SUSTAINABLE AGRICULTURAL PRACTICES ON VINEYARD PRODUCTION: WINE OF LOW NITROGEN FOOTPRINT

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ABSTRACT

Nitrogen (N) is a key nutrient in crop production. When excessive reactive N is present in the environment, it may not only reduce crop production and increase pests and diseases incidence but can also be a serious environmental and human health problem. Agriculture is one of the most important activities where action can and must be taken to promote N losses mitigation and create awareness about the impact of excessive N inputs. The efficient use of N as fertilizer was tested in several field experiments to produce wine of low N-footprint.

Conventional fertilization practices in each farm served as control (treatment A – higher N dose) and three other rates of N inputs (treatments B, C and D, being D the lowest N dose) were applied to vineyards located in two different regions in Portugal, from the variety *Alicant Bouschet*.

Innovative soil probes were set up in the field in treatments A and D, each one at two different depths (30 and 90 cm), to monitor nitrate leaching potential risks in real time. Several samples of soil, plants and fruits were collected for chemical analysis along the growing cycle of each vineyard farm. At harvest time, grapes of each treatment were collected, weighted and vinified to produce a type of wine per treatment.

Different N fertilizer management practices applied in the field of each farmer found no significant differences in fresh grapes production yield and quality. Treatments B and C (medium N doses applied) result in the higher grape production (t/ha). Reduction of N fertilization did not negatively affect production yield neither the potential alcohol content of wine.

Figure 1. Experimental field

Figure 2. Experimental plot, treatment C

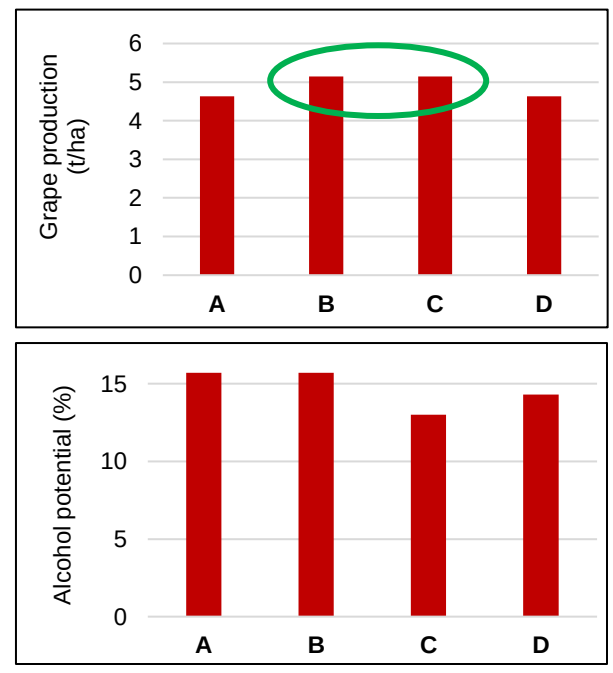

Figure 3a and 3b. Average grape production (t/ha) and potential alcoholic content of wine (%), per treatment (A, B, C, D)

Figure 4. Nitrate leaching soil probes

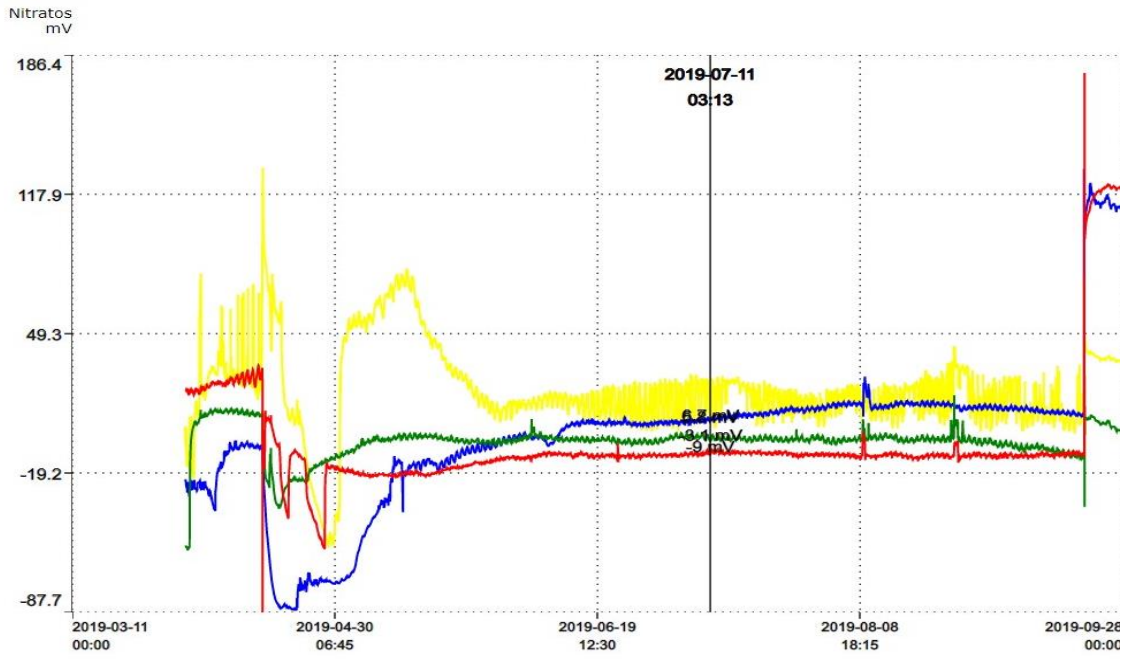

Figure 5. Row data of nitrate leaching per monitored treatment (A and D) at two depths each. *Estimations and data analysis in process.*

CONCLUSIONS

- The conventional farmer practice of higher N inputs in vineyards production did not result in the best yield;
- The innovative soil nitrate probes tested in the vineyard fields showed to be an efficient technology to monitor directly N losses by leaching;
- The new sensors were an added value for farmers allowing the control of N inputs and soil pollution and improving N use efficiency through better agricultural practices;
- Wines of low nitrogen footprint were produced with a very good quality and taste, with similar characteristics of that produced for commercial purposes, before refinement.

Figure 6a and 6b. Wine produced per treatment.

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