

## Carbon dynamic in the decomposer subsystem of the *Leymus chinensis* grassland in northeastern China

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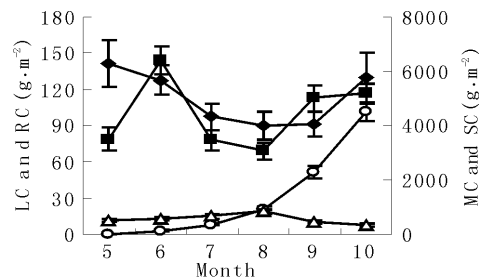
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**Key words :** carbon, litter, microorganisms, dead root, soil, decomposer subsystem

**Introduction** More greenhouse gases especially carbon dioxide is discharged by human activities. Decomposer subsystem including dead roots, litter, soil and microorganisms is the main link of carbon cycle of a grassland ecosystem and play an important role (Frank et al, 2002). The objective of our study was to study the seasonal carbon dynamics in each component of the decomposer subsystem of *Leymus chinensis* grassland in northeastern China.

**Materials and methods** The study was conducted at The Ecological Research Station of Northeast Normal University in southeastern Songnen Plain of Jilin Province, China from May to October in 2002 and 2003. Litter was collected by a 2×2 m iron sieve collector. Soil and dead roots from 0 to 30 cm layer were collected in five plots (25×10 cm). Carbon contents in litter, dead roots and soil were analyzed by the method of potassium dichromate and carbon in soil microorganisms was measured by the method of Vance. Soil moisture, temperature and pH were also determined.

**Results and discussion** The carbon content in litter (LC) increased gradually with the growth of the plants. Carbon content in dead roots (RC) began to increase from May and reached the peak in June. Dynamics of carbon content in microorganisms (MC) and soil (SC) showed a single-hump curve and a "v" curve respectively (Figure 1). Carbon contents in the four groups of the subsystem were soil (81.3%~91.2%) > microorganisms (5.5%~16.9%) > dead roots (1.1%~2.4%) > litter (0.002%~1.6%) and carbon was mainly stored in the soil. LC, RC, MC and SC were affected by environmental factors (Table 1). Since the activity of microorganisms in soil restricted the release of carbon in litter, dead roots and soil by decomposition, they were the key in carbon transformation of the subsystem. Microorganisms were affected by soil temperature, moisture and pH in the study. Therefore, the three environmental factors affected on carbon dynamic of the whole decomposer subsystem.



**Figure 1** Carbon content in decomposer subsystem (○ LC; △ MC; ■ RC; ◆ SC).

**Table 1** Correlations between each group C and main environmental factors.

	T	SM	pH
LC	-0.7529*	-0.5850*	-0.0556
RC	-0.2710	-0.2580	0.4961
MC	0.8319**	0.8325**	-0.6616*
SC	-0.5295*	-0.4691	0.8889**

Note: T: Soil temperature; SM: Soil moisture; pH: soil pH. Correlation significant\*\* at  $p < 0.01$  and \* at  $P < 0.05$

**Conclusions** LC and RC were the carbon source in the subsystem, dynamics of which determined the carbon input. The Dynamic of carbon in whole decomposer subsystem was decided by SC due to its high percentage of carbon content. Soil temperature, moisture and pH affected on carbon reservoir of decomposer subsystem.

### Reference

Frank A.B., Liebig M.A. and Hanson J.D., 2002. Soil carbon dioxide fluxes in northern semiarid grasslands. *Soil Biology & Biochemistry* 34:1235-1241.