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Indian Agricultural Sector Present and Post Pandemic Condition

R.S. Upendra[1], Mohammed Riyaz Ahmed[1], T. Nitesh Kumar[2], S.R. Prithviraj[2], A. Shahid Khan[2]

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ABSTRACT

The COVID-19 influenced global pandemic severely affected the market of small industries and had a deep impact on the agri economic of the farmer community across the globe. The main objective of this article is to emphasize on the influence of global pandemic with agriculture and food sector. The lockdown made ambivalent in agriculture, the point of concern is that, at the first phase of lockdown in India, *Rabi* crops are at harvest stage, due to the lockdown the breakdown of supply chain has been interrupted and left a noticeable impact on the marketability of agriculture crops even though it has registered moderate growth in terms of yield. At present globally mankind is experiencing the waves of pandemic and it caused significant loss to the yield of crops. If the situation continuous, the world is going to experience the hunger deaths. To overcome the issue discussed, agriculture sector needs to adapt new technologies, right from the cultivation, harvest and supply chain with marketing to bring the new normal life back to mankind. This is the right time to have transition from conventional agri practices to the technology invented smart agriculture. Indian agriculture sector should adapt and the former community need to be educated in applying ICT based smart agriculture practices such as utilization of automated machinery, AI (artificial intelligence) enabled cultivation methods, Internet of Things (IoT) and Wireless Sensor Networks based monitoring and maintenance of the agriculture practice. The application ICTs methods in agriculture practices facilitate to choose good quality seeds, optimum quantity of manures required for the enhanced crop yield and direct monetary of the agriculture firm in order to show resilience to the global pandemic impact on agriculture sector. In the present review authors emphasised on various smart agriculture methods and their importance in promoting the agriculture practice as profitable venture and also how this ICT methods helps the sector to overcome the impact of global pandemic and to bring back the new normal life.

Key words: Agroeconomics, Crop yield, Global pandemic, ICT methods, New normal life.

When the pandemic catastrophe started, most of the sectors within the world has slumped due to the coronavirus attack. within the world, every mortal creature needs food, means directly or indirectly all are dependent on agriculture (Ibn-Mohammed *et al*., 2020). Because of lockdown due to the COVID-19 pandemic, in every country mainly farmer community affected at large, wherein crops are at the stage of harvest (Narayan and Saha, 2020; Timilsina *et al*., 2020; Laborde *et al*., 2020). Owing to the absence of workers/ laborers and logistics the farmers faced huge losses as the harvested crops failed to reach the market. Globally there are over 570 million farms and farmlands are currently under cultivation and are principally managed by family people accounting for more than 75%. According to the planet bank survey more than 33% of world gross domestic product (GDP) is from agriculture practice (Fig 1).

The brookings institute anticipated that the ongoing pandemic leads to a global loss of between 2.4-9.0 trillion dollars in GDP 2020 solely (Liew *et al*., 2021). The food agriculture organization (FAO) estimates that, 60% of the world population depends on agriculture fortheir primary source of income. Harvesting and processing foods are the two important issues facing domestic challenges secondary to global COVID-19 (Arouna *et al*., 2020). The processes of harvesting crops and successively packing them for shipment and processing is under extensive stress domestically. Why agriculture is very important nowadays, 820 million people face chronic hunger and 113-million face acute severe insecurity. Thus, disturbance in food access owing to pandemic affects these groups immediately and severely. With 43 per cent of population engaged to contribute 16.5 per cent of gross value added (GVA), the food and agriculture sector has immense potential to wean India out (Thow *et al*., 2016). In step with the International Labour Organization (ILO) provides incomes to over one billion people worldwide and it remains the backbone of the many low-income countries, contributing up to the two third of GDP globally and accounts for 60.4 per cent of employment in those countries (Adhikari, 2021; Nguimkeu and Okou, 2019).

[1]Department of Bioelectronics Engineering, School of Multidisciplinary Studies, REVA University, Bengaluru-560 064, Karnataka, India.
[2]Department of Electronics and Communication Engineering, School of Electronics and Communication Engineering, REVA University, Bengaluru-560 064, Karnataka, India.

Corresponding Author: R.S. Upendra, Department of Bioelectronics Engineering, School of Multidisciplinary Studies, REVA University, Bengaluru-560 064, Karnataka, India.
Email: upendra.rs@reva.edu.in

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ILO is the substantial source of employment for girls, account for 41.9% of the agriculture workforce within the developing world (Benanav, 2019). In every nation, the agricultural sector gains a modest place as an agent of economic development. Due to high dependency on natural resources to get low-value products and susceptibility to economic inconstancies and low price, income elasticity is of great demand. For strengthening agricultural productivity and help resilient, the globe bank board approved the US $150 for climate-smart and competitive food system maintenance (World Bank, 2018).

India is the second largest agricultural land in the world, it comprises 159.7 million hectaresas agriculture land (Fig 2). At present scenario, every nation within the world needs a valuable and productive embracing quick, smart, and innovative approachand is critical to boost agriculture yield and to enhance bridging between health shock and economic shock. The world must adopt new methods to beat the issues created by the pandemic to agriculture and food sector. The prioritization and adapting to innovation will act and the foremost drivers of productivity growth and improved sustainability (Roco, 2020). The available natural resources are adequate, appropriate and available resources should flow within the right direction. The situation within the globe cannot be overcome with the involvement of a single departmentbut it requires a multidisciplinary team of public health specialists, social scientists, researchers, together with political and social leaderships. We know that farmers are the backbone of each country so prevention is often better than cure, therefore the government and agricultural research institutions should train the farmers about innovative farming methods and attentive to the precautions they require even after covid19 (Lamine, 2020).

Background

Agriculture is the art of cultivating crops in traditional way applying conventional practices. Agriculture crops varieties are divided into 3 main groups in the country India based on the season, *i.e* 1) *Kharif* crops 2) *Rabi* crops and 3) Zaid crops (Sharma and Jain, 2014).

Kharif crops

In *Kharif* season crops are grown when the rain begins *i.e.* in the month of June-July, these crops are also known as monsoon crops. It requires a more quantities of water and hot weather climatic condition to grow. These crops are harvested in the month of September-October (Gupta *et al.*, 2018). Some of the commercial crops predominantly grown in season are rice, jowar, maize, cotton, groundnut, jute, sugar cane, turmeric and pulses (Fig 3).

Rabi crops

These are the crops grown in the winter season *i.e.* in the month of October-November, need warm climate for seed germination and maturation followed by clod climatic conditions to grow. The crops grown in this season were harvested in the month of April-May (Reddy *et al.*, 2011). Some of the commercial crops grown in this season are wheat, sunflower, sesame, mustard, tomato, onion, oilseeds (Fig 4).

Zaid crops

These crops have characteristics that they mature early hence, these crops are grown between March-June nothing but between *Rabi* and *Kharif* seasons. The important commercial crops are cucumber, bitter gourd, pumpkin,

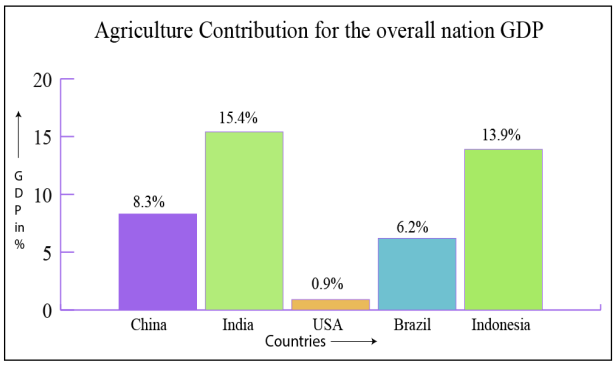


Fig 1: Agriculture contribution for the overall nation GDP.

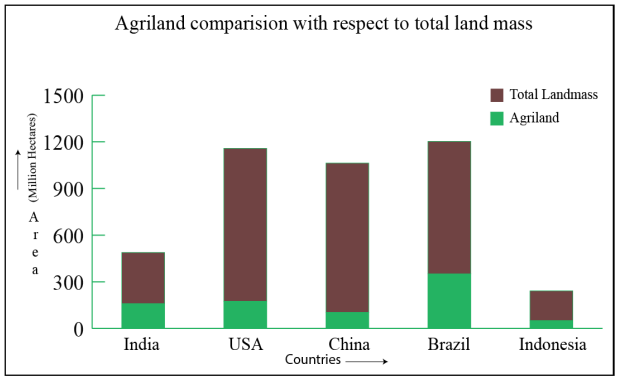


Fig 2: Agri land comparison with respect to total land mass.

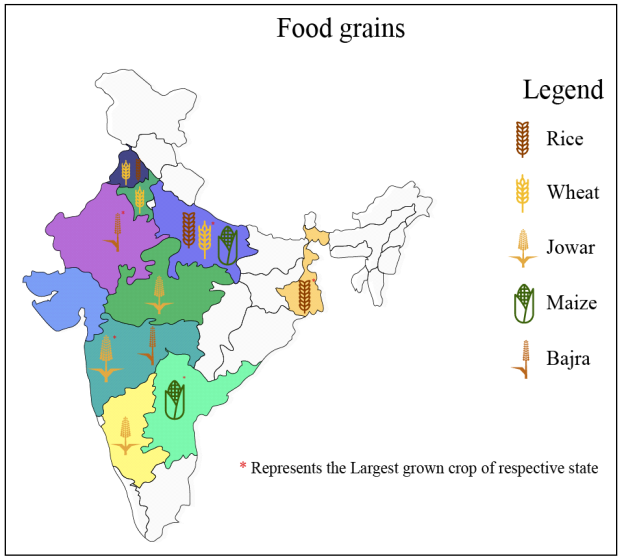


Fig 3: Food grains grown in India.

watermelon, muskmelon, *etc.* (Dixit and Elamathi, 2007). Coffee (Fig 5), Global pandemic started during the *Rabi* Season where crops are at harvest stage. The pandemic affected all the methods which connect the production, yield to the final customer. However it looks like, the strike has been done by the virus and many of the people suffered due to the COVID-19 crisis and also it shows the major impact on supply and demand for food which led to food security at risk.

Impact on agriculture yield, supply chain management and the farmer community

The pandemic made farmers go in huge loss and because of the no help from the government or any organization, especially southern part of the state of Karnataka, India farmers committed suicide. This happened because farmers

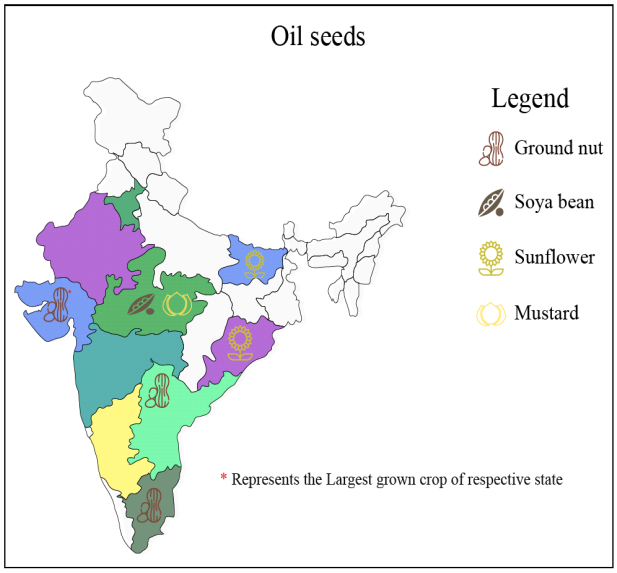


Fig 4: Oil seeds grown in India.

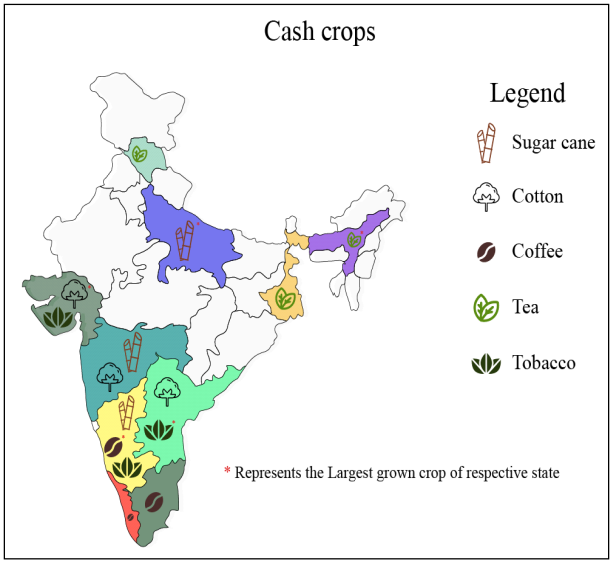


Fig 5: Cash crops grown in India.

unable to sell their harvested crops due to the COVID-19 crisis. Similar kind of deaths have been noticed across the globe mainly due to the failure of supply chain and loss of the marketability of harvested crops. Agriculture is the only sector in the world that helps to grow the economy of most of the countries of the globe. Any sector falls down countries economy, but agriculture has its endowment to create its revenue. During COVID-19 crisis, the agriculture products are at the greater necessities for everyone but there was no proper logistics or transportation and these conditions thrown challenges on the world farmer community and they deliberately suffered with huge losses. To feed the present population in the world crop yield must be increased, hence the agriculture field needs to adapt newer techniques and innovative approaches. Why agriculture is permitted to only old people the young and talented people can bring innovations in agriculture and start working. According to the Committee on World Food Security, definition of farmers is to feed the people in the world, but it is not helping to tackle the hurdles of feeding nine billion people by the year 2050. Therefore, Committee on World Food Security has given slogan to motivate the practice of agriculture in young generation saying, “Let’s make farming famous” (Sahoo *et al*., 2020).

Due to the outbreak of COVID-19 the transportation facility has been stopped and farmers struggled to sell their products in the market. This led to the wastage of the yearly crop yield and forced the farmers to commit suicide. Currently, the supply chain management appears and now it is playing an important role in communication between the customer and the farmers. In India *Rabi* season started during COVID-19 pandemic the crops like wheat, gram, lentil, mustard, *etc*. (including paddy in irrigated tracts) are at the harvestable phase or almost reaching maturity. This is the period were farmers reach market and sell their products, because of severe interruption in the supplyof fruits, vegetables, fish, dairy products *etc*. farmers lost their business and hence the profit. The migration of workers created panic buttons, as they are crucial for both harvesting processes and post-harvest handling of produce in storage and marketing centres. The loss is because of improper supply chain management, in case if it is properly managed the farmers product could be sold and suicides can be avoided. The government has taken an initiative for proper supply chain management *i.e.* Nation Agriculture Market (e-NAM) launched by Shri Narendra Singh Tomar, Union Minister of Agriculture and Farmers welfare, main moto of this initiation is to strengthens the agriculture market by reducing the need for farmers to physically access the wholesale mandis for selling harvested produce (Shruthi *et al*., 2018).

Literature survey

According to the International Labour Organization (ILO), the COVID crisis has influenced logistics and transportation for the supply of products particularly cross-border and local restrictions and labour issues lead to disruptions in the food transport. Restricting the farmers to go and sell to the market

resulted in food waste, also farmers relays on labourers, due to the shortage of them the crops which are at harvest stagehave been not harvested. To address the issue ILO formed a framework based on COVID-19 situation, which includes stimulating the employment and economy, incomes and supporting enterprise's jobs, protecting the workers from the workspace, relying on social dialogue for solutions. ILO also mentioned about the measures to tackle the COVID-19 *i.e* providing and ensuring income security, ensuring the security and health of labourers and ensuring adequate conditions Finally ILO suggested that the government of the respective countries need take up the issue and financial support should be given to farmers (Kivimäki *et al*., 2020).

Fuchs *et al.,* (2021) wrote an article in European news feed called Euracity, stating that COVID-19 catastrophe could kick-off the digital uprising in agriculture. Nowadays digital farming is set to flourishing in the aftermath of the COVID-19 crisis, given its capacity to helping the agriculture sector and to improve its sustainability and recover from the outbreak's impact. According to the survey, fast and reliable agriculture is possible through only digitalization and is the best practice which holds the prospective to struggle many of the issues that have arose during the crisis. Finally, the author concluded saying, it is the situation where pandemic made farmers be connected and able to communicate from distant locations, emphasizing that the digitalisation predominantly imported to encourage the next generation of farmers to take up the baton (Fuchs *et al*., 2021).

Poudel *et al*., (2020) described the impact on food and agriculture at the global level due to COVID-19. The pandemic has affected all the process which connects farm production to final consumers and farmer is suffering a lot due to global trade disturbance, farmers unable to get the agriculture inputs like seeds, fertilizers, and pesticides. Study concluded by saying that the supply chain has been hit hardest by COVID-19 which is causing food security of the most vulnerable segment of the population at risk and suggested that the government should impose the measures to control the COVID crisis without distressing the food supply chain and considering the food security of their resident (Poudel *et al*., 2020).

According to a research study conducted by Siche, (2020), there are two significant impacts on agriculture due to COVID-19 is, supply and demand of food. The author briefs it by saying the supply of food is a major problem during this crisis and another important concern during this pandemic is the demand for food that implies the enthusiasm and ability of consumers to pay for particular goods or services. The Author suggested measures that should focus on keeping the global food chain active and mitigating the impacts of the pandemic across the food systems (Siche, 2020).

The American Farm Bureau Federation published an article on problems faced in agriculture sector during COVID-19 and the study explained why now agriculture made a more impact during this pandemic. Most people are focused on businesses such as restaurants or airlines, which certainly have experienced a sharp and sudden decrease but also agriculture faced same crisis. Study emphasised on why agriculture should be given importance because most of hospitality and travel industries were doing well before the virus crisis. However, farmers were facing problems before the crisis also in terms of economy for several years. Now everyone focused on agriculture because now demand has increased but farmers were under loss (Kolodinsky *et al*., 2020).

Ramakumar, (2020) explains about how to pull up the agriculture during the COVID-19 crisis. The problems, which are faced in agriculture such as farm economy and rural communities will not fix themselves. Therefore, to emerge from the COVID-19 climate and economic emergencies and to reconstruct for the future, existing policy framework should need a new design and it should focus on thriving rural communities, more farmers on the land and ecological flexibility (Ramakumar, 2020).

A group of researchers describes the situation of the current scenario and said that, already agriculture is revolving under an unprecedented confluence of pressure; the farming economy is now struggling to retain its head above water. Due to deficiency of transportation and logistics facilitates, the product relies to lie in the field thwarted farmer and has no alternative other than nurturing the fresh produce to the cattle, to tackle the issue author suggested that railways should plays an important turnkey role in transporting the agriculture inputs- including seeds. There are some negative impacts on agriculture due to COVID-19 known to be market stability, agricultural production, and food supply. Authors urges that people and media should come together in order to appreciate the farmers, who ate kept their life under risk to ensure our food reservoirs in a way similar to doctors and nurses (Singh *et al*., 2020).

Asper the words of NABARD Chair Professor R. Ramkumar in the period of lockdownall economic activities are shut down, in turn, the production and supply of goods and services are disrupted. During this period goods and services are supplied with inadequate amounts to meet existing demand. Author also emphasised that, because of lockdown people do not venture out to purchase goods and services, the condition results in reduced consumption hence the overall demand falls. The global crisis in the economy principally instigated by either demand slowdowns or supply shocks or financial crises. However, this pandemic is bizarre that both demand and supply have fallen. This is the reason why the agricultural economy has fallen. Ramkumar also explained policy measures taken by the government during the period of lockdown (Ramakumar, 2020).

1. The government has announced that most of the agriculture activities will be on the essential list. Mandis notified by the state governments, inter- and intra-state movement of harvesting and sowing related machines and manufacturing, packing units of fertilizers, pesticides and seeds.

2. Govt of India announced the first instalment of PM-Kisan payment to farmers rupees 2000/-shall be paid upfront to farmers. The wages under MGNREGS will be raised from Rs. 182/- to Rs. 202/- per day.
3. The Reserve Bank of India (RBI) announced moratorium on agricultural term loans (including crop loans) for three months.

Rajesh Aggarwal Managing Director, Insecticides (India) Limited, Explains the importance of agriculture and specified why more importance should be given to agriculture especially in the country India. India is basically agrarian countryside and pandemic has heavily impacted the agriculture activities of the country. In addition, the present crisis imposed a perfect opportunity for the farmers where the government must take steps for developing the digitalised supply chain management system such as e-NAM (National Agriculture Markets). Through only around 600 mandis are enrolled in the e-NAM system, the scope is vast provided their performance be improved to embolden the sponsors to raise bids and compete to enrol farmers. Author also mentioned that, one of the important measures to be taken by the government is to create well-positioned and well-resourced granaries across the country to help farmers, save the crops to the time when there will be no harvest despite enough demand (Chananna *et al*., 2020).

Kinley Yonten, a journalist wrote an article on how Bhutan took a challenge in the agriculture field during the crisis of COVID-19. The Bhutan Agriculture Minister Yeshey Penjor announced that due to lockdown in all countries the import is banned so, in this severe condition the people of Bhutan need to feed themselves. The Ministry of Agriculture Bhutan has givena statementthat country take the Covid-19 pandemic as a blessing in disguise and the pandemic had called for a test of sustainability. He announced that to motivate farmers the government of Bhutan would provide loans at zero interest for land resurfacing and development support and direct inputs to the agriculture farms. Bhutan started an initiative flagship program *i.e,* organic farming with 13 million USD for 12 commercial crops (Rasul, 2021).

Giuseppe Pulighe and his colleague written opinion on the improvement of sustainability in agriculture during the phases of and the situation maylead to a boost for wider vision on urban agriculture. Where due shutdown of transportation and logistics the products are not reachable to the urban, hence the COVID-19 outbreak has brought emergent short term acts on food supply and access. This emergence act should be done because at the global level the food has stored for their country so no export of food grains. The author suggested various forms of smart and pioneering urban agriculture, such as vertical indoor farming practices, greenhouses, aquaponics, aeroponics, results in high yield of agriculture crops. To satisfy large population requirements of vegetables need advanced systems, precision automation for nutrient dosing, artificial intelligence and block chain, to optimize the growing process. Finally, the author concluded that, innovative farming deployment will not solve food security and dietary issues, but it contributes to shaping a more resilient urban food system (Castka, 2020).

George Washington once said, “I had rather be on my farm than be emperor of the world”. Yes, how truly a Nobel profession the farming is. However, in the unprecedented times of pandemic, its impact on the economy especially farm economy is complex, varied across diverse segments of agriculture, right from the production to marketing, from procurements of goods to start-ups, the sector had hit a panic button. As we know, poorer sections are always the hard-hit in any disasters such as migrant labourers, daily wageworkers and small marginal farmers. Out of total farm households, small and marginal farmers are 80%. Despite many fiscal packages and monetary policies announced by state and central government, the growing farm economy could not ace its place. Lack of labours, delay in post-harvest of *rabi* crops and *Kharif* crops, lack of transportation, distribution and marketing of the produce, decrease in export, inefficient handling of perishable agriculture produce, interventions of middlemen are ailments, pulling the sector down. This in turn has led to an inflation of market prices, an increase in the food demand among the population.

Why people not implementing the technology that we had present to agriculture? Because implementing the technology to agriculture was not a necessity until now but now the situation is demanding the increased quantity of food products and this is the right situation where the innovative things should appear. The advanced technologies like the Internet of Things (IoT), Artificial Intelligence (AI), Wireless communication, Image processing, Cloud computing will be a gamechanger in agriculture (Vishwanath *et al*., 2021; Upendra *et al.,* 2020). If our country envisions agriculture field with all these technologies discussed, then the practice of agriculture can be a profitable venture and named as precision agriculture. This happens only when young people come out and start implementing their innovative ideas in the agricultural field. The first stage of lockdown had a huge impact on agriculture due to the restrictions imposed on transport, logistics, supply chain, and shutting down of local markets. Even after the announcement of the lockdown 2.0, there was a restricted movement of agricultural machinery, shortage of essential agrochemicals, and other hindrances in the entire supply process. COVID-19 has undoubtedly presented the agriculture sector with several challenges, but it has also enabled many opportunities.

Bill Gates once said, “We always overestimate the change that may occur within the next two years and underestimate the change that may occur within the next ten.” While the changes we have predicted might not happen instantly, there are vast possibilities over the following several decades. We will see drones and AI utilized in ways in which we could never have imagined particularly in the field of agriculture.

IT professionals as ‘Agripreneurs’

There is an enormous opportunity waiting to be unleashed with the convergence of technology and agriculture.

Technologies just like the Internet of Things (IoT), AI, Data Science, Satellite Communications and Mobility have the potential to extend agricultural productivity exponentially. Large-scale introduction of technology during this sector can even reverse the talent flow from agriculture to other sectors and migration to cities in search of livelihood. If the curriculum in central and state agricultural universities are urgently revised to incorporate relevant technology training, then the country going to have tech-enabled smart farmers as a replacement talent force additionally to our IT employees.

CONCLUSION

For now though, in 2020, change is already rambling, AI enabled technologies are well on its routes to help former community to create a post-COVID-19 agriculture practices essential for new normal life. Moreover, the choice for farmers to trade online has resulted in an extremely massive growth of agritech start-ups. These start-ups are creating networks that allow farmers to adopt on their market and sell their produce at better prices. These start-ups are also bringing innovation to stay the world serviceable. With the combination of new-age technologies like the Internet of Things (IoT), Artificial Intelligence (AI), data analytics and remote sensing. Start-ups are offering immediate solutions in restructuring the availability process and helping the farmers to supply more efficiently. There are nearly 450 agritech start-ups in India and in keeping with the estimates of Federation of Indian Chambers of Commerce and Industry (FICCI), these start-ups are growing at 25 per cent rate yearly. The present review has given deep insights on the problems faced by the farmer community during the phases of Lockdown, represented and highlighted the application of innovative ICT based smart agripractices to bring the new normal life in the country India.

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