

Background: Knowledge about vegetation and soil seed bank composition and the processes that contribute to vegetation recovery after the removal of heavy grazing is lacking in sub-alpine ecosystems.

Aims: In order to assess the effects of large herbivores on above-ground vegetation (AGV) and soil seed bank (SSB) characteristics, intensively sheep-grazed areas were compared to adjacent areas where grazing had been removed 10 years previously in a sub-alpine grassland of northern Iran.

Methods: A total of 40 4-m² (2 m × 2 m) plots were established in each treatment, and soil samples were collected from each plot within a depth of 10 cm. Plant species composition was determined for each plot during the flowering stage of herbaceous species in June 2011. The seedling emergence method was used to estimate SSB composition.

Results: A total of 45 species (23 annuals and 22 perennials) emerged from the soil samples of the grazed area, while the number of species emerged from the soil samples of the previously grazing area was 76 (37 annuals and 39 perennials). The removal of grazing led to a significant increase in species richness and seed density in the SSB. Species turnover of AGV was higher, and that of the SSB was similar for grazed areas compared with areas that were formerly grazed. Detrended correspondence analysis ordination of AGV composition showed a clearly separate structure between grazed plots and plots where grazing has been removed, while the segregation was less clear for SSB composition.

Conclusions: We concluded that restoration of locally degraded sites cannot rely on the SSB when grazing is stopped simultaneously and unvegetated gaps are colonised by vegetative growth rather than by seed.