MOSSCLONE: A EU-FP7 project to standardize a devitalized moss clone as passive contaminant sensor

Anna Di Palma[1,3], Paola Adamo[1,3], Roberto Bargagli[2,3], Fiore Capozzi[3], David Crespo Pardo[4], Pietro Iavazzo[3], Valeria Spagnuolo[4,3], Stefano Terracciano[3], Mauro Tretiach[5,4], Simonetta Giordano[3,4]

[1] *Dip.to di Agraria, Università di Napoli Federico II, Portici, Italy;*
[2] *Dip.to di Scienze Fisiche, della Terra e dell'Ambiente, Università di Siena, Italy;*
[3] *AMRA - Analisi e Monitoraggio del Rischio Ambientale, Napoli, Italy;*
[4] *Dip.to di Biologia, Università di Napoli Federico II, Napoli, Italy;*
[5] *Dip.to di Scienze della Vita, Università di Trieste, Italy.*

Mosses, due to their efficiency in the load of both particulate and gaseous forms of inorganic, organic and radioactive pollutants, are widely considered good performing biomonitors either when employed as native species or as transplants. The popular and largely employed technique of so called "moss bags" consisting in material collected in nature and exposed in nylon net bags according to an experimental design seems to show some limits: among others, a certain environmental impact on collection sites and the lack of standardization of the exposure protocol. To overcome these problems, an European research team coordinated by University of Santiago de Compostela (Spain) has developed the FP7 MOSSCLONE project, aimed at setup and patent a new biotechnological tool based on the use of a devitalised moss clone to detect inorganic (metals and metalloids) and organic (PAHs) pollutants.

The main aims of the project are: 1) selection and culture of a particularly performing moss clone; 2) molecular, physical, physical-chemical and multi-elemental characterization of the cultivated clone; 3) large-scale production of new concept moss-bags for transplants; 4) comparison between the data collected using moss-bags and traditional techniques (i.e. bulk deposition collectors, airborne particles samplers and gaseous pollutants samplers) to allow tool validation; 5) methodological standardization to develop a protocol for using moss-bags and 6) identification of pollution sources. For more information www.mossclone.eu.

In the first 20 months of activity the Italian research team was involved in species selection, molecular and physico-chemical characterization of the moss clone, and in exposure standardization assay. The latter has taken into account aspects concerning bag preparation (mesh, shape, size and weight effects) and exposure (height above ground and duration time) items. In order to evaluate the influence of land use and climate on moss uptake, the first test exposure was performed in 21 sites (selected among natural background, urban, industrial, agricultural) of three European countries (Austria, Italy, Spain) with different climate.

Key words: moss bags, pollution, biomonitoring, standardization assay, moss clone.