

Curtis J. Dell

Soil Scientist

USDA-ARS
Pasture System and Watershed Management Research Unit
Building 3702, Curtin Road
University Park, PA 16802

phone (814) 863-0984
cell (814) 880- 0366
email: curtis.dell@ usda.gov

EDUCATION

- 1998 Ph.D., Kansas State University, Manhattan, Kansas, 66506. Major: Soil Microbiology.
Dissertation Title: The impact of fire on nitrogen cycling in tallgrass prairie.
- 1991 M.S., Purdue University, West Lafayette, Indiana, 47907. Major: Soil Microbiology.
Thesis title: Estimation of sorption and desorption coefficients for turf-applied fungicides in
thatch and soil.
- 1985 B.S., Purdue University, West Lafayette, Indiana, 47907. Major: Crop and Soil Science.

PROFESSIONAL EXPERIENCE

Research Soil Scientist (GS-14): USDA-ARS Pasture Systems and Watershed Management Research Unit, University Park, PA (2001 to present) and Adjunct Associate Professor, Ecosystem Science Management Department, Pennsylvania State University (2002 to present): Currently conducting research into carbon, nitrogen, and phosphorous cycling in agricultural soils with an emphasis on nitrous oxide and ammonia emissions. Research projects have investigated use of slow-release and inhibitor treated nitrogen fertilizers to reduce nitrous oxide emissions; application of biochar to improve switchgrass productivity and reduce greenhouse gas emissions on marginal lands; impacts of manure application methods on ammonia and nitrous oxide emissions; soil carbon sequestration potentials and nitrous oxide emissions from multiple land uses and cropping rotations in the Northeastern US; long-term impact of manure application rates on soil quality and carbon, nitrogen, and phosphorous accumulations; impacts of no-till planting and cover crop use soil on C sequestration and soil properties; and impacts of spatial variation on the quantification of soil C sequestration.

Post-Doctoral Research Associate and Instructor: Crop and Soil Sciences Department, Michigan State University, East Lansing, MI: Feb., 1999 to 2001: Conducted research investigating the formation, function, and stability of soil aggregates and the impact of soil management on these processes. Primary focus was the investigation of distribution, source, and metabolism of organic carbon and nitrogen within soil aggregates.

Congressional Science Fellow, United States Senates, Washington, DC: 1998: Served one year on the legislative staff of Sen. Kent Conrad of North Dakota. Competitively selected and fully supported by the American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, and the Weed Science Societies. Duties included obtaining and analyzing information relevant to pending or potential legislation, and briefing the senator and handling his correspondence on a range of agricultural and environmental issues.

COLLABORATIONS and AFFILIATIONS

Team member: Two USDA-ARS base-funded CRIS projects (50/50 split)

1. Sustaining Agroecosystems and Water Resources in the Northeastern U.S. and Mitigating Emissions and Adapting Farm Systems to Climate Variability. Project includes objectives that contribute to the Long-Term Agroecosystem Research network (LTAR)
2. Sustainable Intensification of Integrated Crop-Pasture-Livestock Systems in Northeastern Landscapes.

Co-Leader: USDA Northeast Climate Hub (Since 2016)
Acting Director: USDA Southern Plains Climate Hub (Sept.-Dec. 2019)
Science Advisor to USDA-NRCS for the Chesapeake Bay Watershed (2014-2015)

PUBLICATIONS

- Dell, C.J., J.M. Baker, S. Spiegel, S.A. Potter, A.B. Leytem, K.C. Flynn, C.A. Rotz, D.L. Bjornberg, R.B. Bryant, G. R. Hagevoort, J.C. Williamson, A. Slaughter, and P.J.A. Kleinman. 2022. Challenges and opportunities for manureshed management across U.S. dairy systems: Case studies from four regions. *Journal of Environmental Quality*. 51:251-539. doi:10.100/jeq2.20341.
- Kleinman, P.J.A., S. Spiegel, M.L. Silveira, J.M. Baker, C.J. Dell, S. Bittman, R. Cibin, P.A. Vada, M. D. Buser, T. Tsegaye. 2022. Envisioning the manureshed: Toward comprehensive integration of modern crop and animal production. *Journal of Environmental Quality* 51:481-493.
- Liptzin, D., et al. 2022. An evaluation of carbon indicators of soil health in long-term agricultural experiments. *Soil Biology and Biochemistry* 172: article no. 108708
- Bagnal, D.K., et al. 2022. Selecting soil hydraulic properties as indicators of soil health: Measurement response to management and site characteristics. *Soil Science Society of America Journal* (early access). Doi:10.1002/saj2.20428.
- Rieke, E.L., et al. 2022. Linking soil microbial community structure to potential carbon mineralization: A continental scale assessment of reduced tillage. *Soil Biology and Biochemistry* 168: article no. 108618.
- Weitzman, J.N., P.M. Groffman, P.R. Adler, C.J. Dell, F.E. Johnson, R.N. Lerch, and T.C. Strickland. 2021. Drivers of Hot Spots and Hot Moments of Denitrification in Agricultural Systems *Journal of Geophysical Research-Biogeosciences*. 126 (7)
- Gollany, H.T., S. J. DelGrosso, C.J. Dell, P.R. Adler, and R.W. Polumsky, RW. 2021. Assessing the effectiveness of agricultural conservation practices in maintaining soil organic carbon under contrasting agroecosystems and a changing climate. *Soil Science Society of America Journal* 85:1362-1379.
- Rejesus, R.M., S. Aglasan, L.G. Knight, M.A. Cavigelli, C.J. Dell, E.D. Lane, and D.Y. Hollinger. 2021 Economic dimensions of soil health practices that sequester carbon: Promising research directions. *Journal of Soil and Water Conservation* 76: 55A-60A doi:10.2489/jswc.2021.0324A.
- Ponce de Leon, M.A., C.J. Dell, and H.D. Karsten. 2021. Nitrous oxide emissions from manured, no-till corn systems. *Nutrient Cycling in Agroecosystem* 119: 405-421 doi:10.1007/s10705-021-10131-y.
- Binder, J.M., H.D. Karsten, D.B. Beegle, and C.J. Dell. 2021. Winter annual management to increase nutrient recovery and forage production on dairies. *Agroecosystems, Geosciences, and Environment* 4: Article Number e20157 doi: 10.1002/agg2.20157
- Binder, J.M., H.D. Karsten, D.B. Beegle, and C.J. Dell. 2020. Manure injection and rye double cropping increased nutrient recovery and forage production. *Agronomy Journal* 112: 2968-2977 doi:10.1002/agj2.20181
- Spiegel, S., P.J.A. Kleinman, D.M. Endale, R.B. Bryant, C. Dell, et. al. 2020. Manuresheds: Advancing nutrient recycling in US agriculture. *Agricultural Systems* 182.
- Duncan, E.W., P.J.A. Kleinman, D.B. Beegle, and C.J. Dell. 2019. Nutrient cycling trade-offs with broadcasting and injecting dairy manure. 2019. *Nutrient Cycling in Agroecosystems*. 114:57-70.
- Rau, B.M., P.R. Adler, C.J. Dell, D. Saha, and A.R. Kemanian. 2019. Herbaceous perennial biomass production on frequently saturated marginal soils: Influence on N₂O emissions and shallow groundwater. *Biomass and Bioenergy*: 122:90-98.

- Koide, R.T., B.T. Nguyen, R.H. Skinner, C.J. Dell, R.R. Adler, P.J. Drohan, M. Licht, M.B. Matthews, R. Nettles, K. Ricks, and J. Watkins. 2018. Comparing biochar application methods for switchgrass yield and C sequestration on contrasting marginal lands in Pennsylvania, USA. *Bioenergy Research* 11: 784-802.
- Miller, D.J., J.J. Chai, F. Guo, C.J. Dell, H.D. Karsten, and M.G. Hastings. 2018. Isotopic composition of in situ soil NO_x emissions in manure-fertilizer croplands. *Geophysical Research Letters* 45:12058-12066.
- Dell, C.J., H.T. Gollany, P.R. Adler, R.H. Skinner and R.W. Polumsky. 2018. Implications of observed and simulated soil carbon sequestration for management options in corn-based rotations. *Journal of Environmental Quality*. doi: 10.2134/jeq2017.07.0298
- Hristov, A.N., A.T. Degaetano, C.A. Rotz, E. Hoberg, R.H. Skinner, T. Felix, H. Li, P.H. Patterson, G. Roth, M. Hall, T.L. Ott, L.H. Baumgard, W. Staniar, R.M. Hulet, C.J. Dell, A.F. Brito, and D.Y. Hollinger. 2018. Climate change effects on livestock in the Northeast US and strategies for adaptation. *Climate Change* 146:33-45.
- Duncan, E.W., C.J. Dell, P.J.A. Kleinman, and D.B. Beegle. 2017. Nitrous oxide and ammonia emissions from injected and broadcast applied dairy slurry. *Journal of Environmental Quality*. 46:36-44.
- Dutta, T., C.J. Dell, and R.C. Stehouwer. 2016. Nitrous oxide emissions from a coal mine land reclaimed with stabilized manure. *Land Degradation and Development* 27:427-437.
- Liu, J., P.J.A. Kleinman, D.B. Beegle, C.J. Dell, T.L. Veith, L.S. Saporito, K. Han, D.H. Pote, and R.B. Bryant. 2016. Subsurface application enhances benefits of manure redistribution. *Agricultural and Environmental Letters*. Vol 1. doi:10.2134/ael2015.09.0003.
- Skinner, R.H. and C.J. Dell. 2016. Yield and soil carbon sequestration in grazed pastures sown with two or five forage species. *Crop Science*. 56:2035-2044.
- Dutta, T., R.C. Stehouwer, and C.J. Dell. 2015. Linking organic carbon, water content and nitrous oxide emission in a reclaimed coal mine soil. *Land Degradation and Development* 26:620-628.
- Koide, R.T., B.T. Nguyen, B.T., R.H. Skinner, C.J. Dell, M.S. Peoples, P.R. Adler, and P.J. Drohan. 2015. Biochar amendment of soil improves resilience to climate change. *Global Change Biology-Biofuels* 7:1084-1091.
- Shigaki, F. and C.J. Dell. 2015. Comparison of low-cost methods for measuring ammonia volatilization. *Agronomy Journal* doi:10.2134/agronj14.0431
- Skinner, R.H. and C.J. Dell. 2015. Comparing pasture C sequestration estimates from eddy covariance and soil cores. *Agriculture Ecosystems and Environment*. 199:52-57. Doi10.1016/j.agee.2014.08.020.
- Williams, M.R., A.R. Buda, H.A. Elliott, A.S. Collick, C.J. Dell, and P.J.A. Kleinman. 2015. Linking nitrogen management, seep chemistry, and stream water quality in two agricultural headwater watersheds. *Journal of Environmental Quality* 44: 910-920.
- Dell, C.J., K. Han, R.B. Bryant, and J.P. Schmidt. 2014. Nitrous oxide emissions with enhanced efficiency nitrogen fertilizers in a rainfed system. *Agronomy Journal* 106:723-731.
- Lee, C., G.W. Feyereisen, A.N. Hristov, C.J. Dell, J. Kaye, and D. Beegle. 2014. Effects of dietary protein concentration on ammonia volatilization, nitrate leaching, and plant uptake from manure application to lysimeters. *Journal of Environmental Quality* 43:398-408.
- Nguyen, B.T., R.T. Koide, C.J. Dell, P. Drohan, R.H. Skinner, P. R. Adler, and A. Nord. 2014. Turnover of soil carbon following addition of switchgrass-derived biochar to four soils. *Soil Science Society of America Journal* 78:531-537.
- Myers, T.L., C.J. Dell, and D.B. Beegle. 2013. Evaluation of Ammonia Emissions from Manure Incorporated with Different Soil Aerator Configurations. *Journal of Soil and Water Conservation*. 68:306-314.
- Dell, C.J., P.J.A. Kleinman, J.P. Schmidt, and D.B. Beegle. 2012. Low Disturbance Manure Incorporation Effects on Ammonia and Nitrate Loss. *Journal of Environmental Quality* 41: 928-937.
- Dell, C.J., and J.M. Novak. 2012. Cropland management in the eastern United States for improved soil organic C sequestration. In: M.A. Leibig, A.J. Franzluebbers, and R. F. Follett, editors, *Managing*

- agricultural greenhouse gases: Coordinated agricultural research through GRACEnet to address our changing climate. Academic Press, San Diego, CA.
- Lee, C., A.N. Hristov, C.J. Dell, G.W. Feyereisen, J. Kaye, and D. Beegle. 2012. Effects of dietary protein concentration on ammonia and greenhouse gas emitting potential of dairy manure. *Journal of Dairy Science* 95:1930-1941.
- Liebig, M.A., X. Dong, J.E. McLain, and C.J. Dell. 2012. Greenhouse Gas Flux from Managed Grasslands in the U.S. In: M.A. Liebig, A.J. Franzluebbers, and R. F. Follett, editors, *Managing agricultural greenhouse gases: Coordinated agricultural research through GRACEnet to address our changing climate*. Academic Press, San Diego, CA.
- Soder, K.J., A.F. Brito, M.D. Rubano, and C. J. Dell. 2012. Effect of incremental flaxseed supplementation of an herbage diet on methane output and ruminal fermentation in continuous culture. *Journal of Dairy Science* 95:3961-3969.
- Bryant, R. B., T. L. Veith, G. W. Feyereisen, A. R. Buda, C. D. Church, G. J. Folmar, J. P. Schmidt, C. J. Dell, and P. J. A. Kleinman. 2011. U.S. Department of Agriculture Agricultural Research Service Mahantango Creek Watershed, Pennsylvania, United States: Physiography and history. *Water Resources Research* 47: W08701, doi:10.1029/2010WR010056.
- Buda, A. R., G. W. Feyereisen, T. L. Veith, G. J. Folmar, R. B. Bryant, C. D. Church, J. P. Schmidt, C. J. Dell, and P. J. A. Kleinman. 2011. U.S. Department of Agriculture Agricultural Research Service Mahantango Creek Watershed, Pennsylvania, United States: Long-term stream discharge database. *Water Resources Research* 47: W08703, doi:10.1029/2010WR010059.
- Buda, A. R., T. L. Veith, G. J. Folmar, G. W. Feyereisen, R. B. Bryant, C. D. Church, J. P. Schmidt, C. J. Dell, and P. J. A. Kleinman. 2011. U.S. Department of Agriculture Agricultural Research Service Mahantango Creek Watershed, Pennsylvania, United States: Long-term precipitation database. *Water Resources Research* 47: W08702, doi:10.1029/2010WR010058.
- Church, C. D., T. L. Veith, G. J. Folmar, A. R. Buda, G. W. Feyereisen, R. B. Bryant, J. P. Schmidt, C. J. Dell, and P. J. A. Kleinman. 2011. U.S. Department of Agriculture Agricultural Research Service Mahantango Creek Watershed, Pennsylvania, United States: Long-term water quality database. *Water Resources Research* 47:W08704, doi:10.1029/2010WR010060.
- Dell, C.J., J.J. Meisinger, and D.B. Beegle. 2011. Subsurface application of manures slurries for conservation tillage and pasture soils and their impact on the nitrogen balance. *Journal of Environmental Quality* 40:352-361.
- Lal, R., J.A. Delgado, P.M. Groffman, N. Millar, C. Dell, and A. Rotz. 2011. Management to mitigate and adapt to climate change. *Journal of Soil and Water Conservation* 66:276-285.
- Maguire, R.O., P.J. A. Kleinman, C.J. Dell, D.B. Beegle, R.C. Brandt, J.M. McGrath, and Q.M. Ketterings. 2011. Manure Application Technology in Reduced Tillage and Forage Systems: A Review. *Journal of Environmental Quality* 40: 292-301.
- Rotz, C.A., P. J. A. Kleinman, C. J. Dell, T. L. Veith, and D. B. Beegle. 2011. Environmental and Economic Comparisons of Manure Application Methods in Farming Systems. *Journal of Environmental Quality* 40:438-448.
- Castellano, M.J., J.P. Schmidt, J.P. Kaye, C. Walker, C.B. Graham, H. Lin, and C.J. Dell. 2010. Hydrological and biogeochemical controls on the timing and magnitude of nitrous oxide flux across an agricultural landscape. *Global Change Biology* 16:2711-2720.
- Skinner, R.H. and C.J. Dell. 2010. Reestablishing chicory in multi-species perennial pastures. *Forage and Grazinglands*. (Online June 2010).
- Dell, C.J., P.J.A. Kleinman, T.L. Veith, and R.O. Maguire. 2009. Implementation and monitoring measures to reduce agricultural impacts on water quality. *Tearmann* 7: 103-115.
- Dell, C.J. 2009. Potential for quantification of biologically active soil carbon with potassium permanganate. *Communications in Soil Science and Plant Analysis* 40:1604-1610.

- Rotz, C.A., K.J. Soder, R.H. Skinner, C.J. Dell, P.J. Kleinman, J.P. Schmidt, and R.B. Bryant. 2009. Grazing can reduce the environmental impact of dairy production systems. *Forage and Grazinglands*. (Online Sept. 16, 2009).
- Dell, C.J. 2009. Potential for quantification of biologically active soil carbon with potassium permanganate. *Communications in Soil Science and Plant Analysis* 40:1604-1609.
- Dell, C.J., P.R. Salon, C.D. Franks, E.C. Benham, and Y. Plowden. 2008. No-till and cover crop impacts on soil carbon and associated properties on Pennsylvania dairy farms. *Journal of Soil and Water Conservation* 62:189-196.
- Strock, J.S., C.J. Dell, and J.P. Schmidt. 2007. Managing natural processes in drainage ditches for non-point source nitrogen control. *Journal of Soil and Water Conservation* 62:189-196.
- Schmidt, J.P., C.J. Dell, P.A. Vadas, and A.L. Allen. 2007. Nitrogen export from Coastal Plain field ditches. *Journal of Soil and Water Conservation* 62:235-243.
- Blackwood, C.B., C.J. Dell, A.J.M. Smucker, and E.A. Paul. 2006. Eubacterial communities in different soil macroaggregate environments and cropping systems. *Soil Biology and Biochemistry* 38: 720-728.
- Dell, C.J., and A.N. Sharpley. 2006. Spatial variation of soil organic carbon in a Northeastern US watershed. *Journal of Soil and Water Conservation* 61:129-136.
- Kleinman, P.J.A., M.S. Srinivasan, C.J. Dell, J. P. Schmidt, A.N. Sharpley and R.B. Bryant. 2006. Role of rainfall, seasonal hydrology and landscape factors on phosphorus and nitrogen in surface runoff. *Journal of Environmental Quality* 35:1248-1259.
- Skinner, R.H., M.A. Sanderson, B.F. Tracy, and C.J. Dell. 2006. On-farm comparisons of CO₂ uptake, aboveground productivity, root growth, and soil carbon dynamics in simple and complex pasture mixtures. *Agronomy Journal* 98:320-326.
- Dell, C.J., M.A. Williams, and C.W. Rice. 2005. Partitioning of nitrogen over five growing seasons in tallgrass prairie. *Ecology* 86(5): 1280-1287.
- Dell, C.J., and C.W. Rice. 2005. Short-term competition for ammonium and nitrate in tallgrass prairie. *Soil Science Society of America Journal* 69:371-377.
- Johnson, J.M.F. D.C. Reicosky, R.R. Allmaras, T.J. Sauer, R.T. Venterea, and C.J. Dell. 2005. Greenhouse gas contributions and mitigation potential of agriculture in the central USA. *Soil and Tillage Research* 83:73-94.
- Stout, W.L., C.J. Dell, and R.R. Schnabel. 2003. Effect of manure management on C evolution and water extractable P. *Communications in Soil Science and Plant Analysis* 34 (19 and 20):2907-2918.
- Schnabel, R.R., C.J. Dell, and J.A. Shaffer. 2002. Filter, inoculum, and time effects on measurements of biodegradable water soluble organic carbon in soil. *Soil Biology and Biochemistry* 34: 737-739.
- Ajwa, H.A., C.J. Dell, and C.W. Rice. 1999. Changes in enzyme activities and microbial biomass of tallgrass prairie soils as related to burning and nitrogen fertilization. *Soil Biology and Biochemistry* 31:769-777.
- Dell, C.J., C.S. Throssell, M. Bischoff, and R.F. Turco. 1994. Estimation of sorption coefficients for fungicides in soil and turfgrass thatch. *Journal of Environmental Quality* 23:92-96.