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The role of local species pool, soil seed bank and seedling pool in natural vegetation restoration on abandoned slope land

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Theory and empirical evidence suggest that natural vegetation restoration depends on both the availability of seed resources and on successful seedling establishment. In the hill-gully Loess Plateau region, it remains unclear whether a rich diversity of species persists in the fragmented landscape in spite of intensive human activities and whether the distribution of the soil seed bank and the establishment of seedlings are threatened by serious soil erosion. We investigated vegetation composition in a series of plots with different slope aspects and degrees in a watershed of 8.26 km2 in Shaanxi Provence, China to determine the local species pool. The soil seed bank and seedling recruitment on typical eroded slopes over varied erosion zones were simultaneously studied to characterise soil seed bank resources and seedling establishment. In this study, 133 species were identified in the local species pool. The species' frequency within the soil seed bank, seedling and standing vegetation was positively correlated with the frequency of matched species in the local species pool. The soil seed bank density and species richness had no significantly decreasing with the soil erosion intensity increasing on the hill slope. However, the seedling density and species composition showed significant difference among the investigative times and different erosion zones. Furthermore, the species frequency declined with increasing seed mass. Results of this study indicate that the seeds of widely distributed species always have small size, persist in soil under eroded conditions and have stable seedling density over the growing season. Therefore, these species can successfully recolonise in abandoned slope land. However, late-successional species with large seeds that lack dispersal vectors are less able to disperse and recolonise in areas that need to be restored.