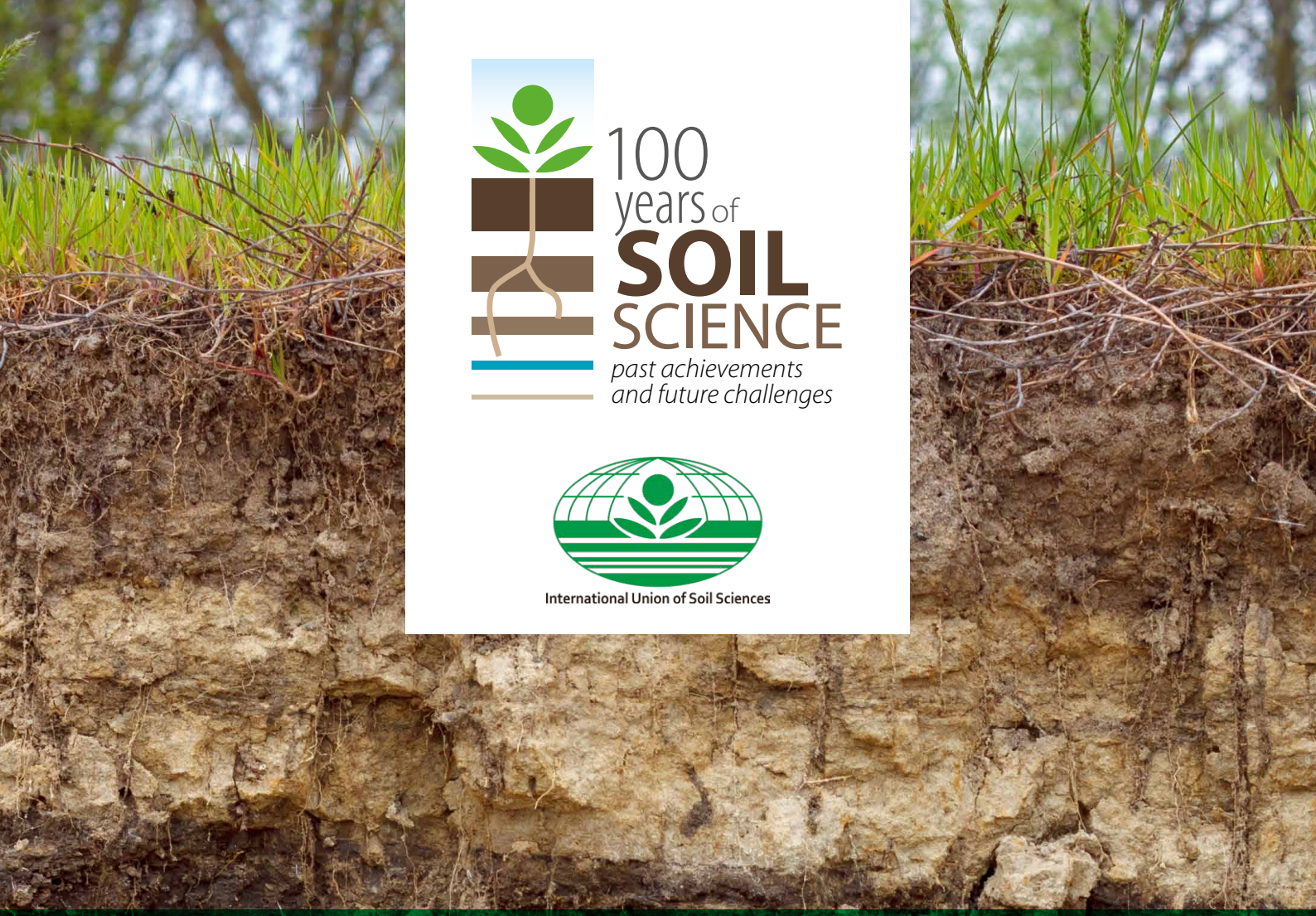

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Centennial Celebration and Congress of the International Union of Soil Sciences

Florence - Italy

May 19 - 21, 2024

ABSTRACT BOOK

ID ABS WEB: 137739

4. Soil health in achieving the Sustainable Development Goals
4.29 133611 - Soils and the environment

NUTRITION OF APPLE ORCHARD WITH LIVESTOCK-DERIVED FERTILISERS: DYNAMICS AND LOSSES OF SOIL MINERAL NITROGEN

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Nitrogen is a very influential macronutrient on crop development. Apple orchards require careful fertilisation, without leading to an excess of N that can be harmful, both to the crop and the environment. This study, in cooperation with the Fruit and Vegetable Growers' Association of Trentino, aimed to replace mineral fertilisers with livestock-derived amendments for apple orchard nutrition, while limiting N losses.
A three-year trial was conducted in an apple orchard of Gala in Trentino. In 2021 the field was organised in randomised plots fertilised with mineral fertiliser (once a year), cattle manure and the solid fraction of digestate from cattle slurry (once at start of the trial). The resulting three theses (MIN, MAN, DIG) were compared to an unfertilised plot (CNT). The soil was sampled on the row during the apple's vegetative cycle, the soil solution was collected using lysimeters at 60 cm, the useful depth limit for roots in this soil, and the leaves were sampled during the fruit swelling. The fruits were harvested at commercial ripening.
Both cattle manure and solid digestate ensured a gradual release of available N into the soil, mainly during the phenological phases of the crop's greatest need, even two and three years after supply. The soil mineral N dynamics in MIN followed the rainfall trend and the release of available N only occurred after flowering if the fertiliser distribution was followed by rain. In the third year, heavy rainfall in May caused an excessive release of N into the soil, which caused heavy leaching, demonstrating a sudden release of mineral N leads to nutrient loss and environmental pollution. N losses in the amended theses were comparable to CNT. N in leaves was similar between the fertilised theses and higher than in CNT. The different strategies ensured similar yield between the theses.
Fertilisation with livestock-derived amendments has proven to be the best strategy to ensure N availability over time and reduce the environmental impact.

Keywords: soil mineral nitrogen dynamics,nitrogen losses,livestock-derived fertilisers,apple orchard,crop nutrition