AJWAL DSOUZA

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EDUCATION

2022–Present **Ph.D. Environmental Sciences, University of Guelph**
Thesis: Harnessing controlled environment systems for enhanced production of medicinal plants
Supervisor: Dr. Thomas Graham

2020–2022 **M.Sc. Environmental Sciences, University of Guelph**
Thesis: Closed-loop Controlled Environment Agriculture through Aerobic Composting
Cumulative GPA: **90.7**/100

2015–2019 **B.Sc. Agricultural Sciences, University of Agricultural Sciences, Dharwad, India**
Thesis: Dose effect of basal nitrogen and di-ammonium phosphate spray on greengram (*Vigna radiata*) yield
Cumulative GPA: 8.69/10

RESEARCH AND PROFESSIONAL EXPERIENCE

Period — Position, Affiliation (Advisors)
Project

2023 **Ag-Tech Topic Specialist**, Arrell Food Institute (Drs. Evan Fraser and Lenore Newman)
Feeding the Future with Canadian Technology.

- Developing a report on mobilizing agricultural technology for a net-zero food system in Canada through stakeholder interviews and qualitative research.

2022–2023 **Research Assistant**, University of Guelph (Drs. Evan Fraser and Lenore Newman)
Investigating the current state of research and technology in the controlled environment agriculture.

- Conducted research on technology in controlled environment agriculture, assessed feasibility of novel technologies for vertical farming, and wrote a systematic review paper.

2022 **Research Associate**, University of Guelph (Dr. Mike Dixon)
Controlled environment production of hydroponic barley and alfalfa fodder.

- Conducted experimental research on optimizing controlled environment conditions for hydroponic fodder production

2020–2022 **Graduate Researcher–M.Sc**., University of Guelph (Dr. Thomas Graham)
Closed-loop Controlled Environment Agriculture through Aerobic Composting

- Designed and executed original experiments, and effectively communicated findings through oral briefings, scientific articles, general-public articles, and conference presentations.

2020–2022 **Research Assistant**, University of Agricultural Science, Dharwad (Dr. R. Hosamani)
Effects of Hypergravity on Plant Growth and Morphogenesis

- Contributed to collaborative research on hypergravity's agricultural potential and co-authored a review article on plant responses to hypergravity.

2021 **Specialist Policy Advisor**, Arrell Food Institute (Dr. Evan Fraser)
Investigating the scope of regenerative agriculture for climate change mitigation in Canada

- Engaged with the Director of Arrell Food Institute to define and investigate regenerative agriculture for climate change mitigation in Canada, conducting literature reviews, policy brief synthesis, and utilizing gained insights for public education through articles and infographics.

2019 **Project Assistant**, I*CAR- Central Plantation Crops Research Institute, Vittal*
Production of high-quality planting material for Cocoa

- *M*anaged the production and distribution of 30,000 high-quality Cocoa seedlings and organized extension activities to promote Cocoa cultivation.

TEACHING

Courses

2023 Teaching Assistant, Plant Health and the Environment, (ENVS 2040) W23

2023 Teaching Assistant, Plant Health and the Environment, (ENVS 2040) W23

2022 Guest Lecture, Intro to Controlled Environment Systems, (ENVS 3300) F22

2021 Guest Lecture, Intro to Controlled Environment Systems, (ENVS 3300) W21, F21

Mentoring Research Projects

Period Student Name and Program, Project Title (*Career Stage when I Advised Student*)

2023 Joseph Roy *BSc*, Horticultural management of the medicinal plant *Salvia miltiorrhiza* (*PhD*)

2022 Henry Visneskie *MES*, Optimising controlled environment production of hydroponic fodder (*RA*)

2021 Mariaelisa Polsinelli *BSc*, Optimizing aerobic composting of spent peat substrate and vertical farm crop residues. (*MSc*)

2021 Rosemary Brockett *Intern*, Downstream processing and valorization of spent peat substrate from vertical farming operations (*MSc*)

PUBLICATIONS

Peer-reviewed Journal Articles

Dsouza, A., Dixon, M., Shukla, M., Graham, T., 2024. Harnessing controlled environment systems for enhanced production of medicinal plants. erae248. IF = 6.9

Hosamani, R., Swamy, B. K., Sathasivam, M., **Dsouza, A.**, Ashiq, M. I., 2024. Cocopeat supplementation negates lunar-soil-simulant-induced baneful phenotypic and biochemical changes in crop plants. *Acta Astronautica.* 220, 416-426. IF = 3.5

Dsouza, A., Newman, L., Graham, T., Fraser, E., 2023. Exploring the Landscape of Controlled Environment Agriculture Research: A Systematic Scoping Review of Current Trends and Topics. *Agricultural Systems.* 209, 103673. IF = 6.8

Hosamani, R., Swamy, B.K., **Dsouza, A.**, Sathasivam, M., 2023. Plant responses to hypergravity: a comprehensive review. *Planta.* 257, 17. IF = 4.5

Dsouza, A., Kiselchuk, C., Lawson, J.A., Price, G.W., Dixon, M., Graham, T., 2022. Development of an automated, multi-vessel respirometric system to evaluate decomposition of composting feedstocks. *Biosystems Engineering.* 224, 283-300. IF = 5.002

Dsouza, A., Price, G.W., Dixon, M., Graham, T., 2021. A Conceptual Framework for Incorporation of Composting in Closed-Loop Urban Controlled Environment Agriculture. *Sustainability* 13, 2471. IF = 3.25

Preprints

Dsouza, A., Price, G.W., Dixon, M., Graham, T. 2022. CO_2 demand-supply balance in composting-based closed-loop plant factories. *agriRxiv.*

General Public Articles

Dsouza, A., Graham, T. 2022. Space agriculture boldly grows food where no one has grown before. *The Conversation*. Article link.

- Featured in independent news outlets such as The National Post, Yahoo! News, Inverse.com, Guelphtoday.com, and more.

Dsouza, A., 2021. Storing carbon in the soil is a nitrogen problem. *Arrell Food Institute*. Article link

Dsouza, A., 2021. Resource Recovery and Inedible Biomass Management in High-Intensity Urban Vertical Farming Applications. *Greenhouse Technology Network*. Article link

Dsouza, A., 2021. Vertical Farms for Urban Food Security. *Medium*. Article link

Conference Proceedings

Dsouza, A., 2022. Evaluating the Feasibility of Carbon Dioxide Enrichment in Greenhouses/Vertical Farms through Composting Crop Residues. *Rural Review: Ontario Rural Planning, Development, and Policy* 6, 1.

Policy Report

Dsouza, A., Willoughby, O. 2021. Regenerative Agriculture for Climate Change Mitigation: Define and Deploy (Policy Recommendation Report to the Canadian Food Policy Advisory Council). Arrell Food Institute.

Manuscripts in Preparation (completed drafts under co-author revision)

Drafts available on request

Dsouza, A., Visneskie, H., Graham, T., Stasiak, M., Dixon, M., Optimizing controlled environment cultivation of hydroponic barley fodder improves yield and nutritive value.

Dsouza, A., Price, G.W., Dixon, M., Graham, T. Spent coffee grounds as an additive to improve vertical farm biowaste decomposition and resource recovery.

CONFERENCE ACTIVITY/PARTICIPATION

Conference Organized

2021 Virtual Graduate Student Conference, School of Environmental Sciences, University of Guelph, Guelph, ON

Conference Presentations

Dsouza, A., Henry, H., Silver, J., Wake, M., Brockett, R., Lévesque, S., Lee, V., Stasiak, S., Lawson, J., Rondeau Vuk, T., Dixon, M. 2023. Canada GOOSE (Growth Options for Outer Space Environments)—Design, development, and validation of a controlled environment food production unit. Northeast Agricultural / Biological Engineering Conference 2023. Guelph

Dsouza, A., Visneskie, H., Graham, T., Stasiak, M., Dixon, M., 2023. Optimizing environment conditions enhances yield and nutritional quality of hydroponic barley (*Hordeum vulgare* cv. Esma) fodder. The Canadian Tri-Society Meeting, Ottawa.

Dsouza, A., Henry, H., Silver, J., Wake, M., Brockett, R., Lévesque, S., Lee, V., Stasiak, S., Lawson, J., Rondeau Vuk, T., Dixon, M. 2023. Canada GOOSE (Growth Options for Outer Space Environments)—A

controlled environment crop production unit for the Deep Space Food Challenge. Canadian Lunar Workshop 2023. Virtual.

Dsouza, A., Graham, T., 2022. Evaluating the Feasibility of Carbon Dioxide Enrichment in Greenhouses/ Vertical Farms through Composting Crop Residues. 7th Annual Rural Symposium, OMAFRA/School of Environmental Design and Rural Development, University of Guelph. Virtual platform.

Dsouza, A., Price, G.W., Dixon, M., Graham, T., 2020. Closed-loop Vertical Farming. Oral presentation. Canadian Society for Horticultural Science Graduate Student Virtual Conference. Virtual platform.

Dsouza, A., Kiselchuk, C., Lawson, J. A., Price, G.W., Dixon, M., Graham, T., 2020. Development of a bench-scale, multi-vessel, aerobic composting system for the evaluation of resource recovery from organic wastes produced in bio-regenerative life-support systems. Pre-recorded lightning talk. American Society for Gravitational and Space Research Conference. Virtual platform.

Dsouza, A., Price, G.W., Dixon, M., Graham, T., 2020. Closed-loop Vertical Farming through Composting. Graduate Student Association Virtual Conference. Virtual platform.

- Won **third place** for best oral presentation

AWARDS & SCHOLARSHIPS GRANTS

2023	Student Oral Presentation-3rd place, NABEC Conference	U$100
2023	NCERA Student Travel Grant	C$650
2022	Laura Bassi Scholarship, Honorary mention for editorial support	
2022	N.R. Richards Scholarship	C$5,000
2022	Deep Space Food Challenge - Phase 2†	C$30,000
2022	George and Lois Whetham Scholarship in Food Systems	C$5,000
2021–2022	Ontario Graduate Scholarship	C$15,000
2021	Keith and June Laver Scholarship in Horticulture	C$10,000
2020	Soden Memorial Scholarship in Agriculture	C$2,500

COMMUNITY INVOLVEMENT/OUTREACH

2023–2024	**President**, Graduate Student Committee School of Environmental Sciences, University of Guelph
2023	**Guest Speaker/Panelist**, All About Space Symposium

Indus Space Inc., Mississauga, ON
- Showcased research on space agriculture to youth of grades 6-12.

2022 **Research Outreach**, A Visit from Space Event
City of Waterloo Museum, Waterloo, ON

2021, 2022 **Discussion Panelist**, Policy Fellowship in Agriculture
University of Guelph
- Discussed the potential and challenges of regenerative agriculture with policy-makers through the University of Guelph Policy Fellowship program.

2020–2021 **International Student Representative**, Graduate Student Committee
School of Environmental Sciences, University of Guelph

2016–2017 **National Service Scheme Volunteer**
University of Agricultural Science, Dharwad, India

2016–2017 **Management Committee Member**, Student Residence
University of Agricultural Science, Dharwad, India

MEDIA COVERAGE

2023 University of Guelph students are in the race to grow food in space, CBC News (Link)

2022 Researchers Contribute Conversation Canada Commentary on Space Agriculture, University of Guelph, News (Link)

2022 Ontario Agricultural College Graduate Studies Viewbook 2023, University of Guelph. Student Spotlight (Link)

PROFESSIONAL MEMBERSHIPS

2020–present Canadian Society for Horticultural Sciences

2020–present American Society for Gravitational and Space Research

REVIEWER ACTIVITY

Biomass Conversion and Biorefinery (1), Science Progress (1), Environment Systems and Decisions (1)

PROFESSIONAL DEVELOPMENT

2020 Graduate Students University Teaching Days (Training), University of Guelph

2020 Writing in the Sciences - Stanford University/Coursera [Audit]

2019 The Economics of Agro-Food Value Chains - Technical University of Munich [Certificate]

OTHER PROJECTS

Deep Space Food Challenge: Team Member January 2021 – Present

Controlled Environment Systems Research Facility, University of Guelph

- Developing a controlled-environment food production unit to produce safe, palatable and healthy fresh foods for communities in remote and harsh environments with limited access to fresh food in addition to astronauts during space missions
- Selected as one of four finalists out of 68 teams for finals phase of the challenge