

## **SYLVIE M. BROUDER**

Professor of Agronomy, Wickersham Chair of Excellence in Agricultural Research

Department of Agronomy: Crops, Soils, and Environmental Sciences

ORCID: <https://orcid.org/0000-0002-7785-5336>; Email: [sbrouder@purdue.edu](mailto:sbrouder@purdue.edu)

### **Earned Degrees**

B.A., Biology, 1985, Harvard University, Cambridge, MA

Ph.D., Ecology, 1993, University of California, Davis, CA

Postdoctoral Associate, Agroecology, 1993-1995, University of California, Davis, CA

### **Employment History**

1995-2000 Assistant Professor, Agronomy Department, Purdue University

2000-2005 Associate Professor, Agronomy Department, Purdue University

1997-pres. Director, Water Quality Field Station, Purdue University Core Facility

2005-pres. Professor, Agronomy Department, Purdue University

2009-2013 Assist. to the Dean (25% FTE), College of Agriculture, for Agroecology/Smarter Agriculture™ Program Development

2012-pres. Wickersham Chair of Excellence in Agricultural Research

### **Selected Honors and Awards Received**

1. Fellow, American Society of Agronomy (2005)
2. Team Award, College of Agriculture, Purdue University (2008)
3. Certified Senior Ecologist, Ecological Society of America (5-yr renewable, 2009 – pres.)
4. Purdue University Spirit of the Land Grant Award for excellence across the tripartite Land Grant mission
5. Wickersham Chair of Excellence in Agricultural Research (2012 – pres.)
6. Fellow, Cohort 8, Food Systems Leadership Institute (2012 – 2014)
7. Appointee, EPA Standing Science Advisory Board (SAB, 2014 – 2017); SAB and Agricultural Science Committee (2021 – 2024); SAB, Biosolids Panel, Chair (2021 – 2022)
8. Fellow of American Association for the Advancement of Science (2017)
9. President Elect, President, Past President American Society of Agronomy (2019 – 2021)

### **Professional Activities**

#### **Memberships in Professional Societies and Organizations**

American Association for the Advancement of Science, American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, Ecological Society of America, Purdue University Cooperative Extension Specialists Association, CAST, Sigma Xi, Purdue University Chapter

#### **Program Focus**

**Research:** Design/implementation/statistical analysis of field and controlled environment experiments on nutrient budgets and soil-plant nutrient cycling process in cropping systems including sampling strategies and designs for spatio-temporal considerations, environmental nutrient losses and crop nutrient use efficiency. Evaluation of agroecosystem viability / sustainability with emphasis on soil, air and water quality ecosystem services in a changing climate.

**Evidence-based Agriculture and Extension:** Increase rigor and relevance of Extension programming through application of systematic (quantitative) reviews (SR) with meta-analysis for translation of the rapidly accruing empirical research results into evidence-based management and policy contextualized to biophysical and socio-cultural conditions.

**Open Science Outreach.** Develop workflows and policy for data curation and preservation in research repositories and reuse by secondary users and novel models for data sharing in public-private partnerships.

**Teaching.** Agronomy 365, Soil Fertility, Lecture with Lab (3 credits)

**Selected Extramural Grants and Contracts (last 4 years)**

1. Koch Industries. Demonstrating Environmental Co-Benefits of Centuro™ for Corn-Based Production Systems Fertilized with UAN. S.M. Brouder (PI) and J.J. Volenec. \$144,155. 4/1/2021 – 5/31/2023.
2. NSF NFEWS/T2: Solar Solutions for Food, Energy and Water Systems (S2FEWS) R. R. Agrawal, P. Bermel, S. Brouder, M. Gitau, J. Riberio, B., Sesmero, M. Tuinstra, S. Woodruff. \$2.5M. 9/19 – 20/24.
3. USDA NIFA AFRI. FACT: An Innovative Cyber-Framework Integrating Public/Private Data for Evidence-Based Recommendations. S. Brouder (PI) w/ 10 Purdue CoPIs, Univ. of WI, African Plant Nutrition Institute and Advanced Agrylitics. \$1,000,000. Integrated. 8/2019 – 7/2024.
4. USDA NIFA AFRI. The NutriNet Knowledgebase for synthesis of North American tile drainage research. S. Brouder (PI) and J.J. Volenec w/ Iowa State and Univ. of IL. \$499,876. Research. 5/2019 – 4/2023.
5. DowDuPont. Demonstrating Environmental Co-Benefits of Instinct® II for Continuous Maize in the Humid Region of the US Cornbelt. S. Brouder (PI), J. Volenec, R. Turco. \$100,000. Research.
6. FFAR-4R Fund (IPNI). Coordinated Site Network for Studying the Impacts of 4R Nutrient Management on Crop Production and Nutrient Loss. 13 Co-PIs representing 8 long-term drainage sites; S. Brouder (Purdue, PI), J.J. Volenec. \$2,000,000 (\$329,865 to Purdue). 1/2017 – 12/2020
7. NSF. NRT- INFEWS: Collaborative Research: Sustainable Food, Energy and Water, Systems (SFEWS). R. Agrawal, P. Bermel, S. Brouder, N. Duval-Couetil, M. Gitau, M. Harris, J. Sesmero, A.A. Swamy, M. Tuinstra, S. Woodruff. 2017 – 2022. \$2,709,005. Education.
8. USDA NIFA AFRI. Cover cropping for sustainable co-production of bioenergy, food, feed (BFF) and ecosystem services (ES). S. Brouder (PI), I. Chaubey, R. Turco, J. Volenec. 2017 – 2020. \$498,612.
9. NSF BD Spokes: PLANNING MIDWEST: Cyberinfrastructure to enhance data quality and support reproducible results in sensor originated big data. E. Bertino, S. Matei, S. Brouder. 2016 – 2017. \$99,938.
10. Sumitomo Chemical Co. Greenhouse plant phenotyping for detecting physiological and morphological changes. J. Jin, M. Tuinstra, M. Mickelbart, A. Carroll, S. Brouder, R. Turco, J. Volenec. 2016 – 2019. \$540,026. Research.
11. USDA NIFA AFRI. Assessing the long run sustainability of US agriculture in an integrated global economy. T. Hertel, L. Bowling, C.X. Song, C. Kucharik, N. Ramankutty, S. Brouder, J.J. Volenec. 2016-2017. \$500,000.
12. 4R Research Fund of the Foundation for Agronomic Research. Proposal for a 4R Fund Research Repository (4R Fund RR). S.M. Brouder, J.J. Volenec, M. Bracke, A. Barton. 2015 – 2017. \$169,663.
13. NCR-SARE. Evaluating the Impact of Biochar on Soil Fertility and Crop Productivity through Farmer Participatory Research and Student Internship Program. K. Gibson, S.M. Brouder, T.J. Benjamin, A.F. Thompson. 2014 – 2017. \$198,453.
14. USDA NIFA AFRI. cenUSA bioenergy, Coordinated Agricultural Project (CAP) in Bioenergy. Purdue Univ. sub-award from IA State Univ. (lead institution). J. Volenec (PU lead PI), S.M. Brouder, R. Turco, C. Chaubey, K. Johnson, P. Murphy, K. Orvis, N. Carroll, N. Olynk, C. Martin, K. Ileleji, C. Martin (PU Co-PIs). 2011 – 2017. \$2,594,974 (PU) of \$25 Million (to 6 institutions).

**Professional, Peer-reviewed Publications (last 4 years, journal articles, book chapters, datasets, etc.; excludes peer-reviewed, commissioned reports)**

1. Brouder, S.M., and J.J. Volenec. In Press. Nutrition of Plants in a Changing Climate In: Z. Rengel, I. Cakmak, P. White (eds.) Marschner's Mineral Nutrition of Higher Plants, 4<sup>th</sup> Edition. Academic Press/Elsevier, Amsterdam, Netherlands.
2. Ojeda, J.J., G. Hammer, K.-W. Yang, M.R. Tuinstra, P. deVoil, G. McLean, I. Huber, J.J. Volenec, S.M. Brouder, S. Archontoulis, and S.C. Chapman. 2021. Quantifying the effects of varietal types × management on the spatial variability of sorghum biomass across US environments. *Global Change Biol. Bioenergy*.
3. Slaton, N.A., S.E. Lyons, D.L. Osmond, S.M. Brouder, S. Culman, L.C. Gatiboni, J. Hoben, P.J.A. Kleinmann, J.M. McGrath, R. Miller, A. Pearce, A. Shober, J.T. Spargo, and J.J. Volenec. 2021. Minimum dataset and metadata guidelines for soil-test correlation and calibration research. *Soil Science Society of America Journal*.
4. Welikhe, P., S.M. Brouder, J.J. Volenec, M. Gitau, and R. Turco. 202X. Dynamics of dissolved reactive phosphorus loss from phosphorus source and sink soils in tile-drained systems. *Journal of Soil Water Conservation*. In Press.
5. Berg, W.K., S.M. Brouder, S.M. Cunningham, and J.J. Volenec. 2021. Potassium and phosphorus fertilizer impacts on alfalfa taproot carbon and nitrogen reserve accumulation and use during fall acclimation and initial growth in spring. *Front. Plant Sci.* 12:1698.
6. Berg, W. K., S.M. Cunningham, S. M. Brouder, S. M., and J.J. Volenec. 2021. Dataset: Influence of phosphorus and potassium nutrition on alfalfa taproot reserve pools during cold acclimation in fall and initial growth in spring. Years 2002 to 2004. Throckmorton Purdue Agriculture Center. Purdue University Research Repository. [doi:10.4231/5BQ9-2V23](https://doi.org/10.4231/5BQ9-2V23)
7. Welikhe, P., S.M. Brouder, J.J. Volenec, M. Gitau, and R. Turco. 2021. Using artificial neural networks to improve phosphorus indices. *Journal of Soil Water Conservation*. [doi:10.2489/jswc.2021.00153](https://doi.org/10.2489/jswc.2021.00153)
8. Brouder, S.M., J.J. Volenec, and T.S. Murrell. 2021. The potassium cycle and its relationship to recommendation development. pp. 1 to 46. In: T.S. Murrell, R.L. Mikkelsen, G. Sulewski, R. Norton, and M.L. Thompson (eds.) *Improving Potassium Recommendations for Agricultural Crops*. Springer Nature Switzerland, Cham Switzerland AG. <https://doi.org/10.1007/978-3-030-59197-7>.
9. Volenec, J.J., S.M. Brouder, and T.S. Murrell. 2021. Broadening the objectives of future potassium recommendations. pp. 385 to 416. In: T.S. Murrell, R.L. Mikkelsen, G. Sulewski, R. Norton, and M.L. Thompson (eds.) *Improving Potassium Recommendations for Agricultural Crops*. Springer Nature Switzerland AG, Cham Switzerland. <https://doi.org/10.1007/978-3-030-59197-7>.
10. Bell, M.J., A.P. Mallarino, J.J. Volenec, S.M. Brouder, and D.W. Franzen. 2021. Considerations for selecting potassium placement methods in soil. pp. 341 to 362. In: T.S. Murrell, R.L. Mikkelsen, G. Sulewski, R. Norton, and M.L. Thompson (eds.) *Improving Potassium Recommendations for Agricultural Crops*. Springer Nature Switzerland, Cham Switzerland AG. <https://doi.org/10.1007/978-3-030-59197-7>.
11. Welikhe, P., Brouder, S. M., Volenec, J. J., Gitau, M. W., Turco, R. F., De Armond, N. S. (2020). **Tile discharge, dissolved reactive phosphorus concentrations and loads for the WOFS (Water year 2011 – 2013)**. Purdue University Research Repository. [doi:10.4231/BJHE-3239](https://doi.org/10.4231/BJHE-3239)
12. Eagle, A. J., Brouder, S. M., Cambareri, G., Drury, C. F., Parkin, T. B., Smith, D. R., Robertson, G. P., Venterea, R. T., Wagner-Riddle, C., Pittelkow, C. M., Omonode, R. A., Vyn, T. J., Pelster, D. E., Chantigny, M. H. (2020). **Nitrous oxide emissions and field-level nitrogen balance of maize and other field crops: Data for meta-analysis**. Purdue University Research Repository. [doi:10.4231/DFB0-F030](https://doi.org/10.4231/DFB0-F030)

13. Bowling, L.C., Cherkauer, K.A., Lee, C.I., Beckerman, J.L., Brouder, S., Buzan, J.R., Doering, O.C., Dukes, J.S., Ebner, P.D., Frankenberger, J.R. and Gramig, B.M., 2020. Agricultural impacts of climate change in Indiana and potential adaptations. *Climatic Change*, pp.1-23.
14. Wiersma, D., W.G. Hartman, S. Pejša, S.M. Brouder, and J.J. Volenec. 2020. Alfalfa Variety Trial Database, 1986-1999. Purdue University Research Repository. doi:10.4231/PHKH-4334
15. Wiersma, D., W.G. Hartman, S. Pejša, S.M. Brouder, and J.J. Volenec. 2020. Metadata for alfalfa varieties and experimental lines 1986 to 1999. Purdue University Research Repository. doi:10.4231/FMY9-6966.
16. Wiersma, D., W.G. Hartman, S. Pejša, S.M. Brouder, and J.J. Volenec. 2020. Genetic and environmental variation in alfalfa forage quality from variety testing experiments conducted in North America between 1986 and 1999. Purdue University Research Repository. doi:10.4231/02PR-9H36
17. Wiersma, D., W.G. Hartman, S. Pejša, S.M. Brouder, and J.J. Volenec. 2020. Genetic and environmental variation in alfalfa stand persistence from variety testing experiments conducted in North America between 1986 and 1999. Purdue University Research Repository. doi:10.4231/KK4K-QD96
18. Wiersma, D., W.G. Hartman, S. Pejša, S.M. Brouder, and J.J. Volenec. 2020. Genetic and environmental variation in alfalfa forage yield from variety testing experiments conducted in North America between 1986 to 1999. Purdue University Research Repository. doi:10.4231/Y31N-5R10
19. Welikhe, P., Brouder, S.M., Volenec, J.J., Gitau, M., Turco, R.F. 2020. Development of Phosphorus Sorption Capacity – Based Environmental Indices for Tile-drained Systems. *J Environ. Qual.* DOI: 10.1002/jeq2.20044.
20. Brouder, S.M. and J.J. Volenec. 2020. Mineral Nutrient Acquisition and Metabolism. Chapter 5. In: In: M. Collins, C.J. Nelson. K.J. Moore and D.D. Redfearn (eds.). *Forages-The Science of Grassland Agriculture. Volume II. 7th Edition.* John Wiley & Sons, Inc., New York, NY.
21. Berg, W. K.; Lissbrant, S.; Volenec, J. J.; Brouder, S. M.; Joern, B. C.; Johnson, K. D.; Cunningham, S. M. (2020), "Phosphorus and Potassium Influence on Alfalfa Nutrition." <https://doi.org/10.4231/PPKB-VK18>.
22. Volenec, J.J., and S.M. Brouder. 2019. Maize Response to P and K in 2006. Experiment 2 at Throckmorton Purdue Agricultural Center: Yield, Soil and Tissue P and K, and Stover and Grain Composition: <https://doi.org/10.4231/WWSK-RA65>
23. Brouder, S.M., Eagle, A., Fukagawa, N., McNamara, J.P., Murray, S., Parr, C., Tremblay, N. Enabling open source data networks in public agricultural research. CAST Issue Paper QTA2019-1, March 2019.
24. Berg, W.K., Lissbrant, S., Cunningham, S.M., Brouder, S.M., Volenec, J.J. 2018. Phosphorus and potassium effects on taproot C and N reserve pools and long-term persistence of alfalfa (*Medicago sativa* L.). *Plant Sci.* <https://doi.org/10.1016/j.plantsci.2018.02.026>.
25. Ojeda, J.J., Volenec, J.J., Brouder, S.M., Caviglia, O.P., Agnusdei, M.G. 2018. Modelling stover and grain yields, and subsurface artificial drainage from long-term corn rotations using APSIM. *Ag. Water Mgmt.* 195: 154–171.
26. Dierking, R., Allen, D., Cunningham, S., Brouder, S., Volenec, J. 2017. Nitrogen reserve pools in two *Miscanthus giganteus* genotypes under contrasting N managements. *Frontiers in Plant Science.* doi: 10.3389/fpls.2017.016
27. Brouder, S.M., Volenec, J.J. 2017. Future climate change and plant macro-nutrient use efficiency. *In Plant macro-nutrient use efficiency: Molecular and genomic perspectives.* Hossain, M.A., Kamiya, T., Burrit, D.J., Phan Tran, L.-S., Fujiwara, T. (eds.). Elsevier. Pp. 357-379.
28. Grassini, P., Pittelkow, C.M., Cassman, K.G., Yang, H.S., Archontoulis, S., Licht, M., Lamkey, K.R., Ciampitti, I.A., Coulter, J.A., Brouder, S.M., Volenec, J.J., Guidin-Garcia, N. 2017. Robust spatial

frameworks for leveraging research on sustainable crop intensification. *Global Food Security*.  
<http://dx.doi.org/10.1016/j.gfs.2017.01.002>.

29. Ojeda, J.J., Volenec, J.J., Brouder, S.M., Caviglia, O.P., Agnusdei, M.G. 2017. Evaluation of Agricultural Production Simulator (APSIM) as yield predictor of *Panicum virgatum* and *Miscanthus x giganteus* in several US environments. *GCB Bioenergy*. 9:796-816.

**Committee on Agriculture  
U.S. House of Representatives  
Information Required From Nongovernmental Witnesses**

House rules require nongovernmental witnesses to provide their resume or biographical sketch prior to testifying. If you do not have a resume or biographical sketch available, please complete this form.

1. Name: Sylvie M. Brouder
  
2. Organization you represent: American Society of Agronomy (ASA), Crop Science Society of America (CSSA) and Soil Science Society of America
  
3. Please list any occupational, employment, or work-related experience you have which add to your qualification to provide testimony before the Committee: Professor and Wickersham Chair of Excellence in Agricultural Research in the Department of Agronomy at Purdue University
  
4. Please list any special training, education, or professional experience you have which add to your qualifications to provide testimony before the Committee: PhD, University of California, Davis (1993); currently conduct cropping systems research, teach soil and nutrient management (undergrad) and research methods (grad) and develop on-farm recommendations for nutrient management and precision agriculture
  
5. If you are appearing on behalf of an organization, please list the capacity in which you are representing that organization, including any offices or elected positions you hold: 2020 President of the American Society of Agronomy

**PLEASE ATTACH THIS FORM OR YOUR BIOGRAPHY TO EACH COPY OF TESTIMONY.**