Genetic dissection of Natural Dry-On-Vine trait in grapevine

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Raisins, a little of context

- Dried grapes
- Industry of more than 100 years in California
  - Multiple uses: raw, cooking, baking, brewing
- Trend to mechanization
  - Labor up to 35% of production costs
- Specialized germplasm
Germplasm: traditional

Sultanina

Fiesta
Germplasm: DOV

CFAES

DOVine

Selma Pete
Germplasm: Natural Dry-On-Vine (NDOV)

Sunpreme (B82-43)
Traditional vs NDOV
How to breed for NDOV raisins?

- *Sunpreme* solely source at the moment
- *VitisGen*
- Mapping of the trait
  - *C87-41 × Sunpreme*, using presence/absence = No hits!
  - *A95-27 × Sunpreme*, using % dry at three date = No hits!
Using a different approach: candidate gene

- Did we have a well constructed linkage map?
- Are we phenotyping the correct trait?
- Fruit drying: a reason or a consequence?
- Thinking in Vavilov: trait parallel series
  - Which other fruits dry on a vine? → wild tomatoes
- Cuticular Water Permeability 1 (CWP1) gene (Hovav, 2007)
  - cuticle microcracking in fruits of primitive green-fruited wild tomato species, *Solanum habrochaites*, *S. cheesmaniae* and *S. pimpinellifolium*
Is *Cwp1* present in grapevine?

- tblastn query of *S. habrochaites Cwp1* on PN40024
Collaboration with the USDA ARS San Joaquin Valley Agricultural Sciences Center

- Craig Ledbetter
  - Research Geneticist
  - Segregating populations (Tray-dry × NDOV) and phenotypic evaluation

- Steven Lee
  - Molecular Biologist
  - Gene cloning and transgenic preparation/evaluation
Gene cloning and (simple) functional evaluation

- Generate primer sequences based on PN40024
- *Sunpreme, Valley Perl* and *Y308-344 (NDOV + REN4)*
- Transferring into tomato (ongoing)
  - Phenotypic evaluation on microfissure density
What about Cpw1 in other genotypes?
Expectations

- Test the hypothesis whether or not $VviCpw1$ is responsible for NDOV trait
  - Provide a tool for the early identification of NDOV genotypes
  - Link NDOV with studies of cuticle characteristics (epidermis) in grape fruits (drying)
  - Collaborate in the selection of NDOV genotypes in a more comprehensive view

- Genotyping of available pedigree and derived germplasm from *Sunpreme*

- Design of transcriptomic and phenotypic evaluations with additional functional tests

Taken from Hovav et al. 2007, The Plant Journal, 52(4) 627-639
NDOV is a minute part but relevant

Agronomic

Sensory

CFAES
Thanks for your attention!