Supplement

COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

PROGRAM ANNOUNCEMENT/SOLICITATION NO./CLOSING DATE/if not in response to a program announcement/solicitation enter NSF 03-2

FOR NSF USE ONLY

NSF PROPOSAL NUMBER

0331882

FOR CONSIDERATION BY NSF ORGANIZATION UNIT(S) (Indicate the most specific unit known, i.e. program, division, etc.)

DEB - Ecosystem Studies

DATE RECEIVED	NUMBER OF COPIES	DIVISION ASSIGNED	FUND CODE	DUNS# (Data Universal Numbering System)	FILE LOCATION
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EMPLOYER IDENTIFICATION NUMBER (EIN) OR TAXPAYER IDENTIFICATION NUMBER (TIN)

SHOW PREVIOUS AWARD NO. IF THIS IS
☐ A RENEWAL
☐ AN ACCOMPLISHMENT-BASED RENEWAL

0235650

IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? YES ☐ NO ☐ IF YES, LIST ACRONYM(S)

NAME OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE

SUNY College of Environmental Science and Forestry

AWARDEE ORGANIZATION CODE (IF KNOWN)

0028514000

ADDRESS OF AWARDEE ORGANIZATION, INCLUDING 9 DIGIT ZIP CODE

SUNY College of Environmental Science and Forestry
PO Box 9
Albany, NY. 122010009

NAME OF PERFORMING ORGANIZATION, IF DIFFERENT FROM ABOVE

PERFORMING ORGANIZATION CODE (IF KNOWN)

ADDRESS OF PERFORMING ORGANIZATION, IF DIFFERENT, INCLUDING 9 DIGIT ZIP CODE

IS AWARDEE ORGANIZATION (Check All That Apply) (See GPG II.C For Definitions)
☐ SMALL BUSINESS ☐ MINORITY BUSINESS
☐ FOR-PROFIT ORGANIZATION ☐ WOMAN-OWNED BUSINESS

☐ IF THIS IS A PRELIMINARY PROPOSAL THEN CHECK HERE

TITLE OF PROPOSED PROJECT **Biotic Control of Calcium Supply: Distinguishing Sources to Regrowing Forests**

REQUESTED AMOUNT	PROPOSED DURATION (1-60 MONTHS)	REQUESTED STARTING DATE	SHOW RELATED PRELIMINARY PROPOSAL NO. IF APPLICABLE
$ 6,000	0 months		

CHECK APPROPRIATE BOX(ES) IF THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW

☐ BEGINNING INVESTIGATOR (GPG I.A)
☐ DISCLOSURE OF LOBBYING ACTIVITIES (GPG II.C)
☐ PROPRIETARY & PRIVILEGED INFORMATION (GPG I.B, II.C.6)
☐ HISTORIC PLACES (GPG II.C.9)
☐ SMALL GRANT FOR EXPLOR. RESEARCH (SGER) (GPG II.C.11)
☐ VERTEBRATE ANIMALS (GPG II.C.11) IACUC App. Date _____
☐ HUMAN SUBJECTS (GPG II.C.11)
Exemption Subsection _____ or IRB App. Date _____
☐ INTERNATIONAL COOPERATIVE ACTIVITIES: COUNTRY/COUNTRIES INVOLVED (GPG II.C.9)
_____
☐ HIGH RESOLUTION GRAPHICS/OTHER GRAPHICS WHERE EXACT COLOR REPRESENTATION IS REQUIRED FOR PROPER INTERPRETATION (GPG I.E.1)

PI/PD DEPARTMENT

Forest and Natural Resources Management

PI/PD FAX NUMBER

315-470-6954

PI/PD POSTAL ADDRESS

1 Forestry Drive
210 Marshall Hall
Syracuse, NY 13210
United States

NAMES (TYPED)	High Degree	Yr of Degree	Telephone Number	Electronic Mail Address
PI/PD NAME **Ruth D Yanai**	**PhD**	**1990**	**315-470-6955**	**rdyanai@syr.edu**
CO-PI/PD				
CO-PI/PD				
CO-PI/PD				
CO-PI/PD				

SUMMARY OF PROPOSED WORK

This is a request for an REU Supplement to Award 235650 "Biotic control of calcium supply: distinguishing sources to regrowing forests."

Summary of Proposed Work

We propose to involve one additional undergraduate student in our research on sources of Ca to forests of different ages. The project is well suited to undergraduate participation because we will have a team of researchers (undergraduates, graduate students, post-doc, and professors) working together in a chronosquence composed of thirteen stands of different ages. There are many possible research questions that can be asked in this context, and the considerable information already collected or to be collected at these sites will provide the necessary background to interpreting new results.

There are clear opportunities for students to develop their own projects; several are immediately obvious to us, but students will be responsible for designing their own research objectives and implementation plans. A student could decide to replicate a study of microbial biomass undertaken in these stands almost ten years ago. This is an exciting prospect because the variation among the stands was high. Repeated sampling of a chronosequence controls for differences among stands other than age; we could learn whether young stands are indeed gaining microbial biomass and old stands losing microbial biomass, as suggested by the earlier study. Similarly, information on the forest floor is available from 10 and 25 years ago. A student could ask questions about the depth and horizonation of the forest floor, which have recently been reported to be changing in similar sites, or about changes in key chemical constituents, such as the decline in Pb concentrations after the end of leaded gasoline. A study of ephiphytes could ask whether the atmospheric contribution of Sr varies by stand age in response to changes in weathering rates. Questions about stand dynamics could be answered by studying changes in overstory composition over the past ten years, and these could be related to differences in soil properties across the chronosequence. Questions about the distribution of tree roots by depth could be added to our planned excavation of quantitative soil pits.

Without dictating the choice of student projects, we can anticipate some of the training benefits they will receive. They will be involved in additional field measurements to those of their own study, as the field teams visit the various sites in the chronsequence. The excavation of quantitative soil pits will give them first-hand experience with the physical properties of forest soils and their variation across the various sites in the project. They will also learn about the morphology and distribution of the tree roots of various species in soil horizons. They will become familiar with the trees of the northern hardwood forest and with the methods of forest inventory and sample collection. If a student is interested in laboratory or greenhouse experience, there are other projects ongoing that could make use of short-term help, just to provide exposure and a change of pace. Perhaps most importantly, the student will learn about research

planning, time management, project coordination, and the scientific method, though shared exploration and problem solving with the many other members of the team.

Project supervision and coordination

The student will benefit from close cooperation with four P.I.s from four institutions, a post-doc, graduate students from various programs, and half a dozen undergraduates, most of them undertaking honors theses. Students will be housed during the field season in a large group house near the Hubbard Brook Experimental Forest, where they will interact with established and developing scientists from many disciplines and institutions. They will also have the opportunity to visit other sites in the region, in Maine, the Adirondacks, and Pennsylvania.

Ruth Yanai has supervised twelve undergraduate students enrolled in various independent study projects over the years at SUNY-ESF, as well as having undergraduate students employed as research aides in the office, field, and lab. Steve Hamburg has supervised countless honors thesis projects at Brown University. The post-doc, Elizabeth Hane, has managed similar field crews in the same research area, and will be managing the cooperative housing experience as well. We hope that students will produce not only honors theses but peer-reviewed publications. Guidance in preparing results for publication is available in a seminar taught by Ruth Yanai: FOR 694 Publishing in Scientific Journals.

Broader Implications of the Proposed Study

Three of the five senior scientists conducting this project are women. It is important for male as well as female students to learn from women scientists, and we will consider both; the opportunities to work with female faculty at SUNY-ESF are few (less than 10% of the faculty are women), and both female and male students benefit from the different skills and perspectives that women provide. Yanai and Hane are active in the ESF Women's Caucus, which is available to undergraduate women as a source of support as they pursue scientific training in a male-dominated establishment.

Previous REU Supplement support

This is a new award, and this is the first request for an REU supplement. An earlier award, DEB-0087263, has supported two REUs in the last two years. In 2001, Dan McLean was supported on an REU supplement. He was extremely competent in the field, including dendrology and root excavation, and was a great help in reconnaissance. He learned new skills in the laboratory, and took the lead in setting up the system for scanning roots and analyzing their geometry.

In 2002, the REU supplement supported Sarah Kulpa's research for her Honors Thesis, which she completed in December. She analyzed samples and data from our previous

experiments on nutrient efflux from intact roots of mature trees, interpreted the results, designed her own experiment, and implemented it. She is currently enrolled in my graduate seminar preparing a manuscript for publication, and her paper is clearly one of the best in the class. Sarah is an extremely capable student, and I have continued to benefit from her skills as she is now working for me as a technician, before starting graduate school in the fall.

Participant selection

We will select a student based on academic and career interests, previous academic course work and field experience, and aptitude for research. We have contact with many potential students through our teaching and research projects; where we don't have first-hand knowledge of student ability and interest, we will interview their referees, rather than relying solely on written references. The Honors Program is a good source of students with exceptional preparation and motiviation.