Haiying Tao
Department of Crop and Soil Sciences
Washington State University
161 Johnson Hall
Pullman, WA 99164
Tel: 509-335-4389
Email: haiying.tao@wsu.edu

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

2015-present	Assistant Professor	Department of Crop and Soil Sciences, Washington State University
2012-2015	Associate Research Scientist	Department of Plant Science & Landscape Architecture, University of Connecticut
2014	Adjunct Lecturer	Department of Engineering, University of New Haven
2008-2012	Post Doc Fellow	Department of Plant Science & Landscape Architecture, University of Connecticut
2002-2007	Research Assistant	Department of Plant Science & Landscape Architecture, University of Connecticut
1998-2002	Assistant Research Scientist	Beijing Research Center for Information Technology, Beijing Academy of Agriculture & Forestry Sciences, China

RESEARCH AND DISCIPLINARY SCHOLARSHIP

1. Publications and creative scholarship

Refereed publications

Book Chapters

Tao, H., G. Yorgey, D. Huggins, D. Wysocki. 2017. Crop residue management, Advances in Sustainable Dryland Farming in the Inland Pacific Northwest. WSU Extension.

Borrelli, K., W.L., Pan, **H. Tao**, C. Paul, T. Maaz. 2017. Soil Fertility Management, Advances in Sustainable Dryland Farming in the Inland Pacific Northwest. WSU Extension.

Journal Articles

Tao, H., T.F. Morris, J. McGuire, P. Kyveryga. 2018. Identify field-specific best nitrogen management practices for corn using aerial imagery and cornstalk nitrate test. Agronomy Journal. Accepted.

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).

H. Tao, 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.

H. Tao, 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.

H. Tao, 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.

Paper in Preparation

H. Tao, W.L. Pan, and P. Carter. Addition of lignin to lime materials for expedited ph increase and improved vertical mobility of lime in no-till soils. Soil & Tillage Research.

Fitria, H. Ruan, S.F. Fransen, A.H. Carter, **H. Tao**, Bin. Yang. Selecting best winter wheat variety for cellulosic ethanol production in pacific northwest. Target one of the following journals: GCB Bioenergy, Bioresource Technology, Biotechnology for Biofuels.

R. Koenig, W.L. Pan, **H. Tao**. Response and economics of winter wheat varieties to chloride fertilization strategies.

2. Grants and contracts

Active:

2018-2020. $58,838. Technology for converting excess nitrogen in dairy manure to fertilizer. Applied BioEnergy Research Program. WSU. Co-PI.

2017-2019. $200,000. Soil health assessment for PNW cropping systems. USDA-NRCS. PI.

2017-2019. $39,966. Sustainable Crop-Livestock Integration for System Health in the Dryland Inland Pacific Northwest. WSU BIOAg. PI.

2017. $50,000. A workshop to plan an international cyber-infrastructure for on-farm precision experiments research. USDA-NIFA-FACT. Co-PI.

2017-2019. $249,937. Concentrating and Blending of Manure Nutrients to Enhance Sustainable Production. WSDA-Specialty Crop Block Grant Program. Co-PI ($99,451).

2017-2019. $61,326. Fertility management for winter canola and spring canola. WA Oilseed Cropping Systems Competitive Grant Program. PI.

2017-2020. $10,500. Developing variable rate nitrogen application maps for dryland wheat production in Washington. Amen Dryland Research Endowment. PI.

2017-2019. $32,206. Integrating livestock to dryland system-grazing on dual-purpose winter canola. WA Oilseed Cropping Systems Competitive Grant Program. Co-PI.

2017-2018. $49,722. Sustainable Crop-Livestock Integration for the System Health in the Dryland Inland Pacific Northwest. Western SARE. Participant.

2016-2018. $22,042. Post-harvest evaluation for reducing N rate, improving soft white winter wheat yield and quality. WSU New Faculty Seed Grant Competition. PI.

2016-2019. $10,000. Evaluation of lignin-lime products on lime solubility. Sustainable Fiber Technologies. Co-PI.

Pending:

2018-2019. $29,836. Impact of Biochar and Fly Ash Application to Soil on Productivity of Wheat in Eastern Washington. WSU BioAg. Co-PI.

2018-2020. $73,668. Assessing Impacts of Direct Root-zone Drip Irrigation on Soil Salinity and Nutrient Movement. WSU ERI. Co-PI.

2018-2022. $5M. Northwest Consortium of Water and Nutrient Management for Dairies. USDA-AFRI-WFPSCA. Co-PI.

2018-2021. $265,583. Advancing soil fertility and plant productivity using on-farm precision experiment. Washington Grain Commission. PI.

2018-2020. $247,502. Assessing Influence of Water Conservation Practices on Vineyard Sustainability. Western SARE. Co-PI.

2017-2018. $24,000. N inhibitor study. Dow AgroSciences LLC.

2017-2018. The Borlaug Fellowship Program. USDA-Foreign Agricultural Service. $32,420. Participant.

Past:

2016-2017. $25,000. Fertility Management for Winter Canola. WA Oilseed Cropping Systems Competitive Grant Program. PI.

2016-2017. $30,000. Developing a computer tool and a field demonstration for agronomic and environmental friendly land application of manure. Dairy Nutrient Management Program. Washington State Department of Agriculture. PI.

2016-2017. $24,000. N inhibitor study. Dow AgroSciences LLC.

2016-2017. $13,699. Dairy nutrient management training program. Washington State Department of Agriculture. PI.

2015-2016. $8,000. Flexible Farming (FlexFarm) production systems: integrating crops and livestock for diverse, resilient, and sustainable agricultural landscapes. WSU-BioAg Planning Grant. Co-PI.

2016. $15,000. Crop residue management and soil fertility management (Write book chapters for REACCH Handbook).

2014-2017. $149,806. Demonstrating adaptive nutrient management based nitrogen management practices using strip trials, aerial imagery, objective tests, and guided stalk sampling. USDA-NRCS. (PI: **H. Tao**. Co-PI: T.F. Morris and R. Meinert).

2014-2015. $72,100. Adaptive nutrient management. Environmental Defense Fund. (PI: **T.F. Morris**. Co-PI: H. Tao).

Unfunded

2017-2021. $499,998. Advancing wheat nutrient recommendations using statistical and economic models developed through on-farm research and participatory learning. USDA-NIFA. PI.

2018-2020. $1M. Increasing agricultural resilience through on-farm experimentation. Co-PI.

2018-2019. $11,647. Fluid P Timing-Placement Effects on Winter Canola Yield and Quality in the Inland Pacific Northwest. The Fluid Fertilizer Foundation. PI.

2017-2019. $250,784. Economical-environmental friendly nutrient export and utilization for sustainable organic agriculture. NIFA OREI. $1,000,000. (PI: P. Ndegwa. Co-PI: S. Fransen, Y. Demissie, T. Peters, S.A. Turner, T. Ball, R. Folwell. H. Tao).

2017-2018. $30,000. Impact of biochar and fly ash application to soil on productivity of wheat in eastern Washington. WSU. BIOAg.

2017-2021. $225,000. Soil health in the Pacific Northwest. USDA-NRCS. $5,662,186. (PI: L. Michael. Co-PI: H. Tao, W.L. Pan, et al).

2016-2018. $496,147. INFEWS/T3:Rediscovering in sunlight and shade the farming system reorientation for transforming land, water, nutrient, and economic efficiency of the global FEWs. NSF-INFEWS. $2,999,634. (PI: R.J. Kremer. Co-PI: T. Reinbott, M. Maliro, F. Ngopola, J. Mughogho, B. Velelic,, H. David, L. Deichman, K. Nichols, E. Omondi, D. Martin, M. Pop, S. Glakin, W. Evans, H. Tao).

2016-2019. $61,880. On-the-go Dairy Manure Nutrients monitoring system for Precision Applications in Crop Production. NIFA Organic Transitions. $499,997. (PI: P. Ndegwa. Co-PI: L. Khot, H. Tao).

2015-2018. $201,320. Research and education program for livestock famers: is there more to manure than we give it credit for? Northeast SARE. (PI: H. Tao. Co-PI: T.F. Morris and R. Meinert).

2015. $2,500. Exploring soil health as affected by management practices. CAHNRS Undergraduate Internship. PI: H. Tao.

2015-2016. $29,972. Investigate soil moisture conditioning and controlled release of fertilizers using biobased hydrogen materials. Internal ERI. $79,226. (PI: J. Zhang. Co-PI: H. Tao).

2016-2019. $178,777. Assessment of crop yield response, change in nutrient use efficiency, and economic benefits from liming. Washington Grain Commission. (PI H. Tao. Co-PI D. Huggins, P. Carter, T. Sullivan, S. Hulbert, W. Thompson, A. Esser).

3. Research mentorship

Visiting Scholar. Ku Wang. Dr. of Soil Science. Department of Geographical Science. Minjiang University, Fujian, China. 2018-now. Advisor.

Visiting Scholar. Coulibaly Sifolo Seydou. Dr. of Agro-ecologist. Lecturer, University Peleforo Gon Coulibaly of Korhogo, Cote d'Ivoire. 2018-now. Co-advisor.

Post Doc, Isaac Madsen, 2017-now, Co-adviser

Katherine Naasko, PhD student, Spring 2018-now, adviser

Rachel Breslauer, MS student, Spring 2017-now, adviser

Marissa Porter, MS student, Fall 2017-now, adviser

Eric Augerson, MS student, Horticulture, admitted for Fall 2018, Co-adviser

Eric Bietila, PhD student, adviser, past student

Cameron Gerecke, MSAG-Plant Health Management, Fall 2017-now, Adviser

Robert Eiichi Butler, MSAG-General Agriculture, Spring, 2016-now, Co-adviser

Brittany Munoz, MSAG-Plant Health Management, committee member

Erin Mackey, MS student, Animal Science, committee member

Fitra Fnu, PhD student, Biological and Agricultural Engineering, committee member

Committee service: Soil PhD Graduate Committee, CSS, WSU

4. Scholarly presentations and posters

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.

Morris, T. F., **H. Tao**, J. Ping, D. Pettinelli, and R. Meinert. 2007. Nitrogen fertilizer recommendations for corn based on a feedback loop. ASA, CSSA, & SSSA International Annual Meetings. New Orleans, LA.

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

Tao, H., T.F. Morris, B. Bravo-Ureta, R. Meinert, J. Neafsey, and W. Smith. 2006. Comaprison of nutrient management plans based on Phosphorus-thresholds. ASA, CSSA, & SSSA International Annual Meetings. Indianapolis, IN.

Tao, H., T.F. Morris, B. Bravo-Ureta, R. Meinert, J. Neafsey, K. Zanger, and W. Smith. 2005. Partial budgeting for implementing nutrient management plans: case study of dairy farms in Connecticut. ASA, CSSA, & SSSA International Annual Meetings. Salt Lake City, UT.

Tao, H., T. F. Morris, R. Meinert, K. Zanger, J. Hyde, W. Smith, and J. Neafsey. 2004. Manure and fertilizer applications by farmers compared with nutrient management recommendations. ASA, CSSA, & SSSA International Annual Meetings. Seattle. WA

5. **Research discoveries:** NA
6. **Research awards and recognitions:** NA
7. **Statement of research**

The main goals of research is to improve nutrient management for soil and water conservation, yield and quality improvement, and economic returns for WA farmers. The research programs will serve farmers need for research, and will be the extension programs based upon.

My strategy for applied research is to build a farmer research network in which our program will lead farmers to identify area of interests for research and extension. We will employ adaptive nutrient management methodology to make continuous improvement in nutrient management.

Current research programs include:

(1) Fertility management for wheat and canola using on-farm small and large-scale precision experimentation.

(2) Evaluation of lignin-lime products on lime solubility. The success of this project will provide a feasible solution for stratified soil acidification in no-till fields using locally available product.

(3) Post-harvest evaluation of N management. Evaluation of protein monitor as part of post-harvest tool for site-specific nitrogen management.

TEACHING AND ADVISING

1. **Goals**

My goals of classroom teaching is to tailor my course materials to meet different categories of needs and interests, to help students master the knowledge by case studies, and to encourage students' critical thinking and analytical mind by providing lab sections or other hands-on activities along with lectures. My goal of mentoring graduate students is to tailor the training program to meet program needs, student's education goals, and student's career goals. The student will be well equipped, independent, and competitive upon graduation.

2. **Responsibilities**

My position does not have formal teaching responsibilities. I am willing to take teaching responsibilities whenever needed by the department.

Instructor

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

- Agroecology. 2001. China Agriculture University

Guest lectures

- 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

3. **Evaluation: NA**
4. **Results: NA**

EXTENSION

1. **Statement of the extension program**

   The extension program will engage all interested stakeholders to identify and solve issues through research and evidence-based education. Results enable stakeholders to make informed decisions and resulting in measurable impacts. The ultimate results will enhance well-being of communities, increase profit, and promote sustainability of natural resources.

   Strategy of developing effective extension program will include: identifying existing problems, farmers' needs, and research priorities; identifying research priorities and finding funding; conducting effective demonstrations; and program implementation and evaluation.

   We are currently working with a group of farmers and consultants from McGregor on large-scale precision experiment to help farmers reach both yield and protein goal while minimize N loss. We are working with University of IL on trial design and data management, and with Montana State University on trial implementation, technical training, and data transferring. We are actively seeking funding to support this long-term multi-state research.

2. **Extension publications and other educational products**

   a. **Peer-reviewed Extension Publications**

      Tao, H., G. Yorgey, D. Huggins, D. Wysocki. 2017. Crop residue management, Advances in Sustainable Dryland Farming in the Inland Pacific Northwest. WSU Extension.

      Borrelli, K., W.L., Pan, **H. Tao**, C. Paul, T. Maaz. 2017. Soil Fertility Management, Advances in Sustainable Dryland Farming in the Inland Pacific Northwest. WSU Extension.

   b. **Other educational materials:**

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

c. Other education media

Tao, H. 2017. Residue yield calculator is now online. Timely Topic published on Smallgrains.wsu.edu.

Tao, H. 2017. Seeding rate converter is now online. Timely Topic published on Smallgrains.wsu.edu.

Tao, H. 2017. Standing crop residue can reduce snow drifting. Timely Topic published on Smallgrains.wsu.edu.

Tao, H. 2017. Wheat straw: to harvest or not to harvest? Timely Topic published on Smallgrains.wsu.edu.

Tao, H. 2017. New publication series: unmanned aerial systems in agriculture. Timely Topic published on Smallgrains.wsu.edu.

Tao, H. 2017. Adjusting wheat-based management strategies for oilseed production. Timely Topic published on Smallgrains.wsu.edu.

Tao, H. 2017. Building soil health. Timely Topic published on Smallgrains.wsu.edu.

Tao, H. 2017. Variable rate nitrogen application-a grower's perspective. Timely Topic published on Smallgrains.wsu.edu.

Tao, H. 2016. Thinking about reducing nitrogen fertilizer applications? Timely Topic published on Smallgrains.wsu.edu.

3. Extension presentations

Presentations & Field Days

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

H. Tao. 2018. Nitrogen fertility of winter canola. WSU Oilseed Workshops. Colfax & Richland, WA. Joint 50-minute presentations, ~150 people.

H. Tao. 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.

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

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

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

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

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

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

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

H. Tao., 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.

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

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

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

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

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

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

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

H. Tao, 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.

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

4. Workshops and other extension activities

H. Tao. Carol McFarland. Feb. 8th, 2018. Managing for Healthy Soils-The Foundation of Healthy Farms Workshop. Pullman, WA.

H. Tao. Carol McFarland. Jan. 4th, 2018. Soil Acidity on the Palouse-Digging Deeper Workshop. Pullman, WA.

H. Tao, William L. Pan. 2016. Dairy Nutrient Management Workshop. Joint held with Far West Agribusiness Association December Conference. Kennewick, WA.

H. Tao, William L. Pan. 2016. Dairy Nutrient Management Workshop. Prosser, WA.

H. Tao. 2016. Regional Soil Acidity and Liming Research Symposium. Pullman, WSU.

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

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

5. Grants and contracts

All research grants listed in section **RESEARCH AND DISCIPLINARY SCHOLARSHIP,** subsection **2. Grants and contracts** have substantial amount of funds allocated for extension education programs.

The grants titled Dairy nutrient management training program is for supporting one workshop for dairy farmers and one workshop for consultants.

All research results listed in section **RESEARCH AND DISCIPLINARY SCHOLARSHIP,** subsection **Statement of research** will be disseminated to growers via farm visits, county grower meetings, winter meetings, etc.

6. Contributions to the scholarship of Extension: NA

7. **Extension awards and recognitions:** NA

SERVICE ACTIVITIES

1. Research and extension

a. Professional

(1) Professional journals - reviewer

- Agronomy Journal
- Field Crops Research
- Acta Agriculturae Scandinavica, Section B-Plant Soil Science
- Water, Air, & Soil Pollution
- WSU Extension & Hatch Project

(2) professional organizations

- Member: Soil Science Society of America (SSSA),
- Member: International Society of Precision Agriculture (ISPA)
- Committee service: NCERA_TEMP 13: Soil Testing and Plant Analysis

b. University

- 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).

- In-class activities: guest lecture: Introduction to Cultivated Plants (Hort/Crops 102), 2015; Advanced Cropping Systems (Crop Sci 403). 2017; Soil Management for Sustainable and Organic Farming Systems (Soil Sci 443). 2017.
- 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.

2. Teaching

a. Professional

I reviewed 7 papers in 2015, 4 papers in 2016, 9 papers in 2017, 3 papers in 2018 for the professional journals and 1 hatch project for WSU described in section **SERVICE ACTIVITIES,** subsection **a.(1).**

I serve as committee members for the organizations described in section **SERVICE ACTIVITIES,** subsection **a.(2).**

b. University

1) In-class activities:
   - 2017. I provided three guest lectures covering soil acidification and on-farm research topics for Crop Sci 403 and Soil Sci 443.
   - 2017. I invited Dr. David Bullock from University of Illinois at Urbana-Champaign to give a special seminar entitled "On-farm field trials using precision agriculture technology: a system for data-intensive agricultural research and management.
   - 2016. I provided three guest lectures covering topics of fundamental soil chemistry, soil physics, and soil fertility for course Hort/Crops 102, WSU.
2) Out-of-class activities: I participated development of exam questions in Soil Science Qualifying Exam (Spring 2016), CSS, WSU.
3) Committee member: Soil PhD Graduate Student Committee. Participated discussion of updating Crop and Soil Sciences Graduate Student Handbook.

ADMINISTRATION: NA