

## Improving Frost Protection of Ohio Grapes under Controlled Environmental Conditions

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The Ohio grape industry has expanded tremendously in the past 20 years, and the number of wineries has increased exponentially to more than 80 wineries. The economic impact of the grape and wine industry and related tourism is estimated to surpass \$100 million in annual revenues to the state of Ohio. However, the expansion of the grape industry is hindered by climatic threats. Winter freeze and spring frost are common events in continental climates and are the leading causes for crop and revenue losses in vineyards in Ohio.

Several frost protection methods have been tested and have yielded varied success. Although site selection remains the superior approach for frost protection, alternatives have included use of heaters, elaborate sprinkler systems, wind machines, and chemicals. These methods are often expensive, labor intensive, and may cause air pollution.

Dormant oils have been used for decades primarily for insect control in fruit trees. However, several researchers found that these oils cause a retardation of bloom and bud break of fruit trees and grapevines, respectively. Unfortunately, the effectiveness of oil was not consistent due in part to seasonal weather variability and time of application.





Scientists sought to improve the efficacy of soybean oil on delaying bud break of grapevines by investigating the optimum time of application in relation to dormancy. Since dormancy is, in part, affected by chilling requirements, it is important to understand the relationship between chilling and oil applications. The specific objectives of this research were to determine the optimum temperature regimes and chilling requirements of two important grape varieties—Concord (*Vitis labrusca* L.) and Cabernet franc (*Vitis vinifera* L.)—in Ohio and to determine the effect of time of oil application on bud break in relation to dormancy and chilling unit accumulation.

Generally, the number of days to 50 percent budbreak decreased linearly with increased chilling duration in both cultivars. There were differences in chilling requirements between the two varieties, and Concord required more chilling hours at a lower temperature than Cabernet franc. Based on results from this study, optimum time of oil application was post-chilling requirements and during the deacclimation stage. Further work is needed to focus on this narrow window of timing and evaluate more varieties.

Researchers also developed an excellent system for testing chilling requirements under controlled conditions. This research has allowed scientists to discover new findings and raise new questions. The plan for the future is to continue to determine chilling requirements for other varieties. The research focus will be geared toward linking onset of dormancy and chilling requirements to cold acclimation of grape varieties.



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