Reducing nitrogen footprint of Portuguese wine

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Abstract

Nitrogen (N) is a key nutrient in vineyard management. The efficient use of N as fertilizer was tested in several field experiments to produce wine of low N-footprint. Agriculture practices different from the conventionally used in each vineyard partner were implemented to achieve higher production and product quality versus lower N inputs. Different N fertilizer management applied in the field found no significant differences in fresh grapes productivity and quality of the wine produced. The N-Footprint tool will confirm the efficacy of the new management procedures and validate the wine of low N-footprint.

Keywords: agriculture, nitrogen-footprint, vineyards

1. Introduction

Nitrogen (N) plays a key role in agriculture and is a crucial nutrient in wine production (Ozpinar et al., 2018). However, if excessive reactive N is present in the environment, it may not only reduce the production and increase pests and diseases incidence, but can be a serious environmental and human health problem, and affect all the natural compartments. Agriculture is one important activity where action can and must be taken to promote N losses mitigation. With this purpose, the operational group "NEP – high Nitrogen Efficient crop Production for better water management" is focused on developing wine grapes production system leading to low N-footprint, in three national wine/grapes producers in Portugal (Fig. 1).

Fig. 1: Geographic location of vineyard's production partners and field experiments.

2. Methodology

New agricultural practices, which include fertilisation (Arrobas et al., 2014) and innovative technologies were tested to increase N use efficiency and decrease the N wine footprint. Conventional fertilization practices (Puig-Montserrat et al., 2017) in each farm served as control and three other nitrogen treatments were tested. Soil, plants and fruits were monitored along the growing cycle of each vineyard farm: a) samples were taken for chemical analysis, specially for N; b) soil probes were used at two different dephts to monitor the nitrate leaching potential risks (Fig. 2). Grapes of each treatment were collected in the end of the campaign, weighted and vinified to produce a different type of wine per treatment.

Fig. 2: Soil nitrate measuring probes (in depht).

3. Results

Treatments applied in the field did not show significant differences in fresh grapes productivity neither in wine quality and taste. Chemical analysis to soil, plant and fruit and the deph analisys to the nitrate leaching data provided by the probes will help to confirm the first result.

4. Conclusions

Wines of low nitrogen footprint (Fig. 3) were produced with success without compromising the production and quality of the product. In the first experiments wine enological quality was similar to regular production by one of the producers. Further results will be ready shortly.

Fig. 3: Wine of low nitrogen footprint.

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