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Revegetation of bare patches in saline-alkali grassland in northeast of China

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Key words: micro site, ridge, restoration, bare saline-alkali patch, saline-alkali soil

Introduction Bare saline-alkali patches resulted from overgrazing and cultivation are distributed throughout Songnen Grassland in northeast of China (Li & Zheng, 1999). The restoration of vegetation in such seriously degraded soil is difficult merely through the withdrawal of livestock alone. Some form of intervention is usually necessary to promote a favourable micro site for the plants establishment (Happer, et al., 1965).

Materials and methods 20 hm² bare saline-alkali patches were ridged into two forms with 20cm height, 65cm width (R20), and 10cm height, 100cm width (R10) in May 2002. The direction of ridge was vertical to the wind. After the hay had been packaged, the remainders were collected and broadcasted (150g/m²) in the R20 (R20+L, 5hm²) and R10 treatments (R10+L, 5hm²). Plant composition, density, height, biomass, and soil characteristic were surveyed and measured in R20, R10, R20+L, R10+L and no treatment plot (Control) in August from 2002 to 2004.

Results Only two annual species *Chloris virgata* and *Suaeda corniculata* emerged in the ridge in 2002. The plants grew in the ditch where the topography was relative high or adjacent the peak of the ridge where the topography was relative low. *S. corniculata* established well in ridge treatments without litter, and disappeared at end of the second season. Compare with the control, vegetation of ridge cultivation could be established better regardless of broadcasting litter (Figure 1). *C. virgata* in ridge plug litter treatments grew better than those in which the ridge only was made in 2002, while it was reversed both in 2003 and 2004. *C. virgata* of R10 grew better than those of R20 in 2002 and 2003. However, *C. virgata* of R20 established better in 2004. The soil water content of 0-20cm in ditch was higher significantly ($P < 0.05$) than that of control, while soil salinity of 0-20cm was decreased, and was lower significantly ($P < 0.05$) than that of control. Compared with R10, the soil of 0-20cm was meliorated more effectively. The ditch had the capability of trapping massive seeds (41957seeds/m², 265 seeds in control).

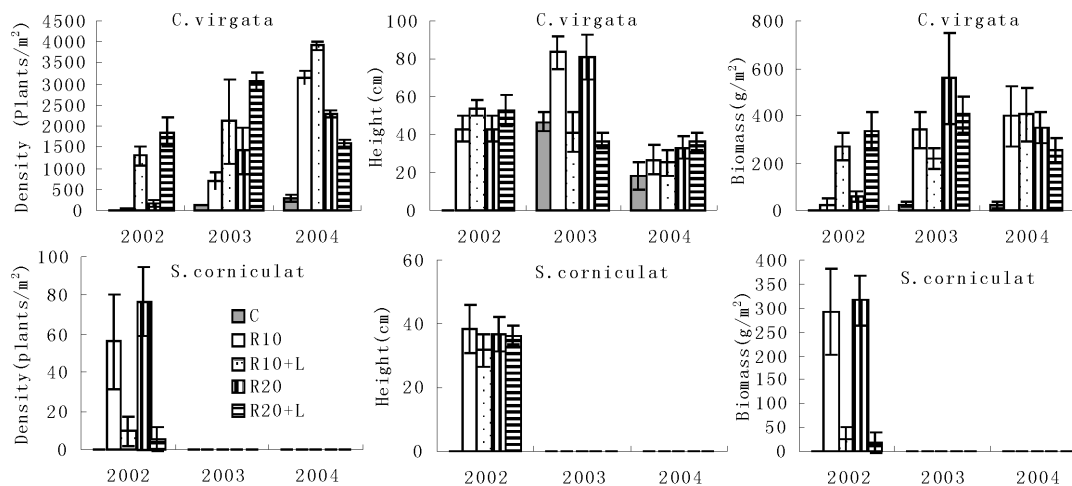


Figure 1 Plant density, height and biomass by ridging in saline-alkali from 2002 to 2004.

Conclusions The approach of revegetation in bare saline-alkali patches by ridging was effective, economic, and practicable. The ridge accumulated more precipitation to leach salinity from the surface soil to deep profile, and trapped sand particles and seeds carried by the wind, which provided a favourable micro site for seeds germination and seedlings growth. The operation of ridging plug litter speeded the establishment of vegetation, but the cost is more expensive. The narrow and high ridge meliorated more effectively the saline-alkali soil, and provided a more favorable micro site for the establishment of vegetation.

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