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The roles of root biomass and its depth distribution in matgrass pasture on steep slopes (*Nardus stricta* L.) for soil resistance improvement

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Roots act in three main ways to stabilize soils in slopes: hydraulically, mechanically and thermally. From the mechanical point of view, roots reinforce the soil by transfer of shear stresses in the soil to tensile resistance in the roots. Pastures in the Lombardy Alps represents a very large land cover areas subjected to soil erosion processes. This study was conducted on a matgrass pasture (*Nardus stricta* L.) located in the Intelvi Valley, (Como, Italy). The sampling area had homogenuos slope ranging between 28-30 degree. In July 2005, twenty soil cores (5 cm diameter x 5,5 cm deep; 4 samples per 5 replicates) every 10 cm in depth, and a large soil sample (20 cm x 20 cm x 40 cm deep) were sampled. For every soil cores, roots freed from soil were scanned before drying in oven (to 105˚ for 24 hours) in order to measure respectively their morphological traits,by mean of the WinRhizo software and their biomass. Bulk density was also measured. Penetration test were performed on the large soil sample at field capacity every 5 cm up to 20 cm depth. During the whole 2006 growing seasons, root biomass was measured both in grazed and fenced area by sequential root coring. The *Root Length Density* (RLD) and *Root Biomass* showed a decrease along the soil profile. The 83% of root length and the 86% of root dry mass occurred in the top 20 cm of the soil. The bulk density did not show any difference along the profile instead. The mean root biomass in the fenced area (1876,35 g/m^2 $\pm$ 267,11) was almost the double in dry weight than in the grazed (948,11 g/m^2 $\pm$ 220,98). The penetration resistance decreased from the top soil to 20 cm deep, with a slight increase only between

5-10 cm. The RLD showed a relationship (R^2= 0.99) with the penetration resistance along the soil profile stronger than the root biomass (R^2= 0.78). The lack of any relationship between the RLD and the soil bulk density highlighted the role played by the roots in soil reinforcement. In the grazed area the root biomass markedly decreased. As consequence, the grazing activity can indirectly reduce the soil resistance.