

Rachel L. Cook

Department of Forestry and Environmental Resources,
North Carolina State University, Raleigh, NC
Office Phone: 919-515-5979; Cell: 618-841-0378
rachel_cook@ncsu.edu
forestproductivitycoop.net
www.rcsoils.com

PROFESSIONAL EXPERIENCE

**Assistant Professor of Silviculture and Forest Soils;
Forest Productivity Cooperative Co-Director** (April 2016 – present)

North Carolina State University – Raleigh, NC

Research focus on forest management to enhance plantation productivity and protect environmental resources.

Assistant Professor of Soil Fertility (Jan 2013-March 2016)

Southern Illinois University – Carbondale, IL

Research focuses on soil fertility of agronomic crops, long-term impacts of tillage and fertility management, and effects of cover crops on soil properties and water quality.

Visiting Professor (Jan 2015-Aug 2015)

Soil Science Department – North Carolina State University

Research project focusing on new enhanced efficiency fertilizer product. Hosted by Dr. Dean Hesterberg.

Sustainable Agriculture Researcher (July 2012-Dec 2012)

BASF – Research Triangle Park, NC

Researched sustainability issues for the Food, Beverage, and Agriculture sector in The Sustainability Consortium and was involved with AgBalance, BASF's model to evaluate environmental, social, and economic impacts in agricultural systems.

EDUCATION

North Carolina State University, Raleigh, NC

College of Natural Resource, Department of Forestry and Environmental Resources

Doctoral Program in Forestry and Environmental Resources, Minor in Soil Science

Advisor: Dr. Jose Stape, Co-Advisor: Dr. H. Lee Allen (Jan 2009-May 2012)

Masters of Science in Natural Resources, Technical Option in Ecological Restoration

Advisor: Dr. Elizabeth Nichols (Aug 2005-Dec 2008)

Saint Louis University, Saint Louis, MO

Honors Bachelor of Science in Biology, Minor in Anthropology

College of Arts and Sciences, Department of Biology (August 2001-May 2005)

TEACHING AND ADVISING EXPERIENCE

Forest Soils, FOR 472/FOR 595, Spring 2018

11 students

Theory and Practice of Silviculture, FOR 304, Spring 2017, 2018

20-26 students

Fertilizers and Soil Fertility, PSAS/CSEM 447, 3 credits (Jr/Sr and graduates)

43–54 students, Instructor evaluations (5 pt scale): 4.45

Soil Fertility Evaluation Laboratory, PSAS/CSEM 448, 2 credits (Jr/Sr and graduates)

28–44 students, Instructor evaluations: 4.4

Soil Management, PSAS/CSEM 443, 3 credits (Jr/Sr and graduates)

29 students, Instructor evaluations: 4.74

Current Topics in Soil Science and Agronomy, PSAS 590/CSEM 390 (Jr/Sr and graduates)

22 students, Instructor evaluations: 4.6

Mentoring Activities

NCSU

Chair: 2 Masters students (Vitor Aguiar, Ariel Zelaya)

SIU

Chair: 3 Masters students (Taylor Williamson, Brent Sunderlage, Ted Ballard)

Co-Chair: 1 PhD student (Sarah Bowman),

Committee member: 5 PhD students, 4 Master's students

Undergraduate research mentees: (Anna Sullivan, Ben Westrich, Austin Sherman, Maya Lewis, Ashley Hanson, Clayton Prates, Ben Clevenger)

PEER-REVIEWED JOURNAL PUBLICATIONS

1. Rubilar, R.A., H.L. Allen, T.R. Fox, **R.L. Cook**, T.J. Albaugh, O.C. Campoe. 2018. Advances in Silviculture of Intensively Managed Plantations. *Current Forestry Reports*. 4: 23-34
2. Sievers, T. and **R.L. Cook**. 2018. Aboveground and root decomposition of cereal rye and hairy vetch cover crops. *Soil Science Society of America Journal*. 82(1):147-155
3. Sunderlage B. and **R.L. Cook**. 2018. Soil Property and Fertilizer Additive Effects on Ammonia Volatilization from Urea. *Soil Science Society of America Journal*. 82(1):253-259
4. Eagle, A.J., L.E. Christianson, **R.L. Cook**, R.D. Harmel, F.E. Miguez, S.S. Qian, D.A. Ruiz Diaz. 2017. Meta-Analysis Constrained by Data: Recommendations to Improve Relevance of Nutrient Management Research. *Agronomy Journal*. 109:1-9
5. Maier, C.A., T. Albaugh, **R.L. Cook**, K. Hall, D. McInnis, K.H. Johnsen, J. Johnson, R. Rubliar, J.M. Vose. 2017. Comparative water use in short-rotation *Eucalyptus benthamii* and *Pinus taeda* trees in the Southern United States. *Forest Ecology and Management*. 397: 126-138

6. Albaugh, T., T. Fox, R. Rubliar, **R.L. Cook**, R.L. Amateis, H.E. Burkhart. 2017. Post-thinning density and fertilization affect *Pinus taeda* stand and individual tree growth. *Forest Ecology and Management*. 396: 207-216
7. Albaugh, T., R. Rubilar, C. Maier, E. Acuña, **R.L. Cook**. 2017. Biomass and nutrient content of *Acacia dealbata* and *Eucalyptus globulus* bioenergy plantations. *Biomass and Bioenergy* 97: 162-171
8. Walia, M., S. Baer, **R.L. Cook**. 2017. Deep Soil Carbon after 44 years of Tillage and Fertilizer Management in Southern Illinois Compared to Forest and Restored Prairie Soils. *Journal of Soil and Water Conservation*. 72: 403-413
9. Trlica, A., M. Walia, R. Krausz, S. Secchi, and **R.L. Cook**. 2017. Continuous corn and corn-soybean profits over a 45-year tillage and fertilizer experiment. *Agronomy Journal*. 109: 1-9. Data available from the Dryad Digital Repository: <https://doi.org/10.5061/dryad.g1n25>
10. **Cook, R.L.** and Trlica, A. 2016. Tillage and Fertilizer Effects on Crop Yield and Soil Properties over 45 Years in Southern Illinois. *Agronomy Journal*. 108:415-426. Data available from the Dryad Digital Repository: <http://dx.doi.org/10.5061/dryad.7920c>
11. **Cook, R.L.**, D. Binkley, J.L. Stape. 2016 Eucalyptus plantation effects on soil carbon after 20 years and three rotations in Brazil. *Forest Ecology and Management*. 359: 92-98
12. **Cook, R.L.**, A. Nail, A. Vigardt, A. Trlica, B. Hagarty, T. Williams, J. Wolt. 2015. Meta-analysis of Enhanced Efficiency Fertilizers in Corn Systems in the Midwest. International Plant Nutrition Institute Report. Web address: <http://research.ipni.net/project/IPNI-2014-USA-4RM06>
13. **Cook, R.L.**, Mendes, J.C.T., Binkley, D., Stape, J.L. 2014. Soil carbon stocks and forest biomass following conversion of pasture to broadleaf and conifer plantations in southeastern Brazil. *Forest Ecology and Management*. 324: 37-45.
14. **Cook, R.L.**, J.L. Stape. D. Binkley, 2014. Soil carbon dynamics following reforestation of tropical pastures. *Soil Science Society of America Journal*. 78: 290-296. *Jan/Feb Cover Photo*.
15. Campoe, O.C., C. Iannelli, J.L. Stape, **R.L. Cook**, J.C.T. Mendes, R. Vivian. 2014. Atlantic forest tree species responses to silvicultural practices in a degraded pasture restoration plantation: From leaf physiology to survival and initial growth. *Forest Ecology and Management*, 313: 233-242.
16. Nichols, E.G., **R.L. Cook**, J.E. Landmeyer, B. Atkinson, D.R. Malone, G. Shaw, L. Woods. 2014. Phytoremediation of a Petroleum-Hydrocarbon Contaminated Shallow Aquifer in Elizabeth City, North Carolina, U.S.A. *Remediation Journal* 24(2): 29-46.

17. **Cook, R.L.** and D. Hesterberg. 2013. Comparison of Trees and Grasses for Rhizoremediation of Petroleum Hydrocarbons. *International Journal of Phytoremediation*. 15: 844–860.
18. **Cook, R.L.**, J. Landmeyer, B. Atkinson, J.P. Messier, and E. Nichols. 2010 Field Note: Successful Establishment of a Phytoremediation System at a Petroleum Hydrocarbon Contaminated Shallow Aquifer: Trends, Trials, and Tribulations. *International Journal of Phytoremediation*. 12(7): 716–732.
19. Burgwyn, B., **Cook, R. L.**, and Bolla, R. I. 2003 *Heterodera glycines*: Density Based Gradient Separation of Eggs. *Experimental Parasitology*. 105 (3–4): 179–183.

INVITED PRESENTATIONS AND OUTREACH

1. Keeping Silviculture in Step with Step-Changes in Productivity. Forest Insight Conference. Watkinsville, GA. October 25-26 (110 in attendance)
2. Cover Crop Effects on Water Quality in Southern Illinois. Southern Illinois Fertilizer and Pesticide Conference. Mt. Vernon, IL, November 2015 (200 in attendance)
3. Nitrogen Management in Southern Illinois. Dow Agrosiences Nitrogen Summit. Las Vegas, NV, July 2015 (30 in attendance)
4. Nitrogen Management in Southern Illinois. Belleville Research Center Field Day, Belleville, IL, July 2015 (210 in attendance)
5. Meta-analysis of Enhanced Efficiency Fertilizers in Midwestern Corn Systems. 4R Nutrient Stewardship Summit. Washington, DC (180 in attendance)
6. 40 years of Tillage x Fertility Research: What have we learned? Illinois Crop Management Conference. University of Illinois Extension. Mt. Vernon, IL. Jan 21, 2015 (74 in attendance)
7. Late Nitrogen Management in Corn Production in Southern Illinois. Illinois Fertilizer and Chemical Association, Peoria, IL. Jan 20, 2015 (300 in attendance)
8. Soil Fertility, Tillage, and Climate Interactions: 44 Years of Research in Southern Illinois. Illinois Certified Crop Advisor Conference, Springfield, IL, December 2014 (300 in attendance)
9. Tillage is Recreational, Fertilizer is Essential: 44 years of a tillage x fertility corn and soybean trail in Southern Illinois. Brownstown Agronomy Research Center (UI) Field Day, Aug 6, 2014 (90 participants) and Dixon Springs Agricultural Center (UI) Field day, Aug 7, 2014 (100 in attendance)

10. Tillage x Fertility: How do 44 years of climate stress affect yields. Belleville Research Center Field Day, Belleville, IL, July, 2014 (230 in attendance)
11. Nitrogen Management in Southern Illinois, Southern Illinois Fertilizer and Pesticide Association 36th Annual Conference, Mt. Vernon, IL, Nov 26, 2013 (167 in attendance)
12. Soil Fertility in Southern Illinois, Illinois Soil Testing Association, Peoria, IL, Aug 13, 2013 (20 in attendance)
13. From Soil Carbon to So. IL Carbon-dale: The journey to soil fertility. St. Louis University Seminar Series, St. Louis, MO, Sept 13, 2013 (40 in attendance)
14. 40 Years in the Making: Long-term Tillage and Fertility Experiment. Belleville Research Center Field Day, Belleville, IL, July 2013 (200 in attendance)

CONFERENCE ORAL PRESENTATIONS (*PRESENTING AUTHOR)

1. Sunderlage, B., **R.L. Cook***. Effects of Soil Properties and Fertilizer Additives on Ammonia Volatilization from Urea. Soil Science Society of America, Tampa, FL. Oct 22-25, 2017
2. **Cook, R.L.*** *Representing Real Soils for Real People: Balancing the Scales*. Early Career Award Invited Presentation. Soil Science Society of America, Phoenix, AZ. November 6-9, 2016
3. Walia, M., **R.L. Cook*** *Deep Soil Carbon after 44 Years of Tillage and Fertilizer Management in Southern Illinois Compared to Forest and Restored Prairie Soil*. Soil Science Society of America, Phoenix, AZ. November 6-9, 2016
4. **Cook, R.L.*** *Meta-analysis of Enhanced Efficiency Fertilizers in Midwestern Corn Systems*. Soil Science Society of America, Minneapolis, MN, November 17, 2015.
5. **Cook, R.L.*** and A.L. Trlica *Tillage and Fertility Effects on Corn and Soybean Yield in a 44-Year Trial in Southern Illinois*. Soil Science Society of America, Long Beach, CA, November 2-5, 2014.
6. Trlica, A.* and **R.L. Cook**. *Tillage is recreational, fertilization is essential: Economic analysis over 44 years of a tillage x fertility corn and soybean trial in southern Illinois*. Soil Science Society of America, Long Beach, CA, November 2-5, 2014.
7. Sweet, A.* J.E. Schoonover, K.W.J. Williard, and **R.L. Cook**. *Improving Nutrient Retention during the establishment of riparian buffers: biochar's potential as a soil amendment*. American Water Resources Association, Portland, OR. November 4-7, 2013.

8. Coleman, A.* J.E. Schoonover, K.W.J. Williard, and **R.L. Cook**. 2013 *The Effect of Application Timing on the Release, Transport, and Fate of a Controlled Release Fertilizer*. American Water Resources Association, Portland, OR. November 4-7, 2013.
9. **Cook, R.L.*** and J. Stape. *Characterization of total soil organic carbon changes and stable carbon isotope dynamics following reforestation of pasture with broadleaf and conifer plantations in Brazil*. Ecological Society of America, Portland, OR. August 2012.
10. **Cook, R.L.*** and J. Stape. *Trees versus Grasses: Soil carbon sequestration and possible impacts for vegetation selection in phytoremediation project design*. Eighth Annual International Phytotechnologies Conference. Portland, OR. September 2011.
11. **Cook, R. L.***, J. Landmeyer, B. Atkinson, J.P. Messier, A. McEachran, G. Shaw, E. G. Nichols. *Performance of Mixed Tree Plantation on BTEX and TPH Removal in Elizabeth City, NC*. Eighth Annual International Phytotechnologies Conference. Portland, OR. September 2011.
12. Nichols, E. G.* , **R.L. Cook**, J. Landmeyer, B. Atkinson, J.P. Messier, G. Shaw. *Energy costs for a successful phytoremediation demonstration site in Elizabeth City, NC*. USEPA and UMASS Sustainable Remediation Conference 2011. Amherst, MA. June 2011.
13. **Cook, R.L.*** and J. Stape. *Soil Carbon Sequestration in Tropical Plantation Forestry: Long term effects of intensive forest management*. Seventh Annual International Phytotechnologies Conference. Parma, Italy. September 2010.
14. **Cook, R.L.***, J. Landmeyer, B. Atkinson, J.P. Messier, A. McEachran, G. Shaw, and E. Nichols. "*Phyto*" *Really Does Work in Elizabeth City, NC*. Seventh Annual International Phytotechnologies Conference. Parma, Italy. September 2010.
15. **Cook, R.L.*** and J. Stape. *Characterizing Soil Organic Carbon Dynamics in Tropical Forest Plantations: Long term effects of intensive forest management*. American Geophysical Union, Meeting of the Americas. Iguassu Falls, Brazil. August 2010.
16. **Cook, R.L.***, J. Landmeyer, B. Atkinson, J.P. Messier, and E. Nichols. *Phytoremediation of a Petroleum-Hydrocarbon Contaminated Shallow Aquifer: Effects of Planting Methods on Tree Growth and Mortality and Preliminary Results*. Fifth International Phytotechnologies Conference. Nanjing, China. October 2008.
17. **Cook, R.L.***, J. Landmeyer, B. Atkinson, J.P. Messier, and E. Nichols. *Using geographic information systems (GIS) and spatial relationships to monitor petroleum-hydrocarbon contaminants and tree growth at a field scale phytoremediation system, U.S. Coast Guard Support Center, Elizabeth City, North Carolina, USA*. Fifth International Phytotechnologies Conference. Nanjing, China. October 2008.

CONFERENCE POSTER PRESENTATIONS

1. Stoll, E.* , **R.L.Cook**, Spatially Classifying Soils and Influential Geology for Forestry Management. Geology Society of America, Seattle, WA, 2017
2. Sunderlage, B.* , **R.L. Cook**, Late Application Nitrogen on Corn: Yield and Nutrient Losses in Southern Illinois. ASA-CSSA-SSSA Annual Meeting, Phoenix, AZ, 2016
3. Sievers, T.* , **R.L.Cook**, Impacts of Cover Crop Decomposition and Nutrient Release on Agronomic Systems in Southern Illinois. ASA-CSSA-SSSA Annual Meeting, Phoenix, AZ, 2016
4. Lange, R.* , **R.L.Cook**, Volatilization and Corn Yield Response to a Urease Inhibitor Under Tillage. ASA-CSSA-SSSA Annual Meeting, Phoenix, AZ, 2016
5. Westrich, B.* , **R.L.Cook**, Nitrogen Loss and Residue Breakdown Potential for Fall-Applied Diammonium Phosphate. ASA-CSSA-SSSA Annual Meeting, Phoenix, AZ, 2016
6. Singh, G.* , K. Williard,, J. Schoonover, **R.L. Cook**, Cover crops for soil and water quality. Water Smart Innovations (WSI), WSI conference, Las Vegas, NV, 2016.
7. Singh, G.* , K. Williard,, J. Schoonover, **R.L. Cook**, Effect of cover crops on soil and water quality parameters at the watershed scale. Second Place Student Poster Award. Universities Council on Water Resources/ National Institutes for Water Resources (UCOWR/NIWR), Annual Water Resources Conference, Pensacola beach, FL, 2016.
8. Singh, G.* , K. Williard,, J. Schoonover, **R.L. Cook**, J. Crim, Using winter cover crops for improving soil and water quality at different topographic positions on the watershed scale. Fourth Place Student Poster Award. ASA-CSSA-SSSA Annual Meeting, Phoenix, AZ, 2016
9. Singh, G.* , K. Williard,, J. Schoonover, **R.L. Cook**, J. Crim, Effects of leguminous and non-leguminous cover crops and tillage on nutrient leaching in a corn/soybean rotation. ASA-CSSA-SSSA Annual Meeting, Phoenix, AZ, 2016
10. Armstrong, J.* , K. Williard, J. Schoonover, and **R.L Cook**. 2013. *Storm Flow Dynamics of Nitrogen in Three Agriculture Watersheds in Central Illinois*, American Water Resources Association, Portland Oregon. November 4-7, 2013.
11. Mellinger, A.* , J. Schoonover, K. Williard, S. Randall, **R.L. Cook**, and J. Groninger. *The Effect of Tillage on Soil Health in Central Illinois*. American Water Resources Association, Portland Oregon. November 4-7, 2013.
12. **Cook, R.L.***, D. Binkley, L. Allen, and J. Stape. *Characterizing Soil Carbon Dynamics in Tropical Plantation Forestry: Long-term effects of short-rotation Eucalyptus plantations*. American Geophysical Union. San Francisco, CA. December 2011
13. **Cook, R.L.*** and J. Stape. *Characterizing Soil Carbon Dynamics in Tropical Plantation Forestry: Long term effects of intensive forest management*. Forest Productivity Cooperative Annual Meeting. New Bern, NC. October 2010.
14. **Cook, R.L.***, J. Landmeyer, B. Atkinson, J.P. Messier, and E. Nichols. *Phytoremediation of a petroleum contaminated aquifer at US Coast Guard Support Center, Elizabeth City, NC*. Fourth International Phytotechnologies Conference. Denver, CO. September 2007.
15. **Cook, R.L.***, J. Landmeyer, B. Atkinson, J.P. Messier, and E. Nichols. *Phytoremediation of a petroleum contaminated aquifer at US Coast Guard Support Center, Elizabeth City, NC*. Third Annual Graduate Student Research Symposium. Raleigh, NC. March 2008.

AWARDS AND SOCIETY MEMBERSHIPS

SSSA S.A. Wilde Early Career Achievement Award (2016)
SIU College of Agricultural Sciences Outstanding Team Award (2014)
Bruce and Barbara Zobel Travel Grant (2010)
NCSU Provost Fellowship Competitive Recruitment Award (2009)
NCSU Charles B. Davey Graduate Fellowship for Excellence in the Biological Science (2008)

Soil Science Society of America (2012-present)
International Phytotechnologies Society (2011)
Xi Sigma Pi, Forestry Honor Society (inducted 2008)
Phi Kappa Phi, Academic Honor Society (inducted 2008)
International Society of Tropical Foresters (2010-2012)

GRANTS AND EXTERNAL FUNDING

NCSU: Members of Forest Productivity Cooperative, ~**\$600,000/year**; NCDA&CS Research Stations Bioenergy Research Initiative Grant Program, Loblolly Pine Plantations to Maximize Bioenergy Production, 01/2017-12/2018, **\$110,744**

SIU: Funds totaling **\$1,106,098** from the IL Nutrient Research Education Council, Agronomic Science Foundation, IL Specialty Crop Grant, International Plant Nutrition Institute, and Industry support.