



International Union of Soil Sciences

# Centennial Celebration and Congress of the International Union of Soil Sciences

Florence - Italy

May 19 - 21, 2024

## ABSTRACT BOOK

ID ABS WEB: 137978

## 4. Soil health in achieving the Sustainable Development Goals

### 4.11 133521 - Caring for mountain soils, the hidden key to climate change adaptation and SDGs: challenges, threats, success stories

#### FROM SOIL TO FORAGE IN ALPINE REGION: THREE-YEAR MONITORING OF NUTRIENT AND ORGANIC CARBON CIRCULARITY IN MOUNTAIN PERMANENT MEADOWS

D. BONA, D. BERTOLDI, S. SILVESTRI, G. IUSSIG

Fondazione Edmund Mach, San Michele all'Adige, ITALY

The study has been performed in an Alpine Valley. Dairy farms are essential for several reasons, including the impact on tourism. Part of the milk produced was collected and processed to produce quality dairy products, and their production protocol requires the use of fodder from the origin area. A consortium plant to treat the manure produced from local farms (115 KWe; feed with 19,000 tons/year of manure) has been built (2019). The liquid digestate (LD), after separation, returns to the permanent grasslands as fertilizers. The solid fraction is mainly delocalized to nearby vineyards. The work aims to monitor (from 2020 until 2022) the fertilizer used (LD), soil, and forage produced in three permanent grasslands at three different mowing dates (June, July, and September).

The LD had a low dry matter (DM) (4.66%) and volatile solids content (74.52%DM), while nutrient content was high (6.45%DM of N; 4.38%DM of Ammonia; 1.77 %DM of P; 9.13 %DM of K). The forage productivity ranged from 7.5 to 11.5 (tons/ha) with annual and seasonal (mow) differences. The nutritional properties of forages show differences among mow and years. The crude protein was about 12–22 (g/100 gDM), the total fibre was from 18–34%, the nitrate content was about 1000 mg/kgDM, and the phosphorus and potassium were 0.1–0.8% and 2.5–4.5%. The soils had a high content of SOM (6–16%) and good nutrient content. The higher value of N was 4 g/kg; exchangeable K values were always greater than 1000 mg/kg, and Mg values were between 400 and 800 mg/kg. Phosphorus has the year's greatest variability: 2020 showed the lowest values (around 200 mg/kg) while 2021, had the highest (between 600 and 900 mg/kg). The main output of this work is the monitoring of the nutrient and organic carbon circularity in mountain areas to improve farming practices for soil health maintenance, and for ensuring higher quality forage for livestock.

**Keywords:** Digestate,Permanent Meadows,Forage,Nutrient,Soil organic carbon