# Noah J. Langenfeld

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## Education

- **Ph. D. Plant Science** **December 2024 Intended**
  *Utah State University*
- **B.S., Biochemistry** **May 2020**
  *University of Wisconsin – Stevens Point*
- **B.S., Biology** **May 2020**
  *University of Wisconsin – Stevens Point*
- **Aquaponics Certificate** **May 2020**
  *University of Wisconsin – Stevens Point*

## Employment

**Graduate Research Assistant** **July 2020 – Present**
*Crop Physiology Lab, Utah State University, Logan, UT*

- Worked closely with other graduate students to develop, design, and execute nutrient recycling projects to optimize recovery of nitrogen in closed life support systems for future missions to, on, and from Mars. Managed hydroponics systems and developed bioreactors for NASA funded food and plant science projects.

**Fresh Market Crew Manager** **June 2011 – July 2020**
*Flyte Family Farms, LLC, Coloma, WI*

- Managed harvest crews to maintain positive morale and GAP adherence while overseeing customer service and operations for consumer-direct sales. Maintained adequate field and greenhouse records to ensure quality control for commercial strawberry and organic blueberry production.

**Master Writing Lab Consultant** **September 2017 – May 2020**
*Writing Lab, University of Wisconsin, Stevens Point, WI*

- Advised students on academic and creative literary endeavors for classes and professional aspirations. Maintained confidential student records while promoting ethical adherence to tutoring policies.

**Personal Statements Honors Intern** **September 2019 – May 2020**
*Writing Lab, University of Wisconsin, Stevens Point, WI*

- Worked with graduating students to develop strategic plans and personal application materials for admittance into graduate school programs.

**Tutoring Mentor** **January 2017 – May 2020**
*Tutoring-Learning Center, University of Wisconsin, Stevens Point, WI*

- Mentored colleagues on pedagogical instruction and content delivery methods. Designed reference and learning materials for students and led group study sessions for undergraduate organic chemistry and plant biology courses.

**Faculty Assistant** **January 2019 – May 2020**
*Department of Chemistry, University of Wisconsin, Stevens Point, WI*

- Worked closely with faculty members to accurately and timely assess and address student performance. Ensured confidentiality and fairness among student content submissions of learning materials.

## Research Experience

**Reduced Chlorophyll in Rice to Improve Canopy Photosynthesis** **March 2021 - Present**
*Crop Physiology Lab, Utah State University, Logan, UT*
Advisors Dr. Bruce Bugbee (Utah State University), Dr. Devin Colman-Derr (UC Berkeley)

- Grew truncated light antenna (TLA) CRISPR-modified rice with reduced chlorophyll content and analyzed physiological responses using LI-COR 6800 portable photosynthesis system and spectrophotometric chlorophyll extraction methods.

**Optimization of Nitrogen Recycling for Closed Life Support Systems** **July 2020 - Present**
*Crop Physiology Lab, Utah State University, Logan, UT*
Advisor Dr. Bruce Bugbee

- Designed, build, and operated hydroponics systems and microbial bioreactors to study nitrogen recycling and conversions in closed systems.

**Genetics of Nitrifying Bacteria** **Fall 2019 - Present**
*Department of Biology, University of Wisconsin, Stevens Point, WI*
Advisor Dr. Ann Impullitti

- Quantified bacterial population densities using qPCR to determine nitrification presence and abundance in diverse aquaponic systems.

**Mechanisms of HIV Protease** **Fall 2019 - Present**
*Department of Chemistry, University of Wisconsin, Stevens Point, WI*
Advisor Dr. Amanda Jonsson

- Studied solved crystallized structures of HIV Protease to elicit possible targets for fighting drug resistance. Worked on digital computational development of possible future inhibitors to block viral life cycle.

**Nanobubble Technologies in Aquaponic Systems** **Spring 2019**
*Department of Biology, University of Wisconsin, Stevens Point, WI*
Advisor Dr. Christopher Hartleb

- Monitored continuous fish and plant growth and development in aquaponic systems to determine effects of nanobubble generation in water columns.

**Antibiotic Resistance Mechanisms in Bacteria** **Fall 2018 – Spring 2019**
*Department of Chemistry, University of Wisconsin, Stevens Point, WI*
Advisor Dr. Amanda Jonsson

- Explored structural identities of bacterial immune response proteins in relation to aminoglycoside resistant mechanisms for antibiotics.

**Hybrid Walleye Stocking Density in Aquaponics** **Fall 2017 – Fall 2018**
*Department of Biology, University of Wisconsin, Stevens Point, WI*
Advisor Dr. Christopher Hartleb

- Tested optimal walleye stocking density in aquaponic systems through water chemistry and organismal growth analysis to promote development of new sustainable options for fish components of aquaponics.

**O-GluNAcylation Protein Catalysis** **Fall 2017 – Spring 2018**
*Department of Chemistry, University of Wisconsin, Stevens Point, WI*
Advisor Dr. Amanda Jonsson

- Developed models for protein glycosylation proteins to study effects of sequence identity on structural function.

## Publications

**Langenfeld, N.**, Skabelund, H., and Bugbee, B. (2022). Analysis of an *in situ* soil pH meter for measurements in soilless media. *HortTechnology*. In review.

Caddell, D., **Langenfeld, N.**, Zhen, S., Klaras, R., Mishra, L., Bugbee, B., and Coleman-Derr, D. (2022). Photosynthesis in rice is increased by CRISPR/Cas9 mediated transformation of two truncated light harvesting antenna genes. *Frontiers in Plant Science.* In review.

**Langenfeld, N.** and Bugbee, B. (2022). Germination and seedling establishment for deep-flow hydroponics: The benefit of slant boards. *PLoS One.* 17(10): e027571 https://doi.org/10.1371/journal.pone.0275710

**Langenfeld, N.**, Pinto, D., Faust, J., Heins, R., and Bugbee, B. (2022). Principles of nutrient and water management for indoor agriculture. *Sustainability*. 14(16): 10204. https://doi.org/10.3390/su141610204

**Langenfeld, N.**, Payne, L., and Bugbee, B. (2021). Colorimetric determination of urea in strong acids. *PLoS ONE.* 16(11): e0259760. https://doi.org/10.1371/journal.pone.0259760

**Langenfeld, N.**, Kusuma, K., Wallentine, T., Criddle, C., Seefeldt, L., and Bugbee, B. (2021). Optimizing nitrogen fixation and recycling for food production in regenerative life support systems. *Frontiers in Astronomy and Space Sciences.* 8:699688. https://doi.org/10.3389/fspas.2021.699688

**Langenfeld, N.** and Bugbee, B. (2021). Evaluation of three dissolved oxygen meters. *HortTechnology*. 31(4), 428-431. https://doi.org/10.21273/HORTTECH04819-21

Bugbee, B. and **Langenfeld, N.** (2021). Utah Monocot/Dicot Solution. *USU Digital Commons.* https://digitalcommons.usu.edu/cpl_nutrients/2

**Langenfeld, N.** and Bugbee, B. (2021). Dissipation rates of oxygen nanobubbles in recirculating systems. *USU Digital Commons.* https://digitalcommons.usu.edu/cpl_techniquesinstruments/19

**Langenfeld, N.**, Rhodes, S., and Bugbee, B. (2021). Deep-flow hydroponic culture: Copper toxicity at 8 µM (0.13 ppm) in tomato. *USU Digital Commons.* https://digitalcommons.usu.edu/cpl_hydroponics/8

## Presentations

- Mass balance optimizes nutrient and water management for indoor agriculture, Poster presentation, NCERA-101 Committee on Controlled Environment Technology and Use Annual Meeting, Tucson, AZ, September 2022
- Mass balance principles for sustainable fertilization, Oral Presentation Flash Talk, American Society for Horticultural Science Annual Meeting, Chicago, IL, August 2022
- Day and night gas exchange is necessary to predict water-use efficiencies of whole crops, Poster presentation, American Society for Horticultural Science Annual Meeting, Chicago, IL, August 2022
- Nitrogen recycling in closed life support systems, Oral presentation, American Society for Plant Biology Annual Meeting, Portland, OR, July 2022
- Microbes for meals: N-fixing microbial biomass as a plant fertilizer, Oral presentation, CUBES Retreat, University of California at Berkeley, May 2022
- Modelling whole plant water-use efficiency from single leaf measurements, Oral presentation, Student Research Symposium – Utah State University, April 2022
- Copper tolerance in hydroponic lettuce for disease prevention, Oral presentation, Rapid Fire Research – Utah State University, March 2022
- Hydroponic copper tolerance for disease prevention, Virtual oral presentation, North Central Extension and Research Activity-101 Annual Meeting, November 2021
- Nutrient solutions for recirculating hydroponics, Oral presentation, Crop Science Society of America Annual Meeting, Salt Lake City, UT, November 2021
- Optimizing nitrogen fixation and recycling for Martian life support, Poster presentation, Hansen Life Sciences Retreat, Logan, UT, October 2021
- Biomanufacturing of nitrogen fertilizer from Martian atmospheric $N_2$ gas, Virtual oral presentation, NASA In-situ Resource Utilization Technical Conference, September 2021
- Maintenance of Nutrient Solutions for Recirculating Hydroponics, Oral presentation, American Society for Horticultural Science Annual Meeting, Denver, CO, August 2021
- CREST: Bacteria Fighting Back, Seminar, Chemistry Student Speaker Series, Stevens Point, WI, October 2019
- Nanobubble Oxygenation Effects on Fish Growth and Water Nutrients in an Aquaponics System, Poster Presentation, College of Letters and Sciences Undergraduate Research Symposium, Stevens Point, WI, May 2019
- Eliciting the Mechanism of Aminoglycoside Resistant NpmA as a rRNA Methyltransferase, College of Letters and Sciences Undergraduate Research Symposium, Stevens Point, WI, May 2019
- Eliciting the Mechanism of Aminoglycoside Resistant NpmA as a rRNA Methyltransferase, Experimental Biology Annual Conference, Orlando, FL, April 2019

- Influence of Walleye (*Sander vitreus*) Stocking Density on Plant Growth in an Aquaponics System, Poster Presentation, College of Letters and Sciences Undergraduate Research Symposium, Stevens Point, WI, May 2018
- OGT Protein Recognition and Catalysis, Poster Presentation, Experimental Biology Annual Conference, San Diego, CA, April 2018
- OGT Protein Recognition and Catalysis, Poster Presentation, College of Letters and Sciences Undergraduate Research Symposium, Stevens Point, WI, May 2018

## Teaching

- Hydroponics, 2 credits, PSC 4900, Sole instructor, Utah State University, Spring 2022
    - Principles and practices of design, maintenance, and applications of hydroponic systems for sustainable food production. Basic solution and chemistry and plant physiology principles and their impact of hydroponic optimization. Lecture and lab components.
    - I created the course from scratch and delivered all lectures and labs (4) independently.

## Unique Coursework

- Environmental Instrumentation (**Teaching Assistant**), PSC 6000, Dr. Bruce Bugbee Fall 2021
- Biochemical Engineering, BENG 6810, Dr. Ron Sims Fall 2021
- Principles of Bioenergetics, CHEM 6760, Dr. Lance Seefeldt Spring 2021
- Environmental Soil Physics, PSC 6670, Dr. Scott Jones Fall 2020
- TEM Workshop: Viruses and Bacteria, Biol 498, Dr. Sol Sepsonwol Spring 2019
- Ecology of Southern Florida, Biol 309, Dr. Brian Barringer Winter 2019
- Techniques in Aquaponics, Biol 384, Dr. Christopher Hartleb Spring 2018
- Environment and Culture of the Mississippi Delta, Geog 387, Lisa Theo Spring 2018
- Post-Secondary Learning Theory and Practicum, Educ 301, Emily Wisinski Fall 2017

## Scholarships/Fellowships

Post-secondary total: **$85,947**

Graduate degree: **$38,547**

- Utah NASA Space Grant Consortium Graduate Fellowship, 2022 $15,000
- Apogee Instruments Graduate Fellowship, 2022 $2000
- Bertrand D. Tanner / Campbell Scientific Graduate Fellowship, 2022 $5000
- George & Viola Larsen Scholarship, 2021 $2547
- Bertrand D. Tanner / Campbell Scientific Graduate Fellowship, 2021 $5500
- Graduate Student Fellowship, Phi Kappa Phi Honor Society, 2020 $8500

Undergraduate degree: **$47,400**

- Tommy Thompson Leadership Scholarship, 2020 $2300
- Wisconsin Potato and Vegetable Growers Association Spud Bowl Scholarship, 2019 $750
- UWSP Student Government US Bank Scholarship, 2019 $750
- Culver-Rogers Award, 2019 $500
- UWSP Writing Lab Scholarship, 2019 $1000
- Edgar Pierson Biology Award, 2019 $750

- Milwaukee Art Museum Garden Club Scholarship, 2019 $2000
- Coloma Dynamites 4H Club Scholarship, 2019 $150
- Waushara County 4H Leader's Association Scholarship, 2018 $100
- UWSP Student Government US Bank Scholarship, 2018 $1000
- Culver-Rogers Award, 2018 $500
- UWSP Kazmerak Scholarship, 2018 $900
- Waushara County Health and Community Education Scholarship, 2018 $500
- Wisconsin Garden Club Scholarship, 2018 $1000
- Waushara County Master Gardeners Scholarship, 2018 $500
- UWSP Student Government US Bank Scholarship, 2017 $1000
- Waushara County 4H Leader's Association Scholarship, 2017 $100
- Thomas Schullen Memorial Scholarship, 2016 $600
- Foundation for Blended and Online Learning Scholarship, 2016 $20,000
- Melvin Laird Memorial Scholarship, 2016 $4000
- Academic Excellence Scholarship, 2016 $9000

## Grants

Total: $3,500

- OSCAR Travel Grant (UWSP), American Society for Biochemistry and Molecular Biology Annual Meeting, 2019, $2000, Funded for Spring 2019
- OSCAR Travel Grant (UWSP), ASBMB 2018 Annual Meeting, $1500, Funded for Spring 2018

## Awards

- Third place flash talk, North Central Extension and Research Activity-101 Annual Meeting, November 2021
- First place oral presentation and poster, Crop Physiology and Metabolism Division of the Crop Science Society of America, November 2021
- Albertson Medal Spring 2020
- University Leadership Award, University of Wisconsin, Stevens Point, WI Spring 2020
- University Leadership Award, University of Wisconsin, Stevens Point, WI Spring 2019
- Culver-Rogers Award, University of Wisconsin, Stevens Point, WI Spring 2019
- Edgar-Pierson Award, University of Wisconsin, Stevens Point, WI Spring 2019
- University Leadership Award, University of Wisconsin, Stevens Point, WI Spring 2018
- Culver-Rogers Award, University of Wisconsin, Stevens Point, WI Spring 2018

## Professional Societies

- American Society of Plant Biology 2022 - Present
- Crop Science Society of America 2021 - Present
- Soil Science Society of America 2021 - Present
- American Society of Agronomy 2021 - Present
- American Society for Horticultural Science 2021 - Present
- American Society for Biochemistry and Molecular Biology 2017 - Present
- American Chemical Society 2017 - Present

## Honor Organizations

- Beta Beta Beta, Biological Honors Society — Spring 2019
- Phi Kappa Phi, Collegiate Honor Society — Spring 2019
- National Society for Leadership and Success — Spring 2018
- Phi Eta Sigma, Freshman Honor Society — Spring 2017

## Extracurricular Involvement

- Member, Plant Science Club, Utah State University, Logan, UT, Fall 2021- Present
- President, Biochemistry Club, University of Wisconsin, Stevens Point, WI, Fall 2018 – Spring 2020
- Social Media Coordinator, Chemistry Club, University of Wisconsin, Stevens Point, WI, Fall 2019
- Vice-President, Botany Club, University of Wisconsin, Stevens Point, WI, Fall 2018 – Spring 2019

## Volunteer Work

- Utah State University Student Nutrition Access Center — 2021-Present
- Coloma Dynamites 4H Club, Coloma, WI — 2012-2020
- Waushara County 4H Executive Leaders Board, Wautoma, WI — 2016-2018
- Humane Society of Portage County, Plover, WI — 2016-2018
- Eyes of Hope Animal Shelter, Oxford, WI — 2008-2016
- Ice Age Trail Alliance, Coloma, WI — 2010-2012

## References

- Dr. Bruce Bugbee, Department of Plants, Soils, and Climate, Utah State University, Logan, UT, (bruce.bugbee@usu.edu) 435-512-5213
- Dr. Christopher Hartleb, Department of Biology, University of Wisconsin, Stevens Point, WI, (chartleb@uwsp.edu) 715-346-3228
- Dr. Brian Barringer, Department of Biology, University of Wisconsin, Stevens Point, WI, (bbarring@uwsp.edu) 715-346-2452
- Dr. Amanda Jonsson, Department of Chemistry, University of Wisconsin, Stevens Point, WI, (ajonnson@uwsp.edu) 715-346-2600