Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09308, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09308
EGU General Assembly 2008

Effect of root density and vegetable garden compost mulch on erodibility of a loamy soil under simulated rain

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Though both above ground and below ground components of vegetation act together in controlling soil erosion, most studies have been concentrated on the effect of above ground components and little is known about the role of roots. The objective of the present work was to evaluate the contribution of roots and of vegetable garden compost in soil erosion control. Perennial ryegrass (*Lolium perenne* L. Hugo) was used for the experiments with living plants, which were grown in a green house. The grass was sown at a rate of 50 kg ha^{-1} and laboratory rainfall simulation experiments were conducted 4, 8 and 12 weeks after sowing. We also included a control and an additional experiment with a seeding rate of 100 kg ha^{-1} four weeks after seeding. Soil pans were 55 cm long, 20 cm wide and 9 cm deep. To study the contribution of roots, experiments were done in two subgroups: (1) in presence of complete plants, (2) after clipping off the shoots. Roots of perennial ryegrass grew quite rapidly attaining a density of 0.614 kg m^{-2} after four weeks and 2.280 kg m^{-2} after 12 weeks. With increasing root density, the amount of soil loss through splash was found to decrease linearly. Similar results were observed with complete plants. Though the amount of percolation decreased with increasing root density, no significant influence of roots on runoff was observed. In the presence of complete plants, runoff was significantly lower than the control and the clipped grass. Soil loss in runoff decreased exponentially with increasing root density. Within a duration of 12 weeks of growth of ryegrass, its roots resulted in a 67% soil loss reduction compared with the control. This could be mainly attributed to observed increase in shear strength of the soil and aggregate stability as root density increased. No influence of roots on bulk density and saturated hydraulic

conductivity was observed. To test the effect of vegetable garden compost applied as a mulch, similar rainfall simulations were conducted on pans with an application of 0, 25, 50, 75 and 100 ton ha^{-1}. Soil splash and wash decreased considerably with increasing compost rates, because of protection of the soil surface from direct raindrop impact.