

# Evaluation of root tensile strength of some mediterranean plant species for slope stabilization

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## Summary

Men always have used plants to protect slopes from water and wind erosion. During last decades, this use has spread in civil and environmental engineering. Naturalistic approach for slope stabilization and erosion control has been studied and experimented, on the basis of concepts of soil bio-engineering.

To better understand soil-root interaction mechanism and to evaluate plant root effects on soil shear strength and slope stability, theoretical and experimental studies about plant biotechnical and mechanical characteristics are needed. This work provides indications on mechanical strength parameters of the roots of two native Mediterranean species that have been studied by means of a series of experimental laboratory tests carried out at the Department of Civil Engineering and Architecture of University of Catania. Keywords: Tensile strength, erosion control, slope stability, root reinforcement.

## 1. Introduction

Man always have used plants for slope protection against water and wind erosion or for stabilization of shallow slides. Naturalistic approach for slope stabilization has been more and more studied and experimented in the last decades. This involves the use of live plants or parts of them (such as seeds, roots, cuttings), alone or in combination with natural inert materials (wood, rocks or soil), artificial biodegradable materials (biomats, geojuta) or not biodegradable materials (geonets, geogrids, geotextiles), sometimes in combination with other stabilization works such as timber piles, earth structures, etc. [CAPILLERI *et al.*, 2016]. Intervention areas can be various: waterways, wetlands, cost, disused quarries, slopes, landfills and road infrastructures.

Vegetation, can effectively contribute as a control measure against erosion or certain instability processes, especially shallow ones. Plants play an active role on slope stability, both on surface, protecting and holding soil particles, and in deeper lay-

ers, reducing pore pressure and increasing soil shear strength. The use of vegetation is particularly appropriate in contexts where soil conservation measures are needed to correctly insert the intervention into landscape. In many cases, naturalistic engineering works are financially advantageous with respect to conventional approaches using concrete, but their costs could vary depending on the material purchase and provision, its transportation, and on the maintenance costs, of the realized works.

An extensive literature about the role that plants play on slope stabilization can be found in specialized papers [WU, 1976; WALDRON, 1977; GRAY and LEI-



Fig. 1 – Plant of *Asparagus Acutifolius*.  
Fig. 1 – Pianta di *Asparagus Acutifolius*.

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