



The application of native species of shrubs rooted and as cuttings in soil bioengineering intervention in the mediterranean areas in Italy

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The Authors offer a few remarks and suggestions on the application of bioengineering techniques and use of materials in southern Italian regions with a Mediterranean climat based on experiences of the last ten years.

Some trials and research are described:

1. Mine waste slope rivegetation trials in Sardinia 1995-2004
2. Live slope grating and vegetated iron net combined with organic mat in the Cinque Terre national park (Liguria 2006)
3. Habitat transplantation in the Alaco dam construction (Calabria 2001-2003)
4. Experimentation on adventitious radication of native shrubs (Torre Salsa Reserve – Sicily 2006)
5. Bank consolidation and dune stabilization with fascine, green mattresses and plantation of native alophytes and reed fences (coats of Sardinia and Lazio)
6. Double green reinforced earth and bituminized geo matting (Roccella and Farinella streams in Sicily – 1991-2003)
7. River bank consolidation with live wooden cribbwall, tamarix fascine and green mattress with tamarisk cuttings (Lazio 2002-2003)

8. reinforced earth dam stabilisation of a fossil dune area planting cuttings of local species such as *Salix alba*, *Nerium oleander*, *Laurus nobilis* and *Tamarix Africana*. The cuttings are planted together with native rooted potted shrubs and directly buried sprouting shrubs originating from the Mediterranean region, particularly *Viburnum tinus*, *Euonymus europaeus*, *Myrtus communis*, and *Cornus sanguinea* (residential area not far away from the seaside at Maccarese (Rome - 2007)).

Some general conclusions are possible:

- Always respect the principle (in verbis Schiechtl) by which the lesser the growing speed of a plant (for ex., due to aridity), the longer should be the duration of support materials in combined techniques (i.e., use of wiremesh instead of logs where fast-growing plants cannot be used or reproduction by wooden cuttings - of willows for example - is not possible).
 - prefer local autochthonous species. This however poses a serious problem because it is not easy to find on the market shrubs, suffruticose or herbaceous plants of the Mediterranean area. Only recently have some nurseries begun to produce shrubs of the Mediterranean shrubs such as lentisk, myrtle, phyllirea and others - the difficulty being that in view of large bioengineering works, production of these plants needs to be planned at least one year in advance. Other species living in the Mediterranean garrigue (*Calycotome villosa*, *Cistus* sp.pl., *Daphne* sp., etc) or in special environments such as gullies or coastal dunes (*Lygeum spartum*, *Atriplex halymus*, *Amphiphyla arenaria* etc) are less well known and hard to find.
 - wherever possible use transplanted wild species that may be little known but are available locally (for example, use garrigue species along the layout of a pipeline or road). Given their costs, plants for this technique are best combined with a reasonable amount (20 to 30%) of young nursery plants
 - prefer species that can be reproduced by wooden cutting and are well suited to a Mediterranean environment (*Tamarix gallica*, *Atriplex halymus*, *Nerium oleander*) if the environment does not allow use of willows normally employed in bioengineering techniques in central Europe.