

CURRICULUM VITAE TAQDEER GILL

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EDUCATION

Doctor of Philosophy in Horticulture

(2022-May 2026)

Concentration: Horticulture & Precision Agriculture

University of Wisconsin-Madison, WI (USA)

Advisor: Dr. Yi Wang

Committee: Dr. Philip Townsend, Dr. Irwin Goldman, Dr. Carl Rosen

GPA: 3.712/4.00

Thesis title: Use of hyperspectral imaging for understanding nitrogen responses of processing vegetable crops such as snap beans (*Phaseolus vulgaris* L.), and dark red kidney beans (*Phaseolus vulgaris* L.) on irrigated sandy soils.

Master of Science in Agriculture

(2020-2021)

Concentration: Plant and Soil Science

Tennessee State University, Nashville, TN (USA)

Advisor: Dr. Jason de Koff

Committee: Dr. William Sutton, Dr. Bharat Pokharel, Dr. Dafeng Hui

GPA: 4.0/4.0

Thesis title: Nitrogen fertilizer effects on yield, oil, protein content, and pollinators of winter canola (*Brassica napus* L.).

Bachelor of Science in Agriculture

(2013-2019)

Concentration: Horticulture

Punjab Agricultural University, Ludhiana, PB (India)

GPA: 8.31/10

PROFESSIONAL EXPERIENCE

Research Assistant (Sustainable Vegetable Production and Precision Agriculture Program)

(Jan 2022-Present)

University of Wisconsin-Madison, WI

- Developed remote sensing-based decision support models for optimizing nitrogen management in vegetable crops using UAV and hyperspectral data.
- Gained hands-on experience in field trial setup, in-season crop management, and systematic data collection, including UAV-based imagery acquisition.
- Performed hyperspectral image preprocessing and feature extraction, followed by statistical analysis using Python and R.

- Built and evaluated machine learning models and Partial Least Squares Regression (PLSR) to predict crop yield and in-season nitrogen status.
- Contributed to the long-term vision of developing an open-source smartphone application that enables farmers to monitor real-time crop nutrient status and make informed management decisions.

Graduate Research Assistant

(Jan 2020-Dec 2021)

Tennessee State University, Nashville, TN

- Evaluated nitrogen rate effects on canola productivity, seed quality traits (protein and oil), and pollinator responses under field conditions.
- Conducted precision measurements of canopy cover and plant density using advanced agricultural sensing technologies.
- Developed image-based yield prediction approaches using high-throughput phenotyping.

Research Assistant

(Aug 2019-Dec 2019)

Punjab Agricultural University, Ludhiana, PB (India)

- Conducted emasculation and controlled pollination in brinjal for hybridization studies.
- Applied selfing and crossing techniques with accurate identification of male-fertile and male-sterile flowers.

Technical Assistant – Part Time

(Jan 2018-Dec 2019)

A1 Potato Tubers Firm, PB (India)

- Assisted in post-harvest operations including cleaning, sorting, grading, cold storage, and packaging of potato tubers for commercial markets.
- Supported logistics and inter-state export of potato produce, ensuring quality standards were met.
- Advised farmers on disease management during tuber storage, contributing to reduced post-harvest losses and improved storage quality.

Commercial Mushroom Production Trainee

(Mar 2019-May 2019)

Punjab Agricultural University, Ludhiana, PB (India)

- Assisted in end-to-end mushroom production workflows, from substrate preparation to harvest.
- Applied best practices in crop monitoring to optimize growth and productivity.

Pest Control Scout

(Aug 2018-Sept 2018)

Punjab Agricultural University, Ludhiana, PB (India)

- Assisted in field surveys and management of whitefly (*Bemisia tabaci*) infestations in cotton crop.
- Collected and analyzed field data and educated farmers on integrated pest management (IPM) practices for effective whitefly control.
- Served as a liaison between research specialists and farmers, facilitating knowledge transfer and adoption of research-based recommendations.

SELECTED HONORS AND AWARDS

Graduate Studies

24-Hour hackathon (second prize) at 2025 CANVAS meeting

(2025)

Bayer

Bayer university mentoring program mentee <i>Bayer</i>	(2024)
True leaf market scholarship (\$5000) <i>True Leaf Market</i>	(2024)
Diversity poster finalist at 2024 ASA, CSSA, SSSA meeting <i>ASA-CSSA-SSSA</i>	(2024)
Peer review mentorship program mentee <i>ASA-CSSA-SSSA</i>	(2023)
3MT thesis competition finalist <i>UW-Madison</i>	(2023)
SEED (Scientists engaging and educating decision-makers) ambassador award <i>ASA-CSSA-SSSA</i>	(2022)
Outstanding M.S. student award <i>Association of Agricultural Scientists of Indian Origin</i>	(2021)
Future leaders in science award <i>ASA-CSSA-SSSA</i>	(2021)
Gerald O. Mott award <i>ASA-CSSA-SSSA</i>	(2021)
<i>Undergraduate Studies and Others</i>	
University merit scholarship <i>Punjab Agricultural University</i>	(2018-2019)
Certificate of academic distinction <i>Punjab Agricultural University</i>	(2017)
Dr. Gurdev Singh Khush foundation for advancement of agricultural sciences scholarship <i>Punjab Agricultural University</i>	(2015-2018)
Alumni association scholarship <i>Punjab Agricultural University</i>	(2016)
Punjab Mandi Board scholarship <i>Punjab Agricultural University</i>	(2014)
Dr. Hargobind Khurana scholarship <i>Punjab School Education Board</i>	(2013)

Inspire award in science
Punjab School Education Board

(2011)

PUBLICATIONS

Xu Z., **Gill T.**, Huang Q., Wang Y., 2026. A comprehensive comparison of multispectral and hyperspectral imagery for plot-level crop yield prediction of kidney beans, snap beans, and potatoes. *Smart Agricultural Technology* (under review).

Gill, T., de Koff, J.P., McGeary, K.D., Ravi Ramasamy., Link Richard., 2025. Characterization of volatile compounds in winter canola (*Brassica napus* L.) flowers for pollinator attraction by electronic nose. *Agrosystems, Geosciences and Environment*. (under revision with minor comments).

McGeary, K.D., de Koff J.P., Link R., Saini P., and **Gill, T.**, 2020. Nitrogen and variety effects on winter canola mortality, shatter, yield and quality. *Agrosystems, Geosciences and Environment*. doi: doi/10.1002/agg2.20254

Gill, T., Gill, S. K., Saini, D. K., Chopra, Y., de Koff, J. P., & Sandhu, K. S., (2022). A comprehensive review of high throughput phenotyping and machine learning for plant stress phenotyping. *Phenomics*, 1-28. doi: 10.1007/s43657-022-00048-z

Gill, T., E. Tetteh, and de Koff J.P., 2020. Comparison of winter canola cultivars in middle Tennessee (Factsheet). Tennessee State University Cooperative Extension Program, ANRB17. Available at: (<https://www.tnstate.edu/faculty/jdekoff/documents/WinterCanola.pdf>)

MANUSCRIPTS IN PREPARATION (Expect to be submitted in next 2 months)

Gill, T., & Wang, Yi., Nitrogen management strategies to enhance yield, nitrogen use efficiency, and environmental sustainability in snap bean (*Phaseolus vulgaris* L.) and kidney beans (*Phaseolus vulgaris* L.). *For submission to Agronomy Journal*.

Gill, T., Townsend, P., & Wang, Yi., Optimizing hyperspectral pre-processing for soil-vegetation spectral separation across growth stages and nitrogen conditions. *For submission to Computers and Electronics in Agriculture*.

Gill, T., Townsend, P., Ravindran P., Heberlein B. C., & Wang, Yi., Site-specific prediction of crop nitrogen status and yield using hyperspectral imaging and machine learning. *For submission to Precision Agriculture*.

CONFERENCE PRESENTATIONS

- Gill, T., Townsend, P., & Wang, Y., (2025) Understanding Nitrogen Responses of Processing Vegetable Crops Grown on Irrigated Sandy Soils Using Hyperspectral Imagery. Oral Presentation at CANVAS meeting, Salt Lake City, UT.

- Gill, T., Townsend, P., & Wang, Y., (2024) Predictive Models for Snap Beans Under Varied N Rates Using Hyperspectral Imagery. Poster Presentation at PSGSC symposium, Madison, WI.
- Gill, T., Townsend, P., & Wang, Y., (2024) Predictive Models for Snap Beans Under Varied N Rates Using Hyperspectral Imagery. Poster Presentation at ASA, CSSA, SSSA International Annual Meeting, San Antonio, TX. **(Second prize and selected for diversity poster contest).**
- Gill, T., Townsend, P., & Wang, Y., (2024) Leveraging Hyperspectral Remote Sensing for Studying Response of Snap Beans (*Phaseolus vulgaris* L.) to Nitrogen. Oral Presentation at ASA, CSSA, SSSA International Annual Meeting, San Antonio, TX.
- Gill T., Townsend P., & Wang Y., (2024) Predictive Models for Vegetable Crops Under Varied N Rates Using Hyperspectral Imagery. Poster Presentation at North American Plant Phenotyping Network (NAPPN) Conference held by Purdue University, West Lafayette, IN.
- Gill T., Townsend P., & Wang Y., (2024) Eye in the Sky: Hyperspectral Imaging for Sustainable Nitrogen Management in Vegetables. Lightening Talk at North American Plant Phenotyping Network (NAPPN) Conference held by Purdue University, West Lafayette, IN.
- Gill T., Townsend P., & Wang Y., (2024) Predictive Models for Vegetable Crops Under Varied N Rates Using Hyperspectral Imagery. Poster Presentation at WPVGA Conference, Stevens Point, WI.
- Gill T., & Wang Y., (2024) Eye in the Sky: Aerial Imaging for Sustainable Nitrogen Management in Processing Vegetable Crops. Oral Presentation at The Wisconsin Agribusiness Classic, Madison, WI.
- Gill T., Townsend P., & Wang Y., (2023) Hyperspectral Signatures as Plant Fingerprints. Lightening Talk at PSGSC symposium, Madison, WI.
- Gill T., Townsend P., & Wang Y., (2023) Eye in the Sky: Sustainable Nitrogen Management Using Hyperspectral Imagery. Poster Presentation at PSGSC Symposium, Madison, WI.
- Gill T., Townsend P., & Wang Y., (2023) Eye in the sky: Sustainable Nitrogen Management Using Hyperspectral Imagery. Poster Presentation at Women in Science and Engineering (WISE) Graduate and Undergraduate Poster Session, Madison, WI.
- Gill T., Townsend P., & Wang Y., (2023) Using Hyperspectral Remote Sensing for Understanding Response of Snap Beans (*Phaseolus vulgaris* L.) to Nitrogen. Oral Presentation at ASA, CSSA, SSSA International Annual Meeting, St Louis, MO. **(First prize).**
- Gill T., Townsend P., & Wang Y., (2023) Hyperspectral Signatures as Plant Fingerprints. 5-minute Rapid Talk and Poster Presentation at ASA, CSSA, SSSA International Annual Meeting, St Louis, MO.

- Gill T., & Wang Y., (2023) Eye in the Sky: Predicting Crop Nutrient Status and Crop Yield. Poster Presentation at Sustainability Symposium, Madison, WI.
- Gill T., & Wang Y., (2023) Eye in the Sky: Hyperspectral Imagery for Nitrogen Management of Vegetable Crops. Lightning Talk at Association of Horticulturists of Indian Subcontinent Interest Group Lightning Talk Competition, Virtual (**Second prize**).
- Gill T., & Wang Y., (2023) Eye in the Sky: Predicting Crop Nutrient Status and Crop Yield. Poster Presentation at UW-Madison Day, Madison, WI.
- Gill T., & Wang Yi., (2022). Response of Kidney Beans and Snap Beans to Nitrogen Management. 5-minute Presentation presented at PSGSC Symposium, Madison, WI.
- Yuldashev F., Bhattarai M., Gill T., de Koff J.P., (2022). Pollinators and Monitoring Options for Winter Canola (*Brassica napus* L.) in Tennessee. Oral Presentation at Tennessee State University University-Wide Research Symposium, Nashville, TN.
- de Koff J.P., Bhattarai M., Gill T., and McGeary K., (2021). Recent Winter Canola Research in Tennessee: Yield, Oil, Protein and Pollinators. Oral Presentation at U.S. Canola Association Fall Meeting, Virtual.
- Gill, T., & de Koff J. P., (2021). Effect of Nitrogen Fertilizer on Yield, Oil and Protein Content and Pollinators of Winter Canola. Oral Presentation at ASA, CSSA, SSSA International Annual Meeting, Salt Lake City, UT. (**Second prize**)
- Gill T., & de Koff J.P., (2021). Effect of Temperature on the Seed Germination of Winter Canola. Oral Presentation at Tennessee State University University-Wide Research Symposium, Nashville, TN. (**First prize**)
- Gill T., McGeary K.D., de Koff J., & Ravi R., (2020). Characterization of Volatile Compounds in Canola Flowers for Pollinator Attraction. Poster Presentation at Research Gala held by Vanderbilt University, Nashville, TN.
- Gill T., McGeary K.D., de Koff J., & Ravi R., (2020). Characterization of Volatile Compounds in Canola Flowers for Pollinator Attraction. Oral Presentation at Tennessee Academy of Sciences, Nashville, TN. (**First prize**)

INVITED TALKS

- Invited graduate student speaker at Cornell Corteva Symposium. (2024)
- Departmental seminars at Tennessee State University. (2020 & 2021)

TEACHING

Teaching Practicum

World Vegetable Crops (PLTSCI 370)

(Fall 2024)

UW-Madison

Helped coordinate experiential learning labs where students explored vegetable families through weekly food preparation activities. I developed a lecture on the *use of precision agriculture technologies in vegetable crop production* and introduced students to the practical applications and challenges of remote sensing, drones, and robotics in various vegetable crops. In the laboratory component, I led *hands-on session on drone and walking dog robot operation*, allowing students to directly engage with emerging agricultural technologies.

Invited Lectures

Introduction to Plant Science and Technology (PLANTSCI110) (Fall 2025)

UW-Madison

Delivered four guest lectures about application of precision agriculture tools to improve sustainability in agricultural systems. Demonstrated *how to fly a drone and its uses in agriculture*.

Available at: (<https://youtu.be/1WZkEUzwNHk?si=Bz-ExGzHmUBVJp1W>).

Research Methods (AGSC 5110) (Spring 2021)

Tennessee State University

Taught a class on inferential statistics, covering statistical significance, hypothesis testing, and interpretation of data.

MENTORING

Undergraduate Students

Gage Anderson (Summer 2025)

Margaux Rierison (Summer 2024)

Finn Johnson (Summer 2023)

Alexander J Lawrence (Summer 2023)

Merriam Schmitz (Summer 2023)

Micaela Bakman (Summer 2022)

Sam Fritz (Summer 2022)

Krista Marie Paras (Summer 2022)

Graduate Student

Zekai Xu (PhD student) (Summer 2025-Present)

EXTENSION & OUTREACH

Field Day Demonstrations

- Demonstrated practical use of DJI Dock 3 and DJI Phantom Pro drones, covering flight planning, safe operation, data collection, and interpretation of drone imagery for precision agriculture decision-making at 2024 Hancock Field Day.

- Presented about “Use of Hyperspectral Imagery for Nitrogen Management” at 2023 Hancock Field Day. Available at: (https://youtu.be/Rt7LwD72BKw?si=vKC_eVo3Ci0WYkLZ).

- Demonstrated Leaf Color Chart (LCC)-based nitrogen management in rice, wheat, and maize and tensiometer-based irrigation scheduling in rice to farmers as part of a groundwater conservation initiative at the 2015 Punjab Agricultural University Field Day.

Extension Meeting Talks

- Gill T., Tsai O., Johnson F., & Wang Y., (2023) Use of Precision Agriculture Technologies in Vegetable Crops at Hancock Agricultural Research Station Field Day, Hancock, WI.
- Gill T., & Wang Y., (2023) Response of Kidney Beans and Snap Beans to Nitrogen Fertilizer. Oral Presentation at Central Wisconsin Processing Crops Meeting, Hancock, WI.

Extension Publications

- Gill, T., E. Tetteh, and de Koff J.P., 2020. Comparison of Winter Canola Cultivars in Middle Tennessee (Factsheet). Tennessee State University Cooperative Extension Program, ANRB17. Available at: (<https://www.tnstate.edu/faculty/jdekoff/documents/WinterCanola.pdf>).

LEADERSHIP & SERVICE

- Reviewer for The Plant Phenome Journal, Agronomy Journal, and Agroecosystem, Geosciences and Environment Journal. (2024-Present)
- Judge, Model Applications in Field Research (Oral I and Poster Sessions) and Bioenergy Community Poster Session at CANVAS Meeting. (2025)
- Judge, Gary “Pete” Peterson Dryland Soil Management Scholarship. (2025)
- Graduate student board representative on American Society of Agronomy (ASA) Board of Directors. (2024-2025)
- Graduate student representative on ASA Science Policy committee. (2024-2026)
- Member on ACS Graduate Student Committee. (2024)
- Judge, undergraduate student poster contest, model applications in field research oral I at ASA, CSSA, SSA meeting. (2024)
- UW-Madison graduate student representative in Department of Plant and Agroecosystem Sciences. (2024-2025)
- Acted as a graduate student representative on the hiring committee for Corn Agronomist in the Department of Plant and Agroecosystem Sciences, UW-Madison. (2024)
- Engaged in science policy advocacy by meeting with U.S. senators and congressional representatives to promote increased research funding and by participating in the 2021 Virtual Congressional Visits Day through the Future Leaders in Science and SEED Ambassador Award programs. (2021-2022)

- Acted as a moderator of Bioenergy Systems General Oral II at the ASA, CSSA, SSSA International Annual Meeting. (2021)

GRANTS

- Graduate Student Travel Award (\$750) to attend the CANVAS Meeting. (2025)
ASA-CSSA-SSSA
- Hyperspectral Imaging for Sustainable Nitrogen Management in Vegetable Crops. (2023)
North Central SARE Graduate Student Grant. (Not funded).

RESEARCH PROJECTS

Horticulture

Development of remote sensing-based models for nitrogen management of dry kidney beans and snap beans

(Jan 2022-Present)

- Developed aerial imagery-based tools to recommend optimal nitrogen rates for growers using UAV and airborne hyperspectral, multispectral, and thermal data.

Effect of varied split nitrogen treatments on various quality traits of potato

(Jan 2022-Present)

- Conducted potato field operations and collected RGB, multispectral, and thermal imagery using drones and robotic platforms.

Effect of cultivar on various qualitative fruit traits

(Mar 2019-Apr 2019)

- Compared fruit weight, size, total soluble solids, acidity of different varieties of Cape Goose Berry (*Physalis peruviana*).

Effect of different rates of ethereal and gibberellic acid on papaya plants

(Jan 2019)

- Quantified the impact of plant growth regulator treatments on fruit yield and quality parameters through controlled experiments.

Agronomy and Soil Science

Effect of nitrogen fertilizer and cultivar on yield, oil and protein content in winter canola (*Brassica napus* L.) production for bioenergy

(Sept 2020-Dec 2021)

- Quantified nitrogen rate impacts on canola yield, seed protein and oil content, and pollinator activity through field-based experiments.

Estimate the fate and transport of nitrate from canola grown in agricultural field

(April 2021)

- Performed nitrate analysis using ion chromatography to assess soil nitrogen availability.

Practical crop production of Maize (*Zea mays*) and *Brassica* spp.*(June 2017-May 2018)*

- Executed comprehensive field operations including land preparation, sowing, irrigation management, thinning, gap filling, fertilizer, and pesticide application, harvesting, and post-harvest handling.

Two semester long practical field training*(July 2014-May 2015)*

- Gained hands-on experience in weeding operations, cotton harvesting, post-harvest handling of turmeric, and identification of medicinal crops.

*Entomology***Determination of best methods for insect monitoring in winter canola***(Feb 2021-Dec 2021)*

- Performed insect sampling in canola fields using sticky traps, pan traps, and sweep nets.

Characterization of volatile compounds in canola flowers for pollinator attraction*(Oct 2020-Nov 2020)*

- Quantified nitrogen- and cultivar-driven variation in floral volatile emissions using e-nose sensing coupled with multivariate analysis (PCA).

*Image Analysis***Development of a pipeline for predicting the canola yield from flower color***(Sept 2020-Dec 2021)*

- Analyzed drone imagery to quantify flower color traits and assess their relationship with crop yield using ImageJ-based image thresholding.

Effect of cultivar on the canola seed size*(Jan 2020-Feb 2020)*

- Quantified seed size differences between hybrid and open-pollinated cultivars using ImageJ-based image analysis.

*Plant Physiology***Evaluation of the differences in the stomatal properties of various canola cultivars***(April 2021)*

- Conducted comparative analyses of stomatal density, morphology, and distribution on upper and lower leaf surfaces of three winter canola cultivars to elucidate traits associated with cold stress tolerance.

PROFESSIONAL MEMBERSHIPS

- American Society of Agronomy
- Crop Science Society of America

- Soil Science Society of America
- North American Plant Phenotyping Network
- Tennessee Academy of Science
- Environment Science Club
- PAU Alumnus Association

REFERENCES

• **Dr. Yi Wang (PhD advisor)**

Associate Professor

Department of Plant and Agroecosystem Sciences

College of Agricultural and Life Sciences, University of Wisconsin-Madison, WI

Contact Information

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Telephone: 608-265-4781

Email: wang52@wisc.edu

• **Dr. Jason P. de Koff (MS advisor)**

Extension Professor

Department of Agricultural Sciences and Engineering

College of Agriculture, Tennessee State University, Nashville, TN

Contact Information

Office Location: 109 Agricultural Biotechnology Building, 3500 John A. Meritt Boulevard, Nashville, TN, 37209

Telephone: 615-963-4929

Email: jdekoff@tnstate.edu

• **Dr. Philip Townsend (PhD committee member)**

Professor

Department of Forest and Wildlife Ecology

College of Agricultural and Life Sciences, University of Wisconsin-Madison, WI

Contact Information

Office Location: A111 Russell Labs, 1630 Linden Drive, Madison, WI, 53706

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• **Dr. Irwin Goldman (PhD committee member)**

Professor

Department of Plant and Agroecosystem Sciences

College of Agricultural and Life Sciences, University of Wisconsin-Madison, WI

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