EVALUATION OF CHLORIDE CONCENTRATIONS IN CATCHMENT OF ŽITAVA RIVER

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Summary

In catchment of upper Žitava flow, in 1994-1998, chloride concentrations in Hostiansky stream were studied. Obtained results showed, that seasonal dynamics of chloride concentrations in water flow was not showed in experimental years. In along profile of water flow, increasing tendency of their values was showed from first to last sampling places. The main producers of chloride contaminants in water flow were Mykoprogres (company for mushroom processing and production), Topolčianky village and Zlaté Moravce town. Accounted Cl- values (according to STN 757 221), classified all sampling places in along profile into first class of water quality (very clean water).

Key words: chlorides, water flow, sampling place and time

Introduction

Chlorides are the components of natural waters and together with HCO₃- and SO₄- anions are dominant (Horáková et al., 1986).

Important chloride sources in surface waters are sewage and some industrial waters, route sprinkling in winter period (Pitter, 1990) and atmospheric waters (Valtýni, Lalkovič, 1995).

In soil, chlorides exist mostly in soluble substances (Ivanič et al, 1988). The highest chloride escapes from soils into water flows are in catchments, where arable soils are in majority from agricultural soils (Noskovič, 1993). They are hygienically harmless in waters, but in higher concentration, water taste can be affected. They are chemically and biochemically stable in water (Biskupič, 1991).

Material and methods

Hostiansky stream, which is in upper part of Žitava river catchment was studied. Water flow springs in Tribeč chain. It flows through Hlbovä dolina, Hostie village and Topolčianky and Zlaté Moravce towns. Its issue is under Zlaté Moravce- part of Chyzerovce. The area of water flow catchment is 120 km². Its average yearly overflow in issue of Žitava river is 0.94 m³.s⁻¹. Flood flat of water flow is covered with grass clumps, various herbs, bushes and trees.

Water flow catchment is spread on two different geographic units. Upper part of Hostie village is in Tribeč chain and lower part of Hostie village is in Žitavská upland. Tribeč is part of crystallic-mesozoic era zone of Karpatty. From soils, there are Ranker, Rendzina, Calcaric Regosol, Eutric Cambisol, and Albic Luvisol. In forest ecosystems, dominant trees are oak, beech and hornbeam. Characteristic representants of trees in water flow flood are ash and older. Žitavská upland is amalgamated between chains Tribeč and Pohronský Inovec. From geological point of view, area is part of Zlaté Moravce bay. Dominant part, mainly in lower height levels, is covered with quarternary sediments (loess). In this soil-formation substrate, Orthic Luvisol were created. Besides this soil type, in this catchment area are Eutric Cambisols and in flat of water flow, there are Eutric Fluvisol.

With regard on agricultural production, catchment of water flow is part of beat areas. From agricultural plants, there mainly cereals crop, from which winter wheat is dominant. In 1995-1998, from fertilizers in dose 54 kg N. ha⁻¹.y⁻¹ were only used. Besides of this, farmyard manure in dose 42 t. ha⁻¹. y⁻¹ were applied under root- crops (data from Farm- Topolčianky). In animal production, there cattle and hog breedings are dominant.

Sampling of water from water flow was done regularly in last decades of months in 1994-1998. Sampling place under Zlaté Moravce town, where samples were taken since March in 1995, was exception. Samples were taken from current in along profile of water flow, following sampling places were determined: 1- Forest ecosystem, 2- Under permanent grass ecosystem on the left side and forest ecosystem on the right side of water flow, 3- Under permanent grass ecosystems on the both sides of water flow, before Hostie village, 4- Under Hostie village, 5- PD Topolčianky- Hostie centre, 6- Under agroecosystem of arable soil on the both sides of water flow, before Mykoprogres, 7- Under Mykoprogres, 8- Under permanent grasses on the left side and tree and bush nurcery on the right side of water flow, before Topolčianky town, 9- Under Topolčianky, 10- Under agroecosystem of arable soil on the both sides of water flow, before Zlaté Moravce town, 11- Under Zlaté Moravce town- part Chyzerovce, in issue of water flow of Žitava river.

Chloride concentrations were determined according to Mohr. Results are presented in mg Cl⁻.l⁻¹. Classification of water in sampling places into water quality classes were done according to accounted typical Cl⁻ values with limits for individual quality classes, which are according to STN 75 7221-classification of surface water quality.
Mean Cl⁻ value obtained in the Hostiansky Brook depending on sampling time and position during the period 1994 - 1998

Sampling time:

![Graphs showing Cl⁻ values for different years (1994-1998)]

Sampling position:

![Graphs showing Cl⁻ values for different positions (1994-1998)]
Results and discussion

Average chloride concentrations with dependence on sampling time in experimental years showed (fig. 1-5), that seasonal regularity was not showed. Average chloride concentrations in all experimental period were fluctuated with dependence on sampling time from 11.33 mg.l\(^{-1}\) (May) to 14.89 mg.l\(^{-1}\) (April) (fig. 6). Increasing tendency of Cl\(^-\) concentrations from first to last sampling place was showed in along profile of water flow in all experimental years (fig. 7-11).

The highest increase during all experimental period was under Mykoprogres (sampling place 7), which processes and produces mushrooms, under Topoľčianky village (sampling place 9) and Zlaté Moravce town (sampling place 11) (fig. 12). We supposed, that chlorides from Mykoprogres come to water flow by insufficiently treated sewage. Increases under Topoľčianky village and Zlaté Moravce town are in connection with insufficiently treated sewage from households directly into water flow. Similar conclusions are presented by Biskupič (1991), as well. Tőlgyessy et al. (1984) showed, that chloride concentrations in sewage waters are in tens mg.l\(^{-1}\). Accounted typical Cl\(^-\) values (table 1), according to STN 75 7221, classified all sampling places in along profile of water flow into first class of water quality (very clean water).

References