LIFE SUBSED

LANDFARMING TO VALORIZE PHYTOREMEDIATED MARINE SEDIMENTS FOR THEIR REUSE IN NURSERY

LIFE17 ENV/IT/000347

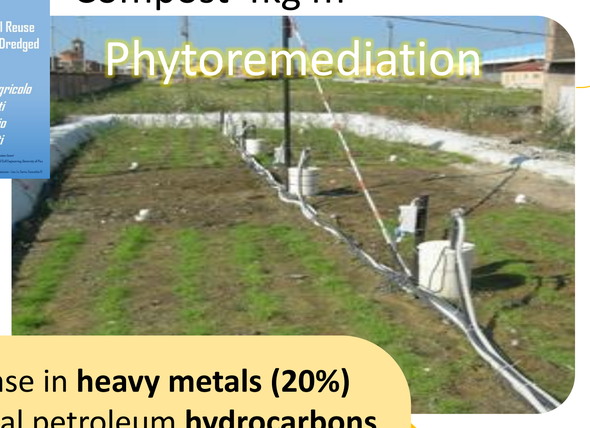
INTRODUCTION

The management of dredging sediments represents a great problem. In Europe every year up to 100-200 million m^3 of contaminated sediments are dredged and need to be treated in order to be reused. Phytoremediation and landfarming represent two biological methods for the remediation of polluted sediments. The aim of **SUBSED project** is to demonstrate the suitability of landfarming process on marine phytoremediated dredged sediments to create a new substrate able to replace the conventional one

MATERIAL AND METHODS

Marine sediments (port of Livorno) were partially decontaminated in **Agriport** project

- Plant used: *Paspalum vaginatum, Tamarix gallica, Spartium junceum*
- Compost 4kg m^2



- ✓ Decrease in **heavy metals (20%)** and total petroleum **hydrocarbons (50-60%)** concentration
- ✓ Improvement in chemical-nutritional properties (**25% increase in N and P**)
- ✓ Stimulation of the biological activity (**50% increase in number and activity of microorganisms**)

- 3 months
- periodically (once a week) mixing and aeration through a little excavator

In **Subsed** project the landfarming was applied to phytoremediated sediments

- The treated sediment will be tested as agronomic substrates

- fruit trees (olive and citrus)
- ornamental plants (protea, calla, laurel),
- food plants (basil, blueberry, wild strawberry and citrus).

Landfarming is a technique for the remediation of contaminated matrices that exploits the biological action of microorganisms through their biodegradative processes towards pollutants

LANDFARMING RESULTS

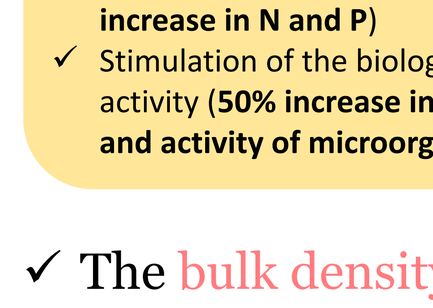
- ✓ The bulk density and the conductivity significantly decreased at the end of landfarming process
- ✓ As expected, no variations for heavy metals were detected
- ✓ Hydrocarbon C>12 decrease noticeably (<100 mg/kg)

In compliance with Italian regulation for agronomic substrate (D.lgs. 75/2010) with the exception of **TOC** (lower) and **bulk density** (higher)

The mixing of sediments with a source of organic matter rich in carbon and light, such as **peat**, **coconut fiber**, **wood fiber**, allowed to reach the required limits

NURSERY RESULTS

Ornamental species
Prunus laurocerasus



Water Regimes
WR1 = normal
WR2 = low (- 30%)

	Stem DW (g)	Leaves DW (g)	Roots DW (g)	Total DW (g)	Total leaf area(cm^2)
Substrates					
LMix 1	42.6 a	116.7 ab	134.8 bc	294.1 bc	9.764.2 a
LMix 2	42.8 a	126.0 a	197.7 a	366.4 a	8.632.6 ab
LMix 3	31.6 b	89.3 c	126.7 bcd	247.6 cd	7.282.6 bc
LMix 4	42.3 a	119.4 a	155.5 ab	317.2 ab	8.442.8 ab
LMix 5	31.6 b	93.0 bc	93.3 cd	218.0 de	6.621.3 c
LMix 6	18.4 c	55.4 d	91.7 cd	165.5 e	4.885.4 d
LMix 7	18.2 c	56.6 d	82.5 d	157.3 e	4.357.3 d
Water Regimes					
WR1	29.6 b	ns	ns	ns	6.677.6 b
WR2	35.3 a	ns	ns	ns	7.604.2 c

Tested Substrates			
LMix1		60% peat	40% pumice
LMix2	25%sediment	45% peat	30% pumice
LMix3	50%sediment	30% peat	20% pumice
LMix4	25%sediment	45% coconut fiber	30% pumice
LMix5	50%sediment	30% coconut fiber	20% pumice
LMix6	25%sediment	45% wood fiber	30% pumice
LMix7	50%sediment	30% wood fiber	20% pumice

- ✓ Plant grew better in LMIX 2 than LMIX 1 (control)
- ✓ Limited growth in presence of wood fiber

October 2020

Substrates	Chroma Index
LMix 1	**14.1ab**
LMix 2	**13.4a**
LMix 3	**14.1ab**
LMix 4	**14.7bc**
LMix 5	**14.3bc**
LMix 6	**16.5d**
LMix 7	**14.9c**

August 2020

Substrates	Chroma Index
LMix 1	**13.6a**
LMix 2	**14.8a**
LMix 3	**16.8b**
LMix 4	**17.1b**
LMix 5	**18.1b**
LMix 6	**31.7d**
LMix 7	**28.8c**

Conclusion The landfarming process was effective in homogenizing the treated sediments and reducing organic contamination, reaching suitable physical and chemical characteristics for its use for agricultural sector in association with other substrates.

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