

Effect of patch size of metacommunity on species diversity in *Leymus chinensis* meadow in the Songnen plains of China

Han Da-yong, Yang Yun-fei, Li Jian-dong

Key Laboratory of Vegetation Ecology, Ministry of Education, Institute of Grassland Science, Northeast Normal University; Renmin Street, 5268, Changchun 130024, China. E-mail: yangyf@nenu.edu.cn

Key words: *Leymus chinensis* meadow, Patch, metacommunity, species diversity, Songnen plains

Introduction The effect of habitat patch size and the spatial distribution of habitat patches have been regarded as important in conservation biology (Fahrig and Merriam, 1994). Moreover, increasing habitat patch size contributes to species richness in local communities. Patch size is too small to be sufficient for sustaining the generation of population. Therefore, the idea can be extended to that of the metacommunity. There will be also a minimum patch area to maintain high species diversity in metacommunity, a set of spatially separated communities. In the present research, *Leymus chinensis* and *Phragmites communis* communities were studied in *L. chinensis* meadow in restoration succession in the Songnen plains of China. Analysis of Species diversity in *L. chinensis* and *Ph. communis* community patches with different sizes to disclose the changes of species diversity among different patches and the effect of patches sizes on the species diversity, and to offer references for species diversity conservation and grassland management.

Materials and methods The present experiment was carried out in *L. chinensis* meadow in Songnen plains ($44^{\circ}35' N$, $123^{\circ}30' E$). Community patches with different sizes both *L. chinensis* and *Ph. communis* dominant in *L. chinensis* meadow in restoration succession were sampled in the middle of August in 2006, when the plants were in the growing season. The species abundance and coverage were investigated in 14 habitat patches, which the average size, the minimum and the maximum are $13.75 m^2$, $1.32 m^2$, and $56.5 m^2$, respectively. In order to gain population density, 1-5 samples were tested in each patch according to the habitat patch size. The total number of samples was 42. The indices of Patric richness, Pielou evenness and Simpson diversity were employed in this research (Zhang, 2004).

Result and discussion Number of species, evenness and species diversity of *L. chinensis* and *Ph. communis* communities increased with an increase in patch area, and all reached the maximum when the patch area was $10.24 m^2$ when richness, evenness and species diversity were 25, 0.66 and 0.82, respectively, and followed by $11.2 m^2$ when number of species, evenness and species diversity were 26, 0.45 and 0.6. The curve became gentler when patch area was larger than $11.2 m^2$. It was concluded that the minimum area of *L. chinensis* and *Ph. communis* community patch was $10.24 m^2$ - $11.2 m^2$ to sustain species diversity in *L. chinensis* meadow in the Songnen plains of China, and abundant species would disappear without certain community environment when patch areas were lower than the ones.

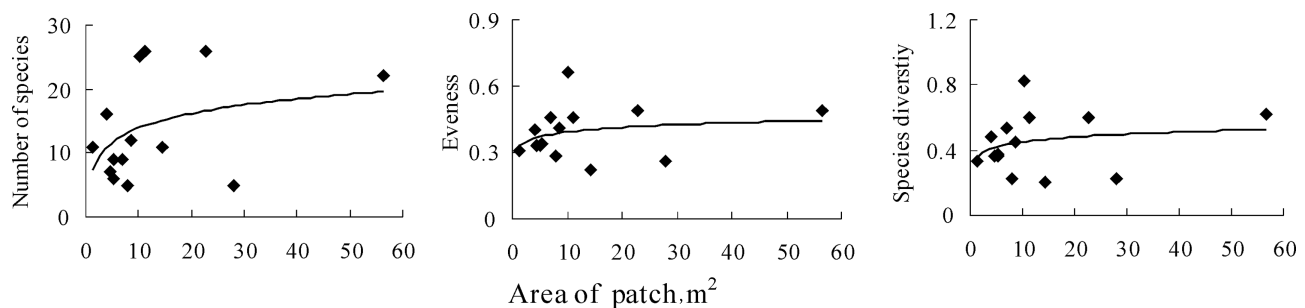


Figure 1 The relationship between richness, evenness and species diversity and the patch size in metacommunity.

Conclusions The richness, evenness and species diversity of *L. chinensis* and *Ph. communis* communities increased as the patch area increased, and the highest value of species diversity were in $10.24 m^2$ - $11.02 m^2$, which was the minimum area to sustain high species diversity and species diversity would decrease when patch areas were lower than the ones, which offered references for species conservation.

References

- Fahrig, L., Merriam, G., (1994). Conservation of fragmented populations. *Conservation Biology*, 8, 50-59.
 Li, J D., Wang, R Z., (1998). Biodiversity of grassland resources in Songnen Plain. *Pratacultural Science*, 15, 1-3.
 Zhang, J T., (2004). *Quantitative Ecology*. Beijing: Science Press, 86-92.