LASER-INDUCED BREAKDOWN SPECTROSCOPY AND INFRARED SPECTROSCOPY FOR THE RAPID AND ACCURATE ANALYSIS OF THE COMPOSITION OF PLANTS. **Jinan Sabsabi¹**, Andressa Adame¹, Mohamad Sabsabi², Francois Vidal¹, Francis Vanier², Aissa Harhira² ¹Institut National de la Recherche Scientifique, Energy, Materials and Telecommunications Centre, 1650 Lionel-Boulet Blvd, Varennes, QC, Canada; ²National Research Council of Canada, 75 Mortagne Blvd, Boucherville, QC, Canada.

In agriculture, rapid and accurate nutrient analysis is critical to optimizing yields. Direct spectroscopy techniques not requiring sample preparation such as laser-induced breakdown spectroscopy (LIBS) or infrared spectroscopy (IR), with their its simplicity and effectiveness, offers an advantageous alternative to traditional methods that are labor-intensive, costly and require skilled personnel. In this work, we use IR and LIBS techniques to measure protein content and elemental composition of barley samples. Our long-term goal is to develop a user-friendly analyzer that can be used in the field by non-experts to measure relevant parameters in real time. Both methods can be performed with compact instruments and require only simple sample preparation. Initially, we focused on barley samples previously analyzed by conventional methods to calibrate our instruments. The complexity of the spectra obtained requires the use of multivariate mathematical methods (chemometrics) that allow the calibration of spectral measurements from extensive data across the spectra. The methods we have used include partial least squares (PLS) and artificial neural networks. This talk will focus on our experimental results, the implementation of the chosen chemometric methods, in particular the data preprocessing steps, and the promising results obtained and their comparison to those of traditional methods.