International workshop on "Isotope-based studies of water partitioning and plant-soil interactions in forested and agricultural environments", 27-29 September 2017, Villa Montepaldi, San Casciano in Val di Pesa, Tuscany, Italy

Evaluation of water isotopic composition of Treviso Red Chicory and soil in northern Italy

Alba Gallo, Daniele Zannoni, Giancarlo Rampazzo and Barbara Stenni

Ca' Foscari University of Venezia, Department of Environmental Sciences, Informatics and Statistics, Italy, alba.gallo@unive.it, Via Torino 155, 30172, Venice

The stable isotope approach in agricultural research is a fundamental method to understand and partition the water fluxes in the soil-plant-atmosphere continuum. Recent studies suggest that the water used by plant (soil water) could not be the same that contribute to groundwater recharge and streamflow (Evaristo et al., 2015).
The aim of this work is to determine the relative contribution of the water reservoir that interest the growth of the Treviso Red Chicory (tardivo and precoce varieties).
Two areas were investigated in Veneto (northern Italy): the former, located in Treviso province, is regulated by the Consortium of variegated Red Chicory of Treviso and Castelfranco; the latter is located in Padova province and is not regulated by the Consortium. Precipitation, stream water and groundwater samples have been collected from both sites to determine the isotopic composition ($\delta^{18}O$ and δD) of the main water reservoir that could interact with plant physiology.
In several studies, different procedures have been developed to extract water from soil and plant, such as lysimeter and centrifugation, respectively.
Groundwater, stream water and precipitation samples were analyzed with the CO_2 equilibration method using a Thermo Fisher Delta Plus Advantages Mass Spectrometer.
We are now developing a cryogenic extraction apparatus to determine both the isotopic composition of plant water (leaves and roots) and soil water (topsoil and subsoil).
The next step of the work will be partitioning the relative contribution of water fluxes in the soil-plant-atmosphere system. We think that this approach can be useful for future studies regarding regional traceability of food and to discriminate the plant transpiration process on land water cycle.

Keywords: stable isotope approach, regional traceability, cryogenic extraction, water fluxes partitioning

References

Evaristo J., Jasechko S., McDonnell J. J., Global separation of plant transpiration from groundwater and streamflow, Nature, 525, 91-94, (2015).