

Extended abstract

Plant cover of sandy deflation scars in reindeer-grazed tundra

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Study area and method

The upper parts of the sandy hills in the East of the Malozemelskaya Tundra are characterized by sandy deflation scars (areas 200 - 3000 m²; depths 0 - 1.5 m) in lichen-dwarf shrub tundra. The kettles are most common close to reindeer herders' camps and settlements. The vegetation cover in sandy areas of the tundra zone has been studied by Andreev and Sambuk in the 1930s and by Pristiyazhnyuk & Telyatnikov (1995); Khitun & Rebristaya (1997) and Magomedova & Morozova (1997). The purpose of my study was to ascertain the state of vegetation cover of such ecotopes and their response to the effect of anthropogenic factors, one of which is reindeer grazing. As part of the study we have tried to find out if there exist connections between reindeer grazing and the occurrence of kettles.

In the field season of 1998, we made 58 descriptions of plant cover of sandy deflations on sampling plots of 5 m x 5 m (Kucherov & Payanskaya-Gvozdeva, 1995) that allowed us to describe a relatively homogenous plant cover. The following parameters were used: species composition, cover percentage, abundance of cryptogamic and vascular plants, plant height, and features of soil.

Results and discussion

The plant cover of the sandy deflation scars was heterogeneous. Four types of plant communities were found in these ecotopes. *Type 1* - communities were dominated by *Empetrum hermaphroditum* + *Arctous alpina* and situated on hillocks, at the periphery and

sometimes in the center of sandy deflation kettles, which presented fragments of destructed tundra. The species composition and diversity of life forms in these communities is similar to those of the bordering moss - lichen - dwarf shrub tundra. *Type 2* - communities of *Racomitrium canescens* - *Empetrum hermaphroditum* occurred on gently sloping hillocks situated closer to the centre of the soil-blowing kettles. The communities of *type 3* (*Stereocaulon rivulorum* - *Polytrichum piliferum*) occurred on the less steep surfaces of the deflation scars, in which spore plants predominated. Primitive plant aggregations in the communities of *type 4* (cryptogamic crusts - *Polytrichum piliferum*) were at the central part of deflation scars, where pebbles and stones predominated. Species composition was variable in such groups. This type belonged to a last stage of degradation of native plant cover and becomes the starting stage for further colonization and overgrowth of sands.

The comparative analysis of these communities of sandy scars revealed the following: species diversity decreased from the first to the fourth type; total plant cover decreased from *type 1* (86%) to *type 4* (3%), consequently the proportion of open substrate increased. There was an accompanying change in covering of different plant groups. The frequency of plant species also decreased from *type 1* to *type 4*. The cover of mosses and lichens increased, while cover of dwarf shrubs and shrubs decreased. The origin of such changes in plant cover of scars may be owing to reduced competition by vascular plants. Increased number of xerophytic species of vascular

plants, mosses and lichens of community *type 4* confirms deterioration of growing conditions in this type of communities. Variability of species composition was the highest in open communities, owing to increased instability of plant growing conditions.

The described changes in plant cover of sandy hills are most probably caused by anthropogenic impact. Reindeer numbered 2340 in the investigated area (Zolotoy, 1999) and grazing in the lichen and dwarf shrub-lichen tundra on sands may be the most important factor in stopping natural development of vegetation cover and causing changes or even total destruction of it. This situation is connected with the deterioration of plant life conditions caused by increased wind erosion. The latter disturbs the moisture regime of the soil. Pebbles on the soil surface also hinder regrowth of plants. Such open areas can persist over the long term, a conclusion proved by registered mapping in 1969 and air photographs in 1984.

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