Developing pattern in *Prunus laurocerasus* grown on sediment enriched substrates (LIFE SUBSED 17 ENV/IT/000347)

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Introduction: Sediment dredging is a necessary activity carried out to guarantee safe navigable waters. In urban and industrial areas, dredging is also performed to remove contaminated sediments and to avoid water pollution. Thus, the management of dredged sediment is a considerable environmental problem recognized worldwide because of both the large amount of material annually dredged and the presence of inorganic and organic pollutants. The dredging and disposal of sediments, is regulated by a number of local, regional and national frameworks that differ depending upon location. In the current European legislation, there are still no clear references to the possibilities and methods of using dredged sediments, which effectively constitute a new type of product that can be used in agriculture. In Italy, dredged sediment reuse has been merely orientated to civil engineering applications until now. Horticulture is the agriculture sector that produces both edible and ornamental plants. Currently, intensive horticulture relies on the use of several non-renewable materials, such as peat. Soilless cultivation generates a relevant demand of substrates, thus creating high environmental impact due to peatland overexploitation and transportation over long distances. In the last years, research has focused on substrates alternative to peat in order to produce "peat-free" substrates certified with Ecolabel brand. The aim of this study was 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 techniques.

Methods: Sediments, dredged from Leghorn port, were subjected to phytoremediation for three years [1]. The phytoremediated sediment underwent landfarming (periodical aeration by mechanical handling) for three months prior to their use for plant cultivation. Various mixtures of substrates combining different proportions of the treated sediment with three types of standard substrates, commonly used for ornamental and flowering crop cultivation in Tuscany, were tested. Standard substrates were the following: i) peat-based substrate (60% peat, 40% pumice) ii) coconut fiber-based substrate (60% coconut fiber, 40% pumice) (CB); iii) wood fiber-based substrate (60% wood fiber, 40% pumice). The substrates were used for the production of rooted cuttings and for the cultivation of cherry laurel (*Prunus laurocerasus* L.) cultivar 'Novita', a typical and very diffuse evergreen ornamental with a very fast growing and plant development. Experiment set up was performed under greenhouse condition. Different water regimes were applied in order to evaluate their effect on plant growth and productivity in relation to the substrate mixtures tested. Before and at the end of plant cycle, the substrates were characterized by a number of physical, chemical, biochemical and ecotoxicological parameters. Laurel plant vegetative growth in terms of plant height, trunk diameter, sprouting and shoot development, leaf number and area, total biomass were monitored during plant life cycle. Physiological parameters such as leaf chlorophyll content, malondialdehyde as a lipid peroxidation, nutrient and heavy metal concentrations were analyzed.

Results: Generally, sediment-based media mixed with coconut fiber and wood fiber showed slightly higher pH and bulk density compared with peat-based media. Substrate type significantly influenced laurel growth, which was strongly reduced when plants were cultivated on sediment mixed with wood fiber, likely duo to the low electrical conductivity of the mixture. The applied water regimes did not affect the considered growth parameters. Chlorophyll content and lipid peroxidation in leaf tissue did not differ regardless of both the substrate mixture and water regime used.

Discussion: All the sediment-based media mixtures showed physicochemical parameters and heavy metal content in line with the Italian regulation for agronomic substrate for mixed growing media (D.L. 75/2010). Laurel plants grew well in all tested substrates, except for substrate mixture containing wood fiber. Reasons for bad testing performance as well as biochemical profiles are still under evaluation.

References: [1] Masciandaro et al. (2014) *J Environ Manage* **134**: 166-174.

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