

## 内蒙古典型草原4种优势植物凋落物的混合分解研究

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**摘要** 混合凋落物的研究对预测生态系统群落水平的分解以及相应的养分释放和进一步的循环等生态学过程具有重要意义。该研究使用网袋法, 对克氏针茅(*Stipa krylovii*)、糙叶黄芪(*Astragalus scaberrimus*)、星毛委陵菜(*Potentilla acaulis*)和羊草(*Leymus chinensis*) 4种凋落物单种及其混合物的分解速率及分解过程中的养分动态进行了野外实验研究, 以探讨凋落物多样性对内蒙古典型草原生态系统分解速率和过程的影响。通过对凋落物分解速率和养分含量变化历时1年的实际测定, 得到下列研究结果: (1)分解341天后, 单种凋落物的剩余重量与初始氮(N)含量呈显著负相关关系( $p < 0.001$ ,  $r = -0.979$ )。混合凋落物中, 糙叶黄芪-星毛委陵菜组合剩余重量的实测值比期望值高7.5%, 表明凋落物混合具有显著的正效应, 但在其他几种组合中没有发现显著的凋落物混合效应; (2)在分解初期的N释放阶段, 克氏针茅-糙叶黄芪和克氏针茅-羊草组合的实测N剩余率分别比期望值低4.7%和10.0%, 表明混合凋落物对初期N元素释放具有显著的负效应。不同凋落物混合组合的磷(P)释放或累积在不同分解时期都得到了一定程度的促进, 尤其是星毛委陵菜-克氏针茅、克氏针茅-羊草和克氏针茅-糙叶黄芪组合, 它们在分解前期、中期和后期, 实测P剩余率与期望值的差异分别为31.1%、23.1%和21.8%。研究结果表明, 在内蒙古典型草原生态系统, 多数混合凋落物对分解速率不产生显著的混合效应; 相反, 大多数混合凋落物对分解过程中的养分动态, 尤其是P元素, 具有显著的混合效应, 而混合效应的方向(正或负)可能是十分复杂的。

**关键词:** 凋落物分解 混合效应 养分动态 草原生态系统

**Abstract:** Aims Litter decomposition is a key process of energy flow and nutrient cycling in terrestrial ecosystems that might be sensitive to the loss of biodiversity. Our objective in this study was to investigate the potential effects of plant litter diversity on decomposition processes and nutrient release in an Inner Mongolia grassland ecosystem. *Methods* We placed aboveground litter (stems and leaves) of four dominant species (*Stipa krylovii*, *Astragalus scaberrimus*, *Potentilla acaulis* and *Leymus chinensis*) individually and in mixture in litterbags in the field on October 27, 2006. We collected the litter bags after 0, 162, 252 and 341 days and determined mass loss and N and P content in the remaining litter. *Important findings* After 341 days, the remaining mass of litter of individual species was significantly negatively correlated with initial litter N content. There was no significant difference between the observed and expected mass remaining for most litter mixtures, except the *A. scaberrimus* - *P. acaulis* mixture, in which mass remaining was 7.5% higher than the expected. Nevertheless, most litter mixtures affected the dynamics of N and P during decomposition. N releases of *S. krylovii* - *A. scaberrimus* and *S. krylovii* - *L. chinensis* were facilitated in the early stages of decomposition, in which remaining N was 4.7% and 10.0% lower, respectively, than the expected. Meanwhile, either release or accumulation of P in four of five litter mixtures was also promoted in different decomposition stages, and the P remaining significantly differed from the expected in *S. krylovii* - *P. acaulis*, *S. krylovii* - *L. chinensis* and *S. krylovii* - *A. scaberrimus* (31.1%, 23.1% and 21.8%, respectively in the early, middle, and later stage of decomposition). Our results show that litter diversity has significant effects on nutrient dynamics, especially for P, but not on mass loss rates of most decomposing mixtures, and the effects of mixing are complex.

**Keywords:** litter decomposition, mixing effects, nutrient dynamics, steppe ecosystem

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