Vita

Candidate's name: Shilpa Devkota

Universities Attended:

Purbanchal University (2020)
Bachelors of Science
Agriculture

University of New Brunswick (2024)
Masters of Science
Biology

Publications / Conference Presentations:

Chiluwal, K., Timilsina, S., Shrestha, K., Shrestha, E., Devkota, S., Sigdel, S., & Shah, L. (2023). Application of Balanced Fertilizers Reduces the Incidence of American Fall Armyworm in Maize Crop. *Available at SSRN 4490058*.

Chiluwal, K., Shrestha, E., Devkota, S., Shrestha, K., Sigdel, S., Khanal, A., Basnet, R., Upadhyay, B., & Aryal, L. (2022). Identification of Cucurbit Fruit Flies and Their Relative Attractiveness to Different Cues and Releasers. *Nepal Journal of Science and Technology*, *21*(1), 45–56. https://doi.org/10.3126/njst.v21i1.49911

Devkota S., Durnford DG. 2023. *Chlamydomonas reinhardtii* photoacclimates to excess light during stationary phase. Canadian Society of Plant Biologists, Université Laval, Quebec City, QC, Canada (Poster Presentation)

Devkota S., Durnford DG. 2024. Microalgae adjust to light stress as they age by restarting cell division. 30th Annual Graduate Research Conference, Fredericton, NB, Canada (Oral Presentation)

Devkota S., Durnford DG. 2024. *Chlamydomonas reinhardtii* photoacclimates to high-light stress by resuming growth in its stationary phase. Conference of the Biological Sciences, Fredericton, NB, Canada (Poster Presentation)

Photoacclimation strategies of Chlamydomonas reinhardtii in response to high-light stress in stationary phase

UNIVERSITY OF NEW BRUNSWICK

THESIS DEFENCE AND EXAMINATION

in Partial Fulfillment

of the Requirement for the Degree of
Master of Science

by

Shilpa Devkota

in the Department of Biology

U.N.B., Fredericton, N.B.

Friday, August 30th, 2024
10:00 a.m.

Bailey Hall, room B22 & via MS TEAMs

Examining Committee

Dr. Dion Durnford	Supervisor
Dr. Adrian Reyes-Prieto	Internal Examiner
Dr. Yang Qu	External Examiner
Dr. Mike Duffy	Chair of Oral Examination

Abstract

Chlamydomonas reinhardtii can photoacclimate to excess light through various short- and long-term mechanisms. During prolonged light stress, cell growth and division help reduce photosynthetic protein concentrations, establishing a new baseline photosynthetic rate. As cells deplete nutrients, division rate declines but persists during the declining growth phase (DGP), partially aiding photoacclimation through dilution alongside inducing unique quenching mechanisms. This study explored *C. reinhardtii'*s protection from high-light stress during its stationary phase where there is limited cell division capacity. We monitored cultures of wildtype strain (*CC125*) over five days in the stationary phase under low-light (LL) and high-light (HL) conditions. Both showed chlorophyll decline, signifying senescence, with HL cells declining more rapidly. HL-exposed cells resumed growth after two days, likely due to metabolite availability from photosynthetic complex turnover. We also investigated the role of LHCSR proteins in photoacclimation, finding that the npq4 mutant (*CC4614)* lacking LHCSR3 survived HL conditions without significant NPQ induction, suggesting other mechanisms may aid in survival. These findings demonstrate how *C. reinhardtii* manages high light during stationary phases to maximize longevity.