



# Viticulture, enology and marketing for cold-hardy grapes



## Sensory Characterization of Frontenac and Marquette Berries and Wines by Descriptive Analysis

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**Background and Rationale:** Cold climate grape cultivars have pedigrees that combine *Vitis vinifera*, the classic wine grape species of Europe, with North American *Vitis* species, especially *Vitis riparia*. The flavor profiles of their berries and wines can be dynamic through the ripening period and may include characteristics of the ancestral species or even novel flavors. The objective of these evaluations is to characterize changes to aroma, flavor and astringency attributes that occur during the ripening of Marquette and Frontenac wine grapes and the resulting changes in their respective wines.

### **Treatments:**

- Grapes grown in the four replications of the NE 1020 trial at Brookings, South Dakota were sampled in 2013 at three to four stages of maturity indicated by soluble solids content.
- Wine was made from early-and late-harvested grapes.
- Descriptive analysis of berries and wines was performed by a panel of 12 people who received 3 to 6 days of group and individual training prior to evaluations to develop their consistency in rating attributes of the fruit and wines.

**Methods:** Frontenac and Marquette grapevines were grown on a high cordon training system in the NE1020 coordinated wine grape variety evaluation planting at SDSU NE Hansen Research Center, Brookings South Dakota. Grapes were harvested at three (Frontenac) or four (Marquette) stages of maturity. These stages were indicated by soluble solids content (Brix) measured on an average of 10 unfrozen berries per location at room temperature. At each maturity uniformly distributed clusters were harvested from each vine in replicate (~4 cluster/vine or 24 clusters/replicate), berries stripped from clusters and a replicate pool (4 separate pools, one for each replicate) were used for replicated brix reading and berries.

Harvested berries were immediately frozen at -80°C, stored in -20°C, and kept frozen until sensory analysis could occur. Fruit was shipped from South Dakota to Minnesota in coolers with dry ice. Wines were made at Prairie Berry Winery using a standard winemaking protocol developed

by the University of Minnesota. Red grapes were crushed, and inoculated with yeast (Uvaferm VRB) immediately after crush. Two days after inoculation with yeast, red wines were also inoculated with lactic acid bacteria (PN4, *Lallemand*). Wines were fermented to dryness, and malolactic fermentation was complete. Marquette was handled slightly differently. There was a gap between fermentation and inoculation with lactic acid bacteria due to winery schedules. It only went through partial malolactic fermentation and was ameliorated to drop the alcohol content. Descriptive analysis of berries and wines was performed by a panel of 12 people who received 3 to 6 days of group and individual training with reference standards for flavors and aromas to develop their consistency in rating attributes of the fruit and wines.

## **Results:**

### **Descriptors for Berries**

Sixteen sensory descriptors were generated that characterized the berries of both Frontenac and Marquette. As expected, the sweetness increased and the sourness and astringency decreased as the grapes of both varieties ripened. The overall intensity of flavor and of citrus flavor in both varieties decreased on ripening. The dried fruit flavor, jammy flavor, and the fermented fruit flavor of Frontenac grapes increased as the grapes ripened. The bitterness of Marquette grapes decreased, and the jammy, and fermented flavors increased as those grapes ripened.

### **Descriptors for Wines**

Twenty sensory descriptors were generated that characterized the Frontenac wine. The aromas and flavors evaluated were artificial banana, black currant, cooked berry, dark fruit, cooked vegetable, fresh green, woody, hay, pepper, spice, floral, ethanol, chemical, white mushroom, dried mushroom, and tamari. The basic tastes that were evaluated were sweetness, sourness, and bitterness. Astringency was also evaluated.

Twenty two sensory descriptors were generated for Marquette wine. The aroma and flavors were the same as those for Frontenac but with the addition of grapefruit and caramel. Sweetness, sourness, bitterness and astringency were also evaluated.

Frontenac wines made from the later harvested grapes were more sweet, and had more banana, cooked berry, black currant, cooked vegetable and floral aromas than the wines made from the earlier harvested grapes. Wine made from the earlier harvested grapes was more bitter and sour, and had more mushroom, tamari, and hay flavors than wine made from the later harvested grapes.

Marquette wines made from the later harvested grapes were more sour, more bitter, more astringent and had more dried mushroom, more cooked vegetable, more pepper, more ethanol and more overall flavor than wines made from the early harvested grapes. Marquette wines made from the earlier harvested grapes were sweeter and had more white mushroom flavor than wines made from the later harvested grapes.