

Thinking ahead: Agricultural silver lining post Covid-19 Pandemic Crisis

Prajjal Dey¹, Debanjana Saha², Udit Nandan Mishra³, Gyaneshwar Jha⁴ and Ankesh Kumar Sharma⁵ and Diptanu Datta^{*6}

¹Faculty of Agriculture, Sri Sri University, Cuttack 754 006, India

²Department of Biotechnology, Centurion University of Technology and Management, Jatni, Bhubaneswar 752 050, India

³Department of Biochemistry and Crop Physiology, Centurion University of Technology and Management, Odisha 761 211, India

⁴Department of Forestry and Environmental Sciences, University of Agricultural Sciences, Gandhi Krishi Vigyan Kendra, Bengaluru 560 065, India

⁵Department of Genetics and Plant Breeding, Anand Agricultural University, Anand 388 110, Gujarat, India

^{*6}Department of Plant Pathology, Odisha University of Agriculture and Technology, Bhubaneswar 751 003, India

(Received 16 February, 2021; Accepted 4 April, 2021)

ABSTRACT

Being referred to as a black swan event, Coronavirus has resulted in over 2.41 million death globally along with 109 million confirmed cases. It has instigated fear of a new recession and financial collapse due to its ripple effect in socio-economic conditions, especially agriculture. Agriculture is the backbone of the Indian economy, disturbance in the farming activity is the major setback plunging the country's food safety. As rightly pointed out by Dale Carnegie "When the world gives you lemons make lemonade" the article analyses and summarize the major and minor aspects of Covid-19 impacts in agriculture. The authors believe that rich and precious lessons can be found and taught even in difficult times like this, which will benefit the farming community enormously. In this context, the authors (we) address the different ways in which the COVID-19 crisis has influenced agriculture and examine realistic and innovative approaches in these tough times for the food and agricultural sector.

Key words : COVID-19, Pandemic crisis, Future scenario, Agriculture, Food security

Introduction

India is a global agricultural powerhouse, ranked second worldwide in farm outputs. It is the world's largest producer of rice, milk, pulses, and spices. The second largest producer of wheat, cotton, vegetables and tea. Agriculture is the primary source of livelihood in rural India. This sector not only pro-

vides 18% share in total GDP but also employment to 60-70% of India's workforce. COVID 19 is predicted to have more impact on the global economy than SARS, and India is no exception under such unprecedented situations. Governments have placed border shutdowns, travel bans and quarantine in response to 'flatten the curve' triggering concerns of an impending economic crisis

and recession. This article reviews the impact on food supply and demand amidst pandemic crisis. There are four substantial and noteworthy issues that have impacted agriculture and should be addressed in the post COVID 19 situations. Firstly, COVID-19 pandemic did not get in the way of agricultural cultivation and management practices, but the unavailability of labourers have interrupted the harvesting activities. Secondly, the food demand and supply crisis has emerged due to a section of people losing their jobs while other section of society piling up of food items in their homes by panicked buying. Third, the impact on perishable items such as vegetables, milk and poultry are more severe and worse than cereals and pulses. Especially due to the closure of restaurants and food malls, the demand for perishable food items faced a big blow. Last but not least, the present situation provides us with an insight into the lacking met under uncertain circumstances and forms the foundation, with a perspective, for curtailing relevant future crises.

COVID-19 outbreak has tested the resilience of the agricultural sector. While the world ground to a halt and public life shuts around the globe, everybody has their attention on the health-care systems that are buckled under the COVID-19 pandemic strain. The Organization for Food and Agriculture (FAO, 2020a) reports that COVID-19 impacts agriculture in two significant aspects: food supply and demand. These two aspects are directly linked to food safety, therefore, food safety is also at risk. Since no cure or vaccine has been developed for COVID-19 disease yet, the scientific community and authorities are seeking knowledge and information for the short- and long-term management of the current and future pandemic crises, respectively.

COVID-19 disrupts some of the agricultural and supply chains activities. Reports show that the non-availability of migrant labour is interrupting certain harvesting activities, especially in northwestern India, where wheat and pulses are harvested. Supply chains are disrupted due to transport problems and other issues. Prices for wheat, vegetables, and other crops have declined, and yet consumers often pay more. During the lockout, media reports indicate that the closure of hotels, restaurants, candy shops and tea shops is already crippling milk sales. Agricultural products are mostly perishable in nature due to which farmers are forced to store their unsold products for a longer time. This leads to a re-

duction in the quality of the food and an increase in the cost of production. Panicked customers pile up foodstuffs which further impacts the quality and the price of the food. The price of the goods depends on the country and its pandemic control policy. Besides, markets have gone a step further by shutting down floor trading that has affected commodity exchange efficiency.

Demand refers to the consumer's will and willingness to buy goods and services in any given timeframe. The demand of food has been impacted by reduced sales and purchases capability. Covid-19 pandemic significantly affected demand groceries restaurants, retail food shops due to reduced income and job losses. The reduction in job working hours and job losses have to lead to decreased household income impacting food security. Food security refers that every individual has excess for basic needs. The vulnerable group are those who experience chronic hunger numbering around 820 million people, followed by small farmers and families, respectively denoted as second and third vulnerable groups. In the supply-side aspects, COVID-19 lockdown has resulted in sing-off processing and packaging facilities due to dearth of Agricultural labourers. Though the centre and state governments are working in harmony for addressing grievances of the farmer yet access to farm inputs including, seeds, fertilizers and crop production is challenging. The lack of transport facilities has put a hold on migratory harvest and agriculture movement. A severe pandemic causing more than a 25% reduction in labour availability could generate significant food shortages across the globe.

What can agriculture learn during COVID-19?

Considering the future of farming after COVID 19, it is clear how significant agriculture is in providing food for the world. As rightly pointed out by Dale Carnegie "When the world gives you lemons make lemonade".

Agriculture is a representative example of adaptation and evolution. Despite wars, financial crisis and previous pandemic farmers are always managed in balancing and continuing an upward projection in productivity and production. But for facing such unexpected challenges in the future, foresightedness adopted with holistic approach should be implemented in agriculture for acting swiftly. The measures to consider include:

Price tracking and direct marketing via online platform

Enhancement of quality and certification of produce are prerequisites in successful participation in E-commerce and gaining the trust of customers. This platform not only prevents wastage of food but also facilitates better trading and mitigating depletion of profit by reducing middleman. .

- i. A number of state governments have temporarily suspended the Agricultural Product Market Commission (APMC) Act and allowed farmers to sell farms anywhere, as suggested by the central government.
- ii. This stretches an opportunity for national consensus in reforming agricultural marketing and minimising restraints on the movement and selling of farm commodities.
- iii. For real time tracking of future price for upcoming 3-4 months a national level region specific dashboard or mobile app can be developed by understanding the market demand and supply behaviour through AI and machine learning. Tech giants like Microsoft is already working on this and they are in the verge of implementing it in the states like Karnataka.
- iv. SMS based registration systems have been used to handle and regulate the arrival and logistics of agri-produce. States like MP has already introduced this innovative approach.
- v. KisanSabha and kisan Rath, mobile based app has already been launched to facilitate the framers traders to connect to supply chain and also to help in searching for carriage vehicles.

Adjustment of agriculture related policies

- I. As we all know, our bread givers i.e. farmers are the worst sufferers in this pandemic, the Govt should make the MSP policy more flexible by covering more crops with adequate price to ensure optimal return in case of crop loss
- II. The lack of access to adequate lending facilities is one of the critical limitations that Indian farmers face. According to IFPRI about 19 percent of agricultural families had KCCs on an average in Jharkhand, Bihar, UP, West Bengal and Odisha, which is reasonably low.
- III. Timely provision of credit and input facility to small and marginal farmers during sowing time can greatly alter the maintenance of crop

thereby maintain a smooth supply chain and for this the Govt should take this charge via National Bank for Agriculture and Rural Development (NABARD) and the Kisan Credit Card (KCC) facility though direct benefit transfer which will create hassle free functioning thereby reducing the time taken in whole credit process.

- IV. Since Govt can not solve the problem on its own, institutional loans on crop credits should be increased.

Preparedness for the manufacturing sector

The pandemic has a significant impact on the manufacturing industry as it caused a steep decline of 18 percent in manufacturing output and 23 percent decline in employment due to high contamination rate. For avoiding such massive food shortage due to collapsing of the manufacturing sector, FAO has suggested for expanding emergency food assistance programme and deliver support to small scale farmers by boosting e-commerce.

Learning from the crisis is our best teacher to increase the preparedness for future shocks. Increasing preparedness for observable risks can be blessings in disguise as it has the potential to identify opportunities to strengthen networks between public and private stakeholders in order to make safer investments. This in turn will eradicate the blockage points and exposed weak points in agriculture and food systems. Reformed data systems at the local, national and global levels can provide real time information regarding the prevailing scenario that will help a riskless decision making for the investors. As the govt. is focusing more on Atmanirbhar Bharat by reforming and giving more flexibility in the MSME schemes, the entrepreneurs must take this as a huge opportunity especially in empowering women.

Enhancement of price risk management

An advanced system incorporating records of production, distribution stocks, and delivery schedule combined with weather can facilitate a stable supply. Building a tough, versatile, and savvy neural manufacturing enterprise COVID-19 is relied upon to quicken the digital transformation in manufacturing by utilizing various technologies. The COVID-19 situation has brought digitalization in the traditional agriculture through increased adoption of field mapping system (satellite imaging). This al-

lows remote access to the farm processes thus minimizes the labor requirements and unnecessary field trips. Post-COVID, customizable and scalable green technologies can be contextualized rapidly which will enable the mass customization of products keeping the price dynamics in view. Resource cycling can be ensured by enhancing the symbiotic relationship between local consumption and production cycles. Agricultural production related risks, on-farm strategies and government policies are the beads in a string whose efficient and effective management should be taken into considerations in order to come up with a risk mitigation strategy. These might provide a holistic approach towards price risk management.

Targeted reforms of restaurants and food marts

Crisis of COVID 19 should be using an opportunity for shifting towards the digital door to door service rather than encouraging peoples for dining out and shopping as in the coming future. There will be an immense starting flood in business for eateries post-COVID as people will attempt to make the most of their public activity once more. Individuals will require a discharge and that will predominantly come as food and liquor. The lift probably won't be enduring, however, as shoppers' monetary reality sets in. With bills to pay and workers to care for, restaurateurs are tossing all that they can at the COVID-circumstance. This has prompted development and better approaches for serving the clients. Extraordinary change must be received by cafes and food shops to get imaginative as quick as could be expected under the circumstances. One example is 'Car Bar option' at a Sydney-based Vietnamese restaurant where customers can enjoy their food and booze altogether inside without being physically present inside the dining area rather they can have them inside their car parked outside at an open place nearby the eatery. From the restaurants and food mart point of view, with the decrease in incoming foreign visitors right now it's just about hanging in there with the maximum old customers being retained and committed to their favorite dine place.

With the increasing health concerns among people, the need of the hour is to upgrade standards for hygiene, working conditions and cooking facilities that have to be reconsidered in the light of the pandemic. Pos-COVID, consumers' preference trend may look something like:

1. Branding and standard of food and commodities

at both restaurants and food marts will drive consumers' assurance to dine and shop at.

2. Trends for cooking will be 'Momino's' (Mom-made) rather than Domino's!
3. With the declining demand of street foods to avoid health hazards, the concept of 'pop-up kitchens' may come up as substitutes where street like foods with home like hygiene will be assured.
4. Increasing trend in restaurant takeaways and online food delivery like Swiggy, Uber Eats and Food Panda may create home-delivery market. It is possible that many customers in the future would rather pick food from their favorite restaurant on their own for greater safety, and want to eliminate a handler in the middle.
5. 'No sharing' will be the new companionship drill. Cafe may must have miniaturized scale measure of specific food variation as there will be less inclination of mass sharing at the dining table rather consumers may go for single small scale dine of their food decisions. It isn't just going to be about contact-less service yet insignificant contact between those at a similar table. Eateries should reconsider menus, portions and costs to oblige this new reality.
6. With expenses and compensations under pressure, keeping an eatery open for just lunch and supper may not guarantee the requirements. Other than full dinner time menus, numerous restaurants will offer n-between meals menus, snack menus, all-day menus and perhaps late-night menus. Time for the 'three shift restaurant'!
7. The consumer will be the victor. While it will be an incredibly difficult time for restaurants, bars, cafes and hotels, the decision for the customer/consumer will be massive. Unacceptable food, administration or cordiality won't be acknowledged in the post-COVID world. Customers will set food patterns through making a statement and have unending decision.

Shelf life and post-harvest storage

For maintaining a level of freshness, post-harvest handling plays a crucial role (Bachmann *et al.*, 2000). Amid COVID-19 situation, is clear that in future situation, a grower who can meet such challenges with long term storage will be able to compete better in the marketplace. Enhancement of shelf life and post-harvest storage of perishable fruits and

vegetables has emerged as one of the major concerns amid COVID 19. Hence proper care should be taken for improving the shelf life and post-harvest storage of fruits and vegetables.

COVID-19 has impacted economic setback most notably in agriculture sector. Its impingement on agriculture is critical and varied across the disparate segments that form the agricultural value string. Alike amid the different segments, its impact extensively among the various quarters and the producers and agricultural wage laborers. This impact will reverberate athwart the huge economy and will lengthy than few months. From manufacturing and production point of views, India occupies a significant position worldwide which includes perishable agricultural commodities like fruits and vegetables. Irreparable damage to the supply chain caused by pandemic lockdown has created havoc for both harvesting operations and post-harvest handling of produce in storage and marketing centers. Thus smooth functioning of the supply chain, with the adequate safety measures for the people involved, is of paramount importance. In this regard the perishable agricultural commodities have made us realized about the post-harvest handling and care.

Information about markets, good practices for social distancing and movement of products should be disseminated by the government in order to ensure supply chains. These include clarification of misconception regarding the following two points:

1. Movement of farm produce does not necessarily involve the interference and movement of a large number of people.
2. Well-established market channels and transactions can take place without the physical presence of the growers/farmers.

For the perishable commodities to reach the end users directly and smoothly, government should declare the warehouses as deemed markets which may increase the coverage and reach among the farmers. In this regard, electronic Negotiable Warehouse Receipts (e-NWRs) should be issued to the farmers storing their produce in Central Warehousing Corporation (CWC) and State Warehousing Corporation (SWC). Transforming perishable food into processed or canned products through physical or chemical methods can maintain the dietary regime of the customers. This might be helpful in stabilizing consumers' diminishing habit of relying on non-perishable food items during COVID-19 pandemic crisis. Good preservation and agro-process-

ing practices may include operations like drying, refrigeration, freezing, vacuum packing to prevent the growth of unwanted harmful microorganisms. Emergency food assistance and social protection programs may assist farmers with small land holdings to support both productivity and marketability of their produce. In this regard keeping a close eye on the food value chain by identifying key bottlenecks in the logistics might be a facilitator in managing the aftermath of economy (FAO, 2020).

Less reliance on human labor: In the future, higher possibility is that growers could seek to become less dependent on human labor where they can, something that has already happened in general (Crowder *et al.*, 2020). Direct application of AI (Artificial Intelligence) or machine intelligence across the agricultural sector could act as an epitome of shift in the way farming is practiced today (Dharamraj *et al.*, 2018). AI-powered farming solutions allow a farmer to do more with less, improve quality, and also ensure a fast marketing strategy for crops.

To escape the immediate worries of the shortage of agricultural labour, policy should make machinery readily available through State agencies, custom hiring centres (CHCs) or Farmer Producer Organizations (FPOs) with suitable incentives. By means of FPOs, community farming can be supported, giving farmers greater trading control, which inturn will reduce the problem of middleman and hence farmers can sell their crops directly in the market (Bachmann and Earles, 2000).

Utilizing the local manpower and resource: We can use the manpower of the migrant labourers those who have shifing to their native place from their working place. Through Ahadhaar verification system we can now implment MNREGA in agrticultural sector efficiently by giving daily wage to more labourers, thereby reducing the to lessen monetary burden of farmer. Besides these we must promote kitechinggarding and urban framing by ulilizing the local resouces which will make us self reliant, and for that the govt should make urban people aware of the benefits of Urban farming.

We must understand the role of women in agriculture and household: As male male farmers are leav- ing framing for other off farm jobs, the role of women in agriculture becomes more crucial. Although the role of women in agriculture is unrecognized and neglected till date, around 40 percent of

the current agricultural workforce is women only. Proper gender equity should be given to women and strict policies should be made and implemented especially in rural areas for land ownership of women. Proper education is key in reduction of prevalence of this pandemic and several other malnutritional diseases as women are the decision makers when it comes cooking and running household activities.

Conclusion

COVID-19 has a significant consequence on human health impacting economy and subsequently agriculture is not outside the consequence. As the virus sculpted its explosive course through our economic and social life, the agriculture sector undertook an almost instant repositioning. The pandemic crisis has clearly demonstrated that change can occur unexpectedly and drastically, causing great uncertainty. Yet the need for existence amplifies us to "To find opportunity in the crisis". New possibilities emerge in crisis and new paths open up. Based on lessons and good practices emerging from the COVID-19 pandemic, we can now take measures for "drawing the silver lining amidst COVID-19" pandemic and maybe even mitigate those crises in future days. At present, we have an opportunity-maybe once in a lifetime possibility to benefit from past mistakes and to build food more healthy, sustainable, equitable and equitable systems resilient. The rainfall has become erratic in most recent times. During the pre-COVID pandemic period north indian states have realised a severe reduction in the air quality especially in Delhi, from this incidence we can realise that in the upcoming future days there are many more pandemics severe than Corona are going to occur and climate change is one of them. So many regional weather stations can be

established for realtime through tracking of weather parameters. We must search some alternate ways like micro-irrigation to save water and besides the several key recommendations as we have mentioned in this review we must strive for sustainability in agriculture.

References

- Bachmann, J. and Earles, R. 2000. *Post-harvest handling of fruits and vegetables*. 1-19. ATTRA.
- Blay-Palmer, A., Carey, R., Valette, E. and Sanderson, M.R. 2020. Post COVID 19 and food pathways to sustainable transformation. *Agriculture and Human Values*. p. 1
- Correia, S., Luck, S. and Verner, E. 1918. Pandemics depress the economy, public health interventions do not: Evidence from the 1918 flu. *Public Health Interventions do not: Evidence from the*
- Crowder, L. 2020. How is coronavirus affecting agriculture in California? *California Agriculture*. 74(2): 69-70.
- Dharmaraj, V. and Vijayan and, C. 2018. Artificial intelligence (AI) in agriculture. *Int. J. Curr. Microbiol. App. Sci.* 7(12) : 2122-2128.
- Fairbairn, M. and Guthman, J. 2020. Agri-food tech discovers silver linings in the pandemic. *Agriculture and Human Values*, p.1.
- Galanakis, C.M. 2020. The Food Systems in the Era of the Coronavirus (COVID-19) Pandemic Crisis. *Foods*, 9(4): 523p
- Kim, K., Kim, S. and Park, C.Y. 2020. Food Security in Asia and the Pacific amid the COVID-19 Pandemic
- Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Iosifidis, C., Agha, M. and Agha, R. 2020. The socio-economic implications of the coronavirus pandemic (COVID-19): A review. *International Journal of Surgery (London, England)*. 78 : 185.
- Poudel, P.B., Poudel, M.R., Gautam, A., Phuyal, S., Tiwari, C.K., Bashyal, N. and Bashyal, S. 2020. COVID-19 and its Global Impact on Food and Agriculture. *Journal of Biology and Today's World*. 9(5) : 221p
- Siche, R. 2020. What is the impact of COVID-19 disease on agriculture?. *Scientia Agropecuaria*. 11(1) : 3-6.