SOILS FOR FUTURE UNDER GLOBAL CHALLENGES

SERBIAN SOCIETY OF SOIL SCIENCE
University of Belgrade, Faculty of Agriculture
Sokobanja, 21-24 September 2021
III International and XV National Congress
https://congress.sdpz.rs/

THE EFFECT OF N FERTILIZATION AND GRASS COVER ON QUALITY OF CABERNET SAUVIGNON CV GRAPES

Aleksandar Simić, Zoran Pržić, Željko Dželetović, Marija Ćosić, Gordana Andrejić, Nebojša Marković, Snežana Brajević, Hakan Geren

Background and objectives:

- Cover crops are important ecological vineyard management tools, which improve the soil structure and soil erosion control, enrich nitrogen and organic matter content, regulate excessive grapevine vigour, and are widely used in vineyard inter-rows combined with herbicide strips under the vines. It's proved to be a useful tool to limit the excessive vine vigour, resulting in changes in the quality of the grapes and wines. However, wine growers are worried that severe competition for resources between the intercrop and grapevines could impair grape yield and quality.
- Heat flow and associated soil temperature are greatly modified by grass cover or plant-residue and soil management practices. Grass cover and plant residue affect soil temperature mostly by altering the reflection coefficient, thereby changing the net radiation at the soil surface.
- **The aim of this study** was to determine the effects of controlled grass cover and fertilisation in the inter-rows on annual course of grass cover temperature and grape quality of Cabernet Sauvignon clones.

Table 1. Agrochemical properties of soils

Treatment (kg N/ha)	Depth (cm)	pH		Total organic C (%)	Total N (%)	Available (mg/100 g)	
		actual	exchangeable			P_2O_5	K_2O
0	0-30	6.98	4.87	0.589	0.054	1.82	19.76
	30-60	6.48	4.78	0.954	0.069	2.19	24.62
50	0-30	6.71	5.34	0.938	0.107	3.95	22.78
	30-60	6.85	4.95	0.866	0.103	1.37	22.06
100	0-30	7.19	5.12	0.618	0.088	1.87	19.93
	30-60	6.58	4.78	0.966	0.117	2.57	21.32

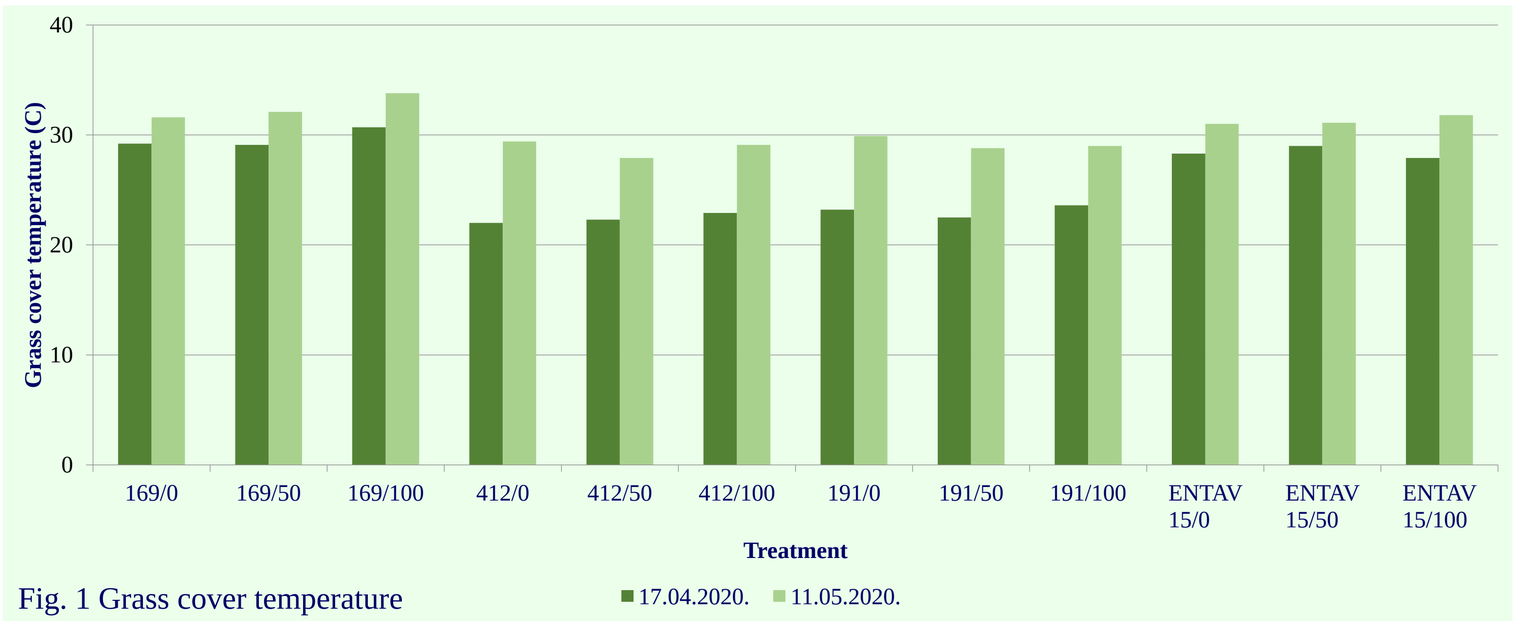

Fig. 1 Grass cover temperature

Conclusions:

- Complete vineyard floor cover cropping significantly influences must quality and, when optimized, represents a sustainable tool to improve the quality of wines.
- Making generalizations about the most suitable floor management system in vineyards is difficult, as response to cover crop is site-specific and variety-dependent due to differences in terms of soil, plant vigour, yield and oenological potential. Therefore, the choice of cover crops strongly depends on the wine grape cultivar, clone and cultivation site.
- The viticultural terroir investigated in this study was characterized by a typical Serbian climate, fertile soil and a productive and vigorous Cabernet sauvignon CV. In this context, complete grass cover with fertilisation treatment AN 50 is recommended in order to improve must quality (sugar and acid content expressed as tartaric acid).

Table 2. Dry biomass, biomass N content, visual assessment of grass cover, must quality of Cabernet Sauvignon CV. *Values followed by the same letter are not significantly different according to Fisher's protected LSD values (P = 0.05); +highest and -lowest temperature

Clone	169			412			191			ENTAV 15		
Doses	0	50	100	0	50	100	0	50	100	0	50	100
Dry biomass of grass cover (t/ha)	0.71	0.63^{-}	0.78	2.69^{+}	2.42	2.46	1.92	2.19	2.53	0.72	0.83	1.29
N content in biomass	1.57	1.56	1.62	1.85	2.11	2.20^{+}	1.85	1.84	1.95	1.31	1.68	1.20^{-}
Visual assessment of grass quality	$^{*}2.70^{-c}$	3.33^{b}	4.00^{a}	7.33^{C}	8.33^{B}	9.00^{+A}	7.33	7.00	8.33	5.92	6.00	6.33
Sugar content (%)	24.9	25.2	23.7	19.9	21.1	19.7	20.8	19.9	17.6	19.7	22.3	17.3
Acid content (g/l)	8.0	7.2	8.1	8.4	7.8	7.1	9.0	8.7	9.9	5.7	6.9	5.4
Glycoacidometric index	3.11	3.50	2.93	2.37	2.71	2.77	2.31	2.29	1.78	3.46	3.23	3.20

Material and methods:

- The experiment was set up in 2020 at Krnjevo, Velika Plana, Central Serbia in a vineyard. The soil was Eutric Cambisol.
- Data were collected in a commercial 12-year-old vineyard and clones examined were Cabernet sauvignon VCR: 169, 191, 412 and ENTAV 15.
- For the soil fertility analysis samples were collected from 0-30 and 30-60 cm depth. Actual and exchangeable pH, total N and organic C content, available P_2O_5 and K_2O were determined via standard agrochemical methods.
- Fertilizer applied was ammonium nitrate with different rates (0, 50, 100 kg N/ha), plot size 10 m^2 (in inter-row spacing) with grass-legume mixture: 60%, *Festuca rubra*, 30% *Lolium perenne* and 10% *Trifolium repens*, sown in autumn 2017 (under clones 412 and 191), and 2019 (under clones 169 and ENTAV 15).
- Dry biomass, N content in biomass and visual assessment of grass quality under influence of nitrogen fertilization were monitored. The sward covering rate per cut was measured as a turf-grass stand density scale, based on a 1 to 9 rating scale.
- The grapes quality was expressed through sugar content in grape. Total acid content was expresed as tartaric acid.
- The grass cover temperature was measured with a thermal imaging camera twice during the vegetation period.
- Data were analysed through analysis of variance and LSD test, in order to recognize significant effects of fertilization treatments.

ACKNOWLEDGMENT

The research was financed by the Ministry of Education, Science and Technological Development, Republic of Serbia, project ref. numbers: 451-03-9/2021-14/200116 and 451-03-9/2021-14/200019