



COVID-19 and the plant health: an unexpected blessing

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Abstract: The viral pandemic caused by the COVID-19 due to its spread across the globe has been the greatest worry for mankind. It has shattered our day-to-day life activities through the imposition of lock- or shutdown and consequently affected the physical, mental, psychological, and socio-economic status of the human beings. On the contrary, it has also acted as a brake on environmental degradation activity by reducing all pollution load levels on the environment. The reduction of harmful pollutants either from air or water is a good indication for plants' growth and development. The present paper highlights such possible outcomes of the COVID-19 pandemic issue on the environment focussing health perspective of plant kingdom particular.

Keywords: Air pollution; COVID-19; Improved environment; Plant health; Water pollution

Introduction

The pandemic COVID-19 has severely impacted our society through its disturbing effects on men's health and related issues across the world (Patra *et al.* 2020; WHO, 2020). The consequences of the financial crash due to such an epidemic has put its stamp on the mental and socio-economic status of the people throughout the planet (Rajkumar, 2020; WTO, 2020).

Since the viral particles are being transmitted among the population through the respiratory droplets, countries worldwide resort to the method of lock or shutdown to break the disease chain. As a result, this has severely affected all forms of human activity, including environmental derogatory. These processes have continued from a few weeks to months and now also continuing, but the normal situation did not come in everywhere. The air and water quality index have been improved due to the reduction of automobile and aviation emissions, industrial effluent discharge and emissions, urban and agricultural waste production, fertilizers and pesticides based

toxic wastes, intolerable vibration sound etc. All such reduction of pollutant load has its bearing on environmental health, as a result, there have been reports about the restoration of natural ecosystem health in many pockets of the world (Chakraborty and Maity, 2020; Muhammad *et al.* 2020). The present communication's specific purpose is to predict plants' health status changes due to coronavirus lockdown.

Evidence on the detrimental impact of plants under air and water pollution

In modern civilization, various anthropogenic activities suddenly increased to fulfill the satisfactory demands of an increasing population. On the other hand, encouragement of such practices loaded the diversified toxic pollutants in the air, water, and soil, which adversely impacted different groups of plant species. The most toxic and dangerous air pollutants are either gaseous or particulate. However, gaseous substances like sulfur dioxide, nitrogen dioxide, fluorides, ammonia, ground-level ozone, and some volatile organic compounds significantly

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impact on plant kingdom at the morphological, physiological, and biochemical, and molecular level. Further, particulate matter such as cement dust, magnesium oxide, lime and gypsum, dust particles from various organic and mineral sources, pesticides, insecticides and herbicides are very sensitive which are impacting different detrimental effects on the growth and development of plants. In particular, leaf necrosis, stomatal damage, loss of membrane permeability, premature senescence, increased reactive oxygen species, alteration of antioxidant systems, loss of rate of photosynthesis, abnormality in carbohydrates, protein and lipid production, etc. are the top most toxicological symptoms as reported from several findings across the world against such pollutants. The above disturbances ultimately destroy the cell or tissue or organ or the whole organism. However, the impact rate varies from species to species and interactions against specific toxic pollutants (Villarini *et al.* 2009; Gheorghe and Ion, 2011; Seyyednejad *et al.* 2011; Saxena and Kulshrestha, 2016; Rout and Panda, 2019). Similarly, water pollution is another major concern towards causing harmful impacts on plant health, which are majorly influenced by the involvement of various harmful substances that are generously produced from various manmade activities like agricultural runoff, discharge of industrial and municipal waste, mining, burning of fossil fuels, smelting, electroplating, oil spills, etc. The involvement of these kinds of activities has significantly released some distinct toxic chemicals and heavy metals that are adversely impacting various plant kingdom groups' cellular and subcellular systems (Inyinbor Adejumoke *et al.* 2018; Kerry *et al.* 2018). Aquatic plants are directly reacted to toxic pollutants as available in polluted water bodies whereas, the terrestrial plants are indirectly affected through the soil medium after associated with contaminated water. The signs of

phytotoxicity such as retardation of growth, dead spots on the surface of leaves, sufficiency and deficiency of some nutritional elements, eutrophication, causing oxidative stress, and imbalance in photosynthetic systems are frequently observed after bioaccumulation of complex and noxious materials through the root system (Kislitsina and Borisova, 2015; Mahmoud and Ghoneim, 2016; Akhkha *et al.* 2019; Feng *et al.* 2019).

Predictions and perspective impact on plant health

Recent studies on the impact of COVID-19 and the subsequent lockdown process suggest improving air quality by a sharp reduction of carbon and nitrogen oxide emissions and fine particulate matters that vary at different levels with respect to towns or countries (Le Quéré *et al.* 2020; Zambrano-Monserrate *et al.* 2020). Similarly, water quality improvements have also been reported (basically from either print or electronic media) from various nations (Ecotricity, 2020; Singhal and Matto, 2020). However, the literature related to the experimental study is limited (Yunus *et al.* 2020). As discussed, the diversified group of pollutants after deposition in either air or water leads to create an unhealthy environment for the growth and development of plants. On the other hand, the reduction of various pollutants (due to ongoing lockdown) is expected to be impacted on a positive way for the betterment of plant health, which includes bushy growth, development of firm leaves, well-formed and bright colour flowers and fruits, well-developed root and shoot systems, no signs of diseases, etc. To support these expected happenings, the most significant report related to the reappearance of some aquatic plant species (reported from different places in Italy) is considered evidence of the happy living of plant kingdom (Clifford, 2020). Similarly, better vegetation is also highlighted during the COVID-19 lockdown and pointed about the

possibility because of no interference of humans (Nongrum, 2020).

Conclusion

No doubt, the emergence and the subsequent spread of COVID-19 pandemic has been the greatest threat to human survival. However, this disease has restricted the human intervention in nature directly or indirectly by reducing the pollution load and restoring ecosystem health. Therefore, it can be concluded that perhaps the pandemic COVID-19 has taught a lesson to mankind to reframe themselves from causing environmental or vegetational deterioration for their sustainable survival.

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