Dr. Zuhua He is a professor at the Center for Excellence in Molecular Plant Sciences /Institute of Plant Physiology & Ecology, Chinese Academy of Sciences (CAS). He earned his M.Sc degree in Plant Genetics and Breeding and completed his Ph.D. in Plant Pathology at Zhejiang University (formerly Zhejiang Agriculture University). Following his graduate studies, he pursued postdoctoral research at the Plant Molecular and Cellular Biology Lab at The Salk Institute for Biological Studies and the Department of Plant Pathology at UC Davis. In December 2000, he was appointed as a full professor and principal investigator at the Institute of Plant Physiology & Ecology, Shanghai Institutes for Biological Sciences, CAS.

Disease resistance has been a major target of breeding to ensure crop production while minimizing the reliance on fungicides, thereby promoting environmentally friendly agriculture. Dr. He’s research interests include functional genomics, mechanisms and application of plant disease resistance in particular broad-spectrum disease resistance genes, and the cross-talk between defense and growth/yield. The overall goals of his laboratory are to identify genes and mechanisms involved in disease resistance, elucidate the tradeoffs between growth and defense, and establish a cutting-edge research system for dissecting and reconstructing broad-spectrum disease resistance with yield balance in crops. In particular, his lab focuses on the durable and broad-spectrum blast resistance locus *Pigm* and discovered a novel mechanism that balances high disease resistance and yield. His lab also systemically dissects programmed cell death (PCD) and broad-spectrum disease resistance. Moreover, they have identified several important yield genes that integrate with disease resistance. Therefore, the knowledge, genes and technologies developed in his lab have greatly facilitated crop molecular breeding for high yield potential and broad-spectrum disease resistance. His lab research has been published in many high-impact journals including *Cell*, *Nature* and *Science*, garnering widespread recognition and acclaim within the scientific community, and He was recognized as highly cited researcher by Clarivate.

Since establishing his own laboratory, Dr. He has achieved the following major advances:

1. **Gene discovery and mechanisms of NLR-mediated broad-spectrum blast resistance.** His group has been focusing on the broad-spectrum and durable blast resistance locus *Pigm*, uncovering the molecular mechanisms that regulate Pigm-mediated blast resistance. They discovered a novel RRM-domain transcription factor PIBP1, which directly interacts with PigmR and other NLRs to regulate plant immunity. Additionally, they elucidated the role of NLRs in guarding defense metabolism to mount PTI and ETI in rice blast resistance.
2. **Conserved immune suppression network in cereals.** To address how the plant intrinsic defense machinery fine-tunes immune homeostasis in their natural habitats, his group discovered an immune network in cereals that orchestrates immune homeostasis, centering on a Ca2+-sensor, ROS scavenging and protein surveillance. The host protein and pathogen effector suppress plant immunity through the same cascade via structural mimicry.
3. **Identification of rice NLR-TF immune module XA48-OsVOZ1.** XA48 perceives the ancient pathogen effector AvrXa48 to activate ETI. This immune module underwent subspecies-specific artificial selection between *indica* and *japonica* rice. By pyramiding XA48-mediated ETI and XA21-mediated PTI, his group resurrected wild rice broad-spectrum resistance, establishing rice PTI and ETI networks and providing a breeding paradigm to develop disease-resistant crops by exploiting wild relatives’ immunity.
4. **Systematic dissection of programmed cell death (PCD) and immune activation in rice.** His group identified several important components involved in defense against rice pathogens and systematically dissected PCD and immune activation in plants.
5. **Cross-talks between immunity/stress and development.** His group systemically dissected the mechanisms of cross-talks between immunity/stress and development, particularly including hormone- and/or receptor-like protein pathways. They discovered several new metabolism and signaling components in plant hormone regulation and elucidated their functions in defense and growth. Particularly, they have identified two key rice grain-filling genes, *GIF1* and *GAF1* (*OsPHO1;2*), which regulate sugar metabolism (grain-filling) and immunity. furthermore, they also recognized the receptor-like kinase ERACTA as a major QTL for stress-triggered cell death, which positively regulates stress tolerance and disease resistance under diverse stresses. Importantly, overexpression of *ERACTA* not only improves plant growth and seed production but also increases stress tolerance.
6. **Establishment of research system for plant comparative immunity.** His lab established an excellent research system for comparative immunity between rice (monocot) with *Arabidopsis* (dicot) models. They discovered an MKP-MAPK protein phosphorylation cascade controlling vascular-specific immunity conserved in rice and *Arabidopsis*.