ABSTRACT

I have studied the seed rain, the seed dispersal and the total and germinable seed banks in the northernmost Swedish Lapland during the years of 1996–2001. The seed rain has been trapped with doormats, a standard method, and the optimal sample area seems to be, in a single study, around 1,5 – 2,0 m^2. A new method of skimming off the grey blanket on top the snowbeds in the beginning of August, in order to measure seed rain size, was developed. The snowbeds were found to serve as seed traps, and as traps for aeolian deposition as well. This new method can be used when a site can be visited only once, e.g., under expeditions.

There is a connection between the mean temperatures of July and August, the seed rain size, and the number of species found. The species composition around the seed trap/snowbed corresponded well to the surrounding vegetation, but extrazonal recoveries with seeds from species far above their altitudinal limit were made. Horizontally, seed dispersal was found to be at least 150 m. The number of seeds and species diversity declined rapidly from seed rain over total seed bank to germinable seed bank. The number of species decreased also with altitude among all three aspects. The total seed bank in this area can be large, with macrospores from *Selaginella selaginoides* and *Empetrum hermaphroditum* seeds as the dominant constituents. This total seed bank must have been built up under a long time, and ^{14}C-analysis of *Empetrum* seeds gave 200 years as an average turnover time. That species clearly belongs to the persistent seed bank as *Empetrum* seeds continued to germinate after repeated freeze-thaw trials.

During the summer of 1999 I took part in the icebreaker-based expedition Tundra Northwest99 (TNW99) across the Canadian Arctic. After extensive sampling (in total 620 soil samples) I had the opportunity to study the seed bank size and composition at 17 sites in an extensive germination trial in a Swedish greenhouse.

The germinable seed bank size was larger in the mesic habitats (381 ± 144 seeds m^{-2}) than in the dry habitats (83 ± 45 seeds m^{-2}). No correlation was found between the seed bank size and the composition of the vascular plant cover, nor with latitude (°N), longitude (°W), or altitude (m a. s. l.). Species richness in the vegetation decreased significantly with increasing latitude both for mesic and dry sites, but the species richness in the seed bank did not vary with latitude in dry sites but significantly increased in mesic sites.

The species in the seed bank were always found in the overall inventory of the site, but not always within the 20m x 20m plot. In addition, they represent, on average, 8% of the inventoried flora in mesic sites and 3% of the species in dry sites.

The results from the present investigation show that the species found in the seed bank were not necessarily produced at the local scale and could come from a shorter or longer distance. The vascular plant species richness across all sites is dominated by herbs and graminoids which reflects in the composition of the seed bank. Most of the dominant species in the vegetation were not commonly found in the seed bank.

Key words: *seed bank, seed rain, dispersal, seed trap, snowbed, germinable, seedling, aeolian deposition, arctic, subarctic*

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