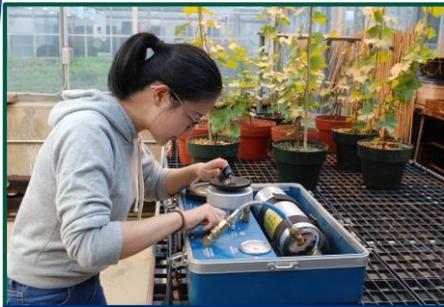




Using the pressure chamber to monitor water stress in VSP canopies.

Tian Tian and Paul Schreiner



Tian using the pressure bomb!



Model 615 Press Bomb

The pressure chamber is a robust and relatively inexpensive tool used to measure the two most common indicators of plant water stress. Leaf water potential (LWP) or stem water potential (SWP) are routinely determined in vineyards with the pressure chamber, and it was thought that both measures must be conducted in a one-hour time period at solar noon (between 12:30 PM and 1:30 PM PDT). This recommendation was based on well-irrigated vines grown on a sprawl trellis. However, the vast majority of wine grapes grown in Oregon are trained using vertical shoot positioning (VSP) where most leaves are shaded at midday when the sun is directly overhead. We suspected that grapevines trained using VSP would not experience the most water stress at midday, and that this would alter when LWP and SWP should be monitored with the pressure chamber.

We tested this by measuring LWP and SWP throughout the day in vineyards using VSP to identify when they reached the daily lowest level (most water stress) and how long readings were stable. Our analysis showed:

- LWP reached the daily low at midday (1PM) and was stable until at least 5 PM on warm days when vines experienced some water stress. *Warm days where some degree of water stress occurs is the most common condition when growers need an accurate measure of stress.*
- LWP reached the daily low at 3PM and was stable until 5PM on cool days, or on warm days when vines were not water-stressed.
- SWP reached the daily low at 3PM and was stable until at least 5PM under all conditions.
- Midday values of SWP were **always** higher than the daily low. *Thus, SWP measured at midday underestimates how much stress vines experience in vineyards with VSP.*

Overall, this study shows that growers can increase the time-window to collect both LWP and SWP in canopies using VSP. Having a four-hour period to measure LWP, in particular, will allow growers to monitor water stress in many more vineyard blocks per day. Growers should not measure SWP at midday.

Tian Tian is currently finishing up her PhD research at Oregon State University focusing on nitrogen use in vineyards and impact on mycorrhizal fungi (tiant@oregonstate.edu).

More details of this research will appear in the OWRI 2020 Spring Technical Newsletter (<https://owri.oregonstate.edu>). Please contact Paul.Schreiner@usda.gov if you have any questions or comments.

Pacific West Area – Horticultural Crops Research Unit

3420 NW Orchard Ave. Corvallis, OR 97330-5098
Voice: 541-738-4021 Fax: 541-738-4025

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