University of Manitoba | Faculty of Graduate Studies

Ph.D. Oral Examination

Linda Alrayes, Ph.D Candidate
Biological Sciences

The oral examination of the doctoral thesis titled

The role of RAD16 and Elongin A/C homologs in Arabidopsis UV tolerance and growth

will be held on

Wednesday, August 24, 2022 @ 1:00pm

https://umanitoba.zoom.us/j/64766423644?pwd=VGgrQXJIeVVRcTJqMm1jTXFDK3BmZz09

Meeting ID: 647 6642 3644
Passcode: 652517

Examining Committee

Advisor: Dr. Jake Stout Biological Sciences

Examiners:
Dr. Sylvia Renault, Biological Sciences
Dr. Belay Ayele, Plant Science

External Examiner:
Dr. Sophia Stone, PhD
Dalhousie University

Thesis Abstract

UV-B and UV-C can damage DNA by generating DNA photoproducts, these DNA photoproducts inhibit DNA transcription and replication, and cause mutations. Thus, DNA photoproducts must be repaired. Plants use two different mechanisms to repair these DNA photoproducts: light-dependent repair via photolyase and light-independent repair via nucleotide excision repair (NER). The NER mechanism in plants is similar to that elucidated in yeast and mammalian models. In yeast systems, the global genomic NER (GG-NER) damage recognition complex RAD7/RAD16/ELC/ CUL3 recognizes the damaged DNA in the non-transcribed regions of the genome. The mammalian Elongin A/B/C/CUL5 /RBX2 and the yeast Elongin A/C/CUL3/RBX1 complexes target the large subunit of the lesion stalled RNAPII on the transcribed strand for ubiqitination and degradation. Arabidopsis has two RAD16 homologs: AtRAD16 and AtRAD16b. In this thesis, I characterized the role of AtRAD16 and AtRAD16b in plant UV tolerance and growth using loss of function and gain of function analysis. Atrad16 and Atrad16b null mutants exhibited increased UV sensitivity, early flowering time and short silique length. AtRAD16 overexpression increased plant UV resistance, and YFP-tagged RAD16 is localized in the nucleus. I also identified Arabidopsis ELA homolog, ELOA, and characterized the role of both Arabidopsis ELA and ELC homologs in plant UV tolerance and growth. Ateloa and Ateloc null mutants exhibited increased UV sensitivity in seedlings and adults.