

# Steven E. McKeand

Professor of Forestry & Environmental Resources  
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## PROFESSIONAL EXPERIENCE:

2005-Present	Director, Cooperative Tree Improvement Program, Department of Forestry & Environmental Resources, North Carolina State University, Raleigh, NC
1983-Present	Assistant Professor ('83), Associate Professor ('89), Professor ('94) of Forestry, Cooperative Tree Improvement Program, Department of Forestry, North Carolina State University, Raleigh, NC
2000-2003	Director of Graduate Programs, Department of Forestry, North Carolina State University, Raleigh, NC
1980-1983	Research Assistant and Tree Improvement Specialist, Tissue Culture Program, Department of Forestry, North Carolina State University, Raleigh, NC

## EDUCATION:

1983 - Ph.D.	North Carolina State University (Forest Genetics)
1978 - M.S.	Purdue University (Forest Genetics)
1976 - B.S.	Purdue University (Forest Production)

## RESEARCH, TEACHING, AND EXTENSION:

My research in forest genetics has primarily been in support of the breeding program of the Tree Improvement Cooperative at N.C. State University, with primary responsibility in the breeding, testing, and selection phases of the program. Specific research interests include: genetic effects on nutritional and ecophysiological processes in forest trees, genetic and environmental control of wood properties, biotechnology/breeding interface, propagation effects on forest trees, seed orchard management, and genotype by environment interactions.

Graduate education has been the focus of most of my teaching career. I have taught Forestry 725 (formerly FOR 611), Forest Genetics since 1986. More recently I have begun teach the undergraduate course in Tree Improvement (FOR 411). I chair the committees of 5 PhD and 1 Masters graduate students.

My extension and outreach activities are mainly with the operational breeding program of the Tree Improvement Cooperative. I travel throughout the southern U.S. working with foresters and breeders helping them develop efficient breeding and testing programs and deployment strategies to maximize gains from the breeding programs.

Working with foresters and landowners, I convey the value of intensive pine plantation management and tree improvement so that the full value of the investment in regeneration can be realized.

## **AWARDS, PROFESSIONAL ORGANIZATIONS, and LICENSES:**

- 2006 Recipient of NC State University Award for Service to Environment and Society
- Society of American Foresters
- Sigma Xi
- Registered Forester (No. 1246) in North Carolina
- Certified Pesticide Operator (No. 2647) in North Carolina
- Society of American Foresters' Certified Forester (No 1650)
- Board Member of the North Carolina Board of Registration for Foresters

## **RECENT (last 5 years) SELECTED PUBLICATIONS (137 total, 75 refereed since 1980):**

McKeand, S.E., B. Li, J.E. Grissom, F. Isik, and K.J.S. Jayawickrama. 2007. Genetic parameter estimates for growth traits from diallel tests of loblolly pine throughout the southeastern United States. *Silvae Genetica* (in press).

Sherrill, J.R., T.J. Mullin, B.P. Bullock, S.E. McKeand, R.C. Purnell, M.L. Gumpertz, and F. Isik. 2007. An evaluation of selection for volume growth in loblolly pine. *Silvae Genetica* (in press).

Alizoti, P., B. Li, and S.E. McKeand. 2006. Early evaluation of intra- and inter-provenance hybrids of loblolly pine for planting in Piedmont regions of the southern US. *For. Sci* 52:557-567.

Emerson, J.L., L.J. Frampton, and S.E. McKeand. 2006. Genetic variation of spring frost damage in three-year-old Fraser fir Christmas tree plantations. *HortScience* 41:1531-1536.

McKeand, S.E., R.C. Abt, H.L. Allen, B. Li, and G.P. Catts. 2006. What are the best loblolly pine genotypes worth to landowners? *J. For.* 104:352-358.

McKeand, S.E., E.J. Jokela, D.A. Huber, T.D. Byram, H. Lee Allen, B. Li, T.J. Mullin. 2006. Performance of improved genotypes of loblolly pine across different soils, climates, and silvicultural inputs. *For. Ecol. and Manag.* 227:178-184.

Yu, Q., B. Li, C.D. Nelson, S.E. McKeand, V.B. Batista, and T.J. Mullin. 2006. Association of the cad-n1 allele with increased stem growth and wood density in full-sib families of loblolly pine. *Tree Genetics & Genomes* 2:98-108.

Bridgwater, F., T. Kubisiak, T. Byram, S. McKeand. 2005. Risk management with current deployment strategies for genetically improved loblolly and slash pines. *South. J. Appl. For.* 29(2):80-87.

Emerson, J.L., L.J. Frampton, and S.E. McKeand. 2005. Genetic variation in young Fraser fir progeny tests. P. 115-117. In: Proc. 27th South. For. Tree Impr. Conf., Raleigh, NC.

Isik, F., B. Goldfarb, A. LeBude, B. Li and S. McKeand. 2005. Predicted genetic gains and testing efficiency from two loblolly pine clonal trials. *Can. J. For. Res.* 35:1754-1766.

Li, B. and S.E. McKeand. 2005. Forest genetics and tree breeding in the age of genomics – IUFRO Conference. *Forest Genetics* 12(2):141-143.

- Lambeth, C., S. McKeand, R. Rousseau and R. Schmidting. 2005. Planting nonlocal seed sources of loblolly pine – managing benefits and risks. *South. J. Appl. For.* 29(2):96-104.
- Martin, T.A, P.M Dougherty, P.M., M.A. Topa, and S.E. McKeand. 2005. Strategies and case studies for incorporating ecophysiology into southern pine tree improvement programs. *South. J. Appl. For.* 29(2):70-79.
- McKeand, S.E. and H. L. Allen. 2005. Summary of IEG-40 Meeting: silviculture and genetic impacts on productivity of southern pine forests. *South. J. Appl. For.* 29(2):61.
- Sherrill, J.R., T.J. Mullin, B.P. Bullock, S.E. McKeand, R.C. Purnell, and M.L. Gumpertz. 2005. Total inside-bark volume estimation for loblolly pine (*Pinus taeda* L.) in genetic trials. P. 123- 125. In: *Proc. 27th South. For. Tree Impr. Conf.*, Raleigh, NC.
- Smith, B.C., B.P. Bullock, and S.E. McKeand. 2005. Comparing parameter estimation techniques for diameter distributions of loblolly pine. P. 104-106. In: *Proc. 27th South. For. Tree Impr. Conf.*, Raleigh, NC.
- Yu, Q., S.E. McKeand, C.D. Nelson, B. Li, J.R. Sherrill and T.J. Mullin. 2005. Differences in wood density and growth of fertilized and non-fertilized loblolly pine associated with a mutant gene, *cad-n1*. *Can. J. For. Res.* 35:1723-1730.
- McKeand, S.E. and H. L. Allen. 2004. Silviculture and genetic impacts on productivity of loblolly pine in the southern United States. Invited paper. P. 373-374. In: Li, B. and S. McKeand, eds. *Forest Genetics and Tree Breeding in the Age of Genomics: Progress and Future*, IUFRO Joint Conference of Division 2, Conference Proceedings. 2004. Available online at:  
[http://www.ncsu.edu/feop/iufro\\_genetics2004/proceedings.pdf](http://www.ncsu.edu/feop/iufro_genetics2004/proceedings.pdf).
- McKeand, S.E., J.E. Grissom, H.L. Allen, and B.P. Bullock. 2004. Ten-year response of diverse families of loblolly pine to fertilization. P. 453-455. In: Li, B. and S. McKeand, eds. *Forest Genetics and Tree Breeding in the Age of Genomics: Progress and Future*, IUFRO Joint Conference of Division 2, Conference Proceedings. 2004. Available online at:  
[http://www.ncsu.edu/feop/iufro\\_genetics2004/proceedings.pdf](http://www.ncsu.edu/feop/iufro_genetics2004/proceedings.pdf).
- Kegley, A.J., S.E. McKeand, and B. Li. 2004. Seedling evaluation of Atlantic Coastal and Piedmont sources of loblolly pine and their hybrids for height growth. *South. J. Appl. For.* 28(2): 83-90.
- Schmidting, R.C., T.L. Robison, S.E. McKeand, R.J. Rousseau, H.L. Allen, and B. Goldfarb. 2004. The role of genetics and tree improvement in southern forest productivity. Chapter 10, P.97-108. In: Rauscher, H.M. and K. Johnsen, eds. *Southern Forest Science: Past, Present, Future*. Gen. Tech. Rep. SRS-75. Asheville, NC. US Dept. Agr., Forest Service. Southern Research Station. 394p.
- Whetten, R.W., Z. Li, and S. E. McKeand. 2004. Microarray Analysis of Gene Expression in OP Pine Families in Field Plantings. P. 257-269. In: Li, B. and S. McKeand, eds. *Forest Genetics and Tree Breeding in the Age of Genomics: Progress and Future*, IUFRO Joint Conference of Division 2, Conference Proceedings. 2004. Available online at:  
[http://www.ncsu.edu/feop/iufro\\_genetics2004/proceedings.pdf](http://www.ncsu.edu/feop/iufro_genetics2004/proceedings.pdf).
- Wu, R, J.E. Grissom, S.E. McKeand, and D.M. O'Malley. 2004. Phenotypic plasticity of fine roots increases plant productivity in pine seedlings. *BMC Ecology* 4:14.
- Yu, Q., Capanema, E., Batista, V.B., Josserand, S., Johnson, G., Nelson, C.D., McKeand, S.E., MacKay, J.J., Kadla, J.F., Li, B., Jameel, H., Chang, H.-M., and Mullin, T.J. 2004. Tracking down the effects of a rare mutant gene in loblolly pine – a first report. In: "2004 Paper Summit, Spring Technical and International Environmental Conference, May 3-5, 2004, Atlanta, GA, USA", CD-ROM published by TAPPI, Norcross, GA

- Byram, T.D., A.C. Mangini, and S.E. McKeand. 2003. Cone and seed insect pest research: the role of the southwide studies. P. 116-125. In: Proc. 27th South. For. Tree Impr. Conf., Stillwater, OK.
- McKeand, S.E., H.V. Amerson, B. Li, and T.J. Mullin. 2003. Families of loblolly pine that are most stable for resistance to fusiform rust are the least predictable. *Can. J. For. Res.* 33:1335-1339.
- McKeand, S.E., J.E. Grissom, R. Rubilar, and H.L. Allen. 2003. Responsiveness of diverse families of loblolly pine to fertilization: eight-year results from SETRES-2. P. 30-33. In: Proc. 27th South. For. Tree Impr. Conf., Stillwater, OK.
- McKeand, S., T. Mullin, T. Byram, T. White. 2003. Deployment of genetically improved loblolly and slash pine in the South. *J. For.* 101(3): 32-37
- McKeand, S.E., T.J. Mullin, B. Li. 2003. Genetic diversity in intensively managed loblolly pine plantations. Invited Paper for Society of American Foresters National Convention. Buffalo, NY (In press).
- Rubilar, R., S.E. McKeand, and H.L. Allen. 2003. Dominance and stand structure analysis in a GxE interaction trial. P. 34-37. In: Proc. 27th South. For. Tree Impr. Conf., Stillwater, OK.
- Roberds, J.H., B.L. Strom, F.P. Hain, D.P. Gwaze, S.E. McKeand, L.H. Lott. 2003. Estimates of genetic parameters for oleoresin and growth traits in juvenile loblolly pine. *Can. J. For. Res.* 33: 2469-2476.
- Sierra Lucero, V., D.A. Huber, S.E. McKeand, T.L. White, and D.L. Rockwood, D.L. 2003. Genotype by environment interaction and deployment considerations for families from Florida provenances of loblolly pine. *Forest Genetics* 10(2):85-92.
- Xiang, B., B. Li, and S.E. McKeand. 2003. Genetic gain and selection efficiency of loblolly pine in three geographic regions. *For. Sci.* 49:196-208.
- Dimmel, D.R., J.J. MacKay, C.E. Courchene, J.F. Kadla, J.T. Scott, D.M. O'Malley, and S.E. McKeand. 2002. Pulping and bleaching of partially cad-deficient wood. *J. Wood Chem. and Tech.* 22:235-248.
- Sierra-Lucero, V., S.E. McKeand, D.A. Huber, D.L. Rockwood, and T.L. White. 2002. Performance differences and genetic parameters for four coastal provenances of loblolly pine in the southeastern United States. *For. Sci.* 48:732-742.
- Lai, C.T., G.G. Katul, J. Butnor, M. Siqueira, D. Ellsworth, C. Maier, K. Johnsen, S. McKeand, and R. Oren. 2002. Modeling the limits on the response of net carbon exchange to fertilization in a southeastern pine forest. *Plant, Cell, and Environment* 25:1095-1119.