

Dynamics of module structures in *Puccinellina tenuiflora* clones in alkalized meadow in the Songnen Plains , China

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Introduction *Puccinellina tenuiflora* , a perennial tuft grass (Puccinellia) , is broadly distributed in alkali meadows on the Songnen Plains , tolerates salt and alkali stress , and forms large-area monodominant communities in alkali-patches that have low levels of surface soil (Yang et al , 1995) . Previous studies have characterized vegetative propagation and sexual reproduction , the effect of different methods of utilization on the dormancy , and phenotypic plasticity and prolonged reproductive growth (Yang et al , 1995 ; Zhang et al , 2006 ; Sun et al , 2007) . The objective of this study was to characterize the relationships between vegetative and , reproductive tiller production and their biomass at heading and ripening stages of *P. tenuiflora* clones . These relationships may improve our understanding of *P. tenuiflora* population ecology and provided scientific guidance for grassland management in this region .

Materials and methods The research was conducted in natural alkali meadows , located at the Pasture Ecology Research Station of Northeast Normal University , Changling , Jilin province of China (44°45'N , 123°31'E) which has a temperate , half-humid , continental-monsoon climate . Sample plots were located in mono-communities of *P. tenuiflora* . Whole clones were sampled at heading and ripening stages of *P. tenuiflora* . Thirty clones were taken from random locations at each growth stage . The tuft diameters were measured , and the number and biomass of total tillers , vegetative tillers and reproductive tillers were counted and weighted , respectively . The number and biomass of each module were analyzed and tested by one-way ANOVA .

Results The tuft diameters of *P. tenuiflora* clones were 11.0 ± 1.9 cm and 13.6 ± 2.2 cm at heading and ripening stages , respectively . The numbers and percents of vegetative and reproductive tillers were not significant ($p > 0.05$) at two stages (Table 1) , indicating the quantitative structures of clones didn't change with growth stages . The biomass of each module was significantly higher at ripening stage than that at heading stage ($p < 0.05$) , and the biomass of vegetative and reproductive tillers at ripening stages were 1.56 and 1.45 times compared with that at heading stage . The differences in percent of the biomass in vegetative and reproductive tillers was not significant ($p > 0.05$) . This indicated that the biomass structures of *P. tenuiflora* clones didn't change during different growth stages .

Table 1 Quantitative characters of the modules of *P. tenuiflora* clones in different growth stages .

Quantitative characters	Growth period	Vegetative tiller		Reproductive tiller		Total	
		Mean±SD	Percent (%)	Mean±SD	Percent (%)	Mean±SD	Percent (%)
Tillers (clone ⁻¹)	Heading	33.6±15.0a	32.3±79.0a	72.4±29.1a	67.7±0.1a	106.0±33.9a	100
	Ripening	32±19.0a	30.3±0.1a	70.7±26.3a	69.7±0.1a	102.7±35.2a	100
Biomass (g·clone ⁻¹)	Heading	1.7±0.9a	15.4±0.1a	8.7±4.7a	84.6±0.1a	10.5±4.0a	100
	Ripening	2.6±1.8b	17.5±0.1a	12.6±4.26b	82.5±0.1a	15.2±4.6b	100

Conclusions The reproductive tillers were dominant in *P. tenuiflora* clones , and the dominance of biomass was much more obvious than that of tiller numbers . From heading to ripening stage , both the number and biomass of *P. tenuiflora* clonal modules were relatively stable . The clones could regulate the vegetative propagation , sexual reproduction , production and allocation of nutrition substance as plant populations .

References

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