

# Rachel L. Cook

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Assistant Professor of Soil Fertility  
Department of Plant, Soil, and Agricultural Systems  
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## **Employment**

### **Assistant Professor of Soil Fertility** (Jan 2013-present)

*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. 50% teaching, 45% research, and 5% service.

### **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 (January 2009-May 2012)

Dissertation title: "*Long-term Effects of Forest Plantations on Soil Carbon in Brazil.*"

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

Advisor: Dr. Elizabeth Nichols (August 2005-December 2008)

Thesis title: "*Phytoremediation of a Petroleum-Hydrocarbon Contaminated Shallow Aquifer, Elizabeth City, NC*"

### **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 Experience**

Fertilizers and Soil Fertility, PSAS/CSEM 447, 3 credits (Jr/Sr and graduates)  
43-54 students, Instructor evaluations: 4.45 / 5  
Soil Fertility Evaluation Laboratory, PSAS/CSEM 448, 2 credits (Jr/Sr and graduates)  
28-44 students, Instructor evaluations: 4.4 / 5  
Soil Management, PSAS/CSEM 443, 3 credits (Jr/Sr and graduates)  
29 students, Instructor evaluations: 4.74 / 5  
Current Topics in Soil Science and Agronomy, PSAS 590/CSEM 390 (Jr/Sr and graduates)  
22 students, 4.6/5

## **Mentoring Activities**

Chair: 3 Masters' students  
Co-Chair: 1 PhD student, 1 masters student  
Committee member: 5 PhD students, 3 Masters students  
Undergrad advisement: 15 students

## **Refereed Articles**

Trlica, A. and **R.L. Cook**. Long-term changes in soil fertility and yield in a 44-year tillage × fertility trial in corn and soybean in southern Illinois. *In preparation 2014*.

Trlica, A. and **R.L. Cook**. Tillage is recreational, fertilization is essential: Profitability in a 44-year field trial. *In preparation 2014*.

**Cook, R.L.**, Mendes, J.C.T., Binkley, D., Stape, J.L. 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.

**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*.

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

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

**Cook, R.L.** and D. Hesterberg. 2013. Comparison of Trees and Grasses for Rhizoremediation of Petroleum Hydrocarbons. *International Journal of Phytoremediation*. 15: 844-860

**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

Burgwyn, B., **Cook, R. L.**, and Bolla, R. I. 2003 *Heterodera glycines*: Density Based Gradient Separation of Eggs. *Experimental Parasitology*. 105 (3-4): 179

### **Invited Presentations**

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 participants)

Late Nitrogen Management in Corn Production in Southern Illinois. Illinois Fertilizer and Chemical Association, Peoria, IL. Jan 20, 2015 (300 participants)

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 participants)

Tillage x Fertility: How do 44 years of climate stress affect yields. Belleville Research Center Field Day, Belleville, IL, July, 2014. (230 in attendance)

Nitrogen Management in Southern Illinois, Southern Illinois Fertilizer and Pesticide Association 36<sup>th</sup> Annual Conference, Mt. Vernon, IL, Nov 26, 2013 (167 in attendance)

Soil Fertility in Southern Illinois, Illinois Soil Testing Association, Peoria, IL, Aug 13, 2013 (20 in attendance)

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)

40 Years in the Making: Long-term Tillage and Fertility Experiment. Belleville Research Center Field Day, Belleville, IL, July 2013

### **Oral Presentations**

**Cook, R.L.** and A.Trlica *Tillage and Fertility Effects on Corn and Soybean Yield in a 44-Year Trial in Southern Illinois*. Soil Science Society of America, November 2-5, 2014.

Trlica, A.L. 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, November 2-5, 2014.

Sweet, Audrey, 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 Oregon. November 4-7, 2013.

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 Oregon. November 4-7, 2013.

**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.

**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.

**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.

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.

**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.

**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.

**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.

**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.

**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.

## **Poster Presentations**

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.

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.

**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.

**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.

**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.

**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**

SIU College of Agricultural Sciences Outstanding Team Award (2014)

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)

## Grants and External Funding

Title	Submitted/ Funded	Agency	Amount Funded
Agronomic and Environmental Assessment of Cover Crops in Illinois	Jan 2013/ Aug 1 2013	Nutrient Research and Education Council (NREC)	\$200,000 (over 5 yrs)
Impact of Novel and Traditional Soil Management Systems on Vine Balance, Water Status, Wine Quality, and Soil Health	April 2013/ Jan 1 2014	IL Dept of Ag/ USDA Specialty Crop Grant	\$54,604 (over 2 yrs)
Sustainable Cover Crop Management in Corn/Soybean Systems	Sept 2013/ Mar 2015	Agronomic Science Foundation	\$40,000 (2 yrs)
Meta-analysis of Enhanced Efficiency Fertilizers in Corn Systems in the Midwest	Dec 2013/ Mar 2014	International Plant Nutrition Institute	\$30,500 (6 months)
Late Application Nitrogen Management in Corn Systems to Optimize Yields and Reduce Nutrient Losses in Southern IL	Nov 2013/ May 2014	NREC	\$174,213 (over 3 yrs)
N-Rate and Hybrid interactions in Corn/Soybean Systems	March 2014	Pioneer	\$30,000 (over 3 yrs)
Soil Mapping and the Effectiveness of Nitrogen Stabilizers	Jan 2015	BASF	\$199,986 (over 2 yrs)
Nitrate Leaching in Cover Crops and Corn/Soybean Systems in Southern Illinois	Jan 2015	NREC	\$184,253 (over 2 yrs)
<b>Total</b>			<b>\$913,556</b>