FAQ

1) First thing to do for beamtime at the CLS - Register as a CLS user and complete appropriate training

- Register as a user: https://cas.lightsource.ca/login?service=https%3A%2F%2Fuser-portal.lightsource.ca%2Fusers%2Flogin%2F%3Fnext%3D%252Fusers%252Fmy%252F
- Training details: https://www.lightsource.ca/training.html
- After registering they can come to CLS and get user badge. Upon doing this they will need to being a piece of government issued ID. This can also be completed after step 2.

2) Complete required training: https://training.lightsource.ca/ (All training is completed online)

- Radiological Worker Training (RWT)
- Workplace Hazardous Material Information System (WHMIS)
- Health Safety Orientation (HSO)
- CLS Laboratory Safety Training**

** CLS Laboratory Safety training will not auto populate as required in the training website. You will have to manually search for this training in the website.

There are three modes of access to acquire beamtime at CLS: general user access, purchased access, and strategic time.

General user access (GUP) – Twice a year there is a call for general user proposals. Anyone can apply for beamtime through this mechanism and beamtime is awarded based on scientific merit and feasibility. All information about applying for beamtime can be found here: https://www.lightsource.ca/call_for_proposals.html

Purchased access/rapid access – At any time you may apply for this type of beamtime and is fee for service. You can contact members of the Plant Imaging group for guidance on how to access the facility in this mode. Typically we can get you into the facility within a few weeks; however, depending on beamline subscription, this time may vary. Further questions may be directed towards Chithra.Karunakaran@lightsource.ca or Jarvis.Stobbs@lightsource.ca.

Strategic time – this time is reserved for first time users within a designated CLS strategic area. One of these strategic areas is agriculture, which includes everything from food science, plant physiology, seed quality, soil nutrient stewardship, among others. Questions about this type of access can be directed towards Chithra.Karunakaran@lightsource.ca or Jarvis.Stobbs@lightsource.ca.
Depending on what you hope to learn about your samples, there are a number of beamlines you can choose from. If you are wanting to learn which elements are in your samples or the distributions of elements in your sample, X-ray fluorescence spectroscopy (XRF) is the experiment you will likely want to perform. Beamlines well suited for these types of experiments are: SXRMB, VESPERS, CMCF-BM, and Bio-XAS. If you are wanting to gather structural CT scans that can be rendered in 3-D, BMIT would be a good choice for your experiments. If you would like to gather quantitative information about protein content in your samples, Mid-IR would be well-suited for your experiments.

Additional information about beamlines can be found at https://www.lightsource.ca/beamlines.html.
The Plant Imaging group at CLS is here to guide and assist new and existing researchers in the agriculture sector. We can assist in project feasibility, defining research goals, sample preparation, data collection, and analysis.
Depending on the technique and beamline, samples can be analyzed in a variety of forms. Typically, XRF samples are dried, ground, and pressed into pellets. In contrast, XRF or IR imaging techniques require samples to be thin sectioned while still wet. X-ray computed tomography (CT) samples can be imaged live and wet, or fixed and dried. For more information about specific sample preparation techniques, you can contact Chithra or Jarvis at Chithra.Karunakaran@lightsource.ca or Jarvis.Stobbs@lightsource.ca.

Technique	Sample Preperation
XRF Bulk Spectroscopy	Dried, ground, and pelletized
XRF Spectroscopy 2-D Imaging	Thin sectioned wet, typically 40 – 80 µm
XRF XANES/EXAFS	Both XRF bulk spectroscopy and imaging sample preparation techniques are both appropriate
Mid-IR Bulk Spectroscopy	Dried, ground, diluted to ~1% in KBr, and pelletized
Mid-IR Spectroscopy 2-D Imaging	Thin sectioned wet, typically 5 – 15 µm
Soft X-Ray Spectromicroscopy	Embedded in resin and ultra-thin sectioned between 100 – 300 nm
Micro-Computed Tomography	Samples can be imaged in a variety of ways depending on goals of experiment which include: fixed in ethanol, critical point dried, or brought in live

Yes, support is available for data analysis. It is up to the users to do the analysis; however, basic pre-processing and normalization information is available upon request. PyMCA is an open-source program that is excellent for XRF analysis, and there are excellent tutorials available for this as well as user support.

You are able to request shift times when applying for a GUP, but these are not guaranteed. If you are coming to the facility through purchased access or strategic time, accommodations can be more tailored to needs.
Before receiving a facility access badge, there will be training required. This training includes health and safety orientation, radiation awareness, and WHMIS training. These are online modules that can be found at https://training.lightsource.ca/. Additional requirements are being at least 18 years of age, and being on an approved permit. When you come to get you badge, please bring government issued photo ID. All information about coming to CLS can be found here: https://www.lightsource.ca/visiting.html.
If your samples need to be dried, there is a freeze drier on-site for a fee . If you are unsure about whether or not your samples need to be dried, please see **How Should I Prepare My Sample** (above)
Most techniques are non-destructive aside from hard X-ray beamlines, which if done in atmosphere, may cause oxidation. Sample preparation is often the most destructive part of the process.
Information about ultra-thin sections **Coming soon**

Cryo-sections **Coming soon**

Depending on the element of interest and expected concentration, several different thicknesses may be more or less appropriate. Typically, samples are cut between 40 - 80 μm; however, thinner sections may be required if concentrations are high, or sample characteristics cause visual artifacts.