

Extended abstract

State of invertebrates on reindeer-grazed localities

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Introduction

Reindeer grazing is practised in the territory of the Malozemelskaya Tundra. In 1998, a study of soil invertebrates was carried out in the following grazing lands of the collective farm Vyucheiskii with 9000 reindeer (Lavrinenko & Kuljugina, 2002): the Timan coast, the northern extremity of the Nenets Ridge, and the basin of the river Indiga. Winter pastures of reindeer are located on the Timan coast; they are dominated by sedge-grass-moss tundra communities. Summer grazing lands are situated in the Nenets Ridge and the Indiga river district dominated by dwarf shrub-lichen and willow tundra communities and forb-grass meadows. The Nenets Ridge is the highest area. In summer it attracts reindeer herds escaping from insects on the windy hills.

We studied 30 plant communities including 15 control plots and 15 experimental plots. The latter were located in places of reindeer trampling and grazing. We collected soil invertebrates by the hand sorting of the soil and litter samples of 25 cm x 25 cm. We also used soil traps (pit fall traps). In all, 30 hand samples were collected and 10 traps were placed in each plant community.

The data of authors Barbashova (1983), Matveeva (1970) and Sharova & Matveeva (1974) showed that the structure of soil biota is essentially changed in the reindeer pasture areas. The feed types of beetles changed along with a general reduction of species number. The number of zoophytes decreased and the number of saprophytes increased. It was also noticed, that species inhabiting the soil surface predominated (Antoshenkov, 1983).

Results and discussion

Vegetation and soil conditions in the research locations were presumably changed because of the constant use of grazing lands. Soil invertebrates, especially forms inhabiting the litter, reacted to the occurring changes. Soil invertebrates dominated the animal populations of tundra communities and included about 70% of general zoomass. About one half of the litter forms belongs to beetles, mostly to the families Carabidae and Staphylinidae. They are the most successful in the tundra landscapes and are important for tundra communities due to their wide feeding spectrum and big populations. These two families showed a considerable species diversity and a broad adaptive radiation. Twentyfive Carabidae species and 14 Staphylinidae species were observed in the research.

The winter pastures

Species diversity of soil invertebrates in the winter pastures was lower than on the area of summer grazing lands. In the control plots the most abundant beetle species were *Pterostichus haemotopus*, *Olophrum fuscum*, *O. rotundicolle* and *O. boreale*. On experimental plots, the beetle species *Pelophila borealis*, *Pt. kokeili*, *Pt. vermiculosus* and *O. boreale* common in tundra ecosystems, were registered. But any differences in qualitative composition of soil invertebrates in the experimental and control plots were not observed. So adjustable reindeer grazing on winter pastures may not influence on the soil biota structure.

The summer pastures

Species composition of beetles in the experimental plots of summer grazing areas was poorer than in the control plots. The species *Amara brunnea*, *Pt. kokeili*, *Omalium rivulare* were found in the experimental and control plots. The beetles *Curtonotus alpinus*, *C. torridus*, *Leistus terminatus*, and *Boreaphyllus benningianus* were only observed in the experimental plots. One of the factors affecting the soil biota on the summer pastures seemingly was trampling. The group of soil invertebrates forms completely disappeared owing to constant trampling. Also a decrease of litter forms was observed. The surface-soil forms living in more rare vegetation are saved.

Conclusion

Not only the species composition of soil invertebrates, but also their life forms was changed under grazing. The number of zoophytic species (feeding on animal food) increased in the tundra ecosystems, Thirtytwo beetle species belonging to this group were found in the control spots while only 8 saprophytic species.

Our data show, that reindeer grazing in summer pastures may have effects on the soil invertebrates through changes of soil biota structure and a decrease of species number. Species tolerating changing environmental conditions are the the most usual species in tundra communities. At high grazing

intensities, absence of beetles on plots has been observed. In the winter pastures (covered with snow) trampling and grazing seemingly have no discernable effect on the soil biota.

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