

Deepak R. Joshi, Ph.D.

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Short Biography: I am Deepak R. Joshi, an assistant professor of Precision Ag and Remote Sensing at College of Agriculture, Arkansas State University. Prior to relocating to Arkansas, I pursued an M.S. and Ph.D. at South Dakota State University (SDSU) and worked as a Research Associate under the supervision of Dr. David E. Clay. Integrating multidisciplinary knowledge of soil health, agronomy, and precision agriculture with the cutting-edge technology of artificial intelligence (AI) in farmers' decision support systems to improve and enhance the production capacity, profitability, and sustainability of diverse cropping systems are my primary research, teaching, and extension interests.

Research experience and interest: Precision Ag, Hyperspectral/Multispectral remote sensing, Soil Health, Soil Carbon Sequestration, Greenhouse gases emission, On-farm research, Machine learning/Artificial Intelligence, Meta-analysis.

Teaching experience and interest: Introduction to Soil (lab class), Soil biology & Chemistry, Precision Ag data mapping, Remote sensing in Agriculture and Application of Artificial Intelligence in Agriculture.

Media Coverages:

- [Can growing cover crops in corn systems increase soil carbon?](#)
- [Grant project to build farmers' confidence in precision ag technologies | News | agupdate.com](#)
- [SDSU ag researchers expand technology with \\$100,000 drone | KELOLAND.com](#)
- [Today's Challenges to Food Security for Smallholder Farmers \(wiley.com\)](#)

Education

Ph.D. Plant Science, South Dakota State University (SDSU), (Brookings, SD, USA) December 2022

Dissertation title: ([Distinguished Dissertation award-2023 by SDSU Graduate School](#))

Machine Learning and Meta-analysis techniques to quantify and predict soil organic carbon, N₂O and CO₂ Emissions from cover cropping systems.

(Advisor: [Dr. David E. Clay](#))

M.S. Data Science, South Dakota State University (SDSU), (Brookings, SD, USA) August 2022

Courses:

Big Data Analytics, Modern Applied Statistics, Programming for Data Analytics, Nonparametric statistics, Artificial Intelligence/Machine learning

M.S. Plant Science, South Dakota State University (SDSU), (Brookings, SD, USA) May 2018

Thesis title:

Land Use Change Sustainability and carbon turnover rate in the Northern Great Plains soil.

(Advisor: [Dr. David E. Clay](#))

B.Sc. Agriculture, Tribhuvan University, (Chitwan, Nepal) December 2010

Professional Experience

- Assistant Professor** of Precision Ag and Remote Sensing August 2023- Present
College of Agriculture, Arkansas State University
- Research Associate III** March 2023- August 2023
Dept. of Agronomy, Horticulture and Plant Science, South Dakota State University
- Research Associate II** September 2021- March 2023
Dept. of Agronomy, Horticulture and Plant Science, South Dakota State University
- Research Associate I** September 2016- August 2021
Dept. of Agronomy, Horticulture and Plant Science, South Dakota State University
- Graduate Research Assistant** January 2014- August 2016
Dept. of Agronomy, Horticulture and Plant Science, South Dakota State University

Publications (Peer reviewed articles, book chapter & newsletter)

- 1) **Deepak R. Joshi**, Sharon A. Clay, Prakriti Sharma, Sharon A. Clay, Tulsi P. Kharel, David E. Clay. (2023). **Artificial Intelligence and high-resolution satellite imagery to predict soybean yield**. *Agronomy Journal* (**Accepted & in press**)
- 2) **Deepak R. Joshi**, David E. Clay, Sharon A. Clay, Janet Moriles-Miller. (2023). **Rye cover crop can have nitrogen credits one year after termination in frigid soil**. *Journal of Soil and Water Conservation*. (**Ready to submit**)
- 3) Richard J. Fischer, Hossein Moradi Rekabdarkolaee, **Deepak R. Joshi**, David E. Clay. (2023). **Soybean yield Prediction using Computationally Efficient Bayesian Spatial Regression Models and Satellite Imagery**. (**In-progress**)
- 4) Shaina M. Westhoff, Sharon A. Clay, Cheryl Reese, **Deepak R. Joshi**, Janet Moriles-Miller, Graig Reicks, Kristopher Osterloh, Dwarika Bhattarai, David E. Clay. (2023). **Combining gypsum with soil health principles in the restoration of a North American Northern Great Plains salt-affected soil**. (**In-progress**)
- 5) **Deepak R. Joshi**, Heidi L. Sieverding, Hui Xu, Hoyoung Kwon, Michael Wang, Sharon A. Clay, Jane M. Johnson, Resham Thapa, Shaina Westhoff, David E. Clay. (2023). **A Global Meta-analysis of Cover Crop response on Soil Carbon Storage Within a Corn Production System**. *Agronomy Journal*. DOI: <https://doi.org/10.1002/agj2.21340>
- 6) Edward Prutzer, Maaz Gardezi, Donna M. Rizzo, Mary Emery, Scott Merrill, Benjamin E.K. Ryan, Panagiotis D. Oikonomou, Juan P. Alvez, Damilola Adereti, Rubaina Anjum, Appala R. Badireddy, Dwarika Bhattarai, Skye Brugler, Nicholas Cheney, David Clay, Sharon Clay, Ali Dadkhah, Joshua W. Faulkner, **Deepak R. Joshi**, Christopher Koliba, John McMaine, Semhar Michael, Sardorbek Musayev, Jarlath O'Neil-Dunne, George Pinder, Taylor Ricketts, Andrew W. Schroth, Scott Turnbull, and Asim Zia. (2023). **Rethinking 'responsibility' in precision agriculture innovation: lessons from an interdisciplinary research team**. *Journal of Responsible Innovation*. DOI: <https://doi.org/10.1080/23299460.2023.2202093>.
- 7) Chitranjan Kumar, Anil K. Singh, **Deepak R. Joshi**, David E. Clay. (2023). **The Ecology of Intercropping Systems, Tree-Cover Dynamics of Grazing Lands, and Cover Crops for Soil Management**. *Agroecological Approaches for Sustainable Soil Management*. DOI: <https://doi.org/10.1002/9781119911999.ch16>

- 8) **Deepak R. Joshi**, David E. Clay*, Sharon A. Clay, Janet Moriles-Miller, Aaron L.M. Daigh, Graig Reicks and Shaina Westhoff. (2022). **Quantification and Machine Learning Based N₂O-N and CO₂-C Emissions Predictions from a Decomposing Rye Cover Crop**. *Agronomy Journal*. DOI: <https://doi.org/10.1002/agj2.21185>
- 9) **Deepak R. Joshi**, Rajan Ghimire, Tulsi P. Kharel, Umakant Mishra, Sharon A. Clay* (2021). **Conservation agriculture for food security and climate resilience in Nepal**. *Agronomy Society of America Journal*. DOI: 10.1002/agj2.20830.
- 10) Graig W. Reicks., David E. Clay*, Sharon A. Clay., **Deepak R. Joshi**., Janet Moriles-Miller., Shaina Westhoff., Aaron Lee M. Daigh & Stephanie A. Bruggeman (2021). **Winter Cereal Rye Cover Crop Decreased N₂O-N Emissions During Early Spring**. *Agronomy Society of America Journal*. <https://doi.org/10.1002/agj2.20658>.
- 11) Douglas J. Fielder, David E. Clay, **Deepak R. Joshi**, Shin-Yi Marzano, Duncan Jakubowski, Dwarika Bhattarai, Cheryl L. Reese, Stephanie A. Bruggeman, and Sharon A. Clay* (2021). **Greenhouse gas emissions and microbial community structure from fields that include salt-affected soils**. *Journal of Environmental Quality*. DOI: 10.1002/jeq2.20223.
- 12) Bharat Sharma Acharya*, Mahendra Bhandari, Filippo Bandini, Alonso Pizarro, Matthew Perks, **Deepak Raj Joshi**, Sheng Wang, Toby Dogwiler, Ram L Ray, Gehendra Kharel, Sadikshya Sharma. (2021). **Unmanned Aerial Vehicle (UAV) Systems in Hydrology and Water management – Applications, Challenges and Perspectives**. *Water Resources Research*. <https://doi.org/10.1029/2021WR029925>.
- 13) Douglas Fiedler, Sharon A. Clay, Shaina A. Westhoff, Cheryl Reese, Stephanie A. Bruggeman, Janet Moiles-Miller, Lora Perkins, **Deepak R. Joshi**, Shin-Yi Marzano, David Clay*. (2021). **Phytoremediation and high rainfall combine to improve soil and plant health in a North America Northern Great Plains saline sodic soil**. *Journal of Soil and Water Conservation*. DOI: <https://doi.org/10.2489/jswc.2022.00112>
- 14) **Deepak R. Joshi**, D.E. Clay, S.A. Clay, and A. Smart*. (2020). **Seasonal losses of surface litter in Northern Great Plains mixed grass prairies**. *Rangeland Ecology and Management*. DOI: 10.1016/j.rama.2019.11.003.
- 15) **Deepak R. Joshi**, J. Ulrich-Schad, T. Wang, S. Clay, B. Dunn, S. Bruggeman, D. E. Clay*. (2019). **Grassland Retention in the Northern America Midwest Following Periods of High Commodity Prices and Climate Variability**. *Soil Science Society of America Journal*. doi: 10.2136/sssaj2019.03.0090.
- 16) Nguyen, L.H., **Deepak R. Joshi** and G.M. Henebry*. (2019). **Improved Change Detection with Trajectory- Based Approach: Application to Quantify Cropland Expansion in South Dakota**. *Land* 2, 8, 57; doi:10.3390/land8040057.
- 17) Van de Stroet, B., G. Reicks, **Deepak Joshi**, S. Subramanian, D. Clay, and S. Clay*. (2019). **Nitrogen application after plant growth regulator herbicide drift reduces soybean growth and yield**. *Weed Science*, 67(3), 346-353. doi:10.1017/wsc.2019.8.
- 18) Samuel Thies, **Deepak R. Joshi**, Stephanie A. Bruggeman, Sharon A. Clay, Umakant Mishra, Janet Miller, and David E. Clay*. (2019). **Fertilizer Timing Affects Nitrous oxide, carbon dioxide, and ammonia emissions from soil**. *Soil Science Society of America Journal*. DOI: 10.1002/saj2.20010.
- 19) Nguyen, L.H., **Deepak R. Joshi**, D. E. Clay, and G. M. Henebry*. (2018). **Characterizing land cover/land use from multiple years of Landsat and MODIS time series: a novel approach using land surface phenology modeling and random forest classifier**. *Remote Sens. Environ.* <https://doi.org/10.1016/j.rse.2018.12.016>.

- 20) **Deepak R. Joshi**, D.E. Clay*, A. Smart, S.A. Clay, T.P. Kharel, and U. Mishra. (2019). **Soil and land use change sustainability in the Northern Great Plains of the USA**. Intech Open. doi: 10.5772/intechopen.84781.

Outreach and newsletter

- 21) **Deepak R. Joshi**, Lauren E. Schwarck and Osler Ortez. 2020. **How to conduct a Literature Review**. CSA News. DOI: 10.1002/csan.20058.

Grants and Funding

- Overcoming climate smart adoption barriers by demonstrating the value of linking no-tillage, cover crops, and enhanced N management into a single system, USDA's Natural Resources Conservation Service (2022 Conservation Innovation Grants award) - \$1,288,032 as **CO-PI** (Dr. David Clay as PI) funded.
- Greenhouse gases emission from Rhizolizer application, LOCUST - \$24,388 as **CO-PI** (Dr. David Clay as PI) funded.
- Impact of Climate Change on the Livelihood of Indigenous community people of Sindhupalchok Nepal - \$1,100 Australian Dollar by OXFAM Australia and OIYP as **PI**.
- Soil geobiology, Hyperspectral Remote sensing and Artificial Intelligence, New Revolution in Enhancing Plant and Soil Health, FFAR - \$ 825,000 as CO-PI (Dr. David Clay as PI) (unfunded).
- Empowering Farmers to Implement On-Farm Climate Smart Soil Health Technologies that Enhance Economic and Environmental Resilience, USDA Conservation Innovation Grant (CIG- onfarm)- \$ 2,330,457 as CO-PI (Dr. David Clay as PI) (unfunded).

Awards and Recognitions

- **2023 Distinguished Dissertation Award** by South Dakota State University Graduate School.
- **First Place in Graduate Student Oral Presentation competition** at 2022 ASA, CSSA and SSSA International Annual Meeting, November 6-10, 2022, Baltimore, MD.
- **2022 U.S. Carbon Program Leadership Award** by U.S. Carbon Cycle Science Program, Washington, D.C., U.S.
- **First Place in Graduate Student Oral Presentation competition** at 2021 ASA, CSSA and SSSA International Annual Meeting, November 7-11, 2021, Salt Lake City, Utah.
- **Third Place in Graduate Student Oral Presentation competition** at 2021 ASA, CSSA and SSSA International Annual Meeting, November 7-11, 2021, Salt Lake City, Utah.
- **2021 Future Leaders in Science Award** by Agronomy, Crop Science Society & Soil Science Society of America.
- **Science Communication Fellowship 2019 Award** by South Dakota Discovery Center and Portal to the Public at Brookings, SD.
- **2019 Plant Science Graduate Student Scholarship** in Honor of Dr. Gregg Carlson from Plant Science Department, SDSU, Brookings, SD.
- **Third Place in Graduate Student Poster Presentation Competition** at 50th Annual Geography Convention, March 14-15, 2019, Brookings, SD.
- **Third Place in Graduate Student Poster Presentation Competition** at 2018 ASA and CSSA International Annual Meeting, November 4-7, 2018, Baltimore, MD.
- **2016 Plant Science Graduate Student Scholarship** in Honor of Dr. David Clay from Plant Science Department, SDSU, Brookings, SD.
- **2015 Maurice and Betty Horton Research and Education Award** from Plant Science Department, SDSU, Brookings, SD.

- Selected for **2015 Graduate Student Leadership Conference** organized by ASA, CSSA and SSSA, November 14-15, Minneapolis, MN at 2015 International Annual Meetings.
- Selected as one of 50 **Youth Council Member** by U.S Embassy Youth Council Nepal from national competition.
- **Second Place in the Presentation Competition** at the International Student Meet (ISM), 2011, Rourkela, India organized by National Institute of Technology (NIT) and UNESCO New Delhi.
- Selected for **2010-2013 Action Partner** by OXFAM International Youth Partnership, Australia from 1600 applicant worldwide.

Scientific Conferences and Presentations

- **Deepak R. Joshi**, David E. Clay, and Sharon A. Clay. **Deep-learning and high-resolution satellite imagery to predict soybean yield**. ASA, CSSA and SSSA International Annual Meeting November 6-10, 2022, Baltimore, MD. **(First Place in Oral presentation competition)**
- **Deepak R. Joshi**, Heidi L. Sieverding, Hui Xu, Hoyoung Kwon, David E. Clay, Shaina Westhoff, Michael Wang and Sharon A. Clay. **Soil Organic Carbon Response to Cover Crop in a Corn System: A Global Meta-Analysis**. ASA, CSSA and SSSA International Annual Meeting November 7-11, 2021, Salt Lake City, Utah. **(First Place in Oral presentation competition)**
- **D.R. Joshi**, D.E. Clay, S.A. Clay, ALM Daigh, J Miller, G. Reicks and S. Westhoff. **Influence of Rye Residue on CO₂ and N₂O Emissions, Soil Moisture and Nutrient Mineralization in Corn Cropping System**. ASA, CSSA and SSSA International Annual Meeting November 7-11, 2021, Salt Lake City, Utah. **(Third Place in Oral Presentation competition)**
- Reicks, G., D.E. Clay, S.A. Clay, **D.R. Joshi**, J. Miller, S. Westhoff, A.L.M. Daigh, and S.A. Bruggeman. 2021. **Winter cereal rye cover crop decreased nitrous oxide emissions during early spring**. ASA Salt Lake City, Nov 8-10.
- Miller, J., S.A. Clay, D.E. Clay, **D.R. Joshi**, G. Reicks, S. Westhoff, A.L.M. Daigh. 2021. **Influence of rye cover crop on early corn growth, photosynthesis genes and yield**. ASA Salt Lake City, Nov 8-10. ASA Salt Lake City, Nov 8-10.
- **D.R. Joshi**, D. Clay, A. Smart and S. Clay. **Determination of Total Carbon Budget and Impact Assessment of Different Seasonal Drought on the Rangeland Soil Carbon**. ASA, CSSA and SSSA International Annual Meeting November 15-18, 2015, Minneapolis, MN
- **Deepak R. Joshi**, David E. Clay, Alexander Smart, Sharon A. Clay, and Tonya Haigh. **Impact Assessment of Climate and Soil Variability on Land Use Changes in Nebraska and South Dakota**. ASA, CSSA and SSSA International Annual Meeting November 6-9, 2016, Phoenix, AZ
- **D.R. Joshi**, D. Clay, A. Smart and S. Clay. **Land Use Change and Soil Sustainability in South Dakota and Nebraska States**. ASA, CSSA and SSSA International Annual Meeting Oct. 22-25, 2017, Tampa, FL
- **Deepak R. Joshi**, David Clay, Alexander Smart and Sharon Clay. **Temporal Changes in Soil Carbon Due to Plant Biomass and seasonal Climate Variability**. ASA and CSSA International Annual Meeting Nov. 4-7, 2018, Baltimore, MD. **(Third Place in Poster Presentation competition)**
- **D.R. Joshi**, D.E. Clay, S.A. Clay, ALM Daigh, J Miller and G. Reicks. **Rye Cover Crop Residue in Greenhouse Gases Emission and Residue Mineralization in Corn Field**. ASA, CSSA and SSSA International Annual Meeting November 10-13, 2019, San Antonio, TX

- J. Miller, S.A. Clay, G. Reicks, D. E. Clay, **D.R. Joshi**, A Daigh. **Spring Planted Cover Crops Influence Early Corn Growth and Development**. ASA, CSSA and SSSA International Annual Meeting November 10-13, 2019, San Antonio, TX
- S. Bruggeman, D. Clay, A. Engel, **D. R. Joshi**, J. Miller, and C. Reese. **Biochar Impacts on Nitrogen Availability Agronomic Soils in Eastern Central South Dakota**. ASA, CSSA and SSSA International Annual Meeting November 9-13, 2020, Virtual.
- **D.R. Joshi**, D.E. Clay, S.A. Clay, ALM Daigh, J Miller, G. Reicks and S. Westhoff. **Rye Cover Crop Residue Effects in CO₂ and N₂O Emission and Residue Mineralization**. ASA, CSSA and SSSA International Annual Meeting November 9-13, 2020, Virtual
- J. Miller, S.A. Clay, G. Reicks, D. E. Clay, **D.R. Joshi**, A Daigh. **Spring Planted Cover Crops Influence Early Corn Growth and Development**. ASA, CSSA and SSSA International Annual Meeting November 9-13, 2020, Virtual
- S. Bruggeman, D. Clay, A. Engel, **D. R. Joshi**, J. Miller, and C. Reese. **Biochar Impacts on Nitrogen Availability Agronomic Soils in Eastern Central South Dakota**. ASA, CSSA and SSSA International Annual Meeting November 9-13, 2020, Virtual.

Professional & Leadership Training

- Training on Hyperspectral Data for Land and Coastal systems, Jan 19th, 26th & Feb 2nd, 2021, organized by National Aeronautics and Space Administration (NASA).
- Headwall Hyperspectral Training at Boston, Massachusetts on March 22, 2021.
- DayCent modeling Training at Argonne National Lab Chicago, October 2- 6, 2020.
- Graduate Student Leadership Conference organized by Soil Science Society of America (SSSA), Crop Science Society of America (CSSA) & Agronomy Society of America (ASA), November 14-15, 2015, Minneapolis, USA.

Professional Organizations

- Leader of Airborne and Satellite Remote Sensing community of ASA, CSSA, and SSSA Society for 2023.
- 2023 Carl Sprengel Agronomic Research Award Committee member, American Society of Agronomy.
- Vice Leader of Airborne and Satellite Remote Sensing community of ASA, CSSA, and SSSA Society for 2022.
- President – Plant Science Graduate Student Association, SDSU (2015- 2016)
- Executive Committee Member – ASA, CSSA and SSSA Graduate Student Committee (2017- 2020)
- Member- International Society of Precision Agriculture (2022- 2023)
- Member – Soil Science Society of America (SSSA) (2015-present)
- Member - Crop Science Society of America (CSSA) (2015-present)
- Member - Agronomy Society of America (ASA) (2015- present)
- Action Partner – Oxfam International Youth Partnership (2010-2013)
- Youth Council Member- USA Embassy Youth Council Nepal (2013-2014)

Peer- reviewer

- International Journal of Agronomy
- American Society of Agronomy Journal
- ISPRS Open Journal of Photogrammetry and Remote Sensing
- Agricultural & Environmental Letters

Additional Skills and Certifications

- Programming, Image & Data Analysis: ArcMap, GIS, R, Python, QGIS, Pix4D, SMS and Surfer
- FAA authorized Unmanned Aerial Vehicle (UAV) Pilot License
- Fluent in English, Nepali, and Hindi