

## International Year of Plant Health 2020 to focus on threat of pests on food security

The United Nations General Assembly declared 2020 as the International Year of Plant Health and the year provides a lifetime opportunity to the global community to ponder over the issue and raise global awareness at scientific and administrative fora on this vital issue which has imminent impact on the food security. There are reports about the crop losses due to the diseases which will further aggravate with the changing climate<sup>1</sup>. The Food and Agriculture Organization estimates that annually, between 20% and 40% of global crop production are lost due to pests. Each year, plant diseases cost the global economy around \$ 220 billion, and invasive insects around US\$ 70 billion<sup>2</sup>. In another study, plant diseases were estimated to cause 15–30% yield losses globally<sup>3</sup>. The losses are based on the documents associated with 137 pathogens and pests associated with wheat, rice, maize, potato and soybean worldwide. This analysis contributes critical information to prioritize and draw strategies for crop health management to improve the sustainability of agro ecosystems in delivering services to societies.

Diseases and pests reduce yields and quality in crops and their aggravation in a particular region can ultimately lead to food insecurity, starvation and deaths. Crop losses due to diseases and pests have resulted in the deaths of millions of people throughout the world and also created waves of migration. Crop losses due to pests and diseases even modified the trade and economy of many countries, and inflicted colossal economic damage and suffering. Classical example of plant pathogen catastrophe is the *Phytophthora infestans* fungus which caused the Irish potato famine (1845–1852), during which one million people died and a further million emigrated from Ireland, causing the population to decrease by about 24% (ref. 4). Late blight is probably the single most important disease of potatoes and tomatoes worldwide. Yield losses caused by late blight and the cost of control measures have been estimated to exceed 6.7 billion dollars annually and the disease is a major threat to food security worldwide<sup>5</sup>. Another major misfortune is associated with the brown spot disease of rice

(*Helminthosporium oryzae*) and the failure of the rice crop caused 'The Great Bengal Famine' resulting in the death of people ranging from 1.5 to 3.5 million people between 1942 and 1946. Coffee leaf rust caused by a fungus, *Hemileia vastatrix*, devastated coffee production in Sri Lanka (Ceylon) in the 19th century. The cumulative effect of the current outbreak of mountain pine beetle (*Dendroctonus ponderosae*) in British Columbia, Canada, killed 13 million ha of lodgepole pine forest and released an estimated 270 million tonnes of carbon, converting the forest from a carbon sink to a large net carbon source<sup>4</sup>. A recent study estimated global annual yield losses of wheat due to stem rust could reach 6.2 million tonnes, which is equivalent to \$ 1.12 billion<sup>6</sup>. In wheat, the most imminent threat is now from stem rust (*Puccinia graminis tritici*) strain which was discovered in Uganda in 1998 and has subsequently spread across Africa, Asia and the Middle East. Similarly, banana wilt caused by *Xanthomonas* affects the food security of 70 million people in Uganda<sup>7</sup>. Potential economic losses between US\$ 200 and 295 million a year due to delayed intervention have been estimated for Uganda. In Tanzania and Rwanda, a 35% drop in sales and doubling of prices due to *Xanthomonas* wilt were reported. In Uganda, 50% less production has been reported for 2014, compared to 2002, whereas the area under banana cultivation declined by 39%.

In recent times, *Xylella fastidiosa* has emerged as deadly bacterium that attacks economically important crops such as olive, citrus or plum trees and grapevines. Since 2015, it is rapidly spreading from the Americas to Europe and Asia. This bacterium costs \$ 104 million per year in wine losses in California alone<sup>2</sup>. In Italy, the bacteria have led to the decline of 180,000 hectares of olive groves and constitute a threat not only to Italy's economy but to the economies of all Mediterranean countries. Maize crop is also under serious threat due to the spread of Fall Armyworm (FAW) (*Spodoptera frugiperda*) in different parts of the world including India. This pest has caused serious losses in Rwanda where maize is grown in over 31,2700 ha in 11

districts across the country<sup>8</sup>. Last year, about 5% of production was lost. But, based on the current FAW infestation level, the yield loss will be higher (up to 50%) in the current farming season if it is not contained. Last year, FAO warned that, if left unchecked, FAW could push more than 300 million people into hunger and lead to annual economic losses of up to \$ 4.8 billion from maize production alone. Another pest, oriental fruit fly (*Bactrocera dorsalis*) has affected trees such as avocado, banana, guava and mango in at least 65 countries. In Africa, ban on import trade due to oriental fruit fly infestations caused annual losses of around \$ 2 billion<sup>2</sup>. As the general public might not be aware of the importance of plant health and of the severe consequences of crop diseases, declaring 2020 the International Year of Plant Health will certainly raise awareness at the global level and because spreading information and awareness globally is an excellent strategy to improve the situation in the long term. Protecting plant health can help us end hunger, reduce poverty, protect the environment and boost economic development.

1. Gautam, H. R., Bhardwaj, M. L. and Kumar, R., *Curr. Sci.*, 2013, **105**(12), 1685–1691.
2. <http://www.fao.org/news/story/en/item/11-87738/icode/>
3. Savary, S., Willocquet, L., Pethybridge, S. J., Esker, P., McRoberts, N. and Nelson, A., *Nat. Ecol. Evol.*, 2019, **3**, 430–439.
4. [www.bbc.com/news/science-environment-15623490](http://www.bbc.com/news/science-environment-15623490)
5. [www.nytimes.com/2019/07/30/science/tomato-potato-agriculture-blight.html](http://www.nytimes.com/2019/07/30/science/tomato-potato-agriculture-blight.html)
6. Pardey, P. G. *et al.*, *Science*, 2013, **340**(6129), 147–148.
7. Ocimati, W., Bouwmeester, H., Groot, J. C. J., Tiftonell, P., Brown, D. and Blomme, G., *PLoS ONE*, 2019, **14**(4), e0213691.
8. [www.newtimes.co.rw/news/farmers-alert-fall-armyworm-strikes-again](http://www.newtimes.co.rw/news/farmers-alert-fall-armyworm-strikes-again)

H. R. GAUTAM<sup>1,\*</sup>  
M. L. BHARDWAJ<sup>2</sup>

<sup>1</sup>Department of Plant Pathology, and  
<sup>2</sup>College of Horticulture,  
Dr Y. S. Parmar University of  
Horticulture and Forestry,  
Nauni 173 230, India  
\*e-mail: hrg\_mpp@yahoo.com