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Effects of cattle grazing on survival and regrowth of *Miscanthus sinensis* tillers

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Key words: cattle, defoliation, grazing intensity, *Miscanthus sinensis*, trampling

Introduction *Miscanthus sinensis* is one of the major native grass species in eastern Asia. Although it has been recognized that *Miscanthus* grasslands were maintained by moderate use (e.g., cutting, burning or grazing), a long-term experiment recently indicated that the grasslands were deteriorated by cattle grazing (Hirata *et al.*, 2007). This suggests that cattle grazing gives different impacts on *M. sinensis* in comparison with cutting. The aim of this study was to investigate the relationships between damages of tillers to *M. sinensis* by cattle grazing and deterioration of *Miscanthus* grasslands.

Materials and methods The study was conducted in early June (early summer), August (late summer) and September (early autumn) 2005, at a *Miscanthus* grassland (3.7 ha) in Kawatabi Field Science Center, Graduate School of Agricultural Science, Tohoku University. Nine paddocks (8 m × 8 m each) were established in the grassland. Before the grazing period in each season, *M. sinensis* tillers were categorized into either wintering tillers, first new tillers or second new tillers based on their height, and 40 tillers of each category were tagged. Two, 4 and 6 steers (mean BW was 270 kg) were grazed for 40 min in three paddocks in each season, to set grazing intensity for 14, 28 and 42 animal unit (AU) · days/ha. In mid-summer and early autumn, 56 and 84 AU · days/ha were also established by grazing again in the same paddock. After each grazing period, the degree of damage of the tillers (defoliation of leaves, defoliation of shoot apexes, or trampling of tiller) and the proportion of survival, and the heights of leaves were recorded.

Results and discussion In wintering tillers, 50-98% of leaves and 20-48% of shoot apexes were defoliated over the grazing seasons (Figure 1). The percentage of trampling, which is specific to grazing condition, increased with the increase of grazing intensity and reached 40-53% in mid-summer to autumn in wintering tillers. The proportion of surviving tillers was lowest (15-27%) when their shoots were trampled. Mean height of leaves in the tillers, which reveals the degree of regrowth after last grazing period, decreased by both of the defoliation of shoot apex and the trampling. The relationships of total proportion of the defoliation of shoot apex and the trampling to grazing intensity (Figure 2) indicates that the damage of *M. sinensis* tillers was low when grazing intensity was less than 42 AU · days/ha.

Conclusions The study indicates the sensitiveness of *M. sinensis* tillers to defoliation of shoot apex and the trampling by grazing cattle, and suggests that *Miscanthus* grasslands would be maintained if cattle was grazed at less than 42 AU · days/ha in autumn, by keeping down damages of plant parts which result in the deterioration of *M. sinensis*.

Reference

Hirata, M., Hasegawa, N., Nogami, K., Sonoda, T., (2007). Tuft, shoot and leaf dynamics in *Miscanthus sinensis* in a young tree plantation under cattle grazing. *Tropical Grasslands* 41, 113-128.

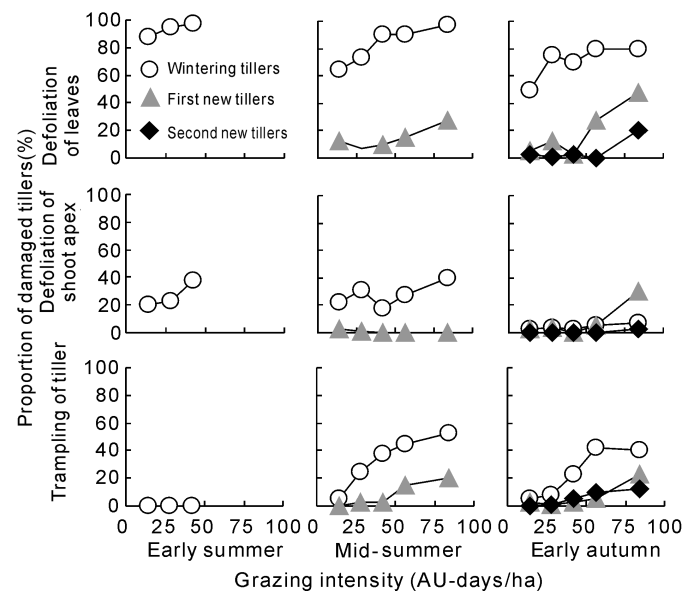


Figure 1 The relationships of the degree of the damages (defoliation of leaves / shoot apex, and trampling of tiller) to grazing intensity.

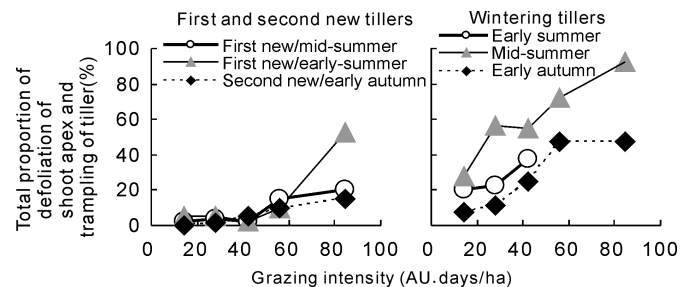


Figure 2 The relationships of the defoliation of shoot apex and the trampling of tiller to grazing intensity.