

The influence of plant communities on postagrogenic soils in the middle taiga zone.

Nikita Churilin, Alexandra Churilina, Natalia Chizhikova, and Evgeny Varlamov

V.V. Dokuchaev Soil Science Institute, Soil Mineralogy and Micromorphology, Moscow, Russian Federation
(nikitachur@ya.ru)

At the present time there are many abandoned postagrogenic croplands in Russia. These lands are gradually involved in natural plant succession, which has affect on the properties of the soil. Therefore, the study of these soils is one of the important trends in the Russian soil science.

The aim of the study was to identify possible trends in soil changes after a long anthropogenic impact on a base of morphological, chemical and some physical properties of postagrogenic soils under different plant communities.

Soils were sampled in the south of Arkhangelsk region, Ustyansky district, near Akichkin Pochinok village. Soils are formed on clay moraine of Moscow glaciation with klastolits. All soil profiles were dug on interfluve.

We determined chemical composition (pH, CaCO₃%, organic carbon, CEC, F₂O₃ (Mer-Jackson), NPK), physical characteristics (particle size distribution, bulk density of the soil) and XRD of <1μm, 1-5μm, 5-10μm fractions from soils.

We selected 4 plant communities on different stages of succession: upland meadow with domination of sod grasses (*Phleum pratense*, *Agrostis tenuis*), 16 years old birch forest where dominantants are herbaceous plants such as *Poa* sp., *Chamerion angustifolium*, *Agrostis tenuis*, 16 years old spruce forest with no herbaceous vegetation and 70 years old bilberry spruce forest with domination of *Vaccinium myrtillus* and *Vaccinium vitis-idaea*.

To study postagrogenic soils we made 4 soil profiles under these plant communities. All profiles have evidence of anthraquic horizon and they have plough pan on a depth of 20-24 m (confirmed by bulk density). The plowed horizon is better expressed in soils under the meadow. All 4 soils are characterized by presence of Fe-Mn segregations throughout the profiles, particle size distribution heaving to the lower horizon and residual albic horizon. We identified following soils: Albic Dystric Retisol (Cutanic Abrubptic Loamic) under the old spruce, Dystric Retisol (Cutanic Loamic Anthraquic) in young spruce, Glossic Albic Dystric Retisol (Cutanic Loamic Anthraquic) in young birch forest and Dystric Retisol (Loamic Abruptic Anthraquic) under upland meadow.

We found a correlation between amount of clay fraction in upper horizons (<20 cm) of these soils and crown density: the amount of clay increases with density of branches. This trend can be explained by the fact that amount of precipitation on the surface of the soil decreases with crown density, therefore clay doesn't migrate to the underlying horizons in the soil. Over time, acid aqueous solution can influence on process of clay fraction redistribution, so it explains the reduction of clay content in the old spruce forest and well-defined albic horizon.

The results of chemical analyses showed that pH of these soils varies between 3 and 4. In all soils we can see illuvial accumulation of P₂O₅, exchangeable bases, K₂O, Fe₂O₃. It was also shown that carbonates are present in horizons close to the subsoil, which content is less than 1%.