

SYLVIE M. BROUDER



Professor of Agronomy, Wickersham Chair of Excellence in Agricultural Research
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Academic Record.

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

Faculty/Professional Appointments

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

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
- Phi Sigma, Gamma Delta Chapter
- Epsilon Sigma Phi, Alpha Lambda Chapter
- Gamma Sigma Delta, Purdue University Chapter
- Purdue University Cooperative Extension Specialists Association
- CAST
- Sigma Xi, Purdue University Chapter

Awards and Honors Received (9 Fellowship, Scholarship, Merit & Publication Awards prior to 2005; 4 Educational/Extension Materials Awards from Professional Societies 2006 - present)

2004-2005 Faculty Fellow, Study in a Second Discipline, Dept. of Statistics, Purdue University
2005 Fellow, American Society of Agronomy
2008 Team Award, College of Agriculture, Purdue University
2009 Certified Senior Ecologist, Ecological Society of America (5-yr; renewable)
2010 Purdue University Spirit of the Land Grant Award for excellence across the tripartite Land Grant mission
2011 Fellow, National Academies *Keck Futures Initiative* Conference on Ecosystem Services
2012, 2017 Wickersham Chair of Excellence in Agricultural Research
2012-2014 Fellow, Cohort 8, Food Systems Leadership Institute
2014-2017; 2021-2024 Appointee, EPA Standing Science Advisory Board
2017 Fellow of American Association for the Advancement of Science

2019 – 2021 President Elect, President, Past President American Society of Agronomy

Selected/Recent Leadership, Collaboration/Consultation & Service Activities

US Environmental Protection Agency Standing Science Advisory Board. Appointed for 3-yr term for expertise in ecology, climate sciences and agriculture to provide independent advice on technical issues underlying the EPA's policy and decision making. 12/2014 – 9/2017; 9/2021 – 9/2024 with associated appointment to the Agricultural Science Committee. Appointed Chair, SAB Biosolids Panel to conduct peer review and provide independent advice on EPA's draft Chemical Risk Assessment and Biosolids Screening Tool. 12/2021 – completion.

National Institute for Food and Agriculture, Agriculture and Food Research Initiative.

Appointed Panelist (FY 2019 funds) and Panel Manager (FY 2020 Funds) for Food and Agriculture Cyber-Informatics Tools Program (now Data Sciences for Food and Agricultural Systems Program); 2021 Panel Manager for rebranded DFAS program.

Extension Committee on Policy's Priority Action Team on Climate (ECOP). Appointed to the PAT (2021 – present) to represent ASA-CSSA-SSSA perspectives and the interests of Extension Specialists. The PAT goal is to identify potential partners, build collaborations and resources for national programs surrounding climate. Brouder also serves on the Climate-Smart Priority Implementation Team tasked with identifying Extension programs that are ready to be scaled up and funded at the National Level.

Coordinated Site Network for Studying the Impacts of 4R Nutrient Management

Collaboration and NutriNet Knowledgebase. Initiated in 2016, the Network formally launched with funding from the Foundation for Food and Agriculture and the fertilizer industry. As WQFS Director, Brouder leads Purdue's participation to quantify stacked ecosystem service benefits from advanced nutrient managements in tile-drained systems. Brouder leads the AFRI-NIFA-funded NutriNet Knowledgebase, a leveraging project that is recovering/standardizing legacy data from North American tile drainage research facilities for syntheses generating new insights.

Advanced Agrilytics, an Indiana-based, regional crop consulting company. Adv.Agr.

(<https://advancedagrilytics.com/>) is a formal collaborator on Brouder's AFRI-NIFA-funded FACT: An Innovative Cyber-framework Integrating Public and Private Data for Evidence-based Practice (2019-2024). Adv. Agr. shares data and insights about on-farm big data to facilitate development of evidence-based, soil-specific fertilizer recommendations.

Fertilizer Recommendation Support Tool (FRST). An 80+ collaboration of soil fertility Extension Specialists – led by NC State Univ. / supported by NRCS (<http://www.soiltestfrst.org/>) – seeking to remove geopolitical and institutional bias and standardize and synthesize research data for improved fertilizer recommendations. FRST was inspired by Brouder-led Smarter Agriculture Conference (Potomac, MD, 2013). Brouder consults on data sharing strategies and participates representing Purdue Extension.

American Society of Agronomy. Elected President-Elect (2019), President (2020), Past-President (2021). Brouder oversaw drafting and initial implementation of the 2020 – 2022 Strategic Plan featuring open science, knowledge translation and diversity, equity and inclusivity initiatives. Brouder-led ASA data initiatives which are ongoing, engage Purdue Libraries and School of Information Science, USDA-ARS National Agricultural Libraries and the Collaboration for Environmental Evidence and the CGIAR Big Data Platform in discussion on standards and frameworks for data sharing and open agricultural data.

Alliance of Crop, Soil, and Environmental Science Societies Elected Budget and Finance Chair (2020 – 2021) and appointed Data Stewardship Committee (2014 – 2018, Chair 2016 – 2018).

American Association for the Advancement of Science, Section O Electorate Nominating Committee. Elected. Duties include active participation in identifying, proposing and ranking individuals to run as candidates for the following positions: Section Chair-Elect, Section Member-at-Large, Members of the Electorate Nominating Committee, Council Delegate(s) of the Electorate. 2020 – 2023.

Ecological Society of America, Board of Professional Certification. Elected to two consecutive terms on the 7-member board evaluating/certifying applicant credentials for several ranks of certification. 2013 – 2019.

Council for Agricultural Science and Technology. Appointed taskforce lead for Commentary: “Enabling Open Source Data Networks in Public Agricultural Research.” 2017 – 2019, commentary published and presented to congressional and senate staffers 3/11/2019.

Haramaya University and World Bank African Center of Excellence (ACE) II. Purdue University (Center for Global Food Security and College of Agriculture) is the Key Partner among participating International Research Institutions in an ACE II for Climate Smart Agriculture (CSA) and Biodiversity. Brouder is Purdue’s lead in articulating the research agenda. 2015 – present.

Center for Fertilization and Plant Nutrition/agmatix. A cooperative agreement of the Israeli Agricultural Research Center and Israeli Chemicals Ltd. Brouder appointed to the 7-member Scientific Committee tasked with providing unbiased, independent advice on the CFPN’s research agenda and institutional directions. 2015 – present. Brouder’s intellectual contributions on data sharing spurred the CFPN and ICL to launch initiatives including agmatix

(<https://www.agmatix.com/>), an agro informatics company that develops data-driven solutions for Ag professionals worldwide; Brouder advises on open access data standards and policy.

African Plant Nutrition Institute. APNI is a formal collaborator on Brouder’s AFRI-NIFA-funded FACT: An Innovative Cyber-Framework Integrating Public and Private Data for Evidence-based Practice (2019-2024). New curricula, an output of the project (AGRY 598 Systematic Reviews in Agriculture and the Environment), are being adopted for use at Mohammed VI Polytech University in Morocco. Brouder collaborated with APNI staff to organize, develop and publish the 2021 compendium Improving Potassium Recommendations for Agricultural Crops.

UN Food and Agriculture Organization/CGIAR Research Programs (CRP). Appointed to 6-member evaluation teams for the CRPs on Wheat and Water, Land, and Ecosystems. Responsible for assessing CRP components on natural resource and crop management, restoration of degraded lands and quality of science. 2014 – 2016.

University of California – Davis World Food Center. Appointed to the Scientific Advisory Board. 2015 – present.

Crop Science Society of America. Appointed to Science Policy Committee (2015 – 2018).

Purdue University. Appointed Director of the Water Quality Field Station, a Core Facility and in-field laboratory for the study of carbon, nitrogen and water cycling in agroecosystems and of agricultural management impacts on the environment (1997 – present). Elected to the Faculty Senate (2018 – 2021). Appointed to the University Library Committee (Chair), Dean’s Advisory Council and Libraries P&T Committee (2015 – present). Appointed to the Faculty Mediation Committee (2016 - 2019). Appointed to the Faculty Censure and Dismissal Committee (2012 – 2015, Chair, 2015). Appointed to the Executive Steering Committee of the Center for Global Food Security (2013 – present). Appointed Ecological Sciences and Engineering Interdisciplinary Graduate Program, Governance Committee (2008 – present). Serves on the ABE-led Scientific Committee for Indiana’s Nutrient Reduction Strategy.

Professional Themes and Skills

- **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 C and N losses and crop nutrient use efficiency, and metrics for quantifying ecosystem services. Evaluation of agroecosystem viability / sustainability with emphasis on soil, air and water quality ecosystem services in a changing climate. Examination of rooting dynamics, the root-soil interface and root/shoot ecophysiology and linkages to genetic basis of abiotic stress tolerance. Multivariate statistical approaches to analysis of soil health and environmental data sets. Analysis of scientific outputs (from science domains, research portfolios, etc.) for quality and inference space including relevance to smaller farm enterprises and usefulness in policy and management recommendation development.
- **Evidence-based Agriculture and Extension:** Increase rigor and relevance of Extension programming through application of systematic (quantitative) reviews (SR) with meta-analysis as a robust/transparent model for translation of the rapidly accruing empirical research results into evidence-based management and policy contextualized to biophysical and socio-cultural conditions. Develop a collaborative infrastructure modeled on the Cochrane Collaborative for evidence-based medicine (<http://www.cochrane.org/>) including (i) educational modules/classes for conducting high quality SRs and meta-analytical techniques, (ii) data repositories for SR protocols and extracted SR data to permit cumulative SRs on key questions, (iii) workflows, tools and policies for acquiring and including non-traditional (e.g. farmer-, consultant- or industry-originated) data with research data in the development of farm- or site-/location-specific recommendations, and (iv) workgroups/forums on evidence for farming that emphasize agro-ecological and enterprise considerations versus the historic geopolitical boundaries approach.
- **Open Access, Open Science Outreach.** Launched Purdue's Smarter Ag™ Initiative in 2013 with the AFRI-NIFA supported Smarter Ag Conference (Potomac, MD) to improve the evidence base for management and policy to ensure a safe, sustainable and secure food supply. Key elements include workflows and policy for data curation and preservation in research repositories (e.g., Purdue Univ. Research Repository, <https://purr.purdue.edu/>) and reuse by secondary users, development and implementation of curricula around data competencies, and development of novel models for data sharing in public-private partnerships. Numerous, pilot projects are currently ongoing or under development including with the National Agricultural Libraries, the African Plant Nutrition Institute, and a consortium of Land Grant Univ. across the US currently developing minimum datasets and data standards for soil fertility research. Outreach activities (presentations, press releases, white papers and working groups) target federal agency program managers, agricultural industry professionals/stakeholders in the data value chain, professional societies and Experiment Station Deans and Directors.

Professional, Peer-reviewed Publications (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, 4th 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. 2021. Dynamics of dissolved reactive phosphorus loss from phosphorus source and sink soils in tile-drained systems. *Journal of Soil Water Conservation*.
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*. 76 (6) 513-526 [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 WQFS \(Water year 2011 – 2013\)](https://doi.org/10.4231/BJHE-3239). 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](https://doi.org/10.4231/DFB0-F030). 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.
30. Dierking, R.M., Allen, D.J., Brouder, S.M., Volenec, J.J. 2016. Yield, biomass composition, and N use efficiency during establishment of four *Miscanthus x giganteus* genotypes as influenced by N management. *Biomass and Bioenergy*. 91:98-107.
31. Morell, F.J., Yang, H.S., Cassman, K.G., Van Wart, J., Elmore, R.W., Licht, M., Coulter, J.A., Ciampitti, I.A., Pittelkow, C.M., Brouder, S.M., Thomison, P., Lauer, J., Graham, C. Massey, R., Grassini, P. 2016. Can crop simulation models be use to predict local to regional maize yields and total production in the US Corn Belt? *Field Crops Res*. 192:1-12.
32. Cibir, R., Trybula, E., Chaubey, I., Brouder, S., Volenec, J.J. 2016. Watershed impacts of bioenergy crops on hydrology and water quality using improved SWAT model. *GCB Bioenergy*. 8:837-848.
33. Orr, M.-J., Gray, M.B., Applegate, B., Volenec, J.J., Brouder, S.M., Turco, R.F. 2015. Transition to second generation cellulosic biofuel production systems reveals limited negative impacts on the soil microbial community structure. *Applied Soil Ecology*. 95:62-72.
34. Trybula, E., Raj, C., Burks, J., Chaubey, I. Brouder, S.M., Volenec, J. 2015. Perennial rhizomatous grasses as bioenergy feedstock in SWAT: Parameter development and model improvement. *GCB Bioenergy*. 7:1185-1202.
35. Brouder, S., De Armond, N., Turco, R., Volenec, J. 2014. Maize grain yield record for the WQFS (1995-2012). Data publication. Purdue University Research Repository. doi:10.4231/R7RN35SJ.
36. Brouder, S.M., H. Gomez-McPherson. 2014. The impact of conservation agriculture on smallholder agricultural yields: A scoping review of the evidence. *In* special issue "Evaluating conservation agriculture for smallholders in developing countries." *Agriculture, Ecosystems and Environment*. 187:11-32.
37. Brouder, S.M., and R.F. Turco. 2014. Soil Nitrogen and Carbon Cycling. *Enycl. of Natural Resources*. Ed. Y.Q. Wang. Taylor and Francis Encyclopedia Program.
38. Volenec, J.J. and S.M. Brouder. 2014. Nutrient Deficiencies and Toxicities. *In* L.H. Rhodes and D. Sumac (eds). *Compendium of alfalfa diseases and pests* (3rd edition). Am. Phytopathological Soc., Minneapolis, MN. pp. 113-117.
39. Brouder, S.M., J.J. Volenec. 2013. Open Access Data: A Federal Mandate and Agriculture's Opportunity. *Members Forum, CSA News* Pp. 26-28, Dec. 2013, doi: 10.2134/csa2013-58-12-14.
40. Adams, M.M., T.J. Benjamin, N.C Emery, S.M. Brouder, K. Gibson. 2013. The effect of biochar on native and invasive prairie plant species. *J. Invasive Plant Sci. Management*. 6(2):197-207.

41. Butler, R., S.M. Brouder, W.G. Johnson, K. Gibson. 2013. Response of four summer annual weed species to mowing frequency and height. *Weed Technology*. 27(4): 798-802.
42. Woodson, P., J.J. Volenec, S.M. Brouder. 2013. Field-scale potassium and phosphorus fluxes in the bioenergy crop switchgrass: Theoretical energy yields and management implications. *J. Plant Nutri. Soil Sci.* 176:387-399.
43. Ale, S., L.C. Bowling, P.R. Owens, S.M. Brouder, J.R. Frankenberger. 2012. Development and application of a distributed modeling approach to assess water-shed scale impact of drainage water management. *Ag. Water Management*. 107:23-22.
44. Ale, S., L.C. Bowling, M.A. Youssef, S.M. Brouder. 2012. Evaluation of simulated strategies for reducing nitrate-N losses through subsurface drainage systems. *J. Environ. Qual.* 41:217-228.
45. Adeuya, R., N. Utt, J. Frankenberger, L. Bowling, E. Kladvko, S. Brouder, B. Carter. 2012. Impacts of drainage water management on subsurface drain flow, nitrate concentration, and nitrate loads in Indiana. *J. Soil Water Conserv.* 2012 67(6):167A-172A.
46. Climate Change Position Statement Working Group. 2011. Position Statement on Climate Change. Working Group Rep. ASA, CSSA, and SSSA, Madison, WI, May 11, 2011.
47. Hernandez-Ramirez, G., S.M. Brouder, D.R. Smith, G.E. Van Scoyoc. 2011. Nitrogen partitioning and utilization in corn cropping systems: rotation, N-source, and N timing. *European J Agron.* 34:190-195.
48. Hernandez-Ramirez, G., S.M. Brouder, M.D. Ruark, R.F. Turco. 2011. Nitrate, phosphate, and ammonium loads at subsurface drains in the eastern cornbelt: Agroecosystem and nitrogen management. *J. Environ. Qual.* 40:1229-1240.
49. Fernandez, F.G., S.M. Brouder, J.J. Volenec, C.A. Beyroudy, R. Hoyum. 2011. Soybean shoot and root response to localized water and potassium in a split-pot study. *Plant Soil.* 344:197-212.
50. Brouder, S.M. Nutrient cycling in soils: Potassium. 2011. *In Soil Management: Building a Stable Base for Agriculture*. J.L. Hatfield and T.J. Sauer (eds.). ASA-SSSA, Madison, WI. Pp. 79-102.
51. Ale, S., L.C. Bowling, J.R. Frankenberger, S.M. Brouder, E.J. Kladvko. 2010. Climate variability and drain spacing influence on drainage water management system operation. *Vadose Zone J.* 9:43-42.
52. Lissbrant, S., S. Cunningham, S.M. Brouder, J.J. Volenec. 2010. Identification of fertility regimes that enhance long-term productivity of alfalfa (*Medicago sativa* L.) using cluster analysis. *Agron. J.* 102:580-591.
53. Berg, W., S. Cunningham, S. Brouder, B. Joern, K. Johnson, J. Volenec. 2009. Influence of phosphorus and potassium on alfalfa yield, taproot C and N pools, and transcript levels of key genes after defoliation. *Crop Sci.* 49:974-982.
54. Fernandez, F.G., S.M. Brouder, J.J. Volenec, C.A. Beyroudy, R. Hoyum. 2009. Root and shoot growth, seed composition, and yield of no-till rainfed soybean under variable potassium. *Plant and Soil*. DOI 10.1007/s11104-009-9900-9.
55. Lissbrant, S., S. Stratton, S.M. Cunningham, S.M. Brouder, and J.J. Volenec. 2009. Impact of long-term phosphorus and potassium fertilization on alfalfa nutritive value-yield relationships. *Crop Sci.* 49:1116-1124.
56. Ale, S., L.C. Bowling, S.M. Brouder, J.R. Frankenberger, M.A. Youssef. 2009. Simulated effect of drainage water management operational strategy on hydrology and crop yield for drummer soil in the Midwestern United States. *Agricultural Water Management.* 96:653-665.

57. Ruark, M., S.M. Brouder, and R.F. Turco. 2009. Dissolved organic carbon from tile drained agro-ecosystems. *J. Environ. Qual.* 38:1205-1215.
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Recent Invitational Papers (89 prior to 2015)

94. Murrell, T.S., S.M. Brouder, and J.J. Volenec. 2021. Big data for smart agriculture: What are we hoping for? Proc. 5th International Agronomy Congress. Nov. 23 to 27. Indian Society of Agronomy, PJTSUA, Hyderabad, India
95. Brouder, S.M. 2021. Plant Nutrition in a changing climate and perspectives on agriculture's role in mitigation and adaptation. Keynote/Plenary Address. Biostimulants World Congress, Nov. 30th, 2021, Hollywood, FL.
96. Brouder, S.M., and J.J. Volenec. 2021. Publishing raw data: How it helps you, others and science and how to do it. SSSA Special Symposium, Modernizing Soil Testing in the US: Fertilizer Recommendation Support Tool (FRST) Update. ASA, CSSA, SSSA International Annual Meeting, Salt Lake City, UT. Nov. 6-12.
97. Slaton, N.A., S.E. Lyons, D.L. Osmond, S.M. Brouder, S. Culman, L. Gatiboni, J. Hoben, P.J.A. Kleinman, J. McGrath, R.O. Miller, A. Pearce, A.L. Shober, J.T. Spargo, and J.J. Volenec. 2021. Development of minimum dataset for soil test correlation and calibration. SSSA Special Symposium, Modernizing Soil Testing in the US: Fertilizer Recommendation Support Tool (FRST) Update. ASA, CSSA, SSSA International Annual Meeting, Salt Lake City, UT.
98. Brouder, S.M. 2021. Agroecology and regenerative agriculture. Healthy Menus R&D Collaborative Mtg (Hybrid), Culinary Institute of America, Aug. 25.
99. Brouder, S.M., and J.J. Volenec. 2021. Initiatives for Advancing Evidence-Based Nutrient Management in US Midwest Agroecosystems. In Advances in Agricultural Evidence Webinar and Panel. Centre for Environmental Evidence Webinar Series, April 13.
100. Brouder, S.M. 2020. The Plant “Food Plate” – What does it look like and why do we care. In Animal, Vegetable, Mineral: Multidisciplinary Perspectives in Food Systems Panel, Food and Nutrition Conference and Expo., Virtual Conference, Oct. 17-20.
101. Brouder, S.M., 2020. Enabling Open Source Data Networks in Public Agricultural Research: Realizing the dream of open data in the “long-tail” of public agricultural research. Ag 2020 Forum, Arlington, VA. Feb. 20-21.

102. Brouder, S.M. 2019. Overview of Programming to Improve Nutrient Management Recommendations. YPF Energy Company – Purdue Meeting. West Lafayette, IN. Sept. 13.
103. Brouder, S.M. 2019. The View from Purdue: Where the OA Journey is Just Beginning. The Open Access Tipping Point Workshop. Washington, D.C. Aug. 28-29.
104. Brouder, S.M. 2019. Synergies and Tradeoffs When Implementing Soil and Water Conservation Strategies. UNSA-Purdue Global Food Security Workshop. Arequipa, Peru. June 19-21.
105. Brouder, S.M. 2019. Enabling Open Source Data Networks in Public Agricultural Research: Realizing the dream of open data in the “long-tail” of public agricultural research. Interagency Working Group on Biological Data Sharing Workshop. Institute for Bioscience and Biotechnology, Rockville, MD. June 12.
106. Brouder, S.M. 2019. Analyst Perspective & Outside-the-Box Research. The Next Big Idea. Ecosystem Service Valuation Workshop, Washington, D.C. April 23-24.
107. Brouder, S.M. 2019. Climate Smart Agriculture. Session 1, Breakout A (Food Supply). Ending Global Hunger Colloquium 2019, West Lafayette, IN April 10- 11.
108. Brouder, S.M. 2019. Big Data and Diagnostics for Nutrient Management. 3rd Annual Mtg, Center for Fertilizers and Plant Nutrition (CFPN) Scientific Committee, ARO, Gilat, Israel, Mar 18-19.
109. Brouder, S.M. 2019. Enabling Open Source Data Networks in Public Agricultural Research. 3 presentations in Washington, DC: Longworth House Office Building, Russel Senate Office Building, and APLU Headquarters. March 11.
110. Brouder, S.M. 2019. Protocols for Incorporating New Data and Data Standardization. Environmental Defense Fund Workshop “Quantifying Nitrogen Losses in Food Supply Chains.” San Diego, CA. Jan. 10.
111. Brouder, S.M., T.S. Murrell, and M.L. Thompson. 2019. K Cycle Redux: Revisiting Mass Balance Approaches to Recommendations. SSSA Special Symposium “Potassium Recommendations.” Joint Mtg of SSSA and the Canadian Soil Science Society. San Diego, CA. Jan. 8.
112. Volenec, J.J., S.M. Brouder, and T.S. Murrell. 2019. Broadening the Objectives of Future Fertilizer Recommendations. SSSA Special Symposium “Potassium Recommendations.” Joint Mtg of SSSA and the Canadian Soil Science Society. San Diego, CA. Jan. 8.
113. Brouder, S.M., J.J. Volenec, B. Deno, and N De Armond. 2018. Cover Cropping for Sustainable Co-Production of Bioenergy, Food, Feed and Ecosystem Services. USDA NIFA Agroecology and Climate Project Directors Meeting. Washington, D.C. Dec. 6-7.
114. Brouder, S.M. 2018. Ecology, Ecosystems, Food Security: The Challenge of Realizing the Virtuous Circle. Climate Smart Agriculture Program Visit. Haramaya Univ., Dire Dawa, Ethiopia. Aug. 21.
115. Brouder, S.M. 2018. Realizing the Dream of Open Data in the “Long Tail” of Public Agricultural Research. DIDAg Workshop, National Agricultural Libraries, Beltsville, MD. June 20-22.
116. Brouder, S.M. 2018. Opportunities for Purdue-ICL Collaborations in Nutrient Management and Precision Agriculture. ICL Corporate Visit to Purdue. June, 20.
117. Brouder, S.M. 2018. Critical Infrastructure to Promote Data Synthesis into Evidence-Based Nutrient Management. Univ. IL NRES Seminar Series, Champaign-Urbana, IL. March 9.
118. Brouder, S.M. 2018. 20+ Years of PA Nutrient Management in the US: Challenges and Promising Pathways Forward. Annual Mtg of the Scientific Committee, Center for Fertilization and Plant Nutrition. Beer Sheva, Israel. Feb. 3-8.

119. Brouder, S.M. 2017. Plant Nutrition: Perspective of comprehensive nutrient management planning. Beck's Advanced Agronomy Training Day. Atlanta, IN. Nov. 13.
120. Brouder, S.M., and J.J. Volenec. 2017. Critical Infrastructure to Promote Data Synthesis into Evidence-Based Nutrient Management. Special Session Symposium: The Nutrient Uptake and Outcome Network (NUOnet). Meeting of the Amer. Soc. Agron.-Crop Sci. Soc. of Amer.-Soil Sci. Soc. of Amer. Oct. 22-25, Tampa, FL.
121. Brouder, S.M. 2017. Agricultural Innovation in the US: Evolution in the farmer-Land Grant partnership. Sustainable Farming Conference Budapest, Hungary, 18 Oct.
122. Brouder, S.M. 2017. Smarter AgTM, data (big & small, grey & dark) through the nutrient management lens. Wickersham Chair Lecture, West Lafayette IN, Oct. 2.
123. Brouder, S.M., and J.J. Volenec. 2017. Critical Infrastructure to Promote Data Synthesis into Evidence-Based Nutrient Management. 72nd SWCS International Annual Conference, July 31, Madison, WI
124. Brouder, S.M. Common, Persistent and Annoying Challenges: The WQFS Sensor Pilot Project and Other Data Quality Lessons from Agriculture. BD Spokes MIDWEST PLANNING Workshop "Sensors and Reproducibility." West Lafayette, IN. March 29, 2017.
125. Brouder, S.M. 2017. Climate Smart Agriculture ~ Mitigation. PCCRC Conference, West Lafayette, IN. Feb. 9.
126. Brouder, S. M, and T.S. Murrell. Improving the accuracy, utility and use of K recommendations. Frontiers in Potassium Science Conf., Rome, Italy, Jan. 24-27, 2017.
127. Brouder, S.M. Data management planning for extended data lifecycles. 4th International Agronomy Special Session on "Big data for evidence-based agronomy for future food security." New Delhi, India, Nov. 22-26, 2016.
128. Brouder, S.M. Evaluation of CGIAR Research Program on Water Land and Ecosystems (WLE). Independent Evaluation Arrangement (IEA) Evaluation Workshop FC15. May 5, 2016.
129. Kling, C.L., P.W. Gassman, Y. Panagopoulos, A. Valcu, T. Campbell, C. Raj, I. Chaubey, J. Frankenberger, L. Bowling, S.M. Brouder, J.J. Volenec, K. Schilling, and C. Wolter. Water quality effects of landscape scale adoption of bioenergy crops. cenUSA webinar. March 25, 2016.
130. Brouder, S.M. and Volenec, J.J. Data repositories, data sharing and data quality and requirements. Great Plains Soil Fertility Conference, Denver CO, March 1-2, 2016.
131. Brouder, S.M. Bad weather and risk: How does nutrient management change? Corn Belt Seed Conference, Indianapolis, IN, Feb. 2-4, 2016.
132. Brouder, S.M. 2015. Scientific Evidence and the smallholder farmer: conservation agriculture research, inference space and quality of science. Meeting of the Amer. Soc. Agron.-Crop Sci. Soc. of Amer.-Soil Sci. Soc. of Amer. Nov. 14-17, Minneapolis MN.
133. Chaubey, I, C. Raj, J. Frankenberger, J.J. Volenec, and S.M. Brouder. 2015. Integrated assessment of bioenergy land use and climate change on ecohydrologic response in the Midwest USA. Inter. Meeting of the Amer. Soc. Agron.-Crop Sci. Soc. of Amer.-Soil Sci. Soc. of Amer. Nov. 14-17, Minneapolis MN.
134. Cibin, R., Chaubey, I., Trybula, E., Volenec, J., Brouder, S., Arnold, J. SWAT model improvements to simulate bioenergy crops production. International Soil and Water Assessment Tool Conference, Sardinia, Italy, June 24-26, 2015.
135. Chaubey, I., Cibin, R., Frankenberger, J. Volenec, J., Brouder, S., Gassman, P., Panagopoulos, Y., Kling, C., Arnold, J. Application of improved SWAT model for

- bioenergy production scenarios in Indiana watersheds. International Soil and Water Assessment Tool Conference, Sardinia, Italy, June 24-26, 2015.
136. Volenec, J.J. and S.M. Brouder. 2015. Getting more from 4R data: Overview of the 4R research data repository. Annu Meeting of The Fertilizer Institute. May 12, 2015 Washington DC.
 137. Volenec, J.J., Brouder, S. 2015. Tri-Societies data initiatives – Overview. AgMIP-USDA Data Harmonization Workshop. National Agricultural Library, May 11, 2015. Beltsville MD
 138. Brouder, S.M. “Taking it to the stacks: Libraries and the research data afterlife.” Researcher Keynote. Harvard Purdue Data Management Symposium. Cambridge, MA. June 16 – 17, 2015.
 139. Brouder, S., Bell, M., Moody, P. 2015. How site-specific are soil test calibration relationships for potassium? 14th International Symposium for Soil and Plant Analysis. Jan. 26 – 30. Kona Beach, HI.
 140. Kovar, J.L., Brouder, S. 2015. What are the unique attributes of potassium that challenge existing nutrient uptake models? 14th International Symposium for Soil and Plant Analysis. Jan. 26 – 30. Kona Beach, HI.
 141. Volenec, J., Brouder, S. 2015. Potassium uptake, crop growth and water productivity: Does distribution of roots and water in the soil profile matter? 14th International Symposium for Soil and Plant Analysis. Jan. 26 – 30. Kona Beach, HI.
 142. Brouder, S.M., “Protected nitrogen.” The 22nd Southwest Agricultural Conference, Ridgetown, Ontario, CA. Jan. 6-7, 2015.

Professional Publications for Farmers, Ag. Professionals (Peer-reviewed Extension publications, station bulletins, training materials, etc.)

1. Purdue Crop Diagnostic Training and Research Center. Corn and Soybean Field Guide, 2021 Edition (Contributors: J.P. Ackerson, J.C. Boncowski, S.M. Brouder, J.J. Camberato, S.N. Casteel, T. Creswell, C.K Gerber, L.A. Humber, W.G. Johnson, C.H. Krupke, R.L. Nielsen, J.L. Obermeyer, J.D. Rorick, D.E.P. Telenko, B.G. Young, Lei Zhang, Marcelo Zimmer). ID-179. Pp. 311.
- Publications Pub. Nos. #2-22 are 1999-2020 annual editions of the Corn and Soybean Field Guide*
23. Bowling, L., Widhalm, M., Cherkauer, K., Beckerman, J., Brouder, S., Buzan, J., Doering, O., Dukes, J.S., Ebner, P., Frankenberger, J., Gramig, B., Kladvko, E., Lee, C., Volenec, J, and Weil, C.. 2018. Indiana’s Agriculture in a Changing Climate: A Report from the Indiana Climate Change Impacts Assessment. Purdue Climate Change Research Center, Purdue University. West Lafayette, Indiana.
 24. Lissbrant, S., W.K. Berg, J.J. Volenec, S.M. Brouder, B.C. Joern, S.M. 2010. Cunningham, and K.D. Johnson. Phosphorus and potassium fertilization of alfalfa. AY-331-W. 6 pp.
 25. Hernandez, G., S.M. Brouder, D.R. Smith, and G.E. Van Scoyoc. 2009. Management practices and weather affect soil surface fluxes of greenhouse gases. Crops & Soils Mag. 42(5): 29 – 34.
 26. Sawyer, J., E. Nafzinger, G. Randall, L. Bundy, G. Rehm, B. Joern, C. Laboski, R. Hoeft, R. Mullen, R. Killorn, and S. Brouder. 2006. Concepts and rationale for regional nitrogen rate guidelines for corn. Iowa State University, University Extension Publ. PM2015. 27pp.

27. Brouder, S., M. Groff, and B. Erickson. 2005. The Presidedress Soil Nitrate Test for Improving N Management in Corn. *2005 Indiana CCA Self-Study article and quiz*. <http://ceu.farmresearch.com/Modules/ModuleDetail.asp?ModuleID=48>
28. Brouder, S.M., B. Hofmann, E. Kladviko, R. Turco, and J. Frankenberger. 2004. Interpreting nitrate concentration in tile drainage water. AY-318-W. <http://www.ces.purdue.edu/extmedia/AY/AY-318-W.pdf>
29. Bongen, A., S.M. Brouder, and R. Turco. 2003. Using Agricultural Land for Carbon Sequestration. CASMGS Outreach (Task V) Public. <http://www.agry.purdue.edu/soils/Csequest.PDF>.
30. Bongen, A., S.M. Brouder and R. Turco. 2003. Global Warming: What Can It Mean for Agriculture? CASMGS Outreach (Task V) Public. <http://www.agry.purdue.edu/soils/GWbroch.PDF>
31. Bongen, A., S.M. Brouder, R. Turco. 2003. Conservation Practices for Carbon Storage. CASMGS Outreach (Task V) Public. <http://www.agry.purdue.edu/soils/mgmtpract.PDF>.
32. Brouder, S.M., and D.B. Mengel. 2003. Determining nitrogen fertilizer sidedress application needs in corn using a chlorophyll meter. Agronomy Guide, AY-317-W, <http://www.agry.purdue.edu/ext/pubs/AY-317-W.pdf>.
33. Brouder, S.M., and D.B. Mengel. 2003. The pre-sidedress soil nitrate test for improving N management in corn. Agronomy Guide, AY-314-W. <http://www.agry.purdue.edu/ext/pubs/AY-314-W.pdf>.
34. Brouder, S.M., A.S. Bongen, K. Eck, and S.E. Hawkins. 2003. Manganese deficiencies in Indiana Soils. Agronomy Guide, AY-276-W. <http://www.agry.purdue.edu/ext/pubs/AY-276-W.pdf>
35. Brouder, S.M. 2003. Cornstalk testing to evaluate the nitrogen status of mature corn. Agronomy Guide, AY-322-W. <http://www.agry.purdue.edu/ext/pubs/AY-322-W.pdf>
36. NCR-13 Committee. 2001. Soil Sampling for Variable Rate Fertilizer and Lime Application. G.W. Rehm, A. Mallarino, K. Reid, D. Franzen, and J. Lamb (eds.). North Central Multistate Report 348, Minnesota Agricultural Experiment Station, University of Minnesota, St. Paul, MN. Pp. 11.
37. NCR-103 Committee. 2001. Crop Responses to Amisorb in the North Central Region. K. Kelling (ed.). North Central Regional Research Report 342. College of Agriculture and Life Sciences, University of Wisconsin, Madison WI.
38. NCR 103 Committee. 2001. Compendium Nonconventional Soil Additives: Products, Companies, Ingredients, and Claims (<http://www.soils.wisc.edu/extension/>).
39. NCR-103 Committee. 1999. Impact of "ACA" on Crop Yield in the North Central Region. North Central Regional Research Report 343. Univ. MN Stat. Bull. 607-1999. Pp. 9.
40. Doster, D.H., S.D. Parsons, E.P Christmas, S.M. Brouder, and R.L. Nielsen. 1999 / 2000 Purdue Crop Guides. ID-166-Rev. 2pp.
41. NCR13 Committee. 1998. Recommended Chemical Soil Test Procedures for the North Central Region. North Central Regional Research Publication No.221 (Revised). 1998. Missouri Agricultural Experiment Station Bull. SB1001. Pp. 72.
42. Reetz, H., S.M. Brouder, and J. Johnson. 1998. Negligence of Potassium in Soybeans: Are You Guilty? News and Views. Potash and Phosphate Inst. Pp. 4. Brouder, S.M., J.E. Hill, J.F. Williams, S.C. Scardaci, L.S. Whent, E. Knight, S.R. Goldman-Smith, and T.E.C. Kraus. 1996. California rice grower survey: 1993 straw management decisions and practices. Agronomy Progress Report No. 252. University of California Agricultural Experiment Station. Pp. 9.

Other Technical Publications and Published Proceedings (59; 1998-present): Non-refereed research conference proceedings and project fact sheets (33) and non-refereed guides for farmers and agricultural industry professionals (26); details on request.

Published Abstracts (last 5 yrs; 150 prior to 2016)

151. Murrell, T.S., S.M. Brouder, and J.J. Volenec. 2021. Big data for smart agriculture: What are we hoping for? Proc. 5th International Agronomy Congress. Nov. 23 to 27. Indian Society of Agronomy, PJTSUA, Hyderabad, India
152. Sela, S., Castellano, M. J., Dobermann, A., & Brouder, S. M. (2021) Data Standardization Can Foster Data Sharing, Research Collaborations and Agronomic Big Data Analysis [Abstract]. ASA, CSSA, SSSA International Annual Meeting, Salt Lake City, UT. <https://scisoc.confex.com/scisoc/2021am/meetingapp.cgi/Paper/137753>
153. Slaton, N.A., S.E. Lyons, D.L. Osmond, S.M. Brouder, S. Culman, L. Gatiboni, J. Hoben, P.J.A. Kleinman, J. McGrath, R.O. Miller, A. Pearce, A.L. Shober, J.T. Spargo, and J.J. Volenec. 2021. Development of minimum dataset for soil test correlation and calibration. ASA, CSSA, SSSA International Annual Meeting, Salt Lake City, UT. <https://scisoc.confex.com/scisoc/2021am/meetingapp.cgi/Paper/133770>
154. Brouder, S.M., J.J. Volenec. 2021. Publishing raw data: how it helps you, others and science and how to do it. ASA, CSSA, SSSA International Annual Meeting, Salt Lake City, UT. <https://scisoc.confex.com/scisoc/2021am/meetingapp.cgi/Paper/137821>
155. Brouder, S.M., and J.J. Volenec. 2021. Initiatives for Advancing Evidence-Based Nutrient Management in US Midwest Agroecosystems. In Advances in Agricultural Evidence Webinar and Panel. Centre for Environmental Evidence Webinar Series, April 13.
156. Deno, Brodrick, J.J. Volenec, and S.M. Brouder. 2019. Cover Cropping for Sustainable Co-Production of Bioenergy, Food, Feed (BFF) and Enhancement of Ecosystem Services (ES). ASA-CSSA-SSSA Annual Mtg., San Antonio, Tex. Nov. 10-13. <https://scisoc.confex.com/scisoc/2019am/meetingapp.cgi/Paper/118713>.
157. Welikhe, P., and S.M. Brouder. 2019. Using Artificial Neural Networks to Improve Phosphorus Indices. ASA-CSSA-SSSA Annual Mtg., San Antonio, Tex. Nov. 10-13. <https://scisoc.confex.com/scisoc/2019am/meetingapp.cgi/Paper/118298>
158. Brouder, S.M., T.S. Murrell and M.L. Thompson. 2019. K Cycle Redux: Revisiting Mass Balance Approaches to K Recommendations. Special Symposium “Potassium Recommendations.” SSSA International Soils Mtg. San Diego, CA. Jan. 6-9. (<https://scisoc.confex.com/scisoc/2019sssa/meetingapp.cgi/Paper/116299>)
159. Volenec, J.J., S.M. Brouder and T.S. Murrell. 2019. Broadening the Objectives of Future Potassium Fertilizer Recommendations. Special Symposium “Potassium Recommendations.” SSSA International Soils Mtg. San Diego, CA. Jan. 6-9. (<https://scisoc.confex.com/scisoc/2019sssa/meetingapp.cgi/Paper/116297>)
160. Ghazanfarpour, N., S.M. Brouder, and J.J. Volenec. 2018. Prediction of Tile Drainage and Crop Yield from Long-Term Corn Rotations Using DSSAT Model in the Midwestern United States. 2018 Joint ASA, CSSA and Canadian Society of Agronomy Mtg. Baltimore, MD. Nov. 4-7. (<https://scisoc.confex.com/scisoc/2018am/meetingapp.cgi/Paper/112825>)
161. Welikhe, P. and S.M. Brouder. 2018. Development and Evaluation of Phosphorus Sorption Capacity-Based Environmental Indices. 2018 Joint ASA, CSSA and Canadian Society of Agronomy Mtg. Baltimore, MD. Nov. 4-7. (<https://scisoc.confex.com/scisoc/2018am/meetingapp.cgi/Paper/111504>)

162. Farmaha, B.S., Volenec, J.J. and S.M. Brouder 2017. Potential of Growing Sorghum As Bioenergy Feedstock on Lands Economically Unfit for Maize Production. Proceedings of Amer. Soc. Agron.-Crop Sci. Soc. of Amer.-Soil Sci. Soc. of Amer., Oct. 22-25, Tampa FL. <https://scisoc.confex.com/crops/2017am/webprogram/Paper106159.html>
163. Brouder, S.M., and J.J. Volenec. 2017. Critical Infrastructure to Promote Data Synthesis into Evidence-Based Nutrient Management. Special Session Symposium: The Nutrient Uptake and Outcome Network (NUOnet). Proceedings of the Amer. Soc. Agron.-Crop Sci. Soc. of Amer.-Soil Sci. Soc. of Amer. Oct. 22-25, Tampa, FL. <https://scisoc.confex.com/crops/2017am/webprogram/Paper105068.html>
164. Trybula, E. and S.M. Brouder. 2017. Does Potassium Management Buffer Crop Yield from Water Stress? a Meta-Analysis. Proceedings of the Amer. Soc. Agron.-Crop Sci. Soc. of Amer.-Soil Sci. Soc. of Amer. Oct. 22-25, Tampa, FL. <https://scisoc.confex.com/crops/2017am/webprogram/Paper108839.html>
165. Brouder, S.M., and J.J. Volenec. 2017. Critical Infrastructure to Promote Data Synthesis into Evidence-Based Nutrient Management. Proceedings of the 72nd SWCS International Annual Conference, July 31, Madison, WI
166. Brouder, S.M., and T.S. Murrell. 2017. Improving the accuracy, utility and use of K recommendations. Frontiers in Potassium Science Conf. Proceedings, Jan. 24-27, Rome, Italy.
167. Farmaha, B.S., J.J. Volenec and S.M. Brouder. 2016. Comparative Analysis of Greenhouse Gas Emissions from Miscanthus and Switchgrass Grown on Marginal Land. Inter. Meeting of the Amer. Soc. Agron.-Crop Sci. Soc. of Amer.-Soil Sci. Soc. of Amer., Nov. 6-9, Phoenix AZ..
168. Trybula, E., T. Mabhaudi, G. Thibaud, P. Chivenge, and S.M. Brouder, 2016. Simulated crop water use response to nutrient management in AQUACROP for Commercial dryland maize production within Kwazulu-Natal, South Africa. ASABE Conf. “Engineering and Technology Innovation for Global Food Security.” Oct. 24-28, Stellenbosch, South Africa..
169. Brouder, S.M., and J.J. Volenec. 2016. Data Repositories, Data Sharing and Data Quality and Requirements. Proceedings of the Great Plains Soil Fertility Conference, Denver, CO, March 1-2, 2016.

Recent, Funded Research, Extension and Teaching Projects:

(53 funded projects totaling 7.61M active 1996 – 2011 including: 17 federal and state contracts totaling 5.96M; 18 industry and private foundation awards, contracts and gifts totaling 1.1M, and 18 Purdue University competitive research awards and fellowships totaling 0.55M. Federal and state agencies included the Natural Resource Conservation Service, the Indiana Dept. of Environmental Management, the North Central Sustainable Agriculture Research and Education program, the US Department of Agriculture, the US Environmental Protection Agency, and the National Science Foundation. Private industry, commodity groups and foundations included the United Soybean Board, the Indiana Soybean Board, New Holland, IMC Agribusiness, Emerge, Agrium, the Potash and Phosphate Institute, the National Pork Producers, Georgia Pacific, the Showalter Trust, Pheasants Forever, and the Boeing Corp.)

54. Koch Industries. Demonstrating Environmental Co-Benefits of Centuro TM for Corn-Based Production Systems Fertilized with UAN. S.M. Brouder (PI) and J.J. Volenec. \$144,155. Extension. 4/1/2021 – 5/31/2023.

55. 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 Research. 9/19 – 20/24.
56. USDA NIFA AFRI. FACT: An Innovative Cyber-Framework Integrating Public/Private Data for Evidence-Based Recommendations. S. Brouder (PI) w/ 10 Purdue CoPIs (AGRY, AgEcon, Stats, LibSIS, Experiment Station), Univ. of WI, African Plant Nutrition Institute and Advanced Agrylitics. \$1,000,000. Integrated. 8/2019 – 7/2024.
54. 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. 5/2019 – 4/2023. Research.
55. Purdue Educational Equipment Grant. Growing tomorrow's leaders: Innovating the experiential learning experience in the lab and in the field. M. Mashtare, S. Armstrong, L. Bowling, S. Brouder, B. Erickson, C. Gerber, C. Johnston, E. Kladviko, G. Koliantz and L. Lee. Education.
56. Purdue-UNSA. UNSA NEXUS: A Purdue-UNSA Initiative to Establish a Center for Food Security in Peru. G. Ejeta, S. Brouder, G. Burniske, J. Ricker-Gilbert, C. Weaver, and S.L. Weldon. \$160,332. Extension.
57. DowDuPont. Demonstrating Environmental Co-Benefits of Instinct® II for Continuous Maize in the Humid Region of the US Cornbelt. S. Brouder, J. Volenec, R. Turco. \$100,000. Research.
58. 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 – 12/2021. Integrated.
59. NSF. NRT- INFIEWS: 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.
60. USDA NIFA AFRI. Cover cropping for sustainable co-production of bioenergy, food, feed (BFF) and ecosystem services (ES). S. Brouder, I. Chaubey, R. Turco, J. Volenec. 2017 – 2021. \$498,612. Research
61. Purdue Univ. Mellon Humanities-Stem Grant. From global-to-local-to-global: Attaining long-run sustainability in US agriculture. T. Hertel, N. Kong, M. Milkoreit, C. Song, L. Bowling, J. Volenec, S. Brouder. 2017 – 2018. \$147,031. Integrated.
62. 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. Research.
63. 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.
64. ARS National Agricultural Library. MOU for Establishing a distributed agricultural data management and repository network. J. Volenec, M. Bracke, S. Brouder. 2015 – 2020. \$3500. Extension.
65. 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. Research.

66. USDA NIFA AFRI. PAgES: An Interdisciplinary Science Workshop on Payments for Agroecosystem Services. B. Gramig and S.M. Brouder. 2016. \$49,500. Research Conference.
67. 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. Research and Extension.
68. 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. Fully Integrated.
69. 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 (total award to 6 institutions). Fully Integrated.
70. USDA/DOE North Central Sungrant Program. Optimization of Biomass Productivity and Environmental Sustainability for Cellulosic Feedstocks: Land Capability and Life Cycle Analysis. S.M. Brouder, R.F. Turco, J.J. Volenec, B. Gramig, D. Allen (Mendel Biotechnology, Inc.), and W. Tyner. 2010 – 2013. \$875,000. (\$700,000/\$175,000 sponsor/required match.) Integrated.
71. NIFA National Needs Fellowship. Graduate education to meet the agro-ecosystem services (AES) challenge. 2010 – 2015. \$236,000. L.S. Lee, S.M. Brouder, J.J. Volenec, K.D. Gibson, L.S. Prokopy. Education.
72. DOE. Watershed scale optimization to meet sustainable cellulosic energy crop demand. I. Chaubey (PI), L. Bowling, S.M. Brouder, K. Cherkauer, B. Engel, J. Frankenberger, R. Goforth, B. Gramig, P. Murphy, J.J. Volenec (Co-PIs). 2010 – 2014. \$1,991,177 (w/ match); \$1,592,385 (cost to sponsor). Research and Extension
73. International Plant Nutrition Institute. Global Maize Initiative. J.J. Volenec, PI, S.M. Brouder, T. Vyn, R.F. Turco, B.C. Joern, R.L. Nielsen, and R.F. Turco Co-PIs. 2008 – 20XX. \$97,000. Integrated/
74. Potash Corporation of Saskatchewan and the Mosaic Company. Graduate Fellowship in Potassium Research. \$400,000. 2002 – present. S.M. Brouder, C. Beyrouthy, J.J. Volenec, T. Vyn and B.C. Joern, CoPIs.
75. International Plant Nutrition Institute. Gift funds to support research on productivity and environmental impacts of bioenergy crops. 2008-20XX . \$47,500. J.J. Volenec, S.M. Brouder, R.F. Turco.
76. NSF REU Program. Purdue REU Site: Tackling Some of the Grand Challenges for Engineering. I. Hua, PI, S.R. Hoffman, J.W. Sutherland, R. Turco, S. Brouder, L. Nies, E.C. Blatchley, M.T. Harris, F. Zhao, T. Harton, Co-PIs. 2010 – 2013. Education.
77. Purdue University-Moi University (PUMU) Partnership Seed Grants. Internationalizing soil and crop science curricula at Purdue and Moi Universities. D.G. Schulze, L. Unruh-Snyder, B. Joern, S. Brouder, G. Van Scoyoc, P. Owens, D.E. Stott. (AGRY) w/ W. Ng’etich, J.R. Okalebo, C.O. Othieno, P. Kisinyo, C. Serrem (Moi University). \$7000. Education.
78. USAID ISE Program. A Sub-Saharan Context for Internationalizing Crop, Soil, and Environmental Science Curricula. Schulze, D.G. (PI), G.E. Van Scoyoc, L.U. Snyder, B. Joern, P.R. Owens, S.M. Brouder, M. Crawford, H. Rowe, N. Freeman, D. Stott, W. Ng’etich, P. MnKen 2010 – 2013. \$150,000. Education

79. USDA NIFA-AFRI Long-term Sustainable Agroecosystem Program-Sustainable Agricultural Systems (LTAP-SAS). Environmental and Productivity Benefits of Ecological Intensification of U.S., Maize-based Cropping Systems. S.M. Brouder, J.J. Volenec, R.F. Turco, T.S. Murrell, B. Gramig, L. Prokopy, H. Zhang, T. Vyn, C. Gerber. 2009 - 2013. \$200,000. Integrated
80. USDA NRI Managed Ecosystems Program. Ecological services of agro-biofuels: Productivity, soil C storage and air and water quality. 2008 – 2013. \$399,999. S.M. Brouder, PI, J.J. Volenec, R.F. Turco, G. Ejeta, and D.R. Smith, CoPIs. Research.

Students and Post Doctorates Advised

Externally funded undergraduates in summer research programs (2012 – present): 6 NSF-funded Research Experience for Undergraduate summer fellows; 1 Summer Research Opportunity Program fellow.

Graduate students under the direct supervision of Dr. Brouder:

Jason Wells	M.S. (1998) co-advised w/ Dr. C. Nakatsu; Non-thesis option.
Alexis Heldt	M.S. (1999); <i>Cover crop impacts on corn and soybean N acquisition and yield.</i>
Brenda Hofmann	M.S. (2002); <i>Influence of tile spacing on crop yields, nitrate concentrations and nitrogen flux in drainage water.</i>
Adam Brock	M.S. (2004); <i>Approaches to variable rate nitrogen management in the eastern corn belt</i>
Fabian Fernandez	Ph.D. (2006) co-advised w/ Dr. C. Beyrouthy; <i>Potassium acquisition by soybean as affected by stratified soil potassium, growth stage, and soil water content.</i>
Matt Ruark	Ph.D. (2006); <i>Fate of dissolved organic carbon in tile drained agroecosystems.</i>
Jamalyn Evans	M.S. (DNF) co-advised w/ Dr. J. Volenec; <i>Impact of phosphorus and potassium on alfalfa root morphology.</i>
Guillermo Hernandez	Ph.D. (2007); <i>Carbon sequestration in corn under four management systems: Greenhouse gas fluxes and soil organic carbon fractions</i>
Brad Carter	M.S. (2007) co-advised w/ Dr. E. Klavivko; <i>Effects of controlled drainage on crop growth, soil quality, and nitrate loading in watersheds.</i>
Andrea Bongen	M.S. (2007); <i>Metals in the Indiana environment.</i>
Sofia Lissbrant	Ph.D. (2008); co-advised w/ Dr. J. Volenec; <i>Innovative strategies for determining critical nutrient levels for alfalfa performance</i>
Patrick Woodson	M.S. (2011) co-advised w/ Dr. J. Volenec; <i>Switchgrass productivity potential on marginal soils</i>
Salah Issa	M.S.E. (2012); <i>Predicting maize productivity potential in humid regions of the U.S. Corn Belt with Hybrid Maize</i>
Jennifer Burks	Ph.D. (2013); co-advised w/ Dr. J. Volenec. <i>N cycling in candidate biofuel crops</i>
Ronald Navarrete	Ph.D. (2014); <i>Potassium availability and use efficiency in maize/soybean production systems</i>
Monique Long	Ph.D. (2015); <i>Physiology of N use efficiency in sorghum</i>

Amanda Montgomery	M.S.	(2015); co-advised w/ I. Chaubey; <i>Water quality impacts of bioenergy crops</i>
Mitchell Greve	M.S.	(2019); <i>Soybean-associated edge-of-field nitrogen losses and fertilizer management implications</i>
Pauline Welikhe	Ph.D.	(2020); <i>Representation of phosphorus cycling in mechanistic crop and hydrologic models</i>
Brodrick Deno	M.S.	(2020); <i>Cover crops for bioenergy, food, fiber and ecosystem service</i>
Matt Pandol	M.S.	(expected 2021); <i>Effect of N-serve on field-scale N losses as Greenhouse Gasses and as Leachate</i>
Elizabeth Trybula	Ph.D.	(expected 2022); <i>Comparative nutrient cycling of maize and sorghum across water availability gradients in South Africa and the US</i>
Mayara dos Santos Rocha	Ph.D.	(expected 2025); <i>Soil organic matter and plant-available potassium</i>
Mandana Mirbakhsh	Ph.D.	(expected 2025); <i>Nitrogen use efficiency in a changing climate</i>
Mallory Ronk	M.S.	(expected 2024); <i>Co-benefits from CenturoTM in maize-based systems using UAN</i>

Service on graduate student advisory committees: 20 M.Sc./M.S.E and 24 Ph.D. students in the following departments/programs: Agronomy, Agricultural Economics, Agricultural Engineering, Civil Engineering, Forestry and the Ecological Science and Engineering Integrated Graduate Program.

Postdoctoral employees under Dr. Brouder's supervision: Frederick Wanjau (1999 – 2001); Katerina Dontsova (co-advised with T. Vyn: 2002), Pauline Nhamo (2010 – 2012), Ryan Dierking (2011 – 2015), Mary-Jane Orr (2012 – 2014), Bhupinder Farmaha (2015 – 2018), Nayereh Ghazanfarpour (2016 – 2019), Joshua Minai (2020 – present). Visiting Scholars: Dr. X. Fang (2002 – 2003) Chinese Academy of Science; Dr. Xiaokun Li (2014 – 2015), Chinese Agricultural University; Jonathan Ojeda, National Res. Council (CONICET) and Univ. Nacional de Entre Rios.

Classroom Teaching

AGRY 598 Systematic Reviews in Agriculture and the Environment: New spring 2022. 3-credit course for graduate students seeking science synthesis skills necessary in the agriculture, big data environment. The course goal is for students to understand the distinguishing features of important systematic review (SR) typologies and be able to apply their knowledge to selecting and conducting the SRs that are appropriate to their own research questions. The course emphasizes open access tools and resources to enable continued use in professional careers beyond Purdue and ensure equity in access to educational resources now and in future, potentially resource-limited environments.

AGRY 365 Soil Fertility: Instructor of record (2016 – present) for required, 3-credit undergraduate laboratory course for students in a variety of agronomic majors within the College of Agriculture. Course objectives include understanding the fundamentals of nutrient availability in the soil and nutrient acquisition by plants, the approaches to diagnosing nutrient status in

plant-soil systems and philosophies of fertilizer recommendations. The course is currently being updated and translated into e-learning formats for distance education use including in Extension programming.

CHE 597/ECE 595 Food and Energy Farms: New fall 2018, offered F19 and F21; course targets the nexus of food, energy and water and is intend to give students a broad background in current issues/grand challenges at the intersection of the science of these disciplines. Co-taught by professors in the Colleges of Agriculture and Engineering with colleagues at Florida A&M University. Brouder teaches modules on crop ecophysiology and water quality in agricultural settings.

AGRY 515 Plant Mineral Nutrition: Developed / instructor of record for 3-credit dual-level course that has been taught every other year beginning fall semester of 1996. The course is designed for students in the biological and agricultural sciences who require a comprehensive understanding of mechanisms controlling nutrient availability in soils, and nutrient assimilation and physiological function in higher plants. Diagnostic symptoms for nutrient imbalances are linked to the assimilation and transport processes and functions of minerals in plant metabolism. The course provides students with a broad understanding of the ecological principles and genetic aspects of mineral nutrition, including disease resistance, interactions with microbial communities in the rhizosphere, genetic variation in uptake- and use-efficiency, competition, and adaptation to deficiencies and toxicities.

SFFS 301 Agroecology: New fall 2016; required 3-credit undergraduate course for Sustainable Food and Farming System majors (interdisciplinary major in the College of Agriculture). Team taught by Gibson (lead), Brouder, Turco and Volenec. This course introduces students to the agroecosystem concept and how it can be applied to land management and food production.

Contributions to other courses and curriculum:

ASM 322 Technology for Precision Agriculture and related text: (3 cr): A 3-module, multi-disciplinary course that is team-taught by Agricultural Engineering, Agronomy and Agricultural Economics faculty. Developed the portion of the curriculum pertaining to soil sampling and analysis, and plant nutrient management – a 2-wk module including lectures on the heterogeneous nature of soil chemical and physical properties, and on the theory and practice of fertility recommendations. The class includes discussions and lab exercises that explore the concept of scale of management.

AGRY 399 Undergraduate Directed Projects (3 cr): Dr. Brouder supervises undergraduate credit experiences in the soil fertility, plant nutrition and water quality. Projects are components of field research projects, and they typically combine field, laboratory, data handling / manipulation and writing experiences

AGRY 598: Introduction to Data Management (1cr): A collaboratively taught course designed to teach graduate students skills for effective management of data including current trends in managing, organizing, sharing and curating research data and the real world challenges to extending data lifecycles. Brouder teaches module on systematic review and statistical meta-analysis emphasizing the data infrastructure needs of such research and is the current instructor of record.

AGRY 598: Ecosystem Services: Charting a Path to Sustainability (1 cr): Participatory seminar emphasizing ecosystem services as a framework for decision making in natural resource / land use and stewardship. The goal of this course was to stimulate critical thinking of MS and PhD students studying at the interface between agriculture and the environment, with a focus on sustainability.

AGRY 696 Graduate Seminar (1 cr): Participatory seminar class the responsibility for which is rotated among Agronomy faculty. The objective is to enhance graduate student skills for critically reviewing and analyzing scientific (peer-review) literature, leading discussions of literature with audiences of mixed expertise, and presenting justification for new research.

Borlaug Summer Institute for Global Food Security: Member of teaching cohort (responsible for Ecosystem Sustainability segment). Program is targeted at beginning graduate students interested in developing a holistic understanding of conceptual challenges around Global Food Security. The goal of my portion of the curriculum is to foster critical thinking about key environmental problems and trade-offs / synergies of potential development activities.

Sustainable Farming Systems Major in the Purdue College of Agriculture: With other AGRY faculty (R. Turco, J. Volenec) worked with BTNY, AgEcon, and Animal Science Faculty to develop the requirements for the interdisciplinary major. Major approved in Dec. 2013 College of Agriculture Faculty Meeting. First student cohort fall 2014.

Guest Lectures: Single lecture in numerous courses including AGRY 365 Soil Fertility (multiple topics); AGRY 560 Soil Physics (Topic: Introduction to Geostatistics); AGRY 101 (Topic: Managing Natural Resources); ABE 591Y Instrumentation and Data Acquisition (Topic: Real World Sensor Function), AGE 569 Global Land Use Change (Topic: Biodiversity, Ecosystem Services and Agriculture) and Environmental Sciences and Engineering Graduate Colloquium (Topics: Tradeoffs and Tensions among Ecosystem Services, Sustainable Intensification, Extensification versus Intensification in Agricultural Landuse).

REFEREES: Please notify me prior to contacting my referees.

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