Relationship of Soil Seed Bank and Vegetation in Hot-Dry Valley Grassland of Jin-Sha River

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Keywords: Hot-Dry Valley, enclosure grassland, soil seed bank, vegetation, regression

Introduction The soil seed bank means the vigorous seeds existing in the soil surface, or buried in the soil, duff or litter, in the certain period and place (Andreza, M.M. and Vera, L.E. 2007). Soil seed bank plays an important role in the community composition and vegetation evolution. Although soil seed bank have been the subject of much recent attention, little is known about the relationship of the soil seed bank and vegetation in Hot-Dry Valley's grassland of Jin-Sha River and understanding of how these interact to determine the importance of soil seed bank to vegetation ecosystem's succession is limited (Luo H. and Wang K.Q. 2006).

Materials and methods The study was conducted in Yongsheng county of Yunnan province. The mean annual temperature is 22℃ and the mean annual rainfall 891 mm. The most rain fall during June to October. The dry season is from November to May. Soil is brown yellow with pH 6.7. The grassland is the typical "Savanna". The representative degeneration grassland was enclosed on JinSha River Hot-Dry Valley in 2004. Soil seed bank was sampled in March 2005 and 2006. The random sampling was used within each sampling region of enclosure and degeneration grassland (as control). Nine plots were taken from each sampling region with three replicates square (20 cm×20 cm). Total soil samples were 243. The sampling depth was 5cm, total depth 15 cm in every sample square. Soil samples were sorted to eliminate plant fragments and stones and kept in ventilating bags. Seed germination test began in April 2006. The soil samples were placed in greenhouse that temperatures ranging from 18℃ to 25℃. Each sample was spread out flowerpots (25 cm) to the depth of 4cm over seedbed soil (the soil was previously sterilized and killed seed by 150℃). All pots were watered as needed to keep the soil moist. The research of vegetation began October 2005 and 2006.

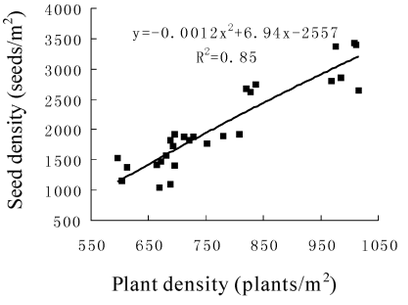

Figure 1 *Relationship between soil seed bank density and vegetation total density.*

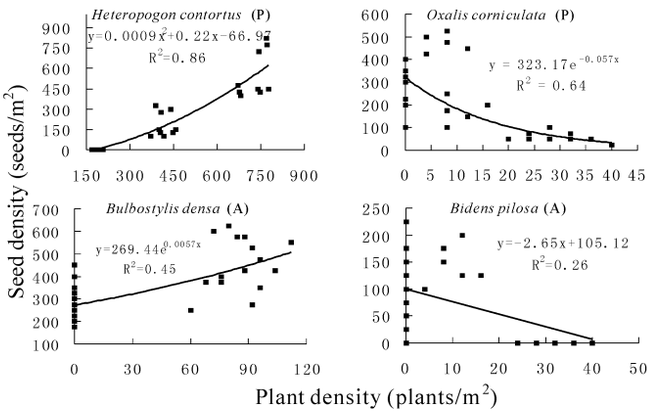

Figure 2 *Relationship between soil seed bank and vegetation density of perennial and annual herbage. (A: annual. P: perennial.)*

Results Seed bank and vegetation density values in this study were found increased significantly ($P<0.001$) compared with other unclosed grassland. Regressions showed a significant relationship ($P<0.01$) between seed bank density and vegetation density when the data of individual species were analysed. Density of the seed bank varied with increasing density of vegetation can be described by a quadratic curve (Figure.1). The perennial and annual herbage were analysed and the high perennial herbage seed bank density with the vegetation density showed the positive regression ($P<0.01$), but the short perennial herbage are negative regression ($P<0.01$). However, the relationship of the seed bank density and vegetation were opposite variation ($P<0.01$) of the annual herbage's seed density compared with the perennial herbage (Figure.2).

Conclusions The results indicate that both of the soil seed bank and vegetation density have significant positive regression on grassland. The perennial and annual herbage's seed bank and vegetation density have significant regression, which it depend on characteristics of vegetation form.

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