

## THE MORTON ARBORETUM

### Job Description

**Job Title:** Research Intern

**Department:** Research

**Supervisors:** Research Assistant (Michelle Catania) and Urban Soil Scientist (Bryant Scharenbroch)

**Salary Classification:** Un-paid Volunteer

**Last Update of Job Description:** November 2010

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#### **General Summary**

The Research Intern provides technical support and assistance in the Morton Arboretum Soil Science (MASS) laboratory. The primary focus area of MASS lab relates to soils and biogeochemical cycling in urban ecosystems. Depending on the scope of the internships, Research Interns in the MASS laboratory may work on specific projects or may provide general field and laboratory assistance. The goal of the internship is to provide the student with hands-on ecological research experience. The intent is to tailor the experience to balance the student's wishes and our expectations.

MASS Research Interns are available throughout the calendar year. Open MASS Internships are listed below. Housing may be available on the Morton Arboretum grounds for MASS Research Interns. Those interested in a MASS Research Internship should contact Bryant Scharenbroch at 630-725-2071 or [bscharenbroch@mortonarb.org](mailto:bscharenbroch@mortonarb.org). General information pertaining to the MASS laboratory is available at [www.masslaboratory.org](http://www.masslaboratory.org).

#### **Principal Responsibilities for MASS Research Intern, Field Internship**

Learn and implement MASS field methods. MASS Interns will assist with research activities on experimental field plots at the Morton Arboretum, greenhouse projects, long-term data plots in urban, forest and prairie systems in the Chicagoland area. Examples of activities include: soil sampling and characterization, tree measurements, water sampling, and general plot maintenance.

#### **Principal Responsibilities for MASS Research Intern, Laboratory Internship**

Learn and implement MASS laboratory methods. Soil chemical analyses include: pH, electrical conductivity, exchangeable calcium, magnesium, potassium, sodium, cation exchange capacity, Bray and Olsen phosphorus, extractable inorganic and organic nitrogen, particulate and total soil carbon and nitrogen. Physical analyses include: texture, color, structure, density, moisture, tension, and aggregate stability. Biological assessments include: nitrogen and carbon mineralization, and characterizations of total microbial biomass, bacteria, fungi, protozoa, nematodes, and macro-fauna.

#### **Principal Responsibilities for MASS Research Intern, Arboriculture and Biochar**

Biochar, a waste product from the burning of biomass, has tremendous potential as a soil amendment for urban tree care. Urban soils are often deficient in carbon, available nutrients, and biological activity. Because biochar has a high affinity for nutrients and long persistence, it is a superior organic amendment for urban soil restoration. To date, no studies have examined biochar's impacts on urban trees and soil. The MASS laboratory and Bartlett Tree Research Laboratories have designed three experiments to take a comprehensive look at biochar for urban tree care. These projects will compare biochar to other nutrient amendments in a greenhouse setting with tree seedlings, a nursery setting with five-year-old trees, and an urban landscape setting with street trees 10 to 20 years old. The MASS Research Intern will provide field and laboratory assistance on these projects.

### **Principal Responsibilities for MASS Research Intern, Urban Soil Carbon Characterization**

The body of research on urban soil carbon storage is minimal. In the summer of 2010, the Morton Arboretum performed an intensive characterization of above-ground urban forest carbon storage using the USDA-FS, iTree protocol and model. Approximately 1000 field plots were sampled through the greater Chicago area. The MASS Research Intern will revisit a subset of these plots (c.a., 100) and collect soil samples 0 to 100 cm. Carbon and nitrogen pools will be determined using a Vario ELIII CN analyzer in the MASS laboratory. The MASS Intern will assist with data analysis and carbon budget computations.

### **Principal Responsibilities for MASS Research Intern, Soil Ecology in Restored Prairies**

Soil organic matter and microbes are key determinants of soil quality, and ultimately successful prairie restorations. The goals of this research are to develop a soil quality index for evaluation of prairie restoration efforts, and identify how soil properties and processes change across restored prairies in the Chicagoland region. To date we have sampled Schulenberg prairie at the Morton Arboretum, Chicago State prairie, and the Tefft Savanna. The MASS Research Intern will sample additional prairie restorations in the Chicagoland area. Fieldwork entails vegetation identification and collection, and soil sampling. The MASS Research Intern for this project must have prior experience in prairie plant identification.

### **Principal Responsibilities for MASS Research Intern, Green Infrastructure and Water Quality**

Green Infrastructure will be assessed for its effects on water quality on individual urban landscapes. Specifically, we will be assessing the impacts on water quality of sustainable organic turf and tree management compared to inorganically-based fertilizers. Monitoring plots will be used to measure nutrient fluxes in precipitation, throughfall, tree available water, deep soil leachate, and runoff. Nutrient concentrations in these water samples will be determined in the MASS laboratory. A water budget will be computed to determine the impact of treatments on nutrient loading. Soil characterizations and measurements of gaseous efflux of CO<sub>2</sub> and N<sub>2</sub>O will also be performed.

### **Qualifications for MASS Research Interns**

Previous training and experience: Prior work experience in laboratory and field conditions is not required. It is preferred that the student be working towards or possess a Bachelor's or graduate degree in the biological sciences. Equivalent combination of training, experience, and interest is acceptable. Preference will be given to individuals with background or interest in pedology, biogeochemistry, or soil ecology.

Physical and mental Requirements: Clear thought, visual acuity, and manual dexterity needed. Applicant must be able and willing to work with others in laboratory and field environments. Ability to use word processing and database software is useful. Good written and oral communication skills. Organizational and independent working skills required. A driver's license is also required.

Working Conditions: Position requires physical activity: lifting and carrying (up to 50 lbs.), bending, standing (several hours), sitting, walking (up to several miles in a day), balancing, kneeling, traveling by car or truck. Work is performed in a combined indoor (60%) and outdoor (40%) setting, and can be in extreme weather conditions (rain, cold temperatures). Use of chemicals may be necessary.

Equipment: General laboratory equipment (e.g., balances, pipettors, centrifuges, etc.), scientific instruments, (e.g., inductively coupled plasma mass spectroscopy, ion chromatography, automated dry combustion, potentiometric titration, etc.), field equipment (soil probes and augers), hand tools, computers, cameras, telephone, copy machine, pick-up, van, etc.