CURRICULUM VITAE

YUAN CHAI

Department of Applied Economics
University of Minnesota, Twin Cities
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EDUCATION

Ph.D. (Applied Economics), University of Minnesota, Twin Cities 2018
Dissertation: "Managing Risk in Agriculture: A Spatial Bio-Economic Perspective"

M.S. (Plant Pathology), University of Minnesota, Twin Cities 2011
Thesis: "Investigations on Stem Rust Resistance Genes in Barley"

B.S. (Biological Science)**,** Tsinghua University, Beijing, China 2008

ACADEMIC POSITIONS

Adjunct Assistant Professor, Department of Applied Economics, University of Minnesota, Twin Cities 2023-present

Co-Director, International Science and Technology Practice and Policy (InSTePP) center, Department of Applied Economics, University of Minnesota, Twin Cities 2023-present

Applied Economist, GEMS Informatics Center, College of Food, Agricultural and Natural Resource Sciences (CFANS), University of Minnesota, Twin Cities 2019-present

RESEARCH INTERESTS

Production Economics; Agricultural Risk Management; Bio-Economic Modeling; Agricultural R&D; Food Security

RESEARCH EXPERIENCE

GEMS Informatics Center, University of Minnesota, Twin Cities

Applied Economist 2019-present
Lead an interdisciplinary team of economists, scientists, and engineers to address key agribusiness challenges; develop and implement multiple economic models in the identification of causal effects, risk exposure, technology adoption, and costs and benefits using various types of observational, survey, and experimental data; produce policy-relevant research findings and reports for both public and private partners; secure and manage grants and projects; mentor graduate students.

Postdoctoral Research Fellow 2018-2019
Developed data and analytical tools for bio-economic assessments of biotic and abiotic risks in US agriculture; collected data and developed models for nitrogen use in US corn production to address agricultural water pollution; contributed to the development and maintenance of GEMS datasets, ontologies and analytical tools.

Department of Applied Economics, University of Minnesota, Twin Cities

Graduate Student Research Assistant 2012-2018
Collected crop production, pests and diseases, and crop insurance data; developed bio-

economic models for crop production and risk management; applied probabilistic method for economic impact analysis on wheat rust diseases.

Department of Plant Pathology, University of Minnesota, Twin Cities

Lab Technician 2010-2012

Designed and conducted greenhouse and field experiments; performed phenotyping and molecular analysis on barley and wheat disease resistance.

Graduate Student Research Assistant 2008-2010

Investigated stem rust disease resistance in barley.

PUBLICATIONS:

Chai, Y., D. J. Pannell, and P. G. Pardey. 2023. "Nudging farmers to reduce water pollution from nitrogen fertilizer." *Food Policy* 120:102525.

Kusunose, Y., J.J. Rossi, D.A. Van Sanford, P.D. Alderman, J.A. Anderson, **Y. Chai**, M.K. Gerullis, S.V.K. Jagadish, P.A. Paul, J.B. Tack, and B.D. Wright. 2023. "Sustaining productivity gains in the face of climate change: A research agenda for US wheat." *Global Change Biology* 29(4):926–934.

Chai, Y., P.G. Pardey, and K.A.T. Silverstein. 2022. "Scientific selection: A century of increasing crop varietal diversity in US wheat." *Proceedings of the National Academy of Sciences* 119(51):e2210773119.

Chai, Y., S. Senay, D. Horvath, and P. Pardey. 2022. "Multi-peril pathogen risks to global wheat production: A probabilistic loss and investment assessment." *Frontiers in Plant Science* 13:1034600.

Senay, S.D., P.G. Pardey, **Y. Chai**, L. Doughty, and R. Day. 2022. "Fall armyworm from a maize multi-peril pest risk perspective." *Frontiers in Insect Science* 2:971396

Chai, Y., P.G. Pardey, T.M. Hurley, S.D. Senay, and J.M. Beddow. 2020. "A Probabilistic Bio-Economic Assessment of the Global Consequences of Wheat Leaf Rust." *Phytopathology*, 110(12):1886–1896.

Chai, Y., P.G. Pardey, C. Chan-Kang, J. Huang, K. Lee, and W. Dong. 2019. "Passing the Food and Agricultural R&D Buck? The United States and China." *Food Policy*, 101729.

Dehmer, S.P., Pardey, P.G., Beddow, J.M. and **Chai, Y.** 2019. "Reshuffling the Global R&D Deck, 1980-2050". *PloS One*, 14(3), p.e0213801.

Cheng, A., **Chai, Y.**, and Wang, J. 2017. "Spillover Effect of Oil Price Volatility on China's Commodities Futures Market". *Journal of Northwestern Polytechnical University*, Xi'an. (2). (in Chinese)

Steffenson, B.J., A.J. Case, Z.A. Pretorius, V. Coetzee, F.J. Kloppers, H. Zhou, **Y. Chai**, R. Wanyera, G. Macharia, S. Bhavani, and S. Grando. 2017. "Vulnerability of Barley to African Pathotypes of *Puccinia graminis* f. sp. *tritici* and Sources of Resistance." *Phytopathology* 107(8):950–962.

Chai, Y., D.J. Kriticos, J.M. Beddow, N. Ota, T. Yonow, and W.S. Cuddy. 2016. "*Puccinia triticina* (Wheat Leaf Rust)." St. Paul, MN: InSTePP-HarvestChoice.

Gill, U., R. Brueggeman, J. Nirmala, **Y. Chai**, B. Steffenson, and A. Kleinhofs. 2016. "Molecular and genetic characterization of barley mutants and genetic mapping of

mutant *rpr2* required for *Rpg1*-mediated resistance against stem rust." *Theoretical and Applied Genetics* 129(8):1519–1529.

Beddow, J.M., P.G. Pardey, **Y. Chai**, T.M. Hurley, D.J. Kriticos, H.-J. Braun, R.F. Park, W.S. Cuddy, and T. Yonow. 2015. "Research investment implications of shifts in the global geography of wheat stripe rust." *Nature Plants* 1(10):15132.

Chai, Y., D.J. Kriticos, J.M. Beddow, E. Duveiller, W.S. Cuddy, T. Yonow, and R.W. Sutherst. 2015. "Puccinia striiformis (Wheat Stripe Rust)." St. Paul, MN: InSTePP-HarvestChoice.

Chai, Y., and J. Beddow. 2014. "Wheat Stem Rust Vulnerability." In K. Sebastian, ed. *Atlas of African Agriculture Research and Development: Revealing Agriculture's Place in Africa*. Washington, D.C.: International Food Policy Research Institute (IFPRI), pp. 60–61.

Steffenson, B.J., H. Zhou, **Y. Chai**, and S. Grando. 2013. "Vulnerability of Cultivated and Wild Barley to African Stem Rust Race TTKSK." In G. Zhang, C. Li, and X. Liu, eds. *Advance in Barley Sciences*. Dordrecht, Netherlands: Springer, pp. 243–255

Chai, Y., J. Nirmala, A. Kleinhofs, and B. Steffenson. 2012. "Failure of RPG1 protein to degrade in high-copy Rpg1 transgenic barley lines results in susceptibility to stem rust." *Physiological and Molecular Plant Pathology* 80:10–18.

WORKING PAPERS

Chai, Y., Pardey, P.G., Gray, R. and Maros L. "Farmer versus Breeder Rights: Sharing the Benefits from Crop Varietal Improvement". In preparation for journal submission.

Maros L., Gray, R., **Chai, Y.** and Pardey, P.G. "Wheat Varietal Development in Canada: The Economic Benefits". In preparation for journal submission.

Senay, S., T.M. Hurley, P.G. Pardey, **Y. Chai** and A. Joglekar. "Global Multi-Peril Pest Risk Assessment for Maize and Wheat." Data analysis completed and in development of first draft.

Chai, Y., and P.G. Pardey. "Risk Types and the Demand for Crop Insurance: A Case Study of U.S. Wheat". In final stage of data analysis and in development of first draft.

GRANTS

Project: Linking Soybean Aphid Losses to Technology Investment Decisions
PI: Philip Pardey; **Co-PI: Yuan Chai**
Project period: 01.2024-12.2025
Funding Organization: Minnesota Invasive Terrestrial Plants and Pests Center (MITPPC), University of Minnesota
Amount: $297,792

Project: A Spatially Explicit, Long-Term Examination of the Changing Climate-Productivity Nexus of US Agriculture
PI: Philip Pardey; **Co-PIs**: **Yuan Chai,** Ali Joglekar
Project period: 09.2024-08.2028

Funding Organization: USDA-NIFA
Amount: $649,835

Project: Potato Breeding Crop Improvement Disease - Pest Risk Threat Assessment
PI: Philip Pardey; **Co-PIs**: **Yuan Chai,** Senait Senay
Project period: 05.2023-05.2024
Funding Organization: PepsiCo, Inc
Amount: $130,860

Project: GEMS-USASK Wheat Benefits and Attribution
PI: Yuan Chai; Co-PIs: Philip Pardey
Project period: 06.2023-06.2024
Funding Organization: College of Agriculture and Bioresources, University of Saskatchewan
Amount: $22,500

Project: GEMS-USASK Wheat Research
PI: Yuan Chai; Co-PIs: Philip Pardey, Kevin Silverstein
Project period: 07.2022-06.2023
Funding Organization: College of Agriculture and Bioresources, University of Saskatchewan
Amount: $41,385

Project: Wheat Multi-Trait Predictions: A Quantitative, Genotype x Environment (GxE) Approach to Supporting Minnesota Wheat Breeding and Farmer Varietal Selections
PI: Kevin Silverstein**; Co-PIs: Yuan Chai,** Philip Pardey
Project period: 02.2022-12.2023
Funding Organization: The Minnesota Wheat Research & Promotion Council
Amount: $97,499

Project: GEMS Support to 4D Wheat Project
PI: Philip Pardey; **Co-PIs**: **Yuan Chai,** Kevin Silverstein
Project period: 10.2020-10.2021
Funding Organization: College of Agriculture and Bioresources, University of Saskatchewan
Amount Awarded: $19,823

Project: Multi-peril pest and disease risk analysis for maize
PI: Senait Senay; **Co-PIs:** Philip Pardey, **Yuan Chai**
Project period: 10.2020-05.2021
Funding Organization: Centre for Agriculture and Biosciences International (CABI)
Amount Awarded: $13,818

Project: Assessing the Global Burden of Crop Losses Attributable to Wheat Microbial Diseases
PI: Philip Pardey; **Co-PIs**: **Yuan Chai,** Senait Senay
Project period: 08.2020-01.2021

Funding Organization: The 2Blades Foundation
Amount Awarded: $24,715

PRESENTATIONS

Chai, Y., K. Silverstein, and P. Pardey. Agro-Biodiversity: The Spatio-Temporal Dynamics of U.S. Wheat Varieties. *Minnesota Supercomputing Institute Research Exhibition, April 28, 2020*

Chai, Y., Pannell, D., and Pardey, P., Hurley, T. Harnessing Flat Payoff Functions for Nitrogen Fertilizer to Address Water Pollution. *AARES (Australasian Agricultural & Resource Economics Society) Annual Meeting, February 15, 2019*

Chai, Y., Pardey, P., and Huang, J. Passing the Food and Agricultural R&D Buck? The United States and China. *22nd ICABR Conference - Disruptive Innovations, Value Chains, and Rural Development, Washington DC, USA, June 15, 2018*

Chai, Y., The Impacts of Biotic and Abiotic Risks on the Demand for Crop Insurance. *Doctoral Dissertation Fellowship Showcase, University of Minnesota, April 11, 2017*

Chai, Y., Microbe Effects on Global Food Security: A Spatio-Temporal Perspective on Wheat Rust Diseases. *Healthy Foods, Heathy Lives Summit, Minneapolis, October 27, 2016*

Chai, Y., Modeling Economics of Pest and Disease Damage and Management. *Advancing Pest and Disease Modeling Workshop, February 23-25, Gaineville, FL, 2015*

Chai, Y., The Global Occurrence and Economic Consequences of Stripe Rust in Wheat. *Department of Plant Pathology, University of Minnesota, February 16, St. Paul, MN,* 2015

Chai, Y., Crop Risk Management: R&D investment & Crop Insurance. *China Agricultural University, August 4, Beijing, China;* and *Inner Mongolia University, August 5, Hohhot, China,* 2014

Chai, Y., Steffenson, B., Nirmala, J., and Kleinhofs, A. Highly expressed RPG1 protein in a five-copy *Rpg1*-transgenic barley line results in susceptibility to stem rust. *Borlaug Global Rust Initiative 2011 Technical Workshop, Saint Paul, Minnesota*, 2011

TEACHING EXPERIENCE

GEMS Informatics Center, CFANS, University of Minnesota, Twin Cities
GEMS X003 Introduction to Data Analysis in R, **Instructor** 2022-2024
GEMS X003 Spatial Data Analysis in R, **Co-Instructor** 2022-2024

Department of Applied Economics, University of Minnesota, Twin Cities
APEC 8222 Big Data Methods in Economics, **Guest Lecturer** Fall 2021

School of Business Administration, Zhongnan University of Economics and Law, Wuhan, Hubei Province, China
R for Applied Economics Short Course, **Instructor** Summer 2019

Department of Applied Economics, University of Minnesota, Twin Cities
APEC 8601 Natural Resource Economics, **TA** Fall 2016

Introduction to Numerical Analysis Software, **Instructor** Summer 2016

Department of Plant Pathology, University of Minnesota, Twin Cities
CFANS 3001 Pests and Crop Protection, **TA** Spring 2010

AWARDS

Minnesota Supercomputing Institute Research Exhibition Finalist Award, University of Minnesota 2020
Doctoral Dissertation Fellowship, University of Minnesota 2016-2017
Hueg Harrison Fellowship, CFANS, University of Minnesota 2014
HarvestChoice Research assistantship, University of Minnesota 2012-2015
MN Agricultural Experiment Station (MAES) Research Assistant 2008-2010
Winner of Competitive Graduate Student Symposium at Borlaug Global Rust Initiative (BGRI) Technical Workshop, St. Paul, MN 2011
Scholarship in recognition of Academic Excellence, Tsinghua University, Beijing 2006
Freshman scholarship, Tsinghua University, Beijing 2004

COMPUTER SKILLS

R; Python; STATA; MATLAB; Mathematica; ArcGIS; QGIS; CLIMEX; DSSAT

LANGUAGE SKILLS

English (Fluent), Mandarin Chinese (Fluent), Spanish (Beginner)

(Last updated September 23, 2024)