



Tree roots improve infiltration into gley soils

B. Lange (1,2), P. Lüscher (1) and P. Germann (2)

(1) WSL, Birmensdorf, Switzerland, (2) Department of Geography, University of Berne, Switzerland (germann@giub.unibe.ch / Fax: +41 31 631 85 11)

Gley soils with dens argilic horizons are common in the Flysch-region of the Swiss Prealps. During the last century and a half large areas of the region were reforested mainly to improve infiltration. The forest service is now supporting research leading to the development of management schemes: Tree species and forest structure should be optimized at specific sites in the quest of rejuvenation the aging forest stands with respect to infiltration.

Infiltration and root densities at various sites under spruce (*Picea abies*), fir (*Abies alba*), and beech (*Fagus sylvatica*) were investigated. Rain simulators sprinkled at plot areas of 1m by 1m during 1 h with an intensity of 70 mm/h (corresponding to heavy regional rain storms). At various depths in the soil profile soil water content was measured with TDR-equipment at intervals of 60 s during 24 h after the onset of sprinkling. After drainage three to six vertical soil cores with diameters and lengths of 10 and 50 cm were collected from the sprinkled area for the determination of root density.

A Water Content Wave approach was applied to the data in order to characterize infiltration. The approach is based on the assumption that gravity is the only flow-driving force and that viscosity is the only force that opposes gravity. Thickness of the water film and its length of contact with the surrounding soil are the two resulting parameters. They characterize infiltration completely. Root lengths per unit volume of soil correlate well with the contact lengths of the water films ($r^2=0.87$), strongly suggesting that tree roots improved soil structure and thus infiltration.