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(Genet et al., 2005)

Watson &)

.(Stokes et al., 2008)

.(Warden, 2004

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(2002) Stokes .(Cofie et al., 2000)

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Collison Simon (2005)

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.(Pollen, 2007)

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(Watson, 2008; Personal communications

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(Mattia et al., 2005)

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(Bischetti et al., 2005; Makarova et al.,
.1998; Mattia et al., 2005; Pollen, 2007)

Norris, 2008;)

- ١-Atterberg
- ٢-Unified Soil Classification System
- ٣-Root Area Ratio
- ٤-Upslope
- ٥-Down slope
- ٦-Instron



(Genet et. al., 2005)

(Genet et. al., 2005)

Abernethy et al.,)

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(Watson & Warden, 2004)

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Bischetti et. al.,)

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(Abernethy et al., 2001)

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(De Baets et al., 2008)

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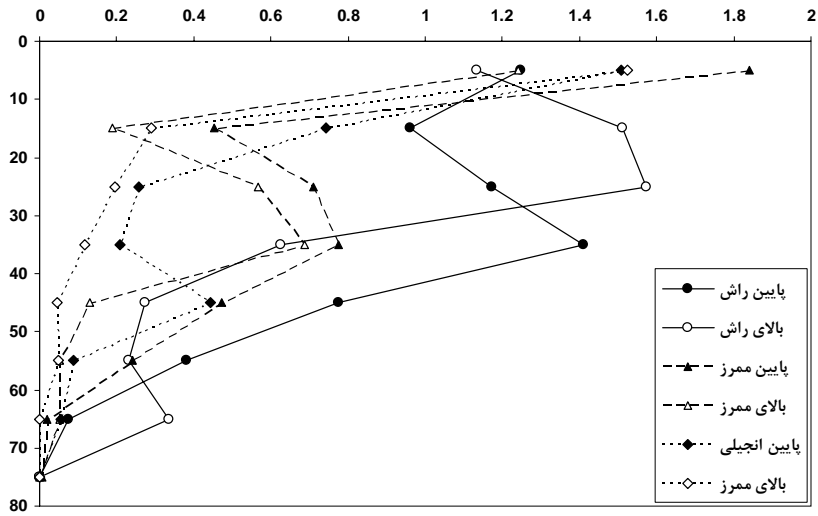
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Intraspecies variations of tree root tensile strength as Eco-Engineering materials in local scale (Case study: Kheyroud Forest)

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Abstract

Effects of plant roots on increasing soil shear strength depend on root tensile strength. Thus, determination of root tensile strength can provide the necessary data for analyzing root-soil relations. Tensile strength of plant roots varied in a wide range and have been reported from thousands to millions of MPa. The main objective of this study was to assess inter-species variations of root tensile strength for three important species of Hyrcanian forests in a local scale. For this purpose, root samples of beech, hornbeam and Persian ironwood were collected from up and down slopes and tensile strength tests were carried out using a standard Instron apparatus. To evaluate the effects of tree species, diameter of roots, and root location on the profiles on tensile strength of the roots, analysis of covariance (ANCOVA) was employed. In this analysis, 369 successful tensile tests were conducted on up and down slopes roots of three species. Root diameters were between 0.3 to 5 mm and measured tensile strengths were between 10.51 to 70.33 MPa. The results of ANCOVA revealed significant differences among measured tensile strengths due to covariate and also trees except for upslope samples of ironwood. Therefore, it was shown that the inter-species variations of tensile strength are statistically significant. This is a major issue, as the present lack of knowledge on the biotechnical behavior of root systems of common tree species has been a limiting factor in using soil bioengineering techniques in Iran. The result, presented in this study verifies the inter-species variations of root tensile strength in beech, hornbeam and ironwood.

Keywords: Inter-species variations, Instron, tensile strength, ANCOVA, eco-engineering

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