

Haiying Tao

Assistant Professor of Soil Fertility and Residue Management
Department of Crop and Soil Sciences, Washington State University
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APPOINTMENT: 75% Extension, 25% Research

EDUCATION

| | | | |
|------------|------|------------------------|-------------------------------------|
| Ph.D. | 2007 | Soil/Plant Science | University of Connecticut, CT |
| M.S. | 2002 | Agronomy | China Agriculture University, China |
| B.S. | 1998 | Crop Physiology | China Agriculture University, China |
| B.S. Minor | 1998 | Agricultural Economics | China Agriculture University, China |

EMPLOYMENT

| | |
|---|-------------------------------|
| Assistant Professor | August 2015 - present |
| Department of Crop and Soil Sciences, Washington State University Department of Horticulture (adjunct) | |
| Associate Research Scientist | February 2012 - August 2015 |
| Department of Plant Science & Landscape Architecture, University of Connecticut | |
| Adjunct Lecturer | January 2014 - December 2014 |
| Department of Engineering, University of New Haven | |
| Post Doc Fellow | February 2008 - February 2012 |
| Department of Plant Science & Landscape Architecture, University of Connecticut | |
| Research Assistant | August 2002 - December 2007 |
| Department of Plant Science & Landscape Architecture, University of Connecticut | |
| Assistant Research Scientist | September 1998 – July 2002 |
| Beijing Research Center for Information Technology, Beijing Academy of Agriculture & Forestry Sciences, China | |

PUBLICATIONS

Note: description of contributions is presented in parentheses: 1-developed the initial idea; 2-obtained or provided funds or other resources; 3-collected data; 4-analyzed data; 5-wrote/created product; 6-edited product.

** Denotes corresponding author*

Refereed journal articles

Published/accepted

Porter, M. W.L. Pan, W. Schillinger, I. Madsen, **H. Tao***. Winter canola response to soil and fertilizer nitrogen in semiarid Mediterranean conditions. *Agron. J.* doi: 10.1002/agj2.20119
Accepted in 12/17/2019, published online but available in print in 2020

Delwiche*, S., **H. Tao**, R.S. Breslauer, B.T. Vinyard, and S.R. Rausch. Is it necessary to manage falling number in the field? *Agrosystems, Geosciences & Environment*. *Accepted in 12/9/2019, in press*

Breslauer, R.S., D.J. Brown, W.L. Pan, D.R. Huggins, **H. Tao***. 2019. Compact subsoils limit winter wheat rooting depth and soil water depletion. *Agron. J.* DOI: 10.2134/agronj2019.03.0188. *Accepted in 9/2/2019, published online but available in print in 2020*

Bullock, D.S., M. Boerngen, **H. Tao**, B.D. Maxwell, J.D. Luck, L. Shiratsuchi, N.F. Martin*. 2019. The data-intensive farm management project: changing agronomic research through on-farm precision experimentation. *Agron. J.* 111:2736-2746. doi: 10.2134/agronj2019.03.0165.

Tao*, **H.**, W.L. Pan and E. Bietila. 2019. Nitrogen mineralization rates in long-term manured fields estimated using lab incubation experiment. *Open Access Journal of Environmental and Soil Sciences*. 12:480-484. DOI: 10.32474/OAJESS.2019.04.000184.

Tao*, **H.** and D.S. Bullock. 2019. Nitrogen fertility management for wheat yield and quality using digital agriculture technologies. *Cereal Foods World*. American Association of Cereal Chemists International. 64 (6):1-5.

Wang, K., D.R. Huggins, and **H. Tao***. 2019. Rapid mapping of winter wheat yield, protein and nitrogen uptake using remote and proximal sensing. *International Journal of Applied Earth Observation and Geoinformation*. 82:1-10. DOI: 10.1016/j.jag.2019.101921.

Fitria, H. Ruan, S.C. Fransen, A.H. Carter, **H. Tao***, B. Yang*. 2019. Selecting winter wheat for cellulosic ethanol production in the Pacific Northwest, U.S.A. *Biomass and Bioenergy*. 123:59-69. DOI: 10.1016/j.biombioe.2019.02.012.

Tao*, **H.**, W.L. Pan, P. Carter, K. Wang. 2019. Addition of lignin to lime materials for expedited pH increase and improved vertical mobility of lime in no-till soils. *Soil Use and Management*. 35:314-322. DOI: 10.1111/sum.12483.

Tao*, **H.**, T.F. Morris, P. Kyveryga, J. McGuire. 2018. Factors affecting nitrogen availability and variability in cornfields. *Agron. J.* 110:1974-1986. DOI:10.2134/agronj2017.11.0631.

Tao*, **H.**, T. F. Morris, B. Bravo-Ureta, R. Meinert. 2014. Factors affecting manure applications as directed by nutrient management plans at four Connecticut dairy farms. *Agron. J.* 106: 1-7.

Tao, **H.**, T. F. Morris*, B. Bravo-Ureta, R. Meinert, J. Neafsey. 2012. Nutrient applications reported by farmers compared with performance-based nutrient management plans for cornfields: A Connecticut case study. *Agron. J.* 104:437-447.

Tao, H., T. F. Morris*, B. Bravo-Ureta, R. Meinert, K. Zanger, J. Neafsey. 2010. A partial budget analysis for phosphorus-based nutrient management plans for Connecticut dairy farms. *Agron. J.* 102:231-240.

P. Kyveryga*, **H. Tao**, T. F. Morris, T. M. Blackmer. 2010. Identification of nitrogen management categories by corn stalk nitrate sampling guided by aerial imagery. *Agron. J.* 102:858-867.

Under review

Porter, M. W.L. Pan, W. Schillinger, I. Madsen, **H. Tao***. Factors affect nitrogen use efficiency of winter canola in semiarid Mediterranean conditions. *Agronomy Journal*.

Refereed extension articles

Published/accepted

Tao*, H. and W.L. Pan. 2019. End-of-season corn stalk nitrate-nitrogen test for post-harvest evaluation. WSU Extension Factsheet FS336E. Washington State University, Pullman, WA.

Tao*, H. and W.L. Pan. 2019. End-of-season corn stalk nitrate-nitrogen test for post-harvest evaluation-A cast study. WSU Extension Factsheet TB66E. Washington State University, Pullman, WA.

Tao*, H., W.L. Pan, P. Carter, K. Wang. Nov. 2019. A wheat straw pulping by-product mixed with lime may address soil acidification in no-till fields. WSU Extension Factsheet TB63E. Washington State University, Pullman, WA.

Tao*, H. and C.W. Rogers. Nov. 2019. Nitrogen inhibitors: how do they work to reduce N losses? WSU Extension Factsheet FS333E. Washington State University, Pullman, WA.

Tao*, H., G. Yorgey, D. Huggins, D. Wysocki. 2017. Crop residue management. Pages 125-162. In G. Yorgey and C. Kruger (eds). *Advances in Sustainable Dryland Farming in the Inland Pacific Northwest*. WSU Extension Bulletin EM108. Washington State University, Pullman, WA.

Borrelli*, K., W.L., Pan, **H. Tao**, C. Paul, T. Maaz. 2017. Soil Fertility Management, Pages 237-283. In G. Yorgey and C. Kruger (eds). *Advances in Sustainable Dryland Farming in the Inland Pacific Northwest*. WSU Extension Bulletin EM108. Washington State University, Pullman, WA.

Tao, H*, T.F. Morris, B. Bravo-Ureta, R. Meinert. 2016. Analyzing the implementation of nutrient management plans by farmers: implications for extension education. *Journal of Extension*. 54(6).

Under review/revision

Breslauer, R.S., D.J. Brown, W.L. Pan, D.R. Huggins, **H. Tao***. Physical limitations to subsoil health and crop yield in the eastern Palouse. PNW Extension. Washington State University, Pullman, WA.

ABSTRACTS, PROCEEDINGS AND PRESENTATIONS

* *Denotes presented by my student*

Nassko*, K., **H. Tao**, D.R. Huggins, I. Madsen, W.L. Pan, J. Reganold, T. Sullivan, S. Wills. 2019. Soil enzymology variability across tillage intensities in semiarid Palouse soils. Soil and Water Conservation Service Annual Meeting.

Nassko*, K., **H. Tao**, D.R. Huggins, I. Madsen, W.L. Pan, J. Reganold, T. Sullivan, S. Wills. 2019. Soil enzymology variability across tillage intensities in semiarid Palouse soils. Soil Health Institute Annual Meeting.

Nassko*, K., **H. Tao**, D.R. Huggins, I. Madsen, W.L. Pan, J. Reganold, T. Sullivan, S. Wills. 2019. Soil enzymology variability across tillage intensities in semiarid Palouse soils. ASA-CSSA-SSSA Annual Meeting.

Nassko*, K., **H. Tao**, D.R. Huggins, I. Madsen, W.L. Pan, J. Reganold, T. Sullivan, S. Wills. 2019. Soil enzymology variability across tillage intensities in semiarid Palouse soils. PNPL

Nassko*, K., **H. Tao**, D.R. Huggins, I. Madsen, W.L. Pan, J. Reganold, T. Sullivan, S. Wills. 2019. Enzyme activities indicate management effects on soil health in the Palouse. Soil Health Workshop, OR.

Alege*, F.P., L.E. DeVetter, **H. Tao**, P.M. Ndegwa. 2019. Pelleting dairy manure and associated compost to mitigate manure-nutrients transportation cost. ASABE Annual International Meeting. Boston, MA.

Tao, H., T. Murray, S. VanVleet, and C. Paul. 2019. Soil pH and lime management. 13th Western Nutrient Management Conference. Reno, NV.

Breslauer*, R.S., **H. Tao**, D.R. Huggins, and W.L. Pan. 2019. Do restrictive soils impact nitrogen needs in dryland wheat systems? SSSA International Annual Meeting. San Diego, CA.

Breslauer*, R.S., **H. Tao**, D. Brown, and W.L. Pan. 2019. How does reduced rooting depth in wheat impact use of stored soil water? SSSA International Annual Meeting. San Diego, CA.

Tao, H., K. Naasko, I. Madsen, and W.L. Pan. 2019. Soil health indicators for dryland production systems in the inland Pacific Northwest. SSSA International Annual Meeting. San Diego, CA.

Porter*, M., **H. Tao**, and I. Madsen. 2019. Winter canola nutrient uptake in the inland Pacific Northwest. SSSA International Annual Meeting. San Diego, CA.

Naasko*, K., I. Madsen, **H. Tao**, W.L. Pan, and D.R. Huggins. 2019. Dynamic topsoil properties of the inland Pacific Northwest. SSSA International Annual Meeting. San Diego, CA.

Naasko*, K., I. Madsen, **H. Tao**, W.L. Pan, and D.R. Huggins. 2019. Dynamic topsoil properties of the inland Pacific Northwest. Poster. SSSA International Annual Meeting. San Diego, CA.

Manuel*, J., K. Naasko, I. Madsen, W.L. Pan, and **H. Tao**. 2019. Landscape and management effect on water infiltration as measured by the Cornell and single ring infiltration methods. SSSA International Annual Meeting. San Diego, CA.

Wills, S., M. Robotham, J. Nemecek, D. Osmond, J. Heitman, D. Presley, P. Tomlinson, **H. Tao**, P. DeLaune, K. Lewis, G. Liles, F. Arriaga, and L. Adams. 2019. Putting soil health indicators in context: a project using dynamic soil properties and soil survey to provide references and potentials. SSSA International Annual Meeting. San Diego, CA.

Porter*, M., **H. Tao**, I. Madsen. 2018. Influence of nitrogen application rate and timing on yield and quality of winter canola. ASA & CSSA International Annual Meeting. Baltimore, MD. Poster.

Delwiche, S.R., S. Rausch., **H. Tao**. 2018. Wheat falling number as affected by field topography. AACC International Cereals & Grains Association Annual Meeting, London, UK.

Fitria*, H. Ruan, S.C. Fransen, A.H. Carter, **H. Tao**, B. Yang. 2018. Selecting winter wheat for cellulosic ethanol production in the Pacific Northwest. Symposium of Biotechnology for Fuels and Chemicals. Clearwater Beach, FL.

Michel*, L., L. Carpenter-Boggs, N. Embertson, T. Sullivan, **H. Tao**. 2018. Establishing cover crops for soil health in low-rainfall eastern Washington. Pacific Northwest Direct Seed Association. 2018 Cropping Systems Conference. Kennewick, WA. Poster.

Porter*, M., **H. Tao**, W.L. Pan, K. Sowers, and D. Roe. 2017. Improving nitrogen use efficiency for winter canola using 4R stewardship. ASA, CSSA, & SSSA International Annual Meetings. Tampa, FL. Poster.

Breslauer*, R., **H. Tao**, D. Brown, and W.L. Pan. 2017. Impact of slope direction on winter wheat protein content in the Inland Northwest. ASA, CSSA, & SSSA International Annual Meetings. Tampa, FL. Poster.

Breslauer*, R., **H. Tao**, D. Brown, and W.L. Pan. 2017. A hard place to farm: the impact of hydraulically restrictive layers on nitrogen use efficiency. ASA, CSSA, & SSSA International Annual Meetings. Tampa, FL.

Lyon, D. and **H. Tao**. 2017. Teaming up for success: the wsu extension dryland cropping systems team. ASA, CSSA, & SSSA International Annual Meetings. Tampa, FL. Poster.

Tao, H., T.F. Morris, and P.M. Kyveryga. 2014. Predicting probability of corn response to nitrogen rates using Bayesian Hierarchical Models. ASA, CSSA, & SSSA International Annual Meetings. Long Beach, CA.

Kyveryga, P.M., T.F. Morris, **H. Tao**. 2014. Database-driven N decision support: using rainfall and feedback information about corn N status and yield response.

Tao, H. and T.F. Morris. 2013. On-farm strip trials to improve nitrogen recommendations. ASA, CSSA, & SSSA International Annual Meetings. Tampa, FL.

Morris, F.F., **H. Tao**, D. Pettinelli, W. Smith, and R. Meinert. 2013. Adaptive nutrient management: a process for refining nitrogen management. ASA, CSSA, & SSSA International Annual Meetings. Tampa, FL.

Morris, T.F., **H. Tao**, C. Sigmund, and S. Friedman. 2011. Nitrogen fertilizer needs estimated by strip trials, field records and soil and corn stalk nitrate results. ASA, CSSA, & SSSA International Annual Meetings. San Antonio, TX.

Morris, T.F., **H. Tao**, S. Friedman, and R. Meinert. 2011. How adaptive management using field records and corn stalk nitrate results informs farmers about nitrogen availability from manure. ASA, CSSA, & SSSA International Annual Meetings. San Antonio, TX.

Tao, H., T. F. Morris, S. Friedman, D. Pettinelli, M. DeBacco. 2011. Implementation of adaptive nutrient management for nitrogen-case studies from Pennsylvania farms. ASA, CSSA, & SSSA International Annual Meetings. San Antonio, TX.

Tao, H., T. F. Morris, S. Friedman. 2011. Improvement of fertilizer nitrogen use in corn fields from implementation of an adaptive management program. Global Issues in Nutrient Management Science, Technology and Policy. 4th International Symposium. Newark, DE.

Tao, H., T.F. Morris, R. Meinert, M. DeBacco, and D. Pettinelli. 2010. Why adaptive management is needed for nutrient management. ASA, CSSA, & SSSA International Annual Meetings. Long Beach. CA.

Tao, H., Tom Morris, Suzy Friedman, Richard Meinert, Dawn Pettinelli. 2009. Categorizing nitrogen availability from manured corn fields using field history and the cornstalk nitrate test. ASA, CSSA, & SSSA International Annual Meetings. Pittsburgh. PA.

Kyveryga, T., **H. Tao**, T.F. Morris, T. Blackmer. 2009. Identification of nitrogen management categories to reduce uncertainty in estimates of economic optimum rates. ASA, CSSA, & SSSA International Annual Meetings. Pittsburgh. PA.

Morris, T.F., T. Blackmer, S. Friedman, P. Kyveryga, **H. Tao**. 2008. Adaptive Management to Improve Nitrogen Recommendations for Corn. ASA, CSSA, & SSSA International Annual Meetings. Huston. TX.

Tao, H., T.F. Morris, B. Bravo-ureta. 2008. Probit model analysis of farmers' decisions to implement recommendations for manure applications. ASA, CSSA, & SSSA International Annual Meetings. Huston. TX.

Tao, H., and T.F. Morris. Effectiveness of performance based nutrient management plans. 2008. New England In-Service Conference. Wentworth, NH.

GRANTS/CONTRACTS/GIFTS/WORKSHOPS

Total funding: \$2,407,434;

Active:

Selective carbonization of CAFOs manure solid fractions for the production of high char yield enriched in N and P. WSU Applied BioEnergy Research Program. \$59,870. M. Garcia-Perez, H. Tao (co-PI), T.D. Murray. (1/1/2020-12/31/2021).

Dissecting Microbiome-Mediated Crop Rotational Value of Pulses and Oilseeds in Dryland Wheat Systems. \$500,000. USDA-NIFA. M. Friesen, S. Sankaran, H. Tao (co-PI), I.J. Madsen, M. Rebecca, T. Sullivan, G. Vandemark. (2020-2023).

Digging deeper, co-innovating soil health solutions in eastern Washington. \$10,000. WSU Soil Health Initiative. M. Friesen, C.R. McFarland, H. Tao (co-PI). (11/21/2019-3/31/2020).

Alleviate soil acidity using fly ash. WSU BioAg. \$18,000. T.D. Murray and H. Tao (co-PI). (08/23/2019-08/22/2020).

Resilient agriculture. Borlaug Fellowship Program-Kazakhstan. USDA-FAS. \$42,141. C. Taugher and H. Tao (co-PI). (10/01/2019-09/30/2020).

Agronomic and economic optimum rate, timing, and placement for phosphorus fertility management for canola. WA Oilseed Cropping Systems Competitive Grant Program. \$78,000. H. Tao (PI), Steve Vanvleet, Aaron Esser, Isaac Madesen. (05/2019-06/2021).

Canola Variety Effects on Soil Health Mediated by Nutrients and the Microbiome. WA Oilseed Cropping Systems Competitive Grant Program. \$10,000. M.L. Friesen, T. Paulitz, T. Sullivan, H. Tao (Co-PI). (05/2019-06/2021).

Fertilizer 4R case studies. Gift from The Fertilizer Institute. \$20,000. H. Tao (PI), W.L. Pan, I. Madsen. (2019-2020).

Direct Root-zone Drip Irrigation Impacts on Soil Salinity and Nutrient Use Efficiency. WA AG Specialty Crop Block Grant. \$247,484. P. Jacoby and H. Tao (Co-PI). (2019-2022).

Impact of Biochar and Fly Ash Application to Agricultural Soils on Soil Health and Crop Productivity. O. A. Vogel Wheat Research. \$146,423. T.D. Murray and H. Tao (Co-PI). (2019-2020).

Crop yield and soil health response to P fertilization. Harley Jacquot Soil Fertility Endowment Fund. \$49,845. H. Tao (PI), W.L. Pan, T. Murray. (2018-current)

Soil health assessment for PNW cropping systems. USDA-NRCS. \$200,000. H. Tao (PI) and W.L. Pan (Co-PI). (09/2017-09/2020).

Concentrating and Blending of Manure Nutrients to Enhance Sustainable Production. WSDA-Specialty Crop Block Grant Program. \$249,937. P. Ndegwa (PI) and H. Tao (Co-PI). (10/2017-09/2020).

Workshop registration/sponsorship:

Tao, H. and Carol McFarland. Jan. 16, 2020. Palouse Soil Acidity in 2020. Pullman, WA. One-day workshop. \$6,126.

Tao, H. And Carol McFarland. Jan. 15, 2020. Soil Health in Eastern Washington: Little Things, Big Impact. Pullman, WA. \$3,710.

Tao H., C. McFarland. Feb. 21, 2019. Soil Acidity Amelioration Workshop. Pullman, WA. One-day workshop. \$4,760.

Tao H., C. McFarland. Jan. 22, 2019. Management Matters for Soil Health Workshop. Pullman, WA. One-day workshop. \$5,866.

Tao, H., C. McFarland. Feb. 8, 2018. Managing for Healthy Soils-The Foundation of Healthy Farms Workshop. Pullman, WA. One-day workshop. \$5,168.

Tao, H., C. McFarland. Jan. 4, 2018. Soil Acidity on the Palouse-Digging Deeper Workshop. Pullman, WA. One-day workshop. \$3,076.

EXTENSION

Extension Platform: WSU Farmers Network

Websites: <http://farmersnetwork.wsu.edu>

Annual Soil Workshops: 2 workshops annually focusing on soil health, soil fertility, digital agriculture. 3 work sessions planned for 2020.

Monthly Webinar: developed for May-December 2020.

Monthly newspaper columns

- Tao, H. 2019. Integrating canola into wheat systems and managing nitrogen for canola. Huckleberry Press.
- Tao, H. & Pettinelli, D. 2019. Earthworms and soil health. Huckleberry Press.
- Tao, H. 2019. Soil depth limits crop yield in the Palouse. Huckleberry Press.
- Tao, H. 2019. Soil health: what is it about. Huckleberry Press.
- Tao, H. 2019. Importance of soil organic matter for crop and soil health. Growers Guide.
- Tao, H. 2019. Soil health and assessment. Growers Guide.
- Tao, H. 2019. Soil health and assessment. Growers Guide.
- Carpenter-Boggs, L. 2019. The microbial aspect of soil health. Growers Guide.

Magazines/Trade Journals

Tao, H., J. Boll, T.F. Morris, D.S. Bullock, B.D. Maxwell. 2019. Farmers' networks for farmer-centric collaborative research and extension. *Crop & Soil magazine*. 52(5):40-46. Soil Science Society of America, Crop Science Society of America, American Society of Agronomy. Online ISSN: 2325-3606, Print ISSN: 0162-5098. Madison, WI. DOI: 10.2134/cs2019.52.0503.

Tao, H. 2019. Factors affecting nitrogen availability and variability in cornfields. *Crop & Soil magazine*. 52(1):4-9. Soil Science Society of America, Crop Science Society of America, American Society of Agronomy. Online ISSN: 2325-3606, Print ISSN: 0162-5098. Madison, WI.

Tao, H. Nov. 2019. Making the most of enhanced decision-making. *Wheat Life*. Ritzville, WA.

Tao, H. Feb. 2019. Soil health assessment: what is it good for? *Wheat Life*. Ritzville, WA.

Tao, H. 2018. Changing roles: from learner to thinker. *CSA News Magazine*. 63(7):32-34. Soil Science Society of America, Crop Science Society of America, American Society of Agronomy. Online ISSN: 2325-3584, Print ISSN: 1529-9163. Madison, WI.

Tao, H. 2017. Reducing nitrogen loss-enhanced-efficiency fertilizer products may be the answer. *Wheat Life*. Ritzville, WA.

Workshops

Tao, H. and Carol McFarland. Jan. 16, 2020. Palouse Soil Acidity in 2020. Pullman, WA. One-day workshop. ~90 participants from universities, conservation districts, USDA-ARS, USDA-NRCS, industries, farms.

Tao, H. And Carol McFarland. Jan. 15, 2020. Soil Health in Eastern Washington: Little Things, Big Impact. Pullman, WA. One-day workshop. >110 participants from universities, conservation districts, USDA-ARS, USDA-NRCS, industries, farms.

Tao, H. and Carol McFarland. Feb. 21, 2019. Soil Acidity Amelioration. Pullman, WA. One-day workshop. 90 participants from universities, conservation districts, USDA-ARS, USDA-NRCS, industries, farms in the WA, ID, OR.

Tao, H. And Carol McFarland. Jan. 22, 2019. Management Matters for Soil Health. Pullman, WA. One-day workshop. 85 participants from universities, conservation districts, USDA-ARS, USDA-NRCS, industries, farms in the WA, ID, OR.

Tao, H. Mar. 19-21, 2018. Digital Farming Workshop. Pullman, WA. Three-day workshop teaching decision-making using digital technologies. 18 participants from universities and industry agronomists.

Tao, H. And Carol McFarland. Feb. 8, 2018. Managing for Healthy Soils-The Foundation of Healthy Farms Workshop. Pullman, WA. One-day workshop. 86 participants from universities, conservation districts, USDA-ARS, USDA-NRCS, industries, soil testing labs, farm organizations, high school, farms in the WA, ID, OR, MT.

Tao, H. and Carol McFarland. Jan. 4, 2018. Soil Acidity on the Palouse-Digging Deeper Workshop. Pullman, WA. One-day workshop. 150 participants from universities, conservation districts, USDA-ARS, USDA-NRCS, industries, farms in the WA, ID, OR.

Bullock, D., **H. Tao**, B. Maxwell. Dec. 15-18, 2017. A Workshop to Plan an International Cyber-infrastructure for On-farm Production Research. LA, CA. 50 Participants.

Tao, H. and William L. Pan. 2016. Dairy Nutrient Management Workshop. Joint held with Far West Agribusiness Association December Conference. Kennewick, WA. One-day workshop. 58 participants, mainly from industry.

Tao, H. and William L. Pan. 2016. Dairy Nutrient Management Workshop. Prosser, WA. One-day workshop. 46 registered, 30 participants from universities, WSDA, industry, dairy farms.

Tao, H. 2016. Regional Soil Acidity and Liming Research Symposium. Pullman, WSU. Half-day workshop. ~30 researchers and graduate students from Washington State University and University of Idaho.

Tao, H. 2016. Introduction of CropScan. Presented by Triangle Ag-Services. Pullman, WSU.

Tao, H. 2016. Update on nitrogen management from WSDA. Presented by G. Bahr and P. Beale. WSU.

Invited presentations

Tao, H. 2019. Soil Acidity 101. Palouse Soil Acidity in 2020. Pullman, WA. ~90 people.

Tao, H. 2019. Mapping nitrogen uptake and removal using on-the-go sensors and remote sensing. Hermiston Farm Fair. Hermiston, OR. ~50 people.

Tao, H. 2019. Wheat yield and quality response to chloride fertilization. Far West Agribusiness Association. Pasco, WA. ~50 people.

Tao, H. 2019. Managing nitrogen for wheat using digital technologies. Far West Agribusiness Association. Pasco, WA. ~50 people.

Naasko*, K., **H. Tao**, W. Pan, I. Madsen, T. Sullivan, J. Reganold, and D. Huggins. 2019. Enzyme activities indicate management effects on soil health in the Palouse. Healthy Soils, Healthy Region Workshop. Pendleton, OR. ~100 people.

Tao, H. 2019. Enhance soil organic carbon sequestration. Methow Conservancy. Twisp. ~ 40 people.

Tao, H. 2019. Soil organic matter: small component, big impact. Methow Conservancy. Twisp. ~ 40 people.

Tao, H. and R. Breslauer. 2019. Getting on the highway: transitioning from learner to thinker. ASA-CSSA-SSSA Webinar Series. ~70 people.

Porter, M., I. Madsen, **and H. Tao.** 2019. Nutrient management of canola. 2019 Washington Oilseed Cropping Systems Workshop. Clarkston. ~150 people.

Porter, M., I. Madsen, **and H. Tao.** 2019. Nutrient management of canola. 2019 Washington Oilseed Cropping Systems Workshop. Wilbur. ~100 people.

Tao, H. 2019. Soil organic matter: small component, big impact. G.S. Long Winter Ag Academy Meets. Kennewick, WA. ~150 people.

Tao, H. and R. Koenig. 2018. Chloride fertility in wheat. Far West Agrobusiness Association December Winter Conference. Kennewick, WA. 50 minutes presentation, ~60 people.

Pan, W.L. and **H. Tao.** 2018. A wheat straw pulping co-product mixed with lime may address acidified soil acidification in the PNW. Far West Agrobusiness Association December Winter Conference. Kennewick, WA. 50 minutes presentation, ~50 people.

Rogers, C.W. and **H. Tao.** 2018. Understanding the effectiveness of nitrogen inhibitors-two case studies. Far West Agrobusiness Association December Winter Conference. Kennewick, WA. 50 minutes presentation, ~60 people.

Tao, H. 2018. Protein and nutrient management in cereal grains. WSU Wilke Research & Extension Farm Field Day. Davenport, WA, ~100 people.

Tao, H. 2018. Management strategies to alleviate the acceleration of soil acidification. McGregor Company Training Program. Colfax, WA. 50 minutes presentation, ~40 people.

Tao, H. 2018. Nitrogen fertility of winter canola. WSU Oilseed Workshops. Colfax & Richland, WA. Joint 50-minute presentations, ~200 people.

Tao, H. 2018. Management strategies to alleviate the acceleration of soil acidification. Soil Acidity on the Palouse-Digging Deeper Workshop. Pullman, WA. 50 minutes presentation, ~150 people.

Tao, H. 2017. Large-scale On-farm research trials to support soil fertility. A Workshop to Plan an International Cyber-Infrastructure for On-farm Production Research. LA, CA. 50 people.

Tao, H. and Aaron Esser. 2017. Large-scale on-farm research trials to support soil fertility management. Wheat Academy, WA. 50 minutes presentation, 75 people.

Tao, H. 2017. Grazing early planted winter canola. WSU Oilseed Workshops. Hartline, Colfax, Odessa, WA. Joint 50-minute presentations, ~150 people.

Tao, H. 2017. Nitrogen rate & timing in winter canola. WSU Irrigated Winter Canola Twilight Tour & BBQ. Field Day in Odessa, WA, ~30 people.

Tao, H. 2017. Nitrogen rate & timing in winter canola. WSU Winter Canola Tour. Field Day in Ralston, WA, ~30 people.

Tao, H. 2017. Nitrogen rate & timing in winter canola. WSU Winter Canola Tour. Field Day in St. John, WA, ~30 people.

Tao, H. 2017. Nitrogen inhibitors and stabilizers for improved nitrogen use efficiency. Latah Soil & Water Conservation District Board Meeting. Moscow, ID. 50 minutes presentation, ~20 people.

Tao, H. 2017. Organic fertilizer sources and mineralization: helping planners better estimate mineralization. Nutrient Management Planning Training-Virtual Day. Whatcom Conservation District. ~20 people.

Tao, H., D. Granatstein, J. Davenport, T. Dupont. 2017. Soil health in perennial and annual cropping systems-Central WA Soils. Washington Soil Health Meeting. Ellensburg, WA. ~30 people.

Tao, H. 2017. Protein monitors as a tool to assess soils. Wilke Soil Health Workshop. Ritzville, WA. ~50 people.

Tao, H. 2016. Soil acidification, liming on western soils. Building Soils for Better Crops 2016 Conference. WSU Extension. 50 minutes presentation, 125 people.

Tao, H and Aaron Esser. 2016. Fine-tune nitrogen management using 4R stewardship. Two 1.5-hour presentations with hands-on activities, 75 people.

Tao, H. 2016. Nitrogen fertilizer management for optimum yield and protein. Adams Conservation District & WSU Annual Meeting. 50 minutes presentation, ~70 people.

Tao, H. Micronutrients. 2016. Asotin County Wheat Growers Meeting. 1 hour informal presentation and discussions ~ 15 people.

Tao, H. 2016. Nitrogen fertility management for wheat. Columbia Conservation District Annual Meeting. 50 minutes presentation, ~40 people.

Tao, H. 2016. Strategies for maintaining regional soil fertility recommendations. Advanced Topics and Agronomy and Soil Science, Walla Walla, WA. 1 hour presentation, 50 people.

Tao, H, 2015. A. Esser. Managing nitrogen for yield and protein in winter wheat. WSU Wheat Academy. Two 1.5-hour presentations with hands-on activities, 75 people.

Tao, H. 2015. Merging research and extension programs to improve soil fertility and nutrient management. Far West Agribusiness Association. 50 minutes presentation, ~ 50 people.

On-line tools developed

- Seeding rate calculator: <https://seedingrate.cahnrs.wsu.edu/>
- Residue production calculator: <https://residueproduction.cahnrs.wsu.edu/>

TEACHING AND MENTORING

Graduate students

Completed

- Rachel Breslauer, MS, Soil Science, Jan. 2017- Dec. 2018, adviser
- Marissa Porter, MS candidate, Aug. 2017- May 2019, adviser
- Brianna Matthies, MSAG-Plant Health Management, Aug. 2018-Jul. 2019, adviser
- Cameron Gerecke, MSAG- Plant Health Management, May 2017-Dec. 2019, adviser

Current:

- Lu Qianwen, PhD candidate, Agri. 2018-present, co-adviser.
- Katherine Naasko, PhD candidate, Jan. 2018- present, adviser
- Robert Eiichi Butler, MSAG-General Agriculture, Jan. 2016- present, Co-adviser
- Tyson Brook, MSAG-Plant Health Management, Jan. 2019-present, adviser
- Kyle Reedy, MSAG- Plant Health Management, Aug. 2019-present, adviser

Thesis committee:

Completed

- Erin Mackey, MS, Animal Science, Aug. 2017-Aug. 2019, committee member

Current:

- Samodya Kushani Jayasinghe, MS, Plant Pathology, Fall 2018-present
- Femi Peter Alege. PhD. Biological Systems Engineering. Fall 2018-present
- Fitra Fnu, PhD, Biological and Agricultural Engineering, Spring, 2017-present
- Brittany Munoz, MSAG-Plant Health Management,
- Pavlina Fojtikova, MSAG-General Agriculture

Visiting scholar

- Zigapa Sapakhova. Associate Professor. Department of Plant Protection and Quarantine, National Agrarian University. 2019. Advisor.
- Dr. Ku Wang. Professor. Soil Science. Department of Geographical Science. Minjiang University, Fujian, China. 2018- present. Advisor.
- Dr. Coulibaly Sifolo Seydou. Agro-ecologist. Lecturer, University Peleforo Gon Coulibaly of Korhogo, Cote d'Ivoire. 2018- present. Co-advisor.

Research assistants

- Wanling Li, Associate in Research. 2017- 2018. Advisor.
- Zachary Smith, Technician. 2017- 2018. Advisor.
- Eric Bietila, Research Assistant. 2015-2016. Advisor.

Courses instructed

- Soil Fertility. 2012-2014. University of Connecticut
- Applied Engineering Statistics. 2014. University of New Haven

Guest lectures

- On-farm research trials. Soil Management for Sustainable and Organic Farming Systems (Soil Sci 443). 2019
- Nutrient management planning for dairy farms. Soil Management for Sustainable and Organic Farming Systems (Soil Sci 443). 2019
- Advance nitrogen fertility research using on-farm trials & big data. Advanced Cropping Systems (Crop Sci 403). 2019
- Nitrogen loss from agricultural systems and impacts on water quality. Soil and Water Science Seminar. Department of Soil and Water Systems. University of Idaho. 2018
- Advance soil fertility research using on-farm trials & big data. Advanced Cropping Systems (Crop Sci 403). 2017
- Nutrient management planning for dairy farms. Soil Management for Sustainable and Organic Farming Systems (Soil Sci 443). 2017

- On-farm research trials. Soil Management for Sustainable and Organic Farming Systems (Soil Sci 443). 2017
- Introduction to soil. Introduction to Cultivated Plants (Hort/Crops 102). 2015
- Soil physical properties. Introduction to Cultivated Plants (Hort/Crops 102). 2015
- Soil fertility and plant nutrition. Introduction to Cultivated Plants (Hort/Crops 102). 2015

SERVICE ACTIVITIES

WSU Service

- Team member: Extension Dryland Cropping Systems Team
- Affiliated faculty: Center for Precision & Automated Agricultural Systems (CPAAS)
- Affiliated faculty: Consortium for Interdisciplinary Statistical Education and Research (CISER).
- Training session for Afghanistan visiting scholar. 2016. WSU Sponsored training in project management and extension methods.
- Search committee for Soil Quality and Sustainable Soil Management position. 2017.

Science professional services

Grant Panelist:

- USDA-Capacity Building Grants for Non-land Grant Colleges of Agriculture. 2018.
- USDA-Capacity Building Grants for Non-land Grant Colleges of Agriculture. 2019.

Ad-hoc reviewer:

- Agronomy Journal
- Field Crops Research
- Journal of Environmental Quality
- Water, Air, & Soil Pollution
- Acta Agriculturae Scandinavica, Section B-Plant Soil Science
- Agrosystems, Geosciences & Environment
- Information Processing in Agriculture
- WSU Extension & Hatch Project

Committee service:

- NCERA_TEMP 13: Soil Testing and Plant Analysis
- WERA103: Nutrient Management and Water Quality

Moderator: SSSA Soil Communication Platform.

PROFESSIONAL MEMBERSHIPS

- Soil Science Society of America (SSSA)
- America Society of Agronomy (ASA)
- Crop Science Society of America (CSSA)
- International Society of Precision Agriculture (ISPA)