

# Vineyard location and management effects on soil respiration



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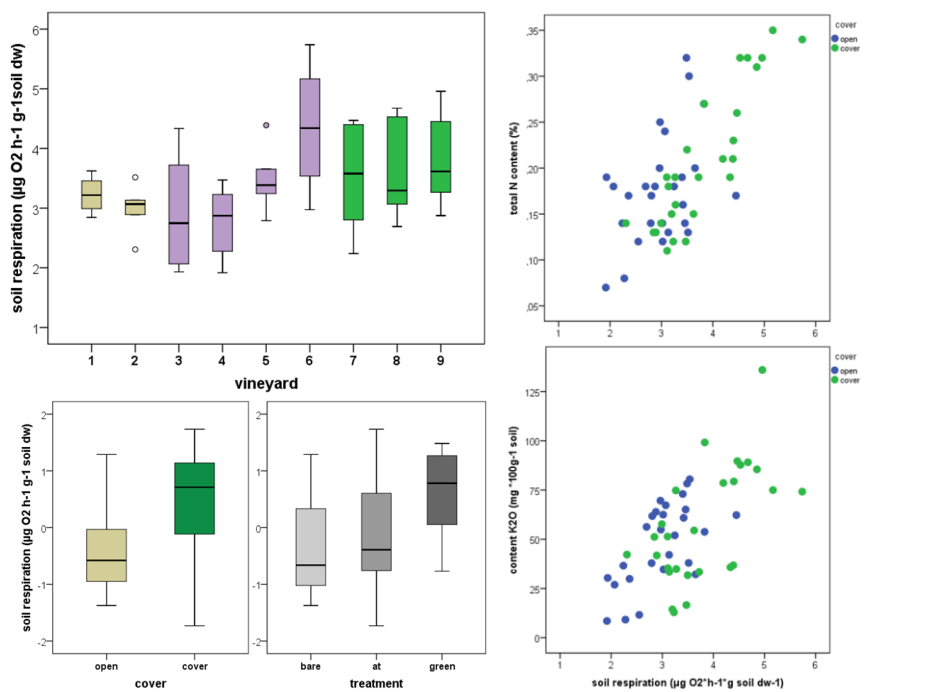
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## Introduction

Soil respiration is a key ecosystemic process resulting in the release of carbon dioxide from the soil by plants, animals and microorganisms. The process is part of the carbon cycling: atmospheric CO<sub>2</sub> is converted into organic compounds by photosynthesis, used for energy turnover of to build structural components. These components are further decomposed by microorganisms thereby closing nutrient cycles. Environmental factors as temperature, soil moisture and nitrogen can strongly influence the carbon conversion rates. In vineyards especially soil cover management affects levels of organic matter being incorporated in the upper layer of vineyard soils. Within a three years project we aim to analyse the factors influencing the soil microbial community and microbial activity in different vineyards employing soil management treatments.

## Objectives

- Vineyard and soil parameter dependent difference in soil respiration
- Effects of tillage and inter-row vegetation cover management on soil respiration



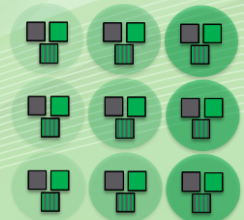
**Fig.1:** (A) Basal soil respiration determined in nine vineyards, (B) influence of inter-row management on soil respiration: open bare soil, alternate soil cover, permanent soil cover, (C) correlation with soil parameters (all vineyards) total N and K<sub>2</sub>O content shown as scatter blots.

## Key results

- ❖ Soil respiration significant different between V4 and V6 (Fig. 1A). No difference in other vineyards.
- ❖ Vegetation cover of inter-rows without soil disturbance increases soil respiration already in the second year of management change (Fig.1B), but not in all vineyards (use of z-transformed data).
- ❖ V1, V2, V9 hat higher basal soil respiration in bare ground inter-rows.
- ❖ Correlation of soil parameters with soil respiration was highest for total N content (coefficient 0.720\*\*) and content of K<sub>2</sub>O (coefficient 0.618\*\*). Results shown as scatter blots (Fig.1C)

## Materials and Methods

Soil samples were collected in June 2016 in the frame of the BiodivERsA/FACCE-JPI joint project "PromESSinG" in nine Austrian vineyards in Lower Austria (Krems, Langenlois) and Burgenland (Großhöflein, Eisenstadt) three different practices for inter-row management: open bare soil, alternate soil cover, permanent soil cover. Soil samples were collected from all treatments and vineyards in duplicates, whereas each sample represents a pool of 10 core borer (0-10cm) samples. Basal soil respiration was determined at the University of Fribourg from 3.5g water-saturated soil during 20 hours at 22° C with an automated electrolytic micro-respirometer (Scheu 1992).



**Fig.2:** Experimental setup, 9 vineyards, each with 3 inter-row management

