

# Overview of Trait Collection at RMI

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2015 Field Season

## 1 Brief Overview

The aim of trait collection in the 2015 field season at the Robert Mondavi Institute teaching vineyard was to quantify differences in water-use strategies across a phenologically diverse set of winegrapes that we have collected phenology data for in 2014 and 2015. These data will be used to test for correlations between phenology and plant functional traits, as well as test for coordinated shifts in traits across the growing season (i.e., at peak flower, veraison, and physiological maturity).

## 2 Collection Times

- 20-24 April: Sampling at peak flowering
- 15-17,19 June: Sampling at early veraison
- 4-7 August: Sampling at physiological maturity

## 3 Methods

Traits were collected at three time points across the season corresponding to peak flowering, veraison and physiological maturity of the plants (see 'Collection Times' above). During each collection period, the same set of traits were collected for four consecutive days. Those varieties sampled that had only representative plant were sampled four times. For all others with two replicate individuals, there were two sampling events (2 days/individual). On each sampling day, and for all plants sampled on that day, a single green, fully developed leaf on a primary shoot was chosen and tagged for sampling leaf water potential. An adjacent leaf was chose to sample stem water potential. The leaves chosen for stem water potential were covered with plastic and foil wrapped bags at 8 AM each morning before sampling. All physiological traits were sampled between 11 am and 1 pm each day, and order of sampling was randomized each day so that the same individuals were sampled at different times during the sampling period. During the sampling period each day, a LI-COR 6400XT portable phtotosynthesis system was used to measure photosynthetic rate and stomatal conductance at a constant temperature of 28 degrees Celsius on the leaf tagged for stem water potential

measurements. Immediately after the LI-COR measurements were taken, the leaf was covered with a plastic bag and cut at the base of the petiole. Water potential was measured on this leaf within 30 seconds of cutting the leaf with a PMS Scholander pressure bomb. Stem water potential was measured on the adjacent covered leaf immediately following the leaf water potential sampling. Both leaves were kept for subsequent trait measurements so that the traits could be coupled. After collection, leaves were scanned, pressed and dried at 60 Celcius for at least three days and weighed.

## 4 Traits Collected

- Leaf water potential (3 time points x 2-4 replicates per time point x 1-2 individuals per variety = 12 replicates per variety)
- Stem water potential
- Photosynthetic rate (A)
- Stomatal conductance (g)
- Leaf area
- Leaf level hydraulic conductance (using leaf area, A, g, leaf water potential and stem water potential)
- Specific leaf area
- Stomatal size
- Stomatal density
- Stomatal pore index
- Trichome density
- Leaf shape
- Vein density (maybe)

Table 1: Varieties Collected

Variety	Plant ID
Auxerrois	12.3 & 4
Chardonnay	12.5 & 6
Gamay Noir	12.7 & 8
Pinot Gris	13.3 & 4
Pinot Meunier	13.5 & 6
Pinot Noir	13.8 & 9
Cabernet Franc	13.9 & 10
Cabernet Sauvignon	14.1
Carmenere	14.3 & 4
Merlot	15.3 & 4
Sauvignon Blanc	16.1 & 2
Trebbiano	17.2
Carignane	17.9 & 10
Durif	18.5 & 6
Marsanne	18.7 & 8
Syrah	19.9 & 10
Valdepenas	20.1 & 2
Gewurtztraminer	20.5 & 6
Furmint	22.7 & 8
Szagos Feher	23.7 & 8
Barbera	24.1
Dolcetto	24.9 & 10
Nebbiolo	25.9 & 10
Sangiovese	26.5 & 6
Zinfandel/Primitivo	32.3 & 4
Morrastel	34.5 & 6
Palomino	34.7 & 8
Verdelho	38.7 & 8
Early Muscat	42.7 & 8
Ruby Seedless	44.1 & 2