SEM/EDAX, XRD analysis and smart data sharing in the study of innovative fertilizers

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The demonstration of the production and use of an innovative fertilizer characterised by reduced salinity, which allow the substitution of chemical and mineral fertilizers, is the target of the European Project Life12 ENV/IT/356 "RESAFE: innovative fertilizer from urban waste, bio-char and farm residues as substitute of chemical fertilizers". Thus, different types of Urban Organic Waste (UOW), Bio-Char (BC) and Farm Organic Residues (FOR) produced in Italy, Spain and Cyprus have been selected in order to obtain a final High Quality fertilizer with desired features. Different receipt have been tested and enzymatic biostabilization treatment at laboratory scale have been carried out over 60 days.

The characterisation analyses have been carried out by Scanning electron microscopy (SEM), Microanalysis (EDAX) and X-Ray diffractrometry (XRD) [1]. Samples have been observed at the SEM for the morphological study and a significant number of microanalyses have been performed on each sample to obtain suitable scientific results for the chemical characterization. XRD has been employed for recognizing the crystalline phases inside the complex biological and amorphous matrix: the crystallographic determination of the phases is based on the microanalysis data. Also the evolution of the mix during biostabilization at laboratory scale was monitored, comparing receipt with and without BC.

Within the project, data sharing has played a fundamental role in order to make the big amount of analysis results quickly and always available among the international partners, both for comparison and for the definition of project steps. Thus, for Life RESAFE project a smart method has been developed for the easy sharing via web of any data (analysis reports, charts, graphs, images, files etc.) in an interactive way. The obtained data have been then related together, allowing the identification of the best receipt of High Quality fertilizer by means of the morphological, crystallographic and chemical features.

As final result, farmers and urban waste managers will have the possibility to reduce costs and obtain environmental and economic advantages, such as the recovery of waste material and the revenue generated from the selling of the new fertilizer. The environmental impact will be also significantly reduced and the greenhouse emissions from landfills will decrease.

References

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