



Effect of foliar nitrogen and sulphur application on aromatic expression of *Vitis vinifera* L. cv. Sauvignon blanc

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- Previous studies have shown that nitrogen deficiency reduces the aromatic quality of Sauvignon blanc, as well as its potential for ageing. This is thought to be linked to the reduced synthesis of *volatile thiol precursors*, as well as of *glutathione*, which plays an important role in protecting volatile thiols from oxidation. Therefore, **high-glutathione content in grapes is an important factor in conserving Sauvignon blanc aroma.**

- These authors decided to study the impact of nitrogen fertilization on the aromatic expression of Sauvignon blanc. The trial took place in 2007 in Bordeaux in a vineyard with a loamy clay soil. This vineyard was chosen because it showed signs of nitrogen deficiency. There were 4 treatments (with 4 randomized replications of 20 vines each):

- **“SOIL N”:** application of 30 kg/ha of nitrogen (ammonium nitrate) to soil right after bloom
- **“LEAF N”:** foliar spray of 10 kg/ha of nitrogen (urea) in two applications before veraison
- **“LEAF N/S”:** foliar spray of 10 kg/ha of nitrogen (urea) + 5 kg/ha of sulfur (micronized sulfur) in two applications before veraison
- **CONTROL:** unfertilized

The authors included a nitrogen + sulfur treatment because previous studies in Colombard had shown that foliar nitrogen was better assimilated if sprayed together with sulfur.

- **Results:**

- 1) **Water status :** Stem water potentials at veraison were between 0 and -7 MPa, indicating no water deficit. (As the authors point out, the lack of water stress is important to study the effect of nitrogen fertilization on aroma compounds).

- 2) **Nitrogen status :** N-tester values (a measure of chlorophyll content, in turn related to N status) were significantly higher in the N-supplemented treatments. However, there were no difference between the soil and the foliar fertilization treatments. Yeast available nitrogen (YAN) was also 60% higher in the Leaf N and Leaf N/S treatments than in the control, but YAN in Soil N was not significantly different from the control. The authors believe this lack of effect of soil N on YAN could be related either to the N application being too late, or to a limited N absorption in this clayey soil.

- 3) **Yield:** Neither soil nor leaf nitrogen applications had an impact on yield.

- 4) **Botrytis infection:** There was no effect on this parameter. This is despite the fact that nitrogen fertilization generally tends to increase Botrytis infection.

5) Juice composition: There was no effect on juice composition.

6) Wine composition: Two small-scale fermentations (700 ml) were conducted for each treatment.

- *Alcohol:* Soil N had higher alcohol than the remaining treatments (pointing to a different sugar-alcohol conversion in this treatment, since all the treatments had similar sugar levels).

- *Glutathione* content was higher in Leaf N and Leaf NS compared to Soil N or the control. The addition of S to the N spray (Leaf N/S) did not increase the glutathione levels compared to the N spray alone.

- *Volatile thiols:* 4MMP content was higher in the Leaf N than in the control. However, 3MHA and 3MH were not. **In Leaf N/S all three volatile thiols were present in higher concentrations compared to the control.**

7) Wine evaluation: The wines were evaluated by a panel of 23 experts familiar with Sauvignon blanc wines, who rated Sauvignon blanc varietal aroma intensity on a scale from 0 to 5. This panel rated the wine from the Leaf N/S treatment as having significantly higher aroma intensity (4.0), followed by the Leaf N wine (3.4). Soil N and Control had similar lower intensities (1.95).

In conclusion, whereas soil nitrogen fertilization normally increases vigor and *Botrytis* incidence, a foliar application of nitrogen improved vine nitrogen status and enhanced aroma expression of Sauvignon blanc in this study without a negative impact on vigor or *Botrytis* susceptibility. This effect was enhanced when nitrogen and sulfur were applied simultaneously. This study has several weaknesses: reporting results of a single year, using extremely small fermentations, and conducting a type of wine evaluation which leaves room for subjectivity. Its strength is the use of winemaking replications. The authors hope to assess next whether the observed impact of foliar nitrogen on this N-deficient vineyard is maintained in vineyards that are not N- deficient.

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