APPLICATION OF ORGANIC CARBON STATUS INDICATORS ON VINEYARD SOILS: THE CASE STUDY OF DOC PIAVE (VENETO REGION, ITALY)

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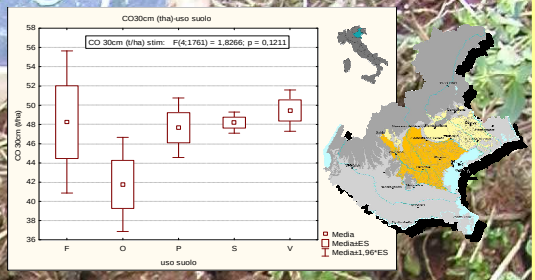
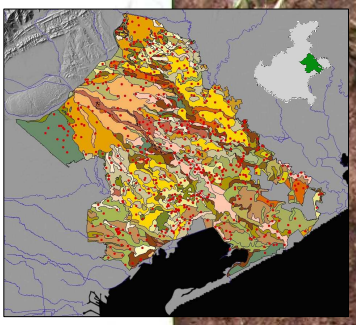
WHY ASSESS SOIL ORGANIC CARBON ON VINEYARD?

According to the **Kyoto Protocol** objectives, it's necessary to identify **alternative carbon dioxide sinks**, and **vineyard soils** could be a significant opportunity.
A previous study, located in the alluvial plain of Brenta and Piave rivers, showed a **significantly higher organic carbon (OC) content** (49 t/ha) in vineyard topsoil (0-30 cm) than in the other main land uses of Veneto region (orchard (F), meadow (O), grassland (P) and cropland (S)).
To study vineyard's capacity to sequestrate OC, the **DOC Piave area** has been investigated. It's located in Treviso and Venice provinces and is near 150,000 ha extended. Vineyards cover about the 5% of the area.





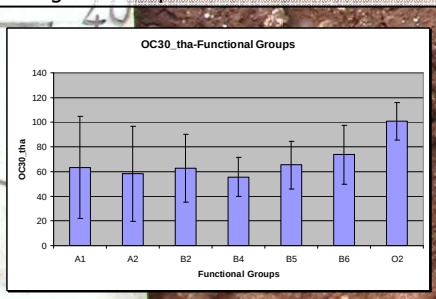
THE FUNCTIONAL SOIL GROUPS

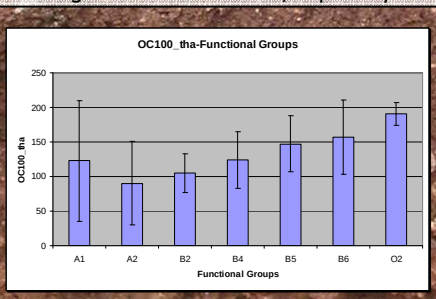
The soil maps of Treviso and Venice provinces at 1:50,000 scale were considered and the Covered Soil Map of Veneto region at 1:10,000 scale was used.
The study area includes **614 soil profiles**, 153 on vineyard and the others mainly on cropland. The profiles are geographically referred with a GIS system and are reconnected to the STUs (**Soil Typological Units**) defined for the soil maps. To better highlight significant differences, STUs were grouped into **functional groups** on the basis of **texture, coarse fragments content, drainage and physiography** (high and low plain).

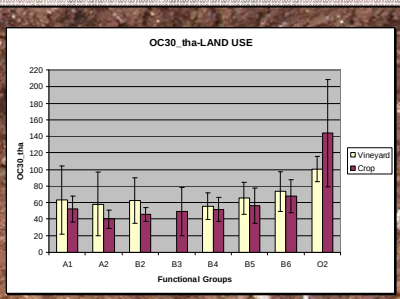
FUNCTIONAL GROUP	LANDSCAPE	COARSE FRAGMENTS	DRAINAGE	TEXTURE
A1	High plain	1-15%		
A2		>15%		
B2	Low plain	<1%	excessively drained, somewhat excessively drained, well drained	Corse loamy, coarse silty
B3		<1%	excessively drained, somewhat excessively drained, well drained	Fine loamy, fine silty, clayey
B4		<1%	moderately well drained	Sandy, coarse loamy, coarse silty
B5		<1%	moderately well drained	Fine loamy, fine silty, clayey
B6		<1%	somewhat poorly drained, poorly drained, very poorly drained	Fine loamy, fine silty, clayey
O2	Soils with mollic horizon	<1%	somewhat poorly drained, poorly drained, very poorly drained	All textures

SOC TREND

Both the topsoil (0-30 cm) and the subsoil (0-100 cm) bar charts show a **close relationship between soil properties and SOC content**:
-in the high plain, soils with lower coarse fragments content have higher fine earth volume, then higher OC value (A1 than A2);
-in the low plain, OC trend increases according to clay content and in opposition to the soil drainage (from B2 to B6);
-soils with mollic horizon and poorly drained (O2) have the highest value.
Furthermore, **vineyard shows higher values than crop on topsoil** for all the functional groups, except for O2 group. Almost all the 90 wineries involved in the present study apply also **manure** on soil, have a **reduced tillage** and, at least, an **inter-row grass covered soil**. These agricultural practices maintain or increase soil organic matter content, especially on the first 30 cm.

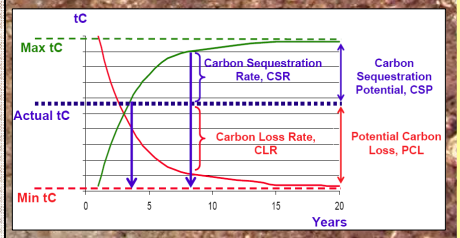






THE SOCSI

The **Organic Carbon Status Indicators** (SOCSI) developed by the JRC-Ispra in 2006 are been considered to investigate OC trend in different soil types and land uses. The SOC content of each combination varies between the **minimum** and the **maximum** values and the actual content determines the potential for the change. The capability classes of **Carbon Sequestration Potential** (CSP) and **Potential Carbon Loss** (PCL) were calculated for each functional group as followed:
•L (low): <[Min+(Max-Min)/3]
•M (medium): between [Min+(Max-Min)/3] and [Min+2*(Max-Min)/3]
•H (high): >[Min+2*(Max-Min)/3]
The most significant results are shown by **OC (%) on vineyard topsoil**: A1, B2, B5 and B6 groups have low potential to loss and high potential to gain OC. So, applying an **appropriate vineyard's management**, it's possible to **increase topsoil organic matter** in these soil types.



CONCLUSIONS

The SOCSI will be drawn on **maps** to get an overview of the DOC Piave area actual carbon stock and its possible changes. The maps highlight also the **priority areas** where policy interventions on carbon management should be concentrated.
In the last years Italy is working on the **first wine carbon calculator** to count emissions from the main wineries and winemakers. Recently the vineyard soil's role of CO_2 sequestering into organic matter is been introduced so there is an urgency to get local information about it.

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