

The influence of natural and anthropogenic factors on the natural and utilitarian qualities of meadows and pastures of the eastern part of the Bukowskie Foothills

Summary

During the 2017-2019 vegetation seasons, 275 relevés were taken on meadows and pastures of the Bukowskie Foothills (south-eastern Poland). Each of 165 soil and plant samples were taken from the area of 0,5 m². The aim of the study was to: characteristics of flora and plant communities of meadows and pastures of the Bukowskie Foothills, depending on some ecological and anthropogenic factors, determination of the impact of habitat and anthropogenic conditions on biodiversity and yield of plant communities, determination of the quality characteristics of the feed, the relationship between certain soil factors and the chemical properties of the sward of meadows and pastures.

On the basis of 275 relevés, 5 associations and 7 communities from the *Molinio-Arrhenathretea* class were distinguished. In terms of meadow area, *Arrhenatheretum elatioris*, *Lolio-Cynosuretum* and *Trisetum flavescens*, *Holcus lanatus* and *Festuca rubra* communities dominated. Synanthropic species predominated in the flora of the phytocenoses. On meadows and pastures of the Bukowskie Foothills 298 species were found, including 35 grasses, 25 broadleaved plants, 33 sedges, rushes and horsetails, 20 trees and shrubs and 185 herbs and weeds. In terms of phytosociological affiliation, the highest number of taxa was found in the *Molinio-Arrhenathretea* class. Species of importance for animal and human health accounted for 28% of the total flora, and honey-giving species for 61%.

The Bukowskie Foothills were dominated by grasslands of medium quality, rarely weak and very weak. Partially patches of meadows and pastures developed on arable land, which was formerly arable, as indicated by the persistence of segetal and ruderal species. The sward of some unused meadows was burnt by farmers, which consequently limited the overgrowth of grasslands by trees and shrubs. On about 35% of the meadows of the studied area, no utilization was found. The reason for this was, among others, a very large decrease in the number of ruminants since the 1990s, mainly in small farms. Lack of use of meadows and pastures is a waste of valuable feed base in feeding farm animals. On extensive meadows and pastures, which dominate in the Bukowskie Foothills, meat cattle breeding can develop successfully.

According to soil-agricultural maps, meadows and pastures in the Bukowskie Foothills were found on brown dystrophic and clay soils formed mainly from clays and clay, less frequently from dust. Most often they had acidic reaction and varied content of organic matter. They were poor in phosphorus, rich in magnesium and characterized by varied potassium content, high iron and manganese content, and low copper and zinc content. The optimal content of magnesium, iron and manganese was found in the meadow sward, while total nitrogen, phosphorus, sodium, copper and zinc were insufficient. The abundance of potassium and calcium was diversified. It is assumed that the acidic soil reaction, lack of assimilable forms of some components in the soil, limited or no fertilization, and the associated botanical composition of the sward may have had an effect on the assimilation of these components by vegetation. No significant correlation between the content of the same components in soil and sward was found, except for phosphorus and potassium. In the sward, total nitrogen had a positive effect on the concentration of most nutrients.

Farmers in the Bukowskie Foothills fertilized mainly sown meadows, which were used intensively, while the remaining meadows and pastures were used extensively mainly for direct payments and agro-environmental payments under RDP 2014-2020. The effect of fertilization, sowing and regular mowing or grazing was a large share in sward, cultivated grasses and broad bean species and a higher yield and its usable value. Moisture and trophism of soil, application of reseeding and utilization had a significantly positive effect on the yield and usable value of the sward, while the negative altitude above sea level. The highest yields of I regrowth were characterized by *Arrhenatheretum elatioris* and *Cirsietum rivularis* and the highest utility value of *Lolio-Cynosuretum* and *Arrhenatheretum elatioris*.

Differences were found between the communities in the intensity of climatic and edaphic factors evaluated with the phytosociological method. This method is a valuable supplement to laboratory analyses of soil, but it cannot completely replace them.

Meadow and pasture communities occurring in the Bukowskie Foothills were generally characterized by average values of the Shannon-Wiener index. The H' index and the average number of species in releve were significantly influenced by the reaction and exhibition, while the negative moisture content, the abundance of phosphorus and nitrogen in the soil, as well as utilization and reseeding had a statistical effect on the H' index and the average number of species in releve. The condition for maintaining the existing species diversity of grasslands in the studied area is extensive use of sward, optimal fertilization and preventing the spread of invasive species *Heracleum sosnowskyi*.