Evaluation of cold-hardy hybrid grapes for enological viability, and quality improvement

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Poster Abstract

Background: In viticulture, production regions are categorized based on the overall characteristics of the area's climate during the growing season. Most cold-climate regions are located near latitude 45°N or S. Much of the continental US that lies along the 45th parallel (which includes Minnesota) has suitable summer growing conditions for wine grapes, however, as the continentality of the region increases, so does seasonal climatic variability. These areas can experience winter temperatures to as low as -34°C, sufficient to kill buds in dormant V. vinifera grapes. The University of Minnesota has a long and successful history of breeding cold-hardy food crops for cold climates, and in the mid-1970s started developing cold-hardy wine grapes.

Method: Hybridization of V. vinifera and French hybrid cultivars with American grapes (V. riparia and derived hybrids) over the past 30 years has resulted in a huge diversity of cold-hardy, disease resistant breeding stock. Potential new grape cultivars are first identified in the vineyard by evaluation of positive viticultural traits such as cold hardness, disease and insect resistance, growth habit, fruit set and yield, and positive primary fruit flavors. Of the 2000 to 4000 grape seedlings planted each year, only 10 to 30 prove to be appropriate for vinification trials. All wines undergo the same standardized vinification procedure according to the grape color. Primary characterization of enological traits in the 3rd to 5th year of fruit production includes sugar and acid production, nitrogen analysis, and sensory evaluation of finished wines. Individual vines which show promise at this stage are propagated in order to do larger-scale vinification trials and evaluation. Optimization trials which may include processing parameters, yeast trials, fermentation temperature, and maceration time help ensure that advanced knowledge of the wine characteristics are evaluated before the vine is propagated commercially.

Results: Since the start of the program, four cold-hardy grape cultivars have been released for commercial use. The result has been exponential growth in the northern wine industry, with the number of vines planted in the state doubling in the 5-year span from 2002-2008. Enological traits of Minnesota-developed grapes include high total acidity along with high sugar accumulation. Red grapes are highly colored teinturier varieties and exhibit low tannins. All four cultivars exhibit high total acidity and sugar levels. Continued breeding efforts coupled with vinification trials show promising results for future releases.