



February 6, 2023

Dr. Courtney Weber
Horticulture Section, Cornell AgriTech
635 W. North Street, Geneva, NY 14456

Dear Dr. Weber and members of the search committee,

I am writing to apply for the Assistant Professor of Grapevine Breeding, Genetics, and Genomics position in the Horticulture Section of the School of Integrative Plant Science (SIPS) at Cornell University. This job opportunity is extremely exciting to me; and my background and experience make me an excellent fit for this role. I have over 8 years of experience in applied horticultural, genetic, and genomic research with diverse horticultural crops. After graduating from Cornell University with a B.S. in Plant Sciences, I earned an M.S. in Horticulture at Purdue University, and a Ph.D. in Plant Breeding and Plant Genetics at the University of Wisconsin – Madison (UW-Madison). I was an NSF Postdoctoral Research Fellow in the Department of Plant and Microbial Biology at the University of Minnesota, and I am now a postdoctoral Research Associate in the Department of Horticulture at UW-Madison. I would love the opportunity to bring my experience and expertise back to New York to serve my alma mater and home-state.

My M.S. research project with Dr. Roberto Lopez focused on sustainable floriculture production under reduced air temperatures with bench-top root-zone heating. This research resulted in three peer-reviewed publications and three articles in grower magazines to disseminate my findings to both the scientific and stakeholder communities. One of my take-aways from this work was that a primary limitation of reduced-input production is the genetics of the crop. This in part inspired my pursuit of a Ph.D. in Plant Breeding and Plant Genetics with Dr. Michael Havey at UW-Madison. My Ph.D. research focused on the genetic basis of chloroplast-associated cold tolerance and parent-of-origin effects in cucumber. I ultimately identified a single nucleotide polymorphism in the chloroplast genome associated with maternally conferred cold tolerance. I also found significant, but hybrid-specific, parent-of-origin effects on early plant growth, demonstrating the value of using reciprocal crossing for improved hybrid development in cucumber. This work resulted in two peer-reviewed publications.

Upon graduating, I was awarded the NSF Postdoctoral Fellowship in Biology (PRFB) to explore how the circadian clock and temporal hormone signaling contributes to the coordination of plant responses to environmental stressors in *Brassica rapa*, a diverse crop species which includes Chinese cabbage, turnip, bok choy, and oilseed varieties. My experience in this project opened a new realm of research questions for me, integrating the concept of time (at the scale of days, seasons, and years) into my previous focus on plant resilience and stress response. In my current role as a Research Associate in the Goldman Lab, I am working with a diversity panel of *Beta vulgaris*, including table, sugar, and fodder beet, chard, and wild relatives, to map genes associated with root development and shape. Shape is an important consumer trait, giving me experience working directly on the breeding and genetics of quality traits, to complement my previous extensive work on abiotic stress tolerance. My research is part of a larger multi-institutional NSF-funded project on organ patterning and shape across horticultural crops, giving me valuable experience working with a collaborative and diverse research group towards shared objectives.

My positions in the Havey and Goldman Labs have afforded me the opportunity to work directly in all stages of their accomplished horticultural breeding programs. I am enthusiastic to apply both my formal training and education in classical and modern breeding strategies and what I have learned first-hand through my involvement in the inner workings of these two renowned and successful programs into my own breeding program. I am highly motivated by both the technical and creative aspects of plant breeding, and look forward to developing and releasing resilient, elite, and unique grape cultivars to serve and support the viticulture and wine industry in New York, and across the country and globe.

Department of Horticulture

My academic career has prepared me to take on the challenges and embrace the opportunities of leading (1) a practical breeding program, (2) a productive, high-impact, externally funded research program, and (3) a collaborative and innovative extension education and outreach program at Cornell. My lab would use traditional and genomic-assisted breeding strategies to enhance grapevine resilience and fruit quality. Use of digital image acquisition and analysis can provide a valuable platform for high throughput phenotyping for both research and breeding efforts. I will use my expertise in this type of analysis to evaluate, investigate, and improve both vine and fruit characteristics. It is also known that many secondary metabolites, important for biotic responses and quality/flavor traits, cycle or change over time on the scale of hours, days, months, and years. This a key area for me to explore for applied trait evaluation, and in the genetic and regulatory characterization of relevant metabolites. I will leverage this knowledge in my breeding program to improve evaluation and selection of grape quality traits, like color, flavor, nutrition, and chemistry.

I am eager to apply the knowledge and expertise I've gained working across diverse horticulture crops and cropping systems to grapevine breeding and genetics. I have a great interest in grapevine research and breeding given my previous work on cold stress response and tolerance and the importance of cold hardiness for New York grapevines. Having heard and read about the excellent grape breeding program at Cornell, I would be honored to utilize the resources and germplasm previously developed and curated, and to continue and expand the program's acclaimed legacy. The current program would be an invaluable asset to my work, adding to the other valuable resources at Cornell AgriTech such as the new USDA-ARS National Grape Improvement Laboratory. In framing my research, breeding, and extension aims, I will not only consider the broader needs of temperate-region grape growers to succeed in our changing climate, but upon starting in the position, I would also survey growers and winemakers in New York and the greater region to identify key traits for my research and breeding program. This will also serve to establish relationships and connections for my extension program.

In addition to my passion for research and breeding, I have a keen love for educating, in varied contexts from direct mentorship, to outreach and extension settings. I have mentored numerous undergraduate and graduate students and pursued several trainings in current pedagogy. I will continue to apply the skills and knowledge I have gained through these and future trainings to continually hone and improve my mentorship, outreach, and extension programming. My extension program would include both face-to-face interactions and collaborations, through farm/winery visits, field days, and outreach events, as well as virtual and digital programming and resource development to reach community members, growers, winemakers, and policymakers across New York and beyond. I look forward to recruiting and mentoring enthusiastic and bright scientists in my research and breeding program, as well as contributing to the mentorship and training of undergraduate and graduate students across programs within SIPS and across the institution.

Beyond research, extension, and mentorship, I am excited to become an active contributor to a section and school with such diverse interests and ideas. I really enjoy taking on leadership and service roles, as shown in my leadership positions across organizations and institutions, and regular participation in outreach activities to engage underrepresented groups with STEM and plant sciences. I love hearing different perspectives, building community, and cooperating to define and work towards shared goals. I am eager to join your section, and begin breeding grapes for resilience and quality, conducting research on the genetic bases of these traits, educating through extension and outreach, and collaborating within the school, college, and university, and across institutions, to serve and support the grape and wine industry in the Finger Lakes Region, throughout New York, across the country, and around the world.

I am enthusiastic about this opportunity and feel that I am uniquely positioned to take on this role and bring my passion and expertise to your section, school, and programs of study. I have included my Curriculum Vitae, Research Statement, Extension Statement, Diversity, Equity, and Inclusion Statement, and contact information for professional references. Please feel free to reach out with any additional questions. Thank you in advance for your consideration, and I look forward to hearing from the committee.

Sincerely,
Madeline W. Oravec (née Olberg), Ph.D.

Department of Horticulture

MADELINE W. ORAVEC (NÉE OLBERG)

Research Statement

I am committed to enhancing the sustainability of New York grape production through development of resilient and valuable cultivars, to overcome production challenges in our changing climate and meet the needs of the prolific cool-climate viticulture and winemaking industry. In my research program at Cornell AgriTech, we will focus on elucidating **genetic, regulatory, and physiological mechanisms** of stress response (specifically cold hardiness) in grapevines and undertake similar approaches to evaluate and exploit secondary metabolite production for flavor, nutritional, and winemaking characteristics of table and wine grapes. We will apply this knowledge to **genomic-assisted plant breeding** strategies to enhance **abiotic and biotic resistance and quality traits** in grapes. Through **elite cultivar development and release** and **research-supported extension education and outreach programs**, my program will support the horticulture, viticulture, and winemaking industry and engage with the community across the Finger Lakes region, New York State, and far beyond.

RESEARCH ACCOMPLISHMENTS

My early-career research focused on sustainable floriculture crop production through projects on the morphological and developmental effects of reduced-input practices. Specifically, I investigated the use of low air temperature in combination with root-zone heating to produce high-quality floriculture crops without delay. Overall, I found that high-quality petunias and poinsettias could be produced under these conditions with sufficient root-zone heating, but results were cultivar dependent (Olberg and Lopez, 2016a; Olberg and Lopez, 2017). I also found that high-quality annual bedding plants could be produced outdoors with minimal inputs, depending on species and variety (Olberg and Lopez, 2016b). Clearly, a major limitation of reduced-input crop production is the resilience of available varieties; and resilient varieties are developed by plant breeders! This realization ignited my passion for plant breeding, fostered my curiosity in the genetic and physiological mechanisms of abiotic stress response, and motivated my pursuit of a Ph.D. in Plant Breeding and Plant Genetics.

My Ph.D. research at UW-Madison focused on the genetic basis of cold tolerance and parent-of-origin effects in cucumber. I evaluated the phenotypic, genetic, and physiological basis of cold tolerance conferred by heirloom variety Chipper using reciprocal hybrids of double haploid (DH) lines; and dissected parent-of-origin effects on seed, cotyledon, and early growth traits using a full diallel cross mating scheme. I ultimately identified one candidate maternally transmitted non-synonymous single nucleotide polymorphism (SNP) in the chloroplast ATP synthase beta subunit gene of Chipper, associated with a cold recovery phenotype maternally conferred by Chipper (Oravec and Havey, 2021a). **My work on the phenotypic, genetic, transcriptomic, and physiological responses to cold stress demonstrates my expertise across these areas to apply in my grape research and breeding program.** I also revealed significant, but DH- and hybrid-specific, general and specific combining abilities and reciprocal effects across traits and populations (Oravec and Havey, 2021b). **This demonstrates my ability to use statistical and practical mating schemes to support and enhance my breeding efforts.** My continued interest in the development of stress tolerant yet productive crops led me to develop my successful NSF Postdoctoral Research Fellowship in Biology (PRFB) proposal on the interaction of circadian regulation of hormone signaling and cold tolerance in brassica. Through this work I gained valuable insights in circadian biology, skills in analyzing complex time-course data, and more experience in cold stress evaluation and physiological assays. My desire to explore horticultural quality traits steered me to my current project mapping QTL associated beet root shape traits through GWAS analysis using a diversity panel of *Beta vulgaris*, including table, sugar, and fodder beet, chard, and their wild relatives. **Through this work I have gained experience in high throughput digital phenotyping and genomic analyses for marker development to support genomic-assisted breeding.**

I've been fully involved in both the Havey Lab USDA-ARS onion breeding program and Goldman Lab root vegetable (carrot, onion, and beet) breeding programs, including trait evaluation and selection, seed cleaning and curation, bulb/root storage and vernalization, field planning and preparation,

seed/bulb/root planting and harvest, plant/field maintenance, pollinations, and plant and genetic assessments. These breeding programs focused on inbred, cultivar, and population development, using both traditional and molecular-facilitated selection for quality and production traits, such as shape and uniformity, flavor and chemical makeup, storage ability, male-sterility and fertility restoration, and biotic tolerances to major pests and diseases. **My understanding of and experience in these breeding programs will aid in building my own strategic and fruitful grape breeding program.**

FUTURE VISION

Despite rising challenges in crop production brought on by climate change, we must continue to increase production of nutritious and delicious foods and goods to feed and nourish our growing population. This requires genetic improvement of crops that are both amenable to producers and desirable to consumers. Systems approaches that address important traits across the whole production pipeline will be vital in the development of improved varieties. Climate change is influencing both biotic and abiotic factors that impact crop production. Rising temperatures and carbon dioxide levels, more erratic and extreme weather events, increasing variability in precipitation patterns, and changing distribution and impact of weeds and pathogens can all influence crop productivity. Developing agronomically and oenologically valuable grape varieties with enhanced flavor and nutritional profiles that are resilient in our dynamic and changing climate is crucial to the sustainability of our viticulture and winemaking industry. My proposed research, breeding, and extension program at Cornell AgriTech will do just that: supporting growers, winemakers, and the grape industry through applied research efforts, genomic resource development, beneficial cultivar release, and research-based resources for grape growers and winemakers.

We will employ traditional and **genomic-assisted** breeding strategies to (1) maintain and progress key **agronomic traits**, (2) enhance **resilience to abiotic and biotic stresses**, and (3) improve quality traits to increase grape **nutritional and winemaking value**. These breeding objectives will be accomplished in parallel with research aims focused on elucidating the (1) **genetic basis**, (2) **regulatory dynamics**, and (3) **physiological mechanisms** of key traits, such as those involved in cold hardiness and secondary metabolite production. My group will develop and employ high-throughput phenotyping strategies and support molecular marker development to improve the efficiency of my breeding program and grape breeding programs around the world. My breeding and research will inform and support my extension efforts to **provide current and relevant research-based support and resources to growers and winemakers** throughout the state and across the country and globe.

Additionally, my group will evaluate traits across scales of time and space. This not only reveals important insights into regulatory effects and genotype by environmental interactions, but also can inform logistical decisions such as when and how to measure traits of interest in breeding programs. Much of the evaluation and selection of quality traits occurs in a short window at or after harvest, but insights into the stability or cycling patterns of traits across the season and across a day could help optimize resource and time allocation to optimize trait evaluation and facilitate better selection. This work in how stress response and quality traits vary across time is a key avenue for both foundational and applied research efforts.

Successful breeding programs are tuned into the current needs and practices of their stakeholder community. When I first start my lab at Cornell AgriTech, I will directly connect with growers and winemakers to assess industry needs and direction and to prioritize key traits of interest for my breeding and research program. To promote and support diversity and inclusion in our industry and in my work, I will especially seek out and engage with women- and minority-owned farms and wineries. I will connect regularly with people across the stakeholder spectrum, including growers, distributors, winemakers, and consumers. I will use these dialogues to direct my research, breeding, and extension efforts, to develop relationships for on-farm and in-winery trailing, and to ensure successful introduction of new cultivars into production. My program will ultimately improve the sustainability, profitability, and success of grape and wine production in New York, across the country, and around the world; will reveal important insights on the genetic regulation and physiological mechanisms of stress response and quality trait; and will develop genomic resources for improved research and breeding efforts. This work aligns with the CALS land-grant mission of providing key research and resources to support agricultural sustainability and growth.

MADELINE W. ORAVEC (NÉE OLBERG)
Extension Statement

My extension program at Cornell AgriTech would serve and support the community and industry by (1) **generating and providing research-based solutions, education, and training** to respond to industry and stakeholder needs, (2) integrating industry and the community in scientific efforts and initiatives through **direct collaboration**, and (3) **delivering education and training resources across broad audiences** (community, industry, policymakers, etc) and platforms to facilitate continuing education, to improve accessibility and understanding of agriculture and STEM, and to advocate for science and the industry.

EXTENSION EXPERIENCE & VISION

Engaging directly with the industry and stakeholder community is vital to the success of breeding and extension programs. I have accomplished this throughout my career such as by attending and presenting at relevant stakeholder events, including the Indiana Flower Grower, Pickle Packers International, and National Onion Association meetings. At Cornell, I would directly engage with relevant grower and winemaker associations and stakeholder groups, such as the Finger Lakes Wine Alliance and the New York Wine and Grape Foundation. These interactions would inform and support my extension and breeding efforts.

It is critical that relevant research progress and findings are made accessible to producers and stakeholders. In my extension program, I would accomplish this by providing educational resources across platforms. For example, I would use more formal avenues like extension bulletins, webinars, digital training modules, in-person programming. I would also try to meet growers and producers “where they are”, such as through direct communication, vineyard/winery visits, and through articles or newsletters in popular magazines and websites. During my M.S. I personally visited many growers and operations throughout the state, sharing applicable findings about the implementation of reduced greenhouse air temperatures in combination with root-zone heating for energy cost savings. I valued the growers’ perspectives to help direct my continued research efforts and was able to provide pertinent information to growers using these techniques about optimal temperature setpoints and crop/cultivar selection. I also published three grower magazine (GPN, Grower Talks, and Greenhouse Grower) articles based on my research to disseminate my findings on reduced input production practices to industry professionals and broader audiences. My group will generate, develop, distribute, and promote key resources on current research, best practices, and cultivar selection in partnership with relevant groups at Cornell and across the state, such as the Cornell Institute for Digital Agriculture (CIDA), the Cornell Climate Smart Farming program, and Cornell Cooperative Extension.

The success of a breeding program depends on the adoption and use of released varieties. For a grape breeding program, this success must span from the vineyard to the winery. In the Goldman Lab beet breeding program, we interact with both producers and restaurants to assess and receive feedback on the appeal and relevance of new varieties. In Fall 2022, I personally delivered beets from our breeding program to world-renowned chef, Dan Barber, at his restaurant, Blue Hill at Stone Barns, in New York for trialing and consultation. These relationships help facilitate both the successful adoption of new varieties, as well as provide valuable feedback for improved selection in our breeding program. I will build these types of relationships with vineyards, wineries, and restaurants to assess and evaluate new grape varieties developed in my program, and to fine-tune the aims of my continued research and breeding efforts. I will also use the feedback I receive to help frame the extension resources I generate describing new varieties and educating producers and winemakers on their value and utility. To directly address and promote diversity, equity, and inclusion (DEI) in my extension program, I will prioritize collaborations with woman- and minority-owned restaurants, vineyards, and wineries.

As part of my extension efforts, I will also plan, organize, participate in, and promote outreach events and resources that engage the broader community in STEM, agriculture, or plant sciences. I will prioritize events that engage underrepresented groups in these fields. I have experience planning and

participating in events like this, such as Expanding Your Horizons, an event to engage middle-school-aged girls in STEM; CALS Experience Weekend, a program to introduce minority students from inner-city Chicago to agricultural research; and the Boy Scout Merit Badge workshop, a full-day workshop to teach scouts across ages about plant sciences.

Finally, my extension program will serve to advocate for the grape growing and winemaking industries in New York and across the country; and will educate the public and policymakers on the value and practices of these industries. These efforts will help protect and support the needs of producers and winemakers and maintain the continued growth and success of these industries in New York and beyond.

MADELINE W. ORAVEC (NÉE OLBERG) Diversity, Equity, and Inclusion Statement

Advancing diversity, equity, and inclusion (DEI) should be a prominent objective in every lab, program, and institution. Structural inequities have long been the norm in science and academia, excluding voices and perspectives, tolerating discrimination, and undermining progress. To address this and work on the reconciliation of these systemic issues, I regularly participate in intentional and difficult conversations, initiatives, and programs to address systemic inequities and personal biases centering on racism, sexism, ableism, and other forms of discrimination. As a postdoc at the University of Minnesota, I was part of the UMN College of Biological Science (CBS) DEI Incentives and Recognition Action Team, in which we explored ways to encourage, measure, and reward efforts to support and promote diversity, equity, inclusion and justice in research, teaching, mentoring, service, and training. Our recommendations are now being put into action to better align professional recognition with college values centering on DEI. This type of systemic problem requires solutions across the institution, department, program, course, and lab group levels. I am committed to being part of this movement to continue progress in promoting, enhancing, and supporting DEI and dismantling systemic inequity within my lab and extension program, section/school, college, and institution at large. I will make conscious efforts in my research, breeding, extension, and mentorship to support, uphold, and expand the Cornell AgriTech DEI values of community, collaboration, innovation, integrity, and diversity (<https://cals.cornell.edu/cornell-agritech/about-agritech/DEI>).

SUPPORTING DEI THROUGH RESEARCH & EXTENSION

One of the unique and appealing benefits of horticultural plant breeding and research is the relevance of the work to a broad and diverse community – people enjoy and engage with the foods and drinks they prepare and consume. This is a great avenue for supporting DEI goals in my work, through engagement with people across backgrounds and cultures. To directly address and promote DEI in my research and breeding efforts, I will integrate a diverse body of growers, farmers, and members of community in my breeding program, such as through farm visits, field days, and community events. Additionally, **I will seek out, support, and collaborate with woman- and minority-owned farms, operations, and wineries.** These are mutually beneficial endeavors for supporting my work and supporting the community and industry. For example, engaging a broad and diverse audience in selection and trait evaluation provides key insights into consumer preference and niche markets for my breeding program. And these collaborations ensure the research I perform and varieties I develop can and will directly support, serve, and benefit diverse communities and minority-owned operations.

I will ensure my extension resources and programming are accessible and beneficial to diverse audiences. This will include creating content across platforms and medias. Additionally, my extension education and applied research efforts will support the needs of and address the challenges faced by both large and small operations. According to the 2017 Census of Agriculture, Black, Indigenous, and People of Color (BIPOC) farmers and producers only accounted for 1.3% of producers in New York State, and over a third of those producers were operating on just one to nine acres. A Working Group was assembled as a result of these findings and four key themes for progress were developed, the second of which was “Access to Education and Training.” As part of my extension program, I would contribute to this initiative by providing readily accessible research-informed resources, education, and training in grape production and cultivar selection, and by working to connect BIPOC students and trainees with paid hands-on and on-farm opportunities to encourage and support the entry of more BIPOC producers into New York State agriculture.

I will organize outreach events that directly engage underrepresented groups in STEM, plant sciences, and my research. I have experience planning, executing, and contributing to these types of events. For example, for two years, I hosted a DNA-extraction and plant virus detection activity for Expanding Your Horizons, an event to engage middle-school-aged girls in STEM, and led an interactive presentation on plant breeding, virus detection, and crop diversity selection for the CALS Experience

Weekend, a program to introduce and recruit minority students from Chicago to agricultural research. I also worked on the planning and organization of a Boy Scout Merit Badge workshop, a full-day workshop to teach scouts across ages and backgrounds about plant sciences and agriculture. I would lead, host, plan, and contribute to similar programs at Cornell, to engage people from all stages of life, backgrounds, and cultures in agriculture, plant sciences, and STEM.

ENHANCING DEI THROUGH RECRUITMENT AND MENTORSHIP

I will recruit and support a diverse body of researchers in my lab and across programs in SIPS. I will tailor my recruitment efforts to directly target underrepresented groups, such as through attendance of events like the Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) and Minority Serving Institutions, Minorities in Agriculture, Natural Resources, and Related Sciences (MANRRS) conferences, and through direct recruitment at historically black colleges and universities (HBCUs). Additionally, I will recruit underrepresented and underprivileged high school and undergraduate students for paid internships and projects during the summer season, to encourage earlier engagement with agriculture and STEM opportunities.

My holistic mentorship style supports community across diversity by tailoring to the individual needs of the members of my group, while supporting collaboration and community building. To me, holistic mentorship means being invested in scientific and career development, as well as personal growth. The scientific community has a responsibility to address the ongoing mental health crisis in academia and specifically in graduate school, and I believe holistic mentorship practices are part of the solution. Multiple studies corroborate that 1 in 3 PhD students are at risk of, have, and/or have sought help for psychiatric disorders, such as anxiety and depression. These matters have only been exacerbated by the turmoil, uncertainty, and obstacles of the COVID-19 pandemic. I am deeply motivated to work towards the resolution of this systemic and enduring crisis. I believe work-life balance must be a priority and out-of-date concepts about the necessity of overworking for career success must be overturned. I will promote open dialogue with all the undergraduates, graduate students, postdocs, and scholars that I mentor about my and their needs and expectations. Paired with regular reassessment, I believe this can help to create a **positive work environment that fosters productivity and scholarship without sacrificing health and happiness.** I consider this integral to supporting DEI and promoting true career success.

I will make conscious and overt efforts to create a supportive, inclusive, and equitable environment in my lab group. I will not tolerate any type of discrimination or marginalization in my lab and will train my students in and encourage bystander intervention to maintain these expectations in our group and across the program and university. Inclusive mentorship practices can help build a supportive lab culture and learning environment. In a full-day workshop on inclusive teaching, offered through DELTA Program and the Collaborative for Advancing Learning and Teaching at the UW-Madison, I learned and practiced many inclusive teaching strategies to support DEI. Additionally, inclusive practices were a major focus in the course I took about current pedagogy and teaching approaches, Teaching in Science and Engineering: The College Classroom (EPD 654). **I employ and embrace many of the same strategies for inclusive teaching in my mentorship practices.** For example, I will use clear and intentional language that overtly supports DEI initiatives, embraces diverse ideas, and values creativity. I will ensure that my lab materials are accessible across audiences and student needs. And I will develop and mentor students in research projects that reflect diverse perspectives and encourage ingenuity and original ideas. **My relationship-centered, holistic, and compassionate approach to mentorship endorses identity awareness, values students across backgrounds, and cultivates belonging.** I remain committed to continual growth and learning and will continue to seek opportunities to learn and exercise inclusive and equitable practices in education and mentorship.