



## Message from the Director

**The final days before the start of a busy field season can be hectic: sampling seedlings; ordering supplies; and lining up spring labor. During such a packed period, it's been wonderful to see so many connections being made or maintained amongst researchers, students, and our Advisory Board during our Annual and First Quarter meetings. Over the last few months we've been working to lay the groundwork not only for this year's funded research obligations, but for incorporating the feedback we received from our Advisory Board. This spring, we're especially grateful for your continued support, engagement, and valuable advice.**

~Matt Clark



Photos by Nick Parkhill

## Meeting Information

Objective 1 Q2 meeting: [June 10 9am PT/11am CT/12pm ET](#)

Objective 2 Q2 meeting: [May 29 12pm PT/2pm CT/3pm ET](#)

Objective 3a: *On hiatus until Summer 2024*

Objective 3b Q2 meeting: *TBD*

Grape Phenotyping Roundtable with Drs. Bruce Reisch, Peter Cousins, and Matt Clark: [April 15th 8am PT/10am CT/11am ET](#)

Objective 4 Q2 meeting: *TBD*

**Annual Meeting Recording:** Our Grad Student/Postdoc Lightning Talks and Keynote Presentation by Dr. Oliver Trapp were recorded. [Click here to view the recording.](#)

Questions about upcoming meetings? Email Kate at [fessl023@umn.edu](mailto:fessl023@umn.edu)

# Objective Updates

## Objective 1:

Manon Paineau, Cantu lab, has localized the *Ren1* locus in the genome of five *Ren1*<sup>+</sup> *V. vinifera* spp. *vinifera* from Central Asia. The comparison of the five *Ren1*<sup>+</sup> haplotypes showed some structural variation, suggesting that the PM-resistant cultivars carry different haplotypes of the locus. Regarding the role testing of candidate genes, Sadanand Dhekney's lab performed the transformation of Thompson Seedless to knock-in four and two candidate genes of *Ren6* and *Ren7*, respectively, previously identified by Melanie Massonnet, Cantu lab. Chris Dardick has started the transformation of Thompson Seedless to knock-in two candidates of *RPV33* (Zou *et al.*, 2023).

## Objective 2:

We are now able to use our genome-wide rhAmpSeq markers to predict 17 RPV alleles for resistance to downy mildew (!), in addition to 11 resistance alleles for powdery mildew and 9 other fruit chemistry and pest resistance traits. Over 66,000 samples have now have been tested with rhAmpSeq markers, including nearly all grapevines from both USDA repositories. Dr. Cheng Zou designed KASP markers for 12 traits, seven of which have been independently validated in breeding programs; one failed, and four others will soon be tested by Cornell. We are coordinating Blackbird microscopy experiments with the grape breeders for the 2024 growing season - [reach out to Lance or Anna if you have an experiment you would like executed.](#) Finally Dr. Yu Jiang's program has made good progress in analyzing 2023 vineyard images and is preparing to send out vineyard imaging robots in April and May - make sure to connect with Yu if you want one.

## Objective 3a:

Vines in the experimental vineyard are scheduled to be pruned and assessed for overwintering survival in coming weeks. Dave and Katie are hoping that the warmer than average winter season allowed for better survival, but after a few very unseasonably warm days, the vineyard crew is on high alert for signs of early bud break. Stay tuned: we will know more within the next few weeks!



### **Objective 3b:**

We have streamlined our MAS pipeline this year with about 50 plates-worth of tissue already collected for rhAmpSeq and a further 49 on the way, across our 10 participating programs. KASP validation efforts are expanding to new institutions and germplasms, and several novel primer sets have recently been designed for deployment in the coming weeks. Several community resource workshops are under development, including a Grape Phenotyping Roundtable that will be held on April 15th with Drs. Bruce Reisch, Peter Cousins, and Matt Clark facilitating (more info above!)

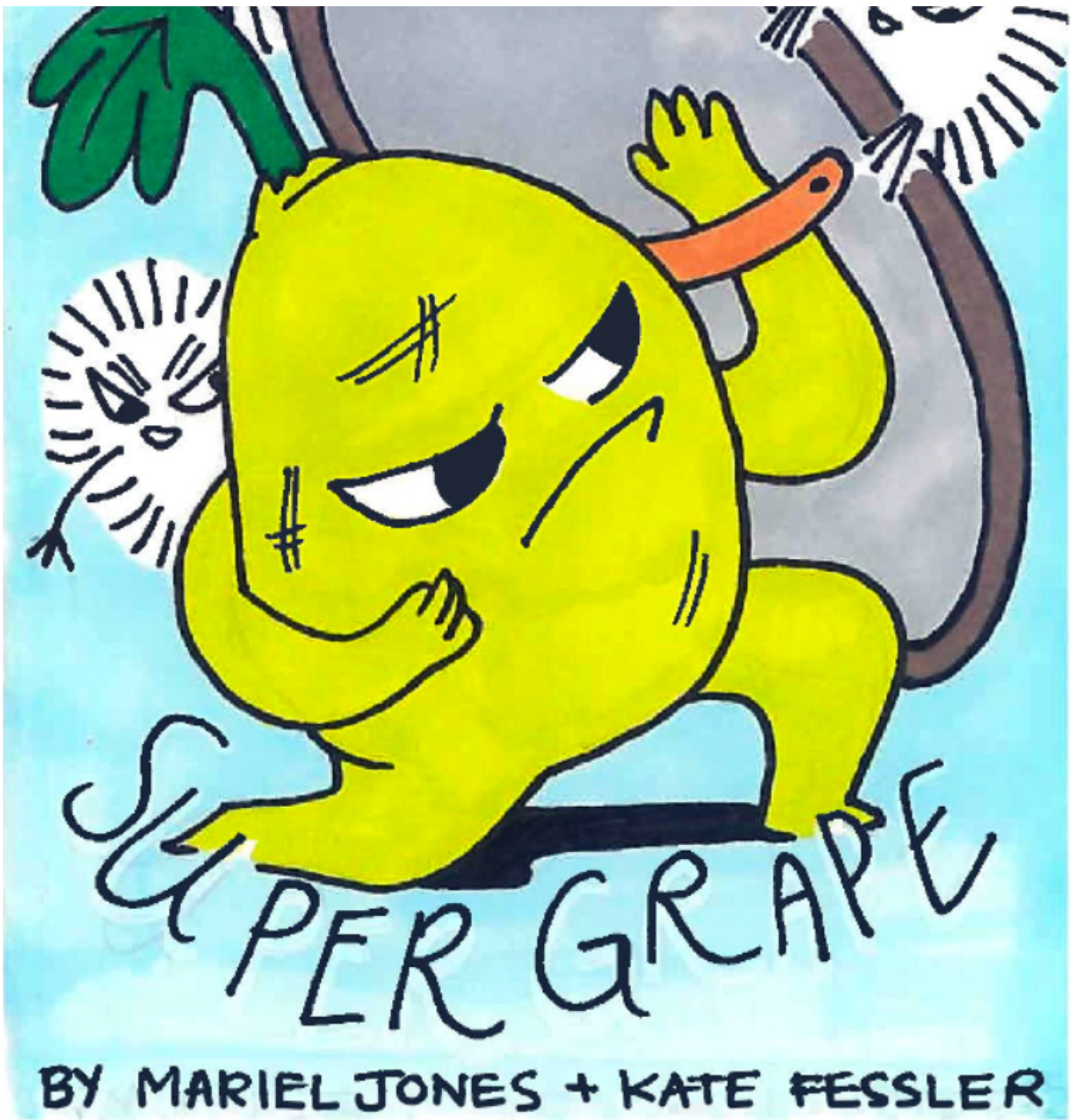
### **Objective 4:**

The team has met on a regular basis and is working on label designs. The team has reviewed the labels designed by our undergraduate design student and suggested changes. We plan to send the labels to Kate and Matt for review before finalization. In the meantime, we are working on experimental designs and planning on the forthcoming mock sessions for testing the EEG and eye-tracking experiments.

## Social media roundup

Click on an image to open the post!









## Announcements

Contact Kate Fessler at [fessl023@umn.edu](mailto:fessl023@umn.edu) to add announcements to this newsletter

Michelle Moyer's Spring Extension newsletter is doing a call for articles! If you have a short, grower focused VG3 article, please email [michelle.moyer@wsu.edu](mailto:michelle.moyer@wsu.edu)

Breeding programs: Please remember to send any updated selection names to the database team at Cornell so they can maintain the most up-to-date version for ease of data access.

Coloring book pages (appropriate for ages 2+) and grape breeding comics (ages 5+) are now available in the VG3 Resource Drive Extension Folder! Feel free to print a stack for any and all outreach events at your institution.

VG3 postcards have been printed. Send your mailing address to [fessl023@umn.edu](mailto:fessl023@umn.edu) to receive a set to hand out at your next event.

## Faculty Spotlight: Anand Dhekney



University of Maryland Eastern Shore

Professor, Department of Agriculture, Food and Resource Sciences

I will be responsible for the functional analysis of candidate genes involved in imparting grapevine resistance to powdery mildew. Any identified candidate genes will be tested by their engineering into susceptible table and wine grape cultivars and studying the response of engineered lines to powdery mildew infection. Simultaneously, identified candidate genes will be edited in resistant *Vitis species* using CRISPR/Cas9 to determine whether loss of function in a resistant species will make it susceptible to infection by powdery mildew. Thus, a knock-in/knock-out approach will be utilized to study the role of resistant genes and their potential transfer to susceptible wine and table grape cultivars using conventional and precision breeding.

I have been very fortunate to work on grapes and conduct research in grape biotechnology for the past 21 years. Being so familiar with the technology, makes every single day feel like a lot of fun and less of work. I am excited to wake up every single day to go to the lab and see what's new and has changed from yesterday.

## Student Spotlight: Hava Delavar



North Dakota State University

Advisor: Dr. Harlene Hatterman-Valenti

Hava Delavar is a Ph.D. student studying plant sciences at North Dakota State University, specializing in plant breeding and genetics. She is advised by Professor Hatterman-Valenti and actively participates in the Grape Germplasm Enhancement Project, alongside her involvement in high-value crop production. With remarkable experience in QTL mapping and molecular work, Hava is enthusiastic about finding innovative solutions to enhance grapevine resilience in challenging environments. Her research focuses on unraveling the genetic architecture of grapes and identifying candidate genes responsible for cold hardiness.

Ultimately, her goal is to advance viticulture by combining the adaptive traits of wild North American species with the excellent fruit quality of European grapes, aiming to develop a new grapevine variety that excels in both adaptability and fruit quality.



From Hava: My role is working with two core families of VitisGen3, primarily involved in phenotyping and preparing samples for genotyping. I appreciate the organized structure of VitisGen3, and my favorite aspect is the opportunity to learn something new each day while working on the project.

## Upcoming Conferences

Click on underlined text for more information about each event

U.S. Sustainable Winegrowing Summit, **April 30-May 1, 2024 in Lodi, CA**

ASEV National Conference, **June 17-20, 2024 in Portland, OR**

In Vino Analytica Scientia 2024, **July 9-12, 2024 in Davis, CA**

International Conference on Grapevine Physiology and Biotechnology, **December 18-19, 2024 in Barcelona, Spain**

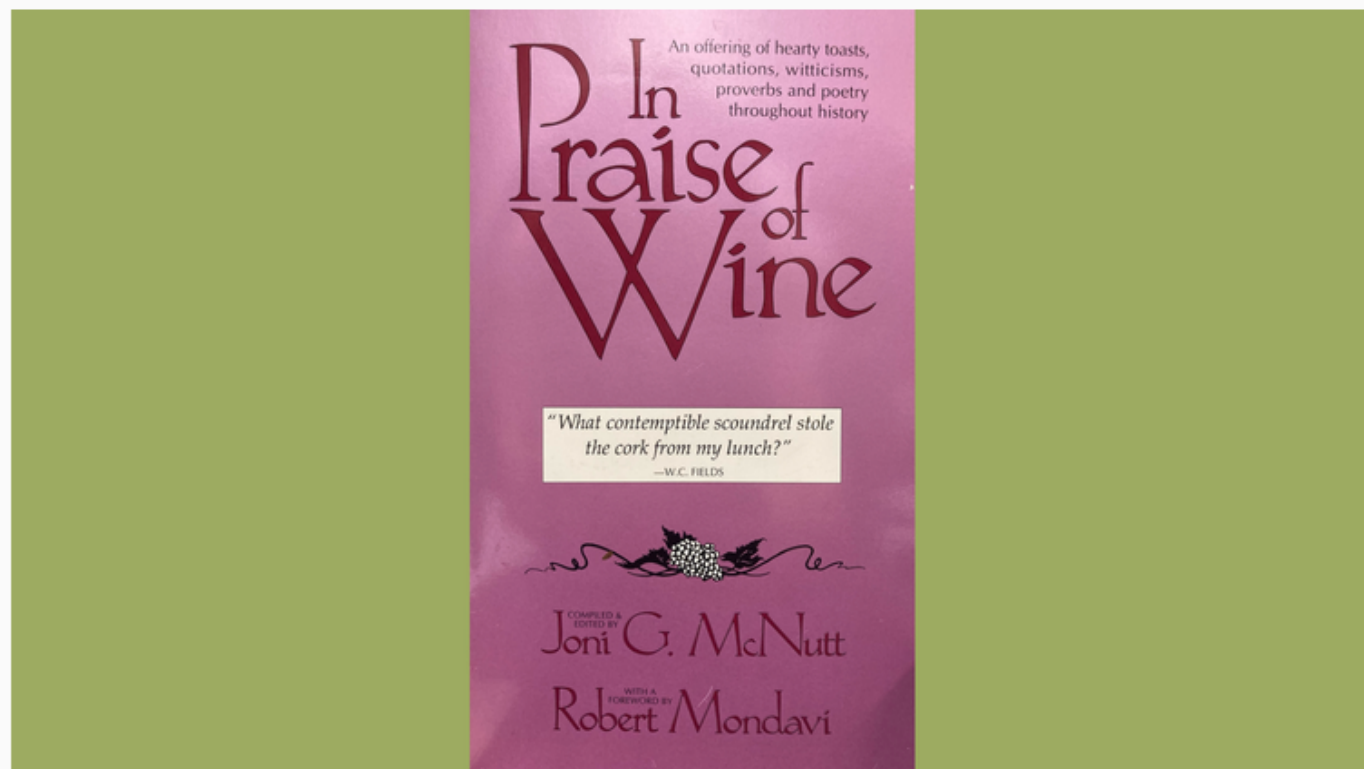
## Upcoming Extension Events

Click on underlined text for more information about each event

Eastern Viticulture and Enology Forum (EVEF) webinar series in collaboration with Penn State, Colorado State, Cornell, U of Georgia, Iowa State, U of Maryland, Ohio State, and Rutgers

Oregon Wine Research Institute Grape Day, **April 2, 2024 10:30am-5pm PST in Corvallis, OR**

## UGA Small Fruits Extension Meeting, **Jun 5, 2024** in **Watkinsville, GA**



Kate recently found a copy of Joni G. McNutt's *In Praise of Wine* at a secondhand shop! Please enjoy a selection from within:

"No, Agnes, a Bordeaux is not a house of ill-repute."

~George Bain: *Champagne is for Breakfast*

Canadian author b. 1920

## Recent papers from VG3 PIs and Collaborators

Abbey, M., Smith, A. G., **Yue, C.**, Marson, C., Lai, Y., & Stowers, C. (2024). Measuring specialty crop grower willingness to pay for genetic modification and genetic editing. *Agribusiness*, agr.21911. <https://doi.org/10.1002/agr.21911>



Arro, J., Yang, Y., Song, G., **Cousins, P.**, Liu, Z., & **Zhong, G.-Y.** (2024). Transcriptome analysis unveils a potential novel role of *VvAP1* in regulating the developmental fate of primordia in grapevine. *Fruit Research*, 0(0), 1–10. <https://doi.org/10.48130/frures-0024-0004>

Chamness, J. C., Cody, J. P., Cruz, A. J., **Voytas, D. F.** Viral delivery of recombinases to activate heritable genetic switches in plants. (2024). In *Biotech Week* (pp. 1263-). NewsRX LLC.

Chitwood, D. H., Torres-Lomas, E., Hadi, E. S., Peterson, W. L. G., Fischer, M. F., Rogers, S. E., He, C., Acierno, M. G. F., Azumaya, S., Benjamin, S. W., Chalise, D. P., Chess, E. E., Engelsma, A. J., Fu, Q., Jaikham, J., Knight, B. M., Kodjak, N. S., Lengyel, A., Muñoz, B. L., ... **Diaz-Garcia, L.** (2024). A high resolution model of the grapevine leaf morphospace predicts synthetic leaves. <https://doi.org/10.1101/2024.03.08.584086>

Cochetel, N., Minio, A., Guarracino, A., Garcia, J. F., **Figueroa-Balderas, R.**, **Massonnet, M.**, Kasuga, T., Londo, J. P., Garrison, E., Gaut, B. S., & **Cantu, D.** (2023). A super-pangenome of the North American wild grape species. *Genome Biology*, 24(1), 290. <https://doi.org/10.1186/s13059-023-03133-2>

**de Sousa Moreira, L.**, **Clark, M. D.**, Tabb, A., Karn, A., Londo, J. P., **Zou, C.**, **Sun, Q.**, van Zyl, S., Prins, B., DeLong, J. D., Burhans, A., Yang, H., & Naegele, R. P. (2024). Identification of Novel Quantitative Trait Loci Associated with Table Grape Fruit Quality Characteristics in a Segregating Population and Transferability of Existing Quality Markers. *J. Amer. Soc. Hort. Sci.*, 149(1), 50-60. Retrieved Jan 29, 2024, from <https://doi.org/10.21273/JASHS05334-23>

**Gadoury, D. M.**, **Cadle-Davidson, L.**, & **Gold, K.** (2023). *USE OF UV LIGHT FOR SUPPRESSION OF GRAPEVINE DISEASES.*

**Gold, K. M.**, Galvan, F. E. R., Rubambiza, G., Liu, E., Kanaley, K., Bolton, S., Starr, C., Whitcraft, A., Weatherspoon, H., & Pavlick, R. P. (2023). *Scalable asymptomatic Grapevine Leafroll Virus Complex-3 detection through integrated airborne imaging spectroscopy, autonomous robotics, and cloud computing.*

Kaya, O., Yilmaz, T., Ates, F., Kustutan, F., **Hatterman-Valenti, H.** et al. Improving organic grape production: the effects of soil management and organic fertilizers on biogenic amine levels in *Vitis vinifera* cv., 'Royal' grapes. *Chem. Biol. Technol. Agric.* **11**, 38 (2024). <https://doi.org/10.1186/s40538-024-00564-2>

Köse B, Svyantek A, Kadium VR, Brooke M, Auwarter C, **Hatterman-Valenti H.** Death and Dying: Grapevine Survival, Cold Hardiness, and BLUPs and Winter BLUEs in North Dakota Vineyards. *Life*. 2024; 14(2):178. <https://doi.org/10.3390/life14020178>

Kunter B., Unal O.B., Keskin S., **Hatterman-Valenti H.**, and Kaya .O (2023). Comparison of sugars and organic acids components of seventeen table grapes varieties produced in Ankara (Turkey): a study over two consecutive seasons. *Front. Plant Sci.* 15:1321210. [doi:10.3389/fpls.2024.1321210](https://doi.org/10.3389/fpls.2024.1321210)

Liu, D., Myers, E. A., Xuan, S., Prichard, L. E., Donahue, L. I., Ellison, E. E., Starker, C. G., & **Voytas, D. F.** (n.d.). Heritable, multinucleotide deletions in plants using viral delivery of a repair exonuclease and guide RNAs. *Plant Physiology*. <https://doi.org/10.1093/plphys/kiae015>

Montero, M. L., Colonna, A. E., **Gallardo, R. K.**, & Ross, C. F. (2024). Sensory profiling of pears from the Pacific Northwest: Consumers' perspective and descriptive analysis. *Journal of Food Science*, 1750-3841.16913. <https://doi.org/10.1111/1750-3841.16913>

Rogers, D. E. E., Stone, D. A. L., Burchard, M. E., Sherman, M. D. J., & **Dardick, D. C.** (2024, February 19). *Almond can be infected by Plum Pox Virus-D isolate Penn4 and is a transmission-competent host* (world) [Research-article]. <https://doi.org/10.1094/PDIS-09-23-1910-SC>

Scorza, R., Demuth, M., Artlip, T., & **Dardick, C.** (2024). 'Tango' Female and 'Hombre' Male Freeze-tolerant Kiwis (*Actinidia chinensis* Planch var. *Chinensis*). *HortScience*, 59(2), 220–224. <https://doi.org/10.21273/HORTSCI17485-23>



Sinclair, G., **Galarneau, E. R.**, Hnizdor, J. F., McElrone, A. J., Walker, M. A., & Bartlett, M. K. (n.d.). Grape cultivars adapted to hotter, drier growing regions exhibit greater photosynthesis under hot conditions despite less drought-resistant leaves. *Annals of Botany*. <https://doi.org/10.1093/aob/mcae032>

Song, G., Liu, Z., & **Zhong, G.-Y.** (2024). Regulatory frameworks involved in the floral induction, formation and developmental programming of woody horticultural plants: A case study on blueberries. *Frontiers in Plant Science*, 15, 1336892. <https://doi.org/10.3389/fpls.2024.1336892>

Torres-Lomas, E., Lado-Jimena, J., Garcia-Zamora, G., & **Diaz-Garcia, L.** (2024). Segment Anything for comprehensive analysis of grapevine cluster architecture and berry properties. *arXiv.Org*. <https://doi.org/10.48550/arxiv.2403.12935>

Waite, J. M., & **Dardick, C.** (2024). IGT/LAZY genes are differentially influenced by light and required for light-induced change to organ angle. *BMC Biology*, 22(1), Article 1. <https://doi.org/10.1186/s12915-024-01813-4>

Waite, J. M., Hollender, C. A., Eilers, J. R., Burchard, E., & **Dardick, C.** (n.d.). Peach LAZY1 and DRO1 protein-protein interactions and co-expression with PRAF/RLD family support conserved gravity-related protein interactions across plants. *Open Access*.

Yang, Y., Wheatley, M., Meakem, V., **Galarneau, E.**, Gutierrez, B., & **Zhong, G.** (2024). Editing *VvDXS1* for the creation of muscat flavour in *Vitis vinifera* cv. Scarlet Royal. *Plant Biotechnology Journal*, pbi.14290. <https://doi.org/10.1111/pbi.14290>

Yilmaz T., Ates F., Turan M., **Hatterman-Valenti H.**, Kaya O. (2024). Dynamics of Sugars, Organic Acids, Hormones, and Antioxidants in Grape Varieties 'Italia' and 'Bronx Seedless' during Berry Development and Ripening. *Horticulturae* 10(3):229. <https://doi.org/10.3390/horticulturae10030229>

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Note: Due to privacy policies at the University of Minnesota, we are no longer able to publish student profiles on our website. Thank you for your understanding about this policy change!

## Call for website contributions!

Do you have a research update to share? Some cool photos to show off? A student looking to add a byline to their CV? Email Kate Fessler at [VitisGen3@umn.edu](mailto:VitisGen3@umn.edu) or [fessl023@umn.edu](mailto:fessl023@umn.edu)



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