An eco-morphological examination of tiller and stolon dynamics in a *Zoysia japonica* sward

M. Ito, Y. Ueda, M. Kodama and T. Okajima
Niigata University, 2-8050, Igarashi, Niigata, 950-2181, Japan, Email: shoot@agr.niigata-u.ac.jp

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Introduction Japanese lawn grass (*Zoysia japonica*), which dominates in grazed semi-natural grasslands in Japan, is being reconsidered recently, because of its high adaptability to poorer conditions and its aggressive creeping habit in open fields. *Zoysia* has a unique potential for indeterminate multiple-node generation in the stolon tip and differential tiller formation at two tillering sites of every multiple-node (Ta in the bottom node and Tb in the mid-part), so that it displays contrasting behaviour in stolon extension and aerial tiller production in various situations (Ito *et al.*, 2003). In this study, we examined the population structure of various tillering modules of *Zoysia* clones in a dense sward.

Materials and methods During the growing season in 2000, changes of the erect tiller population were recorded at a ca. 4-week-interval in 4 quadrats (40cm×40cm) in an experimental *Zoysia* sward (100m^2), which was fertilised with 24:24:24 g/m^2/year of N:P_2O_5:K_2O and defoliated every two weeks from May 19 to October 20. In the same sward, *Zoysia* sods (10cm×20cm) with 3 replicates were collected as well on June 20, August 10, and September 27, and washed out to remove soil and litter for dissection. Number of stolon apices in sods, multiple-node number on stolon segments, stolon length, and developmental state (foot note Table 1) of primary tillers on each tillering site of multiple-nodes were examined.

Results and Discussion The mean population density of total erect tillers was about 15,000 shoot/m^2 during the season examined (Figure 1). Soon after the onset of growth in early May, 34 % of total existing tillers bore ears, and the tiller population declined sharply after the first defoliation in mid May. Decreased tiller density was recovered instantly in late May and early June. New tiller emergence was fairly active during the seasons (ca. 3 % against the total number of existing tillers as counted one week after each defoliation), and it resulted in gradual but steady rise in tiller density. Active generation of erect Ta tillers from stolons coincided with increasing tendency of tiller density, whereas lesser appearance of Tb tillers was always observed (Table 1). Thus, the majority of existing erect tillers seemed to be composed of Ta tillers (53 to 65 % against whole erect tillers) and was supplemented with smaller numbers of Tb tillers (ca. 10 %). The second major component was secondary and tertiary tillers, which attained 27 to 36 % of total erect tillers in the sward. Creeping tillers were rare, i. e., the most erect primary tillers emerged from stolons generally kept upward extension for top growth. The total number of multiple-nodes on stolons bearing various primary tillers averaged ca. 13,000/m^2, and the total stolon length kept a level of ca. 200m/m^2 throughout the seasons, while the stolon apex density stayed < 500/m^2. There is a general tendency of preferential development of existing stolons in *Zoysia* plants growing in a dense sward condition.

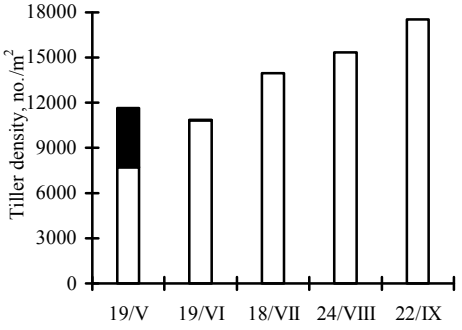

Figure 1 Changes in erect tiller population in *Zoysia* sward. LSD (P<0.05); 3275
■ Reproductive tillers

Table 1 Population density (no/m^2) of primary tillers with different developmental state, as measured on each tillering site

	Date	Et	Sp	Dm	St	Dd*
	20/VI	6167	1067	767	117	10250
(Ta)	10/VIII	7067	533	367	83	7033
	27/IX	9400	350	667	0	5050
	20/VI	833	167	14900	0	2467
(Tb)	10/VIII	1417	500	11417	100	1650
	27/IX	2167	133	11867	17	1283

*Primary tillers were classified as; Et=erect tiller, Sp=sprouting bud; Dm=dormant bud, St= stoloniferous, and Dd=dead tiller.

Reference

Ito, M., M. Kodama, Y. Ueda & T. Okajima (2003). Regularity in developmental patterns of stolons and tillers of *Zoysia japonica* Steud. plants growing under a spaced-plant condition. *Grassland Science*, 49, 438-443.