1. Transpiration drying and associated leaf physiology of common Appalachian hardwood species

Faculty: Dr. John R. Seiler

Project Site: Virginia Tech Department of Forest Resources and Environmental Conservation.

Project: Transpiration drying and associated leaf physiology of Appalachian hardwood species

Brief Description: Drying of wood is a significant cost in the manufacturing of wood pellets. The drying of felled trees with leaf canopies remaining intact is known as transpiration drying, and if significant, could reduce drying costs significantly. Forest trees are known to naturally lose large amounts of water through the process of transpiration but the extent this continues after felling remains unclear. This study will: 1) determine the amount of water, felled, Appalachian tree species can lose through the process transpiration drying; 2) the length of time significant transpiration drying will continue, 3) how long stomata remain open following felling of trees and 4) how long leaf liability continues by measuring chlorophyll fluorescence and leaf water potential. Trees of yellow-poplar, red maple, and various oak species (exact species will be determined at the start of the study) will be felled and immediately stomatal conductance (a measure of how open the stomata are) measured on a subsample of leaves in each canopy. Stomatal conductance, chlorophyll fluorescence and leaf water potential will be measured every day (initially) and then very other day until leaf death. Wood will be sampled for moisture content using an increment bore along the bole. The exact number of replicates and experimental design will be determined by the intern in consultation with their advisor. Field assistants will be available to fell the trees. Data collection will occur during the first 4 to 6 weeks of the internship. Following data collection, statistical analysis will be done with assistances from the advisor and a scientific poster developed for presentation at an undergraduate research symposium.

Background Required: Background in forestry, natural resources, and the desire to work outdoors as well as in a lab setting.

Additional Details:

- All students are expected to participate in person at Virginia Tech in Blacksburg, VA for the duration of the program (May 20 – July 26, 2024).
- The stipend for this summer research opportunity is $6,000.
- The program will include field trips to biomass/bioproducts/bioenergy partners and facilities in the region. Transportation will be provided for these activities.
- Housing is available for the 10-week period in the dorm at Virginia Tech if needed. The student will be responsible for housing costs.

Application: Submit your resume, a statement of interest (maximum of one page), college transcripts (unofficial is acceptable), and two reference letters for review to Dr. Scott Barrett, sbarrett@vt.edu
For full consideration, applications should be submitted by **December 8, 2023.**

Additional Information on the MASBio project can be found at www.MASBio.wvu.edu

2. Assessing Regional Biomass Operations and Supply Chains

Faculty: Dr. Michael Berry

Project Site: Virginia Tech Department of Forest Resources and Environmental Conservation

Project: Assessing Regional Biomass Operations and Supply Chains

Brief Description: This project will review the current state and trends of the biomass market and associated operational methods currently employed to procure this resource in the region. With this project we will also look to explore concepts of recoverability, business models and supply chain material and cash flows to better understand the existing conditions, sustainability and economic viability. The selected student will engage with background research, field visits and/or field studies to help complete this work.

Background Required: Background in forestry, natural resources, and the desire to work outdoors as well as in an office setting.

Additional Details:

- All students are expected to participate in person at Virginia Tech in Blacksburg, VA for the duration of the program (May 20 – July 26, 2024).
- The stipend for this summer research opportunity is $6,000.
- The program will include field trips to biomass/bioproducts/bioenergy partners and facilities in the region. Transportation will be provided for these activities.
- Housing is available for the 10-week period in the dorm at Virginia Tech if needed. The student will be responsible for housing costs.

Application: Submit your resume, a statement of interest (maximum of one page), college transcripts (unofficial is acceptable), and two reference letters for review to Dr. Scott Barrett, sbarrett@vt.edu
For full consideration, applications should be submitted by **December 8, 2023.**

Additional Information on the MASBio project can be found at www.MASBio.wvu.edu

3. Using Hemp-Lime for Carbon Sequestration

Faculty: Dr. Daniel P. Hindman

Project Site: Department of Sustainable Biomaterials, Virginia Tech, Blacksburg, VA.

Project: Using Hemp-Lime for Carbon Sequestration

Brief Description: Hemp has been recently approved for large-scale cultivation in Virginia. According to some estimates, the carbon sequestration of hemp is twice as effective as trees. Currently, hemp is used as hemp-lime, an insulation material with similar thermal resistance values to fiberglass batts. However, much of the hemp source for hemp-lime used in the United States is still sourced from other countries or states. The purpose of this project would be to understand the barriers to hemp-lime production in Virginia. Through industry connections, students will work with a regional hemp producer, understanding and observing their operations and processing methods. Processing challenges and quality control of hemp fiber sources for hemp-lime production will be evaluated. Finally, students will work to produce various hemp-lime samples in the laboratory and to evaluate the thermal properties associated with different product configurations and mixes. This project will develop recommendations to create better links between the agricultural production and construction materials markets.

Background Required: Background in sustainable biomaterials and an interest in working in a lab environment as well as working with hemp producers to better understand barriers.

Additional Details:

- All students are expected to participate in person at Virginia Tech in Blacksburg, VA for the duration of the program (May 20 – July 26, 2024).
- The stipend for this summer research opportunity is $6,000.
- The program will include field trips to biomass/bioproducts/bioenergy partners and facilities in the region. Transportation will be provided for these activities.
- Housing is available for the 10-week period in the dorm at Virginia Tech if needed. The student will be responsible for housing costs.

Application: Submit your resume, a statement of interest (maximum of one page), college transcripts (unofficial is acceptable), and two reference letters for review to Dr. Scott Barrett, sbarrett@vt.edu
For full consideration, applications should be submitted by **December 8, 2023.**

Additional Information on the MASBio project can be found at www.MASBio.wvu.edu

4. Sustainable Plastic Alternatives Derived from Biomass for Packaging Systems

Faculty: Dr. Young Teck Kim

Project Site: Packaging Systems and Designed housed in the Department of Sustainable Biomaterials, Virginia Tech, Blacksburg, Cheatham Hall

Project: Sustainable Plastic alternatives derived from biomass for packaging systems

Brief Description: This project is designed to develop sustainable alternative materials using a series of biomass to replace traditional plastics in packaging. This project relates to an existing USDA project which is focused on utilization of industrial hemp for sustainable packaging material developments such as biobased container or film. Upon request, there is also the possibility to learn more about other bioplastics such as home compostable or ocean biodegradable materials from 7 other on-going projects at Dr.Kim's lab, which are similar or connected to this proposed project. Furthermore, there will be continuous funding opportunities for undergraduate research at the following academic semester.

Background Required: Background in sustainable biomaterials, natural polymers and resources, basic chemistry and chemical reaction, and an interest and desire to learn advanced biomanufacturing processes and systems.

Additional Details:

- All students are expected to participate in person at Virginia Tech in Blacksburg, VA for the duration of the program (May 20 – July 26, 2024).
- The stipend for this summer research opportunity is $6,000.
- The program will include field trips to biomass/bioproducts/bioenergy partners and facilities in the region. Transportation will be provided for these activities.
- Housing is available for the 10-week period in the dorm at Virginia Tech if needed. The student will be responsible for housing costs.

Application:

Submit your resume, a statement of interest (maximum of one page), college transcripts (unofficial is acceptable), and two reference letters for review to Dr. Scott Barrett, sbarrett@vt.edu

For full consideration, applications should be submitted by **December 8, 2023.**

Additional Information on the MASBio project can be found at www.MASBio.wvu.edu

5. A modular bioprocess system for manufacturing consumer bioplastic products from food wastes

Faculty: Dr. Young Teck Kim

Project Site: Packaging Systems and Designed housed in the Department of Sustainable Biomaterials, Virginia Tech, Blacksburg, Cheatham Hall

Project: A modular bioprocess system for manufacturing consumer bioplastic products from food wastes

Brief Description: This project is designed to develop home-compostable and ocean biodegradable bioplastic packaging materials using food waste, which are capable of replacing traditional plastic packaging materials. This is a spin-off undergraduate research project from an on-going USDA project that started in Dec.2022 (https://news.vt.edu/articles/2023/01/cals-research-bioplastics-food-waste.html). Upon request, there will be high possibilities to learn more about other biopolymers or bioplastics, from 7 different on-going projects at Dr.Kim's lab. Those are similar or connected to this proposed project. Furthermore, there will be continuous funding opportunities for undergraduate research at the following academic semester.

Background Required: Background in sustainable biomaterials, natural polymers and resources, basic chemistry and chemical reaction, and an interest and desire to learn advanced biomanufacturing processes and systems.

Additional Details:

- All students are expected to participate in person at Virginia Tech in Blacksburg, VA for the duration of the program (May 20 – July 26, 2024).
- The stipend for this summer research opportunity is $6,000.
- The program will include field trips to biomass/bioproducts/bioenergy partners and facilities in the region. Transportation will be provided for these activities.
- Housing is available for the 10-week period in the dorm at Virginia Tech if needed. The student will be responsible for housing costs.

Application:

Submit your resume, a statement of interest (maximum of one page), college transcripts (unofficial is acceptable), and two reference letters for review to Dr. Scott Barrett, sbarrett@vt.edu

For full consideration, applications should be submitted by **December 8, 2023.**

Additional Information on the MASBio project can be found at www.MASBio.wvu.edu