

Environmental properties of soils in the Pieniny National Park of Slovakia

Charakterystyka gleb Pienińskiego Parku Narodowego na Słowacji

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Abstract. This study examines environmental properties of agricultural soils in the Pieniny National Park of Slovakia. Excluding the present status of basic soil properties and heavy metal content, the development tendency of evaluated properties is described between 1993 and 1997.

One of the most important environmental properties is the susceptibility of agricultural soils to pH value decrease, soil organic matter decrease, available P and K loss and to soil contamination, which has been mostly slight, resp. not determined during short-term compared period.

INTRODUCTION

Soil is a very important part of the environment. The original properties of soil cover depend on geological composition. Geologically, the paleocene flysch is most extended. On this geological substrata occur Cambisols which are mostly covered with grassland. The haligov region (mostly forest) is composed of mesozoic rocks and carbonate sediments including dolomites and limestones (Vološčuk 1992). These substrates are covered with Rendzinas and Cambic Rendzinas. Fluvial sediments are composed of mesozoic rocks and crystalline stones especially near the Dunajec river. In this contribution (as a poster) the basic properties and their development including heavy metals are evaluated in the area of Pieniny National Park in Slovakia between 1993 and 1997.

MATERIAL AND METHODS

The results were obtained from the 10 monitoring sites in agricultural land (arable land and grassland) of Pieniny National Park in Slovakia. The soil samples from the surface have been analysed for pH/KCl, Cox, fractional composition of soil organic matter (humic acids and fulvoacids), content of available nutrients – phosphorus (Egner's method) and potassium (Schachtschabel's method). The heavy metals have been extracted with 2M HNO₃ and 0.05 M EDTA. Soil hygienic status has been evaluated according to valid hygienic limits for Slovakia (Ministerstvo... 1994). Development of these properties is given in the following section. Consequently, only Cambisols and Fluvisols are evaluated (agricultural land) in this contribution.

pH VALUE

These soils are originally slightly acidic to acidic. The soil pH values (pH/KCl) run from 3.7 to 6.3 (in 1993) and from 3.6 to 6.3 (in 1997). The mean pH/KCl value has been changed only very slightly – from 5.0 (1993) to 4.9 (1997). It may be said that any soil pH value tendency has not been indicated in this region between compared years (short-term period of monitoring).

SOIL ORGANIC MATTER

Content of soil organic matter (SOM) is in the range 2.4–6.9% (in 1993) and 2.5–4.6% (in 1997). The mean value of SOM has changed from 4% (1993) to 3.5% (1997). SOM is a very variable soil property and it is interesting that the significant decrease of SOM has been determined on the monitoring site with ski lift. Finally, it may be said that the expressive change of quantity and quality of SOM (the HA/FA ratio is similar during compared period) has not been indicated.

SUPPLY OF AVAILABLE PHOSPHORUS AND POTASSIUM

Supply of available phosphorus in agricultural soils is variable – low (in grassland) and from good to high in arable land (influence of fertilization) – according to UKSUP criteria (1993). On the basis of compared results it may be said that the supply level of available phosphorus in the soils of this region is relatively the same (no expressive change in fertilization level during compared period). Concerning the available potassium supply in agricultural soils the situation is similar. Only a slight decrease of available potassium has been indicated.

SOIL CONTAMINATION

The problem of soil contamination in the Pieniny National Park was described in our last contribution (Linkeš et al. 1997). The comparison of various forms of heavy metals is very interesting. The ones extracted with 2M HNO₃ (Cd, Pb, Cr, Ni) have decreased. Development of the same risk

trace elements extracted with 0.05 M EDTA is relatively different. The content of mobile Cd and Ni has been slightly increased since 1993. This is important because mobile forms are significant for transport to plants and food chain, as well.

CONCLUSION

Concerning the obtained results the susceptibility of agricultural soils can be given as follows:

Soils	pH value decrease	soil contamination increase	SOM decrease	available P loss	available K loss
CM	slight	nd	from slight to medium	slight	slight
FL	nd	nd	nd	nd	slight

CM – Cambisols on flysch

FL – Fluvisols on alluvial sediments along Dunajec river

SOM – soil organic matter

nd – not determined for the time being

In general, on the basis of obtained results it may be said that the susceptibility of agricultural soils in the Pieniny National Park to pH value decrease, soil contamination increase, soil organic matter decrease and to available nutrients P and K loss is mostly slight, resp. not determined for the time being.

REFERENCES

- Linkeš V., Kobza J., Makovčíková J. 1997. Kontaminácia pôd PIENAP-u a jeho okolia. [In:] The Nature of Pieniny in Transformations. Monographical Studies on National Parks. — Vyd. SLZA s. r. o Tatranská Lomnica, ss. 32–37.
- Ministerstvo pôdohospodárstva SR. — Vestník MP SR, roč. XXVI, časťka I., Rozhodnutie 3, č. 531/1991 z januára 1994.
- ÚKSUP (Ústredný kontrolný a skúšobný ústav poľnohospodársky). 1993. Agronomické kritériá pre hodnotenie agrochemických rozborov pôd SR. – Bratislava.
- Vološčuk I. (ed.) 1992. Pieninský národný park. Monografia. — AKCENT, B. Bystrica, 382 s.