

FLORISTIC AND HABITAT ANALYSES AND NATURAL VALUE OF THE ASSOCIATION *POTENTILLO–FESTUCETUM ARUNDINACEAE* (R. TX. 1933). NORDH. 1940

Summary

Studies on the association *Potentillo-Festucetum arundinaceae* (R. Tx. 1933) North. 1940 were conducted in the years 2011-2013 at the Bukówka river and the Molita and Czarna canals in the Czarnków-Trzcianka county in the Wielkopolskie province. Based on the floristic analyses of 23 relevés prepared according to Braun-Blanquet the sward of this association a total of 31 species from 14 botanical families were reported. Plant species belonging to the families Poaceae and Polygonaceae were most abundant in the meadow swards. Apophytes and spontaneophytes, native species (over 90%) were predominant in the floristic species composition. This plant association is characterised by an mean Shannon-Wiener index of floristic diversity $H' = 2.2$.

Key words: meadow communities, natural value, site

ANALIZA FLORYSTYCZNA I SIEDLISKOWA ORAZ WALORY PRZYRODNICZE ZESPOŁU *POTENTILLO–FESTUCETUM ARUNDINACEAE* (R. TX. 1933). NORDH. 1940

Streszczenie

Badania zespołu *Potentillo-Festucetum arundinaceae* (R. Tx. 1933) North. 1940 wykonano w latach 2011-2013 nad rzeką Bukówką oraz kanałem Molita i Czarna w powiecie czarnkowsko-trzcianeckim, w woj. wielkopolskim. Na podstawie analizy florystycznej 23 zdjęć fitosocjologicznych, wykonanych metodą Braun-Blanqueta, w runi zbiorowiska zanotowano występowanie 31 gatunki pochodzących z 14 rodzin botanicznych. Najliczniej w runi łąk reprezentowane były gatunki roślin należące do rodziny Poaceae i Polygonaceae. W składzie florystycznym przeważały apofity i spontaneofity, gatunki rodzimego pochodzenia (ponad 90%). Zespół cechuje się średnim wskaźnikiem różnorodności florystycznej Shannona-Wienera, $H' = 2,2$.

Słowa kluczowe: zbiorowiska łąkowe, walory przyrodnicze, siedlisko

1. Introduction

River valleys are characterised by considerable variation in habitat and geomorphological conditions. This results in a marked diversity of plant communities, including marginal plant communities [8, 15]. Analyses of the plant species composition and habitat conditions of plant communities need to be conducted for the comprehensive evaluation of vegetation in a given area, including its natural value, particularly in the case of marsh and periodically water-logged plant communities [5, 6, 7, 11]. The association of creeping cinquefoil and tall fescue *Potentillo-Festucetum arundinaceae* (R. Tx. 1933) North. 1940 is classified to the alliance of floodplain grassland (*Agropyro-Rumicion crispi*) of the order *Trifolio fragiferae-Agrostietalia stoloniferae* class *Molinio-Arrhenatheretea*, semi-natural, frequently pioneering and anthropogenic plant communities of grasses and low dicotyledonous plants, with creeping shoots, meadow and pasture, found in mesotrophic and eutrophic habitats, in the summer frequently overdriving. The order *Trifolio fragiferae-Agrostietalia stoloniferae* includes compact, moist grasslands of the alliance *Agropyro-Rumicion crispi* found in riparian silty areas (loamy or clayey alluvial soils poor in oxygen and hollows with high water tables [15]. These phytocenoses appear as transient succession stages in locations with destroyed vegetation cover in moist, occasionally water-logged habitats. These plant communities resemble in their character and species composition both mowed humid meadows (*Molinietalia*), pas-

tures (*Cynosurion*) and treaded grassland (*Polygonion avicularis*). This plant community, also called a meadow with tall fescue and silverweed is found in floodplain grassland, treaded flood embankments and pond dikes. To develop these communities it is required a constant water inflow and traditional use as hay meadows and pastures [11].

It grows on relatively fertile mineral, compact substrate, of medium moisture content, rarely flooded by lake waters. This association is resistant to short-term overdriving and it is found on flood embankments and pond dikes [3, 8, 9]. *Festuca arundinacea* and *Potentilla anserina* are two basic species forming the phytocenosis of *Potentillo-Festucetum arundinaceae*. Its floristic composition may include halophilous plant species [10, 11]. This phytocenosis has a two-layer structure, with tall fescue greatly predominant in the upper layer, while silverweed forms the characteristic aspect in the lower layer.

2. Material and methods

Floristic studies were conducted in the years 2011-2013 at the Bukówka River and the Molita and Czarna canals in the Czarnków-Trzcianka county in the Wielkopolskie province. A total number of 23 relevés were prepared using the conventional Braun-Blanquet method [1] in plots of 100 m² (10x10 m). Species were identified based on the nomenclature of the key "Rośliny Polskie" and "Vascular Plant of Poland. A checklist". The plant community was classified using the syntaxonomic system proposed by Matuszkiewicz

[10]. Floristic diversity was calculated by analysing the species composition, i.e. the botanical structure (in %), the total number of species found in the plant community and the mean number of species in the relevé. The plant community was subjected to the assessment of its natural value that was evaluated in a 10-point scale providing the mean value index, natural value and value class according to Oświt [13] as well as based on the Shannon-Wiener floristic diversity index: $H' = -\sum (p_i \times \log p_i)$.

The phytoindication method according to Klapp, modified by Oświt [12] was applied in order to assess moisture content of the habitat.

Within habitat studies the following edaphic factors were included: – according to Ellenberg [2] – moisture content (F), soil reaction (R) and nitrogen content in soil (N) assessed in the 9- and 12-point scales (comprising only moisture content conditions – F), while economic value was assessed based on the yield expressed in d.m. in tha^{-1} and the index of fodder value score LWU according to Filipek [4].

3. Results

Within the floristic composition of the association *Potentillo-Festucetum arundinaceae* a total of 31 plant species were recorded, with the relevé mean of 16 species (tab. 1). Floristic diversity was manifested in the 42.8% share of grasses and 48.7% share of herbs and weeds as well as 2.1% share of leguminous plants. Carex and sedge species accounted for as little as 4.8% (tab. 1).

Based on the floristic analyses of 23 relevés prepared according to Braun-Blanquet [1] in the sward of the plant

community a total of 14 plant family were recorded, representing 26 genera (tab. 2). In the swards of meadows species from the class *Molinio-Arrhenatheretea*, family *Poaceae* were predominant (42.8%), while in the group of herbs and weeds it was the families *Polygonaceae* (14.8%) and *Asteraceae* (10.8%). Within the family of grasses the most abundant was tall fescue (*Festuca arundinaceae*) with stability class IV and cover index $D = 3650$. Moreover, in some phytocenoses numerous specimens of *Poa pratensis*, *Agrostis alba*, *Alopecurus pratensis*, as well as *Holcus lanatus* were found.

The analysed plant community according to the Oświt method [13] is of limited natural value (tab. 3). The mean value index was 2.6 in the value class IVB. The plant association is characterised by an average Shannon-Wiener floristic diversity index $H' = 2.2$. Such a low biodiversity index may result from the progressing changes in habitat moisture content, which may lead to reduce the natural character of plant communities. However, in the opinion of Szoszkiewicz and Szoszkiewicz [14] the natural value of phytocenoses is determined by the presence of valuable rare, threatened and vanishing species, rather than the value of the biodiversity index.

In view of the assessment of the synanthropic degree plant species found in the plant community were classified to geo-historical groups of flora, in which predominant species include apophytes (Ap) and spontaneophytes (Sp) (tab. 3), species of synanthropic plants of local origin, which developed in anthropogenic habitats as well as plant species, which developed or appeared in a given area as a result of natural processes.

Table 1. Floristic diversity of *Potentillo-Festucetum arundinaceae* communities

Tab. 1. Zróżnicowanie florystyczne zespołu *Potentillo-Festucetum arundinaceae*

Association	Number of species		% proportion of the remaining specie			
	Total	Mean in relevé	Grasses	Leguminous	Carex and sedges	Herbs and weeds
<i>Potentillo-Festucetum arundinaceae</i>	31	16	42.8	2.1	4.8	48.7

Source: own work / Źródło: opracowanie własne

Table 2. Participation of different plant groups in the *Potentillo-Festucetum arundinaceae* association and numbers of species and types

Tab. 2. Udział różnych grup roślin w zespole *Potentillo-Festucetum arundinaceae* oraz liczba gatunków i rodzajów

L.p.	Family	Percentage share in association	Number of genera	Number of species
1	<i>Poaceae</i>	42.8	7	9
2	<i>Cyperaceae</i>	4.8	1	2
3	<i>Fabaceae Papilionaceae</i>	2.1	4	3
4	<i>Herbs and weeds</i>	48.7	$\Sigma = 14$	$\Sigma = 17$
4.1	<i>Polygonaceae</i>	14.8	3	4
4.2	<i>Asteraceae</i>	10.8	2	2
4.3	<i>Caryophyllaceae</i>	7.6	1	2
4.4	<i>Ranunculaceae</i>	4.4	1	2
4.5	<i>Boraginaceae</i>	3.8	1	1
4.6	<i>Lythraceae</i>	2.8	1	1
4.7	<i>Rubiaceae</i>	1.7	1	1
4.8	<i>Apiaceae</i>	0.9	1	1
4.9	<i>Urticaceae</i>	0.7	1	1
4.10	<i>Plantaginaceae</i>	0.7	1	1
4.11	<i>Lamiaceae</i>	0.5	1	1
	$\Sigma = 14$	100.00	$\Sigma = 26$	$\Sigma = 31$

Source: own work / Źródło: opracowanie własne

Table 3. Natural values of the identified *Potentillo-Festucetum arundinaceae* association
 Tab. 3. Wartość przyrodnicza w zespole *Potentillo-Festucetum arundinaceae*

Natural value number (Nvn)				
<i>Potentillo-Festucetum arundinaceae</i>	Mean evaluation number	Natural quality	Evaluation category	*H'
Natural value	2.6	Umoderately	IVB	2.2
The share of synanthropic species (%)		Ap – apophytes	88.3	
		Sp.- spontaneophytes	9.6	
		Arch. – archeophytes	2.1	

*H' Shannon-Wiener floristic diversity index

Source: own work / Źródło: opracowanie własne

The analysed plant community at the Bukówka River and the Molita and Czarna canals according to Ellenberg [2] is formed in fresh and partly moist habitats (F=6.15), on soils with weak acid and neutral reaction (R=4.16) with moderate nitrogen contents (N=4.11) and it exhibits slight yield value, with dry matter yield of 3.3 dm⁻¹ ha⁻¹, while in terms of the fodder value [4] it has the fodder value index Lwu=4.6 (tab. 4).

Table 4. Yield and fodder value number of *Potentillo-Festucetum arundinaceae* association

Tab. 4. Plon i wartość użytkowa *Potentillo-Festucetum arundinaceae*

Association	Yield (t sm - DM ha ⁻¹)	**Uvn	Sward Value
<i>Potentillo-Festucetum arundinaceae</i>	3.3	4.6	Average

Source: own work / Źródło: opracowanie własne

In this study the following terms were applied: * Lwu – sward fodder value number according to Filipek [4], FVS – fodder value score index according to Filipek [4].

4. Conclusions

1. The development of the plant community, its richness and floristic diversity as well as nature value are determined first of all by its moisture content, resulting from the habitat mosaic and intensity of use.
2. The calculated floristic diversity (H') is 2.2, which results from the progressing changes in moisture content of the habitat leading to a reduction of the natural character of plant communities.
3. The economic and fodder value of the analysed plant community depends mainly on the conditions and varied use, as indicated by the produced dry matter yield of 3.3 t ha⁻¹) and the sward fodder value number Lwu=4.6.

5. References

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