

Annual Report for Period:07/2011 - 06/2012

Submitted on: 05/04/2012

Principal Investigator: Yanai, Ruth D.

Award ID: 0949324

Organization: SUNY Col Env Sci&Forestry

Submitted By:

Yanai, Ruth - Principal Investigator

Title:

Collaborative Research: Nutrient co-limitation in young and mature northern hardwood forests

Project Participants

Senior Personnel

Name: Yanai, Ruth

Worked for more than 160 Hours: No

Contribution to Project:

Dr. Yanai coordinates the project, oversees study design, staff and students, and coordinates communication among collaborators.

Name: Garrison-Johnston, Mariann

Worked for more than 160 Hours: No

Contribution to Project:

Dr. Johnston has been responsible for fertilization calculations and applications.

Post-doc

Graduate Student

Name: Bae, Kikang

Worked for more than 160 Hours: Yes

Contribution to Project:

student in the Department of Forest and Natural Resources at SUNY ESF. She is measuring soil respiration and estimating total belowground carbon allocation as a function of nutrient availability. She is paid from our project but is also reported on the collaborative project from Cornell because Tim Fahey is advising her.

Name: Pitel, Nicholas

Worked for more than 160 Hours: No

Contribution to Project:

Master's student in Department of Forest and Natural Resources at SUNY ESF. Nick collected green foliage samples.

Name: Vadeboncoeur, Matthew

Worked for more than 160 Hours: No

Contribution to Project:

Matt is one of the leaders of the summer field crew. He has long experience with our sites, having supervised field crews under the earlier Ca project.

Name: See, Craig

Worked for more than 160 Hours: Yes

Contribution to Project:

Craig is a new MS student at SUNY ESF. He is on the management team for the summer field crew. For his research project, his is analyzing nutrient resorption in senescing leaves.

Name: Engelman, Heather

Worked for more than 160 Hours: Yes

Contribution to Project:

PhD student in the Department of Forest and Natural Resources at SUNY ESF. She provides administrative support for the project, including maintenance of www.esf.edu/melnhe

Undergraduate Student**Name:** Murphy, Elizabeth**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Elizabeth processed samples during the academic year. She did an independent study project on vector analysis of nutrient response to fertilization in sugar maple and American beech.

Name: Liu, Lin**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Lin is an exchange student from Sichuan University completing her junior year at SUNY ESF. She has been contributing to the summer field crew through independent study projects investigating root biomass at depth and developing better predictions of height-diameter relationships in trees.

Name: Lim, Zhen**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Amos is a junior at ESF, in the Biology department. He is contributing to the summer field crew through an independent study project study of cellulose and lignin decomposition.

Name: Smeltzer, Neal**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Neal is a student at Colorado College. He has been contributing to the summer field crew effort through a project measuring sap flow in sugar maple and yellow birch, supervised by Heidi Asbjornsen at University of New Hampshire.

Name: Anos, Stephanie**Worked for more than 160 Hours:** No**Contribution to Project:**

Stephanie has been preparing samples for analysis and sorting foliage and roots for the research component of her 'Environmental Scholars' program at ESF.

Technician, Programmer**Name:** Blodgett, Corrie**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Corrie is a Research Support Specialist at SUNY-ESF. She is one of the leaders of the summer field crew. She is a veteran of our earlier Bartlett project.

Name: O'Neill, William**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Bill is a Research Analyst at SUNY-ESF. He has prepared many samples for analysis, and trained the graduate and undergraduate students to do the same.

Other Participant**Research Experience for Undergraduates****Name:** Nywening, Kelly**Worked for more than 160 Hours:** No**Contribution to Project:**

Kelly has been contributing to the summer field crew effort through a project comparing productivity measured by DBH remeasurements versus increment cores, in softwood and hardwood stands at two sites.

Years of schooling completed: Junior
Home Institution: Same as Research Site
Home Institution if Other:
Home Institution Highest Degree Granted(in fields supported by NSF): Doctoral Degree
Fiscal year(s) REU Participant supported: 2011
REU Funding: No Info

Organizational Partners

Miami University Oxford Campus

Cornell University

University of Michigan Ann Arbor

Marine Biological Laboratory

Hubbard Brook Research Foundation

USDA Forest Service - Northeastern Forest Experiment Station

Other Collaborators or Contacts

Mark Green, Plymouth State University, Heidi Asbjornsen and Virginia Hernandez, University of New Hampshire, and Tom Horton, SUNY ESF are also using these sites.

Activities and Findings

Research and Education Activities:

This year was the first year of nutrient additions. We continue to monitor soil respiration and root growth. We are still processing pre-treatment samples for root biomass and litterfall. We completed forest inventory for use in detecting post-treatment responses.

Findings: (See PDF version submitted by PI at the end of the report)

See attached file.

Training and Development:

Training and development continue to rely on active interactions among PIs and senior scientists, science teachers, post-docs, graduate students, undergraduates and technicians. We use weekly conference calls to involve PIs when they are off site, and frequent email on specific topics. We have weekly Science Nights with visiting speakers, alternating between the dormitories at Bartlett and Hubbard Brook. Each undergraduate and graduate student has a mentor or a committee of mentors, who review proposals and consult on implementation of projects. Most of our students, including the summer crew, will present talks at the annual HBES Cooperators' Meeting. They will also present their final reports at a symposium in August, shared with REU students from Hubbard Brook.

Outreach Activities:

Undergraduate Research Program: Several undergraduate students are contributing to the project for college credit (e.g., independent study) coordinated by collaborators. Each student has primary responsibility for some part of the overall project, and assists in other projects for mutual benefit. Students interact regularly with REU students and RET participants affiliated with other Hubbard Brook Experimental Forest programs.

Journal Publications

Fisk, MC; Yanai, RD; Fierer, N, "A molecular approach to quantify root community composition in a northern hardwood forest - testing effects of root species, relative abundance, and diameter", *CANADIAN JOURNAL OF FOREST RESEARCH-REVUE CANADIENNE DE RECHERCHE FORESTIERE*, p. 836, vol. 40, (2010). Published, 10.1139/X10-02

Lucash, M.S., R.D. Yanai, J.D. Blum and B.B. Park., "Foliar nutrient concentrations related to soil sources across a range of sites in the northeastern USA.", *Soil Sci. Soc. Am. J.*, p. 674, vol. 76, (2012). Published,

Fatemi, F. R., R. D. Yanai, S. P. Hamburg, M. A. Vadeboncoeur, M. A. Arthur, R. D. Briggs, C. R. Levine., "Allometric equations for young northern hardwoods: the importance of age-specific equations for estimating aboveground biomass", *Canadian Journal of Forest Research*, p. 881, vol. , (2011). Published, 10.1139/x10-248

Hamburg, S.P, R.D. Yanai, M.A. Vadeboncoeur, M.A. Arthur, C. Driscoll, C.B. Fuss, T.G. Siccama and P.M. Grofman, "From missing source to missing sink: long-term nitrogen dynamics in the northern hardwood forest", *Proc. Nat. Ac. Sci.*, p. , vol. , (2012). Submitted,

Yanai, R.D., C.R. Levine, M.B. Green, J.L. Campbell., "Uncertainty Budgets have no Error: A progress report on Quantifying uncertainty in forest ecosystem studies", *J. For.*, p. , vol. , (2012). In revision,

Levine, C.R., R.D. Yanai, M.A. Vadeboncoeur, S. Hamburg, A. Melvin, C. Goodale, B. Rau, and D. Johnson., "Assessing the suitability of using rotary corers for sampling cations in rocky soils.", *Soil Science Society of America Journal.*, p. , vol. , (2012). In revision,

Yanai, R.D., M.A. Arthur, M. Acker, C.R. Levine and B.B. Park., "Variation in mass and nutrient concentration of leaf litter across years and sites in a northern hardwood forest", *Canadian Journal of Forest Research*, p. , vol. , (2012). In revision,

Blum, J.D., S.P. Hamburg, R.D. Yanai, M.A. Arthur., "Determination of foliar Ca/Sr discrimination factors for six tree species in northern hardwood forests, New Hampshire, USA.", *Plant Soil*, p. , vol. , (2012). In press, Online First., Doi: 10.1007/s11104-011-1122-2

Books or Other One-time Publications

Yanai, R.D., E.B. Rastetter, M.C. Fisk, T.J. Fahey, F.R. Fatemi, and S.P. Hamburg., "Nutrient co-limitation in aggrading northern hardwood forests", (2010). Conference Proceeding, Published
Bibliography: ECANUSA meeting, October 14-16, 2010, Edmundston, NB, Canada.
<http://crsf.umaine.edu/files/2010/10/ProgFECANUSA.pdf>

Yanai, R.D. E.B. Rastetter, M.C. Fisk, T.J. Fahey, R.Q. Thomas and M.A. Vadeboncoeur., "Multi-Element Limitation: Simulation and Measurements Suggest that P is More Limiting than N in Young Northern Hardwood Ecosystems.", (2011). conference proceeding, Published
Bibliography: Austin, TX-Ecological Society of America Annual Meeting, August 7-12, 2011.

Bae, K., R.D. Yanai, T.J. Fahey, and M.C. Fisk., "Fine root biomass and soil respiration reflect belowground carbon allocation in response to nutrient limitation in New Hampshire northern hardwoods.", (2011). conference proceeding, Published
Bibliography: San Austin, TX-Ecological Society of America Annual Meeting, August 7-12, 2011.

Yanai, R.D., M.A. Vadeboncoeur, S. Hamburg, C.D. Canham, and J.D. Blum., "Will Biomass Harvesting of Northern Hardwood Forests Lead to Nutrient Depletion In the Northeastern US?", (2011). conference proceeding/recording, Published
Bibliography: San Antonio, TX ? Symposium--Bioenergy and Soil Sustainability: Forest, Range and Wildlands: I Agronomy Society of America Annual Meeting, October 16-19, 2011. <http://a-c-s.confex>

See, C.R., R.D. Yanai, and B.A. Quintero., "Nitrogen and phosphorus resorption efficiency ratios vary with stand age in northern hardwood forests.", (). conference proceeding, 2011
Bibliography: Rochester, NY?Rochester Academy of Science Meeting, October 29, 2011.

Diggs, F., R. Yanai, and T. Horton, "Mycorrhizae distributions by depth in northern hardwood ecosystems.", (2011). conference proceeding, Published

Bibliography: Rochester, NY?Rochester Academy of Science Meeting, October 29, 2011.

Bae, K., R.D. Yanai, T.J. Fahey, and M.C. Fisk., "Fine root biomass and soil respiration reflect belowground carbon allocation in response to nutrient limitation in New Hampshire northern hardwoods.", (2012). conference proceeding, Published

Bibliography: East Syracuse, NY ?New York Society of American Foresters Winter Meeting, January 26, 2012.

See, C.R., R.D. Yanai, and B.A. Quintero, "Nitrogen and phosphorus resorption efficiency ratios vary with stand age in northern hardwood forests.", (2012). conference proceeding, Published

Bibliography: East Syracuse, NY ?New York Society of American Foresters Winter Meeting, January 26, 2012

Diggs, F., R. Yanai, and T. Horton, "Mycorrhizae distributions by depth in northern hardwood ecosystems.", (2012). conference proceeding, Published

Bibliography: East Syracuse, NY?New York Society of American Foresters Winter Meeting, January 26, 2012.

Web/Internet Site

URL(s):

<http://www.esf.edu/MELNHE>

Description:

The MELNHE website provides public information and a location for breaking news and links to published materials, and useful crew links (weather, road, hunting season notices and a web cam that helps monitor leaf-out). The Shoestring Project blog (<http://shoestringproject.wordpress.com>) keeps cooperators, and the general public in the know. Our site also has a password-protected area for data, documents, contact information, and meeting minutes, viewable only by cooperators.

Other Specific Products

Product Type:

Physical collection (samples, etc.)

Product Description:

Many samples with long-term value are archived at SUNY-ESF and tracked through a system developed by the Soil Fertility Laboratory. Samples in active use are at many locations. Archived and active samples are tracked on an internal lab web site.

Sharing Information:

Sample data is shared among cooperators via <http://www.esf.edu/MELNHE>.

Contributions

Contributions within Discipline:

See Journal publications, above.

Contributions to Other Disciplines:

Nothing to add yet.

Contributions to Human Resource Development:

See Training and Development, above.

Contributions to Resources for Research and Education:

The identification, study, and treatment of replicate plots at three different sites and two or three stand ages at each site represents a huge investment in research infrastructure. We have a mailing list of 50 researchers interested in working at our sites. We invite participation from any potential collaborators with the ideas and the motivation to join us, and the team continues to grow.

Contributions Beyond Science and Engineering:

Nothing to add yet.

Conference Proceedings

Special Requirements

Special reporting requirements: None

Change in Objectives or Scope: None

Animal, Human Subjects, Biohazards: None

Categories for which nothing is reported:

Any Conference

Findings:

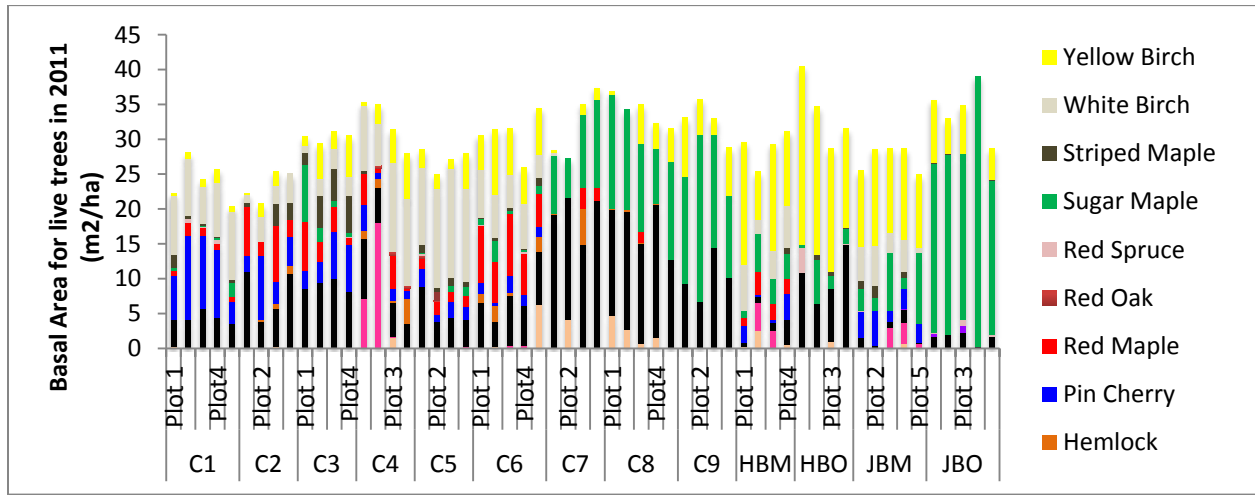


Figure 1. Basal area by species of trees > 2 cm dbh in all our study stands.