Sheng Ying

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RESEARCH INTERESTS

Employing multidisciplinary approaches, including genetics, biochemistry, and multi-omics, to investigate the fundamental mechanisms underlying how model crops respond to and adapt to global climate challenges.

PROFESSIONAL EXPERIENCES

Mar 2021 – Dec 2024	Project Manager (Dr. Peter Lundquist, Michigan State University, East Lansing, MI) **Project**: Adaptive biochemical and physiological responses of maize hybrid lines to managed variables under abiotic stress.
Jan 2016 – Feb 2021	Post-Doctoral Researcher (Dr. Wolf Scheible, Noble Research Institute, Ardmore, OK) **Project**: Identification and functional characterization of novel phosphorus starvation inducible (PSI) genes in plants.
Jul 2012 – Dec 2015	Post-Doctoral Researcher (Dr. William Plaxton, Queen's University, Kingston, ON Canada) **Project**: **i)** Identification and characterization of native calcium-dependent protein kinases (CDPKs) that catalyze regulatory phosphorylation of bacterial-type PEP carboxylase (BTPC) in developing castor oil seeds (COS). **ii)** Functional characterization of *Arabidopsis* purple acid phosphatase (PAP) encoding genes in response to phosphorus stress.
Jul 2011 – Jun 2012	Research Associate (Dr. Yu Li, Chinese Academy of Agricultural Sciences, Beijing China) **Project**: Identification of drought stress-related genes in maize using a Genome-Wide Association Study (GWAS).

EDUCATION

2005-2011	Ph.D.	Biochemistry and Molecular Biology	China Agricultural University & Chinese Academy of Agricultural Sciences Advised by Dr. Tianyu Wang
2001-2005	B.Sc.	Biology	China Agricultural University

PEER-REVIEWED PUBLICATIONS (*Corresponding Author; [§]Graduate students under my supervision; Citation = 1240)

1. **Ying, S.*** (**2025**) Get the ball rolling: update and perspective on the role of chloroplast plastoglobule-associated protein under abiotic stress. *Journal of Experimental Botany, eraf011.*
2. Xu, L.[§]; Lan, Y.; Lin, M.[§]; Zhou, H.; **Ying, S.***; Chen, M. (**2024**) Genome-wide identification and transcriptional analysis of *AP2/ERF* gene family in pearl millet (*Pennisetum glaucum*). *International Journal of Molecular Sciences,* 25(5): 2470.

PEER-REVIEWED PUBLICATIONS (*Corresponding Author; §Graduate students under my supervision)

3. **Ying, S.**; Webster, B.; Gomez-Cano, L.; Shivaiah, K-K.; Wang, Q.; Newton, L.; Grotewold, E.; Thompson, A.; Lundquist, P.K. (**2024**) Multi-scale physiological responses of maize hybrids to nitrogen supplementation. *Plant Physiology,* 195: 879–899.
4. **Ying, S.***; Scheible, W.R. (**2023**) *REGULATOR OF FLOWERING AND STRESS* manipulates stomatal density and size in *Brachypodium*. *Physiologia Plantarum*, 175(5), e14008.
5. Lin, M.§; Dong, Z.; Zhou, H.; Wu, G.; Xu, L.§; **Ying, S.***; Chen, M. (**2023**) Genome-wide identification and transcriptional analysis of the MYB gene family in pearl millet (*Pennisetum glaucum*). *International Journal of Molecular Sciences*, 24(3): 2484.
6. **Ying, S.***; Scheible, W.R.; Lundquist, P.K. (**2023**) A novel stress-inducible protein family regulates drought tolerance and flowering time in *Brachypodium* and *Arabidopsis*. *Plant Physiology*, 191: 643-659.
7. **Ying, S.***; Scheible, W.R. (**2022**) A novel Calmodulin-interacting Domain of Unknown Function 506 protein represses root hair elongation in *Arabidopsis*. *Plant, Cell & Environment,* 45, 1796–1812.
8. **Ying, S.***; Blancaflor, E.B.; Liao, F.; Scheible, W.R. (**2022**) A phosphorus-limitation induced, functionally conserved DUF506 protein is a repressor of root hair elongation in plants. *New Phytologist*, 233: 1153-1171.
9. **Ying, S.*** (**2021**) Genome-wide identification and transcriptional analysis of *Arabidopsis* DUF506 gene family. *International Journal of Molecular Sciences*, 22(21): 11442.
10. Yeboah, A.; **Ying, S.**; Lu, J; Xie, Y.; Amoanimaa-Dede, H.; Boateng, K.G.A.; Chen, M.; Yin, X. (**2020**) Castor oil (*Ricinus communis*): a review on the chemical composition and physicochemical properties. Food Science and Technology, 41 (suppl 2).
11. **Ying, S.**; Hill A.T.§; Pyc, M.; Snedden, W.A.; Mullen, R.T.; She, Y.M.; Plaxton, W.C. (**2017**) Regulatory phosphorylation of bacterial-type PEP carboxylase by the Ca^{2+}-dependent protein kinase RcCDPK1 in developing castor oilseeds. *Plant Physiology*, 174: 1012-1027.
12. Fedosejevs, E.T.§; Gerdis, S.; **Ying, S.**; Pyc, M.; Anderson, E.M.; Snedden, W.A.; Mullen, R.T.; She, Y.M.; Plaxton, W.C. (**2016**) The calcium-dependent protein kinase RcCDPK2 phosphorylates sucrose synthase at Ser11 in developing castor oil seeds. *Biochemical Journal*, 473: 3667-3682.
13. Fedosejevs, E.T.§; **Ying, S.**; Park, J.; Anderson, E.M.; Mullen, R.T.; She, Y.M.; Plaxton, W.C. (**2014**) Biochemical and molecular characterization of RcSUS1, a cytosolic sucrose synthase isozyme phosphorylated *in vivo* at serine-11 in developing castor oilseeds. *Journal of Biological Chemistry*, 289: 33412-33424.
14. Del Vecchio, H.A.§; **Ying, S.**; Park, J.; Knowles, V.L.; Kanno, S.; Tanoi, K.; She, Y.M.; Plaxton, W.C. (**2014**) The cell-wall targeted purple acid phosphatase AtPAP25 is critical for acclimation of *Arabidopsis thaliana* to nutritional phosphorus-deprivation. *The Plant Journal*, 80: 569-581.
15. Hill, A.T.§; **Ying, S.**; Plaxton, W.C. (**2014**) Phosphorylation of a bacterial-type phosphoenolpyruvate carboxylase by a calcium-dependent protein kinase suggests a link between Ca^{2+}-signaling and anaplerotic pathway control in developing castor oil seeds. *Biochemical Journal*, 458: 109-118.
16. Robinson, W.D.; Carson, I.; **Ying, S.**; Ellis, K.; Plaxton, W.C. (**2012**) Eliminating the purple acid phosphatase AtPAP26 in *Arabidopsis thaliana* delays leaf senescence and impairs phosphorus remobilization. *New Phytologist*, 196: 1024-1029.

PEER-REVIEWED PUBLICATIONS ([§]Graduate students under my supervision)

17. Robinson, W.D.; Park, J.; Tran, H.T.; Del Vecchio, H.A.; **Ying, S.**; Patel, K.; McKnight, T.D.; Plaxton, W.C. (**2012**) The secreted purple acid phosphatase isozymes AtPAP12 and AtPAP26 play a pivotal role in extracellular phosphate scavenging by *Arabidopsis thaliana*. *Journal of Experimental Botany*, 63(18): 6531-6542.
18. Fu, J.; Zhang, D.F.; Liu, Y.H.; **Ying, S.**; Shi, Y.S.; Song, Y.C.; Wang, T.Y.; Li, Y. (**2012**) Isolation and characterization of maize PMP3 genes involved in salt stress tolerance. *PLoS ONE*, 7(2): e31101.
19. Lu, M.[§]; **Ying, S.**; Zhang, D.F.; Shi, Y.S.; Song, Y.C.; Wang, T.Y.; Li, Y. (**2012**) A maize stress-responsive NAC transcription factor, ZmSNAC1, confers enhanced tolerance to dehydration in transgenic *Arabidopsis*. *Plant Cell Reports*, 31: 1701-1711.
20. **Ying, S.**; Zhang, D.F.; Fu, J.; Shi, Y.S.; Song, Y.C.; Wang, T.Y.; Li, Y. (**2011**) Cloning and characterization of a maize bZIP transcription factor, ZmbZIP72, confers drought and salt tolerance in transgenic *Arabidopsis*. *Planta*, 235: 253-266.
21. **Ying, S.**; Zhang, D.F.; Li, H.Y.; Liu, Y.H.; Shi, Y.S.; Song, Y.C.; Wang, T.Y.; Li, Y. (**2011**) Cloning and characterization of a maize SnRK2 protein kinase gene, confers enhanced salt tolerance in transgenic *Arabidopsis*. *Plant Cell Reports*, 30: 1683-1699.

PATENT

Ying, S. et al. Conferring drought tolerance and biomass accumulation through the plant-specific RFS gene family. US Patent Application Serial No.: 18/165,840; US20240150785A1, publication date: May 9, 2024.

MANUSCRIPTS UNDER REVIEW OR IN PREPARATION (*Corresponding Author)

1. Hoh, D.; Kanazawa, A.; **Ying, S.**; Lundquist, P.K.; Kramer, D.M. (**2024**) Rate limiting steps in the onset and decay kinetics of rapid photoprotection. Under review for the *Plant, Cell & Environment*.
2. Devadasu, E.; **Ying, S.** et al. (**2024**) Dynamic analysis of maize plastoglobule under heat stress. In preparation for the *Plant Physiology.*
3. **Ying, S.*** et al. (**2025**) Multifaceted analysis reveals the impact of Brachypodium *REGULATOR OF FLOWERING AND STRESS* gene on drought stress response. In preparation for the *Plant Journal.*

COMPETITIVE RESEARCH GRANT ACQUISITION

Aug 2016 — Noble Summer Research Scholars in Plant Science Program (**PI**: Dr. Sheng Ying)

Title: Production of novel Pi-starvation reporter gene lines and screening of a chemical library of compounds that interfere with Pi-signaling in *Arabidopsis thaliana*

Award amount: $10,000

EXTERNAL FUNDING SOURCES

2023 — Plant Resilience Institute Travel Award ($685)

2023 — MTRAC AgBio Research, MI

2014, 2015 — Queen's University Post-Doctoral Travel Award ($500 × 2)

2013 – 2015 — Natural Sciences and Engineering Research Council of Canada (NSERC)

ORAL PRESENTATIONS AND POSTERS AT RESEARCH MEETINGS

2023 **American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America International Annual Meeting** (St. Louis, MO)

"Multi-scale physiological responses of maize hybrids to nitrogen supplementation" (Poster)

2022 **Gordon Research Conference – Plant Molecular Biology** (Holderness, NH)

"RFS regulates flowering time and drought tolerance in *Brachypodium* and *Arabidopsis*" (Poster)

2019 **International Conference on *Arabidopsis* Research** (Wuhan, China)

"Functional investigation of novel P-starvation response genes in plants" (Poster)

2017 **American Societies of Plant Biologists Annual Meeting** (Honolulu, HI)

"Reverse genetic approach to characterize and functional analyze novel phosphate-starvation induced (PSI) genes in plants" (Poster)

2015 **Canadian Society of Plant Biologists Eastern Regional Meeting** (Toronto, ON)

"The Ca^{2+}-dependent protein kinase, RcCDPK1, phosphorylates bacterial type PEP carboxylase at Serine-451 in castor oil seeds" (Oral presentation)

2014 **American Societies of Plant Biologists Annual Meeting** (Portland, OR)

"*In vivo* seryl phosphorylation of bacterial-type phosphoenolpyruvate carboxylase by RcCDPK1 suggests a link between calcium-signaling and the control of anaplerotic photosynthate-partitioning in developing castor beans" (Poster)

2013 **Canadian Society of Plant Biologists Annual Meeting** (Quebec City, QC)

"Biochemical and functional characterization of AtPAP25, a novel cell wall localized purple acid phosphatase induced by phosphate-starved *Arabidopsis thaliana*" (Oral presentation)

TEACHING EXPERIENCE

2015 **Introduction of Biology** (Instructor, BIO102 Fall, 2 Credits), Queen's University (ON, Canada)

- B.Sc. students; 2 classes of 30 students each
- Taught laboratory classes, including introductory lectures, and student supervision; Led separate weekly discussion sections; Prepared and graded exams and quizzes

2024 **Plant Physiology Laboratory** (Lecturer, PLB416L Spring, 2 Credits), Michigan State University

- B.Sc. students (10)
- Prepared syllabus and lecture materials; Design quizzes and exams
- Taught laboratory classes, including introductory lectures, and student supervision, and led separate weekly discussion sections

2024 **Plant Genetic Engineering** (Guest Lecturer, 2 Credits), Guangdong Ocean University (China)

- M.Sc. international students (6); English Teaching
- Taught the basic theories, experimental techniques, and research progress in plant genetic engineering

MENTOR EXPERIENCE

PHD STUDENTS

2011-2012	Min Lu	Institute of Crop Science, Chinese Academy of Agricultural Sciences Co-authored 1 research article (Lu et al. 2012, *Plant Cell Reports*)
2013-2015	Eric Fedosejevs	Department of Biology, Queen's University (ON, Canada) Co-authored 2 research articles (Fedosejevs et al. 2014, *Journal of Biological Chemistry*; Fedosejevs et al. 2016, *Biochemical Journal*)

MSC STUDENTS

2012-2014	Ally Hill	Department of Biology, Queen's University (ON, Canada) Co-authored 2 research articles (Ying et al. 2017, *Plant Physiology*; Hill et al. 2014, *Biochemical Journal*)
2013-2014	Hernando Del Vecchio	Department of Biology, Queen's University (ON, Canada) Co-authored 1 research article (Del Vecchio et al. 2014, *Plant Journal*)
2021-2023	Miaohong Lin	College of Agricultural Sciences, Guangdong Ocean University (China) Co-authored 1 research article (Lin et al. 2023, *International Journal of Molecular Sciences*)
2022-2024	Liang Xu	College of Agricultural Sciences, Guangdong Ocean University (China) Co-authored 1 research article (Xu et al. 2024, *International Journal of Molecular Sciences*)
2024-present	Qing Song	College of Agricultural Sciences, Guangdong Ocean University (China)

BSC STUDENTS

2014-2015	Kyla Stigter	BIO537 Research in Biology Department of Biology, Queen's University (ON, Canada) **Project:** "*Functional genomics indicates a minor role for the purple acid phosphatase isozyme AtPAP17 in Arabidopsis thaliana phosphorus metabolism*"
2015-2016	Nathan Doner	BCHM421/422 Advanced Biochemistry Laboratory Department of Biochemistry, Queen's University (ON, Canada) **Project:** *"Heterologous expression of the castor bacterial-type PEP carboxylase in Arabidopsis thaliana"*
2022-2023	Elizabeth Dubuque	MMG499 Undergraduate Research Department of Plant, Soil and Microbial Science, MSU **Project:** "*Effects of Agronomic Inputs on Maize Physiology*"

RESEARCH SUPERVISION

Summer Research Scholar

2016 Summer Thilani Jayakody — Noble Summer Research Scholars in Plant Science

- Supervised her research project at Noble Research Institute;
- Screening thousands of chemical compounds that interfere with Pi-signaling in Arabidopsis;
- Graduated (Ph.D. program) from the Department of Plant, Soil and Microbial Sciences, Michigan State University (2023).

Research Experiences for Undergraduates (REU) program

2023 Summer Juan Naasko — Co-supervised his REU project at Michigan State University

Project: *"Evaluating transcription factor MYBR87 as a biomarker for nitrogen response in maize seedlings"*

Research Internships

2013-2014 Frances Morin — Supervised her research project at Queen's University (ON, Canada)

- Taught basic molecular techniques (e.g., PCR, gene cloning, etc.);
- Supported her application (Recommender) for the medical school, University of British Columbia (2014).

2013-2015 Matthew Connell — Supervised his research project at Queen's University (ON, Canada)

- Taught recombinant protein purification techniques;
- Supported his application (Recommender) for the medical school, Queen's University (2015).

2017-2018 Sierra Long — Supervised her research project at Noble Research Institute

- Taught gene molecular cloning techniques;
- Supported her application (Recommender) for the Southwestern Oklahoma State University (B.Sc., 2018).

2018-2019 Hanna Walker — Supervised her research project at Noble Research Institute

- Taught Arabidopsis tissue culture techniques;
- Graduated from Southern Oklahoma Technology Center (High School).

2019-2020 Emily Torres — Supervised her research project at Noble Research Institute

- Taught medium preparation and tissue culture techniques;
- Graduated from Southern Oklahoma Technology Center (High School).

2021-2022 Shane Spencer — Supervised his research project at Michigan State University

- Performed tissue sampling and agronomic traits survey at MSU Farm;
- Supported his application (Recommender) for the Graduate School (Doctoral program) at Michigan Technological University (2022).

RESEARCH SUPERVISION (continued)

2022-2023	Alec Fowler	Supervised his research project at Michigan State University ○ Taught prenyl lipid extraction and photosynthetic data collection.
2022-2024	Alethia R. Braun	Supervised her research project at Michigan State University ○ Performed tissue sampling and agronomic traits survey at MSU Farm; ○ Taught prenyl lipid extraction and basic molecular cloning techniques; ○ Taught plant (i.e. *Arabidopsis thaliana*, *Brachypodium distachyon*) tissue culture, *Agrobacterium*-mediated transformation, and PCR-based genotyping skills; ○ Taught ultra-structural image (e.g., TEM) processing and analysis techniques; ○ Supported her application (Recommender) for the ASPB Summer Undergraduate Research Fellowships (2024, Winner).

SCIENTIFIC COMMUNITY SERVICES

2019 – present	**Associate Editor** of *Plant Cell Reports*
2015 – present	**Peer Reviewer** for *Frontier in Plant Science*, *Scientific Reports*, *Physiologia Plantarum*, *Plant Molecular Biology Reporter, BMC Plant Biology, BMC Genomics, Journal of Agricultural and Food Chemistry, MDPI-International Journal of Molecular Sciences, MDPI-Plants, PeerJ, Protoplasma, Genetica, etc.*

SCIENTIFIC SOCIETY MEMBERSHIPS

2012 – 2015	Canadian Society of Plant Biologists (CSPB)
2014 – present	American Society of Plant Biologists (ASPB)