

Karl Hans Kunze

422 Bradfield Hall, Ithaca NY 14853

✉ khk44@cornell.edu ☎ +1-585-813-9335 🌐 [karlkunze](https://github.com/karlkunze) 🐦 [kunzx37](https://twitter.com/kunzx37) 🌐 karlkunze.github.io

Current Position

PhD Candidate in Plant Breeding and Genetics, advisor Dr. Mark Sorrells, Cornell University
2017-present

Education:

B.S. Plant Science concentration in Plant Breeding and Genetics, minor in Business for Life Sciences- Cornell University 2013-2017

Experience

Graduate Research Assistant, Graduate School Field of Plant Breeding minor in Plant Pathology and Food Science, Cornell University 2017-present

Research Projects

Weed Competitive Ability in Organic Spring Naked Barley and use collected field trait phenotypes and UAV imaging to measure barley vigor and growth in organic environments

Genetic by environmental analysis of winter organic naked barley variety trials across 3 years and 3 locations in the Northern United States

Genome wide association of of barley disease resistance across 18 location by year field trials of a naked barley diversity panels

Germination and malting quality analysis of winter barley breeding lines. Characterization of physiological maturity, pre-harvest sprouting, and dormancet breakage related to winter malting barley

Production and development of the Cornell Small Grains winter malting barley breeding program

Counducted research the USDA ARS Cereal Crops Research Unit in Madison, WI in December 2021 and January-February 2022 to assist in malting quality analysis of a subset of NY malting barley lines.

Use aerial imaging to quantify winter barley growth rates to determine winter survival and yield quality

Skills

Highly proficient in operating and data collection of a plant breeding program including recording field phenotypes, data management, using phenotype and genotype data for selection decisions, grain processing, analysis, organization, and experimental design of field trials

Highly proficient in R statistical software and Excel for data management and analysis

Basic proficiency in Unix shell scripting and command line. Limited experience with Python

Certified FAA UAS Part 107 Remote Pilots License.

Highly Proficient in flying unmanned aerial systems for imaging of plant variety trials and breeding populations. Have conducted over 100 aerial imaging flights

Basic proficiency in Agisoft Pro and Open Drone Map software stitching applications. Basic proficiency in Docker applications

Basic proficiency in chemistry malting quality analysis for alpha-amylase, diastatic power, beta-glucan, soluble wort protein and free amino nitrogen analysis

Demonstrated abilities to work in collaborative multi-institutional research projects

Co-led a weekly graduate student journal club with Will Stafstrom in the Spring 2022 semester. Topics were related to current research and topics in the fields of plant breeding, genetics and crop science

Awards Received

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| Gerald O. Mott Award Recipient | March 2022 |
| Cornell Plant Breeding and Genetics Munger-Murphy Award | August 2022 |
| Recipient of the ASA, CSSA, SSSA Future Leaders in Science Award | December 2018 |

Grants and Fellowships

Developing Multi-use Naked Barley for Organic Farming Systems I & II: USDA-NIFA-OREI Grant 2017-51300-26809

American Malting Barley Association Grant 2020-2021: Genetic Characterization of Germination Traits and Their Relationship to Preharvest Sprouting in Winter and Spring Barley

American Malting Barley Association Grant 2021-2022: Germination Traits & Relationships to Pre-Harvest Sprouting

NYS Department of Agriculture and Markets Funding

Publications

1. Travis E. Rooney, Karl H. Kunze, Mark E. Sorrells. The Plant Genome(2022) Genome wide marker effect heterogeneity is associated with a large effect dormancy locus in winter malting barley. <https://doi.org/10.1002/tpg2.20247>
2. Bunting, J. S., Ross, A. S., Meints, B. M., Hayes, P. M., Kunze, K., & Sorrells, M. E. (2022). Effect of Genotype and Environment on Food-Related Traits of Organic Winter Naked Barleys. *Foods*, 11(17),2642.<https://doi.org/10.3390/foods11172642>
3. Chris Massman, Brigid Meints, Javier Hernandez, Karl Kunze, Patrick M.Hayes, Mark E. Sorrells, Kevin P. Smith, Julie C. Dawson, and Lucia Gutierrez. Crop Science(2022) Genetic Characterization of Agronomic Traits and Grain Threshability for Organic Naked Barley in the Northern U.S. <https://doi.org/10.1002/csc2.20686>
4. Sweeney, D.W., Kunze, K.H. & Sorrells, M.E. QTL x environment modeling of malting barley preharvest sprouting. Theor Appl Genet (2021). <https://doi.org/10.1007/s00122-021-03961-5>

Professional Services

Student representative of the CSSA(Crop Science Society of America) executive board 2022-2023

Representative of the CSSA science policy committee 2022-present

Local Graduate Student Liaison representative and member for the National Association of Plant Breeders (NAPB) Graduate Student Working Group Fall 2020- August 2021

Cornell Plant Breeding and Genetics Graduate Student Association Synapsis-Professional Development Committee Member 2020-2021

Corteva Symposium organizing committee member Fall 2018-April 2019

Graduate Student Representative on the 2019 Cornell Plant Breeding Faculty Search Committee Spring 2019

Cornell Plant Breeding and Genetics Graduate Student Association, Synapsis-President 2018-2019

Plant Breeding Field representative for the Cornell Graduate and Professional Student Association 2017-2019

Graduate student representative on the Cornell University, College of Agriculture and Life Sciences alumni committee 2018-present

Professional Societies

Tri societies CSSA(Crop Science Society of America) student member 2019-present

National Association of Plant Breeders (NAPB) student member 2020-present

New York State Agriculture Society member 2017-present

Student Organic Seed Society member 2020-2021

Alumni of Alpha Gamma Rho, Zeta Chapter-Cornell University

Presentations and Conferences attended

Research Presentation titled "Interaction of Pre-harvest sprouting, germination rate and malting quality for winter and facultative malting barley" at the 23rd North American Barley Researchers Workshop and 43rd Barley Improvement Conference September 2022, UC Davis,CA

Research Presentation titled "Developing Winter Malting Barley for New York State" Michigan Beer and Malt Conference January 2022 Traverse City, MI

Research Presentation titled "Components of Weed Competitive Ability" at CSSA,ASA and SSSA Tri-society annual meeting November 2021, Salt Lake City, Utah

Presented eOrganic Webinar Titled "Progress on Organic Naked Barley Breeding, Exploration of Organic Breeding Traits" April 2021

Presenter at the Philly Malt and Grains Conference, Virtual March 2021

Attended Student Organic Seed Society (SOSS) conference- Madison, WI, August 2019

Participant in the Tri-societies poster competition Baltimore, MD, November 2018 Attended NOFA-NY Organic Conference January 2018