# Experimental study of throughfall distribution under a Hinoki canopy in relation to infiltration rate and soil erosion

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To demonstrate spatial and temporal distribution of throughfall, infiltration rate and soil erosion beneath the canopy of a Hinoki (Japanese Cypress) tree stand, the sprinkling experiment was conducted at large-scale rainfall simulator in National Institute of Disaster Prevention (NIED), Tsukuba, Japan. A set of artificial rainfall consist of two rainfalls, 50 mm/h for 15 minutes and 120 mm/h for 20 minutes. Thirty-two tipping bucket rain gauges were placed concentrically beneath the canopy to measure throughfall depth. Raindrop size and velocity was monitored at 32 points with laser drop sizing gauge (LD gauge). Small plots were placed at 4 points with the different distance from the tree stem to measure amount of runoff and sediment yield. Four sets of sprinkling experiments were carried out. First three were continuously, and last was after 16 hours after the 3rd experiment. Infiltration rate was calculated by the subtracting surface runoff from thorughfall. Throughfall depth had large spatial variability comparing with the open rainfall. The uniformity coefficient (CU) of throughfall was approximately 70. Throughfall depth was found to increase with increasing distance from the tree stem. Raindrops which have kinetic energy larger enough to detach soil particle from soil surface (greater than 8.45 x 10-5 J, Morgan et al., 1988) was expressed as D$*$. D$*$was observed beneath canopy but not at the open site, kinetic energy of D$*$was significant at third points from tree stem.

Infiltration rate at each point was measured at 80-100 mm/h for the first three sets, but decreased to 60-70 mm/h for the last experimental case. Final infiltration rates were low at the first and third point from the tree stem (62 mm/h, 65 mm/h), but high at the other points (72 mm/h, 78 mm/h). Total amount of sheet flow sediment was greater than 10 g at the point showing low infiltration rate, but less than 2 g at the other point showing high infiltration rate. Total amount of splash sediment is found to decrease with increasing distance from the tree stem.