VitisGenIII
Quarterly Newsletter, April 2023

Message from the Director

The *Vitis*Gen3 project is off to a great start! Spring brings grape seeds germinating at breeding programs and the protocols for Marker Assisted Selection (DNA testing) being implemented. Lots of decisions are being made about the granular details in experimental design for each project objective, extension coordination, and communications. This includes our new website, *Vitis*Gen3 Logo, and updated social media. Our current IRB has been approved and remaining 2023 funds should be distributed soon.

~Matt Clark

2nd Quarterly Meeting Dates

Objective 1: Genes-on-the-shelf, led by Dr. Dario Cantu
~~Wednesday April 12th, 9am PST/11am CST/12pm EST~~
RESCHEDULED, new date TBD

Objective 2: Tools-in-the-toolbox, led by Dr. Lance Cadle-Davidson
Monday, April 17th, 12pm PST/2pm CST/3pm EST

Objective 3b: Sticks-in-the-ground, led by Dr. Matthew Clark
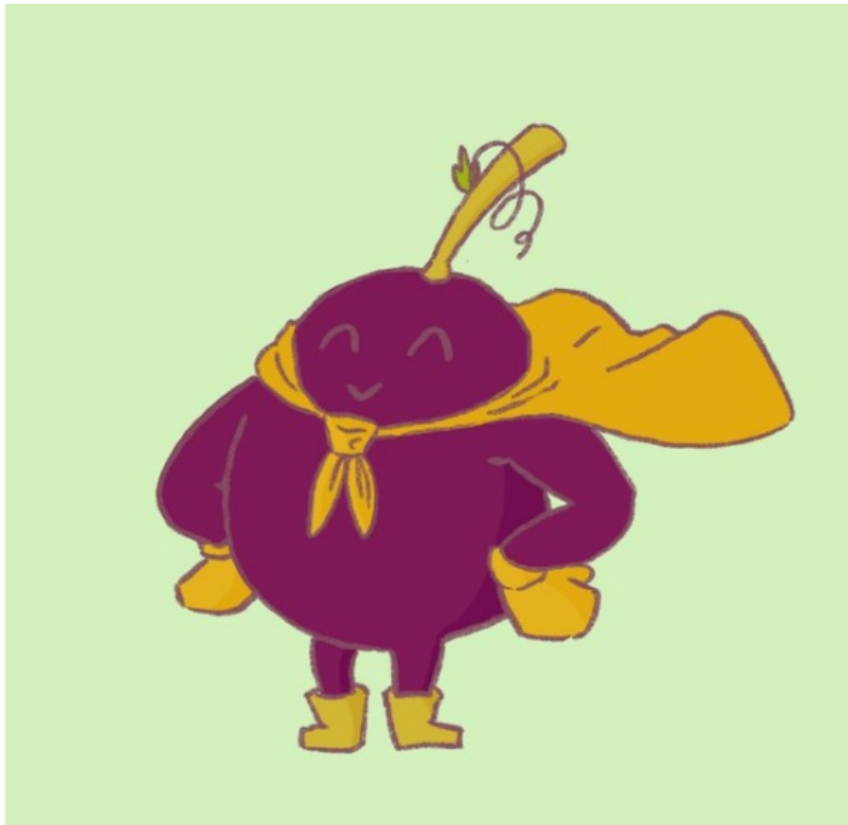Wednesday, May 3rd, 11am PST/1pm CST/2pm EST

Objective 4: Grapes-on-the-table, led by Dr. Chengyan Yue
Tuesday, May 16th, 9am PST/11am CST/12pm EST

Not sure which meeting to attend? Email Kate at fessl023@umn.edu

Blog post roundup

Click on an image to open the post!

Updates from our Objective Leads

Objective 1: Dario Cantu

The Cantu and Cadle-Davidson labs are focused on Objective 1, "Genes on the shelf," which involves identifying genes related to grape powdery mildew (PM) resistance. The teams' first step is to identify candidate NLR genes among nine genetic loci found in diverse wild grapes. Once the candidate genes are identified, the teams will test their role in resistance by conducting stable knock-ins in PM-susceptible *Vitis vinifera* plants, transient RNAi-mediated knock-downs in PM-resistant sources, and stable knock-outs using genome editing. A new postdoc, Manon Paineau, joined the Cantu Lab in Fall 2022 and has completed the phased chromosome reconstruction of three of the five *Ren1+ V. vinifera* accessions. Mélanie Massonnet has begun the manual refinement of gene models within the two haplotypes of the *Ren6* and *Ren7* loci in the *V. piasezkii* genome, and Cheng Zou has done the same for *Rpv33* from *V. x doaniana*. The team is in the process of cloning binary vectors to test the role of two candidate genes for *Rpv33* and five candidate genes identified in the resistance loci *Run1.2b+* and *Run2.2+* haplotypes of *Muscadinia rotundifolia* Trayshed.

Objective 2: Lance Cadle-Davidson

The Objective 2 team has been working on two subobjectives: computer vision and marker-assisted selection (MAS). For vineyard computer vision, Yu Jiang's group is coordinating the logistics of Year 1 vineyard imaging with Cornell/ARS, Minnesota, South Dakota, and ARS-Parlier. For lab computer vision, Lance Cadle-Davidson's group will receive samples for 8 Blackbird experiments from breeders starting mid-April. Hyperbird is being optimized with Katie Gold's group. For MAS, Kate Fessler has coordinated tissue collection and worked the logistics of DNA isolation, Cheng Zou has designed assays for low-cost KASP marker testing of 10 loci, and Lance is coordinating with Ag-Biotech to test-run samples this spring. Qi Sun has hired a postdoc to join the team in April. Curators Claire Heinitz and Erin Galarneau are making plans to sample their entire collections this summer for DNA isolation at ARS-Geneva, with support from Moira Sheehan's Breeding Insight project.

Objective 3 (field trial): Katie Gold

Establishment of two experimental vineyards will occur during spring of 2023, located on a research farm maintained by Cornell AgriTech in Geneva. The first planting will be of NY06.0514.06, which will be minimally sprayed to asses their resistance to both powdery and downy mildew. Disease assessments will be conducted weekly throughout the season by human, hyperspectral, and phytopatholobot to verify and cross check findings. The second planting will consist of six selections from the Reisch breeding program, and each row will serve as a replicate for fungicide efficacy rating. Fungicide treatments will include: no fungicide; early bloom only; early bloom+1 mid-season application; early bloom+post-chasmothecia detection; and early bloom + post-harvest.

Objective 4: Chengyan Yue

The socioeconomic team is working on literature review on eye-tracking studies and information overloading. Focus group discussion questions have been developed and will be reviewed with the industry advisory panel members. Once the focus group discussion questions are finalized, participants will be recruited and we expect to conduct the focus group discussion in early summer. In the meantime, the team has been working with the companies Tobbi and Ant Neuro on the functions of eye tracking and EEG equipment and will purchase the equipment early summer when the funding is released.

Quarterly Staff Spotlight: Melanie Massonet

My role within *Vitis*Gen3 is to identify genes responsible for powdery mildew resistance in the wild grapes *Vitis piasezkii* and *Muscadinia rotundifolia*. The discovery of resistance genes will allow us to develop perfect markers (i.e. molecular markers specific to the resistance genes) for marker-assisted selection and accelerate the breeding process. These markers will also help create new cultivars that combine both strong and durable powdery mildew resistance with high-quality fruit traits, and thus ensure sustainable viticulture.

As a former member of *Vitis*gen2, I am thrilled about *Vitis*gen3. I love being part of this amazing multi-disciplinary team and I am very excited to carry on the work that the genetic team has started in *Vitis*gen2.

Upcoming Conferences

Save the Date! New Growers Symposium of Georgia **June 24th in Carrolton, GA**
Contact Dr. Sarah Lowder at Sarah.Lowder@uga.edu for more info

74th American Society for Enology and Viticulture National Conference **June 26-29 in Napa, CA**

GiESCO meeting **July 17-21 at Cornell University in Ithaca, NY**

VII Symposium of Mediterranean Malvasias **September 27-30 in Dubrovnik, Croatia**

Save the date! National Association of Grape Breeders Conference will be held **October 3-4th at the University of Arkansas in Fayetteville, AK**
Contact Dr. Margaret Worthington at mlworthi@uark.edu for more info

V International Symposium on Biotechnology and Molecular Breeding in Horticultural Species **October 18-21 in Nanjing, China**

Recent papers from VG3 PIs and Collaborators

Agüero, C. B., **Riaz, S.**, Tenscher, A. C., Bistué, C., & Walker, M. A. (2022). Molecular and functional characterization of two RGA type genes in the PdR1b locus for Pierce's disease resistance in Vitis arizonica/candicans. *Plant Cell, Tissue and Organ Culture (PCTOC)*, *151*(3), 497–510. https://doi.org/10.1007/s11240-022-02366-6

Brodsky, H., Calderón, R., Hamilton, D., Li, L., Miles, A., Pavlick, R., **Gold, K.**, Crandall, S., Mahowald, N. (2023) Assessing Long-Distance Atmospheric Transport of Soilborne Plant Pathogens [dataset] Cornell University eCommons Repository. https://doi.org/10.7298/ddgx-ht24

Kong, X., **Yue, C.**, Watkins, E., Barnes, M., & Lai, Y. (2023). Investigating the Effectiveness of Irrigation Restriction Length on Water Use Behavior. *Water Resources Management*, *37*(1), 251–268. https://doi.org/10.1007/s11269-022-03367-y

Kuska, M. T., Heim, R. H. J., Geedicke, I., **Gold, K.** M., Brugger, A., & Paulus, S. (2022). Digital plant pathology: A foundation and guide to modern agriculture. *Journal of Plant Diseases and Protection*, *129*(3), 457–468. https://doi.org/10.1007/s41348-022-00600-z

Nigar, Q., **Cadle-Davidson, L., Gadoury, D. M.**, & Hassan, M. ul. (2023). First Report of *Colletotrichum fioriniae* Causing Grapevine Anthracnose in New York. *Plant Disease*, *107*(1), 223. https://doi.org/10.1094/PDIS-03-22-0604-PDN

Olson, J., Zou, C., Karn, A., **Reisch, B., Cadle-Davidson, L., Sun, Q., & Clark, M.** (2022). Genetic Analyses for Leaf Variegation in Hybrid Grape Populations (Vitis spp.) Reveals Two Loci, Lvar1 and Lvar2. *HortScience, 57*(11), 1416–1423. https://doi.org/10.21273/HORTSCI16763-22

Rubin, M., Crain, J., Dehaan, L., **Diaz-Garcia, L.**, Hershberger, J., Poland, J., Schlautman, B., Turner, K., Tassel, D. V., & Miller, A. (2022). *High dimensional phenomics and automation to transform domestication of new crops* [Preprint]. Preprints. https://doi.org/10.22541/au.166733730.06318530/v1

Steede, G., Swenson, R. D., & McKay, T. D. (n.d.). Filling the Third Circle with Interdisciplinary Lesson Planning: A Case Study of Pre-Service Teachers. *Journal of Human Sciences and Extension.*

Svyantek A, Wang Z, **Hatterman-Valenti H**. Impact of Steam Extraction and Maceration Duration on Wines from Frozen 'Frontenac' Must. *Fermentation.* 2023; 9(4):317. https://doi.org/10.3390/fermentation9040317

Uddin, A., **Gallardo, R. K.**, Rickard, B., Alston, J., & Sambucci, O. (2022). Consumer acceptance of new plant-breeding technologies: An application to the use of gene editing in fresh table grapes. *PLOS ONE, 17*(12), e0270792. https://doi.org/10.1371/journal.pone.0270792

Announcements

Contact Kate Fessler at fessl023@umn.edu to add announcements to this newsletter

Anne Fennell is recruiting a graduate student. Contact Anne at anne.fennell@sdstate.edu for more information

The Exec Team is working with a graphic designer to create informational VG3 postcards to hand out at conferences, field days, grower meetings, etc.. Send your mailing address to Kate Fessler at fessl023@umn.edu to receive a set for your next event.

New to VG3? Click here to submit a profile for the website

Call for website contributions!

Do you have a research update to share? Some cool photos to show off? A student or researcher looking to add some bylines to their CV? Email Kate Fessler at VitisGen3@umn.edu or fessl023@umn.edu

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