Sustainable substrates for agriculture from dredged remediated marine sediments: from ports to pots (LIFE 17 ENV/IT/000347)

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Sediments are dredged annually from harbours and waterways for ensuring proper and safe navigability, preventing flooding and reducing the pollution load of water bodies. In fact, sediments are a sink of inorganic and organic pollutants directly released into waters or reaching water-bodies trough leaching and leakage. The relocation of dredged sediment in horticulture for crop cultivation and production appears challenging due to the possible transfer of contamination to soil, plant and humans, but at the same time could be a strategy for reducing the intensive use of peat in soilless culture. Aim of the SUBSED project is to demonstrate that it is possible to convert a waste (the dredged marine sediment) into a supply (a commercial substrate) through the application of environmentally and economically sustainable practices. The sediment was dredged by Leghorn port and subjected to phytoremediation. The decontaminated sediment was then processed through three months landfarming, which enhanced the biological activity and proved to be successful for improving sediment physicochemical characteristics, except for bulk density and total organic carbon. The remediated sediment was mixed with different standard commercial growing media (i.e. peat, coconut fiber and wood fiber) in different proportions for soilless cultivation of non-food crop species (such as laurel, an evergreen ornamental with a very fast growing and plant development; calla lily and king protea, grown for cut flower and potted plant, respectively) and food crop species well adapted to the Mediterranean basin, but characterized by different growing seasons and agronomic requirements (such as citrus, olive, wild strawberry, blueberry and basil). Different water regimes were applied in order to evaluate their effect on plant growth and productivity in relation to the substrate mixtures tested. Morphometric, biochemical and physiological analysis were performed for quantitative and qualitative assessment of crop production and for plant stress detection.

Keywords: sustainability; peat-alternative substrates; horticulture; contaminants, circular economy.