# Agriculture: Long way to go Through Agritech

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## Abstract

The Agriculture sector is one of the largest employers in India with more than 265 millions engaged in farming. More than 70% of rural India works in farms and depends on agriculture and allied sectors for livelihood. However farm incomes have seen a steady decline in recent years with low productivity being the main contributing factor. Low productivity leads to fall in farm incomes, hamper long time food security and affects India's potential to become a global producer and exporter of food, feed and fibre.

Approximately, 60% of our agriculture still remains rain dependent. Ground water is depleting at an alarming rate. The frequency and severity of natural disaster is increasing on account of climatic changes. Costs of cultivation have been rising at a faster pace than the prices of agriculture produce. The low of diminishing return have already set in squeezing farmer's profit progressively. Fragmentation of land holdings has rendered about 80% of them as economically unviable. Mono cropping patterns are causing severe imbalances in the soils and endangering biodiversity.

**Keywords**: Agtitech, productivity, livelihood, food security, expoter.

## Introduction

Indian agriculture needs technology adoption more than any other country. Despite being the major producer of agricultural crops – largest producer of milk, jute and pulses and second largest producer of rice, wheat, sugarcare, cotton, fruits and vegetables – India is increasingly finding it difficult to make farming a sustainable and profitable economic activity for every stakeholder. The soil quality in large tracts of land is declining, water stress is worsening and climate change, with associated flash flood and droughts, has turned farming in to a high – risk sector.

With 70% of India's rural population depending on farming for sustenance, mostly small and marginal farmers, there is an urgent need to reduce production costs and increase farms income. The only solution is tech interventions that being in-efficiencies at all levels of agriculture ecosystem – from sowing to harvesting,

from marketing to value addition  Technology is being used to minimize agriculture losses and generate revenues.

India with its 15 agro-climatic zones and varying cultivation practices can benefit from advances in agritech such a digital farming. Farmers can benefit from faster, more accurate method of monitoring plants and take better – informed decision. With solution like precession farming, they can ensure that each section of the farm gets the exact crop protection it needs at the right time. This technology saves farmer's resources and ensures healthy plant growth leading to economic and environmental benefits.

The Indian Council of Agriculture Research (ICAR's) 2005 vision Documents too, emphasis on use of technology, including robotics and automation, energy efficient and environment – friendly devices for farm operations; precision farming using it, Geographic Information System, GPS and remote sensing; climate smart resource management technologies; and smart sensors and new delivery systems to help combat viruses and pathogens. According to the documents, high performance computing could be used to analyse very large data sets particularly these related to agriculture genomics, proteomics, geo-informatics and climate change.

The vision document goes a step further. It also articulates the need to have a regulatory process of new technologies so that formers have access to latest technology advancements. It also suggests that a mix of technologies be used to admire higher productivity.
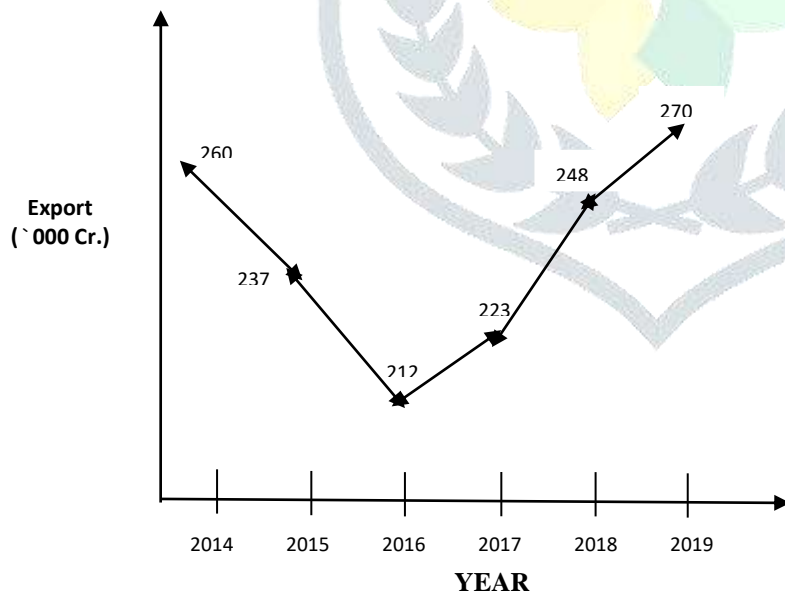
*Present Indian Agriculture Scenario at a glance :*

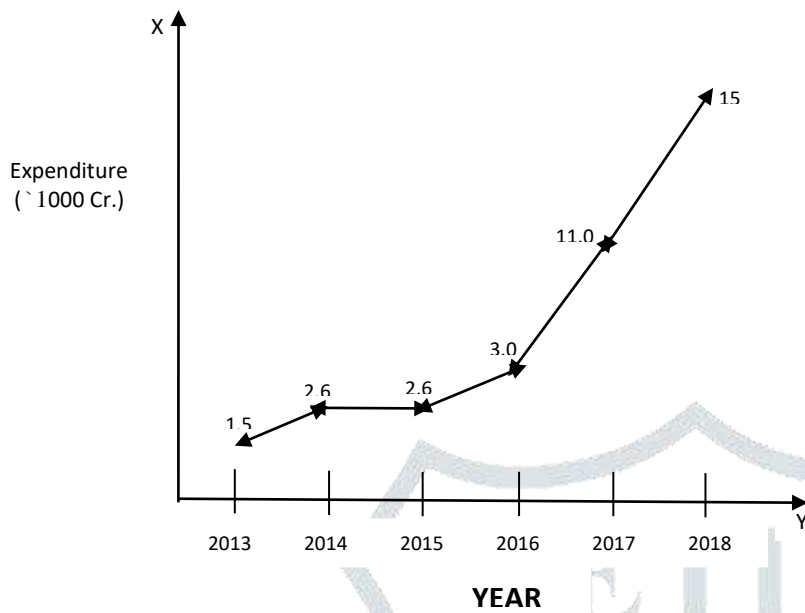1. *Annual Growth (%) in the financial year 2009 to 2019 yearwise.*
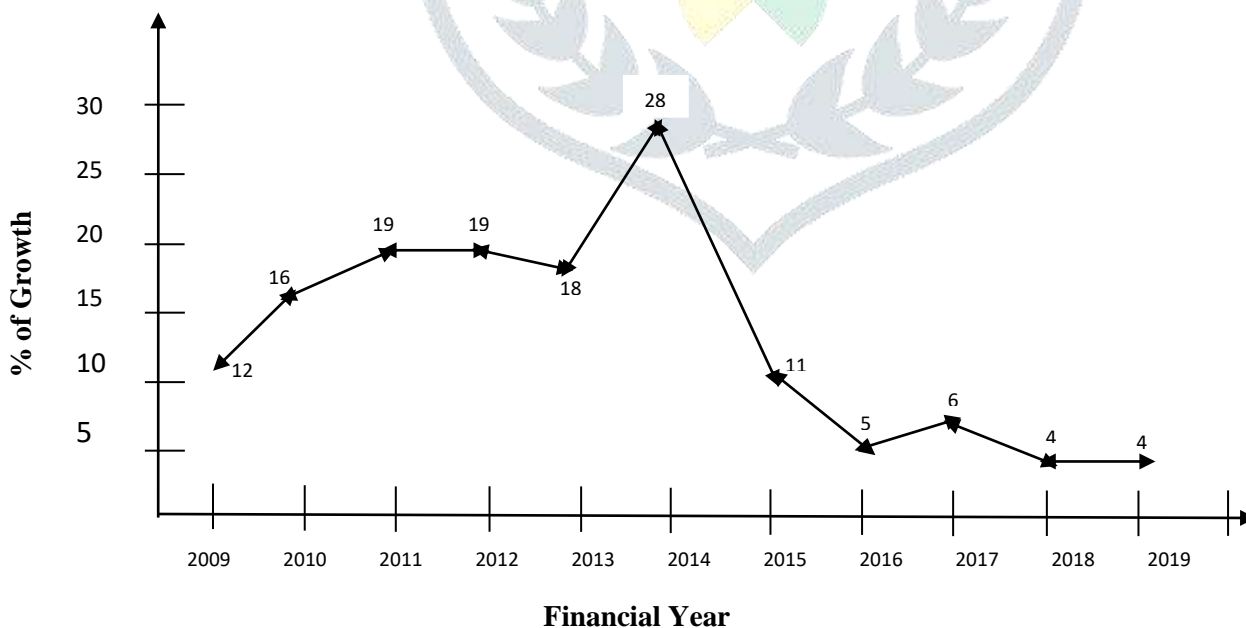
## 2. *Farmer's Wage (Rs./Per day)*



**Financial Year**
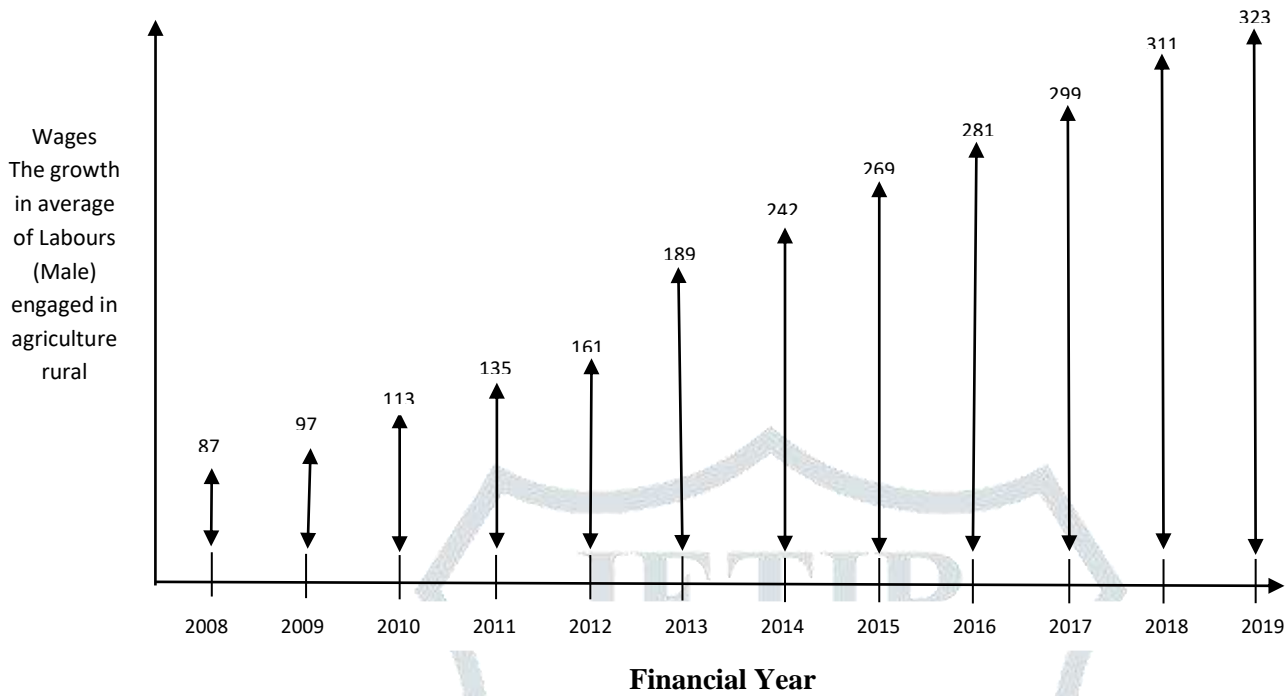
## 3. *Export of Agri-related products & Services .*



**YEAR**

**4.Funds released in five year (2013 to 2018) for Crop Insurance :**



- The Budget allocation for 2019-20 is ` 1.4 lakh crore  by the ministry of Agriculture which is 80% higher than the revised estimate of 2018-2019.

- $248 million dollar funding received by India's agri-tech start-ups in 2019 (till June) whereas in 2018 only $ 73 million revised.

*Food grain Break-up*

5. *Total 284.95 Million Toners IN 2018-2019*
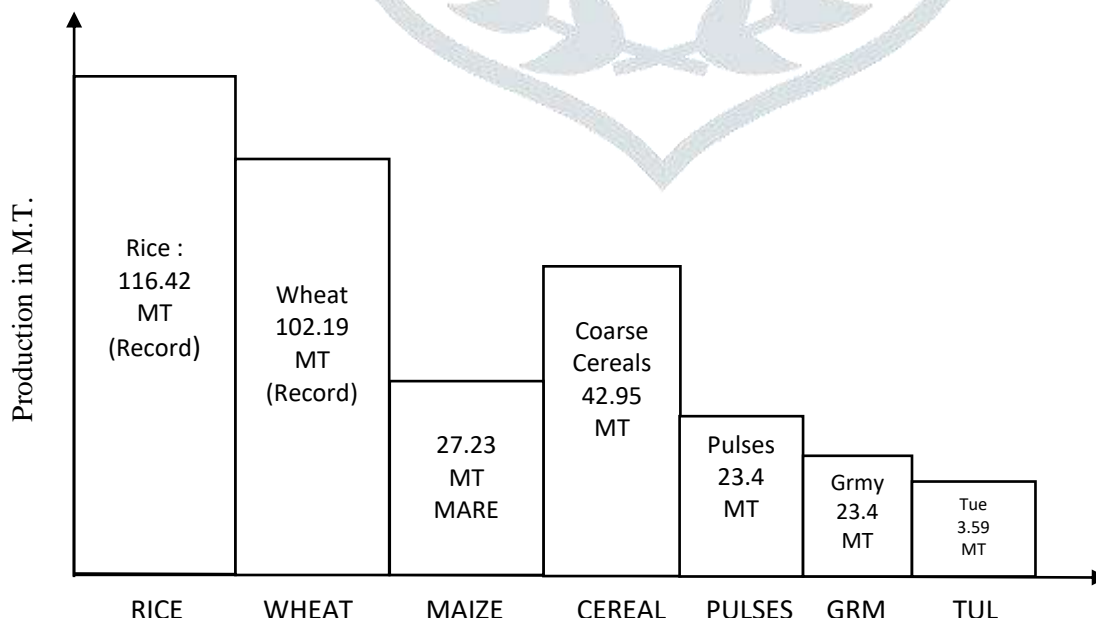


**Source :** Ministry of Agriculture & Farmer Welfare.

## Agriculture challenges :

1.  Inadequate Resources :
    -   Human
    -   Physical and
    -   Financial
2.  Poor linkages and convergence in research, extortion and farmer market and public – private initiating.
3.  Lade of focus on value
4.  Poor infrastructure in mobility, connectivity, information and communication technology.

## Tech Solutions :

1.  High yielding Seed Technologies
2.  Resource – Conserving, eliminate resilient Tech.
3.  Mechanisation Technologies
4.  Post harvest technologies
5.  Next Gen Tech such as biotech, nanotech, GIS and Sensor technology, IT, Internet, drones, block chain.

One of the big challenge in Agtech (Agriculture Technology) adoption is cost. The techniques should be such to make it more affordable and bringing down the cost of agtech solutions to make them relevant for small & medium farmers.

Now 'agriculture extension' is redefined as "an empowering system of sharing information, knowledge, technology, skills, risk and farm management practices, across agriculture sub-sectors and along all aspects of agriculture supply chain, so as to enable the farmers to realise higher net income from their enterprises on sustainable basis.

One technology that has immerse untapped potential to enhance India's crop productivity is hybridisation. Hybride seeds offer various benefits such as stronger biotic stress tolerance and protection against devastation pests and diseases, in-built abiotic stress tolerance and increased resilience towards adverse growing conditions such as temporary drought, moderate salinity and flash floods. By growing hybride rice, Indian farmers have achieved additional yield advantage of one tonne/hectare and additional income of Rs. 6,000-10,000 per acre.

### Public & Private Participation in Agritech :

Agriculture is the primary source of livelihood for asent 60% of India's population. Gross value added by agriculture, forestry & fishing is estimated at Rs.18.53 lakh crore. Given its importance, the focus of

Government as well as the private sector is an increasing funding, spreading insurance coverage and using tech-solution.

At nation, Government and organisation at all levels – private and public, natural as well as local – are making to build innovative solutions to solve the problem of agriculture using technology. A lot of activitiy is based in India and save farmers albeit in small numbers, have begun to adopt agritech practices.

**Government Initiatives :**

The Government has set a goal of doubling farmer income by 2022. For this, the Govt. has focused on science and technology interventions in agriculture. Use of big Data Internet of Things, Artificial Intelligence and Blockchain in developing value chains and use of robot and sensors figure significantly, alongwith the need for better research in crop science and generally modified technologies in to do list.

Narendra Singh Tomar Union Minister of Agriculture and former's welfare, said in Lok Sabha that the Government has decided to carry out pilot studies to optimize crop cutting experiments (CCEs) in varius states under the farm insurance scheme Prime Minister Fasal Bhima Yojna (PMFBY). "The studies used various technologies, including satellite data, artificial intelligence, modelling tools etc to reduce the number of CCEs required for insurance unit level for Yield estimation. The Govt. issuing satellite imagery to assess crop area, crop condition and crop yield under various programmes." Satellite data is also being used for drought assessment, to assess the potential area for growing pulses and horticultural crops.

The Govt. can do a lot more to help advance technology interventions in agriculture. Govt. can open up lot of date-base. The Indian Meteorological Department can provide weather data. The Indian Space Research Organisation has satellite data. They should open it. It can help private players, especially Start- ups, assist the Govt. in augmenting its activities to support farmers.

Agriculture technology may prove to be boon for not only increasing farmer's income but also curtailing wasteful expenses. Instead of the traditional way of assessing crop loss through manual crop cutting experience (CCE) that are prone to error, the Government has decided to migrate to a technology based assessment model where Synthetic yield analysis will be carried out using a combination of weather analysis, limited CCE and Satellite data.

The Govt. has planned to totally migrate to technology based assessment of paddy & wheat within the next three (crops) seasons and all corps very soon. The Government is also planning to link insurance policies to land records that are being digitised by various States. The Govt. expects to have a data base of land records of all farms in India in near few year.

Once that happens, the possibility of multiple and bogus claim will be eliminated as the aadhar number will be attached with land records & that will land to reduce the wastage of Govt. fund. Finally we can say that the technology can help to avail the genuine claim crop losses through the crop insurance schemes.

## PRIVATE PARTICIPATION

With increased focus on agriculture from various sides, Private Participators are working to build innovative solutions to solve the problems of agriculture using technology.

**IBM Research** is pursuing a digital farming initiative. One of the objective of digital farming or precision agriculture is to raise farm productivity by increasing the visibility of agronomic condition such as soil moisture, Crop health and weather and leveraging digitisation, mobile, IOT and Cognitive technologies. The team is working on developing a suite of solutions (Pest risk prediction, Plant deserve/Pest detection, Crop identification, Yield Prediction, Precision, irrigation advisory services etc) leveraging the company's big data platform.

**Mahindra & Mahindra**, the world's largest tractor manufacturer by volumes is working on digital and data driver technology to back productivity, crop care and yield in a more definitive way. Over the past two years, the company has entered into five strategie partnership and has made investment in some of them, including Start-pus, to develop data and digital driver capabilities. The company has also tied up with foreign firms for capabilities in machine learning, bid data analytics and computer vision to help growers make better informed decisions about Crop management so that productivity can be increased.

**The 'better life Farming'** alliance is a long time partnership between Bayer, IFC (International Finance Corporation), Netafim, Yara, De Heat and Big Basket. Better life Farming is its agri-entrepreneurship model, which supports Smallholders to ren 'Better life farming' Centres where they enable transfer of technology on seeds, Crop protection, Crop nutrition, drip irrigation, Soil management, financial literacy etc to after small holder farmers. They will also deliver services such as market, linkage, access to input and crop advisory.

**Indore-based agritech Stent-up Gramophone** has given focus on crop advisory and supply of quality inputs. Company helps farmers to inform productivity by working with them and supplying inputs. It has built a knowledge repository around agronomy and automated that so farmer get a personalised advisory at their plot level. Doorstep delivery of agri-input (Seeds, Pesticides, Fertilizers, agri landware). Gramophone also helps farmers in identifying the problems, Suggests the most suitable solution a product and supply it from genuine sources. It works anywhere in the country are any Crop and have parameters such as the soil it grows as, the region where it grows, the weather conditions needed at different stages etc. These relevant farm specific information around gramophone's service is helping farmers to increase productivity by 15-30% and

reduce costs. Gramophone handle & about 40 Crops such as Soyabean, Cotton, Chilly vegetable and wheat etc.

**Fasal**, a Bengaluru based start-up provides Crop advisory services, but mostly to horticulture farmers. Fasal's advisory is mostly around the microclimate within the farm whereas the others advisory jemmies, especially related to wheather, were mostly generic in nature. Fasal provides all farm level data in terms of temperature, pressure and moisture, above the soil, below the soil, by using or sensor at the farm level. Fasal also provides information through SMS or app in farmer's languages at farm level, Crop specific, irrigation recommendation, pest recommendation, disease recommendation in regular basis as per their requirement.

**For Mart** a lucknow based Start-up provide virtual credit card using which the farmers can buy different input based on their credit limit from offline retail channel partners. The company has made partner with financial institutions an one end & on the other side underwrites customers. The Company does the match – marking and our service providers, the retailers, become the Pickup points for their services. It also provide end to end services in term of customer on – boarding, including KYC, loan disbursement, tracking and risk irrigation in one platform through their own technology. Repayment is not monthly but at the end of the crop session.

**Food Chain Partnership of BAYER** launched in India in 2007. Food chain partnership is an innovative global Business Model developed to serve the needs of the food industry. This initiative focuses on Collaboration between farmers, processors, traders and retailers to meet consumer demand for sustainable production of healthy, high quality and offarable food. Food chain partnership covering 16 crops and benefiting our 89,000 farmers.

There are dozens of other firms in this space but given the low scale at which these companies operate, there is enough space for hundreds of such entrepreneurs to provide tech based solution to each of India farmer's pre & post harvesting problems. They, Private Participation and Government should work together for sustainable agriculture.

**Conclusion :**

Indian agriculture needs diversed technologies. Every attempt to make agriculture profitable and sustainable - be it at the stage of cultivation, harvesting, marketing and consumption – would be a case to be benefit from technological intervention.

Bill Gate has rightly said – " Success, however, with depend not only on technology, but also its offer density."

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