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| Project Title | Irrigation Management Strategies for Medicinal Cannabis in Controlled Environments |
| Position | Master of Science (MSc) |
| Institution | University of Guelph |
| Department | School of Environmental Science |
| Primary Advisor(s) | Dr. Michael Dixon/Dr. Thomas Graham |
| Term | 2 years/6 semesters |
| Start | Immediate |
| Stipend | Full stipend as per University of Guelph standards |

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| Project Description |
| The medicinal cannabis industry has seen a resurgence in research and technology development following changes to the law in Canada (April 2014) governing the production and distribution of this medicinal commodity. Acceptance of medical marijuana by the clinical community however, has not been overwhelmingly positive, due in part to lack of a consistent pharmaceutical grade test product. The clinical community needs to understand the product that is being delivered to the patient and they need it to be consistent over time (e.g., same production methods, inputs, consistent levels of secondary metabolites). As a result, emphasis is now being placed on high quality production practices that result in standardized products that conform to pharmaceutical standards. In order to avoid the variability in product quality in field and greenhouse production, it is necessary to rely on completely controlled environments (closed plant production chambers) to achieve medicinal consistency.  The University of Guelph’s industry partner, ABcann Medicinals, has installed highly sophisticated controlled environment growth chambers, with customized design elements provided by the University for precise control over temperature, humidity, light, carbon dioxide, nutrients and water. Irrigation is a critical variable in the controlled environment production of plants for food or medicine. There is considerable evidence linking irrigation management not only to healthy productivity of plants, but also attributes of quality related to secondary metabolites, which determine characteristics such as taste (in food crops) or quality and quantity of medicinal compounds (e.g., medicinally linked cannabinoids).  An array of *in-situ* stem psychrometers will be deployed for the real-time monitoring and control of cannabis water status in response to manipulation of various environment parameters. These data, combined with the data from a suite of plant monitoring systems deployed at the production site, will be used to develop irrigation management protocols that will maximize the production of target secondary plant metabolites, while maintaining the production consistency necessary to advance clinical trial verification of the phyto-medicinal properties of cannabis and its products. |

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| Student Responsibilities |
| The successful candidate will undertake a MSc program at the University of Guelph which will include:   * Required course work as directed by advisory committee (dependent upon previous education and experience) * Working with senior researchers to develop experiment designs, execution of experiments, data analysis, and publication of results * Complete all requirements of a MSc degree as outlined by the University of Guelph   The student will be working with controlled substances (medicinal cannabis) under very strict operating conditions **at the industry partner location in Napanee, ON**. The student will be expected to complete all necessary training both at the University of Guelph and at the production facilities in Napanee.  The nature of the project will require the student to split their time between the University of Guelph and the ABCann facilities in Napanee, ON. |

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| Qualifications (recommended) |
| The following qualifications are desired but not necessary require for the position. Required qualifications are indicated in brackets.   * Undergraduate degree in a plant related science (e.g., botany, plant biology, plant agriculture, etc.) (REQUIRED) * Minimum 70% (75% preferred) average in the final 2 years of a four year Honours degree or equivalent (REQUIRED) * Aptitude for electronics a/o programming; mechanical aptitude * Proficiency in Excel or equivalent * Valid drivers license |

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| Apply to | |
| Contact | **Theresa Rondeau Vuk**  **Program Manager, CESRF**  University of Guelph  School of Environmental Science, Bovey Building  Guelph, Ontario.  Canada  N1G 2W1  519.824.4120 x52909  [trondeau@uoguelph.ca](mailto:trondeau@uoguelph.ca?subject=OCE-ABCann%20MSc%20Application) |
| Pre-Screening Application Material | Please provide   * Short cover letter (1-page) * Transcripts (unofficial are suitable for initial application) * Statement of research interests (i.e., why do you want to undertake a MSc; what is professionally appealing about the current project) (1-2 pages max). *Note: the statement of research interest will also be used as a gauge of written communication proficiency.* |
| Formal Application to the University | Once the candidate has been screened and deemed an appropriate fit for the position, the student will be required, with assistance from advisors, to submit a formal application to the University of Guelph, including:   * Two academic reference letters (due upon formal submission of application to the University) * Proof of English proficiency (if English is not the candidates first language)   For further details, see: Masters Programs in the School of Environmental Science <https://www.uoguelph.ca/ses/programs/graduate-programs>  For a full break down of general requirements for a MSc at the University of Guelph please visit: <https://www.uoguelph.ca/graduatestudies/future/apply/requirements> |