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Plant Diseases and Food Security: An Overview

Fazal ur Rehman[1*], Nageen Naz[2] and Maria Kalsoom[3]

[1]Department of Plant Pathology, College of Agriculture, University of Sargodha, Pakistan
[2]Government College Women University Faisalabad, Pakistan
[3]Institute of Food Science and Technology, University of Sargodha, Pakistan

*Corresponding Author
Fazal ur Rehman*
E-mail:
fazalurrehman107@gmail.com

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INTRODUCTION

A large number of plant pathogens cause diseases in agricultural fields (Kalsoom et al., 2020). They can range from viroids of a few hundred nucleotides to higher plants. Their results range from mild symptoms to disasters in which vast areas are devastated by food crops. The global food supply shortage, where at least 800 million people are inadequately fed, is compounded by devastating plant diseases (other then these pathogenic microbes, some beneficial microbes are also present in Phyllosphere (Rehman et al., 2020a) as well in Rhizosphere and Rhizoplane (Rehman et al., 2020b). It is difficult to monitor plant pathogens because their distributions are complex in time, space, and genotype. They grow most powerfully, always overcoming the opposition that might have been the crop breeder's challenging accomplishment. It is necessary to define the issue and explore solutions in order to overcome the losses they cause. At the scientific level, quick and precise identification of the causative organism, precise estimation of the severity of the disease and its impact on production, and identification of its mechanisms of virulence are needed. The reduction of the inoculum of the pathogen, the inhibition of its pathogenicity mechanisms and the enhancement of genetic diversity in the crop can then reduce the disease. A significant role to play is traditional plant breeding for resistance, which can now be encouraged by marker-assisted selection. With genes that impart resistance, there is also a role of transgenic modification. There is a need at the political level to understand that plant diseases are endangering our food supply and to commit sufficient resources to their management. More than 800 million people lack sufficient food; 1.3 billion continue living on less than $1 per day and at least 10percent of total of the world's food production is lost with plant diseases.

The depiction of these statistics with food shortages and the destruction to agricultural production caused by plant diseases cannot be overlooked by plant pathologists.

Virus Disease

Virus disease is not thought to be a significant cause of crop failure by certain agricultural economy authorities, although the role of so many virus diseases in limiting agricultural production has been emphasized in recent and past relevant literature. Data analysis obviously demonstrates the significant influence of viral diseases on agricultural productivity, the management of which carries high economic costs. To assess the potential benefit, an effective study of the damage incurred by viral pathogens and the benefits resulting from the successful control of pathogens should be carried out for individual crops in each state or region. So many plant viruses are extremely contagious and are often drastic in their effects on plants. Almost all reduce agricultural productivity seriously. Viruses cause or trigger various abnormalities and a huge amount of money is invested on trying to prevent virus diseases from becoming catastrophic. Losses caused by any pathogen can not be directly measured because they are so variable in potential yield and damage. It is particularly difficult to experimentally assess the losses attributable to virus diseases because it is extremely hard to prevent contamination of healthy control plants and inoculation under vector-proof circumstances may not accurately reflect what occurs under environmental circumstances. In comparison to the situation with invertebrate pests, where casualties are generally related to the population densities of the pests, the prevalence of causal viruses or the magnitude of the attack are not accurate guides to the amount of damage caused. In a few pathogens, attempts have been made to create relationships between the loss of final yield and certain indicators, such as disease occurrence, severity and length, or between combinations thereof, but the relationships tend to be true only under conditions which are strictly specified.

Bacterial Disease

Plant diseases caused by bacterial pathogens impose severe restrictions on crop production and, on a global scale, cause large annual losses. It can be extremely difficult to achieve consistent effective management of these diseases, and management capacity is often impacted by growers' dependence on highly disease-susceptible cultivars due to consumer preferences and environmental conditions that favor pathogen growth. Existing and growing problems with bacterial diseases and problems found in new geographical regions are in the headlines, but the list of problems with bacterial diseases with few successful management options is long. Because of the narrowing areas of agricultural land, the ever-increasing worldwide human population requires the sustained stable production of a safe food supply with increased returns. The detection and implementation of sustainable disease management strategies for bacterial diseases is a major factor in ensuring the sustainability of crop production systems with predictable yields. Additionally, due to the growing evolution of resistance to existing bactericides, the detection of novel management strategies has also come to the fore.

Fungal Disease

The Irish starvation of 1845/46, which was caused by the failings of the potato crop in Europe just because of one fungal diseases, the Potato Late Blight, stands out among the illustrations of how damaging a crop disease can be (caused by a filamentous fungus-like member of the Oomycota, Phytophthora infestans). It is an amazing storey of how, while leading to the deaths of one in eight of the Irish population, a crop pathogen influenced the structure of our civilization and our understanding of nature. In addition, data reviewed by scientists suggest that an emerging species of fungus is behind the problem in 70 percent of cases where infectious disease causes the extinction of an animal or plant type. Fungal pathogens are currently destroying at least 125 million tons

of the five top agricultural crops — rice, wheat, maize, potatoes and soybeans — annually, which could instead be used to nourish those five food crops. The large proportion of calorie intake by individuals are provided by these crops. The destruction to rice, wheat and maize caused by fungi alone costs worldwide agriculture $60 billion per year. For those in the developing countries, where 1.4 billion people are living on much less than $1.25 a day and depend more highly on these low-cost foods, the consequences are overwhelmingly devastating. More than just productive output, diseases such as rice blast, soybean rust, stem rust in wheat, corn smut in maize and late blight in potatoes have an impact; many have broad socio-economic costs.

CONCLUSION

Plants account for about 80 percent of the human nutrition. Even so, they are necessary for food security, or the ongoing access to adequate, accessible, secure and healthy food for all of us to live active and healthy lives. Food safety is threatened by plant pests and diseases because they can damage crops, thereby reducing food availability and access, and increasing food costs. The palatability of foods can also be negatively affected by plant pests and diseases, resulting in changes in the traditional food preferences of populations. Today, plant pests and diseases pose a greater threat to food security than ever before, owing to increasing global trade and a changing climate, as global trade increases the change of these pests from their native environments and changing climates create new favorable conditions for plant pests and diseases. The losses of 20 to 40 percent of global food production are caused by plant pests and diseases.

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