

Xiyu Ma

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Education

2010 B.S., Life Science, University of Science and Technology of China, Hefei, China
2017 Ph.D., Biochemistry, Texas A&M University, College Station, TX

Research Experience

Kansas State University, Manhattan, KS 2025-present

Assistant Professor, Department of Plant Pathology

- Investigating molecular mechanisms of plant innate immunity
- Developing new technologies for crop resistance

Boston Children's Hospital/Harvard Medical School, Boston, MA

Postdoctoral Fellow at Dr. Judy Lieberman Lab 2021-2025

- Investigated the mechanism of NK cell killing of ER-stressed tumor cells
- Identified novel substrates for Caspase-4 and Caspase-1
- Studied post-translational modification of pyroptosis mediator-Gasdermins

Texas A&M University, College Station, TX

Postdoctoral Associate at Drs. Ping He & Libo Shan Lab 2017-2021

Graduate Research Assistant at Drs. Ping He & Libo Shan Lab 2011-2017

- Studied mono-ubiquitination of a key protein kinase BIK1 by E3 ligase RHA3A/B and how it controls plant innate immunity
- Investigated the function of a lipid kinase DGK5 which is regulated via differential phosphorylation by BIK1 and MAP kinase
- Global ubiquitination analysis of flagellin-triggered signaling networks

Publications

Kim SI, **Ma X**, Kong L, Guo W, Xu L, Shan L, Zhang R, He P*. Global profiling of CPL3-mediated alternative splicing reveals regulatory mechanisms of DGK5 in plant immunity and phosphatidic acid homeostasis. *Genome Biology*. 2025 Mar 21;26(1):65.

Mormile B, Yan Y, Bauer T, Wang L, Rivero R, Carpenter S, Clement C, Cox K, Zhang L, **Ma X**, Wheeler T, Dever J, He P, Bogdanove A, Shan L. Activation of three targets by a TAL effector confers susceptibility to bacterial blight of cotton. *Nature Communications*. 2025 Jan 14;16(1):644.

Ma X, Lieberman J*. Poking holes in the blood-brain barrier. *Immunity*. 2024 Jun 11;57(6):1192-1194.

Du G, Healy L, David L, Walker C, El-Baba T, Lutowski CA, Goh B, Gu B, Pi X, Devant P, Fontana P, Dong Y, **Ma X**, Miao R, Balasubramanian A, Puthenveetil R, Banerjee A, Luo R, Kagan JC, Oh SF, Robinson CV, Lieberman J, Wu H. ROS-dependent S-palmitoylation activates cleaved and intact gasdermin D. *Nature*. 2024 Jun;630(8016):437-446

Kong L¹, **Ma X**^{1*}, Kim S, Zhang C, Li B, Thapa H, Chen S, Yeo I, Devarenne T, Munnik T, He P*, Shan L*. Dual phosphorylation of DGK5-mediated PA burst regulates ROS in plant immunity. *Cell*. 2024 Feb 1;187(3):609-623 (**Co-first, co-corresponding author**)

Santara SS, Lee DJ, Crespo A, Hu JJ, Walker C, **Ma X**, Zhang Y, Chowdhury S, Meza-Sosa KF, Lewandrowski M, Zhang H, Rowe M, McClelland A, Wu H, Junqueira C*, Lieberman J*. The NK receptor Nkp46 recognizes ecto-calreticulin on ER-stressed cells. *Nature*. 2023 Apr;616(7956): 348-356.

Ma X¹, Zhang C¹, Kim DY, Huang Y, He P, Vierstra RD, Shan L*. Ubiquitylome Analysis Reveals a Central Role for the Ubiquitin-Proteasome System in Plant Innate Immunity. *Plant Physiology*. 2021 Apr 23;185(4):1943-1965. doi: 10.1093/plphys/kiab011.

Ma X, Claus L.A.N., Leslie M.E., Tao K, Wu Z, Liu J, Yu X, Li B, Zhou J, Savatin D.V., Peng J, Tyler B.M., Heese A, Russinova E, He P*, Shan L*. Ligand-induced monoubiquitination of BIK1 regulates plant immunity. *Nature*. 2020 May;581:199-203

Wan W, Zhang L, Pruitt R, Zaidem M, Brugman R, **Ma X**, Krol E, Perraki A, Kilian J, Grossmann G, Stahl M, Shan L, Zipfel C, van Kan J, Hedrich R, Weigel D, Gust A*, Nuernberger T*. Comparing Arabidopsis receptor kinase and receptor protein-mediated immune signaling reveals BIK1-dependent differences. *New Phytologist*. 2019 Mar;221(4):2080-2095.

Lal NK, Nagalakshmi U, Hurlburt NK, Flores R, Bak A, Sone P, **Ma X**, Song G, Walley J, Shan L, He P, Casteel C, Fisher AJ*, Dinesh-Kumar SP*. The Receptor-like Cytoplasmic Kinase BIK1 Localizes to the Nucleus and Regulates Defense Hormone Expression during Plant Innate Immunity. *Cell Host Microbe*. 2018 Apr 11;23(4):485-497.

Zhou J, Liu D, Wang P, **Ma X**, Lin W, Chen S, Mishev K, Lu D, Kumar R, Vanhoutte I, Meng X, He P, Russinova E*, Shan L*. (2018) Regulation of Arabidopsis brassinosteroid receptor BRI1 endocytosis and degradation by plant U-box PUB12/PUB13-mediated ubiquitination. *Proc. Natl. Acad. Sci. USA*. 2018 Feb 20;115(8):E1906-E1915.

Ma X¹, Xu G¹, He P, Shan L*. Feature Review: SERKing coreceptors for receptors. *Trends in Plant Science*. 2016;21 (12):1017-1033.

Lin W¹, **Ma X**¹, Shan L, He P*. Review: Big roles of small kinases: the complex functions of receptor-like cytoplasmic kinases in plant immunity and development. *Journal of Integrative Plant Biology*. 2013 Dec;55(12):1188-97.

Lin W, Lu D, Gao X, Jiang S, **Ma X**, Wang Z, Mengiste T, He P, Shan L* (2013) Inverse modulation of plant immune and brassinosteroid signaling pathways by the receptor-like cytoplasmic kinase BIK1. *Proc. Natl. Acad. Sci. USA*. 2013 Jul 16;110(29):12114-9.

Unpublished manuscripts:

Ma X, Chen J, Guo K, Healy L, Khamiees O, Ruan J, Wu H, Lieberman J. Mechanism-based identification of Caspase-4 substrates by Pc-Dap trapping. *In preparation*.

Conferences

American Society of Plant Biologist (ASPB)	Austin, TX, July 2012
American Society of Plant Biologist (ASPB)	Minneapolis, MN, July 2015
Structural Biology Symposium	Houston, TX, March 2016
American Society of Plant Biologist (ASPB)	Austin, TX, July 2016
Fundamental Immunology & Its Therapeutic Potential (CSHL meeting)	Cold Spring Harbor Lab, NY, April 2017
American Association of Immunology (AAI)	Austin, TX, May 2018

Presentations

Borlaug Institute Monthly Seminar	May 28 th , 2015
Title: Ubiquitination in plant immune receptor complex regulation and signaling	
Poster Presentation (ASPB conference 2015)	July 2015
Title: Flagellin-induced monoubiquitination of BIK1 regulates Arabidopsis innate immunity	
Concurrent Symposium (ASPB conference 2016)	July 12 th , 2016
Title: Microbe-associated Molecular Pattern-induced Monoubiquitination of Receptor-like Cytoplasmic Kinase BIK1 in Arabidopsis Immunity	
Poster Presentation (CSHL meeting 2017)	April 27 th , 2017
Title: Differential phosphorylation of diacylglycerol kinase DGKB by PRR-associated kinase BIK1 and MAP kinase regulates plant immunity	
Title: PAMP-induced monoubiquitination of PRR-associated kinase BIK1 by an E3 ligase LUCKY positively regulates plant innate immunity	
Block Symposium (AAI conference 2018)	May 6 th , 2018
Title: PAMP-induced monoubiquitination of PRR-associated kinase BIK1 by an E3 ligase LUCKY positively regulates plant innate immunity	
Borlaug Institute Monthly Seminar	April 27 th , 2018
Title: How monoubiquitination of a kinase orchestrates plant immunity? BIK1 got LUCKY	
Invited zoom seminar (University of Texas, Austin)	May 6 th , 2020
Title: Ligand-induced monoubiquitination of BIK1 regulates plant immunity	
Invited zoom seminar (Hubei University of Technology, Wuhan, China)	May 17 th , 2022
Title: Ubiquitination in plant immune signaling: out of the classical degradation	
Poster Presentation (PCMM, BCH retreat 2023)	Sep 26 th , 2023
Title: Mechanism-based identification of Caspase substrates (Winner of Best Poster Award)	
Poster Presentation (PCMM, BCH retreat 2024)	Sep 24 th , 2024
Title: The protein translation machinery is a potential target of inflammatory caspases	

Teaching Experience

Dept. of Biochemistry & Biophysics, Texas A&M University

Teaching Assistant, Genetics Lab

Fall 2011, Spring 2012, Fall 2016

Dept. of Biochemistry & Biophysics, Texas A&M University

Guest lecture, Green Immunology Education & Outreach

August 2014; August 2016

Lecture titled 'Protein Ubiquitination and Degradation.'

Editorial Boards

2024- Associate Editor, Frontiers in Plant Science

2019- Frequent reviewer for Trends in Plant Science, The Plant Journal, Frontiers in Plant Science, Frontiers in Microbiology, Molecular Plant Pathology, Plant Communications

Awards

2018 AAI Trainee Abstract Award

2017 Dissertation fellowship (OGAPS, TAMU)

2016 ASPB travel grant

2015 Graduate Student Presentation Grant (OGAPS, TAMU)

2009, 2006 Outstanding Student Scholarship (USTC)

Google Scholar:

https://scholar.google.com/citations?hl=en&user=sfXIjPwAAAAJ&view_op=list_works&sortby=pubdate

Linkedin:

<https://www.linkedin.com/in/xiyu-ma-842288a3/>