



Soil nitrogen dynamics in high-altitude ski runs during the winter season (Monterosaski - Vallée d'Aoste - Italy)

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In many Alpine catchments, the development of winter tourism determined a widespread change in land use, shifting from forested and cultivated lands to ski slopes.

The construction of a ski slope implies a strong impact on the landscape, with potential consequences on the soil quality. In most cases, the construction procedures include the total or partial removal of the soil body, the reallocation of the fine hearth fraction, the subsequent seeding of plants and the use of organic fertilizers.

This work aims to evaluate soil physical and chemical properties and nitrogen (N) dynamics in anthropogenic soils from ski slopes of different age.

Study sites were located in Champoluc (AO)- NW Italy between 2400 and 2700 m ASL. Topsoils (0-10 cm depth) were sampled in 4 ski slopes hydroseeded with commercial mixtures 4, 6, 10 and 12 years earlier, and in 4 control plots at the same exposure and altitude as the ski slopes. Soil samples were characterized, N dynamics in winter was evaluated with the buried bag technique and snowpack was analyzed for chemical and physical properties.

Total nitrogen (TN) content in topsoil ranged 0.75-1.06 g kg⁻¹ and was not correlated with the ski slope age. In all but one site, the TN content was significantly lower in the ski slope than in the control plot. A positive net ammonification and nitrification throughout the winter were found in all but one ski runs.

These results suggest a high variability in the evolution degree of these anthropogenic soils. The net overwinter N mineralization that we report demonstrates that these soils are biologically active during the winter season. Such activity results in a pool of labile inorganic nitrogen potentially available for plant demand at the spring snowmelt.