

Master's Graduate Research Assistantship

Multi-Omics Approaches to Map Seed Coat Color Stability in Dry Beans

The [Dry Bean Breeding & Computational Biology](#) Lab at the University of Guelph is excited to announce Master graduate research assistantship positions in the field of plant genomics and epigenomics, with a focus on seed coat darkening in cranberry and pinto beans. This project presents a unique opportunity for highly motivated individuals to be part of a cutting-edge research effort aimed at unraveling the genetic, epigenetic, and molecular mechanisms behind darkening traits in cranberry beans, an issue of significant importance to both growers and the dry bean industry.

Department: Plant Agriculture,
Ontario Agricultural College
(OAC), University of Guelph

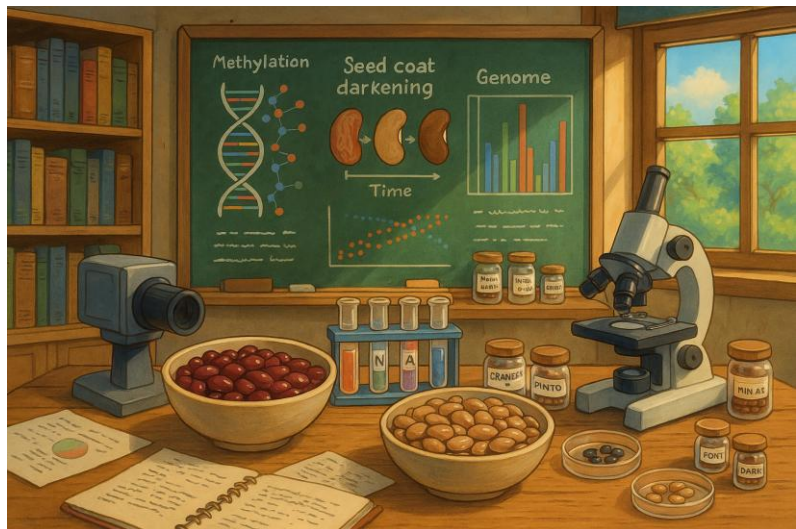
In collaboration with:
Department of Biological
Sciences, University of Toronto
Scarborough

Start Date: Fall 2025

Number of positions: 2

Position Overview:

Seed coat darkening is a critical quality concern for cranberry and pinto beans, significantly impacting market value, consumer acceptance, and storage life. While non-darkening and slow-darkening varieties exist, the complex genetic and epigenetic mechanisms driving gradual darkening are still not fully understood. This project will employ an integrated multi-omics approach, including genome sequencing, genome-wide association mapping, methylome (DNA methylation) profiling, and hyperspectral reflectance phenotyping, to uncover both the genetic loci and epigenetic modifications regulating seed coat color stability and darkening over time. The research will directly enhance breeding programs by identifying precise genetic and



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epigenetic markers for seed coat stability, paving the way to develop bean varieties with improved resistance to darkening and superior quality.

Key Responsibilities:

- Analyze genome and methylome sequencing data from a diverse panel of cranberry and pinto bean varieties with a broad range of darkening phenotypes.
- Conduct genome-wide association studies (GWAS) and epigenome-wide association studies (EWAS) to identify candidate genes and epigenetic modifications linked to seed coat darkening and stability.
- Utilize hyperspectral reflectance phenotyping to quantify and monitor seed coat color changes over time under controlled experimental conditions.
- Integrate genetic, epigenetic, and phenotypic data using advanced bioinformatics tools to uncover regulatory networks influencing seed coat color.
- Assist in the development, validation, and application of molecular and epigenetic markers for selection of stable, non-darkening bean varieties.
- Contribute to the design, implementation, and analysis of greenhouse and experiments related to seed coat darkening.
- Prepare research findings for publication, present results at scientific conferences, and participate in multidisciplinary team meetings.

Qualifications:

- Bachelor's degree in Genetics, Molecular Biology, Plant Science, Bioinformatics, Computational Biology, or a closely related field.
- Demonstrated interest or experience in genomics, epigenetics, or plant breeding, with familiarity in genome and/or methylome sequencing preferred.
- Experience with bioinformatics tools and statistical software for the analysis of high-throughput genetic and epigenetic data (e.g., GWAS, EWAS) is an asset.
- Knowledge of or interest in hyperspectral phenotyping and integration of multi-omics datasets.
- Strong analytical and problem-solving skills, with the ability to work independently and collaboratively in an interdisciplinary environment.
- Excellent written and oral communication skills, with a commitment to contributing to scholarly publications and scientific presentations

Application Process:

- Interested candidates should email the following documents to myoosefz@uoguelph.ca with the subject line "Epigenomics – YOUR NAME" or "Genomics – YOUR NAME" based on your preference:
- Cover letter (specify interest in “Multi-Omics Approaches to Map Seed Coat Color Stability in Dry Beans” and detail relevant experience and research interests)
- Curriculum vitae (CV)
- Contact details for three references

The University of Guelph acknowledges that we reside on the ancestral lands of the Attawandaron people and the treaty lands and territory of the Mississaugas of the Credit. We offer our respect to our Anishinaabe, Haudenosaunee, and Métis neighbors as we continue to strengthen our relationships.

The University of Guelph is committed to equity, diversity, and inclusion and strongly encourages applicants from underrepresented groups to apply. We look forward to welcoming an enthusiastic and dedicated candidate to join our research team and contribute to impactful advancements in dry bean breeding!