

Research in Plain English (bonus feature)

Impact of Fruit -Zone Leaf Removal on Rotundone Concentration in Noiret

Research in Plain English provides brief, non-technical summaries of journal articles by Cornell faculty, students, and staff.

Authors: Laura J. Homich, Ryan J. Elias, Justine E. Vanden Heuvel, and Michela Centinari

[American Journal of Enology and Viticulture, October 2017. 68: 447-457; DOI: 10.5344/ajev.2017.16106](#)

Summary by Raquel Kallas



Photo courtesy of Bruce Reisch

Background. Rotundone is a compound found in grape skins that is responsible for black pepper aroma in wine. Shiraz, Gamay, and Gruner Veltliner are a few examples of *Vitis vinifera* varieties that are known for distinct black pepperiness. Studies on these varieties have shown a positive relationship between concentration of rotundone and perception of black pepper aroma in wines. Other work on *V. vinifera* has established that relatively cooler climates and seasons result in higher rotundone accumulation in grapes. For example, Takase et al. 2015 found maximum levels of 2.34 $\mu\text{g}/\text{kg}$ of rotundone in Shiraz from Japan, while Scarlett et al. 2014 recorded up to 1.08 $\mu\text{g}/\text{kg}$ in Australian Shiraz.

Noiret, an interspecific hybrid developed at Cornell, has been noted for its black pepper characteristics. The objectives of this study were to determine if what is known about rotundone in *V. vinifera* also applies to Noiret, and to investigate if viticultural management practices, such as leaf removal, can affect black pepper intensity in the wines.

Experimental Design. In 2014 and 2015, two separate leaf removal experiments were conducted at the Experiment Station in Geneva, NY on eight-year-old Noiret vines trained to high-wire cordons. Because they were planted on different rootstocks, results from the two trials were analyzed separately.

- Experiment 1 investigated the effects of leaf removal on rotundone concentration using own-rooted Noiret. The maintained sunlight exposure (MSE) treatment involved leaf removal in the fruiting zone from pea-sized berries through harvest. This was compared to a control (CON), where the fruiting zone was manipulated and shaded throughout the season.
- Experiment 2 considered the effects of timing of leaf removal on rotundone concentration using Noiret grafted to Millardet de Grasset 101-14 rootstock. A pre-verasion leaf removal treatment (LR) was compared to a post-verasion leaf removal treatment (PVLRL).

Sampling and Analysis.

- Canopy density and light penetration were measured throughout the growing season using Enhanced Point Quadrat Analysis (EPQA).
- Berries were sampled for rotundone concentration throughout the growing season.
- Yield components and chemical composition (Brix, TA, pH) were measured at harvest.
- A sensory panel rated the intensity of black pepper aroma in wines made from the treatments (wines were diluted to two parts wine, one part water).

Results. Corroborating what was already established in studies on *V. vinifera*, rotundone in Noiret was affected by seasonal temperature – the cooler of the two seasons (2014) resulted in higher rotundone concentrations *in the berries*, in both experiments and across all treatments, compared to the warmer season (2015). However, in the warmer season, vines with maintained sunlight exposure in the fruiting zone from leaf pulling (Experiment 1, MSE) had significantly higher rotundone concentrations compared to vines with a shaded fruiting zone (Experiment 1, CON) in both the berries and in the wine. Additional work is needed to explain this result, but the authors suggest that it may be due to increased stress from defoliation and/or increased oxidation from sunlight exposure. There were no notable results in Experiment 2 regarding timing of leaf removal during the season. Finally, the sensory study confirmed that, as is the case with *V. vinifera*,

concentration of rotundone in Noiret is positively correlated with the perception of black pepper aroma.

The Takeaway:

1. Cooler seasons resulted in higher concentrations of rotundone in Noiret berries, regardless of leaf removal practices.
2. Concentration of rotundone is positively correlated with the perception of black pepper aroma in Noiret wines.

Raquel Kallas (M.P.S. '16) is the extension support specialist with the statewide viticulture extension program, based at Cornell AgriTech at NYSAES in Geneva, NY.