

Review Article

Impact of COVID-19 Pandemic on Indian Agriculture

Sumit Sow¹, Shivani Ranjan^{1*}, Mainak Ghosh², Navnit Kumar¹, Sanjay Kumar² and Dharendra Kumar Roy¹¹Department of Agronomy, Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar, India²Department of Agronomy, Bihar Agricultural University, Sabour, Bhagalpur, Bihar, India**Abstract**

The COVID-19 pandemic has been considered as the utmost crucial global health calamity of the century and the greatest challenge that the human kind faced since the 2nd World War. Due to prolonged lockdown, restrictions are imposed on transportation as well as movement of people. It has enormous effect on agriculture and allied sectors, which is called as base of Indian economy. Moreover, it also hampered agricultural logistic and supply chain. In order to protect and safeguard the livelihoods of millions of people associated with the agricultural system, India needs to be smart and innovative to bridge the health, and socio-economic shock. Government support in the form of subsidies for other agricultural inputs is more necessary. The hour is required to maximize farming opportunities, which have proven their usefulness and durability in present difficult times.

Keywords: Agricultural system, COVID-19, India, Socio-economic shock

***Correspondence**

Author: Shivani Ranjan

Email: ranjanshivani54@gmail.com

Introduction

In India, farmers are constantly fighting vagaries of monsoon and unpredictable rainfall, weather extremes, interrupted supply chains and increasing inflation. Besides the pandemic, locust infestation from East Africa to India had a disastrous effect on agriculture [1]. The pandemic has led to instability, export and import bans, loss of revenue and economic insecurity. The actions taken to attempt to reduce the transmission of the virus have interrupted enterprise processes and routines which include social distancing and global lockdowns. Moreover, COVID-19 also affects the global economy and financial markets. Several reductions in income, unemployment, interference in transportation, services, manufacturing, etc., are the consequences of decreasing the economy [2]. Since farming is not immune from the complications currently being experienced by the global business market, some of the aspects COVID-19 affects the agricultural sector have been found [3]. Since the agricultural sector continues to be one of the bright spots amidst this pandemic, there is a need of prioritizing agricultural sector during this time to ensure speedy economic recovery of the country.

COVID-19

COVID-19 is a disease caused by a new corona virus known as SARS-CoV-2. WHO first came to know about this new virus on 31st Dec 2019 in Wuhan, China. The Novel Corona virus has now been officially named COVID-19 by the WHO on 12th Feb 2020. "co" stands for "corona", "vi" for "virus" and "d" for "disease", while "19" stands for the year when the outbreak was first recognized [4]. India reported its first case of the Corona virus on 30th Jan 2020. Corona viruses transmit from animals to humans in some cases, which can then be transmitted from person to person. Like the influenza virus, the corona virus spreads through both direct as well as indirect contact. The best preventive remedy is to avoid being exposed to the virus. India prepared a vaccine named covaxin against COVID-19 to its population early in 2021. The Covid-shield and Sputnik V first vaccine also has been developed. The economic implications of COVID-19 pandemic have brought the agricultural sector into focus and heightened its responsibility to feed and employ thousands who have lost livelihoods. At this time when all other sectors of the economy are reported to be under significant stress, the agricultural sector continues to be promising the economy [5].

Role of antioxidants

Immunity plays dynamic role in prevention of etiopathological mechanism of the formation of diseases. Significant role of free radicals in initiating as well as enhancing immunity to minimize the diseases is major point of focus behind utilization of anti-oxidant and rejuvenation therapy. The development of new antivirals for COVID-19 is a great challenge and needs a substantial length of time and effort for designing and validation [6, 7]. Several shreds of

evidence indicate that many nutritional supplements from different spices, herbs, fruits, roots, and vegetables can decrease the risk or severity of a wide range of viral infections by boosting the immune response, particularly among people with insufficient dietary sources and also by their anti-inflammatory, free radical scavenging, and viricidal functions. These nutrients can be repurposed in mitigating the pathological effects induced by the SARS-CoV-2 infection. Oxidative stress and inflammation are key factors increasing COVID-19 severity especially in the presence of chronic diseases related with the antioxidant system fragility. Among the polyphenolic compounds, curcumin which is used for preventive or prophylaxis treatments of virus infections could be a possible treatment option for patients [8]. Moreover, the combination of vitamin C, curcumin, and glycyrrhizic acid, encourages interferons production and regulates the inflammatory response, suggesting that the combination of these compounds may be useful in modulating the immune response to counteract infections.

Challenges to the Agriculture due to COVID 19

Non-existence of efficient planning and preparation by the Central government for tackling the COVID-19 pandemic has dealt a massive blow to India's economy and has caused enormous hardships to working people of the country. The lockdown coupled with sudden negative income shock posed serious concerns about food and nutritional security in India [3]. In a survey of 2259 migrant youth, 32% reduced their daily food intake (Imbert, 2020). Consumers changed their behaviour patterns by decreasing consumption of non-essentials, reduced market visits, stocking and consumption behaviour changed [9, 10].

- **Harvesting of crops:** Unplanned and sudden imposition of the lockdown lead to massive and unprecedented disturbance in agricultural activities such as harvesting, sale of agricultural produce, and purchase of inputs. The post-harvest operations like threshing, winnowing, loading and storage were also very slow due to lack of workers in most of the places.
- **Crop losses:** Between March and June of 2020, about 59 per cent of the area of the country had a large excess (over 60%) of rainfall [11]. The excess moisture at this stage of the crop is likely to have lead to considerable losses to all crops including wheat. Lack of availability of cold-storages for perishable crops like potato, tomato and other vegetables and fruits lead to massive losses to producers of these crops.
- **Trustless:** Demand for milk has reduced by 20-25 %. While the cooperatives continued to obtain milk, many private dairies and informal milkmen sharply reduced purchase of milk from dairy farmers. Farmers, who have farming poultry and produce fruits like mangoes, litchis and watermelon have suffered huge losses due to disruption of exports and disintegration of domestic demand.
- **Functioning of mandis:** The sudden imposition of the lockdown resulted in a disruption of supply chains and, the farmers could not take their produce to the wholesale markets and haats, and traders could not go to villages to buy the produce [9]. Due to limitations on the entry of farmers into the mandis and the quantity each farmer could sell on any day, there were long queues of farmers, waiting outside the mandi gates for hours and days. Because of these issues, during the lockdown, total arrival of wheat, gram, mustard, potato, onion, tomato and cauliflower in the market was 38, 73, 61, 48, 59, 9 and 12 % less than in the same period last year, respectively [11].
- **Procurement:** Procurement was deferred by several weeks. Only a small amount of produced have been obtained. In many states, farmers have been left to sell the produce to private traders. The price of produce in major mandis in various states varied and which shows that produce was being sold at prices considerably below the MSP.
- **Inputs:** In the lockdown, producers were unable to get fertilizers and pesticides for their crops. Dairy farmers were not able to buy cattle feed. Delays in harvesting of rabi crops resulted in interference in the supply of fodder. The demand for fertilizers is likely to increase in June as farmers would need them for the kharif crop. The disruptions in global supply chains could lead to shortage in fertilizer availability during the kharif season.
- **Deregulation of agricultural markets:** Government is using this crisis to aggressively push for the reforms of APMC Acts and the Essential Commodities Act. Deregulation of agricultural markets is being done to support corporate dissemination in agriculture through systems such as contract farming. This will strengthen the monopoly power of corporate buyers, traders and commission agents, and open ways for them to buy agricultural produce directly from farmers at low prices. Monetizing the excess stock in the buffer could be a probable source of revenue for the union government. The stock held by the Food Corporation of India has in store more than double the buffer stock norms and is worth at least ₹1,50,000 crore (US\$205 billion) [12]. Concerted efforts and interinstitutional partnership (regional as well as global) are inevitable [13] as

envisaged in the Sustainable Development Goal 17 to strengthen the weaker and vulnerable sections of the society.

Impact on Indian Agriculture

The contribution of agriculture to Indian GDP is approximately 17%. Agriculture is the biggest source of livelihood in India, with its related industries. The main source of 70% of rural households remains agriculture [5]. In the era of post-COVID 19 the effect on Indian agriculture are as follows:

- **No procurement with peak harvest:** Rabi season crops such as wheat, gram, lentil and mustard were harvested or in almost maturity (including paddy in irrigated tract). This is also the season that farm harvests are mandated by designated governments for secured procurement operations. But due to the various restrictions like social distancing and token system to sell harvest, Indian farmers are facing troubles to sell their produce on time and preparing land for upcoming seasonal crop.
- **Lack of workers due to reverse migration:** In certain respects, non-availability of workers has been weakened. As a result, migrant work has become scarce and daily incomes for the production of cultivated crops have increased sharply. Some farmers, including paddy and wheat growers, have luxuries in using harvest machinery because sometimes they don't have to rely upon vast amounts of manual labour. They are somewhat independent.
- **Public products shortage:** The most important task is to provide customers with food grains, fruits and vegetables and other basic goods, in both rural and urban areas. Initially, transportation by rail and road to last-mile supply agents of public distribution system (PDS) goods were negatively impacted.
- **Lockdown induced debt and Cash flow restrictions:** The main challenge that farmers must overcome is the reimbursement of seed loans, gold loans and other informal debts [14]. Crop credits are paid back from April to May and a new loan is issued at the commencement of the new season. Failure to do so would require them to borrow money from the informal sector for the new season at high interest rates.
- **Wastage of food:** Prior to COVID-19, development of crops in expectation of a peak season may have been plentiful. The abrupt dynamic changes such as lock-out and customer loss led to a large number of products being destroyed. Fresh products to be sold in warehouses instantly, rotted away because of poor demand or limitation in exports [6]. Wastage results in depletion of incomes and profits for companies, which due to the continuing pandemic is hard to deny or mitigate.
- **Price drop:** Due to lack of market access, including stopping transportation and closing of borders, agricultural prices have plunged [5]. The increased labour costs and the lack of access leads to a massive loss of land, and therefore to a stronger method of 'stop-loss,' for crops to rot in fields. The demand for food has diminished due to uncertainty and the reduction of people's spending capacity, even though this decrease is still slight; the situation could deteriorate if the pandemic lasts for a long time, due to reduced income and job losses [15].
- **Reduced availability to animal feeds and animal health service:** Social distancing and shortage of personal protective gears have reduced the efficiency of animal fodder and industrial feed enterprises which affected the production of animals. Restricted movement and illness are resulting in labour shortages and reduced supply of raw materials or other ingredients. Disruption of supply and trade routes has further curbed feed supply [16]. In India at least during the 1st phase of lockdown inadequate availability of critical inputs such as feed and fodder, significantly affected the growth and production of the rearing animals, leading to substantial economic loss. Due to closure of feed plants, availability of the animal feed in most of the places was difficult. Due to lack of proper access to the feed supply, the dairy farmers in the initial period had to compromise the feeding of their cattle and buffaloes mainly with the available dry crop residues and brans. The banning of transport caused shortage of logistical supplies, along with limited veterinary services. In addition, delivery and use of vaccines and medicines were interrupted.

The creation of competitive, sustainable, and cost-effective goods that support and improve health is one of the industry's most pressing concerns in the post-COVID age. This crisis has highlighted the fragility of our food systems and the necessity to rethink them in order to promote food security, as evidenced by panic buying, food shortages, price spikes, various social and economic effects, as well as food loss and waste issues [17]. Moreover, it should be a top priority to make food systems more sustainable and resilient [18]. The technological, organizational, economic, and social actions that can be taken to increase the resilience of agricultural systems to COVID-19 are listed in **Table 1**.

Table 1 Measures to enhance agriculture systems resilience [19]

Measures	Enhancement measures
Technical measures	Various technical solutions aiming to enhance the level of functional performance of agriculture sector infrastructures. Usually the simple design of infrastructure has a bigger absorptive capability and it can be easier for such systems to adapt and it is easier to repair them. The measures like smart packaging system and other innovations in food supply chain can be good example.
Organizational measures	Organizations and institutions in agriculture sector need to select a necessary recovery effort, considering available absorptive, adaptive, and restorative capabilities of the agriculture system. It is necessary to compare costs of recovery with the speed of recovery and to select relevant actions selected based on time of recovery. The new management approaches, innovations and entrepreneurship in farms and other agricultural entities are also very useful. Urban–rural partnerships, improved legal regulations of labor, international trade regulations can be good example
Economic measures	The market prices act automatically and regulate demand for threatened agricultural goods during pandemic. Banning such price increases are negative impact on resilience as they diminish the absorptive and adaptive capabilities of system resilience provided by the market mechanisms, however economic support measures and state aid for farmers to survive during pandemic are useful.
Social measures	The strong communities developed in rural areas can enhance the social resilience capacities of agricultural systems. Usually in the case of disaster and afterwards, neighbours pool their resources, survive during pandemic more easily and start rebuilding as government aid always come with delay

Pandemic and e-Agri Business

COVID-19 has triggered the challenges of supply and demand of agricultural products and highlighted numerous problems of agricultural marketing for farmers. During the peak pandemic crisis, when supply chain has disrupted and shelves of grocery stores set empty had forced the food producers to destroy everything they produced. So, the farmers are looking at the road with new alternative where they can independently market their products directly to the customers and here comes the need of online marketing [8]. E-agri business has a pretty good package of advantages and also challenges. The online marketing of agricultural commodities enables the augmentation of number of market outlets that are readily available for producers and consumers, which in turn gives multiple choices to consumers and farmers. It is also a customer convenience service. It promises farmers a real time payment. By modernizing the agriculture industry, customer base is expanded and incredible amount of data can be collected and made available for consumers [20]. The platform also faces certain challenges which include lack of technical support and management for farmers, product compatibility (few products are highly perishable), lack of customer connections which is highly important in online marketing and also lack of proper package and distribution.

Examples of some online agriculture websites in India is ‘Ninja cart’ and ‘Agrostar’, those are working on the mission of helping farmers win by providing a complete range of agri solutions at the fingertips of farmers. Several efforts are taken by Government of India and other agencies like e-Nam platform which is a pan India electronic trading portal for agricultural commodities and also Digital India, a flagship programme of GOI with a vision to transform India into a digitally empowered society.

Efforts of Government of India for farmers during COVID-19

In response to COVID-19 crisis, the Indian government has involved three policy measures for agriculture sector. These have to be implemented immediately, otherwise post crisis will be fiercer, virus is killing presently, but hunger will kill later. Most of the agricultural activities have been enlisted in the essential list. Farm workers in the fields, farming operations by farmers, various agencies engaged in procurement of agriculture products including Minimum Support Price, mandis notified by the State Governments, inter- and intra-state movement of harvesting and sowing related machines and manufacturing, packaging units of fertilizers, pesticides, and seeds among others have been exempted from these [14]. However, rural institutions including self help groups grabbed the opportunities provided by the situation of stitching facemasks, PPEs and preparation of sanitizers thereby helping the society as also earning some income for their members. It has also stated that the first instalment of the PM-Kisan payment to farmers, i. e., Rs 2000, will be paid up front to farmers and MGNREGS wage will be raised from Rs 182 to Rs 202 per day. The Reserve Bank of India (RBI) has also announced a moratorium on agricultural term loans (including crop loans) for a

period of three months [21]. These rural institutions like SHGs and farmers' club were also active in creation of awareness in rural areas about COVID 19 and its preventive measures.

Conclusion

The Covid-19 had a major negative impact on the agriculture sector. This pandemic has led to unemployment, restriction of exports and imports of goods, lower production rates, revenue depletion, waste and potential insecurity in terms of farm strategies. The dilemma will not disappear with the end of the lockdown rather, towards the beginning of the new farming season, it is possible that they get exacerbated. So, there is need to adopt the new normal of life with COVID-19 and need not to wait for complete eradication of virus. Farmers need to adopt the e-channel for marketing and advisory for farm and farm produce. There is great need of creating awareness for COVID-19 and myths related to it. There is need to support our farmer by different government schemes with effective implementation and execution. A positive mindset is always a great weapon against this type of invisible enemy and this can encourage the farmers with their efforts towards ensuring the food security of the country.

References

- [1] Timilsina, B, Adhikari, N, Kafle, S, Paudel, S., Poudel, S., Goutam, D. Addressing impact of COVID-19 post pandemic on farming and agricultural deeds. *Asian Journal of Advanced Research and Reports*, 2020, 11(4):28–35.
- [2] Chengappa, P. G. Secondary agriculture: a driver for growth of primary agriculture in India. *Indian Journal of Agricultural Economics*, 2013, 68(1):1–19.
- [3] Dilnashin, H., Birla, H., Rajput, V. D., Keshwani, C., Singh, S. P., Minkina, T. M., Mandzhieva, S. S. Economic Shock and Agri-Sector: Post-COVID-19 Scenario in India. *Circular Economy and Sustainability* 2021, 1:1479–1490.
- [4] Zhao, S., Lin, Q., Ran, J., Musa, S.S., Yang, G., Wang, W., Lou, Y., Gao, D., Yang, L., He, D. Preliminary estimation of the basic reproduction number of novel coronavirus (2019-nCoV) in China, from 2019 to 2020: a data-driven analysis in the early phase of the outbreak. *International Journal of Infectious Diseases*, 2020, 92:214–217.
- [5] Pandav, C.S., Ranjan, S., Sharma, S. COVID- 19: Agriculture innovation to achieve food security & tackle malnutrition in India. *The Week*. 2020. Retrieved from <https://www.theweek.in/news/india/2020/04/20/COVID-19-Agriculture-innovation-to-achieve-foodsecurity-tackle-malnutrition-in-India.html>
- [6] Mishra, A., Bruno, E., Zilberman, D. Compound natural and human disasters: managing drought and COVID-19 to sustain global agriculture and food sectors. *Science of the Total Environment*, 2021, 754:142210.
- [7] Vikas, V., Sharma, J.P., Singh, M., Sharma, M.K., Sharma, R., Gupta, V., Dhotra, B., Sharma, A., Kumar, S. and Singh, A. Air Quality Changes during Weekend Lockdown amid Coronavirus (COVID-19) Pandemic: Case Study of Jammu District (J&K), India. *Chem. Sci. Rev. Lett.*, 2020, 9(36): 1020-1025.
- [8] Cariappa, A. A., Acharya, K. K., Adhav, C. A., Sendhil, R., Ramasundaram, P. Impact of COVID-19 on the Indian agricultural system: A 10-point strategy for post-pandemic recovery. *Outlook on Agriculture* 2021a, 50(1):26-33.
- [9] Cariappa, A. G. A., Acharya, K. K., Adhav, C. A., Sendhil, R., Ramasundaram, P. COVID-19 induced lockdown effects on agricultural commodity prices and consumer behaviour in India – Implications for food loss and waste management. *Socio-Economic Planning Sciences*. 2021b, 21-24.
- [10] Sista, R.V. and Raill, V. Questionnaire Based Study: Changes in Dietary Habits and Sleep Pattern Before and During Covid-19 Lockdown Period (Indian Scenario). *Chem. Sci. Rev. Lett.*, 2020, 9(36): 1058-1062.
- [11] HLPE. Impacts of COVID-19 on food security and nutrition: developing effective policy responses to address the hunger and malnutrition pandemic. Rome. 2020. (also available at <https://www.fao.org/3/cb1000en/cb1000en.pdf>).
- [12] Gulati, A. Offloading excess food grain stocks through open market operations will generate much-needed resources for govt. 2020. Available at: <https://indianexpress.com/article/opinion/columns/india-lockdown-food-stock-food-corporation-of-india-ashok-gulati-6469970/> (accessed 1 February, 2022).
- [13] Baudron, F., Liegeois, F. Fixing our global agricultural system to prevent the next COVID-19. *Outlook on Agriculture*, 2020, 49(2):111–118.
- [14] Varshney, D., Roy, D., Meenakshi, J. V. Impact of COVID-19 on agricultural markets: assessing the roles of commodity characteristics, disease caseload and market reforms. *Indian Economic Review*, 2020, 55:83–103.
- [15] FAO - Food and Agriculture Organization. FAO Director-General urges G20 to ensure that food value chains are not disrupted during COVID-19 pandemic. 2020a. (Available in: <http://www.fao.org/news/story/>

en/item/1268254/icode/)

- [16] FAO Mitigating the impacts of COVID-19 on the livestock sector. Rome. 2020b. (Available at <https://www.fao.org/documents/card/en/c/ca8799en/>)
- [17] Choudhary, R., Nandal, D.P., Sidhu, H.S., Jat, H.S., Nehra, M. and Jat, M.L. Evaluation of Tillage and Crop Establishment Methods on Carbon Sustainability Index and Nutrient Use Efficiency of Cotton-Wheat System. *Chem. Sci. Rev. Lett.*, 2020, 9(33): 220-226.
- [18] Boyacı-Gündüz, C. P., Ibrahim, S. A., Wei, O. C., Galanakis, C. M. Transformation of the Food Sector: Security and Resilience during the COVID-19 Pandemic. *Foods*, 2021, 10:497.
- [19] Štreimikienė, D., Baležentis, T., Volkov, A., Ribašauskienė, E., Morkūnas, M. and Žičkienė, A. Negative effects of covid-19 pandemic on agriculture: systematic literature review in the frameworks of vulnerability, resilience and risks involved, *Economic Research-Ekonomska Istraživanja*, 2022, 35(1):529-545.
- [20] Principato, L., Secondi, L., Cicatiello, C., et al. Caring more about food: the unexpected positive effect of the Covid-19 lockdown on household food management and waste. *Socio-Economic Planning Sciences*, 2020, 25-28.
- [21] Ramakumar, R. The Covid-19 Pandemic and Indian Agriculture: A Note. *Foundation for Agrarian Studies*. 2020. (Retrieved from <http://fas.org.in/blog/covid19-and-indianagriculture/>)

© 2022, by the Authors. The articles published from this journal are distributed to the public under “**Creative Commons Attribution License**” (<http://creativecommons.org/licenses/by/3.0/>). Therefore, upon proper citation of the original work, all the articles can be used without any restriction or can be distributed in any medium in any form.

Publication History

Received	28.08.2022
Revised	10.12.2022
Accepted	11.12.2022
Online	31.12.2022