The effect of vegetative cover in the erosion prevention of a cattle trodden slope pasture

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Introduction Grazing is the effective means of harvesting energy and protein from steep pastures in mountainous country . However , there are risks associated with the practice , such as degradation of the soils that sustain pasture communities . Details of the effect of vegetative cover of a grazed pasture on soil loss with runoff water are not clearly understood .

The loss of vegetative cover caused by grazing at high stock densities (Warren et al . 1986a) allows direct impact of raindrops on soils (Lal and Elliot , 1994) . Damage to vegetation and soils by hoof trampling increases when cattle are grazed on moist soils (Betteridge et al . 1999) . This paper reports a field study , designed to determine the effect of vegetative cover on soil loss with runoff water , of a slope pasture in the mountain trodden by cattle , untrodden with vegetative cover and untrodden with no vegetative cover .

Materials and methods An experiment was conducted in Japanese mountain pasture to quantify the effect of vegetative cover on soil loss with runoff water . Four plots , each of 8m × 22m area , were fenced to exclude cattle from grazing . Duplicate plots of (20m × 2m) were with no vegetation cover (Bare) , and with 90 , 70 and 40 percent vegetation cover of 8 cm pasture height trodden by zero , three or six cows of approximately 300 kg body weight for 15 minutes on steep pasture on 14 June and 30 September , 2004 . Measurements included pasture cover , tiller density and soil loss in runoff water .

Results and discussion Pastures with no vegetation cover and with 40 percent vegetation cover resulted in a greater soil loss with runoff water . Increased soil sediment loss with runoff water mainly resulted from the area with no vegetation cover and with low vegetation cover (Figure 1a) . Runoff ratios for the low and high trodden plots and bare plot were higher than vegetative plot . Nevertheless sediment loss from the low trodden plot was low compared to the high trodden plot (Figure 1b) showing a similar runoff ratio . Results indicate that vegetation cover negatively act to soil surface by reducing the raindrop impacts and the runoff water entrainment .

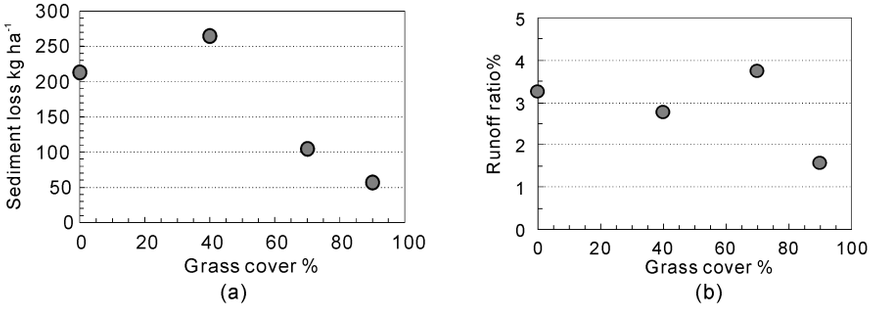

Figure 1 *Relationship between grass cover and soil sediment loss (a) and between grass cover and runoff ratio (b) from control , lightly and heavily-trodden , and bare-ground sites of steep pasture during the months July to November (values are total of the months) , 2004 .*

Conclusions Pastures with high or moderate vegetation cover was less seriously affected than pastures with low vegetation cover or bare ground for soil loss , indicating that steep pastures with low vegetation cover or with bare places are more susceptible to soil erosion .

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