frontiers | Frontiers in Agronomy

TYPE Editorial
PUBLISHED 16 January 2023
DOI 10.3389/fagro.2022.1104122

OPEN ACCESS

EDITED AND REVIEWED BY
Monica Höfte,
Ghent University, Belgium

*CORRESPONDENCE
Tariq Mukhtar
drtmukhtar@uaar.edu.pk

SPECIALTY SECTION
This article was submitted to Disease Management, a section of the journal Frontiers in Agronomy

RECEIVED 21 November 2022
ACCEPTED 30 December 2022
PUBLISHED 16 January 2023

CITATION
Mukhtar T, Vagelas I and Javaid A (2023) Editorial: New trends in integrated plant disease management.
Front. Agron. 4:1104122.
doi: 10.3389/fagro.2022.1104122

Editorial: New trends in integrated plant disease management

Tariq Mukhtar[1]*, Ioannis Vagelas[2] and Arshad Javaid[3]

[1]Department of Plant Pathology, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan, [2]School of Agricultural Sciences/Department of Agriculture Crop Production and Rural Environment, University of Thessaly, Magnesia, Greece, [3]Department of Plant Pathology, Faculty of Agricultural Sciences, University of the Punjab, Lahore, Pakistan

KEYWORDS

plant disease management, biocontrol, new trends, resistance, integration

Editorial on the Research Topic
New trends in integrated plant disease management

It has become imperative for agricultural scientists, researchers, and several governmental and non-governmental institutions and research organizations around the globe to motivate, assist and support the enforcement of Integrated Plant Disease Management (IPDM) due to growing concerns regarding unsustainable tendencies in the management of plant diseases. The importance of plant disease control for sustainable development in agriculture, including technological advancements and new delivery methods, has increased as a result of recent improvements in IPDM. Biotechnological approaches, genetic engineering in particular, offers new techniques for reducing dependency on hazardous chemical pesticides. The agrochemical sector is creating highly specialized and targeted products, and new biological control agents are being used more frequently. The practice of organic farming has become well-known around the world and is closely related to IPDM systems.

The number of people engaged in producing food as well as the area under agricultural cultivation in various regions of the world is declining every year. In much of the agricultural produce obtained thus far, numerous crop protection strategies played a pivotal role. However, continued reliance on these antiquated and traditional practices has put today's food security in jeopardy. Modern plant protection has undergone a revolution as a result of pesticide resistance, various market forces, and anticipated detrimental effects associated with the use of pesticides. Hence, the nonstop reliance on synthetic pesticides has been found to be unacceptable.

IPDM will be among the most suitable and pertinent methods under the prevailing circumstances for effective battling plant diseases to increase crop productions. This strategy requires the application of contemporary technologies in IPDM with various cropping systems. This scientific evaluation of plant protection trends considers a number of developments such as new mechanisms of action, apprehensions about pesticide residues, new tools to stop pathogen resistance and emergence of new pathogen races, assessment of novel biocontrol agents, up-to-date molecular tools etc. Modern technical methods are becoming increasingly important, especially the use of remote sensing instruments that enable accurate and systematic pathogen surveillance, smart sprayers, and the creation of novel, high-yielding disease-resistant cultivars. This integrated management system might also work with genetic approaches and techniques including marker technology, plant-

incorporated protectants, RNAi, and stacked traits. These are desperately and urgently needed and are a great challenge. The idea of IPDM will provide an opportunity for all the scientists of the world to work together to develop integrated management strategies for plant pathogens and diseases.

Keeping the above-mentioned facts in view, scientists were invited to submit research papers related to new trends in integrated plant disease management under the section Disease Management. Five researchers contributed in this regard. In the first contribution, Zheng et al. described diseases and pests infecting oilseed rape. They highlighted important issues that can threaten its production and suggested novel and innovative strategy like synchronizing the regional crop frequency on the landscape level for the control of these pests. In the second article, Mansoori et al. proved that methanolic extracts of flowers and leaves of *Lantana camara* had substantial antioxidant and antimicrobial activities. Numerous tested phytochemical components were found in varying levels in both extracts depending upon variances in their antioxidant and free radical scavenging properties. *In vitro* antimicrobial tests revealed that both extracts of *L. camara* suppressed the growth of plant pathogens like *Pyricularia oryzae* (syn. *Magnaporthe oryzae*), *Xanthomonas axonopodis* pv. *glycines*, and *Xanthomonas oryzae* pv. *oryzae*. In the third article, Ding et al. reported that expression of the flavonoid regulator AtMYB12 in tobacco not only raised the levels of flavonoids but also boosted the defense against *Ralstonia solanacearum*, *Alternaria alternata*, *Colletotrichum nicotianae*, and aphids, therefore, flavonoid regulator AtMYB12 is a good candidate for breeding multifunctional resistance crops in the future. The fourth article discusses the biochemical profile of rice phenotypes showing different levels of resistance to rice brown spot caused by *Bipolaris oryzae*. The concentration of defense enzymes viz. Catalase (CAT), Phenylalanine ammonia-lyase (PAL), Polyphenol oxidase (PPO), Peroxidase (POD), and b-1,3-Glucanase enzymes may be employed as biochemical markers for the identification of disease resistant genotypes at early stages of the disease because they were found to have a different response in susceptible and resistant genotypes. Understanding the resistance mechanisms against rice brown spot is aided by the accumulation of defense related enzymes at various time points and disease severity levels (Ashfaq et al.). In the last article, Rasool et al. discovered that transgenic expression of synthetic replication associated protein and synthetic coat protein resulted in only minor symptoms and decreased the accumulation of Begomovirus-Betasatellite in *Nicotiana benthamiana*. Their findings supported the possibility of using the CPsyn and Repsyn genes for the resistance of Cotton leaf curl Kokhran virus-Burewala strain (CLCuKoV-Bu) and associated betasatellites connected to cotton leaf curl disease (CLCuD), as well as the possibility of developing a pathogen derived resistance (PDR) mechanism for the control of CLCuD. It is hoped that the findings of these researchers will lead to eco-friendly management of important diseases and avert yield losses.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note