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## Abstract

The aim of this work was to study the influence of early defoliation in the vineyard on Aglianico wines quality from Apulia region (Italy). Early defoliation was conducted in commercial Aglianico (*Vitis vinifera* L.) vineyards situated in Apulia region in Italy during the 2019 season. Three defoliation treatments were carried out in the vineyard: DN, where 100% of fruit-zone leaves removed from the North canopy side; DS, 100% where of fruit-zone leaves were removed, from the South canopy side DNS, where 100% removal of fruit-zone leaves on both the North and the South side of the canopy. A control (CT), where all basal leaves were retained in each shoot, also was performed. Instrumental (GC-MS) and sensory analysis (QDA) were used to evaluate the treatment effect on volatile composition and sensory descriptors of wines. Results showed the effect of early defoliation treatment on 37.8 % (14 out of 37 compounds) of the volatiles identified and quantified. Defoliation treatments led to wines with the significant highest concentrations of 13 volatile compounds. Aglianico wines from early defoliation in north side (DN) increase the concentration of nine volatile compounds respect to south side (DS) and both sides (DNS). In sensory analysis Aglianico wines were defined by sixteen sensory attributes with GM > 30 %, where the highest values were reached for defoliation treatments vs control. Moreover, ten sensory descriptors (>30 % GM) reached the highest value for DNS treatment. The highest value for total quality was also reached by DNS treatment. In conclusion defoliation treatments increased the volatile concentration of Aglianico wines.

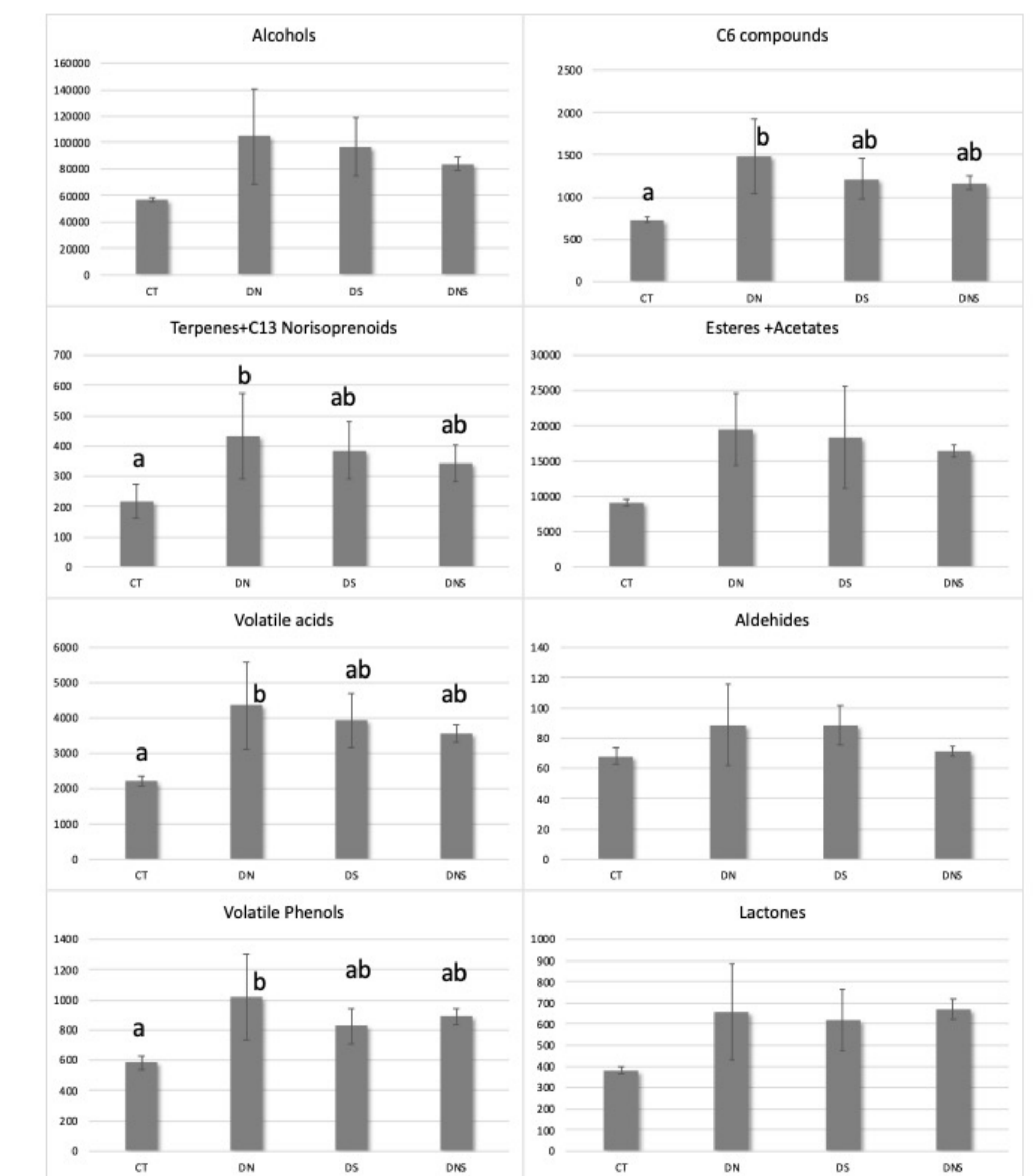
**Enological parameters.** Table 1 shows the influence of the defoliation treatments on the enological parameters of the Aglianico wines. In general, early leaf removal led to wines of higher alcohol, and more total polyphenol index, whereas pH, titratable acidity, malic, tartaric, citric and acetic acids remained generally unaffected. Similar results were found in Tempranillo wines from Spain, where higher alcohol content, more intensely coloured and with a larger total polyphenol index were showed when pre-bloom leaf removal was applied (Vilanova et al. 2012). Our results also coincide with Diago et al. (2010) who reported that mechanical defoliation was more effective in reducing yield, cluster weight and number of berries than manual leaf pulling, by affecting the fruit microclimate.

Parameters	CT		DN		DS		DNS		Sig.
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Glucose + Fructose (g/l)	0.12 a	0.02	0.31 c	0.01	0.24 b	0.01	0.39 d	0.02	***
Ethanol (%vol)	13.17 a	0.03	13.52 c	0.03	13.32 b	0.06	13.82 d	0.03	***
PH	3.20	0.04	3.16	0.05	3.23	0.04	3.18	0.04	ns
Total acidity (g/l)	5.89	0.20	6.12	0.20	5.81	0.22	6.10	0.19	ns
Tartaric acid (g/l)	1.29	0.34	1.30	0.36	1.33	0.19	1.33	0.34	ns
Citric acid (g/l)	0.26	0.01	0.28	0.02	0.26	0.01	0.27	0.00	ns
Malic acid (g/l)	0.98	0.03	0.94	0.04	0.94	0.01	0.91	0.06	ns
Acetic acid (g/l)	0.09	0.01	0.07	0.01	0.07	0.01	0.08	0.01	ns
IPT	35.07 a	1.81	40.47 b	0.76	36.00 a	1.31	40.20 b	0.75	**

Differences letters indicate significant differences for Tukey's test at  $p < 0.05$ .

Sign: \*\*, \*\*\* and ns indicate significance at  $p < 0.01$ ,  $0.001$  and not significance, respectively.

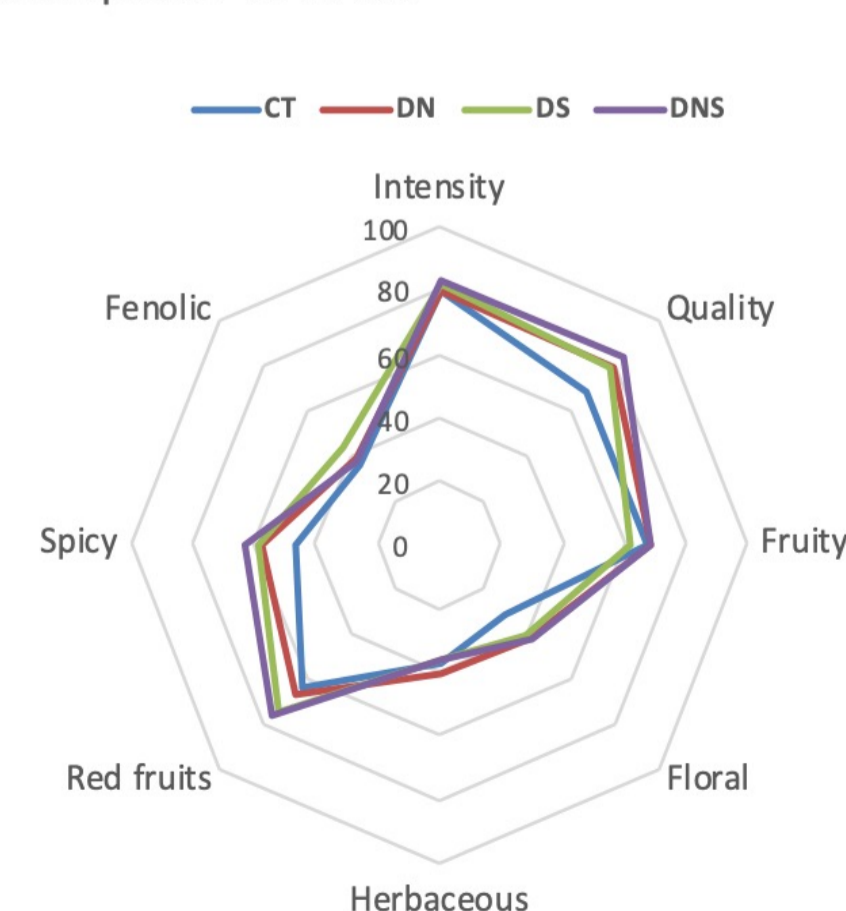
**Wine volatile composition.** Figure 1 shows the effect of early defoliation on the concentration ( $\mu\text{g/L}$ ) of the volatile composition of Aglianico wine. Early leaf removal induces significant changes in the concentration of four groups of compounds (C6 compounds, terpenes + C13 norisoprenoids, volatile acids and volatile phenols) increasing their concentration respect to control. Several works showed that defoliation induced an increase of grape and wine volatile composition (Reynolds and Wardle, 1989). Early defoliation induced the increase of three alcohols (3-methyl-1-pentanol, 2,3-butanediol and 1-octanol) one C6 compounds (1-hexanol), one terpene (E-8-hydroxy linalool), four esters + acetates (hexyl acetate, diethyl succinate, diethyl malate and ethyl miristate), three volatile acids (octanoic, nonanoic and decanoic acids) and two volatile phenols (4-ethylphenol and 4-vinylphenol).



Differences letters indicate significant differences for Tukey's test at  $p < 0.05$ .

**Sensory analysis.** Descriptive analysis revealed the Aglianico wines were characterized with twenty-seven aroma descriptors belonging to aroma (17 descriptors), taste (9 descriptors), and total value. The intensity (I) and frequency (F) of each attribute permitted the Geometric Mean (GM) to be obtained. GM (%) was calculated, for each descriptor, as a square root of the product between the relative intensity and relative frequency. Descriptors with GM > 30 % were considered the most contributor descriptor in this study. Eight sensory attributes with GM > 30 % defined the aroma of Aglianico wines. In taste also eight attributes showed GM > 30 %. The highest % GM of total value was also reached by wines from DNS treatment. Aroma and taste profiles in basis to GM (%) are showed in Figure 2.

(a) Aroma descriptors > 30 % GM



(b) Taste descriptors > 30 % GM

