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## Impact of COVID-19 on Indian agriculture

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### Abstract

The ongoing coronavirus pandemic is a most challenging issue of world at present time. India is also affected adversely due to the severity of this pandemic. Moreover, COVID-19 has severe impacts on agriculture, but due to the rapid mortality rate, it has shadowed the agricultural issues. But this ignorance of agricultural sector may create a dangerous crisis of food security in India if the appropriate measures are not taken. Due to prolonged lockdown, as announced by government, several restrictions are imposed on transportation sector. It is also ordered to population that not to move outside of their houses. These restrictions have created closure of various agricultural markets that hampered the agricultural supply chain. Main problem created due to this COVID-19 issue is the migration of agricultural labours. As a result of this labour scarcity, various agricultural operations like harvesting become difficult to be handled. It has also become difficult for farmers to get quality seeds and proper machinery for their agricultural operations. Government should plan appropriate strategies to tackle these agricultural problems. There is need of introduction of self-operated machinery so that hindrance in agricultural operations as caused by labour scarcity can be effectively tackled off. ICT is also a good option during this pandemic. Subsidies must be provided to the manufacturers of such machineries so that these machineries can be available to farmers at affordable prices. Farm population must be protected from corona virus by rapid testing and practicing social distancing. There should be involvement of farming community including agricultural workers in the government assistance package.

**Keywords:** COVID-19, lockdown, restrictions, food security, agricultural operations and social distancing

### Introduction

Coronavirus is not a new problem for world. It has been associated with various diseases outbreaks in Asia. SARS (Severe Acute Respiratory Syndrome) and MERS (Middle East Respiratory Syndrome) were the initial forms of coronavirus which earlier emerges during 2002 and 2012, respectively. At present, a novel coronavirus, casual organism of COVID-19 disease, is known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It has emerged in late 2019 and become pandemic for several countries. World Health Organization (WHO) announced the official designation for this current CoV associated disease to be "COVID-19", caused by the SARS-CoV-2. CoVs belong to the family Coronaviridae (subfamily Coronavirinae), the members of which infect a broad range of hosts, producing symptoms and diseases ranging from a common cold to severe and ultimately fatal illnesses such as SARS, MERS, and, as of present, COVID-19. Subsequently, on March 11th, 2020, a pandemic situation was declared. At present, we are not in a position to effectively treat COVID-19 since neither approved vaccines nor specific antiviral drugs for treating human CoV infections are available. Most nations are currently making efforts to prevent further spreading of this potentially deadly virus by implementing preventive and control strategies.

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“Covid - 19”, caused by the SARS-CoV-2. CoVs belong to the family Coronaviridae (subfamily Coronavirinae), the members of which infect a broad range of hosts, producing symptoms and diseases ranging from a common cold to severe and ultimately fatal illnesses such as SARS, MERS, and, as of present, COVID-19. Subsequently, on March 11th, 2020, a pandemic situation was declared. At present, we are not in a position to effectively treat COVID-19 since neither approved vaccines nor specific antiviral drugs for treating human CoV infections are available. Most nations are currently making efforts to prevent further spreading of this potentially deadly virus by implementing preventive and control strategies.

First case of this viral infection was reported in Wuhan, China, on December 31, 2019 (WHO, 2020a) as a result of which, occurrence of COVID-19 disease took place (Wang, 2020). It is totally different from SARS-CoV and MERS-CoV. Since that time, its infection is continuously increasing at an alarming rate. Covid-19 is a contagious disease that mainly spreads through hand shaking, sneezing, coughing when come in contact with COVID-19 positive patient. This disease has disturbed every form of life. Although, this disease has originated in China, but due to poor quarantine measures or lack of awareness, it has become a major issue of concern for several nations including India. Hanashima and Tomobe (2012) <sup>[4]</sup> reported that quarantine has a significant effect on human activities and economic growth. COVID-19 has also adverse impacts on agricultural activities, as we all know that outbreak of any infectious disease leads to hunger and malnutrition (Burgui, 2020; Sar *et al.*, 2010, Singh *et al.* 2017a; Singh *et al.* 2017b; Singh *et al.* 2017c; Singh *et al.* 2018; Tiwari *et al.* 2018; Tiwari *et al.* 2019a; Tiwari *et al.* 2019b; Kour *et al.* 2019; Singh *et al.* 2019) <sup>[5, 6, 26-34]</sup>. Agriculture is one of the most important sectors in human development and is related to food security (Abdelhedi and Zouari, 2020; Kogo *et al.*, 2020) <sup>[7, 8]</sup>. It constitutes a major part of GDP and more than sixty per cent of Indian population is engaged in agricultural and allied activities. According to a report of International Food Policy Research Institute (2020) <sup>[13]</sup>, it was assumed that under COVID-19 containment scenario, approximately 14-22 million people may have to face extreme poverty throughout the world and there will be nearly 25% of declination in agri-food exports. Due to COVID-19 attack, several restrictions have been imposed on Indian population to not to move out of their houses. The lockdown also resulted in migration of various agricultural labours which causes scarcity of labour in various agricultural activities like harvesting. These restrictions also caused shutdown of major markets. It becomes very difficult to farmers to sell their produce and buy various inputs for sowing of next crop under these restrictions. As we all know that India is agricultural powerhouse of world and being a largest producer of various agricultural commodities like milk, pulses and spices, so if there is any adverse change in Indian agriculture, it will surely leads disastrous impact or famine (World Bank, 2020) <sup>[9]</sup>. As per these discussed aspects of COVID-19 on Agriculture, the present paper explains the adverse impact of COVID-19 on food supply, food security of nation and various mitigation strategies to minimize or overcome these adverse impacts.

#### Challenges of the agriculture in COVID-19

- ✓ Disruptions in the attainment of food grains by government organizations.
- ✓ Interruptions in harvesting process by private dealers.

- ✓ Scarcity of labours to harvest *rabi* crops.
- ✓ Shutdowns of the retail farming markets.
- ✓ A shortfall in the availability of drivers to run the transport sector.
- ✓ Restrictions in the movement of various agricultural commodities across major highways.
- ✓ Barricades in the operations of APMC *mandi*.
- ✓ Closure of the important retail agricultural markets.
- ✓ Stoppage of labour work under the MNREG scheme.

#### Current impact of COVID-19 on agricultural system:

There is a great impact of coronavirus crisis on agricultural systems. As we know that, it is end of *rabi* season and for upcoming *kharif* season, it is necessary to make availability of various crop seeds and other farm inputs to farmers so that *kharif* crops can be sown without any intervention. This requires the help from allied sectors such as transport, testing labs and the packaging industry. According to a recent statement by International Seed Federation (ISF), there is currently no evidence that food, including seed, is a likely source or route of transmission of the virus. Transmission via surfaces which have recently been contaminated with the virus is, nonetheless, possible through smear infections. However, fear spreads faster than COVID-19. S. Mahendra Dev and Rajeswari Sengupta (2020) reported that the problem of health risk in rural areas is much more solemn in inner-city areas since of high compactness. But, it can spread to 70% of the India's inhabitants who live in rustic areas. Some migrant workers have already gone back to rural areas. The most important and potential impact of this lockdown under the agriculture sector is the disruption of the activities and supply chain in agriculture. Due to transportation issues and breaking of chain between the intermediaries, the supply chains have been in the losers' ends. There is a huge gap between the prices received by the farmers and the prices paid by the consumers. The wheat prices have gone down drastically, however the consumers are paying a larger price at the market level. The lockdown also coincided with harvesting time of *rabi* crops. It is believed that the relief packages announced by the government are hardly to make benefit to the farmers and once the lockdown is lifted, the prices of the agricultural commodities will crash rapidly leading to an excessive fall in the farmer's income. Also there is adverse impact on the cropping decisions on upcoming *kharif* crops, thus making it difficult for farmers to plan their future investment decisions. All these aspects proved that this pandemic have posed a threat to the agricultural community at large. The adverse impact of COVID-19 on Indian agriculture can be discussed by following points:

#### Food supply

According to fundamental reports, it has shown that in northwest India, which is major producer of wheat, the non-accessibility of transient work has been disrupting the major activities of this region. The disruptions in supply chains are mainly due to the restrictions in the transportation sector. Costs have declined for wheat, vegetables, and different yields, yet buyers are regularly paying more. According to media report, it has shown that the conclusion of inns, cafés, sweet shops and coffeehouses under this lockdown conditions is as of now discouraging milk deals. Poultry ranchers are also affected badly due to the falsehood as spread by social media that chicken are the bearers of COVID-19.

The study of network of food supply chain is very essential as it provide all information of intermediate connects between

farm produce and consumer's table, including processes like manufacturing, packaging, distribution and storage (Chen *et al.*, 2020) [11]. Despite the government restrictions on the movement of people including agricultural workers, the supply of basic necessities is still assured. Cessation of borders and restrictions in international trade also disrupted various import and export activities of agricultural commodities. Moreover, disturbances in food transfer are very less so that supply remain stable. Livestock sector is badly affected due to scarcity of animal feed and shortage of labour under the lockdown situation. (Zhang, 2020) [13]. It was observed that prices of essential commodities, which are basic need of human population, have remained stable.

One of the indices that measure the variation of the price worldwide is the FAO Food Price Index (FFPI), a measure of the monthly variation of the international prices of a basket of food products. According to the FAO (2020c), the FFPI (FAO Food Price Index) of February 2020 had an average of 180.5 points, that is, 1.9 points (1.0%) less than in January, constituting the first month decrease after four months consecutive increases. This was resulted due to the sudden and sharp fall in export price of various vegetables oils.

### Food demand

Demand signifies the desirability and ability of consumers to pay money for a specific commodity or service, during a specific period (Gottheil, 2013) [14]. As a result of COVID-19, demand of various food commodities has reduced due to hike in prices and increased rate of unemployment (FAO, 2020b) [17]. However, the online delivery of various commodities could be a best option under these lockdown restrictions imposed by government (FAO, 2020a) [16]. But due to the fear of spreading of infection by contact, contactless delivery services are more preferred by consumers. Delivery through drone based systems is best example of contactless delivery.

### Food security

Food security signifies that food is basic need of people and everyone should have easily access to essential food commodities without any restrictions (Rosales and Mercado, 2020). To mitigate the impacts of COVID-19 on our food supply system, appropriate measures should be taken by government.

**Table 1:** Status of Covid-19 impact on Agricultural Sector

Impact	Action Required
Short term shortage of goods on domestic markets	Monitor availability of food in rural areas and especially in remote communities.
Long term shortage of goods on domestic markets	Monitor imports of farming inputs as well as food price inflation of imported products.
Food insecurity in vulnerable communities	Provide direct and indirect assistance to the most vulnerable households.
Wasting of fresh produce	Monitor the status of fresh produce and put mechanisms in place to acquire "surplus" food.
Loss of market share abroad	Monitor the export status of the Wine Industry and support relevant initiatives.
Shortage of farming inputs	Monitor the availability of imported farming inputs as well as domestic input supply chains. Industries and importers/suppliers coordinate bulk purchase of essentials.
Falling farms	Monitor the financial and technical health of farms.

Troskie *et al.*, 2020 [38]

### Role of agricultural extension during COVID-19 crisis

During this hard time, there is much more need of agricultural extension professionals and their management strategies to combat the ill effects of COVID-19 on agricultural production. Various awareness campaign run by extension organizations and committees have important role in decreasing the spread of this pandemic. According to a survey conducted by extension committee on organization and policy, it was found that a major strength of extension professionals have been engaged in COVID-19 related outreach. These extension professionals have been conducting various educational programs with the help of mass media. Buys (2020) reported that information related to COVID-19 can also be spread through webinars and written examinations. These extension agents are also helpful in providing technical assistance at distance basis. Although Indian extension specialists are doing good job, but there is need of more efforts to combat this adverse situation. Indian extension system involves large networks of KVKs, state and central agricultural universities, ATMA, ATARI and ATIC that can help the farmers by giving proper guidance regarding maintenances of sanitization during field operations. Indian Council for Agricultural Research (ICAR) also playing an important role to train the farming community about how to operate various farming practices under this pandemic. Through various mechanisms, it has been awaking the farmers about social distancing, covering faces, washing hands on regular basis. Thus, Indian agricultural extension system has been playing an important role during this pandemic, in dissemination of important information through conduction of various awareness programs and activities (Pandav *et al.*, 2020) [20].

### Management strategies for farmers to combat COVID-19 impact on agriculture

The poor or marginal farmers are badly affected under this pandemic. Approximately 85 percent of Indian homestead family units are being little and minor ranchers, so proper government assistance should be provided to such communities, mainly to those which are severely affected by COVID-19 pandemic. Various online business and web based conveyance organizations should be encouraged with motivating forces. As the *kharif* (stormy/wet) season is coming very soon, so government should initiate very smooth policies to provide financial support to farmers so that they will not face any problems in buying various agri-inputs for cultivation of *kharif* crops. Agri-inputs such as seeds, composts, agro-synthetic substances must be easily accessible to farmers so that a good production can be achieved. India, being exchange surplus on items like rice, meat, milk items, tea, nectar, agricultural items, and so forth may take advantage of the lucky breaks by sending out such items with a stable agro-trades strategy.

The focal government's alleviation bundle, called Pradhan Mantri Garib Kalyan Yojana (Prime Minister's arrangement for the prosperity of poor people), is planned for giving security nets to that hit the hardest by the COVID-19 lockdown.

### Immediate access to required agricultural technologies and digital agri-solutions

Digital agriculture plays an important role to support and address the farmers about the impacts of COVID-19 on agricultural production, labour availability, input supply and logistics. For example, agricultural drones in China helped the

farming community to address labour constraints and to reduce human contact amid COVID-19. Other agricultural digital tools also have been helping the farmers by linking them with buyers and logistics service which reduces the impacts of control measures related to COVID-19 on aggregators and supply chains. A new app “Kisan Rath” is being launched by Indian government on 18 th April, 2020. Recently ICAR has also launched an agro-advisory system to maintain hygiene and social distancing (Singh, 2020). Thus, public-private partnerships and investments in existing agricultural technology programs accelerate these solutions faster to help more people to manage this pandemic situation due to COVID19. According to Padhee (2020) [22], there is need of toll free numbers in all languages to provide solutions of various queries of farmers regarding farming practices. ICT programs as started by various government organizations, are also helping farmers for digital agri-solutions through ICT platforms e.g. Haritha Kerala Mission is conducting online classes on vegetable farming topic using Facebook live (Maji *et al.*, 2020) [21]. Though, recently the government of India has exempted farming operations, farm workers, custom hiring centres of farm harvesters and implements as well as mandis and procurement agencies from the lockdown rules (PTI, 2020) [24]. Digital logistics is helpful in removing the barriers in transport, aggregation, and retail systems. Chilli dryers are also distributed by ITC field staffs to farmers which have several advantages like faster drying, contamination prevention from foreign materials and more profits to farmers by reducing the chances of disaster sales (Maji *et al.*, 2020) [21]. The farmers’ producer companies (FPCs) have also started several initiatives like Sahyadri Farms, Nashik-based FPC which helps the farmers in selling of their fruits and vegetables (Maji *et al.*, 2020) [21]. A vegetable and fruit vending van, operated by solar energy is also developed by Indian Institute of Horticultural Research (IIHR) with the purpose of supplying fresh, dust-free and hygienic vegetables at customers’ doorstep. This van has evaporative cooling technology that has potential to keep vegetables fresh for two days. Leafy vegetables are safely stored in the storing trays of van with the help of cooling chamber (Kumar, 2020) [8]. Besides, access to food, income, resources & assets, information and social support sometimes are not equal in every society. Thus, divisions of labour and interpersonal and social dynamics within the household and society may influence access to information, financial support, and health services. Thus, gender sensitive solutions to address COVID-19 should be highly encouraged (Choularton and Mallory, 2020) [25]. Technologies like blockchain and cloud computing must be harnessed to ensure food traceability in food chains.

#### **Role of government in boosting up of agricultural sector during this COVID-19 crisis**

There is need of collaboration efforts by state and central governments for boosting up of agricultural sector. Various bans as imposed by Indian government should be removed so that import and export of agricultural commodities can be enhanced. Special attention should be given to e-commerce and delivery companies to promote their activities under these corona restrictions. Government should provide favourable policies for various kinds of start-ups to encourage their activities because Indian population is losing their jobs day by day under this COVID crisis. A special attention should be given to agricultural industries relying upon small and medium enterprises to boost up the rural economy (Padhee, 2020) [22]. The Reserve Bank of India (RBI) has also

announced a moratorium on agricultural term loans (including crop loans) for a period of three months (Ramakumar, 2020). There is need of biosecurity arrangements to clear the disruptions in food supply. To maintain long term food security and even after this COVID-19 crisis, an exemplar shift is much needed; require a strategy that will go beyond “proverbial relief and development dilemma”. Thus, local systems must develop a sustainable food system with high resilience (Babu and Dorosh, 2017) [37]. Amount provided by government to Indian farmers under PM Samman Kisan Nidhi should be increased from the current INR 6,000 to INR 15,000. Although the government is taking measures towards ensuring security to the farming community, but they are not sufficient as agriculture in an interdependent and interconnected system. A lag in any one level of the supply or procurement chain might simply cause a cessation in the entire process of farming thereby leading to huge losses in the harvested agricultural commodities. Prangya Paramita Sahoo & Suvangi Rath (2020) [1] concluded that Nonetheless, it very well may be fought with the coordinated endeavors of the focal and state governments alongside the examination establishments and augmentation administrations. Government can play an significant role to boost up agriculture sector by following ways-

- ✓ Awareness programs on COVID-19 should be conducted in various villages.
- ✓ Various policies should be made for the rectification of falling prices and labour scarcity.
- ✓ It is necessary for our food security that various supply chains should remain in functioning stage without facing any barriers.
- ✓ Farmers and other agricultural works should maintain social distancing and go for quick COVID-19 testing if any symptoms appear.
- ✓ Poultry and livestock sector need more attention from government and special policies should be made for these sectors for easiness in their market access and input supply.
- ✓ There should be inclusion of farmers other agricultural workers in government’s assistance package and other programs addressing the crisis.
- ✓ Various bans on the import and export of commodities should be removed to promote the trade of country.
- ✓ There should be an urgent need of expansion of Pradhan Mantri Fasal Bima Yojna (PMFBY) scheme to provide relief to COVID-19 affected farmers.
- ✓ An unemployment allowances or assistance should be provided to MNRGA job card holders.
- ✓ Government should ensure a fresh flow of credit to all small and marginal farmers for the *kharif* season of 2020.
- ✓ More infrastructure services like hermetic storage, cold storage *etc.* should be facilitated by government to minimize post-harvest losses.
- ✓ Relevant incentives should be provided to food processing industries for growing the share of value added products.
- ✓ Farmeres should be pushed to sell their produce through e-NAMs (online portal). It will mitigate the spread of COVID-19 by reducing human contact. It will also minimizes the post-harvest losses as farmers will have freedom to sell their produce through this platform.
- ✓ MSP’s of various crops for agricultural year 2020-21 should be substantially raised to a 1.5 times the cost of production.

### Precautions during field operations

Labours working in agricultural farms should be free from this COVID-19 infection. There should be testing of these labours on regular basis. While operating agricultural equipments, farmers should cover their face by masks and hands by gloves. If these are not available, alternatives can also be used, like covering face through any cotton cloth and hands by any polythene. These are cost effective means and also safe to a good extent.

### Conclusion

The Corona virus has now become a major challenge for world. At present time, nearly 67 lakhs people throughout the world had infected by this virus, approximately 4 lakh people had died due to this pandemic and these figures are continuously increasing at a very rapid rate. Agriculture sector, which is the backbone of Indian economy has also affected badly due to this COVID-19 pandemic. Lockdown across the country imposed by our government had created several problems for farming community like restrictions in transportation and marketing of their produce during harvesting season. Thus, the transfer of agricultural commodities to the ultimate consumers has been obstructed. The extent of wastes of perishable commodities like fruits and vegetable has increased to a great extent due to restrictions in the transportation. Another major problem faced by Indian farmers is scarcity of labour as most of labours have migrated to their native states due to this pandemic. Due to this shortage of labour, the harvesting of *rabi* crops have adversely affected, which directly resulted into reduction of final output. Food demand and thus food security are greatly affected due to mobility restrictions, reduced purchasing power, and with a greater impact on the most vulnerable population groups. As this disease is contagious and spreading at very rapid rate, so the government has to take various bold decisions immediately for combating the effects of this COVID-19 pandemic especially on food and agricultural sector because it was well said that everything can wait but agriculture cannot. Various cooperatives, social workers, NGO's should have to come forward to help the poor and marginal farmers during this hard time. To avoid the adverse impact of COVID-19 outbreak and to keep the agriculture sector unaffected, the government should issue particular guidelines for agriculture operations. The price structure should be undertaken into consideration and changed in such a way that the farmers are not under any kind of financial losses. The farming community along with the laborers should be protected from Corona virus by maintaining social distancing. A common platform should be provided to farmers for direct marketing to meet the demand of the consumers by home delivery of the agricultural produce and avoid any kind of wastages in the harvested products.

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