting up of co-operative sale societies and co-operative warehousing units may be the best solutions to help the agriculturists realize rightful profits on their output at the community level.

The availability and access to markets by small and marginal farmers are vital in designing the market infrastructure. At present, co-operative marketing consists of commission shops in various market places. These shops neither undertake collection or aggregation of agri-produce from the farmers at the farms nor do they provide joint and cost-effective transportation and other logistic support for ensuring better price discovery. Further, there is lack of adequate mechanism within the co-operative marketing system to undertake and ensure timely and adequate processing and preservation facilities for perishable and semi-perishable agri-products.

Co-operative sale societies or marketing units encourage intelligent and orderly market of marketable agri-surplus, eliminate speculation and wastage, arrange fair and appropriate distribution of agri-produce between producers and consumers, stabilize marketing of agri-productions through appropriate linkages with regulated and organized APMC Mandis through regulated auction processes.

The need of the hour is to upgrade and strengthen the co-operative marketing infrastructure to undertake high volume of business on a large scale during the active business period considering the seasonality in the agriculture. Cooperative marketing units need to be transformed into multipurpose societies which should take up activities like establishment of organized facility centres for aggregation and transportation of agri-commodities, assaying, pre-conditioning, grading, standardizing, packaging and storage of the products. Such co-operative



marketing architecture needs to consider establishing functional logistic centres at village, taluka and district levels to facilitate aggregation and onward supply of agri-produce. Such produce can move under the ownerships of the member farmers of the co-operative marketing societies like that of the organized dairy marketing in India.

Thus, a strong and vibrant cooperative marketing infrastructure has a large potential in making agricultural and rural markets and the related marketing systems efficient by effective and timely dissemination of market intelligence and real demand statistics of the commodity.

To achieve a truly unified national agricultural market by 2019-20, co-operative marketing architecture needs to be reviewed, rehashed, promoted, upgraded and linked to the online platform of National Agriculture Market (e-NAM). This will facilitate creation of a pan-India e-platform and facilitate participation of buyers from all over the country thereby helping the co-operative marketing societies so linked with this e-platform realize the best prices for their tradable products.

Effective Value Addition and Warehousing through Cooperation: Co-operative warehousing and co-operative rural and urban godowns could be promoted and strengthened and linked to marketing activities to maximize benefits of value addition in respect of perishable and semi-perishable commodities. Thus, the need of the hour is to:

- establish community level co-operative processing and value addition hubs at strategic places in rural and urban growth centres;
- ensure finance to such co-operative processing and value addition units through assuring access to banking infrastructure or through adequate and efficient public-private-partnerships;
- facilitate co-operative processing startups and encourage venture capitalists to invest in such innovative agri-processing startups through appropriate policy interventions;
- set up adequate accredited food quality testing labs at convenient and strategic locations;
- make available infrastructure for skill development and capacity building of fanner members in processing and preservation of perishable and semi-perishable agri-products;
- impart training and basic orientation tips to members of co-operative marketing societies on grading, assaying, sorting and standardization of agri-commodities.

THE ROAD MAP AHEAD

Cooperatives are democratic organizations controlled and operated by members themselves. Members not only actively participate in setting their policies and making decisions, but also contribute equitably to the capital and exercise joint control over it. Being autonomous entities, co-operatives can decide on their own about their economic activities, can enter into agreements with other organisations, including governments, or can raise capital from external sources to finance their chosen business ventures without undermining the spirit of cooperation and co-operative autonomy. Co-operatives are the people's institutions and their management is vested in the people themselves. Co-operative enterprises and cooperatively organised economic entities have tremendous potential in creating a viable and vibrant agricultural and rural economy through inherent community participation.

Co-operatives as organizational arrangements of collective economic activity can break interlocked capital, labour and output markets and alleviate poverty. However, to achieve these goals, the issues faced by co-operatives need to be addressed and services of these decentralized democratic agencies should be improved upon for linking small and marginal farmers and the poor effectively to the global market.

To ensure appropriate remunerative prices for agri-products, the need of the hour is to develop a cadre of strong production, marketing and service co-operatives. While cooperative producer organizations can reap benefits of lower input costs, ensure stability and longevity of contract farming arrangements and deliver a fair and sustainable distribution of profits amongst the member farmers, co-operative sale societies would encourage intelligent and orderly market of marketable surplus through regulated auction processes to ensure right prices for the agri-commodities.

We need to upgrade and strengthen the co-operative marketing infrastructure to undertake high volume of business on a large scale during the active business period. Further, the co-operative marketing units need to be transformed into multipurpose societies to take up activities like establishment of organized facility centres for aggregation and transportation of agri-commodities, assaying, pre-conditioning, grading, standardizing, packaging and storage of the agri-products. In addition to this, co-operative warehousing and co-operative rural and urban godowns should be promoted and strengthened and linked to marketing activities so as to ensure rightful benefits of value addition and quality price discovery of agri-products.



SEED BIOPRIMING – “A TECHNOLOGY FOR BETTER CROP ESTABLISHMENT”

*NANDISH, M.S. and SUCHITHA. Y.

Biopriming

Crops are like children. If they are given a good start in life they usually grow tall, strong and healthy. But if crops grow slowly after germination they often become stunted, are more likely to be damaged by pests and diseases and will yield less.

When seeds are sown, they have to absorb water from the soil before they germinate. This can take a long time. If this time is reduced by soaking the seeds before they are sown, germination happens more quickly, resulting in a healthier crop. The idea of soaking seeds before sowing is not new. However, it is rarely practiced on a regular basis because farmers are unsure of how long seeds should be soaked, leading to mixed success. With this idea now a days researchers are concentrating on the biopriming of the seed to increase the vigor of the seeds and also to get the healthy seedlings.

Bio-priming is a process of biological seed treatment that refers combination of seed hydration (physiological aspect of disease control) and inoculation (biological aspect of disease control) of seed with beneficial organism to protect seed. It is an ecological approach using selected fungal antagonists against the soil and seed-borne pathogens. Biological seed treatments may provide an alternative to chemical control.

A brief history of seed priming

Man established contact with seed physiology since the beginning of agriculture and quickly realized that many seeds do not germinate easily and uniformly. Ancient civilization was fascinated by the capacity of an apparently « dead seed » to resurrect and to produce a viable young and healthy seedling after germination. The Greek Theophrastus

(ca. 372–287 BC) already focused on seed physiology and suggested that germination process may be temporarily interrupted. Pre-hydration of legume seeds before sowing was performed by Roman farmers in order to increase the germination rate and synchronize germination as reported by the Roman naturalist Gaius Plinius Secundus. Several centuries later, these techniques were still used for a wide range of species according to the French agronomist Olivier de Serres (1539–1619). In 1664, Evelyn mentioned that temperature prior sowing may have an impact on further germination while one century later; Ingenhousz analyzed the impact of light on seedling emergence.

During the nineteenth century, numerous botanists started to describe morphological processes associated with seed germination. Sachs experimented the impact of various compounds (including tyrosine and asparagine) before and during germination. The discovery of plant hormones in the 1920s underlined the crucial role of these compounds in seed desiccation tolerance, reserve mobilization, as well as cell division and cell elongation occurring during germination. The possibility to influence final germination as a consequence of pre-sowing treatment has led to a wide range of empirical methods for numerous cultivated plant species during the year 1970s.

The plant growth promoting microorganisms used in biopriming

Many Plant Growth Promoting Microorganisms (PGPRs) are used in biopriming. Some of the common biocontrol agents viz., *Trichoderma harzianum*, *Pseudomonas fluorescens*, and also certain biofertilizers like *Rhizobium*, *Azotobacter*, *Azospirillum*, phosphate solubilizing and mobilizing microorganisms can also be used.

Some of the examples of advantages of the seed biopriming

Sl. No.	Organisms used	Crop	Plant growth promotional activity
1.	<i>Azotobacter chroococcum</i> and <i>A. lipoferum</i>	Barley	Increase in 1000-grain weight, dry matter accumulation, grain yield, biological yield and harvest index
2.	<i>Pseudomonas</i> spp.	Safflower	Increased number of branches, heads per plant, diameter of head, grain number per head, grains per plant, 1000 grain weight, oil content and grain yield
3.	<i>Azotobacter chroococcum</i> <i>Azospirillum lipoferum</i> , <i>A. chroococcum</i> <i>A. lipoferum</i>	Maize	Grain yield, crop growth rate and dry matter accumulation
4.	<i>Azotobacter</i> and <i>Azospirillum</i> spp.	Maize	Increase in grain yield, plant height, number of kernels per ear and number of grains per ear row
5.	<i>Pseudomonas fluorescens</i>	Sunflower	Shoot height, root length and seedling weight
6.	<i>Clonostachys rosea</i> , <i>P. chlororaphis</i> , <i>P. fluorescens</i> , <i>T.harzianum</i> , <i>T. viride</i>	Carrot and onion	Increase in emergence and yield

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Role of biopriming in biotic and abiotic stress tolerance

Sl. No.	Organisms	Crop	Role in stress tolerance
Biotic stress tolerance			
1.	Trichoderma harzianum	Maize	Fusarium verticillioides and fumonisins tolerance
2.	Pseudomonas fluorescens	Sunflower	Alternaria blight tolerance
3.	Clonostachys rosea	Carrot	Alternaria dauci and Al. radicina tolerance
4.	Pseudomonas fluorescens	Pearl millet	Downy mildew tolerance
5.	Pseudomonas aureofaciens	Sweet corn	Pythium ultimum tolerance
6.	Pseudomonas fluorescens	Sweet corn	Damping-off tolerance
Abiotic stress tolerance			
1.	Bacillus pumilus, B. furmus	Potato	Salinity, drought, heavy metal stress tolerance
2.	Bacillus cereus	Rice and mungbean	Salinity tolerance
3.	Agrobacterium rubi, Burkholderia gladii, P. putida, B. subtilis	Radish	Improved seed germination under saline conditions

Advantages of biopriming

- 1) Increases colonization of added microbial inoculants on the seed surface
- 2) Seed priming often results in more rapid and uniform seedling emergence and may be useful under adverse soil conditions
- 3) It gives protection against seed and soil borne plant pathogens
- 4) Improved germination and seedling growth
- 5) Increases availability of the nutrients in seedling rhizosphere

Limitations of Seed Biopriming

Main limitations of priming techniques Seed priming has emerged as an effective approach for increasing seed vigor. The optimal treatment differs between species, cultivar, and seed lots. Such variability is a major limitation of the priming method since numerous trials are required to identify the most appropriate strategy for each situation. There is no "general rule" concerning modalities of seed priming and there is no clear trend of priming response according to the taxonomic position of the species. This, undoubtedly, limits the commercial implementation of priming treatments. Some priming treatments may imply a risk of medium contamination by fungi and bacteria, which may heavily impair subsequent seed germination. In some cases, repeat priming treatment after storage may partly remove the damaging effect on seed viability while, in other cases, such a loss is permanent and not reversible.

Procedure of seed biopriming

1. Pre-soak the seeds in water for 12 hours.
2. Mix the formulated product of bioagents (Trichoderma harzianum, Pseudomonas fluorescens etc.) with the pre-soaked seeds at the rate of 10 g per kg seed.
3. Put the treated seeds as a heap.
4. Cover the heap with a moist jute sack to maintain high humidity.

5. Incubate the seeds under high humidity for about 48 h at approx. 25 to 32° C.
6. Bioagents adhered to the seed grows on the seed surface under moist condition to form a protective layer all around the seed coat.
7. Sow the seeds in nursery bed/ main field.

Economics of biopriming

The seed biopriming technique is a cost effective approach for the biocontrol of different pathogenic microbes and application of beneficial bacteria to the soil. Along with the crop productivity, biopriming can also be favored as the potential technique for biocontrol of several plant pathogens. Control of these plant pathogens is usually carried out by using costly pesticides where we can promote this technique as dual purpose technology enhancing the plant productivity and stress resistance side by side.

Conclusion and future prospects

Regarding the application of the bacteria, it has been explained by the scientists that biopriming can be used effectively in application of the bacteria as it gives enough number of bacteria in the seeds. Competition of the our desired inoculants with local bacteria is also a problem which can be addressed by biopriming as our desired bacteria will already be inside the seeds reducing the chance of desiccation as well as harmful effects of any pesticides applied to the field. On the other basis, it can also be an alternative approach for the application of bacteria to small seeded crops which can imbibe the bacterial suspension resulting in entrance of bacteria inside the seed. Biopriming gives equal or better control against several root rot diseases so can be used commercially as an alternative to fungicides successfully. In the application, there is need to search for the more better media for application due to cost hurdles which can definitely be reduced by further research. Second, this method can be implied to other crops yet not experimented which will give better picture of potential of this technology.



PROSPECTS OF WIND ENERGY IN INDIA

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Introduction

The use of conventional energy, which played a key role in industrial revolution, is an indicator of economic development of a country. At the same time, conventional energy use over the period has resulted in cataclysmic problems like climate change and global warming. Therefore, use of clean energy is a much talked about subject in today's world. In order to safeguard the interest of future generation, the world today is moving towards renewable and clean energy sources. India though a developing country, will require 7.3% annual growth rate in power generation by 2035, to fuel its economic growth of about 7% per annum. Therefore, it is one of the critical components of infrastructure development in India. India's power sector is endowed with various types of power generation such as coal, lignite, natural gas, oil, hydro, nuclear power and viable renewable energy sources such as solar PV, wind, small hydro and waste to energy. Among the renewable energy sources, exploitation of wind energy has good potential in India. As per Indian Renewable Energy Development Agency (IREDA) Annual Report 2016-17, investment in renewables needs to be scaled up significantly and to do this mobilizing, affordable financing and adopting new business models will be essential. Keeping this in view, a detailed review of importance and enhancing windmill energy has been attempted.

Status of power sector in India

As on 31 January 2018, India's total installed capacity of power generation, was 334.40 (Gigawatt) GW of which, installed thermal power station capacity was estimated at 219.81 GW, Nuclear at 6.78 GW, large hydro renewable energy at 44.96 GW and other renewable energy sources were estimated at 62.85 GW.

Importance of wind energy

India is one of the fastest growing nations with ever increasing demand for energy, both for its domestic and industrial development. Since the major source of energy today is from imported oil or coal, there is a need to switch over to alternative renewable sources like solar and wind, which are environment friendly. As per an estimate in 2015, wind energy helped to reduce CO₂ emission by 637 million tonnes globally. As the windmills can be installed in wastelands where there is high wind speed, the abandoned wasteland can be put to effective use. Now a days hybrid

models are being set up, where solar and wind energy infrastructure are created on the same piece of land. Offshore wind farms are the latest trend, with great opportunity for India having 7th longest coastline in Asia. Therefore, wind energy can be effectively used in supplementing current sources of renewable energy in India.

Global status of wind energy

According to the 2017 report published by Global Wind Energy Council (GWEC), the cumulative installed capacity in the world as on 31 December 2017 was 5,39,581 MW. Wind energy sector is growing at 30% growth rate, with China (1,88,232 MW) as leader, followed by USA (89,077 MW), Germany (56,132 MW) and India (32,848 MW). China (35% share) leads in wind power production, followed by USA (17% share) and Germany (10% share) in installed capacity. India's production contributes only 6% of wind power capacity. India, with geographical location similar to China, has great potential for increasing installed capacity of wind power (GWEC_PRstats2017).

State-wise potential & exploitation of wind energy

State-wise details of wind energy potential and potential exploited are given in Table 1. MNRE has estimated a potential of 302.25 GW spread across different states, of which only 10.68% could have been exploited so far. Gujarat state has the highest potential (84431 MW) for production of wind energy, followed by Karnataka (55857 MW) and Maharashtra (45394 MW). Tamil Nadu (7861 MW) is fast moving than other states, followed by Gujarat (5340 MW) and Maharashtra (4771 MW). Madhya Pradesh is the leader, followed by Tamil Nadu and Rajasthan, in exploitation of potential.

Table 1: Cumulative Wind Power installed capacity operational as on October 2017

Sr. No.	State	Potential assessed (MW)	Installed capacity (MW)	Share (%)
1	Tamil Nadu	33800(5)	7861.46(1)	23.26(2)
2	Gujarat	84431(1)	5340.62(2)	6.33(7)
3	Maharashtra	45394(3)	4771.33(3)	10.51(4)
4	Rajasthan	18770(6)	4281.72(4)	22.81(3)
5	Karnataka	55857(2)	3751.40(5)	6.72(6)
6	Andhra Pradesh	44229(4)	3618.85(6)	8.18(5)
7	Madhya Pradesh	10484(7)	2497.79(7)	23.82(1)
8	Telangana	4244(8)	100.80(8)	2.38(9)
9	Kerala	1700(9)	51.50(9)	3.03(8)
10	Others	3342	4.30	0.13
	Total	302251	32279.77	10.68

Figures in parentheses indicate rank;
Source: MNRE website at www.mnre.gov.in

The major wind power projects are situated in Tamil Nadu (Muppandal in Kanyakumari), Rajasthan (Jaisalmer), Maharashtra (Brahmanvel in Dhule), Gujarat (Bhuj), Orissa (Damanjodi) and Karnataka (Tuppadahalli).

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Institutional framework related with wind energy in India

In 1982, Department of Non-Conventional Energy Sources (DNES), renamed as MNES after 10 years, was created under the Ministry of Energy, with the objective of taking care of additional sources of renewable energy. Govt. of India (GoI) set up Centre for Wind Energy Technology (C-WET), which has been vested with the technical responsibility of developing wind resources assessment. GoI established the Indian Renewable Energy Development Agency (IREDA) in 1987.

The MNRE, GoI has been sponsoring wind resource assessment (WRA) programmes to measure, analyze and publish wind data in the country for the last two decades. Under these programmes, wind has been measured at 811 locations for periods ranging from one to five years. As on 31 March 2017, 19 stations are in operation in six states.

a. Indian renewable energy development agency (IREDA)

IREDA is a non-banking financial company (NBFC) under the administrative control of MNRE. It is a public limited government company active in promoting, developing and extending financial assistance for renewable energy (RE) and energy efficiency (EE) projects through innovative financial mechanisms. It is currently the biggest financial contributor of India's RE sector. IREDA, with headquarters in Delhi, has branches and camp offices in Chennai, Hyderabad and Ahmedabad. It caters to wind, hydro, solar, biomass, cogeneration, waste to energy, biofuel, new and emerging areas.

b. National institute of wind energy (NIWE)

NIWE has been established by MNRE at Chennai as an autonomous R&D institution of GoI to accelerate utilization of wind energy. NIWE is involved in realization of nationwide WRA programme, sponsored by the GoI, in association with State Nodal Agencies (SNA). Further, NIWE takes up validation studies, technical due diligence studies, micro-siting exercises, detailed project report preparation, repowering analysis, wind power forecasting, etc.

Initiatives of NABARD

National Bank for Agriculture and Rural Development (NABARD) has identified wind energy as a thrust area for extending long term refinance to the banks. Accordingly, refinance assistance has been extended to few commercial banks against wind energy projects in Maharashtra state.

Further, NABARD has also extended direct finance under consortium arrangement with commercial banks for wind energy sector in the states of Karnataka, Maharashtra and Madhya Pradesh.

Incentives provided by GoI for wind energy

The wind energy being a clean source of energy, GoI in 2015, gave lot of importance to wind energy under Intended Nationally Determined Contributions (INDCs)³ under the United Nations Framework Convention on Climate Change (UNFCCC) for reduction in greenhouse gases. GoI also provides various fiscal incentives, for setting up wind power plants, as under:

Tax incentives – An accelerated depreciation @80% and tax holiday for 10 years period is allowed by GoI to renewable energy companies.

Generation based incentives – The Govt. gives an incentive of 50 paise per unit of wind power supplied to the grid by independent power producers with aggregate wind farm capacity of maximum 4000 MW.

Preferential tariffs – State electricity regulatory commissions are encouraged to set preferential tariffs for power produced from wind energy.

Renewable purchase obligation (RPO) – CERC, which is a central regulator, fixes an RPO for each state. The state is under obligation to purchase fixed amount of electricity from renewable sources.

Renewable energy certificates (REC) – CERC, in 2010, issued advisory for issue and recognition of REC for renewable energy generation. RECs, also known as green tags, are tradable instruments in energy sector.

Setting up wind farms in India

In order to ensure healthy and orderly growth of wind power sector in India, MNRE issued guidelines in July 1995 for setting up wind power projects, which were revised in June 1996 and then in October 2016. The initiatives of GoI have resulted in setting up 32.28 GW of wind power capacity in the country as on October 2017. The GoI aims at doubling the same to 60 GW by 2022. The advisory for setting up wind farms includes selection of site, certification & quality assurance, micrositing, grid connectivity, metering & real time monitoring, health & safety, hybrid models, etc. The details may be seen from MNRE website at www.mnre.gov.in

Project cost & funding mechanism

The project cost components include land, land development, installation cost of wind turbines and transmission infrastructure. The land for setting up wind farms is allotted by respective State Governments. The land development cost vary from place to place. On an average, project cost for a wind energy project with a rotor dia of 114 m and hub height of 90 m including land cost ranges from ₹ 8–10 crore/ MW. However, the running cost of a wind power project is very low as compared to non-conventional power



plants. The projects are funded through bank loan @75% and balance through equity contribution.

Windmills can change the development discourse as experience in Odanthurai Panchayat reveals. Highlights of the case are presented in Box 1.

Box 1

Windmill: A step towards renewable energy by Odanthurai Panchayat

ODANTHURAI village Panchayat in Tamil Nadu was spending almost 60 per cent of its monthly income on electricity bill. The idea of setting up a windmill turbine generator (WTG) was mooted. Panchayat approached Central Bank of India (CBI) for getting finance. The total project cost was ₹ 155 lakh (including land cost) with down payment of ₹ 40 lakh by the Panchayat. This was a new area for the banker but looking at the confidence of the Panchayat head to take up this activity, the bank agreed to the proposal. The bank sanctioned term loan of ₹ 115 lakh @ interest rate of 8% per annum and a repayment period of 7 years including a grace period of 6 months for setting up 350 KW capacity WTG without government guarantee. The bank took only 20 days to process and sanction the loan.

It is the first Panchayat in the country to take such an initiative. The project was implemented by Suzlon Wind Farm, an agency implementing windmill turbine generator on a turnkey basis. The bank also entered into loan agreement with Panchayat and also entered an agreement with Suzlon for implementing the project. The Panchayat has mortgaged land and also hypothecated the windmill and the other equipment in favour of the bank. Suzlon took 2 months to complete erection of WTG during implementation and the windmill was made operational without any problem. The Panchayat though had issues, was regular in making repayment of loan to the bank.

Suzlon sends monthly report of power generated to Panchayat and payment from Tamil Nadu Electricity Board (TNEB) is received on monthly basis. TNEB initially paid @ ₹ 2.70 per unit and increased to ₹ 2.90 per unit after 2006. It could be inferred that Panchayat can be an institution for direct lending for setting up windmill. Implementation of such a project at Panchayati Raj Institution (PRI) level will result in generating clean and renewable energy to help electrification of non-electrified regions of the country.

Technology aspects in setting up wind farms

Technically there are two types of wind power generation systems, viz., residential system and wind farm system. In residential system, the windmill should be 150 metres away from any nearby obstruction and at a height that the blades of the rotor are 9 metres above the obstruction including buildings. In wind farm system, each wind turbine creates turbulence in area behind and around it, therefore, turbines

need to be placed well apart from each other. The required distance is expressed in rotor diameter. General rule of thumb is that the turbines are placed 7 rotor diameter away from each other e.g. if the diameter is 80 metre then the distance should be 560 metres between two turbines.

Productive wind speed: The range of wind speed that are usable by a particular wind turbine for electricity generation, is called productive wind speed. The power available from wind is proportional to cube of the wind's speed. The speed of the wind and the amount of energy that can be generated, are directly related. Productive wind speed will range between 4 m/sec to 35 m/sec. The minimum prescribed speed for optimal performance of large scale wind farms is about 6 m/sec.

Land requirement: Wind turbines create turbulence in the area around it. Therefore, each turbine need to be spaced adequately to avoid interference due to turbulence. The land requirement for a wind energy plant is 50 – 60 acre per MW, however, actual area covered by turbine is only 5% (2.5 acre/MW). Wind power potential is mostly assessed assuming 1 % of land availability for wind farms required @12 ha/MW in sites having wind power density exceeding 200 W/sq.m. at 50 m hub-height. Wind power generation: The energy in the wind turns two or three propeller-like blades around a rotor. The rotor is connected to the main shaft, which spins a generator to create electricity. Wind turbines are mounted on a tower to capture maximum energy. At 100 feet (30 meters) or more above ground, they can take advantage of faster and less turbulent wind. Wind turbines can be used to produce electricity for a single home or building, or they can be connected to an electricity grid for widespread electricity distribution.

Supplier of technology in India

India has leading manufacturers of wind energy equipment. Therefore, this sector is one of the focus areas of GoI under "Make in India" initiatives. There are 20 approved manufacturers in India, which manufacture 53 models of turbines upto capacity of 3 MW per turbine. The wind turbines manufactured in India are of international standard. The top-six OEMs in terms of cumulative installed capacity in India are: Suzlon (35.4%), Wind World (18%), Gamesa (10.1%), Vestas (7.6%), Regen (7.3%) and Inox (5.68%). LM Wind Power has set up its second blade factory in Vadodra, Gujarat. Senvion, an established European player, started its operations in India and acquired the Kenersys manufacturing facility. Gamesa set up new factory at Nellore in Andhra Pradesh; Acciona entered the market last year, and Envision and Sany Global are expected to enter the market soon. Vestas opened their blade manufacturing unit in Gujarat. The current manufacturing capacity in the country is around



10 GW. Support framework for wind energy in 28 states and Union Territories have defined a Renewable Purchase Obligation (RPO) for renewables.

Employment opportunities

As per an estimate of Confederation of Indian Industries (CII), MNRE, on an average an addition of each megawatt wind power create direct job opportunities for 1.28 persons and indirect job creation of 2.56 persons. It may be seen from Table 2 that wind power sector would create direct and indirect job opportunities for 2.31 lakh persons by 2022. If a systematic approach is followed to exploit the estimated potential, wind energy sector can create immense employment opportunities of 11.64 lakh persons in the country.

Sr. No.	Year	Cumulative installed capacity (MW)	Employment generation (Numbers)		
			Direct	Indirect	Total
1	October 2009*	10900	14000	28000	42000
2	January 2018	32848	42190	84380	126570
3	By 2022	60000	77064	154128	231192
4		302000 (Estimated Potential)	387890	775780	163670

*CII (2010).HRD strategies for Indian renewable sector

Tariff determination

The State Electricity Regulatory Commissions determine the tariff for wind projects. However, the Central Electricity Regulatory Commission (CERC) comes up every year with a tariff guideline for the entire country based on wind power density in five zones. To address grid integration challenges, the government has initiated the Green Corridor programme. The objective is to improve linkage between India's regional grids with its national grid. This will facilitate inter- state transmission. The government's Green Energy Corridor initiative to facilitate transfer of power from high renewable energy installation states to other parts of the country, consists of 765 kV and 400 kV high voltage transmission lines and an associated 765/400kV substation and associated equipment; and four HVDC terminals (two at 800 kV and two at 320 kV) as part of the increased inter-regional connectivity between India's western and southern regional power grids. Year 2016, saw a number of new policies for promoting wind power, including the draft wind-solar hybrid policy, guidelines for development of on-shore wind projects, guidelines for prototype wind turbines, and the proposal for evaluation of small wind energy and hybrid projects. Further, in November 2016, MNRE issued guidelines for a transparent bidding process for 1000 MW of wind, to be connected to the inter-state transmission system.

Tariff for Wind Power Projects

Wind potential states are providing promotional tariff for wind power projects in their respective states. The details are given in Table 3.

Sr.No.	State	Tariff ₹ per kWh
1	Andhra Pradesh	4.84
2	Gujarat	4.19
3	Karnataka	4.50
4	Madhya Pradesh	4.78
5	Maharashtra	3.82-5.56
6	Rajasthan	5.76 & 6.04
7	Tamil Nadu	4.16

Source: www.mnre.gov.in/annual report 2016-17.

Advantages of wind energy over other sources

Wind energy is environment friendly and cheapest domestic source of renewable energy. It can be used through distributed generation or grid interactive power generation, using on-shore or off-shore technologies. It is suitable to install in remote/rural areas and a source of rural employment generation/ creates jobs. Wind power projects have low gestation period, low operation and maintenance cost, fastest payback period and least equity participation as also benefit of depreciation.

Disadvantages of wind energy over other sources

The disadvantages are: high repair and maintenance cost, technically feasible only where strong, dependable winds are available, and intensive monitoring systems.

Challenges faced by wind energy development in India

- Requires high initial investment, though steep fall in cost of wind power over last 10 years.
- Good wind sites are often located in remote, inaccessible locations.
- Must still compete with conventional electricity generation sources on a cost basis.
- The renewable energy certificate (REC) framework linked to the RPO, which was introduced for interstate purchase and sale of renewables-based power need, to be made effective.

Entrepreneurs are reluctant due to absence of capital subsidy availability.

Way Forward

Wind power technology is evolving fast and bringing new products to market that meet the needs of the local conditions across the country. In India, R&D is needed from industries, dedicated Govt. agencies and universities for creating the necessary ecosystem for industry-specific projects. A public-private model for this purpose would be welcome by the industry if a research agenda is jointly developed to meet the current challenges being faced by the national industry. This will further enhance the capacities of our technical institutions and create a robust research community (like NIWE) for research, technology upgradation and cost reduction to promote excellence in wind power development activities.



HI-TECH HORTICULTURE FOR HIGH YIELD AND PRODUCTIVITY

¹Raghupathi B*, ²Bhavya N and ³Adyant Kumar, ¹Amit Lohar

Hi-tech horticulture is a chain system of cultivation having proper linkage right from selection of seed variety for sowing to supply it to the end user. Hi-tech horticulture is defined as modern cum intensive cultivation system, less environment dependent, capital intensive and has capacity to improve productivity and quality. Hi-tech horticulture is now widely employed for the profitable commercial production of horticultural products. Hi-tech horticultural practices include

1. Protected/Greenhouse Cultivation
2. Precision Farming
3. High Density Planting
4. Plasticulture
5. Hydroponics
6. Fertigation, Micro Irrigation or Drip Irrigation
7. Micro Propagation/Hi-tech propagation
8. Integrated Nutrient Management (INM)
9. Integrated Pest Management (IPM)
10. Hi-Tech Mechanization
11. Modern Post Harvest Management
12. Sub-Surface Drainage System

1. Protected/ Greenhouse Cultivation

It is defined as the production of horticultural crops inside, beneath or protected by structures to provide modified growing conditions and/or protection from pests, diseases and adverse weather. This protected cultivation offers several advantages over traditional production techniques such as 1. Better quality of produce, 2. Higher productivity, 3. Nursery raising and hardening of plants, 4. Better insect & disease control & reduced use of pesticides, 5. Off-season cultivation and 6. Efficient use of resources. Some crops are highly suitable for protected cultivation such as capsicum, tomato, cucumber, cabbage, strawberry, muskmelon, rose, gerbera, carnation, orchid etc.

2. Precision Farming

It is defined as information and technology based farm management system to identify, analyze and manage variability within fields for optimum profitability,

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sustainability and protection of the land resource. Some of the tools and equipments involved in precision farming are 1. Global positioning system (GPS), 2. Sensor technologies like Remote Sensing (RS), 3. Geographic information system (GIS), 4. Grid soil sampling and variable-rate fertilizer (VRT) application, 5. Crop management, 6. Soil and plant sensor, 7. Rate controllers, 8. Precision irrigation in pressurized systems, 9. Software and 10. Yield monitor.

3. High Density Planting (HDP)

High density means to increase the plant population per unit area for increasing the production of crops. HDP is defined as planting at a density in excess of that which gives maximum crop yield at maturity if the individual tree grows to its full natural size or in other words, it is the planting of more number of plants than optimum through manipulation of tree size. In India, HDP has been proved useful in many fruit crops e.g. guava, pineapple, banana, mango, apple, pomegranate and citrus etc.

Principle of HDP is to make the best use of vertical and horizontal space per unit time and to harness maximum possible returns per unit of inputs and resources. Some of the factors affecting HDP include cultivar, system of planting, planting material, nutrition and moisture, economics of production. Advantages of HDP are 1. Best utilized of land and resources, 2. Increase in yield per unit area, 3. Quality production of fruit crops, 4. Easy for interculturings operation, plant protection and harvesting, 5. To obtain export quality of the harvest and disadvantages includes: 1. Less life span of the fruit, 2. Difficult to manage the tree canopy, 3. Require high techniques for the maintenance of fruit trees.

4. Plasticulture

Plastics can play a major role in energy conservation. They require minimum energy in production and conversion to finished products. The practice of using plastics for commercial horticultural production is termed as 'Plasticulture'. Various applications of plastics in horticulture include protected cultivation (greenhouse structures; high and low tunnels etc); plastic mulching, and plastic lining, drip irrigation, packaging and storage for superior quality of produce and in post-harvest management, seeds packaging, planting and propagation etc. Plastics have definite



advantages over conventional materials such as higher strength/weight ratio, superior electrical properties, flexibility and thermal insulation properties, excellent corrosion resistance, impermeability to water, gas, etc., resistance to chemicals and less friction due to smoother surface.

Plasticulture improves the economic efficiency of production systems, helps in efficient water and energy management, reduces temperature fluctuations and moisture fluctuations, helps in controlling pest and disease infestations and plays a dominant role in precise irrigation, nutrient applications by reducing wastage of water and nutrients and by reducing soil erosion. Use of plastics has proved beneficial to promote the judicious utilization of natural resources like soil, water, sunlight and temperature.

5. Hydroponics

Hydroponics, another hi-tech horticulture technology offers great scope for horticultural producers worldwide. Hydroponics is a technology for growing plants in nutrient solutions (water and fertilizers), with or without the use of an artificial medium (e.g. sand, gravel, vermiculite, rockwool, peat moss, sawdust) to provide mechanical support.

Advantages of hydroponics: Control of nutrition, Conservation of water, Conservation of nutrient, Better health and faster growth reduces the need for pesticides, No need for herbicide, A plant started in hydroponics is vigorous, Optimum utilization of plant genetic potentials, Increase both size and quality of crops, Access to the roots, Production of a large quantity of biomass, growing a crop in extreme conditions, Better use of space, no soil to carry up and down and Accelerated growth of a mother plant.

Disadvantages of hydroponics: Commercial scale requires technical knowledge as well as a good grasp of the principles, on a commercial scale the initial investment is relatively high, great care and attention to detail is required, particularly in the preparation of formulas and plant health control and a constant supply of water is required.

6. Fertigation, Micro-irrigation or Drip irrigation

Fertigation is the application of fertilizers, soil amendments, or other water-soluble product through an irrigation system is known as fertigation. Main advantages of fertigation includes higher yields and better quality crops, increased efficiency of nutrients, reduction of groundwater pollution, greater convenience and economy, efficient application of microelements.

Micro irrigation is defined as the frequent application of

small quantities of water directly above and below the soil surface; usually as discrete drops, continuous drops or tiny streams through emitters placed along a water delivery line.

Need of micro irrigation: to make agriculture productive, environmentally sensitive and capable of preserving the social fabric of rural communities, help produce more from the available land, water and labor resources without either ecological or social harmony, generate higher farm income, on-farm and off-farm employment. **Micro irrigation:** 1. Drip irrigation-root zone application 2. Sprinkler-for due effect 3. Fertigation 4. Chemigation 5. Herbigation. Drip irrigation is now a widely used irrigation practice worldwide. Drip irrigation has many advantages over a standard irrigational procedure. These advantages include optimum utilization of irrigational water, maximum water use efficiency by supplying water within the root system of the plants, and minimum evaporative loss of soil moisture.

7. Micro Propagation/Hi-tech propagation

Micropropagation is the practice of rapidly multiplying stock plant material to produce a large number of progeny plants, using modern plant tissue culture methods.

Advantages of Micropropagation: Large numbers of genetically identical plants produced rapidly, Species that are difficult to grow from seeds or from cuttings can be propagated by micropropagation, Plants can be produced at any time of the year, large numbers of plants can be stored easily, Genetic modifications can be introduced into thousands of plant quickly, after modifying only a few plants, Requires relatively small growing space and Pathogen free plants can be raised and maintained economically.

Limitations of Micropropagation: Sophisticated facilities are required, Demands greater skill in handling and maintenance than conventional techniques and Shoot-tip derived plants may show genetic instability, E.g. 6-35% of banana clones developed through shoot tip culture show morphological variation.

8. Integrated Nutrient Management (INM)

Integrated Nutrient Management (INM) also has become a widely practiced Hi-tech horticulture practice now. Integrated Nutrient Management refers to the maintenance of soil fertility and of plant nutrient supply at an optimum level for sustaining the desired productivity through optimization of the benefits from all possible sources of organic, inorganic and biological components in an integrated manner. **Componentets of INM:** 1. Fertilizer (slows release and coated) 2. Organic manuring (FYM, poultry etc.), 3. Green manuring, 4. Green leaf manuring,



5. Composting of farm-town compost, 6. Bio fertilizer, 7. Vermiculture.

Advantages of INM: Enhances the availability of applied as well as native soil nutrients, Synchronizes the nutrient demand of the crop with nutrient supply from native and applied sources, Provides balanced nutrition to crops and minimizes the antagonistic effects resulting from hidden deficiencies and nutrient imbalance, Improves and sustains the physical, chemical and biological functioning of soil and Minimizes the deterioration of soil, water and ecosystem by promoting carbon sequestration, reducing nutrient losses to ground and surface water bodies and to atmosphere.

9. Integrated Pest Management (IPM)

Integrated Pest Management (IPM) is an eco-friendly approach which aims at keeping pest population at below economic threshold levels by employing all available alternate pest control methods and techniques such as cultural, mechanical and biological with emphasis on use of bio-pesticides and pesticides of plant-origin like Neem formulations. IPM Components: IPM requires competence in three areas: prevention, monitoring and intervention.

Benefits of IPM: Improved crop profitability due to better pest control measures and appropriate use of crop protection products, Stable, reliable and quality crop yields, Decreased severity of pest infestations, Reduced potential for problems of pest resistance or resurgence, Increased consumer confidence in the safety and quality of food and fiber products, Crop protection companies that integrate IPM principles into marketing and customer support for their products also stand to benefit from, sustained market share and access, Less risk of restrictions or deregistration, New opportunities for established and novel products, techniques and services, Longer product lifecycles, Decreased resistance of pests to crop protection products and biotech plants, Increased public confidence in, and credibility of, the crop protection industry.

10. Hi-Tech Mechanization

Mechanization is the process of changing from working largely or exclusively by hand or with animals to doing that work with machinery. **Benefits of Mechanization of horticulture:** It increases production, It increases efficiency and per man productivity, Increases the yield of land per unit of area, Results in lower cost of work, It contracts the demand for work animals for ploughing, water lifting, harvesting, transport etc., It brings in other improvements in horticulture technique, It modifies social structure in rural

areas and it leads to commercial horticulture.

11. Modern post harvest management

Horticulture business mainly comprises of horticulture food processing, fruit and vegetable retailing and floriculture industry. **Horticulture Food Processing:** Spoilage of fresh fruits and vegetables due to their short shelf life and subsequent wastage of large quantities of fruits and vegetables is a major issue even today. There is only one way to minimize this food wastage, that is horticulture food processing. Fruit and vegetable processing holds the key to curtail food wastage down to the possible minimum level. Another major advantage of horticulture food processing is its value-addition.

Horticulture food processing forms a major percent of the entire food processing industry. Horticulture foods like fruits and vegetables are processed into various value-added products such as pickles, jams, squashes, concentrates, marmalade, fruit mixes, canned vegetables, and canned fruits for long-term consumption. **Fruit and Vegetable Retailing:** Fruit and Vegetable Retailing is a major horticulture business that employs millions of small time entrepreneurs. Retail market of fruits and vegetables has tremendous growth potential in the immediate future. Due to the increased health awareness of the consumers, consumption of fresh fruits and vegetables are also increasing day by day.

12. Sub-Surface Drainage System

Subsurface drainage is the removal of excess water from the root zone. It is accomplished by deep open drains or buried pipe drains. Subsurface drainage is an important conservation practice. Poorly drained lands are usually topographically situated so that when drained, they may be farmed with little or no erosion hazard. Many soils having poor natural drainage are, when properly drained, rated among the most productive soils in the world.

Specific benefits of subsurface drainage are: (i) aeration of the soil for maximum development of plant roots and desirable soil microorganisms; (ii) increased length of growing season because of earlier possible planting dates; (iii) decreased possibility of adversely affecting soil tilth through tillage at excessive soil water levels; (iv) improvement of soil water conditions in relation to the operation of tillage, planting and harvesting machines; (v) removal of toxic substances, such as salts, that in some soils retard plant growth; and (vi) greater storage capacity for water, resulting in less runoff and a lower initial water table following rains.

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STRENGTHENING RURAL DEVELOPMENT THROUGH SMART FARMING

India lives in her villages – Mahatma Gandhi

C.L. Dadhich*

INTRODUCTION

Nearly seventy per cent of Indian population live in about 6 lakh villages. These villages are scattered over vast geographical area of the country. Density of population is very thin. Agriculture is a major occupation. Agriculture is hugely dependent on vagaries of monsoon. The social and economic conditions of masses in these rural areas is far from satisfactory. The incidence of poverty is deep rooted and widespread in rural areas. Theodore Schultz (1981) rightly said that if we know the economy of being poor we know much of economics that matter. Plausibly everything else can wait but not the development of these villages. The main objective of the paper is to trace the identity of these villages, captures the major disquieting features. The paper also suggests the strategy for strengthening development of rural areas. This paper contains six sections. Section 1 deals with introductory remarks Section 2 contains definitions of rural areas. Major disquieting features have been delineated in Section 3. The importance of development has been highlighted in Section 4. Strengthening rural development through smart farming has been discussed in Section 5. The summary of discussion is given in Section 6.

DEFINITION OF RURAL AREAS

As economists have a number of definitions of a concept, rural areas have been defined differently by different organizations and experts. Reserve Bank of India defined all banking centres according to latest census with population of less than 10000 as rural centres with population of 10000 and above but less than 0.1 million as semi-urban centres, with population of 0.1 million and above but less than 1 million as urban and centres with population of 1 million and above as metropolitan centre.

Surprisingly, latest banking statistics relating to 2016 is based on 2001 census. Needless to say, this inordinate time lag reduces the utility and relevance of data.

According to external website of Commissioner of Census Govt. Rural area is any place as per latest census which meets the following criteria.

*The author is Honorary Secretary of Indian Society of Agricultural Economics, Mumbai. The author is thankful to Dr. R.B. Barman, Chairman, National Statistics Commission; Dr. B.K. Bhoi former Principal Adviser, Reserve Bank of India and Mrs. Vijaya Venkatesh, Associate Editor, Indian Journal of Agricultural Economics for their valuable comments on the earlier draft.

- A population of less than 5000.
- Density of population less than 400 per sq. km.
- More than 25 per cent of male working population is engaged in agricultural pursuit.

These are the two main definitions. There may be many more but these two may be sufficient to bring home a point that more than one definition may not only cause identity confusion but at times undermine the utility of information and data collected by these agencies. It goes without saying that there is an urgent need to have a uniform definition of rural areas to enhance the compatibility of data and information.

DISQUIETING RURAL FEATURES

There are glaring differences between in socio-economic features of rural and urban not only in India but throughout the world. Thorstein Veblen (2008) pointed out that life in industrial society inculcates standards and values entirely different from those of life in rural environment. In India many scholars have gone to an extent to describe rural areas as Bharat (untouched of industrial revolution) and urban areas as India (with large impact of industrialisation). As a result of difference of level of industrialisation, life style, standard of living value system and economic conditions are quite different in rural and urban areas. Rural society as well as rural economy have been at disadvantageous positions vis-a-vis urban counterparts in respect of number of factors. The most disquieting features are as under:

3.1 Prepondence of Small Sized Village

Population-wise distribution of villages as per the latest census is present in Table 1.

Table 1: Population wise distribution of villages in India according to 2011 census

Population	No. of Villages	Percentage
Up to 500	512182	86
500-1000	61112	10
1000-2000	18949	3
2000-5000	4665	1
Others	575	0
Total	597483	100

Source: Census of India.



It may be observed there from that out of the 5.97 lakh villages as many as 512182 villages constituting about 86% have population up to 500 persons. Plausibly enough, small sized villages not only make infrastructure development a costly proposition but make it an unviable proposition as well. In this backdrop it is difficult to have full utilisation of infrastructure like schools, hospitals, markets, banks, etc. At times reaching out to these villages is very difficult also Interestingly, second phase of financial inclusion envisaged to open bank branches in the villages with 1000 population. Incidentally, as many as 96% of the villages in the country have population of below 1000.

3.2 High Dependency Ratio

Age-wise distribution of population in rural and urban area is presented in Table 2. It may be observed there from that as many as 274 million persons forming about 33% were below 15 years of age as against 26% in urban areas. Thus as compared to urban areas dependency ratio is significantly higher in rural areas. This phenomenon leads to higher living cost and low rates of savings and investment.

Table 2: Age wise distribution of Population according 2011 census (In million)

Age (in Years)	Rural	Urban	All	Percentage		
				Rural	Urban	All
Less than 15	274	99	372	33	26	31
15 to 60	484	247	730	58	66	60
More than 60	73	31	104	9	8	9
Age not stated	3	2	4	0	0	0
Total	834	377	1210	100	100	100

Source: Census of India

3.3 Poor Literacy Rate

According to a survey conducted by NSSO in 2011, the literacy rate in rural areas was pegged at 71% as compared to 86 per cent in urban areas. Adult literacy (age 15 years and above) rate in rural India was 64% as compared to 84% in urban areas. The survey further pointed out that only 6% of rural households, 29% of the urban households possessed computer. Evidentially, literacy rate (computer literacy) in rural areas was lower in rural areas as compared to urban areas. The literacy level has an important bearing on the quality of human resources.

3.4 Higher Incidence of Rural Poverty

In 2011-12 as many as 22 crore persons were below poverty line in rural areas as compared to 5 crore in urban areas. Speaking in terms of percentage, poverty ratio was 26% in rural areas as against 14% in urban areas. It is worth noting here that as compared with 2004-05 there is marked decline in both absolute number of poor and poverty ratio in the country (Table 3) however, higher incidence of rural poverty has been noticed during the reference period.

Table 3: Number and Percentage of Poor*

Year	Number of poor (million)			Poverty ratio (per cent)		
	Rural	Urban	Total	Rural	Urban	Total
2004-05	326.3	80.8	407.1	41.8	25.7	37.2
2011-12	216.5	52.8	269.3	25.7	13.7	21.9

Source: Niti Aayog, *Estimated by Tendulkar Method.

3.5 Lower Credit Deposit Ratio in Rural Areas

Despite huge branch network, rural branches have credit deposit ratio of 68% in rural areas against 91% in metropolitan areas. Incidentally average CD ratio in the country was as high as 70%. This confirms the common belief that there is siphoning off rural savings to metropolitan areas.

Table 4: Population Group-Wise Credit Deposit Ratio Scheduled Commercial Banks According to Place of Utilisation – End March 2016

Population Group	Credit Deposit Ratio
Rural	68.3
Semi-urban	63.2
Urban	60.2
Metropolitan	91.0

Source: BSR, RBI

3.6 Higher Incidence of Rural Indebtedness Rural Households

According to the latest All India Debt and Investment Survey 2012, about 31.4% households were indebted in rural areas as compared to 22.4% in urban areas. Agency-wise in rural areas about 19.0% households were indebted to non-institutional sources as against 17.2% households to institutional sources. However in the case of urban areas, proportion of households indebted to non-institutional resources was markedly lower at 10.3% as compared to institutional sources i.e. 14.8%. In short while non-institutional sources were in prominence in rural areas, institutional sources played prominent role in urban areas (Table 5).

Table 5: Incidence of Indebtedness of households as on 30.6.2012 (in %)

	Institutional	Non-institutional	All
Rural	17.2	19.0	31.4
Urban	14.8	10.3	22.4

Source: NSSO

3.7 Higher Dependence on Private Sources of Credit in Rural Areas

Amount-wise almost similar trends were observed. More than 44% of rural debts were taken from the private sources as against about 16% in urban areas. Institutional sources provided 84% of debts in urban areas as against 56% in rural areas (Table 6).



Table 6: Distribution of Loans Outstanding as at June 2012 (in %)

	Institutional	Non-institutional	All
Rural	56.0	44.0	100.0
Urban	84.5	15.5	100.0

Source: NSSO.

3.8 Higher burden of Interest in Rural Areas

Interest rate wise distribution of outstanding loans as presented in Table 7, reveals that about 64% of loans were at an interest rate of higher than 12% as compared to 46% in urban areas. This indicates that urban households are in a better position to obtain loans at lower rate of interest as compared to their rural counter-parts.

Table 7: Percentage Distribution of Loans according to Rate of Interest

	Up to 12%	Above 12%
Rural	35.7	64.3
Urban	53.6	46.4

Source: NSSO.

3.9 Higher Dependency on Agriculture

Over the years, while the proportion of work force engaged in agriculture has gradually declined the number of persons engaged on farms have increased sharply. At least 75% of rural workers are engaged in agricultural and allied activities. As a result, pressure on land further aggravated, leading to higher degree of disguised unemployment in rural area in general and agriculture in particular.

IMPORTANCE OF RURAL DEVELOPMENT

In order to improve the social and economic conditions of teeming rural millions, it is imperative to address these disquieting features with a sense of urgency. Addressing these issues in the rural areas is known as rural development. It is much more than economic growth. While economic growth is increase in the output or GDP the development is the process whereby there is substantial change in the structure of output techniques of production and improvement in educational skills, infrastructure, cultural outlook and changes in social attitudes (Rangarajan and Dholakia, 1979). The development is ultimately reflected in terms of the rise in standard of living. In short, rural development is rise in the standard of living of rural masses on a sustainable basis rather than one time rise or sudden rise.

A number of scholars pointed out that countries with highest agriculture growth per worker experienced the fastest rural development and sizeable reduction in rate of rural poverty

in particular (Byerlee et al. 2009). Agricultural development is a big challenge in India as Indian agriculture suffers from number of limitations. Among others, these limitations included low productivity, uncertainty of production and side effects of developmental projects.

4.1 Low Productivity

Analysis of yield of paddy in five top paddy producing countries of the world indicates that yield of the paddy in India was 3.1 tonne/hectare as against the world average of 4.2 tonnes/hectare. The higher yield of 6.5 tonnes/hectare was noticed in China. Similarly in case of wheat, as against average yield of 3.0 tonnes/hectare India witnessed yield of 2.9 tonnes/hectare. However, highest yield of 7.1 tonnes/hectares was recorded in France. Incidentally these two crops accounted for about 89% of foodgrain production in India. Similarly in case of milk yield, per milch cattle milk in India is as low as 3.8 kg/day as compared to 27.6 kg/day in USA and 6.0 kg/day in China (Dadhich, 2017) Inter-state variation in milk yield in India suggests that there is enough scope for improvement in milk yield.

4.2 Instable Agriculture

As mentioned earlier agricultural GDP is contributed mainly by crop sector distantly followed by livestock sector including dairy sector, fisheries sector and forestry sector. While value of output of crop sector is highly volatile, livestock sector particularly dairy sector is invariably stable (Dadhich 2014). As crop sector accounted for little over two thirds of value of output, its volatile nature, impacts the agricultural economy quite frequently.

4.3 Side Effects of Agricultural Revolutions

India witnessed a number of agricultural revolution viz., green revolution, white revolution, blue revolution, golden revolution, so on and so forth. These revolutions contributed a great deal in agricultural sector yet at times brought about some unhealthy developments such as green revolution encouraged indiscriminate use of chemical fertilisers and pesticides impacting the quality of soil, excess irrigation caused water logging green house gases pollution, climate change, etc. has not only affected climate change but has a significant effect on it in turn. The relationship between agriculture and climate change is a two way street. Similarly, market driven white revolution achieved milk production largely by increasing the number of milch animals rather than improving the yield per animal (Dadhich, 2017). This caused adverse impact on environment (higher production of methane gases) enhance competition between men and milch animals for food and fodder, higher water consumption for producing milk particularly in arid zone



areas. According to a study (Singh et al., 2004) dairying based rural livelihoods systems are now threatening the limited water resources. Such side effects are also noticed as a result of other agricultural revolutions (blue and golden revolution).

INVIGORATING SMART FARMING

In this backdrop, smart farming should be tried with advantage.

5.1 Smart Farming

According to the most popular definition, the smart agriculture is an approach for transforming and reorienting agriculture under the new realities like climate change, socio-economic changes, etc. (Lippur et al., 2014). However, most comprehensive definition of the smart agriculture was given by the UNO in 2013. Accordingly smart agriculture substantially increases productivity, enhances resilience (adaptation), reduces (mitigation) ill impact (side effects) of various developments to achieve food security and economic development of the country. The undercurrent of these definitions is transformation of the agriculture to increase production through enhanced productivity, enhance resilience and mitigate the ill-effects of various developments. It is a broad version of precision farming and sustainable farming with explicit focus on climate change.

5.2. Scope of Smart Farming

As we include allied and other ancillary activities under agriculture, the smart agriculture includes apart from the crop production, sub sectors like livestock, horticulture and plantations, fisheries, forestry it also includes whole gamut of supply chain and agri-business activities. The specific examples of smart agriculture interventions included among others, Soil management drought tolerant varieties dairy development, farming catfish, carbon finance to restore crop fields, waste reducing rice thresher, rainfall forecasting, incentive system for low carbon agriculture, so on and so forth. A typical example of smart farming intervention relates to National Dairy Plan (NDP) sponsored by NDDDB. Under the NDP producer companies are encouraged to arrange village based milk procurement system that is equipped with electronic weighing and testing system to ensure transparency at all levels, with quality assurance and members payment in their respective bank account (member is informed through SMS). This intervention also ensured higher milk productivity through better feeding and breeding, i.e., ratio balancing and quality AI services at the door step of producers using top genetic available in the country for producing superior calves with higher productivity. Advance technology is being used for milk

payment processing, milk pricing and milk data transfer through general Pocket Radio Service route information with mobile technology. Call centre is in place to support field engineering services for better management of equipment and to control breakdown loss (Paayal 2015-16). In this way switch over to smart agriculture will ensure the desired results in a big way.

5.3 Pillars of Smart Farming

The smart agriculture is based on the six Es. First is economic viability. The project should be economically viable and should generate at least 15 per cent internal rate of returns (IRR). Second, it should use the resources in an efficient manner. Main resources are land, water and labour. One the measure of the efficiency is higher per unit production. This will ensure higher productivity and production. Third, the smart agriculture project should judiciously use the energy particularly of fossil fuel like crude oil, etc. it may also encourage production of bio-gas and solar energy. Fourth, these projects should benefit all the sections of society particularly weaker sections of the society across all the regions of the country particularly less developed regions. It should not accentuate inter and intra regional imbalances. Fifth the smart agriculture should protect environment and restore the ecological balance and sixth, it should generate employment in the country particularly for the less privileged people.

5.4 Technologies of Smart Farming

The smart agriculture is mainly based on technologies. These technologies include sensing technologies such as remote sensing like weather forecasting, land use pattern mapping, cropping pattern mapping and forecasting, soil testing, mineral mapping of animals for feed production, mineral mixture, etc., telematics technologies, software communication, system mobile banking, direct transfer payment system (milk payment), Kisan credit cards and hardware/software system. The ultimate objective is to design a robust network of sensors to combine all the data and analyse the same to shape a farm management information system to enable farmers to take better decisions at right moment. The higher use of technologies in agriculture also upgrades it to smart agriculture and enable it to achieve the desired results. In other words, green digital revolution is smart agriculture revolution. The success of smart agriculture will depend on adoption of these technologies that will in turn depend on the availability of financial assistance.

SUMMARY

India lives in her villages. An analysis of socio-economic



characteristics of rural areas revealed that a large number of Indian villages are small sized leading to under utilisation and non viability of infrastructural projects. This apart, the comparatively higher dependency ratio in rural areas led to poor standard of living and low rates of saving and investment. The higher illiteracy ratio in general and women illiteracy ratio in particular is still a cause of concern in rural areas. The wide urban-rural divide was also noticed in regard to poverty level incidence of indebtedness and banking infrastructure. The lower credit deposit ratio of rural branches confirms the common belief of syphoning of rural savings in metropolitan areas. While proportion of work force engaged in agriculture has declined over the years the absolute number of persons engaged in agriculture has registered a rise. The proportion of rural work force engaged in agriculture is still sizeable. Agriculture still suffers from low level of productivity, higher volatility in production and side effects of excessive use of chemicals. There is lot of confusion on the definition or contours of rural areas. The multiple definitions have made information and data on rural sector somewhat non-compatible. FAO recommended Smart farming to address these problems. Use of science and technology particularly that of digital technology is commonly known as Smart farming. In order to gainfully use the rural work force to speed up rural development on one hand and address, current problems of agriculture, on the other there is no alternative but to invigorate smart farming.

References :

1. Theodore Schultz (1981), Investing in People, The Economics of Population Quality, University of Chicago Press.
2. Byerlee, D., Diao, X., and Jackson, C. (2009), Agriculture, Rural Development, and Pro-poor Growth: Country Experiences in the Post-Reform Era. doi: 10.1146/annurev.resource.050708.144239.
3. Thorstein Veblen (2008), The Theory of the Leisure Class, <https://www.gutenberg.org/files/833/833-h/833-h.htm>
4. Lipper L, Thornton P, Campbell B.M. (...), Torquebiau E.F. (2014), Climate-Smart Agriculture for Food Security, Nature Climate

Change Vol.4, pp.1068-1072.

5. FAO (2013a), Climate-Smart Agriculture: Sourcebook, Rome, Italy: Food and Agriculture Organisation of the United Nations.
6. Papuso I., Faraby J.A. (2013), Climate Smart Agriculture, Seminar on Climate Change and Risk Management, May 6, 2013.
7. Singh O.P. et al. (2004), Virtual Water Trade in Dairy Economy: Irrigation Water Productivity in Gujarat, Economic and Political Weekly, July 31, 2004.
8. Paayas Milk Producer Company (2015-16), Annual Report.
9. Government of India (2011), Census of India.
10. Government of India (2014), Key Indicators of Debt and Investment in India.
11. Government of India (2015), Economic Survey 2014-15.
12. National Bank for Agricultural and Rural Development (2015), Annual Report 2014-15.
13. Rangarajan, C. and Dholakia B.H. (1979), Principles of Micro-Economics, Tata McGraw Hill Publishing Company.
14. Dadhich, C.L. (2014), Role of Dairying in Diversification of Agriculture in Eastern India, in Madhusudan Ghosh, Debashis Sarkar and Bidhan Chandra Roy, Editors Diversification of Agriculture in Eastern India.\
15. Dadhich C.L. (2016), Financing of Agriculture in a Smart Way: Delineated Issues, CAB Calling, July-December 2016.
16. Dadhich, C.L. (2017), Problems and Perspectives of Financing of Smart Agriculture in India in Gupta K.R. and Angadi V.B., Edited, Smart Farming – Problems and Prospects.
17. Dadhich C.L. and Bhoi B.K. (2017), Farm Loan Waiver: A Critical Evaluation, Forum of Free Enterprises, August 2017.
18. Dadhich C.L. (2017), Invigorating Smart Dairying in India: Some Reflections, Indian Dairyman, December 2017.
19. Reserve Bank of India (1954), All India Rural Credit Survey.
20. Reserve Bank of India (1969), General Report (Vol. 1), Report of the All India Rural Credit Review Committee.
21. Reserve Bank of India (2016), Basic Statistical Returns of Scheduled Commercial Bank in India, Vol. 45.

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Conclusion

India is gifted with a wide variety of agro climatic conditions. Almost all types of horticultural crops can be grown in one region or the other. Horticulture today, is not merely a means of diversification but forms an integral part of food and nutritional security, as also an essential ingredient of economic security. Adoption of horticulture, both by small and marginal farmers, has brought prosperity in many regions of the country. With shrinking land for agri-

horticultural activity, now time has arrived to double the production and increase productivity of horticulture along with quality to feed the increasing population and also to ensure the nutritional and aesthetic security of our nation which will be major challenge. The sensible option before the farmers of nation is adopt hi-tech horticulture to increase further the production levels and productivity per unit area with quality.



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271 days to 364 days	6.95
1 year exact	7.10

Additional Interest of 0.60% is applicable to Senior Citizens for deposits over and above 1 year.

** Rate of Interest, subject from time to time.

Key Financial Indicators

(₹ in crores)

S. No	Particulars	As on 31.03.2018
1	Share Capital	144.10
2	Reserves	466.00
3	Owned funds	610.10
4	Deposits	3851.25
5	Borrowings	3388.92
6	Working Capital	7850.27
7	Loans & Advances	5195.75
8	Call money & short term deposits with other Banks	1198.25
9	Investments	1328.66
10	Gross Profit	66.97
11	Gross NPAs	0.24%



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Marching towards Golden Telangana



FARMER PRODUCER COMPANY: FARMING WITH A BUSINESS ANGLE

Dr. Yadnya Pitale*

Fertile Crescent of the old world ploughed the first steps of agriculture as a sustainable occupation for humans in the ancient world, leading to creation of civilizations.

Though one of the world's oldest profession, evolution of agriculture in terms of modernization is however still slow globally. It has remained un-evolved over the phases of time as compared to other means of livelihood. Agricultural practice in most parts of the world is still having the traditional outlook and inclusion of modern infrastructure is mostly restricted, only to the developed parts of the world. Professional approaches mostly found only in the newer tilled lands of North America, Australia and to some extent Europe. India persay mostly uses the old methods of farming with some deviation in this practice in the areas closer to the urban grounds. The strategy approached for agriculture is still being the old one based on annual rain forecast. It is need of the hour for agriculture to adopt and implement a business approach in its practice so as to achieve the much required professional approach in its dealings.



Large Warehouses storing 100 mln tonnes in Saskatchewan, Canada

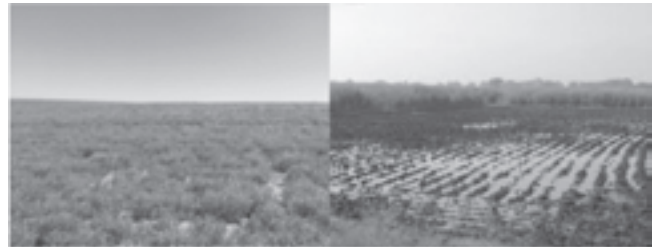


Modern farm equipment on farm in Alberta

Global agriculture estimates suggest that in spite of its popularity as an occupation there has been a yearly decline of at least 2% in the labor engaged in agriculture. In India the labor engaged in agriculture has fallen down to 50% as

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compared to 70% during the pre- independence days. Rapid industrialization leading to urbanization can be seen as one of the causes. At the same time, there are various other socio economic reasons behind fall in percentage of labor engaged in agriculture and one of the notable reason accounted for, could be size of landholding. In modern times, nuclearisation of families has led to split in farm sizes thus resulting in smaller land holding per farmer family. Increasing urbanization mainly due to the high rate of occupational hazards like climate change have also led to fall in farming labor which in turn is moving to urban areas to seek employment in the daily wage sector.



Farm size of 2000 acres per farmer family in Canada Small farm size in Maharashtra a field bordered by other Sugarcane fields

There is, however a certain percentage which goes back to rural hometowns to carry out faming for the kharif season. Upon discussing various reasons for youth falling out of the farming occupation there is also one reason which has acted as a catalyst to retain youth in the farming sector. This reason is the improved educational status of rural youth and non-availability of white collar jobs in the urban sector .This small percentage of young farmers have been instrumental in driving farming as an employment for a better tomorrow and is using modern techniques to increase farm productivity. However marginal farming still acts as a blow in improving the financial status of these youth. Integrated approach towards farming needs to be brought into action to remove the perils of marginal farming.

Cooperative farming approach has been already time tested in the sugar, poultry and dairy sector and their successes have been critically examined and found to be remarkable. However the general farming sector has not shown great inclination towards success of cooperative farming and the reasons could be defined as farmer specific and model specific. The farmer specific reasons could be, 1. Every farmer needs to grow a cereal for domestic consumption, 2. A farmer may be seeking agricultural credit for a function other than the farm function under the guise of the same, 3.



Farmland may have lost productivity and may need a crop rotation etc. The model specific disadvantages of cooperative farming could be, Lack of Business approach, self-interest of directors leading to corruption, conflict of general interests, lack of administrative knowledge to maintain official records etc. Cooperative farming could well be a solution for diminishing the perils of marginal farming however it tends not to be one. In context to such varied reasons for not forming a cooperative the farmers especially in not so good farming zones lack productivity leading to losses. In such conditions a Farmer Producer Organization / Company model comes to rescue. This model gives the farmer liberty to seek loan, assess the quality of his soil, seek healthy seeds, knowledge of appropriate use of pesticides and fertilizers, storage and market for the final produce, agricultural credit with good repayment quality etc. The FPO approach in broad sense is a business approach to farming. In a study conducted to examine food security conditions titled as, "Enabling Food for All", a small section of FPOs was examined in rural Maharashtra. It was found that at least an encouraging 60% of the small number of existing FPO units are functioning efficiently and have been a boon to appreciate the socio economic conditions of the farmers. Some have also been part of the Global Value Chain and are creating interesting profitability through the various sections of the chain. Some of the examined FPOs were Kadava Green Future, Devnadi Valley Green Vision, Tapolaecoagrotourism, Krushideep Agricultural Producer Company. These formed a minute sample to exactly understand the efficacy of FPO model for the marginal farmers and a general conclusion about their success can be made of the fact that all the member farmers are shareholders of this unit and have worked towards profit generation. Best administrative and accounting practices are a key to their success as an organization.

Farmer Producer Organization/Company is a membership driven business model comprising of farmer members. This concept was born out of the necessity to integrate small farm holdings scenario. The main aim of this concept is to provide economy of scale and scope to the farmer members again with reference to agricultural input as well as outputs. The FPC business model provides an integrated approach to water shed management, soil management, fertilizer and pesticide management etc. Overall, the collective approach helps to mitigate the risks of marginal farming like access to subsidies, agricultural insurance, water, training and awareness to farmers with new techniques and microfinance etc.

Devnadi Valley Agricultural Producer Company Ltd in Sinner taluka of Nashik district, is a company for the farmers, by the

farmers and of the farmers. Currently company has around 1000 farmers as members and has started Agri Mall. Devnadi Valley Agriculture Producer Company is a platform to enable farmers to increase their bargaining power and bring them on a competitive footing with other agriculture related entities. Devnadi Agri Mall is the input shop for the farmers, which supplies all types of inputs i.e. pesticides, fertilizers, seeds, hardware, drip irrigation system tools, tractors, and other farm equipment to the farmers. This is the one stop shop to the member farmers. Devnadi Vegetable Express has enabled the farmers to supply directly the vegetable produced by farmers to the customers in various residential societies in Nashik city. This helped farmers as they are getting 20% higher rate than the current rate as well as earning income everyday as the supply continues throughout the week. The company provides field support to farmers for the proper crop management as well as water management, which help farmers to increase crop yield. This field support help farmers to manage pesticides, fertilizers and water effectively and efficiently.

The Tapola agro tourism is a FPO based on tourism coupled with farming. The farmers in this area are mostly strawberry farmers having lands at the periphery of the Lake Tapola. In this FPC the farmers have come together forming a FPC. Tents for Tourist have been raised on the peripheral area belonging to the farmers which are let out to the tourists. The tourists can enjoy the fresh strawberry from the farms.

The Krushideep Agricultural Company based out of Malegaon is a FPC which has been catering even to the warehousing needs of the member farmers.

The Kadava Green Futures at Khadaksukane Dindori Nasik, is a FPC having association of 400 young farmers mostly into growing fruits and have 100% export potential. The USP of this company is that it has been growing fruits having international standard value.

The farmers forming these FPC have shown exemplary confidence in adopting modern methods of farming. They have incorporated information technology in their dealings and are informed about climate changes through social media. Moreover these farmers have understood the benefits of economies of scope in farming a particular crop. It's very important to note that these farmers aligned with each other through a common business goal thus integrating their inputs and outputs.

Most important part is the engagement of labor in a FPC. Marginal farmers engaged in growing crop of individual interest had to struggle with the availability of labor during the sowing and harvesting times. Different crop growing



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- | | |
|---|--|
| <ul style="list-style-type: none"> ● Non-Farming Rural Enterprises, Rural Housing, S.R.T.O. ● Sericulture, Integrated Horticulture/ Floriculture, Medicinal Plants, Individual Dairy Development and Sheep / Goat rearing / Poultry/Piggery / Rabbit Rearing / Fisheries and Fishing Boat ● Big and Small Lift Irrigation Schemes ● Rural Godowns / Agri Clinic & Agri Business Centres ● Purchase of Agriculture Lands ● Solar Lights/SolarPumps | <ul style="list-style-type: none"> ● Purchase of Two Wheelers ● Rain Water Harvesting Structures ● Vermi Compost Units ● Bio-digester ● Farm Mechanisation ● Combined Harvester ● JCB/Dozers ● Coffee curing, Drying yards (Paddy, Areca, Coffee etc.) ● Agricultural Implements ● Gold Loans, Salary Loans etc. |
|---|--|

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4. Two years and above	9.50%	

STRENGTHEN THE FARMERS' BANK

**FOR DETAILS, PLEASE CONTACT US OR OUR BRANCH OFFICES OR ANY PRIMARY
CO-OPERATIVE AGRICULTURE AND RURAL DEVELOPMENT BANK IN THE STATE.**

K. Shadakshari, Ex-MLA
President

Poornima .S, K.C.S.
Secretary I/C

A. C. Diwakara, K.C.S.
Managing Director



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8.25%* (p.a.)



Vehicle Loan

- Concession in Service Charge upto 31/12/2018

9%* (p.a.)



2-Wheeler Loan

- Concession in Service Charge upto 31/12/2018

10% (p.a.)



Gold Loan

11% (p.a.)



Loan to Professionals

- Concession in Service Charge upto 31/12/2018

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pattern made this task even more difficult. The formation of FPC helps in regulating labor uniformly applying it for the entire crop grown by the FPC. In addition to labor the FPC also helps farmers in negotiating better deals for agricultural inputs like fertilizers and pesticides and apart from this the FPC provides inputs on soil health care along with measured use of pesticides and fertilizers.

These farmers have taken up the concept of FPC maintaining utmost ethics and transparency in its dealings. At the same time it is interesting to note that a FPC is not subject to any subsidies as it does the Cooperative which makes the FPC concept invincible in an era of debate on subsidies on the world's desk.

In the modern India when incomes are being subjected to scrutiny for taxes it is touching to note that a farmer's income can be scrutinized due to the FPC model and a firm check can be had on the deliverables of subsidies. Crop failures due to climate change can be authenticated in event of an FPC being in place.

A small comparative analysis of FPOs in India to that with International ones reveals that though, this concept is very novice to India, it has been a powerful tool internationally which has brought about organization of agriculture as a business entity. Saskatchewan Pulse Growers Association in Canada is a Pulse Crop Development Board that is accountable to and funded by growers is an example of a FPO along with the World Farmers Organization. These organizations have been able to flourish with the FPO kind of business model. The WFO is associated with FAO (Food and Agriculture organization of the United Nations) assisting in global agriculture trade and food sufficiency.

Global food trade is sustainable only in condition of steady supply of farm resources. If procurement is restricted to be sourced from one particular region then it implies that the trade is going to suffer losses in event of famines or other climatic hostilities. It has been observed that FPOs have been drivers and catalyst in accomplishment of the task of, "Farm to Table" as they play an instrumental role in ensuring collective produce due to its very building block. The FPOs have in fact brought strength to global food trade.

Most importantly, the integrated farming approach having

different farming products on hand makes it unique from the cooperative concept of farming which has a single agricultural outcome.

If State Governments need to understand a farmer then it would be rightly in the interest of the government to interact with more number of FPOs/FPCs. This can happen only when the Governments will promote the FPO/FPC model by introducing monetary awards linked with competitive bidding. It would also be necessary for the state governments to promote the inception of FPOs/FPCs especially in the interior backward areas who need to be educated about this concept. The agriculture market related decisions i.e MSP is more in interest of the farmers with the FPC being an associated decision maker. The state governments also would play a critical role by creating a sustainable FPC and trader interface by authorizing such trades via committees as this will help price stabilization thus boosting consumer confidence.

As compared to the cooperative model the FPO model is still highly resilient to mal practices but it has been observed that though one concept of FPO runs overwhelmingly well in one region the replication of the same concept may turn into a failure in some other area and this may have given rise to abnormalities in consistent success of this model across the agricultural sector. Corrections in devising alterations suitable to an area are mandated after seeking a feasibility of such a FPO establishment for a group of farmers. An extensive guide has been published by NABARD for establishment of a FPO but it is desirable that an exhaustive study to be conducted before implementation of any FPO project of such kind with a forecasted vision so as to reference future goals. Our research team has devised a FPO performance Index so as to analyze and understand the viability of a FPO project in long run. A detailed study will help in understanding and fixing long term goals for an FPC to succeed in addressing food related issues in general.

We strongly believe that such a tool will not only filter projects for financial validity but also enable healthy disbursement of funds and their reach for the socio-economic upliftment of the farmers.



Maharashtra sugar production Second highest ever

Currently, the state is the second highest sugar producer in the country after Uttar Pradesh. Sugar production in the state is 140% higher than in 2016-17 where production was impacted by the drought. The area under sugarcane has increased by 2.7 lakh hectares over the last year. The cane area grew from 6.3 lakh hectares in 2016-17 to 9 lakh hectares in 2017-18. Kolhapur and Solapur regions led in sugar production, though the latter is an arid area. Productivity also increased from 75 tons per hectare in 2016-

17 to 100 tons in 2017-18. However, the rise in production has led to a dip in sugar prices from 3,600 per quintal last year to 2,900 now.

The state's domestic consumption is only 24 lakh tons and it currently has pending stocks of 79 lakh tons. The Centre has stepped in with an increased import duty on sugar from 50% to 100% and also scrapped export duty on sugar which was earlier at 20%.

Now, a scanner to check paddy quality

A rice-miller based in Raichur, Karnataka, has developed a paddy scanner that carries out a physical analysis of the sample within minutes and helps buyers - mainly millers and procurement agencies - make informed decisions and curb pilferages. "The device, named Amvicube Paddy Analyser - PA-200, is the first of its kind in the world," claimed Vikram A Sreerama, managing partner of Shriya Rice Mills in Raichur.

"The scanner works on the principle of absorption and reflection technology and is powered with a simple touchscreen. Once the grains are placed in the designated tray, the scanner analyses the paddy for its physical qualities - such as length and width - while identifying the percentage of brokens, all without removing the husk," he adds.

PA-200 also helps identify contamination, by finding out the mixture of other variety grains in the sample, if any, and displays the result within 2.5 minutes, which can then be e-mailed or sent through SMS, says Sreerama, managing partner of Amvicube, the start-up that has developed the product using various electronic components largely

available in the country. While the Karnataka government has provided a grant for Amvicube to help commercialise PA-200, the Centre has assisted the company in filing a patent for PA-200, which is priced at around ₹6 lakh.

Amvicube has sold about 25 scanners, mainly in Raichur, and is in talks with entities such as Rashtriya e-Market Services, which operates the unified markets platform in the APMCs of Karnataka and e-NAM, to deploy these machines as the talk of assaying gains ground in the agri-marketing space.

Amvicube figured as the most innovative product in the post-harvest space at the recent Indo-Israel Agri Challenge.

Himanshu Jobanputra of Shreeji Agrotech in Raichur, who has been using PA-200 for three months now, says the scanner helps him determine the accurate price of paddy. Millers normally depend on middlemen to purchase paddy and the price depends on the extent of brokens in the grains. "Accurate identification of brokens through scanning helps fix the right price, thus avoiding pilferages," Himanshu adds.

World's biggest project in Telangana set to water state's crops, villages

The country's biggest irrigation project, the Kaleshwaram Lift Irrigation Scheme, in Telangana which holds several national and world records will start receiving water from the Godavari River from the first week of August. The ₹80,000-crore project will create history in a state where the second-highest number of farmers commits suicide after Vidarbha in Maharashtra due to failed monsoons and lack of water for irrigation. The Kaleshwaram project envisages to irrigate 18 lakh acres in 13 districts and stabilise another 17 lakh acres in another seven districts of Telangana. It will also provide drinking water to several towns and cities, especially Hyderabad and Secunderabad, and water for industries in many districts. Telangana Chief Minister K Chandrasekhar Rao is seeking ₹ 20,000 crore from the Centre for the project.

Through this project, Telangana will harness water at the confluence of three rivers with Godavari by constructing a barrage at Medigadda in Jayashankar Bhupalpally district and reverse pump the water into the main Godavari River and divert it into a huge and complex system of reservoirs, water tunnels, pipelines and canals. The project had to be built at such a size and scale because while the Godavari flows at 100 metres above mean sea level (MSL), Telangana region is located at 300 to 650 metres above MSL.

The massive project divided into seven links and 28 packages involves digging of 20 reservoirs in 13 districts with a total capacity to store 145 TMC.

Govt appoints IDBI Bank MD M K Jain as RBI Deputy Governor

The government appointed IDBI Bank managing director MK Jain the new deputy governor of RBI, filling up the post that

was lying vacant since July last year after SS Mundra's tenure came to an end.



Grams : KRISHI BANK

PHONE : 2587040/2587069



The Haryana State Co-operative Agriculture and Rural Development Bank Ltd., Panchkula.

Shakarita Bhawan, Bays No.31-34, Sector-2, Panchkula, Haryana.

The Haryana State Cooperative Agriculture and Rural Development Bank Ltd. is the specialized institution in the State, which caters to the Long term credit needs of the farmers for the upliftment of the economic position of the agriculturists and allied fields.

The Bank advances Long Term loans to the farmer for the following purpose.

Sr. No.	Name of the Scheme	Period	Scale of finance
1	Minor Irrigation, WCS/UGPL	7 year	₹ 1.20 lacs to 5.00 lacs
2	Farm Mechanisation	5 - 7 year	85% of cost of mechanisation
3	Purchase of land	7 year	Upto 15.00 lacs
4	Horticulture/Farm Forestry Medicinal & Aromatic plant	5 - 9 year	₹ 65000 to Rs. 4.40 lac per acre
5	Animal Husbandry	5 - 9 year	₹ 75000 to 14 lac. 5 unit
6	Rural Godowns	7 year	90% of the Project Cost
7	Rural Housing	Up to 10 years	2.00 lacs to 7 lacs

NON-FARM SECTOR

Sr. No.	Name of the Scheme	Period	Scale of finance
1	Marriage places	Upto 10 years	90% of the Project Cost
2	Community Hall	-do-	
3	Village/Cottage Industry	-do-	
4	Public Transport Vehicles	-do-	
5	Rural Education Infrastructure	-do-	
6	Other SSI Units	-do-	

The Loan for the purpose of Non-Farm Sector, Rural Housing and Purchase of land are being advanced @ 13.50% p.a. w.e.f. date 07.6.2018.

Note: For further details, kindly contact the Haryana State Cooperative Agril & Rural Dev. Bank Ltd., Panchkula and the District Coop. Agril & Rural Dev. Banks at Districts level and its branches at Tehsil & Sub-Tehsil level in the State.

DHANESH ADALAKHA
Chairman
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Managing Director
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Insurance cover to crops damaged due to weather

The new Weather Based Crop Insurance Scheme (WBCIS) was announced and a 15-member committee has also been formed to set parameters for the scheme. The variables for considering a correlation would, among others, be wind speed, and drop and rise in temperature, which could affect all kinds of crops. The 15-member committee will put in place

further guidelines and a scientific model for connecting the weather patterns to damages. "If the temperature drops, how will it affect the quality of mango. When the wind changes directions it hurts the productivity of bananas. These are the kind of parameters we want to put in place for the WBCIS," said an official.

Private companies to install solar panels on water bodies, dams

Sunny side up



18 Total Projects since 2018



₹1,63,268 cr
Total Investment



41,785 persons
Total employment

Companies investing

- Adani Green Energy
- Adani Transmission
- ReNew Power Ventures
- Tata Power Co Ltd
- Soft Bank Energy
- Univergy Think Green Pvt Ltd
- Torrent Power Ltd
- Techfederal International
- Waaree Energies Pvt Ltd
- Giriraj Renewable Pvt Ltd
- Paramount Solar Pvt Ltd



In a desperate attempt to boost the dwindling production of solar energy in the State, Maharashtra will allow private players to install panels on water bodies, rivers and dams. The 'floating' policy for solar panels is aimed taking the State's power generation from solar sources from the current 624 megawatts (mw) to about 3,200 mw or 40% of the total renewable energy production of 7,839 mw. Maharashtra generates 34,000 mw of energy from all

sources every month but renewable energy forms only a tiny fraction of this.

This year, Maharashtra has signed 18 MoUs with energy companies promising an investment of ₹1,63,268 crore and jobs to 41,785 people in the solar sector. These include the Adani Green Energy Ltd, Tata Power Co Ltd, Torrent Power Ltd and Waaree Energies Ltd.

To boost rural economy, NABARD seeks to raise ₹40,000 cr through issue of bonds

In a bid to support investment credit in the farm sector and infrastructure build-up in rural areas, the National Bank for Agriculture and Rural Development (NABARD) is planning to raise about ₹40,000 crore through bond issuance in FY2019. In FY 2018, NABARD raised ₹33,000 crore against ₹25,000 crore in FY2017. The weighted average borrowing cost came down to 7.05% against 7.35%.

roads, irrigation, veterinary hospitals, primary schools and primary health centres; and also to give funding support for setting up warehouses, modernisation of dairies and rural housing.

Focus areas

According to Dr. Bhanwala, NABARD's focus, among others, is to boost long-term refinance (to RRBs, co-operative banks and commercial banks) so that asset creation happens in the agriculture sector and farm productivity improves; to provide States' support for establishing rural infrastructure -

Water Atlas

Meanwhile, NABARD, in association with the Indian Council for Research on International Economic Relations, is planning to launch a 'Water Atlas' to map the water consumption patterns of 10 crops across different States. Dr. Bhanwala said water consumption per kilogram of crop output will be mapped so that crop planning and water efficiency can happen across the country.

Lending colour to turmeric farming

Turmeric farmers in Erode face many issues. But the work done by Erode Agricultural Producers Co-operative Marketing Society in Karungal Palayam, a suburb in Erode, is transforming the local agriculture market and bringing in much-needed change. The society has 45,929 farmer-members who receive benefits including free-of-cost warehousing and secured loans at low interest. While

farmers in many mandis across the country depend on commission agents to sell their produce, here the farmer sells straight to the trader/buyer. Since the buyer is usually not in a position to pay the farmer the same day, the society settles the farmer's dues immediately by using its funds, and collects the same from the trader within 7-15 days.

But at the Erode Agricultural Producers Co-operative



Marketing Society, there is no place for these intermediaries. The society auctions turmeric electronically through a mobile app, saving time and ensuring transparency. In a recent research paper - 'Inclusive Growth and Development: A Study of an Agricultural Producers Co-operative Marketing Society in Tamil Nadu' - C Pitchai, Associate Professor, Department of Cooperation at Gandhigram Rural Institute, acknowledges the work of the society in creating an effective and transparent marketing network for turmeric. Co-operative societies are turning into a beacon of light for farmers, and there are a few other examples in Tamil Nadu - Tiruchengode Co-operative Marketing Society, Gobi Agricultural Producer Co-operative Marketing Society and Nilgiris Co-operative Marketing Society.

Pricing power

The society lends up to ₹3 lakh to a member. The loan value is 60-80% of the turmeric's prevailing market price. The loan is disbursed the same day the farmer brings his produce to the society, says P Kandaraja, the society's Managing Director. The farmer pays the interest when he retrieves his bags from the warehouse. Farmers who want to extend the loan can do so. The society, though, rechecks the stock's quality before renewing the loan.

IMF retains India's FY19 GDP growth forecast at 7.4%

The International Monetary Fund has retained its growth forecast for India, but warned that the government must strengthen the credibility of its fiscal policy. The IMF continues to expect India's GDP to grow 7.4% in 2018-19 (April-March) and 7.8% in 2019-20. The call for India to strengthen the credibility of its fiscal policy comes after the country missed the fiscal deficit target of 3.2% of GDP for

Nutritional mission aims to cover 235 districts this year

The government extended its ambitious Poshan Abhiyaan to 235 additional districts in its second phase taking the total of districts covered by the national nutrition mission so far to 550 districts. The additional districts to be covered during the current financial year were decided on the basis of the level of stunting prevalent in district as well as to ensure those districts affected by left wing extremism and those declared aspirational districts by NITI Aayog left out in the first phase covered, according to a decision arrived at the

2nd largest unbanked population in India, says World bank

According to the latest Global Findex Database released by the World Bank on the sidelines of the annual Spring meeting of the IMF and the World Bank, 11% of the world's unbanked adults are in India. Globally, 69% of adults - 3.8 billion people - now have an account at a bank or mobile money provider, a crucial step in escaping poverty. This is up from 62% in 2014

Turmeric bags can be stored in the warehouse free of charge for three months. After that, a fee of ₹2/bag/ month is levied for three months, and then ₹4/bag Turmeric being loaded at the market yard of Erode Agricultural Producers Co-operative Marketing Society for the subsequent three months. This is done, says Kandaraja, to make sure farmers do not stock their produce for longer periods. For a trader (buyer) at the society, the advantage is the free credit he gets. Traders get a credit period of 7-15 days, after the society's board of directors assess their credibility.

Value addition

The society makes value-added products - turmeric powder, chilly powder, sambar and rasam-mix powder and coriander powder, among other things, - under the brand 'Mangalam'. The crushing, blending, roasting and packaging machines are installed inside the society's premises. The revenue from the sale of value-added products in 2017-18 was ₹7.5 crore, up from ₹5.2 crore in 2016-17 and ₹3.5 crore in 2015-16. The total turnover (income) of the society in the last year was a little over ₹100 crore. The major chunk of the yearly revenue comes from the e-auctions. (The society collects a service charge of 1.5 per cent of the value from each of its members).

2017-18 by 30 basis points.

In addition to missing the fiscal deficit target, the government altered the fiscal consolidation roadmap for the third time in four years, and now aims to reduce the fiscal deficit to 3 per cent of GDP only by 2020-21.

first meeting of National Council on India's Nutrition Challenges (NCINC) chaired by NITI Aayog Vice-Chairman Rajiv Kumar. NCINC is the apex body to formulate policies, guide and monitor all nutrition based schemes. The ₹9,000-crore mission will strive to reduce stunting, under-nutrition, and low birth weight by 2% and anaemia (among young children, women and adolescent girls) by 3% annually over the three-year mission period.

and just 51% in 2011. From 2014 to 2017, 515 million adults obtained an account, and 1.2 billion have done so since 2011, according to the Global Findex database. The bank said China and India, despite having relatively high account ownership, claim large shares of the global unbanked population because of their sheer size.



Tenant farmers become landowners

The Maharashtra government has, through an Ordinance, declared that farmers in Vidarbha, who till date worked as “tenants” on government land, would now be the “owners” of the land. “With this, farmers wouldn’t have to go through the tedious process of applying with the revenue department and paying fees to get legal ownership of land, as stipulated in an earlier provision. The decision would benefit 1 lakh farmers from Vidarbha,” said Revenue Minister Chandrakant Patil.

The issue had been hanging fire since 1968, when Vidarbha was amalgamated with Maharashtra from its earlier CP and

Berar Province. A large number of farmers had been tilling revenue department land - Class II category - as tenants. Ownership land, meanwhile, was categorised as Class I. For conversion from Class II to Class I, farmers had to apply and pay fees. The decision was arrived at with the government constituting a Cabinet sub-committee headed by Patil, with Finance Minister, Agriculture Minister, Energy Minister and Social Justice Minister as members. While tenant farmers are mainly located in Bhandara, Chandrapour and Wardha Districts, a few are scattered in some other Vidharbha districts as well.

Deposits in Jan Dhan accounts cross ₹80,000 crore

The total deposits in Jan Dhan accounts crossed ₹ 80,000 crore mark with more people joining the flagship financial inclusion programme, according to official data. The deposits, which have been steadily rising since March 2017, were at ₹80,545.70 crore on April 11, 2018, data released by the finance ministry showed.

India's financial inclusion efforts have won recognition from the World Bank as their data indicate that 55 per cent of new bank accounts opened are from India, Financial Services

Secretary Rajiv Kumar had said. The deposits increased in the later part of November 2016 to over ₹74,000 crore from about ₹45,300 crores in the beginning of the month as people rushed to deposit the scrapped currency notes of ₹500 and ₹1,000, as per the government data. Thereafter, deposits in the accounts dipped before picking up again in a steady manner from March 2017. It increased to ₹ 73,878.73 crore in December 2017, to ₹75,572 crore in February 2018 and further to ₹ 78,494 crore last month.

Mahindra charts out plan to double farmers’ income in 4 years

Mahindra Agri Solutions has drawn a detailed business plan and grouped 52 clusters across the country under Mahindra Agri Village to double farmers’ income in four years by hand-holding them in the pre-harvest stage and directly linking their produce with market for better realisation.

With its intervention, the company has already increased yield by 7-20% in cotton, chilli, paddy, sugarcane, banana, maize, pomegranate, groundnut and soyabean crops. The 52 identified clusters consist of 218 villages and 12,000 registered farmers across 15 States. Ashok Sharma, Managing Director & CEO, Mahindra Agri Solutions, said the company has already done the baseline survey of Mahindra Agri Villages to identify the pain points and working with different institutes to devise a customised action plan. At the pre-harvest stage - based on input from consumer centres - the company will advise farmers right from what to grow, introduce best practices to improve yield, provide

them with irrigation solution to reduce cost and give financial assistance through Mahindra Finance.

Buy-back plans

Post-harvest, Mahindra will buy back the produce from farmers and sell it directly to consumers through modern retail chain. The company has set up its first distribution centre at Sonipet near Delhi and similar centres will come up close to each Mahindra Agri Villages, he said.

Digital help

Taking the digital push ahead, Mahindra Agri Solutions is planning to use artificial intelligence to launch AskMe services on its Mahindra MyGuru App which receives 300 - 500 farm related queries. The app has been downloaded by over 4 lakh people from rural areas where farmers ask questions on related issues including pest attacks.

Rice, buffalo meat push up farm produce exports

Exports of Indian agricultural and processed foods have staged a rebound in financial year 2017-18 at \$18.43 billion, recovering from a five-year low, driven by strong volume growth in rice (both basmati and non-basmati), guar gum and dairy products. The farm product shipments were up 15 per cent in dollar terms over the previous year’s \$16.03 billion.

Rice accounted for 42% of the total shipments at over \$7.7 billion (\$5.7 billion last year). Also, the higher unit price realised by exporters contributed to the growth in value terms. In volume terms, rice shipments exceeded 12.68 million tonnes (mt) against last year’s 10.75 mt. Basmati shipments crossed 4-million tonnes, while non-basmati



exports were estimated at 8.63 mt for the year.

Livestock exports up

Buffalo meat shipments, which accounted for 22 per cent of overall exports, were up marginally in value at \$4.03 billion (\$3.9 billion) and in volume 1.34 mt (1.32 mt). Other livestock

products including processed meat, poultry and dairy products have witnessed an increase over last year. Dairy products grew by a fifth to \$303 million (\$254 million), while poultry products were up 8 per cent to \$86 million.

CCEA approves restructured bamboo mission with outlay of ₹1,290 cr

The government approved a restructured National Bamboo Mission (NBM) with an outlay of ₹1,290 crore for two years, a move aimed at benefiting one lakh farmers, according to an official statement. The Cabinet Committee on Economic Affairs (CCEA) approved Centrally Sponsored Scheme of NBM under National Mission for Sustainable Agriculture (NMSA) during remaining period of 14th Finance Commission (2018-19 and 2019-20). "An outlay of ₹1,290 crore (with ₹950 crore as central share) is provisioned for implementation of the Mission during the remaining period of 14th Finance Commission". It is proposed to bring about

one lakh hectare area under plantation and it is expected that about one lakh farmers would be directly benefitted in terms of plantation. The Mission will focus on development of bamboo in limited states where it has social, commercial and economical advantage. The states include, the North Eastern region, Madhya Pradesh, Maharashtra, Chhattisgarh, Odisha, Karnataka, Uttarakhand, Bihar, Jharkhand, Andhra Pradesh, Telangana, Gujarat, Tamil Nadu and Kerala. The Mission is expected to establish about 4,000 treatment/product development units and bring more than 1,00,000 ha area under plantation.

With last outpost in Manipur, government says all villages have power

With electricity reaching Manipur's Leisang on Saturday evening, the Central Government has announced the completion of electrification of all villages in the country. Leisang in Senapati district, with 19 families, now joins the other 5.97 lakh inhabited villages that have been officially connected to the national grid. When the NDA government launched its version of the village electrification scheme — the ₹76,000 crore Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY) — there were an estimated 18,452 unelectrified villages. An additional 1,275 villages were added to the list subsequently. Electrification of 5.77 lakh villages had been achieved over the years by previous governments. According to the 2011 Census, there are 5,97,463 villages in the country.

access to electricity, according to estimates made available on the Ministry of Power's official website on April 29.

While the task of "village electrification" may have been accomplished, an estimated 3.14 crore rural households are still without any access to electricity — about 17% of the total 17.99 crore rural households. Around 25.64% of rural households in Bihar, 44.2% in Uttar Pradesh, 43.3% in Assam, 52.25% in Jharkhand and 36.34% in Odisha do not have any

POWERING UP	
Number of villages electrified since the Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) was launched in 2005 :	
2005-06	9,819
2006-07	28,706
2007-08	9,301
2008-09	12,056
2009-10	18,374
2010-11	18,306
2011-12	7,934
2012-13	2,587
2013-14	1,197
2014-15	1,405
2015-16	7,108
2016-17	6,015
Source: Annual Reports, Rural Electrification Corporation	

Rural entrepreneurs make power from poo

"Poo to Power" may sound awkward and impractical, but Aditya Aggarwal and his brother Amit have achieved it in Karnal. Two industries, one producing wire nails and another tinner rivets, owned by the family run on 100% electricity produced from cattle dung from 'gaushalas' or cow sheds. The dung-based power plant started in 2014 without government support. It generates around 2 MW of power. Elsewhere, in Silani village of Haryana's Jhajjar district, Sukhbir Singh stumbled upon the idea of producing power

from chicken faeces at his poultry farm to escape the clutches of corrupt electricity department officials in 2010. Change-makers like the Agarwal brothers, Sukhbir Singh and others in Punjab, Uttarakhand and Tamil Nadu have come in handy for the Modi government to make its "Gobar-Dhan" scheme distinct from other government projects by encouraging entrepreneurs to convert cow dung and other bio-mass available in rural areas to generate electricity, gas and fertiliser and make it a part of their business model.



Land record receipts: Maharashtra goes digital

Maharashtra became the first state to provide digitally-signed land record receipts (also known as 7/12 receipts), which Chief Minister Devendra Fadnavis claimed would check irregularities and bring in transparency. The 7/12 receipt is the most important document which establishes the ownership of the land, and is primarily used by farmers while applying for loans. It is also used by the government during crop surveys and to extend various facilities. The farmers will now have to inform only the gat (group) number or survey number to bank or a government department, and

the respective agency can ensure the 7/12 receipt online. Presently, eight lakh 7/12 receipts come with digital sign, and the aim is to complete the digitisation of all 2.5 crore receipts by August 1. The digitisation of the revenue records began in 1990 as a pilot project in Wardha, Vidarbha region. The government has spent ₹90 crore on the project. To get the 7/12 receipt with digital sign, one must go to <https://mahabhulekh.maharashtra.gov.in> and fill the necessary details. A pdf file with digital sign can be printed, which can be used with any government office.

Centre pilots private poppy cultivation and extraction of opium with new technology

The Centre has taken the first step towards privatisation of poppy cultivation and extraction of narcotic raw materials. It has awarded a licence to Rusan Pharma for the trial cultivation of poppy and extraction of opium from it through a new technology that improves the crop yield. Opium is the source of alkaloids such as morphine, codeine and the baine, used in anti-addiction therapies and medicines that treat extreme pain, such as in cancer patients. Opium production in India is highly controlled. Farmers sell their produce to the Centre, which then processes it at the Government Opium and Alkaloid Factories at Neemuch and Ghazipur. The extracts are then given to pharma companies to make cough-syrups, pain-killers, etc.

Private participation will improve the quality of seeds available to the farmer and improve the quantity of yield from the crop, he said, adding that it will also bring better prices for farmers. The move could also help India regain its

place in the export market such as to the US (currently dealing with an opioid crisis) and Europe. India had lost out, he said, because of the traditional lancing methods.

Replacing the old

Only certain areas in Madhya Pradesh, Rajasthan and Uttar Pradesh cultivate poppy and farmers use the traditional method of harvesting opium gum through a manual process called lancing, he explained. The new concentrated poppy straw technology involves harvesting the poppy gum through a largely mechanised method.

Under the pilot, Rusan will supply quality seeds to farmers sourced from European partners, as also Indian seeds, said the company's business development head Malavika Saxena, without giving details. About 5,000 hectares are presently under commercial use. For the trial, Rusan would cultivate two hectares in UP and Rajasthan, she said.

Maharashtra eyes large-scale cage fish farming in Sindhudurg

Maharashtra government has sought technical support from the Central Marine Fisheries Research Institute (CMFRI) for starting large-scale cage fish farming ventures in the brackish water of the Sindhudurg district. Cage culture involves holding fish within an enclosed space while maintaining a free exchange of water. Cage farming allows aquaculture practitioners to maintain stocks of fish in a controlled manner. CMFRI has successfully demonstrated cage culture of fishes such as milkfish, mullet, cobia, pompano, sea bass, pearl spot, and shellfishes such as shrimps, crabs and lobsters. In a meeting held at the CMFRI headquarters in Kochi, Maharashtra minister of state for

finance, planning and home (rural) Deepak Kesarkar requested the CMFRI authorities to provide technical guidance to the state to launch 500 cage fish farming units Sindhudurg district. Sindhudurg, a coastal district in Maharashtra, has rich brackishwater resources.

The CMFRI team will also select ideal spots and suitable species for the farming. The CMFRI will soon submit a detailed project proposal to the Maharashtra government after reviewing environmental and geographical aspects of the region.

Govt mulls new bank to fund women SHGs

Encouraged by the low rate of defaults and with an aim to boost women employment and earnings, the Centre is considering setting up a "special bank" to finance women's self help groups by increased credit flows. An expert committee will explore options of such a bank and if the credit needs of SHGs can be better served by an apex

financial body with members drawn from such women's groups, along the lines of Andhra Pradesh's 'Streenidhi cooperative'.

To be set up by rural development ministry that runs National Rural Livelihoods Mission, the expert panel is likely to be headed by G C Chaturvedi, former secretary to the



government of India. While a dedicated bank for SHGs is an option that the expert panel would explore, an alternative high on the ministry's list is replicating the model of 'Streenidhi Credit Cooperative Federation' - an apex society of federations of SHGs in Andhra Pradesh. The AP experiment is seen as successful with 'Streenidhi' emerging as a key

body supplementing the credit requirements of women's groups. In its search for viable alternative channels of credit supply to SHGs the expert panel will make a holistic supply of the challenging being faced by the women's groups in tapping the regular banking system.

Banks should fund first generation entrepreneurs'

State Statistics

- Aggregate bank deposits and gross credit of scheduled commercial banks in Maharashtra are ₹21,64 Lakh crore and ₹23 Lakh crore
- Credit to deposit ratio as on March 31, 2017 is 106.3%
- Annual credit plan size for priority sector in Maharashtra ₹2,91 Lakh crore
- Bank accounts opened under Pradhan Mantri Jan Dhan Yojana 2.2 crore
- Disbursement of loan under MUDRA Yojna ₹16,976 crore



The Maharashtra State government has accused

commercial banks for asking higher margin requirements from first generation entrepreneurs, particularly those in the food processing industry, and termed the lenders as 'non-supportive'.

In the letter, the Chief Minister said the lenders are creating hurdles by insisting high credit margins up to 40% on the basis of external ratings and without considering farm land as a collateral, especially in the case of the agricultural and food processing industry. The agricultural and food processing industry contributed 14% to the national Gross Domestic Product (GDP), said in his letter.

Farm credit: UP, TN forge ahead of Maharashtra, shows RBI data

Maharashtra which used to receive the largest share of agriculture credit has been overtaken by states such as Uttar Pradesh and Tamil Nadu in fiscal 2017 despite a large number of banks being headquartered in the state. During the fiscal ended March 2017, Maharashtra, accounted for outstanding farm credit of ₹ 98,000 crore while Uttar Pradesh with ₹122,000 crore and Tamil Nadu with ₹124,100 crore of outstanding farm credit respectively overtook the largest industrialised state in the country, according to the RBI data. However, ten years ago, in 2007, Maharashtra had topped with outstanding farm credit of ₹24,400 crore against ₹23,400 crore in UP and ₹23,100 crore in Tamil Nadu. In other words, while farm credit in Maharashtra has gone up, other states like UP and Tamil Nadu witnessed more credit disbursements to farmers. One reason for the sluggish farm credit offtake could be the cautious approach of banks while extending farm loans in the wake of rising non-performing assets (NPAs) and farm loan waivers in many states.

headquartered in Maharashtra with 12,392 distribution offices across the state.

In fact, agricultural credit across the country grew at its slowest pace since financial year 2011. Farm credit grew at just 3.8% in 2017-18 as compared to 12.4% in the previous year. The farm debt waivers announced by five states together are likely to widen the combined fiscal deficit of states by ₹107,700 crore (0.65% of GDP). This is marginally lower than the impact of UDAY scheme on the combined fiscal deficit of the states in FY16 and FY17. While the farm debt waivers announced by Uttar Pradesh and Punjab are part of their respective FY18 budgets, waivers announced by Maharashtra, Rajasthan and Karnataka are outside their FY18 state budgets. Thus, these states will have to either generate additional resources to fund farm debt waivers or cut FY18 budgeted expenditure, India Ratings said in a report.

Maharashtra also witnessed a deceleration in incremental rise in farm credit. The incremental rise in farm credit in the state was ₹ 11,000 crore in 2017, down from ₹ 12,200 crore in 2016, RBI data has revealed. UP registered a ₹14,600 crore incremental rise in farm credit in 2017. The fall has happened despite nine leading commercial banks, including SBI - being

Andhra Pradesh and Telangana, which announced a farm debt waiver of ₹43,000 crore and ₹17,000 crore respectively in 2014, however have adopted a staggered payment mechanism. They rolled over the announced farm debt waivers over four years with the last instalment due in FY18.

Govt to link 200 more mandis to eNAM platform this fiscal

The Government will link additional 200 wholesale mandis to the online trading platform eNAM this fiscal and also encourage inter-mandi transactions, Agriculture Secretary SK Pattanayak has said. At present, 585 regulated mandis in

14 States are linked with the electronic National Agriculture Market (eNAM) launched in April 2016. The priority will be given to improve the quality and encourage inter-mandi online trading, he said.



eNAM platform

Online trading on the eNAM platform can be done through the website, trading platform or the mobile App available in several regional languages. So far, 73.50 lakh farmers, 53,163 commission agents and over one lakh traders are registered

Maharashtra tops list of states in growth of personal loans: RBI

Maharashtra tops the list of states when it comes to personal loans with borrowers getting ₹2.95 lakh crore credit from commercial banks as on March 2017, according to the handbook of statistics for Indian states released by the RBI. In the last nine years, personal loans in Maharashtra have grown 3.54 times, the data shows. In comparison, personal loans on an all-India basis grew 3.22 times to ₹15.6 lakh crore. The state is also the largest recipient of overall bank credit. Maharashtra is followed by Karnataka with personal loans worth ₹ 1.66 lakh crore, then Andhra Pradesh (including Telangana) with ₹ 1.62 lakh crore, Tamil Nadu with ₹ 1.56 lakh crore and Gujarat with ₹ 94,400 crore. These

Centre unveils model contract farming law

The agriculture ministry released the Model Contract Farming Act, 2018, which lays emphasis on protecting the interests of farmers, considering them as weaker of the two parties entering into a contract. It is a promotional and facilitative Act and not regulatory in its structure. In addition to contract farming, services contracts all along the value chain, including pre-production, production and post-production, have been included in the Act, a statement from the ministry said. The Act says that the contracted produce will be covered under crop/ livestock insurance in operation. Also, contract framing will be outside the ambit of APMC Act. Protecting farmers, the Act says that no permanent structure can be developed on farmers' land or premises.

The concept of Contract Farming refers to a system of

How a farmers' group is reviving the jackfruit?

A farmer producer organisation (FPO) in Karnataka's Dakshina Kannada district is putting the humble jackfruit back on the table which lends itself to being transformed into a value-added product or two. Jackfruit grown in the backyard goes waste; only a few small or micro units in the private sector manufacture value-added products from it in coastal Karnataka. Now, Pingara Horticulture Farmers' Producer Company Ltd, located near Vitla town, about 50 km from Mangaluru, is aiming to change that.

K Ramkishor, President of Pingara Horticulture, told that 1,000 farmers within a 15-km radius of Vitla are members of the FPO, which is supported by the Karnataka Horticulture Department. He said the FPO members were inspired by the efforts of Shree Padre, a farmer from Kasaragod in Kerala,

on the eNAM platform from 14 States. The 14 States include Andhra Pradesh, Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh and Uttarkhand.

states account for 56% of personal loans and 58.4% of the overall bank credit. The fastest growth in terms of personal loans is seen in Haryana, where it grew 4.9 times to ₹ 49,700 crore. It is followed by Jharkhand, which grew 4.16 times to ₹ 17,900 crore and Jammu and Kashmir that recorded a growth of 4.11 times to ₹14,800 crore. In Maharashtra, personal loans make up for only 12.7% of overall bank credit - lower than the national average of 19.7%. In Goa, ₹ 45 out of every ₹ 100 lent by banks goes to personal loans. Jammu and Kashmir (39.8%), Assam (37.3%) and Kerala (37%) are other states where personal loans make for a high proportion of overall bank loans.

farming in which bulk purchasers including agro-processing/exporting or trading units enter into a contract with farmer(s) to purchase a specified quantity of any agricultural commodity at a pre-agreed price. Cultivation of commercial crops, like cotton, sugarcane, tobacco, tea, coffee, rubber and dairy, has had some elements of informal contract farming for a long time. With a view to integrate farmers with bulk purchasers including exporters, agro- industries etc. for better price realisation through mitigation of market and price risks to the farmers and ensuring smooth agro raw material supply to the agro industries, Union Finance Minister in the budget for 2017-18 announced the creation of a "Model Contract Farming Act".

who has been spreading awareness about the neglected crop's potential for the last decade-and-a-half.

Value-added products

He said the FPO produces value-added jackfruit products such as papads, finger chips and halwa. The Pingara FPO has the capacity to process around 400 kg of raw jackfruit a day. This can go up to 600-700 kg a day, though sustaining it in the off-season is difficult as the FPO employs 18 people, mostly women, he said. The FPO prepares around 1,000 pieces of papad and 5 kg of chips a day. It produces around 50 kg of jackfruit halwa in a week. It is also working on a kind of jackfruit payasam and hopes to market the product soon.

Ramkishor said the FPO collects raw jackfruit from farmers' doorsteps. Some also deliver the fruit to the FPO. The farmers



are offered ₹2 a kg if the jackfruit is collected. Those who deliver the jackfruit to the FPO are paid ₹4 a kg. The Karnataka Horticulture Department has provided a 90% subsidy on the cost of the equipment to produce value-added jackfruit products. Production is limited to the period between April and September. Keeping the requirements of

jackfruit during the off-season in mind, some raw jackfruits are kept in brine to prepare products such as papads. Pingara also takes up the manufacture of value-added banana products in the off-season to sustain its activities. In addition, it also provides agri implements on hire to farmers.

CSR funds spin a new future for the humble charkha

The charkha, a tool and symbol of India's freedom struggle, is getting a new spin - with a bit of help from the corporate sector and various trusts. At about ₹15,000 a piece, the charkha is a rather expensive tool. The Khadi and Village Industries Commission is on an aggressive mission to tap funding so that the spinning wheel can be donated to rural artisans.

From 2004 to 2014, a mere 175 charkhas had been donated. But from November 2015 to February 2018, the number has risen exponentially to 30,767. This is thanks to donors like ONGC, JK Group, GMR, Oil India, GNFC, Sir Dorabji Tata Trust,

the British High Commission, Dr Bansi Dhar Memorial Society, WWF-India and the World Bank, apart from a few HNIs. KVIC obtains the funds under various schemes and uses them to donate charkhas.

At times, companies (such as ONGC) are required to rehabilitate people at project sites. One option is to donate funds to buy spinning wheels, which offer an alternative source of livelihood to the displaced people, said Saxena. Today's charkha is an evolved version of what Mahatma Gandhi used: It is made of steel and weighs about 42 kg.

Does growth in pulses output mean India has reached self-sufficiency?

Till recently, there were two agri-commodities in which India was seen as being perpetually and increasingly import-dependent: edible oils and pulses. Between 2010-11 and 2016-17, the import value of the former soared from \$4.72 billion to \$10.89 billion, while from \$2.25 billion to \$4.24 billion in the case of the latter. During the fiscal ended March 2018, imports of edible oil rose further to \$11.64 billion. The last two years have registered a substantial jump in the country's pulses output to 23-24 million tonnes (mt).

If 23-24 mt is, indeed, the "new normal" for domestic pulses output, it has significant implications. In a just-published paper ('Changing Consumption Patterns and Roles of Pulses in Nutrition, and Future Demand Projections') for the International Food Policy Research Institute at Washington, three economists - Praduman Kumar, P K Joshi and Shinoj Parappurathu - have estimated the likely demand for pulses in India till 2030. They have projected the total domestic pulses demand under three different income growth scenarios: at current GDP growth rates, the demand is expected to go up from 18.02 mt in 2010 to 21.87 mt in 2020 and 26.58 mt by 2030. If GDP growth is "low" (25% below existing rates), the demand would rise to only 21.40 mt in 2020 and 25.22 mt in 2030. The corresponding numbers in a "high" growth scenario (25% above current rates) are 22.36 mt and 28.07 mt, respectively.

PULSES: PRODUCTION VS. IMPORTS (million tonnes)

	PRODUCTION	IMPORTS
2000-01	11.06	0.35
2005-06	13.38	1.70
2010-11	18.24	2.70
2013-14	19.25	3.66
2014-15	17.15	4.58
2015-16	16.35	5.80
2016-17	23.13	6.61
2017-18	24.51	5.65

Fruit & vegetable output pegged at over 307 million tonnes in current year

Horticulture production is estimated at 307.2 million tonnes (mt) in the current year (July-June), up 2.2 per cent over last year, according to second advance estimates released by the Union Agriculture Ministry. Last year's production was 300.6 mt. The production of fruits is estimated to be about 94.4 mt and vegetable 182 mt, the data showed. Total area under horticulture crops was also up by 2.3 per cent to 25.4 million hectares (mha) from 24.85 mha in 2016-17. At 50.33 mt (48.61 mt) potato production is estimated to be 3.5 per cent, whereas a slump is expected in the output of onions, which is down 2.6 per cent at 21.84 mt. The highest increase in

production among major vegetable crops, however, witnessed in tomato whose output is projected to grow by 6.6% to 22 mt.

Among fruit crops, citrus fruits output is expected to go up strongly to 9.6% at 12.51 mt (11.42 mt). The production of mangoes is projected to grow by 5.2% to 20.52 mt, banana production is expected to drop below 30 mt (30.5 mt). The production of plantation crops too registered a decent growth mainly in crops such as areca and cashew. Spices production will be up 5% to 8.54 mt (8.12 mt).



Banks have given ₹ 6 lakh crore Mudra loans to 12 crore beneficiaries

Prime Minister Narendra Modi said that loans worth ₹ 6 lakh crore have been given to 12 crore beneficiaries under the Mudra scheme. (PMMY) has helped and encouraged people to tread the unconventional path, fulfil their dreams and generate jobs for others by setting up small businesses. PMMY was launched by the Prime Minister on April 8, 2015, for providing loans of up to ₹ 10 lakh to the non-corporate, non-farm small/micro enterprises. Last fiscal, the

government extended ₹ 2.53 lakh crore credit under the Mudra Yojana, while ₹ 5.73 lakh crore has been extended in last 3 years. The government developed the new product 'Mudra' with a view to provide opportunity to poor people and small businesses to obtain loans from banks without any collateral to either start small enterprise or expand the existing ones, he said. Mudra has created opportunities for self-employment and is acting as job-multiplier.

CPCRI showcases sprayers mounted on tractors, drones for areca farming

With the monsoon setting in, arecanut growers prepare for a spray of copper sulphate to protect the crop from fruit rot disease. But labour availability is a major problem. Three years ago, during an interaction with growers, P Chowdappa, Director of the Kasaragod-based Central Plantation Crops Research Institute (CPCRI), was asked for a solution. Now CPCRI is ready with two prototypes. The Institute invited them to its research station at Vitla in Dakshina Kannada district for a demo of a tractor-mounted sprayer and a drone. The tractor-mounted sprayer developed in collaboration with ASPEE, can spray copper sulphate solution up to a height of 100 ft. Usually arecanut plants reach a height of around 30 ft. A single person can handle the entire spraying operation in the place of three workers needed for manual spraying. Many a times, banana and cocoa are intercropped. In such cases, driving a tractor-mounted sprayer in the

plantations will be a bit difficult. Considering this CPCRI is also trying out a drone model for spraying, he said. For this, CPCRI is collaborating with the Bengaluru-based General Aeronautics Pvt Ltd (a start-up incubated by the Entrepreneurship Centre of Indian Institute of Science).

Abhishek Burman, founder director and Chief Executive Officer of General Aeronautics, told that the original design of the drone was for paddy and wheat crops. However, General Aeronautics demonstrated its drone at Indian Institute of Oil Palm Research in Andhra Pradesh with encouraging results. He said that the drone is designed for a 15-litre tank and covers ground swath of 3.5 metres. It takes about four minutes to spray one acre of paddy and wheat. The drone can cover three-four acres in one sortie. On configuring the drone for arecanut crop, he said the start-up will work with CPCRI.

Free banking services will not attract GST

Tax authorities have made it clear that free service – such as certain number of ATM withdrawals, issuance of cheque book or account statement provided by banks – will not attract Goods and Services Tax (GST). But charges for late payment of credit card dues and additional interest charged in case of default in EMI payment will attract GST. This clarification has come after the Department of Financial Services and Department of Revenue were not on same page

regarding the imposition of GST on services such as free ATM transaction or issuance of cheque book. In fact, tax authorities have issued notices to many banks asking them to pay tax on free services as they are subject to 'maintaining minimum balance'. After all these notices, the DFS had approached the revenue department, seeking clarity on whether such services would attract GST.

UCBs allowed to be converted into small finance banks

The RBI will allow urban cooperative banks to voluntarily convert themselves into small finance banks. "The High Powered Committee on urban cooperative banks (UCBs), chaired by R. Gandhi, the then Deputy Governor of Reserve Bank, had, inter alia, recommended the voluntary conversion of large Multi-State UCBs into Joint Stock Companies and other UCBs which meet certain criteria into Small Finance Banks (SFBS). Taking these recommendations into consideration, it has been decided to allow voluntary

transition of UCBs meeting the prescribed criteria into SFBS," said the regulator in its statement on developmental and regulatory policies. Deputy Governor NS Vishwanathan said the RBI will come out with a detailed scheme norms for conversion of urban cooperative banks into small finance banks. The High Powered Committee had earlier recommended that UCBs with business size less than ₹20,000 crore be allowed to convert into small finance banks.

Government may launch Credit Enhancement Fund

The government is set launch a ₹500-crore credit enhancement fund next month to facilitate infrastructure investments by insurance and pension funds. The fund was

first announced in the financial budget for fiscal year 2016-17. "India is launching a dedicated fund may be next month to provide credit enhancement for infrastructure projects



which will help in upgrading credit ratings of bonds issued by infrastructure companies and facilitate investment from investors like pension and insurance funds. The initial

corpus of the fund, to be sponsored by IIFCL (India Infrastructure Finance Company), will be ₹500 crore, and it will operate as a non-banking finance company.

Oyster farming proves a financial boon for women self-help groups in Kerala

Edible oyster farming seems to be providing sweet rewards for women self-help groups in Kerala, thanks to the initiatives of the Central Marine Fisheries Research Institute to commercialise the venture in backwaters and estuaries. If the recent bumper harvest of oysters and mussels by a 40-woman group near Kochi from around 16 units is any indication, these groups have successfully reaped an average of 1.5 tonnes from each unit. Currently there are 50 such groups across the State concentrating on oyster farming. Oyster meat is priced at ₹600/kg, while that of mussels is at ₹660/kg. Besides the live consumption of oysters is also on the rise in five star hotels, which is an emerging market.

Oyster farming was popularised in India through the National Agricultural Innovation Project funded by the World Bank in 2005. Later, CMFRI's collaborative efforts with the State Fisheries Department made it a profitable aquaculture venture practice along the coastal states, especially in Kerala

and Maharashtra. In India, the commercial production of oyster was started in 1995 at Ashtamudi Lake in Kerala with an initial production of around 2 tonnes. Today, the figure has reached around 4,045 tonnes. Globally, China is the leading producer of oysters.

Simple technology

Edible oyster culture is a very simple technology and women farmers can easily understand these aspects through observation and practice. The successful oyster farming developed by CMFRI is the 'Rack and Ren' method, using bamboo poles. About 25 poles are required to set up a 5x5-square-metre rack. The period between November-December is the ideal time to start farming in Kerala, which could be harvested in May. As there is no need for supplementary feed, oyster farming is less expensive compared to fish farming. The initial capital to set up the farming units is the major expense of the farming, he said.

KisanKraft plans to take 'aerobic rice' technology to 5 states

The Bengaluru-based KisanKraft intends to take the 'aerobic rice' technology to five states during this kharif season and conduct demonstrations to reach out to more farmers. KisanKraft is a designer, importer and distributor of affordable farming equipment suited to the needs of small and marginal farmers.

According to Ravindra K Agrawal, Promoter and Managing Director, KisanKraft, the aerobic rice technology is an excellent solution for water-stressed paddy farmers. It could prove to be a lifesaver for the country, farmers and help in restoring soil conditions while contributing to national food security, he told. Aerobic rice is direct-seeded into the field, eliminating the cost of raising nursery, transplantation and its related impact on labour health. Direct seeding also reduces 'seed rate' dramatically. There is no puddling and no standing water, hence costs associated with the use of water

and pumping cost is also minimised. It also ensures saving of more than 60% in water and 55% in labour. Use of fertiliser is reduced since it no longer washes off with excess water.

Carbon footprint

Certain pests and diseases don't breed in aerobic conditions, therefore, use of chemicals is also reduced. A lot of aerobic rice varieties have been released in India and abroad, Agrawal said. Paddy fields today are known to be one of the biggest agricultural anthropogenic sources of greenhouse gases (nitrous oxide and methane, in particular). "Aerobic rice severely reduces these gases by eliminating standing water, and thus, as a nation, we can reduce our carbon footprint and accrue carbon credits," Agrawal added. All this is possible without any compromise in grain yield. Mixed cropping and crop rotation practices are possible. Soil health improves since continuous mono-culture is curtailed.

Maharashtra has highest number of ATMs in country, says RBI

Maharashtra continues to have the highest number of automated teller machines (ATMs) in the country at the end of financial year 2017-18, according to RBI data. The state had 25,651 ATMs. That means more than one out of every 10 cash dispensing machines in the country are located in Maharashtra. During the financial year 2017-18, the number of ATMs in the state has declined marginally from a year ago, as the total number of ATMs in the country has also declined

slightly to 2,22,066 from 2,22,318 in the same period. According to experts, the slight decline in the ATMs in the country is due to "consolidation and re-alignment" of the ATM deployment business post demonetisation.

Post cash crunch, older ATMs were replaced with newer ones and based on the data gathered during demonetisation, ATMs are being re-deployed from places where there are fewer number of withdrawals to places where the ATM



withdrawals are more. Maharashtra was followed by Tamil Nadu, which had 25,277 ATMs at the end of 2017-18 up from 24,653 a year ago. Uttar Pradesh, Karnataka and Gujarat followed the two states to make up the top five. Dastur said

Kerala waives plantation tax, declares moratorium on agricultural I-T

The Kerala cabinet has waived plantation tax and declared a moratorium on agriculture income tax, meeting a long-pending demand of the plantation sector. Kerala accounts for 82% of the rubber, 71% of cardamom, and 21% of coffee produced by the country's plantation sector. Growing production costs and poor price realisation have dealt a body blow to the sector, which has been faced with a financial crisis during the last two years. The Cabinet decision endorses the recommendations of the Krishnan Nair Commission that studied the issues plaguing the sector.

Tax burden eased

Tamil Nadu does not levy taxes on the plantation sector, but Kerala charges ₹700 a hectare as plantation tax. The agriculture income tax was 50 per cent of profits, while in

TN spurs more-crop-per-drop concept with micro irrigation

The Tamil Nadu government plans to bring under drip irrigation 3.57 lakh acres in 2018-19 at a financial outlay of ₹982.18 crore, according to the policy note for the year. The official figures for 2017-18 peg the acreage at 3.01 lakh at a total financial outlay of ₹692.26 crore. Between 2011-12 and 2016-17 the State brought in over 4.72 lakh acres under

Bee-keeping, a sweet way to tap more income in rubber plantations

Bee keeping and rubber plantations may seem unconnected. But the Rubber Board thinks otherwise. It has embarked on a unique initiative to encourage stakeholders to take up apiculture to earn additional revenue from rubber holdings at a time when the sector is bleeding. The Board's bee keeping certificate course, which was launched during 2016-17 has found many takers now, as honey production could fetch them around ₹300/kg in the local market. Those who successfully completed the first such course in Apiculture at Meenachil-Palakkad Rubber Producers' Society are retired people, NRI returnees and house wives, who want it as a hobby or part-time engagement. Some of them have started processing and value addition in a limited way, said PP Shaji, Deputy Rubber Production Commissioner, Rubber Training Institute. The encouraging response from farmers, rubber producers and members of self help groups prompted the Board to extend the course to other seven RPS from Kollam in the South of Kerala to Kannur in the North, this year.

Preserving ecosystem

The first course was started during 2016-17 at Meenachil

the penetration of ATMs in the country is still low as compared to the global standards and globally there are 350 to 400 ATMs per million people, whereas in India, there are under 200 ATMs per million people.

other States it is much less. The current Left Democratic Front Government has already reduced the agriculture income tax to 30 per cent and now has declared a moratorium on the tax. The Commission had also flayed the building tax on workers' one-room tenements attached to the plantations. It has reportedly recommended rebuilding the quarters with at least two bedrooms and toilet facilities.

Industry reacts

The Association feels it will be a step in the right direction for revamping perennially crisis ridden plantations in this State. The turnover of Kerala plantations was ₹21,000 crore in 2012-13 which has dropped to ₹7,800 crore in 2016-17 due to international price fluctuation of commodities. Nearly a million people depend on the sector.

micro irrigation at a financial expenditure of ₹1,170.88 crore benefitting 2.05 lakh farmers including 1.52 lakh small and marginal farmers.

Small and marginal farmers get 100% subsidy and the other farmers 75% for micro irrigation. The subsidy is shared 60-40 between the Centre and the State government.

RPS for farmers, rubber producers and members of self help groups aimed at enabling the participants to engage in self employment and develop entrepreneurship. Bee keeping equipments will be made available by the RPS's. The Kerala State Bio Diversity Board also extended support, considering the importance of honey bees in preserving the diversity of the nature and various ecosystems, he said.

According to Shaji, the production potential of honey from approximately 5.50 lakh hectares of rubber plantations in Kerala is ₹80,000 tonnes. But the actual production is hardly 5,000 tonnes as of now. Apiculture is a long-term developmental as well as employment-generating activity. It is an ideal agro-based subsidiary enterprise providing supplementary, even major income in rural areas. The majority of honey production in India is confined to South India, mainly Kerala and Kanyakumari district of Tamil Nadu which account for 42% of the national production, estimated at a lakh tonnes in 2017-18 as per the National Bee Board figures.



Need to raise maize production to 45mt by 2022

India has to increase maize production in the country by 75% to 45 million tonnes (mt) by 2022 to meet the increasing domestic requirement, a report by FICCI and Price Water house Coopers said. By 2022, India would need 30 mt of maize for feed and another 15 mt for food. For this to happen, the maize production has to grow at a CAGR of 15%, the report said.

Tapping the PPP area

Inaugurating a maize summit organised by the Federation of Indian Chamber of Commerce and Industry (FICCI), the Minister Shri Radha Mohan Singh said there was a need for a mix of strategies and interventions around technological innovations, promoting producer aggregation and linkages, enabling supporting infrastructure, forging public-private

partnerships and appropriate policy measures to boost maize cultivation in the country. "Forging PPP opportunities for establishment of maize-based silage making units, skill development centres and farm machinery banks are the prospective avenues for investment," he said.

Promoting maize crop

FICCI Director-General Dilip Chenoy stressed the importance of promoting maize cultivation as it was one of the most climate-friendly crops. "By cultivating maize, farmers can save 90% of water and 70% of power as compared to paddy and earn far more than what they are earning through paddy and wheat," he said. The report also called for incentivising private players to install maize dryers.

NITI Aayog, ITC tie up to strengthen farming systems in 25 aspirational districts

NITI Aayog and ITC Ltd will collaborate in the agriculture and allied sectors in order to strengthen farming systems across 25 aspirational districts. Launched by the Prime Minister in January, the 'Transformation of Aspirational Districts' programme aims to improve performance of these districts. A Letter of Intent (LoI) for the partnership was signed by Yaduvendra Mathur, Additional Secretary, NITI Aayog, and Anil Rajput, Senior Vice-President – Corporate Affairs, ITC Ltd. Amitabh Kant, CEO, NITI Aayog, was present on the occasion. The 25 aspirational districts covers States of Assam, Uttar Pradesh, Madhya Pradesh, Rajasthan, Bihar and Jharkhand.

ITC will promote best practices and technologies, set-up

demonstration farms and also create master trainers from government extension workers. Master trainers will be created at the block level. The company will also work out the logistics to ensure the farmers are trained even at the gram panchayat level. NITI Aayog will work in close collaboration with the district administrations and ITC to build capacities. In order to ensure implementation, performance review and problem solving, a Project Management Committee (PMC) at the district level will be set up. It is expected that over 2 lakh lead farmers (LF) in 25 districts will be trained as a part of the partnership.

GI tag and branding boost demand for Mattu Gulla brinjal

Efforts by a set of growers — assisted by NABARD financially, and a private university in the form of marketing interventions have helped boost the prospects of 'Mattu Gulla' (a brinjal variety) with geographical indication (GI) tag in Udupi district of Karnataka. 'Mattu Gulla' is now seeing better prospects after growers started marketing it with trademark stickers as a stamp of authenticity. For over 120 growers including Laxman Mattu, who live near the seashore at Mattu village in Udupi district, the cultivation of the vegetable is the main source of livelihood. They grow this unique brinjal on around 200 acres of land for almost eight months from October to June.

Considering the demand for this variety in the market, traders were earlier marketing brinjal grown in other villages

of the district also as 'Mattu Gulla'. Laxman Mattu, who is also the manager of Mattu Gulla Belegarara Sangha (Mattu Gulla growers' society), told that though Mattu growers start planting seeds in August, some traders were marketing brinjal from other villages as 'Mattu Gulla' in August itself. S Ramesh, Assistant General Manager of NABARD, Mangaluru, said that the bank sanctioned Mattu Gulla FPO (farmer producer organisation) project in 2015. This project got a financial assistance of ₹9.06 lakh from the NABARD. Manipal Academy of Higher Education's (MAHE) Centre for Social Entrepreneurship (CSE) stepped in as the hand-holding agency for growers in marketing. 'Mattu Gulla' had got the GI tag in 2011-12

Agriculture may grow 3.5% in 2018-19

India's agriculture growth is seen at 3.5% in 2018-19 aided by normal monsoon, said Niti Aayog member Ramesh Chand.

The farm sector grew 3.4% in 2017-18. Output from crop contributes about 60% to the total farm sector production,



livestock 20%, forestry and logging 8.5% and fishing and aquaculture 5.5%. Normal rains this year may lead to a bumper production of kharif and rabi crops, he said. India Meteorological Department has projected the South-West monsoon rains at 97% of long period average this year. The government has set the total food grain output target are record high of 283.7 million tonnes (mt) from 277.5 mt last

year and has set the rice production target at 113 mt (July-June), up from an estimated output of 100 mt last year. Wheat production is targeted at 100 mt (97.1 mt); target for pulses is 24 mt, slightly higher than the record production of 23.9 mt in the previous year and oilseeds 36 mt up from an estimated production of 2909 mt last year.

From BSY to Siddaramaiah, the land of milk and money

It started as a ₹ 2 per litre subsidy to Karnataka's milk producers by the then BJP government under BS Yeddyurappa in July 2008. On May 13, 2013, the day the new Siddaramaiah led Congress administration assumed office, the "incentive" given to farmers over and above the procurement price paid by dairy cooperative societies was doubled to ₹ 4 per litre. And in November 2016, it was further raised to ₹ 5 a litre. But Siddaramaiah's government hasn't stopped with Ksheera Dhare as the subsidy/incentive scheme for dairy farmers is called. In August 2013, it launched a Ksheera Bhagya scheme. This one provides a 150-ml glass of free milk daily to around 1.04 crore children: 65 lakh studying in government/ government aided schools and another 39 lakh in pre-school anganwadi centres. The free milk was initially given for three days of the week and, in July 2017, extended to five days. An amount of ₹ 1,206 crore has been budgeted for Ksheera Dhare this fiscal, the same as in 2017-18. The outlay for Ksheera Bhagya was ₹ 700 crore last fiscal, which is projected to go up to ₹840 crore in 2018-19 because of the free milk being made available for more number of days. The combined outgo will, thus, be well over ₹ 2,000 crore. But the two schemes, Ksheera Dhare in particular, have definitely given a huge boost to dairying in Karnataka. Between 2007-08 (before Yeddyurappa set the ball rolling) and 2012-13, milk procurement by the 14 district unions affiliated to the Karnataka Cooperative Milk Producers' Federation (KMF) rose from an average 30.25

lakh kg per day (LKPD) to 49.06 LKPD. In the period after Siddaramaiah enhanced the producer's subsidy, the average procurement rose to 70.77 LKPD in 2017-18. In other words, a more than 2.3 times jump in 10 years! Milk production in the state, too, has gone up from 42.44 lakh tonnes to 65.62 lakh tonnes between 2007-08 and 2016-17.

"Our unions paid farmers an average price of ₹ 24 per litre for cow milk (with 3.5% fat and 8.5% SNF or solids not fat content) during 2017-18. The state government's ₹ 5/litre incentive was in addition to this and credited directly into their bank accounts," said a top KMF official. There are 24.5 lakh farmer-members of the nearly 14,200 village societies that are part of KMF's district-level dairy unions.

MORE INCENTIVE, MORE MILK		
Year	Producer incentive (₹ crore)	Procurement (avg. lakh kg/day)
2007 - 08	0	30.25
2008 - 09	136	32.53
2009 - 10	266	35.77
2010 - 11	281	37.59
2011 - 12	319	42.84
2012 - 13	362	49.06
2013 - 14	441	51.53
2014 - 15	818	58.61
2015 - 16	1016	64.88
2016 - 17	994	65.51
2017 - 18	1206	70.77

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

Prabhu Sankar, an agricultural engineer based in Coimbatore, was deeply concerned about the dwindling returns of farmers prompted this engineering graduate from the Mahatma Phule Krishi Vidyapeeth in Pune to look for innovative ideas in corporate farming. Thanyas Organic Pvt Ltd, the start-up he founded with a few friends, has perfected farming techniques that can increase the productivity of a piece of land by at least 10 times with substantially less water and nutrients.

The start-up is being incubated at the Tamil Nadu Agricultural University's (TNAU) Agri Business Directorate in Coimbatore. "The beauty is that the entire farm can be managed remotely using the internet of things (IoT)," says R Murugesan, Director of Agriculture Business Development at TNAU, who heads

the incubation centre. The technique can be used to grow vegetables, flowers, medicinal plants and spices. Thanyas' 30,000 sq ft experimental farm, which the start-up uses to test out various protocols, is located at Palladam, in Tirupur district.

Cloud-based fertigation

Using a cloud-based server, Sankar, sitting 40 km away in Coimbatore, can not only schedule a fertigation session, but also actively monitor the plants every day. "We will use similar procedures for a 10,000 sq ft pilot farm that we are putting up for Rallis India, a Tata concern, in Lonavala, near Pune," says Sankar.

Thanyas' Palladam farm produces nearly 80 types of vegetables. The farm is based on aeroponics, an advanced



version of soil-less agriculture, in which water and nutrients are sprayed on the suspended roots of the plants. While the technique has been evolving since the 1970s in the West, developing similar protocols for the tropics and sub-tropics is a tough job, says Sankar. The plants are grown on raised beds that stand a few feet from the ground, making it possible to cultivate several rows on either side of the bed.

Tea output rises 5.9% to 1,325 million kg in 2017-18

Indian tea output touched 1,325.1 million kg in 2017-18, rising by 5.9%, according to the Tea Board of India. Exports too hit a high of 256.6 million kg, rising by 12.7% during this year. "Much of this increased output comes from the STG [small tea growers] segment," said Tea Board Chairman P.K. Bezboruah, adding that the organised sector was stagnant. Egypt, China Pakistan and Russia were among the countries buying more Indian tea. Mr. Bezboruah said that it would be a great achievement if the export level could be sustained. S.

How rice cultivation in Punjab has become environmentally sustainable?

Since the initiation of rice research at the Punjab Agricultural University (PAU), right from its establishment in 1962, there have been tremendous achievements in both varietal development, and standardisation of production and protection technologies in the crop. The impact can be seen from milled rice production in Punjab rising from a mere 6.88 lakh tonnes (lt) to 132.58 lt between 1970-71 and 2017-18, with average per-hectare yields, going up from 1,765 kg to 4,325 kg. This jump in output and productivity has been due to the untiring efforts of rice researchers and the state's technology savvy farmers.

Recently released rice varieties from the PAU mature in 123-145 days and have been widely adopted by farmers, as they are also high-yielding and generate savings in water, fertiliser, pesticide and labour use. The new non-basmati varieties - namely PR 121 (released in 2013), PR 122 (2013), PR 123 (2014), PR 124 (2015) and PR 126 (2016) - mature one to five weeks earlier than the earlier popular varieties such as PR 118 (158 days maturity seed-to-grain) and Pusa 44 (160 days), while yielding almost the same. The yields are actually much higher in terms of per unit area, per unit time and per unit of inputs. Also, these varieties possess marker assisted pyramided bacterial blight disease-resistant genes (Xa4/ Xa5/ Xa13/ Xa21). They are resistant to all the ten known bacterial blight pathotypes prevalent in Punjab.

During the 2012 kharif cropping season, 39% of Punjab's total non-basmati paddy area was covered by the long-duration, late-maturing Pusa 44 and 33% under PAU (PR) varieties. The balance 28% was accounted for by other publicly bred and private sector varieties/hybrids. But in the 2017 season, the area share of PAU/PR varieties was 68.5%.

Spreading roots

NABARD has contacted Thanyas for a small demonstration facility at its Lucknow campus. According to TNAU's Murugesan, the Prince of Qatar has evinced interest in an aeroponics based vertical farm in his kingdom. "Initially it will be on a 2.5- or 5 acre land; if successful it may get extended to 250 acres," he says.

Soundararajan, Director, Tea Development, Tea Board, said that during 2017-18, output of high value orthodox tea and green tea increased. Both command good prices in the international market. India's export earnings rose 13.8% in dollar terms and 9.3% in rupee terms in 2017-18. Auction prices of tea had risen by an average of 10% between January and December, but remained low between January and April 2018 at about ₹ 117 per kg.

In kharif 2018, this is expected to further go up to 75-80%. Simultaneously, the share of Pusa 44 fell to 17.7% in 2017 and is expected to decline below 10% in the ensuing kharif season.

PR PADDY VARIETIES IN COMPARISON TO PUSA 44		
PARAMETER	PR 121	PR 126
Time saved (days)	15-18	25-30
Fertilisers saving*	249	306
Savings of Pesticides*	1138	1411
Irrigations saved (Number)	3-4	5-6
Labour savings*	720	1040
Total variable costs*	2981	4151
Net profit*	+278	+176
* Rupees/acre		

PR 121 has now emerged as the most popular variety among Punjab's farmers due to its short duration, yield stability across cropping environments, and bacterial blight disease resistance and good milling qualities. With an average paddy yield of 30.5 quintals per acre and maturing in 140 days, this variety (its actual yield potential is 38 quintals, more than the average 32 quintals for Pusa 44) was planted in over 7 lakh hectares or 27.9% of Punjab's non-basmati rice area in 2017. The other new PAU varieties with their respective area shares included PR 126 (13.6%), PR 124 (8.3%) and PR 122 (6%). All these varieties are now gaining popularity in other states. Due to the large-scale adoption of the new short-duration, yet high-yielding varieties, Punjab registered an all-time-high paddy productivity of 6,488 kg per hectare (4,325 kg of milled rice) during kharif 2017. The state also achieved a



record paddy production of 198.87 lt (132.58 lt in terms of rice) last year. If one considered only non-basmati paddy, Punjab's average per hectare yields have increased from 64.21 quintals in 2014 to 65.96 quintals in 2015, 65.93 quintals in 2016 and 68.92 quintals in 2017. Also, it is worth noting that the state's contribution of rice to the central pool in 2017 was 118.33 lt again a record. The yields from the new varieties, are almost on a par with the earlier popular long-duration varieties. However, by maturing 2-4 weeks earlier,

they yield more per unit area, per unit time, and per unit of fertiliser, pesticide and water (see table). Thus, these are more efficient, a prerequisite for crop breeding today. By maturing in 125-140 days, which allows for the fields to be vacated by the first week of October, the new varieties give farmers at least a 15-20 day window to manage the leftover stubble from harvesting using combines.

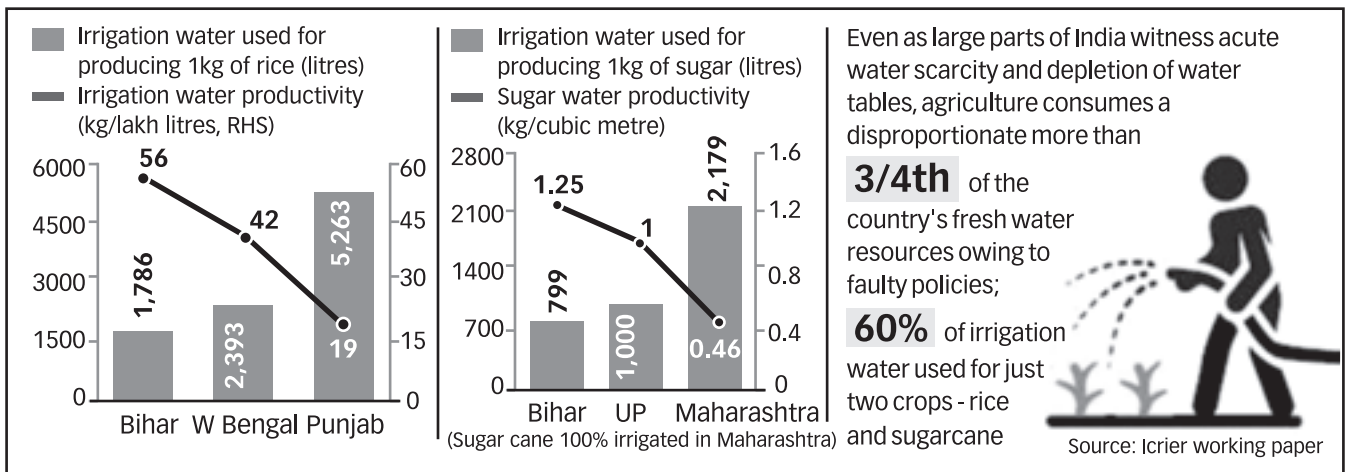
Why Punjab shouldn't be India's rice bowl and Maharashtra must shun sugarcane?

Punjab farmers, helped by near-total irrigation, stick to rice cultivation since it is profitable for them. Free power provided by the state government and an assured paddy procurement mechanism keep them going. This is when rice could have been grown with substantially lesser use of irrigation water in the eastern states of Bihar and West Bengal. Similarly, farmers in Maharashtra, despite the state's abysmally low irrigation coverage (18%), choose water guzzling sugarcane over other crops like cotton, tur and groundnut which produce higher value of output per unit of irrigation water. The reason: Sugarcane is 100% irrigated in Maharashtra and the crop's profitability is assured by a clutch of sugar mills that provides the farmers sort of an assured market. And 60% of irrigation water is used for rice and sugarcane, the two most water-guzzling crops.

profitable agriculture: Cases of rice and sugarcane". The idea is to take policy action in order to make cultivation of rice and sugarcane more profitable to farmers in regions where the crops' irrigation water productivity/economic water productivity are high. Tamil Nadu, for instance, may have high land productivity for irrigated rice comparable to Punjab's, but Bihar is seen more suited for rice cultivation than both the states as the state's irrigation water productivity for rice is ₹ 56 kg/lakh litre compared with Tamil Nadu's ₹39 kg and Punjab's ₹19 kg.

A recent working paper by Icrier discussed the issue in detail and called for a paradigm shift in water use for agriculture, with the objective of shifting water-intensive crops to regions where the natural resource is abundant. "The price-based subsidy existing for inputs at present must shift to income- directed policies, wherein the input subsidies/benefits must be directly transferred to the farmer's account rather than getting reflected in the price of the particular input," Ashok Gulati and Gayathri Mohan wrote in the paper titled, "Towards sustainable, productive and

Also, a rational option for the country would have been to stick to traditional sugarcane region, the sub-tropical Uttar Pradesh and Bihar, where irrigation water productivity for the crop is high. "... one cubic metre of water produces 1.25 kg of sugar in Bihar and 1 kg of sugar in UP, while in Maharashtra (it is) as low as 0.46 kg," Gulati and Mohan observed. The Icrier paper underlined the need for strengthening the marketing opportunities and re-designing procurement policies, keeping in mind the economic water productivity of crops in different regions. Similarly, promoting less water-intensive maize crop linked to the food processing industry might ensure assured marketing opportunities to farmers in Punjab, encouraging the process of moving rice production out of the state, the paper added.





Students build multi-purpose agricultural machine

An all-in-one machine built as part of a start-up project by four students is being projected as a solution to the problem of lack of agricultural labour in the State and rising costs. The multi-purpose agricultural machine built by the four final semester students of the St. Thomas College of Engineering and Technology at Sivapuram can replace the use of several single-task gears being used for doing separate tasks in agricultural fields. They call the machine 'Mannira' and they

have demonstrated that it can perform various agricultural works such as ploughing, transplanting, irrigation, harvesting, grain separation, winnowing and milling. The use of the machine is hoped to reduce costs and raise profits as it is an answer to depleting agricultural workforce. The team has already applied for patent for the product they have developed at a cost of ₹2 lakh.

Agripreneurs of Tamil Nadu peel European market for bananas

The first of banana exports to Europe will start in a couple of months through separate private initiatives in Tamil Nadu. This will eventually open the doors to markets in the West for the local varieties. One, the Trieste Port Authority in Italy is funding a project by the Tamil Nadu Banana Growers Federation, which is working with the Tamil Nadu Agriculture University, to standardise harvesting and post-harvest facilities for banana exports.

East Asia, targeting overseas Indians. But now, exporters are targeting developed markets in Europe. While initially, the Cavendish banana will be shipped, he plans to popularise local varieties including Red Banana, Poovan and Kathali.

G Ajeethan, General Secretary, Tamil Nadu Banana Growers Federation who is backed by the Trieste Port Authority says, as of now, there is no common infrastructure facility meeting European norms for banana exporters in the State.

Austrian interest

Through another project, a buyer based in Vienna, Austria, keen on Indian varieties for the local markets there, is supporting Tripura based fruits exporter Ka Ve Ezhilan of Greeneers Agro Products India. The exporter is partnering with the National Research Centre for Banana (NRCB) and a consultant in IIT-Madras for a cable conveyor for moving harvested bananas to the pack house. This equipment has been demonstrated to the buyer who has approved the idea, he said.

For freshness

The Port Authority is funding the Federation and the Agriculture University about ₹1.25 crore to establish a rope conveyor facility in a selected banana farm. The major challenge is to minimise human handling during harvest and post-harvest to maintain the freshness of the fruits at destination. By mid-June, Ajeethan expects to ship out the first of the consignments to Europe. The consignment will initially be airlifted through Kochi or Bangalore, he said.

Ezhilan, who is, on his own initiative, investing over ₹10 crore in a pack house for fruits exports in Pollachi, says the first consignment of about 100 kg of Grand Naine variety of banana will be airlifted by the month end. Then, exports will be stepped up and by September a 20-tonne consignment of the fruit will be shipped out. The objective is to move about 150 such containers a year. Ezhilan says farmers can benefit from a 20-25% increase in prices as compared with the ₹15-20 a kg they get now.

S Uma, Director & Convenor, NRCB, said a team at the centre has designed the protocol for sea shipments of Nendran variety of bananas to Dubai. This was a Public-Private Partnership project with a Kochi-based exporter, Fair Exports India and the Agriculture and Processed Food Products Export Development Authority, New Delhi.

Tapping the West

Theni in Tamil Nadu is a major banana cultivation centre but exports are primarily restricted to Gulf countries and South-

While airlifting can be costly, protocols have to be designed for sea shipments as the fruits will be in transit for up to three weeks. Now, nearly 20 tonnes of Nendran are being shipped out weekly. This has helped to bring down prices for overseas consumers who now pay about ₹125 a kg compared to ₹150 for air cargo consignments. Farmers too benefit as they get ₹5-10 more per kg.

India in a race against wilt in Cavendish banana

Tropical Race 4 (TR4), the virulent strain of fungus *Fusarium oxysporum cubense* that is threatening banana crop globally with the fusarium wilt disease, has hit the plantations in India, the world's top producer of the fruit. The devastating disease which surfaced in the Cavendish group of bananas in parts of Bihar is now spreading to Uttar Pradesh, Madhya

Pradesh and even Gujarat, and threatening to inflict heavy losses to the country's ₹50,000-crore banana industry.

India is the largest producer of banana and accounts for 29.1% of the global output. The country's output is estimated at around 30 million tonnes from an area of 0.80 million hectares.



TR4, the soil-borne pathogen infests banana plants with the fusarium wilt disease through the roots that spreads to the vascular system and blocks transportation of water and nutrients in the stem, resulting in yellowing of leaves and plant death.

Low awareness

Sources said the fusarium wilt pathogen persists in soil for decades and is extremely difficult to manage. The disease had initially surfaced in the Katihar and Purnea districts of Bihar in 2015 and had spread to Faizabad district of Uttar Pradesh last year and now to Burhanpur district in Madhya Pradesh and Surat in Gujarat. However, details of total acreage affected hit by the disease were not available.

In India, most of the farmers use suckers as planting material and are not aware of the serious nature of TR4 in banana. The incidence of Fusarium wilt will increase in the years to come said an agenda note on kharif conference. As the banana bunches are transported to various States, the pathogen can spread through peduncle of the bunches and there is a chance for the spread of this virulent TR4 strain to other States as well.

Agri plan with ₹ 33,000cr outlay to go on for 2 yrs

In its effort to double farmers' income by 2022, the government has approved continuation of the agri umbrella scheme 'Green Revolution - Krishonnati Yojana' with a central outlay of over ₹ 33,269 crore till March 31, 2020. The programme was launched last year after clubbing the existing 11 different schemes for better implementation and monitoring. The 11 schemes, focussing on creating/strengthening of infrastructure of production, reducing

'Burn affected plants'

The National Research Centre for Banana, under the Indian Council for Agricultural Research, has begun advocating of burning disease-hit plantations in the affected regions. In collaboration with the State agriculture departments, it is exhorting banana farmers to take up crop rotation and growers are seen shifting to maize and paddy in Bihar among other States. Though more than 20 varieties of banana are grown commercially in India, the trade mainly depends on the Cavendish clones that include Grand Naine, Robusta, Bhusaval, Basrai and Shrimanthi among others.

Cavendish variety affected

The Cavendish clones, which account for 55 per cent of the total area and contribute to around 64 per cent of the total output, are highly susceptible to the fusarium wilt disease. The Cavendish cultivars globally have succumbed to the TR4 race in many producing countries including China, Taiwan, the Philippines, Indonesia, Malaysia, Australia, Pakistan and, most recently, in Jordan, Mozambique and Vietnam.

output cost and marketing of agriculture and allied produce, have been under implementation for the past few years.

"The Cabinet Committee on Economic Affairs (CCEA) approved the umbrella scheme in agriculture sector beyond 12th five year plan for the period from 2017-18 to 2019-20," said Union law minister Ravi Shankar Prasad. Under the umbrella scheme, the MIDH will get the highest amount (over ₹ 7,533 crore) as central share.

Gujarat farmer strikes it rich with muskmelon; drops the not-so-hot potato

Khetaji Solanki, a 41-year old farmer from Banaskantha district in North Gujarat a potato farmer switched to muskmelon and struck gold on his 7 bigha (4 acres) holding. Solanki produced 140 tonnes of muskmelon with a 70-day crop cycle. Sold at the rate of ₹15 a kg at the markets in Kashmir, Rajasthan and Gujarat, the muskmelon earned Solanki over ₹20 lakh inspiring others who had been unable to profit from traditional crops. Solanki used innovative methods to cultivate muskmelon as he cut down his costs significantly by making use of alternate inputs such as water-soluble fertilisers. He also cut down on pesticides by using organic mixtures of gaumutra (cow urine), soured buttermilk

and neem leaves.

Technology helps

For better productivity, Solanki used drip-irrigation and mulching techniques, which reduced water wastage as well as brought down the labour costs. The biggest portion of the cost was seeds, which cost him ₹36,000, while water-soluble fertiliser came to ₹45,000 and mulching and drip together cost about ₹40,000. "Our costs further came down as we received State government subsidy of ₹22,000 for mulching," he added.

TN to give a ₹100-cr push to support collective farming

Small and marginal farmers in Tamil Nadu will benefit from a ₹ 100-crore collective farming initiative this year with the State government in the process of identifying villages to implement the programme. Farmers are being organised in

a three-tiered structure: Farmers Interest Groups (FIGs) of up to 20 farmers each; Farmers Producers Groups (FPGs) comprising five FIGs totalling 100 farmers; and Farmers Producers Organisations (FPOs) of 10 producers groups



each. The first two bring farmers together to achieve economies of scale in production with contiguous areas being formed as a single unit. The FPOs will play a marketing function.

According to a press note, last year over 10,000 FIGs were organised into 2,000 FPGs. Each of the producers' groups have been given an investment grant of ₹5 lakh to purchase farm equipment. Apart from using the equipment within the group, these can also be rented out to other farmers.

Purchasing power

Of the total ₹100 crore granted last year, over 8,800 equipment including three integrated harvesters, 747 tractors, 1,849 power tillers, 1,369 weeders, 783 rotavators and over 3,400 other farm machines and equipment were purchased benefiting 1.98 lakh small farmers, the note said.

The FPGs have also been organised into FPOs and these are

Centre targets a new high in food grains output this year

The Union government has set a foodgrain output target of 283.7 million tonnes (mt) during 2018-19, in the backdrop of forecasts of a favourable monsoon. The target is nearly 6 mt, 2%, more than the estimated production of 277.5 mt in the last crop year (July-June). The targets set for rice and wheat are 113 mt and 100 mt respectively, which are 2 mt and 3 mt more than the production in 2017-18 as per the second advance production estimates, said Agriculture Commissioner SK Malhotra, while addressing a national conference on agriculture for kharif campaign.

Oilseeds, coarse cereals

While the target for pulses is kept at a marginally higher level

TN may tap PPP or JV model for ₹400-cr agri supply chain project

As part of a ₹400-crore modern supply chain management project for fruits, vegetables and perishables, Tamil Nadu is exploring options of a public private partnership or a joint venture model, according to officials concerned.

The ₹398.75-crore project, spread across 10 districts, involves establishment of over 58 primary processing centres with cleaning and grading facilities.

Project funding

The project will be funded under the NABARD-Warehouse Infrastructure Fund which will provide 95 per cent of the cost. The balance funding will be from the State through the Agricultural Marketing Board. The biggest of the facilities is coming up at a cost of about ₹52 crore at Pochampalle including ₹39 crore for export-oriented processing of mangoes, according to officials.

now in the process of becoming registered companies. The FPOs are eligible for financial assistance of ₹20 lakh over a period of two years under the provisions of the Small Farmers Agri-business Consortium. The State government will also support these organisations access equity grant of ₹10 lakh available under the SFAC.

Agricultural marketing

In the current year, the official said the Tamil Nadu Agricultural Marketing and Agri Business wing hopes to register at least 50 FPOs as companies. As of now, 45 have already been registered with the Registrar of Companies to become Farmers Producers Companies. The Tamil Nadu Agricultural Marketing and Agri Business will support each company with ₹20 lakh under the National Agriculture Development Programme or the Rashtriya Krishi Vikas Yojana. The government has a contract farming policy that is in the final stages of formulation.

of 24 mt, which will still mark a new record, the government aims to increase the production of coarse cereals by more than 1.3 mt to 46.7 mt in the current year, he said. The Centre recently declared 2018-19 as the year of millets.

Cash crops - Cotton, after a dip in production last fiscal, is expected to pick up momentum. The government has set a target of 35.5 million bales (of 170 kg each) as against 34 million bales last year.

The production of sugarcane in 2018-19 is expected to be as high at 355 mt as that in the current year.

Roping in FPOs

The government is keen on including the private sector and Farmer Producer Organisations, groups of farmers brought together in company-style structure, to run the primary processing facilities in PPP model or in joint venture.

Processing centres

The facilities are coming up in major production centres including Dharmapuri, Krishnagiri, Ramanathanpuram, Coimbatore, Dindigul, Theni, Tuticorin, Tirunelveli and Tiruchi. The objective is to set up the primary processing centres close to major production centres where farmers can avail of the basic processing facilities such as cleaning, grading and sorting to get better value for their produce.



Flagship crop insurance scheme runs into rough weather

A well-conceived pro-farmer agricultural crop insurance scheme - the Pradhan Mantri Fasal Bima Yojana (PMFBY) - is faced with the prospect of coming a cropper. The reason: The failure of most states to make timely payments of their premium subsidy share and also conduct the requisite number of crop cutting experiments (CCE) for assessment of yield losses.

Under the PMFBY's operational guidelines, state governments are supposed to call bids for the selection of insurance companies in early February, well ahead of the new crop year. This is followed by the issuance of notifications incorporating all relevant details - the crops covered and companies operating in different areas, indemnity levels and average yields against which compensation is calculated, sum insured, actuarial premium rates and subsidy on this, etc - by March in respect of the kharif season and by September for rabi. The cut-off dates for receipt of premium from farmers, making them eligible for insurance, are July 31 (for kharif) and December 31 (rabi).

The weakest link in crop insurance

The states are also expected to release the first instalment of their premium subsidy contribution for kharif in August-September and the balance 50% by November-December, with the corresponding rabi season cut-offs being January-February and April-May respectively. Besides, they are required to carrying out CCEs - a minimum of four in every village/gram panchayat, 16 in every taluka/tehsil/block and 24 in every district - for estimation of yields. The CCE-based yield data is to be submitted to insurance companies within a

month after harvesting, which happens during October-December for the kharif and April-June for the rabi crop. The companies, in turn, are to process, approve and make payments of the final claims in three weeks from the receipt of the yield data.

"If the states provide their full share of premium subsidy along with yield data not later than January for kharif and July for rabi, farmers can receive their claim payments within reasonable time. Insurance companies will obviously not process claims unless they get their full premium payment and also the crop yield data for loss assessment," a top Union Agriculture Ministry official pointed out. Unfortunately, the above "seasonality discipline" is not being maintained by most states. Rajasthan, for instance, issued the notification of the PMFBY scheme for kharif 2017 only on July 22, when the bulk of sowing was already completed. Even for the rabi season, the notification came on November 3, when farmers would have finished planting their main mustard crop. This would automatically have deprived them from seeking protection against losses due to failed/prevented sowing.

"We are pushing the states to at least notify the scheme before April 15, to allow adequate time for the implementation agencies (insurance companies) and also for banks to debit the premiums and upload the details of the individual insured farmers," the official said. Even for the coming kharif 2018 season, the states - barring a few such as Maharashtra, Karnataka and Odisha - are yet to issue the necessary notifications.

SEASON-WISE, YEAR-WISE PERFORMANCE OF CROP INSURANCE SCHEMES (in ₹ crore)

	2016-17			2017-18		
	KHARIF	RABI	TOTAL	KHARIF	RABI	TOTAL
Gross Premium	16349.32	5830.5	22179.82	19124.67	5328.89	24453.56
■ Farmer's share	2927.17	1456.14	4383.31	2924.47	1191.06	4115.53
■ Centre's subsidy	6624.52	2179.38	8803.9	8041.47	2046.67	10088.14
■ States' share	6797.63	2194.98	8992.61	8158.73	2091.16	10249.89
Estimated Claims	-	-	15624.38	13655.03	-	-
Approved Claims	9983.55	4449.86	14433.41	1759.16	-	-
Paid Claims	-	-	12959.1	401.83	-	-
Farmers covered (lakh)	405.76	169.12	574.88	327.8	152.04	479.12
Farmers benefited (Lakh)	91.17	21.06	112.23	-	-	-
Area Insured (Lakh ha)	379.07	192.47	571.54	332.17	143.08	475.25

Source: Ministry of Agriculture and Farmers' Welfare.

The ultimate sufferer from this is the farmer. In 2016-17, gross premium collections of insurance companies - both charged to farmers as well as subsidy received from the Centre and states — amounted to ₹ 22,180 crore. As against this, payment of claims totalled just ₹ 12,959 crore. While

that can probably be attributed to 2016 being a normal monsoon year and no reports of widespread crop damage or losses, it is striking, nevertheless, that the claims paid out are lower than what has been estimated by state governments or even approved by insurance companies. And these, for



crops that were harvested or suffered yield losses at least a year ago.

The same story has been repeated in 2017-18, where insurance companies have collected over ₹ 24,450 crore worth of premium receipts even after the delays by states in forking out their subsidy contribution. But the fact that payouts to farmers have so far totalled just ₹ 402 crore - when more than four months have passed since the kharif crop was harvested - points to undue delays in the furnishing of yield data by states. Further, the CCE-based yields are themselves prone to questioning by insurance companies, which is reflected in the gap between the claims approved by them and the losses estimated by the states (see accompanying table). "The weakest link in PMFBY is the CCE. Crop loss assessment has to not only be timely, but also reasonably accurate in order to inspire confidence among insurance companies," admitted the earlier-quoted official.

The result: A scheme that looks good on paper is now virtually flattering to deceive. For farmers, a uniform 2 per cent premium rate on the sum insured for all kharif season foodgrains and oilseeds, while 1.5% for rabi crops and 5 per cent for annual and horticultural crops, is the lowest they can hope for. The sum insured being equal to the "scale of finance" (the loan limit fixed by banks, covering the underlying crop's estimated production costs) and coverage extending to losses at every stage (from sowing to post-harvest) makes PMFBY all the more attractive to the farmer.

In 2016-17, a total payout of ₹ 12,959.10 crore to 1.12 crore farmers was made under PMFBY. That works out to ₹ 11,571 per farmer. But more than the amount, it is the timeliness of payment that matters. If the farmer has less or no crop to sell because of rainfall failure, and there is inordinate delay in insurance claim settlement, he is invariably forced to go to the moneylender.

This situation can, perhaps, be significantly addressed if PMFBY is made a fully Centrally-funded scheme. Currently, states have to pay 50% of the premium subsidy and also do all the CCE and other groundwork - for a scheme bearing the prime minister's name. Once the Centre starts bearing the entire subsidy cost, the insurance companies can no longer complain about not getting their premium monies upfront and in time. The states, too, would be forced to fall in line, if the release of premium subsidy is linked to their adhering to "seasonality discipline" that is lacking now.

Complete central funding might, of course, go against the grain of competitive cooperative federalism advocated by the Modi government. But if the Centre can pay 100 per cent subsidy on fertilisers, what stops it from taking complete ownership of a scheme more deserving of support than even interest subvention on crop loans?

The weakest link in crop insurance

Crop cutting experiments (CCE) have traditionally been conducted to obtain reliable average yield rates for

estimation of agricultural production. These are mostly done by district/subdivision-level officials from the revenue, economics and statistics or agriculture departments of the concerned state governments. The field where a CCE takes place is supposed to be selected based on scientific sampling. The crop in a well-marked plot of this field is, then, harvested, threshed, winnowed and weighed. If the produce contains moisture, it has to be dried first before weighing.

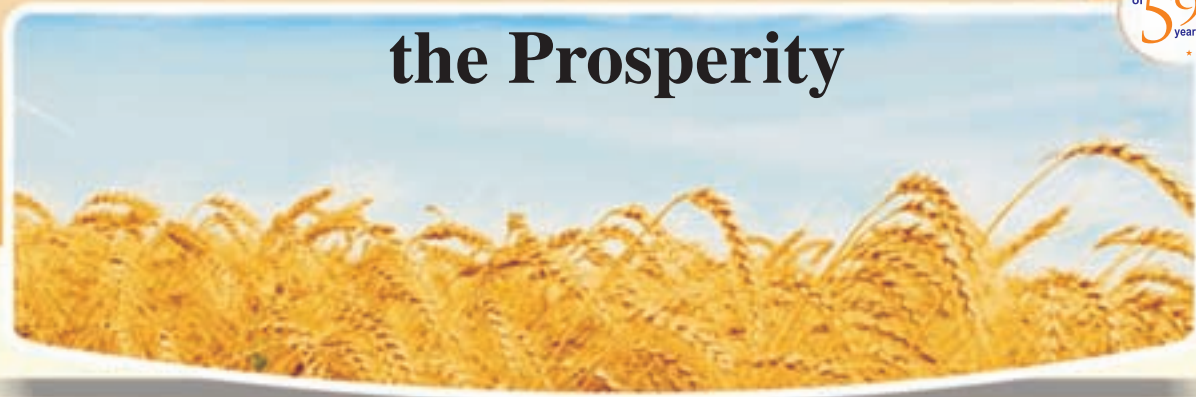
The above system, has been a tried-and-tested one and seen as having worked reasonably for arriving at agricultural production estimates. But when used for payment of crop insurance claims, it is hardly the best for two reasons. The first is for the simple fact that states would "want" yields to be higher in the former case (to paint a rosy picture of production), while lower in the latter (to enable farmers get the maximum insurance payout).

The second reason for non-suitability is the sheer number of CCEs required in a crop insurance scheme, whose aim is not to arrive at an average yield figure, but to provide risk cover and make individual loss assessment in respect of crores of farmers. Under the Pradhan Mantri Fasal Bima Yojana (PMFBY), states are supposed to carry out at least four CCEs in every village panchayat for each crop and submit the yield data to insurance companies within one month of harvest. Given that there are about 2.5 lakh gram panchayats in India, it would mean 10 lakh CCEs in a single season - and many more if more than one crop is grown in the same village or even by the same farmer.

"We need to reduce the number of CCEs and, at the same time, ensure sufficient data integrity to satisfy the insurance company," an Agriculture Ministry official noted. According to him, it is possible to use satellite-based remote sensing technology for more intelligent planning and "smart sampling" of fields where CCEs need to be done. "You can select crop areas based on NDVI (normalised difference vegetation index) values captured by satellite remote sensors. There can be more CCEs in places with low to moderate NDVI values and less in those where the more green and dense vegetation (hence better crop health status) is reflected in higher values. Through this technology-enabled smart sampling, the number of CCEs can be brought down by 30-40%," he said.

As far as yield estimates go, there aren't too many technological alternatives to CCEs right now. Instead, the focus has to be on fewer but high-quality CCEs that the insurance companies can co-observe with state government officials. The yield estimates could also be confirmed with satellite imagery, soil moisture and rainfall data. The capturing and transmission of CCE survey data using mobile phones with time and date stamping - the Agriculture Ministry already has an [Android](#)-based app for this purpose - can further support timely processing and payment of claims.

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