IN VINO ANALYTICA SCIENTIA SYMPOSIUM 2013 Reims

# Effect of nitrogen fertilization on the phenolic composition of white grapes

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## Introduction

Deficiency in plant nitrogen can reduce the sensory quality of wines. The characteristic « stress » describes such as bitter, astringent and coarse wines. This organoleptic attributes are often related to phenolic compounds in red wine, but their role in white wine is not yet well known.

## Aims of study

In order to study the relation between nitrogen deficiency, stress and phenolic compounds, experimental dispositive of foliar nitrogen application on four white grapes variety (Chasselas, Chardonnay, Sauvignon blanc, Gewürztraminer) was undertaken in Changins vineyard at Geneva lake side.
Chemical analyses were done during ripening, wine-making and compared with organoleptic analyses results.

## Effect of nitrogen fertilization

The efficiency of the foliar fertilization was controlled by the measurement of yeast available nitrogen using Formol Index and OPA-derivatization methods.

Fertilized variants contain more nitrogen at harvest, but this difference was not significantly reflected in sensory analyses results, excepted Gewürztraminer. (**Tab.1.**)

## Analyses of phenolic composition

Analyses of phenols were done on the freshly pressed grape juice after 200 mg/l $SO_2$ addition.
Centrifuged, filtered samples were directly injected to HPLC-DAD (**Fig.1**.).
The seven most abundant picks are identified and quantified. Identification of other compounds (10-15) are currently carried out.

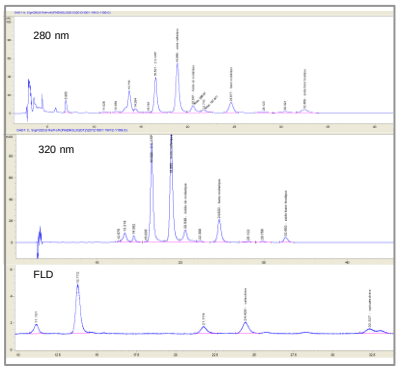


**Fig. 1**: Phenolic profile of Chasselas. Chromatogram obtained on Nucleodur PFP column (250x4,6mm), eluents are $H_2O$ with 1% formic acid and acetonitrile.

## Phenolic compound profile

The most abundant compounds are hydroxycinnamic acids, in esterified form (caftaric acid) or conjugated with glutathion (2-S-GRP).
Significant differences were found in the profile of the four grape varieties (**Fig.2.**), and in the concentrations of some compounds during wine-making (**Fig.3.**).

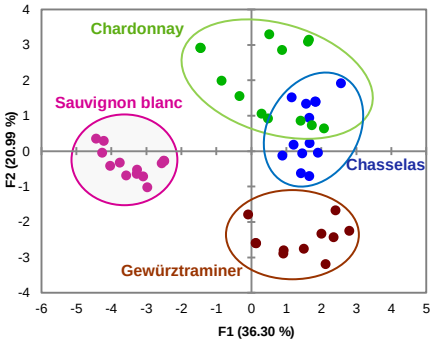


**Fig. 2** : Principal component analyses of the phenolic profiles of the grape juice at harvest.

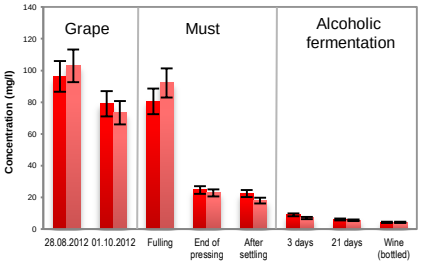


**Fig. 3** : Evolution of caftaric acid's concentration in Gewürztraminer grape during ripening and in different phases of wine-making.

| | N [mg/l] | Stress | Bitterness | Fruits | Flower |
|---|---|---|---|---|---|
| Chasselas 0N | 54 | 2.6 | 2.9 | 3.7 | 2.8 |
| Chasselas 20N | 72 | 2.7 | 3.2 | 3.6 | 2.4 |
| Chardonnay 0N | 121 | n.d. | n.d. | n.d. | n.d. |
| Chardonnay 20N | 190 | n.d. | n.d. | n.d. | n.d. |
| Sauvignon 0N | 80 | 2.1 | 2.4 | 4.0 | 2.6 |
| Sauvignon 20N | 107 | 2.0 | 2.5 | 4.3 | 2.9 |
| Gewürztraminer 0N | 158 | 2.2 | 2.9 A* | 3.4 | 3.1 B* |
| Gewürztraminer 20N | 221 | 1.6 | 2.4 B* | 3.7 | 4.0 A* |

**Tab. 1** : Yeast available nitrogen in grape at harvest N [mg/l] and sensory analyses results of wines. Notes of panelist go from 1 to 7. * significant difference at 5%

## Conclusion

Foliar nitrogen application had in this year no significant effect on the concentration of most abundant compounds.
Further investigation are currently carried out to identify potential markers including the unknown picks.
This experimental disposition will be used to confirm results in 2013.

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