EDITORIAL

Insights in Plant-Microbe Interaction through Genomics Approach (Part III)

Jagajjit Sahu[1], Anukool Vaishnav[2] and Harikesh B. Singh[3,*]

[1]National Center for Cell Sciences (NCCS), University of Pune Campus, University Road, Ganeshkhind, Pune-411007, Maharashtra, India; [2]Department of Biotechnology, Institute of Applied Sciences and Humanities, GLA University, Mathura-281121, Uttar Pradesh, India; [3]Somvanshi Research Foundation,13/21 Vikas Nagar, Lucknow-226022, Uttar Pradesh, India

This part brings three interesting articles which are very unique and enlightening reviews on important areas of plant-microbe interaction. The parts I and II have been able to present extensive insights into plant-microbe interactions in various fields which is in continuation in this part too [1, 2]. This part puts light on Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR)/Cas9 (CRISPR-associated protein 9) Era plant-microbe interaction, translational research on Fusarium Head Blight (FHB) in Wheat and plant-virus interaction with reference to viral effector proteins.

Beginning with the article by Prabhukarthikeyan and co-authors, it presents the emerging CRISPR/Cas9 approach which has gained immense attention in the last few years [3]. The authors here have started with a brief introduction about the plant-microbe interactions and the CRISPR/Cas9 technique and continued with descriptive but precise mention of the use of this technique for resistance against fungal, bacterial and viral disease. Apart from these, the use of CRISPR/Cas9 technique in case of beneficial microbes and phytopathogens is also discussed. Collections of information from earlier studies have been collated into a table to highlight the target genes. The table mentioned very important genes such as WRKY, eIF4E, *etc*. which are well-known to be the regulators of many important signaling pathways in various crops. The authors have pointed the fact that despite this powerful technique in our hands for a time, it has only been extensively used in validating the previously identified genes/pathways and still need to be employed in the successful development of durable resistance in crops against multiple pathogens.

Teli *et al*. discuss a major threat to most cereal crops such as wheat and barley, commonly known as Fusarium head blight or scab [4]. The pathogenic strains of Fusarium are generally devastating for the host plants due to their adaptability and multi-faceted nature [5]. History of FHB has documented evidences of most threatening epidemics during the years 1917, 1919, 1928, 1932, and 1935 in the United States [6]. The authors have provided a comprehensive delineation on FHB along with its symptoms, complexity and survivability. There are figures to illustrate the predominance of FHB associated pathogens worldwide, biochemical foundation of host-pathogen interaction in FHB and cutting-edge techniques such as RNA interference (RNAi) and CRISPR to remodel the host defence. There are two tables presenting the information regarding the RNA and CRISPR interference mediated defense against FHB. Extensive description about various strategies such as the conventional breeding, molecular marker, transgenic and non-transgenic genome engineering approaches has been well-documented in this article to offer insights into host-pathogen interaction in FHB.

The third article by Marwal and Gaur describes specifically the plant-virus interactions and viral effector proteins [7]. Plant defense machinery is very difficult to understand as it behaves differently depending upon the type of pathogen attack. It is even more critical in case of virus infection as all viruses infecting plants can augment their transmission leading to damaging the host plants. The authors have provided a schematic illustration of R gene mediated resistance in plants, signaling molecule induction, plant antiviral pathways and viral counter-defenses as well as virus effector proteins in plant resistance development. Detailed understanding of R-Avr interactions and mode of their actions can lead to unravel the mystery of plant-virus interactions and this article aimed for providing available information in a brief and precise way to help broaden our knowledge in this regard.

*Address correspondence to this author at the Somvanshi Research Foundation,13/21 Vikas Nagar, Lucknow-226022, Uttar Pradesh, India; Tel: +91542-6702583; +91542-6702576; Cell: 09415355571; E-mail: hbsinghbhu01@gmail.com

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AUTHORS' CONTRIBUTIONS

All authors JS, AV, HBS, contributed in writing this Editorial article for the research topic "Insights in plant-microbe interaction through genomics approach (Part III)".

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