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Contribution of vegetative reproduction of *Leymus chinensis* and *Carex duriuscula* to population persistence during restoration succession after flood disturbance in the Songnen Plains , China

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Key words : tillers , rhizomes , meadow vegetation , succession , plant competition

Introduction *Leymus chinensis* is the dominant species and *Carex duriuscula* is a general companion species in *L. chinensis* meadows . Vegetative reproduction is crucial to perennial plant population persistence (Benson and Hartnett , 2006) . In the Songnen Plains of China , a periodic flood due to abnormal weather was followed by natural recovery through successional processes (Li and Yang , 2004) . Our objective was to quantify the contribution of vegetative reproduction to population persistence and dynamics .

Materials and methods The study was conducted at the Pasture Ecology Research Station of Northeast Normal University , Changling , Jilin Province , China (44°45'N , 123°31'E) . Average annual temperature is 4.9°C . Mean annual precipitation is 470.6 mm . From August 1994 to September 1995 , the *L. chinensis* meadow was flooded . All plants were dead . In the second year , *C. duriuscula* appeared ; *L. chinensis* seeds began germinating after 2 years . In September 2003 and 2004 , aboveground and belowground populations of both species were sampled randomly and on areas where the two species with different densities grew together . The collected areas were 0.25×0.25 m² with a depth of 0.30 m . Twenty replicates were collected on each date . Potential vegetative reproduction (PP) including that derived from tiller nodes (TPP) and rhizomes (RPP) were counted . The data were analyzed with SPSS statistical software .

Results The density of *L. chinensis* PP increased , but that of *C. duriuscula* decreased from 2003 to 2004 (Figure 1) . The average productivity of tillering nodes and rhizomes for *L. chinensis* was about 7.8 and 1.2 times that observed for *C. duriuscula* in the 2 years , respectively . The ratio of the number of PP : the number of tillers was 1.76 for *L. chinensis* and 0.27 for *C. duriuscula* 2003 and 2004 , respectively (Table 1) . Approximately 76% PP of *L. chinensis* present in 2003 generated established stems in 2004 , and while this figure was only 6% for *C. duriuscula* . These results indicate that the competitive ability of *L. chinensis* was much higher than that of *C. duriuscula* in terms of vegetative reproduction during recovery in an early successional stage in a *L. chinensis* meadow .

Table 1 The productivity of tillers (individuals tiller⁻¹) and rhizomes (individuals m⁻¹) in 2003 and 2004 . TPP/T = potential population of tiller nodes/tiller number . RPP/R = potential population of rhizomes/rhizome length . PP/T = total potential population/tiller number .

Species	Year	TPP/T	RPP/R	PP/T
<i>L. chinensis</i>	2003	0.52	10.04	1.83
	2004	0.96	5.94	1.68
<i>C. duriuscula</i>	2003	0.14	7.22	0.35
	2004	0.05	5.92	0.19

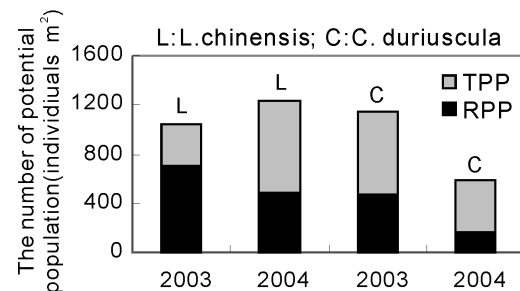


Figure 1 The density of potential population on vegetative reproduction in 2003 and 2004 . TPP : potential population of tiller nodes ; RPP : potential population of rhizomes .

Conclusions *L. chinensis* was superior to *C. duriuscula* in the production of tillering nodes and rhizomes as well as the storage of potential population in vegetative population . PP of both *L. chinensis* and *C. duriuscula* were good predictors of population dynamics of the two species . Consequently , PP played an important role during natural succession after flooding on the natural meadow . *L. chinensis* would be the dominant species at a stable stage of recovery .

References

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