



Covid-19 Pandemic And Its Impact on Biopesticidal Activities Against Agricultural Pests

DR. DEEPALI LALL

Associate Professor, PG Department of Zoology, SD Government College, Beawar, Rajasthan, India

ABSTRACT: Agriculture, in general, is an input-intensive sector. Key agricultural inputs include fertilizers, plant protection products (PPPs; that include conventional and bio-pesticides or any other beneficial arthropod used for inundative and inoculative biological control, including bees for pollination), seeds, fuel and labor. Disruptions in the supply and availability of these inputs are likely to result in reductions in outputs. However, these reductions depend on how much a given cropping system is dependent on these inputs (e.g. organic farming and agroecological cropping systems are less dependent on synthetic inputs compared with conventional systems, but can be more labor intensive). The production, choice, purchase and application in a timely manner of these inputs are widely affected both at the upstream and downstream level by the COVID-19 pandemic leading to severe consequences in the agricultural sector.

The word “pesticides” is a complex word that encompasses all compounds that are applied to destroy or regulate pests; this includes insecticides (insects), herbicides (weeds) and fungicides (fungi). One of the primary sponsors of the green revolution was finding ways to improve and use safe pesticides to control the wide range of herbal and insect pests, which affect negatively the quantity and quality of world food production. This review provides an analysis of pesticides' definition, classifications, toxicity, factors affecting toxicity, pesticides in water resources, their environmental fate, impacts on human health and their methods of detection, disposal and treatment. Moreover, this work gives a brief description of the extraction methods used for pesticides analysis besides comparing the analytical techniques used to measure the very low concentration of pesticides. Finally, this work suggests to find further alternative methods to identify the pesticide residues and other highly hazardous pollutants.

The different pandemics that humanity has experienced, such as the Spanish Flu, Asian Flu, Hong Kong Flu, HIV/AIDS, SARS, Ebola, and Swine Flu, have had a great impact on the economy, the environment and any human activity, such as livestock, agriculture, tourism, transport, education, health, fishing, mining, industry, commerce, etc. Currently, humanity is facing another pandemic, the infection of the new coronavirus (2019-nCoV) that generates the disease known as COVID-19. The objective of this document is to analyze and discuss the effects in agriculture of events related to the disease of COVID-19. For this analysis, data from the Food Agriculture Organization (FAO), the World Health Organization (WHO) and scientific and technical documents have been used. There is sufficient evidence to affirm that the pandemic caused by the COVID-19 disease has an important effect on agriculture and the food supply chain, mainly affecting food demand and consequently food security, with a great impact on the most vulnerable population.

EPA expects all products on List N to kill the coronavirus SARS-CoV-2 (COVID-19) when used according to the label directions. To find a product, locate the EPA Reg. No. on the product label, then enter the first two sets of numbers into the tool. For example, if EPA Reg. No. 12345-12 is on List N, you can buy EPA Reg. No. 12345-12-2567 and know you're getting an equivalent product. These products are for use on surfaces, not humans. Children should not use these products. Inclusion on List N does not constitute an endorsement by EPA. Additional disinfectants may meet the criteria for use against SARS-CoV-2 (COVID-19). EPA will update this list with additional products as needed.



I.INTRODUCTION

In Wuhan, China, on December 31, 2019, the first cases of infection of a new coronavirus (2019-nCoV) are reported which generates the disease that is now known as COVID-19 different from SARS-CoV and MERS-CoV. Since that time, the report of globally confirmed cases of infection with this new virus has had an alarming growth (Figure 1), now being the main global health problem, which is affecting the normal development of society and all its components. There is always a risk of developing a new infectious disease from the Spanish flu of 1918, to AIDS that still has no definitive cure. Well now, Covid-19 is the contagious disease that threatens and disturbs humanity. From past pandemics that the world has experienced, it has been shown that quarantines and panic have an impact on human activities and economic growth but, the effect also occurs in agricultural activities. When there is an outbreak of infectious disease, there is also an increase in hunger and malnutrition. The situation worsens as the disease progresses, making movement restrictions more and more stringent, causing labor shortages for the harvest, or difficulties for farmers to bring their products to market. Agriculture is one of the most important sectors in human development and is related to food security hence, the objective of this research is to analyze the relationships between agriculture and food security and how these relationships are being affected by events related to the disease of COVID-19. Lockdown and quarantine measures applied to combat the COVID-19 pandemic have limited the production and supply of PPPs thereby affecting crop protection activities worldwide. Evidence shows a surge in demand for PPPs due to individuals and groups ordering more stock than they would normally. This will further hamper availability of PPPs on the market. For example, in China, a country affected at an early stage of the pandemic, the production of PPPs declined sharply and only resumed gradually after production plants were shut down following the outbreak. [1] Because China is one of several key producers and suppliers of PPPs to many developed and developing countries, the COVID-19 pandemic may affect the availability or lead to a rise in prices of PPPs worldwide. This may have an important impact on crop protection and yields, especially across high-income countries that are more exposed to disruptions in input supplies for their agricultural production processes compared with low-income countries. For example, grain and oilseeds production in the EU, the USA or Canada, largely depend on these inputs, notably fuels, seeds, fertilizer and pesticides.[2]

Low-income countries that have labor-intensive agricultural systems may find their supply chains disrupted and outputs compromised due to labor shortages owing to the COVID-19 pandemic. This is mainly due to direct health effects or indirect effects of shutdowns. However, high-income countries have also faced labor shortage problems such as those of spray operators or seasonal labor requirements for planting vegetables and harvesting fruits, as already is the case in the United States and in several EU countries such as France, especially in the horticultural sector. However, even row crops that are typically less labor intensive have been impacted (<https://www.reuters.com/article/us-health-coronavirus-usa-wheat/u-s-farmers-scramble-for-help-as-covid-19-scuttles-immigrant-workforce-idUSKBN2431BQ>). This means that labor shortage effects occur across both high and low-income countries and that they are sector-specific rather than country-specific.[3]

Even in the absence of labor shortage, farmers may either not have access to bank loans or may not be willing to purchase pesticides to protect their crops. This may particularly be the case in developing countries where farmers may save money for eventual household healthcare issues that may be either directly or indirectly aggravated by the COVID-19 pandemic. In the absence of prompt crop protection interventions, there might be two major types of crop losses in terms of: i) quality, because the visual aspect of agricultural products may be jeopardized that renders them unmarketable, and ii) quantity, because in the absence of timely protection interventions, pests will attack crops and reduce yields.

A shortage of certain types of equipment, such as fogging equipment that is currently in high demand for disinfectants to reduce the spread of COVID-19, may affect the crop protection sector. This equipment is used for crops such as potatoes, to apply sprout suppressants in storage. Shortages due to COVID-19 have also impacted the availability of respiratory protective equipment for agricultural workers handling pesticides, which has been reported in the United States. This has led to a number of temporary recommendations from the U.S. EPA, including reusing N95 respirators, using expired respirators, applying pesticides that do not require respirators, and delaying pesticide applications. Clearly, this is leading to increased risks for the applicator as well as increased crop damage due to suboptimal applications.[4]



II.DISCUSSION

For inundative biological control, farmers' pest management strategies rely on regular introductions of beneficial insects and mites that are live animals with a short shelf life. The logistics to supply these animals depends on rapid transit across borders, and on logistics running effectively. Staff shortages will interrupt logistics and lead to some shortages and delays. Although no data are yet available in this regard, we can expect significant yield losses due to the lack of timely crop protection interventions owing to labor shortage during the COVID-19 pandemic. The authorization process prior to approving any PPP is generally lengthy and requires a lot of interactions between the manufacturer and regulatory authorities of a country. This is particularly the case in the EU following the Regulation 1107/2009/EEC on placing of PPPs on the market. This process might be slowed down due to the COVID-19 pandemic. The COVID-19 pandemic may have affected a range of measures needed to ensure plant health. They include quarantine measures, implementation of plant health regulations, especially those related to plant passporting requirements. In addition, emergency authorization processes, needed to contain quarantine pests, may have been affected, yet the urgent threat of such pests requires a prompt intervention. Quarantine staff or inspectors of consignments at the borders may be exposed to sanitary risks due to the COVID-19 pandemic. For example, it is yet unclear whether the existing biosecurity systems remained fully operational during the pandemic for an effective surveillance and management of potential biological threats to plant health or whether these systems were relaxed or restricted to some extent. In particular, it is critical to recognize that the future of global food security and safety is linked across borders. A weak biosecurity in one country not only threatens neighbouring countries and/or continents but the entire planet. Reviewing regulations and their implementation to secure crop protection, harvests and food supply is thus critical to safeguard food systems. Application of science-based preventive actions, including quarantine measures to contain invasive pests threatening global food security and safety is critical to protect plant health.[5,6]

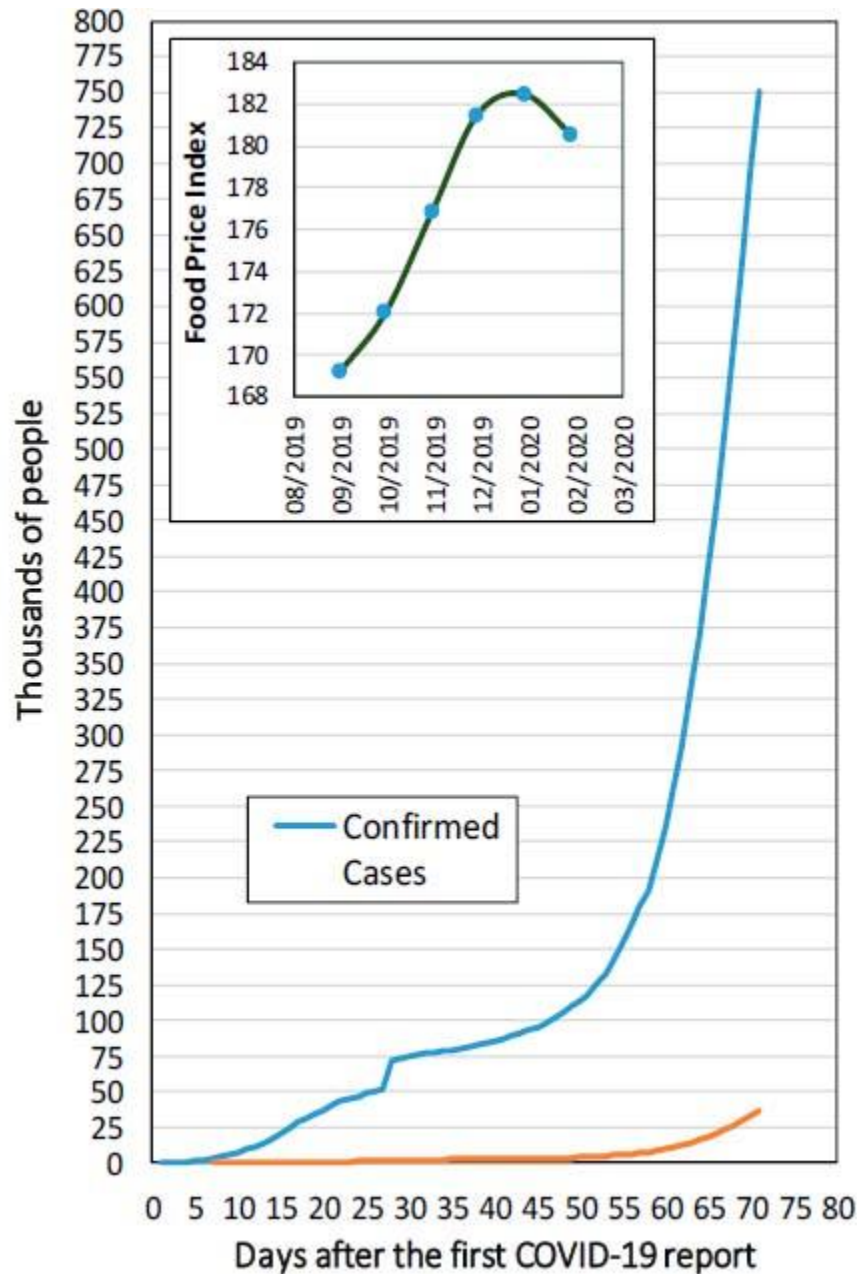


Figure 1: Globally confirmed cases, deaths and Food Price Index by the effect of COVID-19.

Food security-Food security implies that everyone has unrestricted access to food that allows them to satisfy their basic needs . Not taking quick action implies an imminent food crisis, with a greater effect on the most vulnerable population[7]. Measures should focus on keeping global food supply chains active and mitigating the impacts of the pandemic across the food system. Social programs act as an umbrella that minimizes the effect of short-term crises.

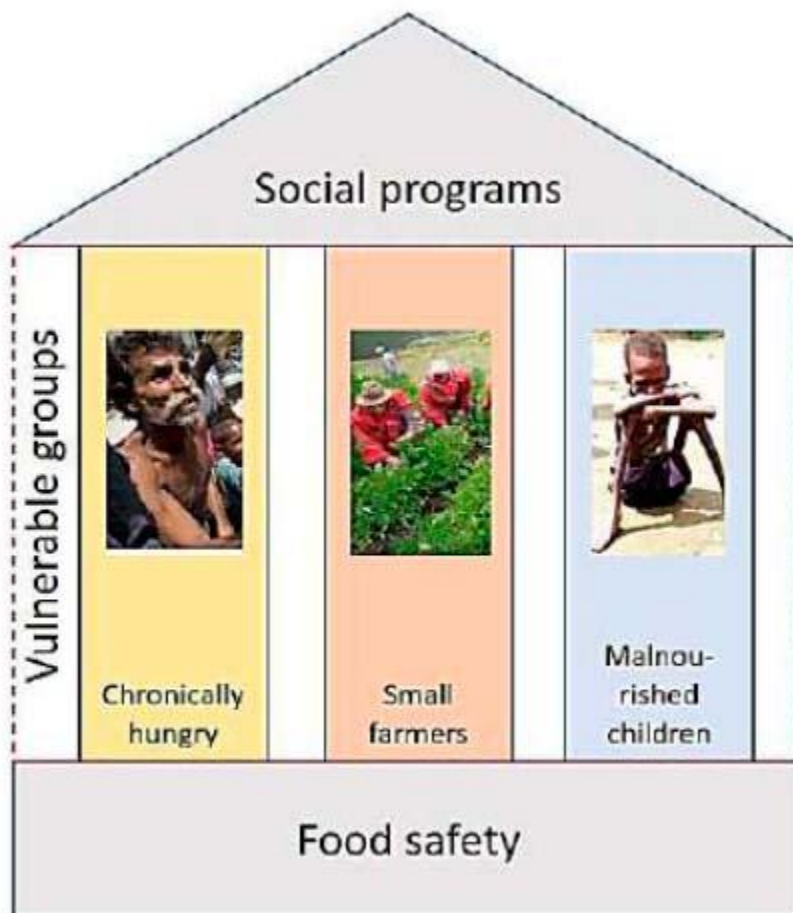


Figure 2: Groups vulnerable to a food crisis.

The first vulnerable group: people who experience chronic hunger and do not consume enough caloric energy to live a normal life, which currently numbers about 820 million people . This group of people cannot afford any possible interruption of their livelihoods or access to food that a situation with COVID-19 could bring. If the virus spreads in countries where such people live, with health systems with limited capacity, the consequences could be serious. A second vulnerable group: small farmers, who may be prevented from working on their land and accessing markets to sell their products or buy seeds and other essential inputs. The third vulnerable group: children from low-income families, who are mainly nourished by food provided by social programs; the suspension of these programs due to the pandemic puts food security and nutrition at risk, and as a consequence the existence of children with limited capacity to cope with diseases . Thus, each country must direct its actions to maintain social food programs, taking the necessary precautions to avoid transmission of the virus.[8]

III.CONCLUSION

The COVID-19 global outbreak is a wake-up call for a joint reflection among key stakeholders who are concerned about human, veterinary and plant health, under the umbrella of the one world one health initiative. This pandemic has shown the world how adopting preventive measures is essential to secure global health from the introduction and spread of devastating pests. This applies to human health as it does to animal and plant health. More specifically to crop health, re-designing of diversified cropping systems that are less reliant on synthetic inputs will certainly help improve the resilience of cropping systems with positive impacts on soil health. Lessons learned from the COVID-19 pandemic should encourage the development of more resilient food systems that can readily face similar pandemic events in the future. Finally, although a



number of impacts of the COVID-19 pandemic on crop protection have already been observed, the true impact of the pandemic remains unknown. An assessment is thus needed to measure the impact of the COVID-19 pandemic on the crop protection sector, including impacts on global plant health. The pandemic called COVID-19 disease has a great impact on the actions and activities of humanity, agriculture is not outside this impact.[9] 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 cases of contagion increase, governments take more drastic measures to stop the spread of the virus, also influencing the global food system. The premise of any measure adopted should be to protect the health and food security of the population, to the detriment of economic growth, although some governments go in the opposite direction [10]

REFERENCES

1. Barzman M., Bàrberi P., Birch A.N.E., Boonekamp P., Dachbrodt-Saaydeh S., Graf B., Hommel B., Jensen J.E., Kiss J., Kudsk P., Lamichhane J.R., Messéan A., Moonen A.-C., Ratnadass A., Ricci P., Sarah J.-L., Sattin M. Eight principles of integrated pest management. *Agron. Sustain. Dev.* 2015;35 doi: 10.1007/s13593-015-0327-9. [CrossRef] [Google Scholar]
2. Brewin D.G. The impact of COVID-19 on the grains and oilseeds sector. *Can. J. Agric. Econ.* 2020;68:185–188. doi: 10.1111/cjag.12239. [CrossRef] [Google Scholar]
3. Early R., González-Moreno P., Murphy S.T., Day R. Forecasting the global extent of invasion of the cereal pest *Spodoptera frugiperda*, the fall armyworm. *NeoBiota.* 2018;40:25–50. [Google Scholar]
4. European Commission . 2009. Directive 2009/128/EC of the European Parliament and of the Council of 21. October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides. [Google Scholar]
5. European Commission . 2009. Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 Concerning the Placing of Plant Protection Products on the Market and Repealing Council Directives 79/117/EEC and 91/414/EEC. [Google Scholar]
6. FAO . 2020. Addressing the Impact of Covid-19 on the Global Action for Fall Armyworm Control 4.<http://www.fao.org/fall-armyworm/en/> [Google Scholar]
7. He S., Creasey Krainer K.M. Pandemics of people and plants: which is the greater threat to food security? *Mol. Plant.* 2020;13:933–934. doi: 10.1016/j.molp.2020.06.007. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
8. Isaac N. Cornell Alliance for Science; 2020. COVID-19 May Stall Nigeria's Rollout of GMO Cowpea.<https://allianceforscience.cornell.edu/blog/2020/05/covid-19-may-stall-nigerias-rollout-of-gmo-cowpea/> accessed. [Google Scholar]
9. Makoni M. 2020. COVID-19-hit Africa Agricultural Research Feels the Pinch. The Scientist <https://www.the-scientist.com/news-opinion/in-covid-19hit-africa-agricultural-research-feels-the-pinch-67794>. [Google Scholar]
10. Oerke E.C. Crop losses to pests. *J. Agric. Sci.* 2006;144:31–43. [Google Scholar]