SUMMARY

FLORISTIC, UTILITY AND LANDSCAPE VALORIZATION OF MEADOWS AND CERTAIN ADJACENT PLANT COMMUNITIES IN WESTERN AND CENTRAL PART OF THE KOLBUSZOWA PLATEAU.

550 phytosociological relevés in grassland communities (meadows, pastures, rushes, psammophilous grasslands and mat-grass sward) were taken in the growing season 2011-2013 in the Kolbuszowa Plateau (south-eastern Poland). 165 soil samples and 83 plant samples (from the surface of 0,5 m^2) were collected in several approaches. The aims of the study were: conducting characteristics of flora and plant communities according to certain environmental factors and degree anthropopression, demonstrating the usefulness of phytoindication method to conduct valorization of meadow, rush and grassland habitats, assessment of biodiversity of the distinguished phytocoenoses, general environmental valorization, conducting characteristics of meadow communities in terms of the yielding of sward and its qualitative values, as well as drawing attention to landscape values of the ecosystems under study.

The plant communities of meadows, rushes, psammophilous grasslands and mat-grass sward consisted of 338 species including 42 grasses, 29 leguminous plants, 37 sedges, rushes and horsetails, 30 trees and shrubs, as well as 208 herbs and weeds. Most numerous were species belonging to these families: *Asteraceae, Poaceae, Cyperaceae* and *Fabaceae*. The biggest occurrence could be noticed for species with low value as animal feed: *Holcus lanatus* and *Juncus effusus*. The largest group were species that occur infrequently and very rarely, including these under partial protection: *Plantanthera bifolia, Dactylorhiza incarnata, Dactylorhiza maculata, Helichrysum arenarium, Menyanthes trifoliata*. Among strictly protected species only *Dactylorhiza majalis* was widespread.

In terms of phytosociological affiliation, the most frequent were species of the classes: *Molinio-Arrhenatheretea, Phragmitetea, Artemisietea vulgaris* and *Stellarietea mediae*. A large group comprised of species that do not belong to any of already defined syntaxa. Given the life-form categories, the most frequent were hemicryptophytes, and therophytes and geophytes respectively. Most frequent were indigenous plant species - 87%, while antropophytes 11.6%. Medicinial plants accounted for nearly 32% and melliferous about 66% of the entire flora.

Based on 550 phytosociological releves 30 associations and 12 plant communities were distinguished, the majority of which were meadow communities of the *Molinio-*

Arrhenatheretea class and the rush community *Phragmitetea*. The most frequent of rush communities were the associations: *Phragmitetum australis* and *Acoretum calami*. The most common meadow communities were phytocenoses of the *Molinietalia* order. Most frequent of the order were the associations: *Cirsietum rivularis*, *Scirpetum sylvatici* and the communities *Holcus lanatus* and *Juncus effusus* that belong to the *Calthion* alliance, as well as tall herbs of the *Filipendulion* alliance. Their spread in the Kolbuszowa Plateau is the evidence for abandonment of wet meadows use. The most common of the *Arrhenatheretalia* order were plant patches of the *Arrhenatheretum elatioris* association and of the *Agrostis capillaris* community. Occurrence of segetal and ruderal species indicates their origin as formerly arable lands**.**

The study area was dominated by unused meadows over those agriculturally used. The reason for this was a drastic reduction in cattle population (from the 90s) in very small farms, mostly measuring several hectares. As a consequence of abandonment of land-use meadow vegetation is displaced by ruderal, forest and scrub species, which as the result of secondary succession encourages the occurrence of communities of low economic and nature value. Simultaneously rare and protected species disappear.

According to soil-agricultural maps a scale of 1: 5000 the study area was dominated by mineral soils, among them brown soils made of sand of different granulometric composition. Organic or organic-mineral soils (muck-peat, muck-mud) covered mostly sands. They could be characterized by acid reaction, low or very low content of assailable phosphorus compounds, varying content of potassium, medium or high content of magnesium. The study area was dominated by poor and very poor meadows and pastures classified as complex 3z. Some patches of grassland communities developed on agricultural suitability complexes of arable soils. Ecological conditions of the distinguished communities were estimated with phytoindication method. There were clear differences between communities in terms of numerical values of climatic factor indicators (insolation and temperatures) and edaphic factors (soil moisture, pH and trophic soil index). Also the differences in syntaxa within certain communities could be noticed.

Ecological imbalance in the distinguished communities is indicated not only by the presence of alien species, but also a small participation of species with the highest levels of constancy in their floristic composition.

Rush and grassland communities could be characterized by lower floristic diversity in relation to the pasture communities. The lowest values of Shannon Wiener Diversity Index could be noticed for the following associations: *Glycerietum maximae,*

Phalaridetum arundinaceae and *Caricetum acutiformis* and the highest for *Arrhenatheretum elatioris* and *Cirsietum rivularis* and the communities of *Holcus lanatus* and *Deschampsia caespitosa*.

Rush communities were characterized by lower values of the synanthropisation index in relation to the pasture communities. The highest rate of the synanthropisation index could be observed for the association *Lolio-Polygonetum arenastri* with a heavily tread sward, while the lowest for *Caricetum rostratae*.

The greatest landscape values, which were estimated with the Oświt's method, had the following rush associations: *Caricetum rostratae, Equisetetum fluviatilis* and *Glycerietum plicatae*, while the smallest the *Lolio-Polygonetum arenastri* association and the *Corynephorus canescens* community, which resulted from the essence of the method according to which wetland species are highly rated in relation to those typical of dry habitats.

The botanical composition of meadows and pastures, lack of systematic fertilization and extensive use or abandonment of their use, all have a negative impact on the yielding and utility value of the sward. The highest yielding from the first regrowth of sward was recorded for the *Cirsietum rivularis* association and the *Cirsium palustre* community for which Lwu (utility value) was very low. The lowest dry matter yield of sward, but of the highest value was obtained from the pastures of the *Lolio-Cynosuretum* association.

Considering the demand of ruminants for nutrients in feed, generally in samples of the sward deficiency of total nitrogen, potassium, calcium, zinc, sodium, and copper could be observed. The level of phosphorus and magnesium varied, while that of iron and manganese was excessive. The poor absorption of nutrients by the majority of plants was most likely affected by acid reaction of the meadow soils, their insufficient content, lack of fertilization, botanical composition of the sward, as well as not always optimal time for obtaining plant samples. There was no statistical evidence for a correlation between the level of the same nutrients in the soil and the sward with an exception of positive dependence of potassium in the sward from manganese and copper in the soil and copper in the sward from organic matter and copper in the soil.

The presence of mosaic of rush, meadow and grassland communities, often with a significant number of herbs, their colorful flowers and inflorescences diversifies the agricultural landscape and makes it aesthetically pleasing.

The obtained results are the source of information on the current floristic composition of the rush, meadow and grassland communities, ecological conditions in which they

occur. They also highlight the threats to biodiversity of meadows due to abandonment of their agricultural use. Results from the obtained study may be useful to educate farmers and encourage them to undertake actions to cease degradation of habitats and meadow communities as grazing areas. It is also about preservation of natural values of not only meadow ecosystems, but also rush and grassland communities for future generations, which is the prevailing principle of sustainable development in our country, including the Kolbuszowa Plateau.

If the meadow and pasture-use is not restored in the coming years, and most certainly this will be the case, the ecosystems shall disappear from the landscape of the KolbuszowaPlateau, which is a loss to biodiversity of the area, as well as agriculture.