

DYNAMICS OF NITROGEN STABLE ISOTOPE RATIO IN SOIL, PLANT AND FRUIT IN AN APPLE ORCHARD OF TRENTO: CONVENTIONAL VS ORGANIC FARMING

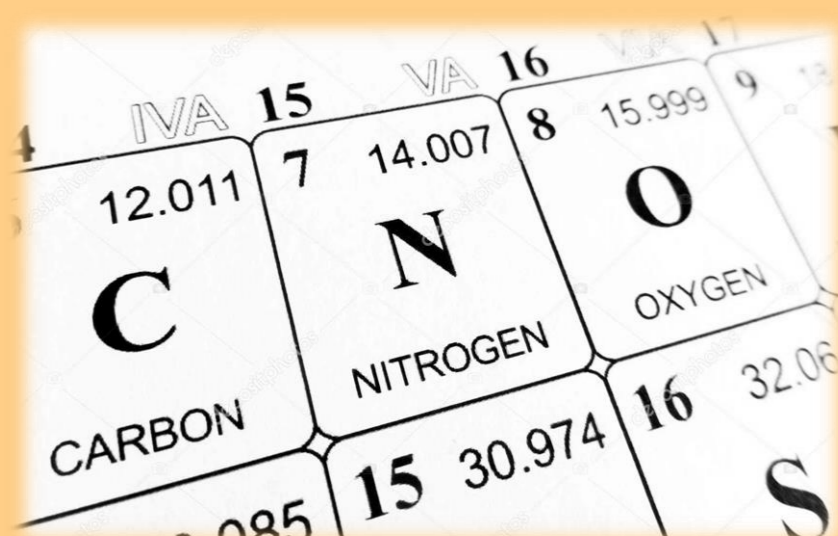
R. Morelli^{1*}, F. Camin², R. Zanzotti¹, E. Mescalchin¹

¹ Environment and Mountain Agriculture Department, Technology Transfer Centre, Edmund Mach Foundation, E. Mach Street, 1 - 38010 San Michele all'Adige (TN), Italy

² Food Quality and Nutrition Department, Research and Innovation Centre, Edmund Mach Foundation, E. Mach Street, 1 - 38010 San Michele all'Adige (TN), Italy

* raffaella.morelli@fmach.it

Nowadays, organic agriculture is catching on all over Italy in order to reduce the impact on human health and environment, and prevent soil degradation.



Nitrogen stable isotope ratio ($\delta^{15}\text{N}$) is one of the strongest markers for organic production.

Mineral fertilizers have a lower $\delta^{15}\text{N}$ (-6 - +6‰) than organic fertilizers (1 - 37‰) because the first ones are synthesized by atmospheric N_2 , whereas the second ones derive from transformation mechanisms that enrich matrix in heavier nitrogen.

After plants uptake and metabolic processes, nitrogen preserves similar isotope ratio of absorbed products. Therefore, we can deduce the kind of nitrogen source absorbed and used by plants.

GOAL

We are conducting a study on an apple orchard (*Gala cv.*) in Valsugana (Trentino Alto Adige, Northern East Italy), with the overall aim of comparing conventional VS organic agronomic management. Mineral fertilizers and pesticides are used in conventional management, animal composted manure and substances admitted in organic farming are employed in the organic one.

In this investigation, we aim to identify the nitrogen source of plants in both managements. Particularly, we are studying the uptake of nitrogen sources by plants and nitrogen translocation to fruits.



EXPERIMENTAL DESIGN

The experimental field has been managed with conventional agronomic practices until 2017.

In April 2018 it has been divided into two plots, each subjected to one management (conventional and organic farming).

This experimental design includes sampling of soil and plant (leaves) every six weeks and sampling of apples on harvest for three years.

Samples are being collected in ten replicates for management.

PRELIMINARY SOIL INVESTIGATION

We conducted chemical and physical analysis of soil before managements separation (T_0) to characterize the field. We collected and analysed 18 soil samples (0-20 cm depth) on the whole plot. The soil is quite heterogeneous (see Table).

Preliminary information about Nitrogen stable isotope ratio is not available yet.



* Average \pm Standard Deviation (n=18)

TEXTURE	pH	CARBONATES g/Kg CaCO_3	ORGANIC MATTER %	TOTAL N %	EXCHANGEABLE K g/kg K_2O	EXCHANGEABLE Mg g/kg MgO
Mainly Silt Loam	7.5 \pm 0.1	371 \pm 192	5,4 \pm 2	0.3 \pm 0.1	105 \pm 27	887 \pm 232



PERSPECTIVES

This experimentation will allow us to follow $\delta^{15}\text{N}$ dynamics in conventional and organic farming, from ground to fruit. In this way we can extend our knowledge on nitrogen isotope ratio as marker of organic products in apple crops, which has been not extensively studied.

Finally we will evaluate how $\delta^{15}\text{N}$ is related with other parameters linked to fruits quality.

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