

Contract

Mac's Creek Vineyard and Winery Grape Grower's Survey Cold Hardiness Study - #18-13-060

Grant Amount

\$1,710

Contact

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Issue of Interest

Finding techniques that can be effective on our cultivars in Nebraska could make the difference between devastating damage, which negates any profitability and a consistent, quality wine and grape industry. Nebraska winters can be harsh, even brutal, and are certainly damaging to grapevines. This damage can result from several reasons, which are noted below:

- Ambient temperatures can be among the coldest in the country. While average winter temperatures are above zero degrees Fahrenheit (F), ambient temperatures can consistently fall into the sub-zero range. It is not unusual for temperatures in our vineyard to plummet to the -10°F to -25°F range for one night to one week. Obviously, damage to grapevines can occur at these temperatures; however, if growers carefully select appropriate cultivars for these temperatures, damage can be minimized or avoided (e.g., Frontenac, LaCrosse, Brianna, etc.). Thus, ambient temperatures do not have to be a serious problem for Nebraska vineyards.
- Volatile temperatures frequently cause, heretofore, unavoidable damage. While many appreciate the January or March early thaw, it is the last thing grape growers wish to see for our vines. An early thaw can lead to an early break of dormancy and an early push of buds, which are only to be followed by deadly plunges in temperatures. The winter of 2004 was no exception. The winter saw 50 – 60°F for two weeks in late March, followed by 19°F in mid-April. Damage to primary buds during this period was extensive.
- Late frosts/freezes are a way of life in central Nebraska and they annually take their toll on row crops, such as corn and grape crops. Such frosts are expected in early and even mid-May. However, the late-May freeze, which occurred during the third week of the month, and its extent at 22°F, was devastating. This event resulted in grape crop loss in our vineyard at over 95 percent loss with primary, secondary, and tertiary bud loss, as well as approximately ten-percent loss of plants.

Thus, the problem is not one of a lack of cultivars that can withstand winter temperatures in Nebraska. The problem is one of minimizing winter damage from extensive temperature swings, which can result in an early dormancy break and early bud break, which can be accompanied by a late frost or freeze. Therefore, the purpose of this research is to evaluate techniques designed to enhance grapevine cold hardiness, specifically, effects of late winter spraying of dormant vines with products designed to delay bud break from two to four weeks.

Approach to Problem

The control group received no treatment. Tx1 sample was treated with Alginate gel (Appendix A), which is designed to delay bud break. The first and only application was made on March 19, 2008. Tx2 sample was sprayed with a Soy Oil (see Appendix A) designed to delay bud break. Tx2 was treated four times with the Soy Oil spray. The initial treatment was applied on March 17, 2008. A second application was made on April 4, with subsequent applications made on April 21 and April 28, 2008.

All vines were long pruned, leaving approximately ten buds on each fruiting cane, beginning January 1, 2008. Delayed bud break counts, which were rated on a scale of one to five (see Appendix B), were made at bud swell or bud break. Due to rain, only the Marechal Foch buds were evaluated on May 8. All three cultivars were evaluated on May 13 and 20, 2008.

A second dependent measure, crop yield at harvest, will be taken at harvest time. Clusters will be collected for each of the three samples, divided by the number of plants and an average of pounds per plant per sample group will be determined.

- **Sample:** Three samples of 45 vines each (Total N=135) were studied.
 - Treatment 1 (Tx1) sample consists of 15 vines across 3 different cultivars (Tx1 total N=45).
 - Treatment 2 (Tx2) sample consists of 15 vines across the same 3 cultivars (Tx2 total N=45).
 - Control (C) sample consists of 15 vines across the same 3 cultivars (C total N=45).
 - Sample plants were selected by alternating sequence with counterbalanced selection (i.e., C, Tx1, Tx2; Tx1, Tx2, C; Tx2, C, Tx1).
 - Obviously weakened or fragile plants were omitted. Only visibly healthy plants aged six years or greater were selected. Cultivars sampled include Marechal Foch, Brianna, and St. Croix

Goals/Achievement of Goals

Finding techniques that can be effective on cultivars in Nebraska could make the difference between devastating damage, which negates any profitability, and a consistent, quality wine and grape industry.

Results, Conclusions, Lessons Learned

Research Question #1: Is there a difference in delayed bud break counts when comparing the three groups? Average delayed bud counts were determined for each group and these means compared using a One Way ANOVA. Preliminary results are as follows:

- Marechal Foch (May 8, 2008, rating) proximal buds (four buds closest to the cordon) - Tx2 buds were significantly delayed as compared to the control group. Tx1 buds were significantly delayed as compared to the control group. No difference was found between Tx1 and Tx2 groups.

- Marechal Foch (May 8, 2008, rating) distal buds (four buds furthest from the cordon) – Tx2 buds were significantly delayed as compared to the control group. Tx1 buds were significantly delayed as compared to the control group. No difference was found between Tx1 and Tx2 groups.
- Marechal Foch, St. Croix, Brianna (May 13 and 20, 2008) proximal and distal – Tx2 buds were significantly delayed as compared to the control group.

Additional post hoc analysis continues in order to discern other group comparisons and to estimate the amount of delay for each treatment group. More data will be included in the December 31, 2008, report.

Research Question #2: Is there a difference in harvest yields when comparing the three groups? Average yields will be determined for each group and the corresponding means compared using a one-way ANOVA. Should significance be found, follow-up analysis (Tukey post hoc analysis) will be applied to evaluate all possible pair-wise comparisons. More data will be included in the December 31, 2008, report.

Progress According to Outcome Measures

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