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Investigating on the relationship between subsurface infiltration rate and hydraulic conductivity of forest soil

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The objective of this study was to closely investigate the relationship between infiltration rate and hydraulic conductivity of forest soil in forested hillslopes focusing approximately 0.1m below the ground surface. A total of 38 sampling points from forests with two different species (*Japanese cedar* and *Hiba arborvitae*) were selected with respect to their thinning period in Ishikawa prefecture. The study was conducted using artificial rainfall condition that employ oscillating nozzle simulator. Soil at different depth and surface vegetation samples were collected before and after thinning from each forest type. The collected soil samples of the specific depth then were used to determine the effect of thinning on the soil permeability and hydraulic conductivity. The soil permeability and hydraulic conductivity then were measured before and after thinning for each soil sample.

Results indicated that the maximum infiltration rate (FIR_{max}) on surface soil ranged from 142 to 562 and 93 to 641 mm/h in *Japanese cedar* and *Hiba arborvitae* plantation, respectively and these values were higher than predetermined rainfall intensity. Although higher rates of hydraulic conductivity were measured at depth of 5 and 5 -10 cm, surface runoff has been observed at both depths. Exceptionally, a single surface soil sample collected from *Japanese cedar* showed a small value as observed in aquiclude while its maximum infiltration rate was over 300m/h without undergrowth but litter. The effect of time after thinning was not reflected on the maximum infiltration rate and hydraulic conductivity. Moreover, the influence of slope, amount of covermaterials and soil characteristics were not observed on both measured parameters. As an advantage, forest cover reduces the direct rain drop impact that prevents the pore space of soil from being clogged and as a result higher values of both maximum infiltration and hydraulic conductivity rates were found.

Keywords: Infiltration rate, Hydraulic conductivity, Oscillating nozzle rainfall simulator, Japanese cedar, Hiba arborvitae