

# Soil fertility, greenhouse gas emissions and agronomic performance in a vineyard with different soil managements in a semiarid Mediterranean environment

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## Introduction



**Vineyard**



**Cover crop (faba bean)**

To counteract the decline of soil organic matter (SOM), the introduction of cover crops with or without nitrogen (N) fixing forage legumes, has become a management technique widely used in vineyards of semiarid environment. However, cover crop and tillage may stimulate greenhouse gas emissions ( $\text{CO}_2$ ,  $\text{N}_2\text{O}$ ,  $\text{NH}_3$ ).

$\text{CO}_2$  emission is expected due to the speeding up of the mineralisation process and the adding of fresh organic residues.

$\text{N}_2\text{O}$  emissions are also expected in soils of semiarid environment due to climatic conditions (rainfall concentrated in a short period) that can create, in clayey soil, anoxic microsites where denitrification can occur.

$\text{NH}_3$  emissions are expected following heavy supply of N fertilisers in sub-alkaline soils.

## Objectives

To investigate the effect of different soil managements on greenhouse gas emissions from a vineyard soil.

Soil fertility and agronomic performance of the vineyard will be also evaluated to find out the best management practice.

Tested soil managements will be i) traditional tillage, ii) cover crop 1 (faba bean), iii) cover crop 2 (spontaneous vegetation), iv) herbicide.

## Materials and methods



**Soil samples**

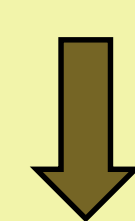


**Laboratory analysis**

- Total organic C
- Extractable organic C
- C and N microbial biomass
- Soil respiration
- Soil denitrification



**Gas samples**



**Laboratory analysis**

- Carbon dioxide
- Nitrous oxide
- Ammonia



**Wine and grape samples**



**Laboratory analysis**

- Biomass production
- pH
- °Brix
- Acidity
- Yeast available nitrogen