



## **Evaluation of diverse methods for measuring humification index of ombrotrophic peats**

Claudio Zacccone (1,2), Cesar Plaza (3), Claudio Ciavatta (4), Teodoro M. Miano (5), and William Shotyk (1)

(1) University of Alberta, Department of Renewable Resources, Edmonton, Canada (zacccone@ualberta.ca), (2) University of Foggia, Department of the Sciences of Agriculture, Food and Environment, Foggia, Italy (claudio.zacccone@unifg.it), (3) Spanish National Research Council, Madrid, Spain, (4) University of Bologna, Department of Agricultural Sciences, Bologna, Italy, (5) University of Bari, Department of Soil, Plant and Food Sciences, Bari, Italy

Structural changes of organic matter occurring in peat during the humification process have been generally evaluated by indirect measurements of the degree of humification.

Besides traditional and (more or less) objective and reproducible methods, such as the von Post humification scale or the visual estimation of the relative proportions of fiber structures, several other methods have been published and a wide variety of geochemical, spectroscopic and molecular techniques used in humification studies. Among them, thermogravimetric methods, the relative proportion of carboxyl and hydroxyl groups, atomic ratios, absorbance measurements of alkaline peat extracts, the abundance of free radicals, and the fluorescence properties of bulk peat and corresponding humic macromolecules have been used as a descriptor of the humification process, often providing contrasting results.

To answer fundamental questions about humification, and to be able to compare data, it is very important to determine what is the best humification index able to quantify the humification degree and the evolution of peat humification along vertical profiles. The possibility to better understand the extent to which bogs may serve as reliable geochemical archives is of paramount importance, especially considering that ombrotrophic cores from bogs have been and are often used to reconstruct environmental changes over time (decades to millennia). Nine bogs from four continents, and 4-5 peat samples from each core collected at different depths, have been selected for this study. Then, each peat sample has been tested using several physical, chemical and spectroscopic approaches in order to identify the simplest, most valid and cost-effective method to be applied in geochemical and paleoenvironmental studies.