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VEGETATION AND SEED BANK COMPOSITION IN RELATION TO STATE-AND-TRANSITION DYNAMICS UNDER GRAZING: BACKGROUND FOR MONGOLIAN RANGELAND RESEARCH

Gantuya Jargalsaikhan

Research Institute for Animal Husbandry
Zaisan-53, 11rd khoroo, Khan-Uul district 210153
Ulaanbaatar, Mongolia
gant_416@yahoo.com

Supervisor

Dr Anna Gudrun Thorhallsdottir
Agricultural University of Iceland
annagudrun@lbhi.is

ABSTRACT

In recent years, many researchers have stated the importance of above- and belowground interactions to better understand succession in plant communities and state and transition dynamics in rangelands. Studies indicate that improved knowledge of the soil seed bank is a key element in understanding above- and belowground interactions and plant community dynamics in grazed rangelands in countries like Mongolia and Iceland. The aim of the current project was to study current succession theories, with special emphasis on state-and-transition models to understand rangeland ecosystem dynamics under grazing, and become familiar with the main methods to analyse current vegetation and soil seed banks. In the case study, the main objective was to compare three sites with different grazing pressures in Hvitarsida, West Iceland, in relation to current vegetation, seed bank composition and their correlation. Samples were collected on the 25th of July 2012. The current aboveground vegetation was analysed using the frequency method within 10, 0.5 x 0.5 m frames on a 50 m transect. Soil seed bank sampling was taken from the uppermost 10 cm in the middle of the frame with a 10 cm diameter cylinder after removing all dead biomass and mosses from the surface. Seed banks were determined using the germination method in trays placed outside in a sheltered place and watered twice a day. After 6 weeks, emerged seedlings were analysed, i.e. species composition determined and counted. Perennial grasses and perennial forbs were the major components of the aboveground vegetation and the soil seed bank at all sites. Fewer seedlings emerged from the most heavily grazed site compared to the other two sites, indicating a limited seed setting under heavy grazing. Only one significant difference was found in the aboveground compositions between the sites; *Galium normanii*, a small forb, was found in

more abundance ($p = 0.002$) in the heavily grazed site (C) than in the other two sites. The results showed that there were significant differences in species composition above and below ground, giving very little similarity in species composition between seed banks and current vegetation compositions. The only exceptions were *Agrostis capillaris* and *Bistorta vivipara* that had a close similarity between the current aboveground vegetation and the soil seed bank. *Agrostis capillaris* had a great abundance in all the sites and *Bistorta vivipara* profile rates were mostly with bulbils that most likely were numerous in the soil. The study results agree with current theories on seed bank composition and similar studies; that the similarity between current aboveground vegetation and soil seed bank depends on current dominant species (annual or perennial) and the productivity (high or low) of the site.