Steven W. Culman
Assistant Professor and State Specialist of Soil Fertility
The Ohio State University

School of Environment and Natural Resources
1680 Madison Ave., Wooster, OH 44691
culman.2@osu.edu; (330) 263-3787
soilfertility.osu.edu; @CulmanLab

EDUCATION

Ph.D., Agronomy, Cornell University, Ithaca, NY — August 2008
M.S., Soil Science, Cornell University, Ithaca, NY — May 2005
Fulbright Scholar, USEF Nepal, 2004
B.A., Biology, Thomas More College, Crestview Hills, KY — May 1999

RESEARCH AND EXTENSION EMPHASIS

My research and extension programs focus on improving soil fertility and nutrient management through management practices that enrich nutrient cycling, active organic matter pools and soil health. As the state specialist in soil fertility, I conduct research with, educate and learn from a wide variety of growers on nutrient management and soil fertility issues.

PROFESSIONAL EXPERIENCE

Assistant Professor of Soil Fertility, The Ohio State University — 2013 - Present
School of Environment and Natural Resources
Appointment: 50% Extension, 35% Research, 15% Teaching
Postdoctoral Researcher
Agricultural Sustainability Institute, University of California, Davis — 2013
Kellogg Biological Station, Michigan State University — 2009 - 2012
Department of Land, Air and Water Resources, University of California, Davis — 2008 – 2009
Graduate Research Assistant, Cornell University — 2001 - 2008
Department of Crop and Soil Sciences

TEACHING

Instructor, The Ohio State University, *Soil Fertility* — 2014 - Present
Co-Instructor, The Ohio State University, *Introduction to R for Environmental Sciences* — 2014 - Present
Co-Instructor, The Ohio State University, *Soil Science Seminar* — 2016 - Present
Instructor, Michigan State University, *Practical Analysis of Ecological Communities in R* — 2010
Teaching Assistant, Cornell University, *Sustainable Agriculture, Forages* — 2005 - 2006

ACTIVE GRANTS

Culman. S.W. and Bergefurd, B. 2018-2020. Assessing Soil Fertility and Soil Health in Midwest Hop Production. USDA North Central Sustainable Agriculture Research and Education Grant. ($98,561)

Culman. S.W. 2017-2020. Using active organic matter tests to help predict crop nutrient needs. New Innovator Award. Foundation for Food and Agriculture Research. ($443,082)

Culman. S.W. 2016. Documenting the impact of pipeline installation on crop productivity. 2016-2020. Kinder Morgan and Ohio Farm Bureau Federation. ($120,000)

Wilson, R., Doohan, D., Levies, K., **Culman, S.W.** Quantifying and predicting the effects of ecological weed management strategies on the organic agroecosystem to inform farmer decision making. 2015-2018. USDA Organic Transitions. ($497,506)

Subburayalu, S., **Culman, S.W,** Dick, W. Developing a tool for growers to predict sulfur availability in their soils. USDA AFRI-CARE 2015-2018. ($199,771)

Doohan, D., Dick, W., Kleinhenz, M., **Culman, S.W**., Lindsey, L., Kumarappan, S. 2014-2018. Practiced by

Farmers but Untested by Scientists: Uniting Both in Participatory Research and Education to Explain the Effects of Soil Balancing on Farms, Soils, Crops, Weeds and Insects, USDA Organic Agriculture Research and Extension Initiative. ($1,996,381)

Hoy, C., Klaiber, H.A., Kumarappan, S., **Culman, S.,** Mariola, M., Moledina, A. 2014-2018. Diversification Strategy for Small and Medium-Sized Farms, USDA AFRI Small Medium Farms. ($499,600)

COMPLETED GRANTS

Scarf, P., Osmond, D., **Culman, S**., LaBarge, G., Lory, J., Myers, B., Wattes, H. 2014-2017. Adaptive Management For Phosphorus To Improve Economic And Water Quality Outcomes, USDA AFRI. ($473,021)

Culman, S.W., Thomison, P., Lindsey, L., LaBarge, G., Waters, H., Lentz, E., Haden, V.R. 2015-2017. Revising Corn and Wheat Fertilizer Recommendations in Ohio. Ohio Corn Marketing Programs. ($410,104)

Culman, S.W. and Lindsey, L. 2017. Revising Soybean Fertilizer Recommendations. Ohio Soybean Council. ($120,000)

Culman, S.W., Hurisso, T.T., Fulford, A.M. Chaganti, V.N. 2017. Evaluating Soil Protein as a New Soil Health Indicator. Organic Farming Research Foundation. ($14,993)

Culman, S.W., Lindsey, L., Dorrance, A. 2016. Revising Soybean Fertilizer Recommendations. Ohio Soybean Council. ($180,000)

Culman, S.W. 2013 – 2016. Developing A Soil Active Organic Matter Test For Organic Growers. Ceres Trust Organic Research Initiative. ($178,981)

Culman, S.W., Doohan, D., Goebel, C., Dick, W., Haden, R. Witter, J. 2015. OARDC Equipment Grant. ($15,485)

Culman, S.W., Lindsey, L., LaBarge, G., Dorrance, A., Michel, A. 2014. Refining soil fertility recommendations for soybeans in Ohio. Ohio Soybean Council. ($200,000)

Culman, S.W., Slater, B. Dick, W., Dorrance, A., Michel, A., Haden, H. Sulc, M., Francis, D., Cornish, K., Basta, N. 2014. OARDC Equipment Grant. ($26,149)

Culman, S.W., Lindsey, L., LaBarge, G., Dorrance, A., Michel, A. 2013. Refining soil fertility recommendations for soybeans in Ohio. Ohio Soybean Council ($192,248)

Culman, S.W. and Snapp, S.S. 2011 – 2012. A new crop for a variable climate: intermediate wheatgrass biology and forage potential. Generating Research and Extension to meet Economic and Environmental Needs, Michigan Forage Council ($64,200)

Snapp, S.S., **Culman, S.W.** and Morrone, V. 2010 – 2012. Fostering complex soil food webs and building soil fertility with organic production: the potential of perennial wheat. Ceres Trust Organic Research Grant ($155,159)

Culman, S.W. Land Institute Graduate Research Fellow. 2005 – 2008. The Land Institute ($22,500)

Culman, S.W., Gaby, J.C., O'Neill, B.E., Cadillo-Quiroz, H. 2007. T-RF Manager: Software for the Analysis of Microbial Community Data. National Science Foundation, Biogeochemistry Integrative Graduate Education and Research Traineeship Program, Small Grant ($4,500)

Culman, S.W. 2004 – 2005. Cornell University Conference Travel Grant ($875)

Culman, S.W. 2003 – 2004. Fulbright Scholar, United States Educational Foundation, Nepal ($18,500)

Culman, S.W. 2003. Cornell University, Foreign Language Area Studies Research Travel Grant ($2,200)

JOURNAL ARTICLES ** denotes research that originated in the Culman lab

In prep

Culman, S.W., Pugliese, J., DeHaan, L.R., Ryan, M.R., Crews, T. E., Jungers, J. M., Scheaffer, C., Larsen, J., Maul., J., Sulc, R.M., Schipanski, M.E., Risso, V.P., Wiedenhoeft, M. Biomass defoliation of the perennial grain, Kernza increases grain yields and productivity across a temperate climatic gradient. To be submitted to Ecological Applications

Culman, S.W., Fulford, A.M., Thomison, P., Minyo, R., Lindsey, L.E., Dorrance, A.M., Richer, E. Watters,

H., LaBarge, G., Martin, C., Extensive on-farm strip trials demonstrate modest needs of phosphorus and potassium fertilizer in corn-soybean rotations in Ohio. To be submitted to Agronomy Journal.

Culman, S.W., Hurisso, T.M., Oppenheimer, O., Sprunger, C.S. Should We Measure Active Organic Matter For Routine Soil Testing? To be submitted to Agricultural and Environmental Letters.

Culman, S.W., Sprunger, C.D., Snapp, S.S., Ollenburger, M., Basso, B., DeHaan, L.R. Can perennial grain systems provide both regulating and provisioning ecosystem services? To be submitted to Agricultural and Environmental Letters.

In review

Sprunger, C.D., **Culman, S.W.,** Palm, C.A., Thuita, M., Vanlauwe, B. Long-term application of high quality residues enhances maize yield and soil nutrient pools across Kenya. *Nutrient Cycling in Agroecosystems.*

Published

Wade, J., **Culman, S.W., Sharm, S., Mann, M. Demyan, S., Mercer, K., Basta, N. 2019. How does phosphorus restriction impact soil health parameters in Midwestern corn-soybean systems? *Agronomy Journal.*

Pugliese, J., **Culman, S.W., Sprunger, C.D. Defoliation increases root biomass and stimulates nutrient cycling in a perennial grain crop managed for both grain and forage. *In Press, Plant and Soil.*

Chaganti, V., **Culman, S.W., Dick, W.A., Kost, D. Evaluating the Effects of Gypsum Application Rate and Frequency on Corn Response to Nitrogen, *In Press, Agronomy Journal.*

Ryan, M.R., Crews, T.E., **Culman, S.W.**, DeHaan, L.R., Hayes, R.C., Jungers, J.M., & Bakker, M.G. 2018. Managing for Multifunctionality in Perennial Grain Crops. *BioScience*, 68:294–304.

Hurisso, T.T., Moebius-Clune, D.J., **Culman, S.W., Moebius-Clune, B.N., Thies, J.E., and Van Es, H.M. 2018. Soil Protein as a Rapid Soil Health Indicator of Potentially Available Organic Nitrogen. *Agricultural and Environmental Letters* 3: 1-5.

Sprunger, C., **Culman, S.W.**, Robertson, G., & Snapp, S. 2018. Perennial grain on a Midwest Alfisol shows no sign of early soil carbon gain. *Renewable Agriculture and Food Systems*, 33:360–372.

Hurisso, T.T., **Culman, S.W., Zhao., K. 2018. Repeatability and Spatiotemporal Variability of Emerging Soil Health Indicators Relative to Routine Soil Nutrient Tests. *Soil Science Society of America Journal* 82: 939–948.

Testen, A.L., Mamiro, D. Nahson, J., Amuri, N., **Culman, S.W.** Miller, S.A. 2018. Farmer-Focused Tools to Improve Soil Health Monitoring on Smallholder Farms in the Morogoro Region of Tanzania. *Plant Health Progress* 19: 56–63.

Hurisso, T., **Culman, S.W., Zone, P., & Sharma, S. 2018. Absolute values and precision of emerging soil health indicators as affected by soil sieve size. *Communications in Soil Science and Plant Analysis*, 49:1934–1942.

Wade, J., **Culman, S.W., Hurisso, T.T., Miller, R.O., Baker, L., Horwath, W.R. 2018 Sources of Variability that Compromise Mineralizable Carbon as a Soil Health Indicator, *Soil Science Society of America Journal* 82:243-252.

Fulford, A.M. and **Culman, S.W. 2018. Over-Fertilization Does Not Build Soil Test Phosphorus and Potassium in Ohio. *Agronomy Journal* 111:56-65.

Chaganti, V., and **Culman, S.W. 2017. Historical Perspective of Soil Balancing Theory and Identifying Knowledge Gaps: A Review. *Crop, Forage & Turfgrass Management*. 3:1-7.

Obrycki, J.F., Basta, N.T., **Culman, S.W.** 2017. Management Options for Contaminated Urban Soils to Reduce Public Exposure and Maintain Soil Health. *Journal of Environmental Quality* 46: 420-430.

Brooker, A.P., Lindsey, L.E., **Culman, S.W. ,** Subburayalu, S.K., Thomison, P.R. 2017. Low Soil Phosphorus and Potassium Limit Soybean Grain Yield in Ohio. *Crop, Forage & Turfgrass Management* 3: 1-5.

Calderón, F.J., **Culman, S.W.**, Six, J., Franzluebbers, A.J., Schipanski, M.E., Beniston, J. Grandy, A.S., Kong, A.Y.Y. 2017. Quantification of Permanganate Oxidizable C Using Infrared Spectroscopy. *Soil Science Society of America Journal* 81, 277-288.

Crews, T.E., Blesh, J., **Culman, S.W.,** Hayes, R.C., Jensen, E.S., Mack, M.C., Peoples, M.B., Schipanski, M.E.,

2016. Going where no grains have gone before: From early to mid-succession. *Agriculture, Ecosystems & Environment* 223, 223–238. doi:10.1016/j.agee.2016.03.012

Hurisso, T.T., **Culman, S.W., Horwath, W.R., Wade, J., Cass, D., Beniston, J.W., Bowles, T.M., Grandy, A.S., Franzluebbers, A.J., Schipanski, M.E., Lucas, S.T., Ugarte, C.M., 2016. Comparison of Permanganate-Oxidizable Carbon and Mineralizable Carbon for Assessment of Organic Matter Stabilization and Mineralization. *Soil Science Society of America Journal* 80, 1352–1364. doi:10.2136/sssaj2016.04.0106

DeHaan, L.R., Van Tassel, D.L., Anderson, J.A., Asselin, S.R., Barnes, R., Baute, G.J., Cattani, D.J., **Culman, S.W.**, Dorn, K.M., Hulke, B.S., Kantar, M., Larson, S., Marks, M.D., Miller, A.J., Poland, J., Ravetta, D.A., Rude, E., Ryan, M.R., Wyse, D., Zhang, X., 2016. A Pipeline Strategy for Grain Crop Domestication. *Crop Science* 56, 1–14. doi:10.2135/cropsci2015.06.0356

Fulford, A.M., **Culman, S.W., Mullen, R.W., Dygert, C.E., 2016. Corn and Soybean Response to Phosphorus and Potassium Fertilization in Ohio. *Better Crops With Plant Food* 100, 7–9.

Londo, A.J., LaBarge, G., Watters, H., **Culman, S.W.**, Rose, M.A., Hall, P. Arnold, G., Custer, S., Richer, E., Noggle, S., Penrose. C. 2015. Water Quality and Nutrient Management Extension Programs in Ohio. *Journal of Contemporary Water Research & Education* 156: 48–55.

Hankinson, M. W., Lindsey, L.E., **Culman, S.W**. 2015. "Effect of Planting Date and Starter Fertilizer on Soybean Grain Yield." *Crop, Forage and Turfgrass Management* 1(1). doi:10.2134/cftm2015.0178.

DuPont, S.T., Beniston, J., Glover, J.D., Hodson, A., **Culman, S.W.**, Lal, R., Ferris, H. 2014. Root traits and soil properties in harvested perennial grassland, annual wheat, and never-tilled annual wheat. *Plant and Soil* 381: 405-420

Maul, J.E., Buyer, J.S., Lehman, R.M., **Culman, S.W.**, Blackwood, C.B., Roberts, D.P., Zasada, I.A., Teasdale, J.R. 2014. Microbial community structure and abundance in the rhizosphere and bulk soil of a tomato cropping system that includes cover crops. *Applied Soil Ecology* 77:42–50.

Grandy, A.S., Salam, D.S., Wickings, K. McDaniel, M., **Culman, S.W.,** Snapp, S.S. 2013. Soil Respiration and Litter Decomposition Responses to Nitrogen Fertilization Rate in No-till Corn Systems. *Agriculture, Ecosystems and Environment* 179:35–40.

Culman, S.W., Snapp, S.S., Ollenburger, M., Basso, B., DeHaan, L.R. 2013. Soil and water quality rapidly responds to the perennial grain, kernza wheatgrass. *Agronomy Journal* 105:735–744.

Culman, S.W., Snapp, S.S., Green, J.M., Gentry, L. 2013. Short and long-term labile soil C and N dynamics reflect management and predict corn agronomic performance. *Agronomy J* 105: 493–502.

Culman, S.W., Snapp, S.S., Schipanski, M.E., Freeman, M.A., Beniston, J., Drinkwater, L.E., Franzluebbers, A.J., Glover, J.D., Grandy, A.S., Lal, R., Lee, J., Maul, J.E., Mirsky, S.B., Six, J., Wander, M.M. 2012. Permanganate oxidizable carbon reflects a processed soil fraction that is sensitive to management. *Soil Science Society of America Journal* 76:494 – 504.

Briar, S.S., **Culman, S.W.**, Young-Mathews, A., Jackson, L.E., Ferris, H. 2012. Nematode community responses to a moisture gradient and grazing along a restored riparian corridor. *European Journal of Soil Biology* 50: 32-38.

Sánchez-Moreno, S., Ferris, H., Young-Mathews, A., **Culman, S.W.**, Jackson, L.E. 2011. Abundance, diversity and connectance of soil food web channels along environmental gradients in an agricultural landscape. *Soil Biology & Biochemistry* 43: 2374-2383.

Jack, A.L.H., Rangarajan, A., **Culman, S.W.**, Sooksa-Nguan, T., Thies, J.E. 2011. Choice of organic amendments in tomato transplants has lasting effects on bacterial rhizosphere communities and crop performance in the field. *Applied Soil Ecology* 48: 94 – 101.

Glover, J.D., Reganold, J.P., Bell, L.W., Borevitz, J., Brummer, E.C., Buckler, E.S., Cox, C.M., Cox, T.S., Crews, T.E., **Culman, S.W.**, DeHaan, L.R., Eriksson, D., Gill, B.S., Holland, J., Hu, F., Hulke, B.S., Ibrahim, A.M.H., Jackson, W., Jones, S.S., Murray, S.C., Paterson, A.H., Ploschuk, E., Sacks, E.J., Snapp, S., Tao, D., Van Tassel1, D.L., Wade, L.J., Wyse, D.L., Xu, Y. 2010. Perennial questions of hydrology and climate response. *Science* 330: 33 – 34.

Culman, S.W., Young-Mathews, A., Hollander, A., Sánchez-Moreno, S., Ferris, H., O'Geen, T.A., Jackson, L.E. 2010. Biodiversity is associated with indicators of soil ecosystem functions over a landscape gradient of agricultural intensification. *Landscape Ecology* 25: 1333 – 13348.

Young-Mathews, A., **Culman, S.W.**, Sánchez-Moreno, S., O'Geen, T.A., Ferris, H., Hollander, A., Jackson, L.E. 2010. Plant-soil biodiversity relationships and nutrient retention in agricultural riparian zones of the Sacramento Valley, California. *Agroforestry Systems* 80: 41 – 60.

Glover, J.D., Reganold, J.P., Bell, L.W., Borevitz, J., Brummer, E.C., Buckler, E.S., Cox, C.M., Cox, T.S., Crews, T.E., **Culman, S.W.**, DeHaan, L.R., Eriksson, D., Gill, B.S., Holland, J., Hu, F., Hulke, B.S., Ibrahim, A.M.H., Jackson, W., Jones, S.S., Murray, S.C., Paterson, A.H., Ploschuk, E., Sacks, E.J., Snapp, S., Tao, D., Van Tassel1, D.L., Wade, L.J., Wyse, D.L., Xu, Y. 2010. Increased food and ecosystem security via perennial grains. *Science* 328: 1638 – 1639.

Culman, S.W., DuPont, S.T., Glover, J.D., Crews, T.E., Buckley, D.H., Ferris, H., Fick, G.W. 2010. Long-term impacts of high-input annual cropping and unfertilized perennial grass production on soil properties and belowground food webs in Kansas, USA. *Agriculture, Ecosystems and Environment* 137: 13 – 24.

Glover, J.D., **Culman, S.W.**, DuPont, S.T., Broussard, W., Young, L., Mangan, M., Mai, J., Crews, T.E., DeHaan, L.R., Buckley, D.H., Ferris, H., Reynolds, H., Turner, E., Wyse, D. 2010. Harvested perennial grasslands provide ecological benchmarks for agricultural sustainability. *Agriculture, Ecosystems and Environment* 137: 3 – 12.

DuPont, S.T., **Culman, S.W.**, Glover, J.D., Buckley, D.H., Ferris, H. 2010. No-tillage conversion of harvested perennial grassland to annual cropland reduces root biomass, decreases active carbon stocks, and impacts soil biota. *Agriculture, Ecosystems and Environment* 137: 25 – 32.

Culman, S.W., Bukowski, R., Gauch, H.G., Cadillo-Quiroz, H., Buckley, D.H. 2009. T-REX: Software for the processing and analysis of T-RFLP data. *BMC Bioinformatics* 10:171

Culman, S.W., Gauch, H.G., Blackwood, C.B., Thies, J.E. 2008. Analysis of T-RFLP data using analysis of variance and ordination methods: a comparative study. *Journal of Microbiological Methods* 75: 55 – 63.

Culman, S.W., Duxbury, J.M., Lauren, J.L., Thies, J.E. 2006. Microbial community response to soil solarization in Nepal's rice-wheat cropping system. *Soil Biology and Biochemistry* 38: 3359 – 3371.

BOOK CHAPTERS AND OTHER PUBLICATIONS

In review

Culman, S.W. and Hurisso, T.H. Microbial Food Source – Available Carbon, in *Laboratory Methods for Soil Health Assessment (eds)* Karlen, D. and Stott, D. Soil Science Society of America, Madison, WI

Hurisso, T.H. and **Culman, S.W.** Microbial Food Source – Bioavailable Nitrogen, in *Laboratory Methods for Soil Health Assessment (eds)* Karlen, D. and Stott, D. Soil Science Society of America, Madison, WI

Published

Dick, W.A. and **Culman, S.W.** 2017. Biological and Biochemical Tests for Assessing Soil Fertility, in *Soil Fertility Management in Agroecosystems (eds)* Chatterjee, A. and Clay, D. Soil Science Society of America, Madison, WI

Culman, S.W., Haden, V.R., Maxwell, T., Waterhouse, H., Horwath, W. 2014. Greenhouse Gas Mitigation Opportunities in California Agriculture: Review of California Cropland Emissions and Mitigation Potential. NI GGMOCA R3. Durham, NC: Duke University

PRESENTATIONS AT SCIENTIFIC MEETINGS

Can the Perennial Grain Crop Kernza Yield Both Forage and Grain? American Society of Agronomy Annual Meetings, November 6-9, 2016, Phoenix, AZ

Using Active Organic Matter Measurements to Predict Agronomic Performance. American Society of Agronomy Annual Meetings, November 6-9, 2016, Phoenix, AZ

Using Active Organic Matter Measurements to Predict Agronomic Performance. North Central Extension and Research Activities (NCERA-13) Annual Meeting, July 18-20, 2016, State College, PA

Kernza Dual-Use Trials. Perennial Grain Annual Conference, July 7-9, 2016, Wilson, KS

Adaptive Nutrient Management to Address Environmental Issues. North Central Extension and Research Activities (NCERA-180) Annual Meeting, May 17-19, 2016, Columbus, OH

Permanganate Oxidizable Carbon and Nutrient Stratification in Long-Term No-till Systems, American Society of Agronomy Annual Meetings, November 15-18, 2015, Minneapolis, MN

Evaluation of Phosphorus and Potassium Fertilization on Corn and Soybean Yields and Soil Test Levels in Ohio. North Central Soil Fertility Meeting, November 5-6, 2015, Des Moines, IA

Measurements of active organic matter. North Central Extension and Research Activities (NCERA-13) Annual Meeting, February 23-25, 2015, Iowa City, IA

Measurements of active organic matter. Mid-Atlantic Soil Testing and Plant Analysis Working Group Annual Meeting, February 10-11, 2015, Richmond, VA

Ecosystem Services Provided by a Novel Perennial Grain Kernza Wheatgrass. American Society of Agronomy Annual Meetings, November 2-5, 2014, Tampa, FL

Permanganate oxidizable carbon reflects a processed soil fraction that is sensitive to management, Soil Science Society Annual Meeting, Cincinnati, OH, 2012

Update of perennial grain research at Michigan State University, Perennial Grain Annual Meeting, Winnipeg, Canada, 2012

Ecosystem services provided by a perennial grain in Michigan, Michigan Organic Reporting Conference, E. Lansing, MI, 2012

Managing Nitrogen in Croplands: Implications for Increasing Ecosystem Services in Agricultural Landscapes, Culman, S.W. and Jackson, L.E., American Geophysical Union Annual Meeting, San Francisco, CA, 2011

Comparing landscape biodiversity and community composition of soil food webs between cultivated fields and grasslands, Ecological Society of America Annual Meeting, Albuquerque, NM, 2009

Differences in soil properties and food web structure following 75 years of high-input wheat versus no-input harvested prairie meadows in Kansas. Ecological Society of America Annual Meeting, August 3-8, 2008, Milwaukee, WI

The Effects of Soil Solarization on the Microbial Community in Nepal's Rice-Wheat System, Soil Ecology Society Conference, Argonne National Laboratory, Argonne, IL, 2005

Soil Solarization in Nepal: Effects on Soil Microbiology and Broader Implications, Agronomy Division of the Nepal Agricultural Research Council, Khumaltar, Nepal, 2004

PUBLISHED CONFERENCE ABSTRACTS

Helping Farmers Navigate Complex Decisions about Managing Weeds in Organic Systems. Doohan, D., Besette, D., Beaudrie, C., **Culman, S.W.,** Wilson, R. Weed Science Society of America Annual Meeting, February 11-14, 2019.

Weeds as Indicators of Soil Imbalance and Other Rural Legends. Doohan, D., Kleinhenz, M., Brock, C., Jackson-Smith, D., **Culman, S.W.,** Kumarappan, S., Herms, C., Levia Soto, A., Weed Science Society of America Annual Meeting, February 11-14, 2019.

On-Farm Evaluation of Crop Diversity Effects on Soil Health and Ecosystem Function in the Great Lakes Region. Christine Dazil Sprunger and **Steve Culman**, American Society of Agronomy Annual Meetings, January 6-9, 2019, San Diego, California

The Impact of Vegetation Management Strategies on Soil Health in Urban Vacant Lots. Nicole C. Hoekstra, Christine Dazil Sprunger, Nicholas T. Basta, Mary M. Gardiner, and **Steve Culman,** American Society of Agronomy Annual Meetings, January 6-9, 2019, San Diego, California

Evaluating Effects of Soil Test Levels and Fertilization on Tissue Phosphorus and Potassium Concentrations in Corn and Soybean of Ohio. Phoo Zone, **Steve Culman**, Ryan Haden, Laura E. Lindsey, and Kaiguang Zhao, American Society of Agronomy Annual Meetings, January 6-9, 2019, San Diego, California

Evaluating the Effects of Nzone Max on Corn N Efficiency in Ohio. Madison Campbell and **Steve Culman**, Soil American Society of Agronomy Annual Meetings, January 6-9, 2019, San Diego, California

Does a Healthy Soil Really Require Less N and P Fertilizer in Corn-Soybean Agroecosystems? Moving from Correlation to Causation. Jordon Wade, **Steve Culman**, Jessica A.R. Logan, M. Scott Demyan, Matthew Ruark, Antonio P. Mallarino, James J. Camberato, Hanna Poffenbarger, John H. Grove, Joshua M. McGrath and Daniel E. Kaiser, American Society of Agronomy Annual Meetings, January 6-9, 2019, San Diego, California

Effects of Broadcast and in-Furrow Fertilizer Placement on Plant Nutrient Status and Grain Yield in Midwestern Corn Cropping Systems. Van Ryan Haden, **Steve Culman** and Anthony Fulford, American Society of Agronomy Annual Meetings, January 6-9, 2019, San Diego, California

Optimizing Experimental Parameters for High-Throughput Plate-Based Diffuse Reflectance Infrared Fourier Transform Spectroscopy of Soils. Leonardo Deiss, M. Scott Demyan, and **Steve Culman**, American Society of Agronomy Annual Meetings, January 6-9, 2019, San Diego, California

Soil Health Tests for Organic Growers that Reflect Organic Matter Stabilization vs. Mineralization. Hurisso, T.T., **Culman, S.W.**, Midwest Organic and Sustainable Education Annual Conference, LaCrosse, WI, February 23-25, 2017

Soil balance relationships - Ca/Mg ratios, Chaganti, V., **Culman, S.W.**, Conservation Tillage Conference, Ada, Ohio, March 7-8, 2017

Corn and Soybean Yield Response to Phosphorus and Potassium Fertilization in Ohio. **Steven W. Culman**, Anthony M. Fulford, Laura Lindsey, Peter R. Thomison, Rich Minyo, Anne Dorrance and Van Ryan Haden, American Society of Agronomy Annual Meetings, October 22-25, 2017, Tampa, Florida

Healthy Soil Healthy Environment – an Ohio State University Extension Signature Program. Vinayak S. Shedekar, Alan P. Sundermeier, **Steven W. Culman**, Sarah Strausbaugh, and Khandakar R. Islam, American Society of Agronomy Annual Meetings, October 22-25, 2017, Tampa, Florida

The Effects of Long-Term Phosphorus Restriction on Soil Health and Phosphorus Availability. Wade, J., **Culman, S.W.**, Demyan, M.S. American Society of Agronomy Annual Meetings, October 22-25, 2017, Tampa, FL

Developing a Tool for Growers to Predict Sulfur Availability in Their Soils. Subburayalu, S.K., **Culman, S.W.**, Dick, W.A. American Society of Agronomy Annual Meetings, October 22-25, 2017, Tampa, FL

Making Research Available to Build Healthy Soils - an Ohio Initiative. Shedekar, V.S., Sundermeier, A.P., Islam, K.R., **Culman, S.W**., Strausbaugh, S. American Society of Agronomy Annual Meetings, October 22-25, 2017, Tampa, FL

Integrated Soil Fertility Management Has Altering Effects on Soil Health and Crop Productivity across Sites in Kenya. Sprunger, C.D., **Culman, S.W.,** Palm, C. American Society of Agronomy Annual Meetings, October 22-25, 2017, Tampa, FL

Crop Rotation Diversity and Yield Resilience: Evidence from 11 Long-Term Experiments in North America across a Precipitation Gradient. Bowles, T.M., Grandy, A.S., Calderón, F.J., Cavigelli, M.A., **Culman, S.W.**, Deen, B., Drury, C.F., Garcia, A.G., Gaudin, A.C.M., Harkcom, W.S., Lehman, R.M., Osborne, S.L., Robertson, G.P., Schmer, M.R., Strock, J.S. American Society of Agronomy Annual Meetings, October 22-25, 2017, Tampa, FL

Developing Soil Tests to Predict Nitrogen Availability to Corn in Ohio. Fulford, A.M., **Culman, S.W.**, Hurisso, T.T., Thomison, P.R., LaBarge, G.A., Watters, H.D. American Society of Agronomy Annual Meetings, October 22-25, 2017, Tampa, FL

Effects of Soil Balancing Treatments on Soils, Crops and Pests in Organically Managed Farms. Soto, A.L., **Culman, S.W.,** Dick, W.A., Kleinhenz, M., Herms, C., Doohan, D. American Society of Agronomy Annual Meetings, October 22-25, 2017, Tampa, FL

Comparing Variability of Soil Health Indicators to More Commonly-Measured Soil Nutrient Availability Tests. Hurisso, T.T., **Culman, S.W.**, Zhao, K. American Society of Agronomy Annual Meetings, October 22-25, 2017, Tampa, FL

Respiration Is Not an Accurate Predictor of N Mineralization Across California Agricultural Systems. Wade, J., Horwath, W.R., Burger, M. **Culman, S.W.** American Society of Agronomy Annual Meetings, November 6-9, 2016, Phoenix, AZ

Pathogen Response to Altering Levels of Soil Fertility in Soybean Fields Across Ohio. Eyre, M., Martin, C. **Culman, S.W.**, Dorrance, A. American Pathological Society, August 1-5, 2015, Pasadena, CA

The impact of interseeding cover crops into Ohio corn systems on competition for water and nutrient resources and on the surface soil physical properties. Synder, E., Haden, V.R., **Culman, S.W**., Fausey, N.R., Slater, B.K. CSCAP 2015 Annual Meeting, August 3- 4 2015, Nebraska City, NE

Relationship Between Labile Soil Organic Matter Fractions and Plant Productivity. Hurisso, T.T., **Culman, S.W.**, Wade, J., Horwath, W.R. American Society of Agronomy Annual Meetings, November 15-18, 2015, Minneapolis, MN

The Opportunities and Challenges of Interseeding Cover Crops in North American Corn-Soybean Systems. Van Ryan Haden, V.R., Snyder, E., **Culman, S.W**. American Society of Agronomy Annual Meetings, November 15-18, 2015, Minneapolis, MN

Determining Yield Limiting Factors in Ohio Soybean Production. Brooker, A. Lindsey, L.E., **Culman, S.W.**, Thomison, P.R., Subburayalu, S.K. American Society of Agronomy Annual Meetings, November 15-18, 2015, Minneapolis, MN

Nine-Year Evaluation of Phosphorus and Potassium Fertilizer Recommendations for Corn and Soybean in Ohio. Fulford, A.M., **Culman, S.W.**, Dygert, C. Mullen, R., Lentz, E.M. American Society of Agronomy Annual Meetings, November 15-18, 2015, Minneapolis, MN

Can Soil Respiration Predict N Mineralization? Wade, J., Burger, M., **Culman, S.W.,** Horwath, W.R. Wageningen Soil Conference, August 23-27, 2015, Wageningen, Netherlands

Ecosystem Services Provided By a Novel Perennial Grain Kernza Wheatgrass. Sieglinde Snapp, Lee DeHaan, Christine Sprunger, Ariane Peralta, and **Steve Culman,** American Society of Agronomy Annual Meetings, November 2-5, 2014, Long Beach, CA

Towards a rapid method of measuring labile soil C using infrared spectroscopy. Calderon, F.J., **Culman, S.W.**, Franzluebbers, A., Schipanski, M.E., Six, J., Snapp, S.S. American Society of Agronomy Annual Meetings, November 2-5, 2014, Long Beach, CA

Effect of Starter Fertilizer and Plant Date on Soybean Yield and Quality. Hankinson, M., Barker. D., **Culman, S.W.,** Lindsey, L.E. American Society of Agronomy Annual Meetings, November 2-5, 2014, Long Beach, CA

Correlation Between Soil Test Values and Plant Nutrient Concentrations, Brooker, A., **Culman., S.W**., Lindsey, L.E. American Society of Agronomy Annual Meetings, November 2-5, 2014, Long Beach, CA

Effect of Starter Fertilizer and Plant Date on Soybean Growth, Nodulation and Yield. Hankinson, M., Barker. D., **Culman, S.W.,** Lindsey, L.E., North Central Soil Fertility Conference, November 19-20, 2014, Des Moines, IA.

Evaluation of Organic Soil Matter Testing Measures. **Culman, S.W.** Midwest Organic and Sustainable Education Service. February 27-March 1, 2014. La Crosse, WI

Perennial Roots: A Key Driver to Ecosystem Stability and Long Term Yield. Amanda Hodson, **Steven Culman**, Joshua Beniston, Rattan Lal, Jerry Glover, Howard Ferris, and S. DuPont, American Society of Agronomy Annual Meeting, November 3-6, 2013, Tampa, Florida

Perennial Wheat: A Multipurpose Cover Crop for the Midwest. Nikhil jaikumar, Vicki Morrone, Sienna Tinsley, **Steven Culman**, and Sieglinde Snapp, American Society of Agronomy Annual Meeting, November 3-6, 2013, Tampa, Florida

Weighing the Value of Perennial Grains As Cover Crops. Sienna Tinsley, Steven Culman, Sieglinde Snapp, and Vicki Morrone, American Society of Agronomy Annual Meeting, November 3-6, 2013, Tampa, Florida

Root Production An Indicator For Belowground C Storage and Nitrogen Use Efficiency In Perennial and Annual Grain Cropping Systems. Christine Sprunger, **Steven Culman**, and Sieglinde Snapp, American Society of Agronomy Annual Meeting, November 3-6, 2013, Tampa, Florida

Implications for Carbon Sequestration: Management Effects On Annual Versus Perennial Root Production. Sprunger, C., Snapp, S.S., **Culman, S.W.** American Society of Agronomy Annual Meeting, October 21-24, 2012, Cincinnati, OH

Potential for Perennial Grasses As An Organic Dual Forage-Grain Crop In Michigan. Tinsley, S., Snapp, S.S., **Culman, S.W.**, Utsumi, S., American Society of Agronomy Annual Meeting, October 21-24, 2012, Cincinnati, OH

Microbial Contributions to Carbon Sequestration Potential in Response to Perenniality. Peralta, A.L., **Culman, S.W.**, Sprunger, C., Lennon, J.T., Snapp, S.S. American Society of Agronomy Annual Meeting, October 21-24, 2012, Cincinnati, OH

Nitrogen Fixation Over the Long-Run: Lessons for Organic and Integrated Grain Production From the Living Field Laboratory. Snapp, S.S., Gentry, L., **Culman, S.W.** American Society of Agronomy Annual Meeting, October 31-November 4, 2010, Long Beach, CA

Plant and Soil Biodiversity in Riparian Corridors in an Agricultural Landscape. Jackson, L.E., **Culman, S.W.,** Young-Mathews, A., Ferris, H., O'Geen, A.T., Sánchez Moreno, S. Second DIVERSITAS Open Science Conference, October 13-16, 2009, Cape Town, South Africa

T-RF Manager: a web-based tool for storage, labeling, processing, and analysis of T-RFLP data. Bukowski, R., **Culman, S.W.**, Ripolla, D.R. International Society of Computational Biology, July 19-23, 2008, Toronto, CA

Multivariate Analyses of Terminal Restriction Fragment Length Polymorphism (T-RFLP) Data: A Comparative Study. **Culman, S.W.**, Gauch, H.G., Thies, J.E. American Society of Agronomy Annual Meeting, November 6-10, 2005, Salt Lake City, UT

Effects of CRW Transgenic Corn and Tefluthrin on the Soil Microbial Community: Activity, Diversity and Abundance. Devare, M.H., Thies, J.E., Jones, C.J., **Culman, S.W.**, Martinez, C.E. American Society of Agronomy Annual Meeting, November 10-14, 2002, Indianapolis, IN

EXTENSION ACTIVITIES

Provide statewide leadership in soil fertility, nutrient management and soil health across Ohio.

Highlights

Soil Fertility and Nutrient Management

- Completing Efforts to Update Field Crop Fertilizer Recommendations in Tri-State Region, a major effort that has involved over 300 on-farm strip trials across the state
- Started and lead Agronomic Crop Research and Extension (ACRE), a summer internship experience where undergraduate students are placed in county extension offices across the state to help facilitate on-farm research

Soil Health

- Helping lead Ohio State University Signature Program in Soil Health, outreach program focused on education on diversity of soil health issues
- Lead Soil Health In-Service Workshops: Intensive 1 day workshops to train educators in soil health (6 workshop ran, 181 participants total)
- Provide national outreach leadership on soil health, have given over 7 invited talks on soil health in regional conferences for certified crop advisors and commercial soil test laboratory operators

Ohio Agronomy Guide, 15th edition

Culman, S., Haden, R., Witter, J. 2017. *Chapter 2: Soil and Water Management.* Ohio Agronomy Guide, 15th edition, Ohio State University Extension, Bulletin 472

Lentz, E., **Culman, S**., Haden, R. 2017. *Chapter 3: Soil Fertility.* Ohio Agronomy Guide, 15th edition, Ohio State University Extension, Bulletin 472

Thomison, P., Michel, A., Tilmon, K., **Culman, S**., Paul, P. 2017. *Chapter 4: Corn Production*. Ohio Agronomy Guide, 15th edition, Ohio State University Extension, Bulletin 472

Lindsey, L., Lentz, E., Michel, A., Tilmon, K., **Culman, S.** Paul, P. 2017. *Chapter 5: Small Grain Production*. Ohio Agronomy Guide, 15th edition, Ohio State University Extension, Bulletin 472

University Factsheets

Lentz, E., LaBarge, G., Lindsey, A., **Culman, S.** *Statistics and Agricultural Research*, ANR-40: https://ohioline.osu.edu/factsheet/anr-40

Culman, S., Saeed, M., Fulford, A. *Ohio Data that Shaped the Tri-State Fertilizer Recommendations*, AGF-518: https://ohioline.osu.edu/factsheet/agf-518

Sharma, S., **Culman, S.**, Fulford, A., Lindsey, L., Alt, D., Looker, G. *Corn, Soybean, and Alfalfa Yield Responses to Micronutrient Fertilization in Ohio*, AGF-519: https://ohioline.osu.edu/factsheet/agf-519

Extension and Outreach Talks

2018: 17 presentations, ~1211 participants
2017: 14 presentations, ~480 participants
2016: 16 presentations, ~750 participants
2015: 18 presentations, ~870 participants
2014: 6 presentations, ~398 participants

CORN Newsletter Articles (>4K active subscribers)

2018 Articles: 6 as primary author, 5 as coauthor (11 total)
2017 Articles: 5 as primary author, 1 as coauthor (6 total)
2016 Articles: 4 as primary author, 4 as coauthor (8 total)
2015 Articles: 6 as primary author, 7 as coauthor (13 total)
2014 Articles: 1 as primary author, 3 as coauthor (4 total)

Professional development offerings

- Association of Ohio Pedologist, Quantitative Measures of Soil Health, Wooster, OH August 7, 2018 (60 people, full day workshop)
- Ohio No-Till Field Day, Wooster, OH August 29, 2018 (200 people, full day workshop and talks)

Miscellaneous Extension Service

- Curricula Development for the Fertilizer Application Certification Training program which certifies >12k commercial applicators every 3 years
- Provide annual editorial review of extension ANR on-farm research reports in soil fertility

ADVISING AND MENTORSHIP

Postdoctoral Research Scholars (6 total)

Current: Leonardo Deiss
Complete: Anthony Fulford, Tunsisa Hurriso, Vijay Chaganti, Christine Sprunger, William Osterholz

Graduate Student Chair (5 total)

Current: Jordon Wade (PhD, ENR), Noely Gonzalez-Maldonado (MS, ENR)
Complete: Phoo Zone (MS, ESGP), Jennie Pugliese (MS, ENR), Cassandra Loney (MENR)

Graduated Student Committee Member (21 total)

Current MS students: Louceline Fleuridor (HCS), Taylor Dill (HCS)
Completed MS students: Matt Hankinson (HCS), Claire Sutton (SENR), Katie Linder (HCS), Aaron Brooker (HCS), Dave Tomashefski (SENR), Meredith Eyre (Plant Pathology), Andrea Leiva Soto (HCS), Steven Doyle (SENR), Jonell Winger (MPHM), Trey Colley (FABE)

Current PhD students: Alyssa Lamb (HCS), Andrea Leiva Soto (HCS), Ram Khadka (Plant Pathology), Chris Eidson (ESGP), Nall Moonilall (ESGP), Ellen Maas (SENR), Luis Huezo (FABE)
Completed PhD students: John Obrycki (SENR), Anna Testen (Plant Pathology), Emma Kurth (SENR)

Visiting Scholars Hosted
Muhammad Tariq Saeed

Post-Bachelor Technicians
Kenzie Reynen, Phoo Zone, Stuti Sharma, Meredith Mann, Bethany Herman, Nicole Hoekstra

Summer Undergraduate Research Internships (7 total)
Student Research Opportunities (SROP): Noely Gonzalez-Maldonado, Otto Oppenheimer
OARDC Research Internship Advisor: Nakian Kim, Samantha Wander
ATI Summer Internships: Andrew Herzog, Madison Campbell

Undergraduate Advisor for Sustainable Agriculture Minor (2015-Present)

ACADEMIC SERVICE AND ACTIVITIES

Manuscripts Reviewed for:
Agriculture, Ecosystems and Environment, Agricultural and Environmental Letters, Agronomy Journal (4), Applied Microbiology and Biotechnology, Applied Soil Ecology, Crop Management, FEMS Microbiology Letters, Field Crops Research, Geoderma, Journal of Environmental Quality, Microbial Ecology, Nature Methods, Renewable Agriculture and Food Systems (2), Plant and Soil, Plant Breeding, Soil Biology and Biochemistry, Soil Research, Soil Science Society of America Journal (9), The Journal of Agricultural Science

National and Regional Service:

North Central Extension and Research Activity (NCERA-13) State Representative	2014–Present
Foundation for Food and Agricultural Research Soil Health Advisory Committee	2016–2018
Perennial Grain Community Chair and Vice-Chair, American Society of Agronomy	2015–2016
Mentor for Golden Opportunity Scholars Program, Agronomy Science Foundation	2012
External Grant Reviewer for USDA-ARS Project Plan: Water Quality Processes, Management and Control	2012

Miscellaneous Service:

Ohio State SENR Grad Studies Committee Soil Rep	2016–Present
Ohio State OARDC Consolidated Farms Committee	2016–Present
Ohio State SENR Greenhouse Representative	2015–Present
Ohio State SENR Faculty Search Co-Chair, Soil Rhizosphere Processes	2018
Ohio State SENR Faculty Search Committee, Community Food Systems	2017
Ohio State Mellinger Farm Advisory Committee	2015 – 2017
Ohio State SENR Faculty Search Committee, Soil and Environmental Mineralogy	2016
Ohio No-Till Council Board Member	2015–2016
International Perennial Grains Conference Organizer, Kellogg Biological Station	2010, 2011
Seminar Committee Member, Kellogg Biological Station	2010 – 2011
President of New World Agriculture and Ecology Group at Cornell	2004 – 2005
Cornell Departmental Graduate Student Symposium Organizer	2003
Permaculture Designer Certificate, NSW Australia	1999

Professional Affiliations

American Society of Agronomy, Soil Science Society of America