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Affect of fencing on community structure and species diversity of *Eragrostis nigra* on degraded grassland in Karst Area

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Key words : *Eragrostis nigra*, degraded pasture, fencing, community structure, species diversity

Introduction Backspiked lovegrass (*Eragrostis nigra*) played a very important role in grassland resources in Karst area. However, because of over grazing in the long past, it caused a serious degradation of grassland and heavy soil erosion, leading to the continual expansion of bare land in the area. The trial, through three-year observation, was aimed at effect of restoration of *Eragrostis nigra* vegetation on the degraded grassland by means of fencing so as to provide theoretical foundation and practical measures for sustainable utilization of the grassland in karst area.

Materials and method the trial was conducted at hill site in Qiubei county, Yunnan (East longitude 103°52', north latitude 24°04', elevation 2300 meters, annual rainfall 1120mm, annual temperatures 13.4°C) with 1hm² fenced to compare with natural grazing without fencing. The vegetation of the trial land was dominated with *Eragrostis nigra* and Shiny cinquefoil (*Potentilla fulgense*) and the total coverage of the community was about 60%-70% with sward height about 15cm in average. The coverage, density, height and biomass of the vegetation community were measured before the trial and the same items were recorded in September each year during the trial phase.

Results The results showed that: (1) Coverage of pasture was increased from 60% (before fencing) to 100% after fencing. The quantity characters and spatial characters of dominant species changed regularly, such as sward height was increased significantly, both blackspiked lovegrass and Shiny cinquefoil (*Potentilla fulgense*) were increased significantly and dominated upper synusia gradually. The density of blackspiked lovegrass was decreased annually. (2) Comparing with control, richness index of community and indexes of Margalef were increased significantly during three years by fencing. Indexes of Menhiniek was increased significantly in the second and third years. Diversity indexes of Shannon-Weaver was increased significantly in the second year, but it was not significant in the third year. There was no significant difference on Pielou evenness index in the restoration processing of degraded pasture. (3) Clustering between community of different fencing phase, 5 communities cluster 3 kinds, I (before fencing and without fencing), II (second year and third year), III (first year after fencing). (4) Second years and third year after fencing, the total above-ground biomass, grass and forbs were increased significantly. The legume biomass after four months of fencing was higher than those of control, sixteen months and twenty-eight months after fencing. After twenty-eight months of fencing, the total biomass of pastures increased 4 times (comparing with control) and reached to 5.8 t/hm² (DM). There was also a obvious change in community of vegetation with ratio of grass and legume increased from 21% to 55%, forbs decreased from 76% to 43%, and legume decreased from 6% to 1%.

Conclusions With fencing, the vegetation coverage in the trial grassland was greatly improved, which effectively controlled the soil erosion. At the same time, after fencing, the sward height, output of the biomass and the productivity of the grassland all were improved in large standard. The ratio of perennial grass in the vegetation was largely increased, while that of the forbs decreased after fencing, which, in turn, significantly improved the quality of the grassland, maintaining the sustainable utilization of the grassland. Fencing treatment improved the species diversity in the community of the grassland, maintaining the stability and capability to stressing of the community of the grassland. Therefore, on the degraded grassland dominated with *Eragrostis nigra*, fencing was an effective technical measure for restoration. In the actual practice, it was suggested that degraded grassland could be used again after third year of fencing. Rotational grazing with adequate grazing was recommended.

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