

Mineral and trace element contents of lichens in Finnish reindeer herding area

Mauri Nieminen¹ and Maarit Rantataro²

¹ Finnish Game and Fisheries Research Institute, Reindeer Research, Koskikatu 33 A, 96100 Rovaniemi, Finland

² Department of Environmental Conservation, University of Helsinki, Helsinki, Finland

In winter, the basic types of fodder for semi-domesticated reindeer are lichens (mainly *Cladina* species) and some winter-green plants (see Nieminen and Heiskari 1989). Lichens are food specific to the reindeer, and in many arctic areas lichens constitute nearly 2/3 of the entire vegetable mass consumed by reindeer during the year. Lichens apparently need stable substrate and clean air for prolific development. The susceptibility of lichens to air pollutants is well documented. Five lichen species (*Cladina rangiferina*, *Cl. stellaris*, *Cl. mitis*, *Cetraria nivalis* and *Stereocaulon* sp.) were collected from 50 sample areas in northern Finland during summer 1983. Two lichen species (*Cl. rangiferina* and *Cl. stellaris*) were also collected from 17 sample areas during summer 1987. During summer and autumn 1988 together 22 reindeer forage plants (6 terrestrial lichens and 2 arboreal lichens, *Alectoria* and *Bryoria* sp., growing on birch, pine and spruce, 3 mushrooms, 5 deciduous trees and 6 shrubs, grasses and herbs) were collected for selenium measurements from 4 areas in northern Finland. Forage samples were collected from several different plants of each species. Only current annual growth was collected from the shrubs and live part from lichens. The contents of Cd, Pb and Ni were analysed by graphite furnace technique and contents of Na, K, Ca, Mg, Al, Cu, Zn, Mn, Fe and Se by Perkin Elmer 360 or Varian 30/40 atomic absorption spectrophotometers using standard

methods. Mineral and trace element values varied in different lichen species. The highest Pb values were measured in *Stereocaulon* sp. lichens in Ostrobothnia and in the Kajaani region during summer 1983. The highest Cd values were measured in *Cetraria nivalis* lichens in the regions of Fell and Forest Lapland also during summer 1983. High Al values were measured in *Stereocaulon* sp. lichens in all phytogeographic regions in present study. The values of minerals and trace elements were usually lower in the Forest and Fell Lapland than in the other regions, and slightly higher values were measured in the eastern part of Finland during 1983 and 1987. Very high Fe and Al values were measured in the tops of Saana and Pulju fells in the reindeer herding area. The selenium content in Scandinavian rocks, soils and plants is usually very low (Oksanen and Sandholm 1970). High selenium values were measured in lichen species and mushrooms collected during summer and autumn 1988 in Kaamanen and Kuusamo regions.

References:

- Nieminen, M. and Heiskari, U. 1989: Diets of freely grazing and captive reindeer during summer and winter. - *Rangifer* 9(1):17-34.
- Oksanen, H. and Sandholm, M. 1979: The selenium content of Finnish forage crops. - *J. Sc. Agr. Soc. Finl.* 42:251-254.