

II. Abstract:

Wine grapes are an economically important crop to Pennsylvania, a cold-climate growing region prone to damaging winter temperatures and spring frost events. While newly introduced hybrid varieties of grapevine exhibit great potential for withstanding winter minimum temperatures, their propensity for early bud burst risks crop loss and decreased ability to accumulate sufficient carbohydrate reserves for winter survival. Xylem anatomical structures provide constraints on the efficiency of water movement in plants and have been implicated as important predictors for phenological development and vine growth rate. We propose to evaluate the response and recovery from post-bud burst freeze stress of two contrasting wine grape genotypes (*Vitis vinifera* L. 'Chardonnay' and *Vitis* spp. 'La Crescent') using relationships between xylem structural features, hydraulic loss-of-function, vine shoot growth, and photosynthetic rates. Additionally, we will evaluate bud cold hardiness over the winter to determine what effects post-bud burst frost stress has on overwinter bud survival. Results from this study will aid in practical recommendations to wine grape producers for vine management and varietal selection for Pennsylvania and other cold-climate regions.