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SEGETAL FLORA OF THE ŁUKÓW PLAIN

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Abstract

The aim of the study was to characterize and analyze the segetal flora of the Łuków Plain. The study was carried out from 2003 to 2006 in 182 towns and villages. Vascular flora of the arable fields in the area under study consists of 305 species belonging to 39 families and 168 genera. The analysed flora is characterised by the prevalence of native species (64.6%) over alien species (35.4%). Archaeophytes dominate among anthropophytes, whereas meadow species are the most frequent in the group of apophytes. Annuals and biennials show a slight prevalence over perennials. The analysis of the life-form categories shows the dominance of therophytes (52.8%) as well as a relatively high share of hemicryptophytes (34.4%) and geophytes (12.5%). In the analysed flora, rare and very rare species constitute a vast majority (61.7%), whereas the common and very common species reach 13.1%.

Key words: archeophytes, apophytes, kenophytes, Sub-Atlantic species, speirochoric species

INTRODUCTION

Segetal flora of the Łuków Plain so far has not been the object of a complete study. Data on the occurrence of vascular plants in the area can be found in the papers by Ciosek and Skrzyczyńska (1989), Ciosek et al. (1997), Ciosek and Pikulski (1997), but these data mainly concern other kinds of vegetation. The geographical ranges of some Sub-Atlantic species, e.g. *Arnoseris minima* and *Teesdalea nudicaulis*, run across this region. They are considered rare and endangered plants in many regions of Poland and in Europe (Fijałkowski and Nycz, 1998; Urbisz et al. 1998; Siciński, 1998; Kubat and Kaplan, 2001; Prasse et al. 2001; Cheffings and Farrell, 2005; Pinke et al. 2006). The reason for their regression is an increase in the area of fallow lands, afforestation of poor soils and their high sensitivity to herbicides, and high fertilization level (Fijałkowski, 1994; Fijałkowski and Nycz, 1998; Siciński, 1998). The Łuków Plain is a typically agricultural mezoregion of rather traditional farming methods. For this reason, the numerous occurrence of speirochoric species in segetal flora of the studied area was noted.

These features of the area as well as the lack of studies on the flora of arable fields inspired the author to undertake this study on the Łuków Plain area. The aim of the study was to investigate and analyse the flora of the Łuków Plain, with a special attention to speirochoric and Sub-Atlantic species.

THE AREA UNDER STUDY

The Łuków Plain covers an area of about 2600 km^2 and stretches from Adamów and Kock to the Bug River Valley between Terespol and Mielnik (Kondracki, 2002) over the territories of several districts: Łuków, Siedlce, Łosice, Radzyń, and Biała Podlaska Districts. According to the physiographic division, the area belongs to the macroregion of the South Podlachian Lowland, which is a part of the province of the Central Polish Lowlands. It is the furthest to the east area of the Central European Lowland. The land features are not significantly diversified. The areas of denudation plains, sometimes slightly undulating, prevail here. The sediments of the Central Polish glaciation, mainly of the Odra Stage, primarily clays and sands of the basal moraine, were mixed and diluted during periglacial processes related to transgression and regression of the glacier. Fluvioglacial sands lying on different sediment levels in some areas are visible on the

surface in the form of sands and clays. Sand forms are usually mixed with dust fraction. In the river valleys and land hollows, contemporary sediments developed in the form of peat on the mineral base and boggy soil. Poor soils prevail in the studied area (class IVb – 29% and V – 29%), whereas the best soils are extremely rare. From the floristic point of view, the Łuków Plain is an area of great interest, which mainly results from the fact that the north-eastern range boundaries of many species, for instance *Abies alba* and *Daphne cneorum*, run through this area.

METHODS

The field studies were carried out from 2003 to 2006 in 182 towns and villages in 19 communes. The studied region is shown in Fig. 1. Lists of plant species and 815 phytosociological relevés made according to the Braun-Blanquet method in cereal and root crops as well as in stubble fields constituted the material for flora analysis. The studies were carried out in cultivated fields, excluding balks, roadsides, and fallow lands. Taxonomic differences, the biological spectrum and geohistorical structure of the flora, along with stability and frequency of occurrence of the species, are presented in the paper. The used taxonomy is according to Rutkowski (1998) and species nomenclature follows Mirek et al. (2002). In defining the features of the species, the following papers were used: Anioł-Kwiatkowska (1974), Kornaś (1968, 1977), Korniak (1992), Rutkowski (2007), Sowa and Warcholińska (1987), Zając (1979), Zając and Zając (1975, 1992), Zając et al. (1998). The frequency of occurrence of the taxa is given according to the pre-arranged formula stating that the number of stands is equal to the number of towns and villages, where the following categories: very rare, rare, quite rare, frequent, quite common and very common, occur in 1-3, 4-14, 15-36, 37-72, 73-109, 110-145 and 146-182 stands, respectively.

RESULTS

The segetal flora of the Łuków Plain consists of 305 species belonging to 39 botanical families and 168 genera. Over 70% of the taxa are in the ten families most abundant in species. The most numerously represented families are as follows: Asteraceae (51 species and 34 genera), Poaceae (33 species and 20 genera), Fabaceae (24 species and 6 genera), and Brassicaceae (22 species and 18 genera) (Table 1).

A characteristic feature of the flora under discussion is the considerable prevalence of apophytes over anthropophytes: 197 species (64.6%) and 108 species (35.4%), respectively (Fig. 2). A clear dominance of species from meadow habitats can be observed among apophytes: 72 species (36.5%). Waterside and marshy habitat taxa (40 species – 20.3%), apophytes of dunes and sands (34 species – 17.3%) and forest taxa (29 species – 14.7%) have a lesser contribution, and thermophilous grasslands with 22 species (11.2%) have the smallest contribution (Fig. 3).

Archaeophytes prevail among alien species (83 species – 27.3%). Special attention is drawn to the fact that speirochoric species, such as *Agrostemma githago*, *Bromus secalinus* and *Avena strigosa*, are frequently found there. Moreover, this group also consists of common and resilient field weeds, such as: *Apera spica-venti*, *Echinochloa crus-galli*, *Fallopia convolvulus*, *Raphanus raphanistrum*, *Capsella bursa-pastoris*, *Anthemis arvensis,* and *Matricaria maritima* subsp. *inodora*. Epecophytes are represented by 19 species (6.2%) and ergasiophytes by 6 species (2.0%) (Fig. 1). Common kenophytes of the area under study are *Galinsoga parviflora* and *Conyza canadensis*. The mass occurrence and invasive nature of species such as *Vicia grandiflora*, *Bunias orientalis* and *Anthoxanthum aristatum* in some localities are also especially noteworthy.

Therophytes with 161 species (52.8%), particularly among anthropophytes (92 species – 85.2%) (Fig. 4), are the dominant life-form of the flora in question. Hemicryptophytes are quite numerously represented by 105 species (34.5%), particularly among apophytes (94 species – 47.7%). There are 38 species of geophytes (12.5%) and one chamephyte.

Analysing the stability of the flora of the Łuków Plain, the prevalence of annuals and biennials (173 species – 56.7%) over perennials (132 species – 43.3%) can be observed. The short lifespan is characteristic for anthropophytes (98 species – 90.7%), whereas among apophytes perennials prevail (122 species – 61.9%) (Fig. 5).

In the analysed flora, rare and very rare species are dominant, constituting 61.6% of the flora. There are 40 common and very common species (13.1%).

Table 1.
Systematic list of species

Family and species name	Geographic-historical group	Persistence	Life form	Frequency
Equisetaceae				
1. ***Equisetum arvense*** L.	Am	P	G	very common
2. ***E. sylvaticum*** L.	Am	P	G	rare
3. ***E. palustre*** L.	Am	P	G	very rare
Urticaceae				
4. ***Urtica urens*** L.	Ar	A	T	rare
5. ***U. dioica*** L.	Af	P	G(H)	very rare
Polygonaceae				
6. ***Polygonum aviculare*** L.	Aw	A	T	common
7. ***P. bistorta*** L.	Am	P	G	very rare
8. ***P. amphibium*** L.	Aw	P	G	frequent
9. ***P. hydropiper*** L.	Aw	A	T	rather common
10. ***P. mite*** Schrank	Aw	A	T	very rare
11. ***P. minus*** Huds.	Aw	A	T	rather rare
12. ***P. persicaria*** L.	Aw	A	T	rather common
13. ***P. lapathifolium*** L. subsp. ***pallidum*** (With.) Fr.	Aw	A	T	common
14. ***P. lapathifolium*** L. subsp. ***lapathifolium***	Aw	A	T	common
15. ***Fallopia convolvulus*** (L.) A. Löve	Ar	A	T	very common
16. ***Rumex acetosella*** L.	As	P	G(H)	very common
17. ***R. acetosa*** L.	Am	P	H	very rare
18. ***R. obtusifolius*** L.	Af	P	G	rather rare
19. ***R. crispus*** L.	Am(w)	P	G	frequent
Chenopodiaceae				
20. ***Chenopodium glaucum*** L.	Aw	A	T	very rare
21. ***Ch. hybridum*** L.	Ar	A	T	rare
22. ***Ch. polyspermum*** L .	Aw	A	T	rare
23. ***Ch. album*** L.	Aw	A	T	very common
24. ***Atriplex patula*** L.	Ar	A	T	rare
Amaranthaceae				
25. ***Amaranthus retroflexus*** L.	Ep	A	T	rather rare
26. ***A. chlorostachys*** Willd.	Ep	A	T	very rare
27. ***A. lividus*** L.	Ep	A	T	very rare
Caryophyllaceae				
28. ***Arenaria serpyllifolia*** L.	At	A	T	rather rare
29. ***Stellaria media*** (L.) Vill.	Am(f)	A	T	very common
30. ***S. graminea*** L.	Am	P	H	rather rare
31. ***Holosteum umbellatum*** L.	As	A	T	very rare
32. ***Cerastium arvense*** L.	As	P	H(Ch)	rare
33. ***C. holosteoides*** Fr. em. Hyl.	Am	A	H	common
34. ***C. semidecandrum*** L.	At	A	T	rather rare

35. ***Sagina procumbens*** L.	Am(w)	P	H	rather rare
36. ***Scleranthus annuus*** L.	Ar	A	T	common
37. ***Herniaria glabra*** L.	As	A	T	very rare
38. ***Spergula arvensis*** L.	Ar	A	T	common
39. ***S. arvensis*** L. subsp. ***maxima*** (Weihe) O.Schwarz	Ar	A	T	very rare
40. ***S. morisonii*** Boreau	As	A	T	very rare
41. ***Spergularia rubra*** (L.) J. Presl et C. Persl .	Aw	A	T	frequent
42. ***Agrostemma githago*** L.	Ar	A	T	rather rare
43. ***Melandrium album*** (Mill.) Garcke	Am	A	T	frequent
44. ***M. noctiflorum*** L.	Ar	A	T	rather rare
45. ***Gypsophila muralis*** L.	Aw	A	T	rather common
46. ***Saponaria officinalis*** L.	Aw	P	G(H)	very rare
Ranunculaceae				
47. ***Consolida regalis*** S.F. Gray	Ar	A	T	rather rare
48. ***Ranunculus flammula*** L.	Aw	P	H	very rare
49. ***R. repens*** L.	Am(w)	P	H	frequent
50. ***R. sardous*** Crantz	Am	P	T	rather rare
51. ***R. acris*** L. s.str.	Am	P	H	very rare
52. ***Myosurus minimus*** L.	Aw	A	T	rare
Papaveraceae				
53. ***Papaver somniferum*** L.	Er	A	T	very rare
54. ***P. argemone*** L.	Ar	A	T	rare
55. ***P. dubium*** L.	Ar	A	T	rare
56. ***P. rhoeas*** L.	Ar	A	T	rather rare
57. ***Chelidonium majus*** L.	Af	P	H	very rare
Fumariaceae				
58. ***Fumaria officinalis*** L.	Ar	A	T	rare
Brassicaceae				
59. ***Sisymbrium officinale*** (L.) Scop.	Ar	A	T	rather rare
60. ***S. altissimum*** L.	Ep	A	T	very rare
61. ***Descurainia sophia*** (L.) Webb. ex Prantl	Ar	A	T	rare
62. ***Arabidopsis thaliana*** (L.) Heynh.	As	A	T(H)	frequent
63. ***Bunias orientalis*** L.	Ep	A	T	very rare
64. ***Erysimum cheiranthoides*** L.	Ar	A	T	rather rare
65. ***Rorippa palustris*** (L.) Besser	Aw	A	T	rather rare
66. ***R. sylvestris*** (L.) Besser	Aw	P	G(H)	frequent
67. ***Armoracia rusticana*** P. Gaertn., B. Mey. et Scherb.	Ar	P	G	rather rare
68. ***Cardaminopsis arenosa*** (L.) Hayek	As	A	H	rare
69. ***Berteroa incana*** (L.) DC	At	A	T	rather rare
70. ***Erophila verna*** (L.) Chevall.	As	A	T	rare
71. ***Neslia paniculata*** (L.) Desv.	Ar	A	T	very rare
72. ***Capsella bursa-pastoris*** (L.) Medik.	Ar	A	T	very common
73. ***Teesdalea nudicaulis*** (L.) R. Br.	As	A	T(H)	very rare
74. ***Thlaspi arvense*** L.	Ar	A	T	rather common

75. ***Lepidium ruderale*** L.	Ar	A	T	very rare
76. ***Brassica napus*** L.	Er	A	T	very rare
77. ***B. nigra*** (L.) W. D. J. Koch	Er	A	T	very rare
78. ***Sinapis arvensis*** L.	Ar	A	T	rather rare
79. ***S. alba*** L.	Er	A	T	very rare
80. ***Raphanus raphanistrum*** L.	Ar	A	T(H)	very common
Crassulaceae				
81. ***Sedum maximum*** (L.) Hoffm.	At	P	G	very rare
Rosaceae				
82. ***Rubus caesius*** L.	Af	P	Ch	very rare
83. ***Agrimonia eupatoria*** L.	At	P	H	very rare
84. ***Sanguisorba officinalis*** L.	Am	P	H	very rare
85. ***Geum urbanum*** L.	Af	P	H	very rare
86. ***Potentilla anserina*** L.	Am	P	H	frequent
87. ***P. erecta*** (L.) Raeusch.	Af	P	H	very rare
88. ***P. reptans*** L.	Am	P	H	very rare
89. ***P. norvegica*** L.	Aw	A	T	rare
90. ***P. arenaria*** Borkh.	At	P	H	very rare
91. ***P. collina*** Wibel	Aw	P	H	very rare
92. ***P. argentea*** L. s.str.	At	P	H	very rare
93. ***Alchemilla monticola*** Opiz	Am	P	H	very rare
Fabaceae				
94. ***Vicia sepium*** L.	Af	P	H	very rare
95. ***V. grandiflora*** Scop.	Ep	A	T	very rare
96. ***V. sativa*** L.	Ar	A	T	rather rare
97. ***V. angustifolia*** L.	Ar	A	T	common
98. ***V. hirsuta*** (L.) S.F. Gray	Ar	A	T	common
99. ***V. tetrasperma*** (L.) Schreb.	Ar	A	T	common
100. ***V. villosa*** Roth.	Ar	A	T	common
101. ***V. cracca*** L.	Am	P	H	rare
102. ***Lathyrus pratensis*** L.	Am	P	H	rather rare
103. ***L. tuberosus*** L.	Ar	P	G	very rare
104. ***Melilotus alba*** Medik.	At	A	T	rare
105. ***M. officinalis*** (L.) Pall.	Af(w)	A	T	rare
106. ***Medicago falcata*** L.	At	A	T	rare
107. ***M. sativa*** L. s.str.	Er	P	H	very rare
108. ***M. lupulina*** L.	At	A	T(H)	rather rare
109. ***Trifolium dubium*** Sibth.	Am	A	T	rare
110. ***T. campestre*** Schreb .	Am	A	T	rather rare
111. ***T. montanum*** L.	Am	P	H	very rare
112. ***T. repens*** L.	Am	P	H	frequent
113. ***T. hybridum*** L.	Am	P	H	rare
114. ***T. medium*** L.	Af	P	H	very rare
115. ***T. pratense*** L.	Am	A	T	rather rare

116. ***T. arvense*** L.	As	A	T	rather rare
117. ***Lotus corniculatus*** L.	Am	A	T	rare
Oxalidaceae				
118. ***Oxalis stricta*** L.	Ep	P	H	frequent
Geraniaceae				
119. ***Geranium pratense*** L.	Am	P	H	very rare
120. ***G. dissectum*** L.	Ar	A	T	very rare
121. ***G. pyrenaicum*** Burm. F.	Ep	P	H	very rare
122. ***G. pusillum*** Burm. F. ex L.	Ar	A	T	rather common
123. ***Erodium cicutarium*** (L.) L'Hér.	Ar	A	T(H)	common
Euphorbiaceae				
124. ***Euphorbia helioscopia*** L.	Ar	A	T	rather rare
125. ***E. peplus*** L.	Ar	A	T	rare
126. ***E. cyparissias*** L.	At	P	G(H)	very rare
127. ***E. esula*** L.	At	P	G	very rare
Malvaceae				
128. ***Malva alcea*** L.	Ar	A	H	very rare
129. ***M. pusilla*** Sm.	Ar	A	H	rare
130. ***M. neglecta*** Wallr.	Ar	A	T	rare
131. ***M. sylvestris*** L.	Ar	A (P)	H	very rare
Clusiaceae				
132. ***Hypericum humifusum*** L.	As	P	T(H)	rather rare
133. ***H. perforatum*** L.	Am	P	H	rare
Violaceae				
134. ***Viola arvensis*** Murray	Ar	A	T	very common
135. ***V. tricolor*** L. s.str.	As	A	T	very rare
Cucurbitaceae				
136. ***Echinocystis lobata*** (F. Michx.) Torr. et A. Gray	Ep	A	T	very rare
Lythraceae				
137. ***Peplis portula*** L.	Aw	A	T	rare
138. ***Lythrum salicaria*** L.	Am	P	H	rare
Onagraceae				
139. ***Oenothera biennis*** L.	As	A	T	very rare
140. ***Chamaenerion angustifolium*** (L.) Scop.	As	P	H	very rare
141. ***Epilobium parviflorum*** Schreb.	Aw	P	H	very rare
142. ***E. roseum*** Schreb.	Aw	P	H	rare
Apiaceae				
143. ***Eryngium planum*** L.	As	P	H	very rare
144. ***Anthriscus sylvestris*** (L.) Hoffm.	Af	P	H	very rare
145. ***Pimpinella saxifraga*** L.	At	P	H	rare
146. ***Aegopodium podagraria*** L.	At	P	H	very rare
147. ***Aethusa cynapium*** L.	Ar	A	T	rare
148. ***Carum carvi*** L.	Am	A	T	very rare
149. ***Pastinaca sativa*** L.	As	P	H	very rare

150. ***Heracleum sphondylium*** L.	Am	P	H	very rare
151. ***Torilis japonica*** (Houtt) DC.	Af	A	T	very rare
152. ***Daucus carota*** L.	Ar	A	T	rather rare
Primulaceae				
153. ***Lysimachia nummularia*** L.	Am	P	G	rare
154. ***L. vulgaris*** L.	Am	P	G(H)	very rare
155. ***Centunculus minimus*** L.	Ar	A	T	rather rare
156. ***Anagallis arvensis*** L.	Ar	A	T	frequent
Gentianaceae				
157. ***Centaurium pulchellum*** (Sw.) Druce	Am	A	T	rare
Rubiaceae				
158. ***Galium palustre*** L.	Aw	P	H	very rare
159. ***G. aparine*** L.	Af	A	T	common
160. ***G. spurium*** L.	Ar	A	T	very rare
161. ***G. boreale*** L.	Af	P	G	very rare
162. ***G. verum*** L. s. str.	Am	P	G	rare
163. ***G. mollugo*** L. s.str.	Am	P	G	rare
Convolvulaceae				
164. ***Convolvulus arvensis*** L.	At	P	G	very common
Boraginaceae				
165. ***Lithospermum arvense*** L.	Ar	A	T	rare
166. ***Echium vulgare*** L.	At	A	H	very rare
167. ***Symphytum officinale*** L.	Aw (m)	P	G	rare
168. ***Anchusa officinalis*** L.	At	A	T	rare
169. ***A. arvensis*** (L.) M. Bieb.	Ar	A	T	rare
170. ***Myosotis arvensis*** (L. Hill.	Ar	A	T(H)	very common
171. ***M. stricta*** Link ex Roem. et Schult.	As	A	T	rather rare
172. ***Cynoglossum officinalis*** L.	As	A	T(H)	very rare
Lamiaceae				
173. ***Galeopsis ladanum*** L.	Ar	A	T	rather rare
174. ***G. speciosa*** Mill.	Af	A	T	rare
175. ***G. pubescens*** Besser	Af	A	T	rather rare
176. ***G. tetrahit*** L.	Af	A	T	rather common
177. ***G. bifida*** Boenn.	Af	A	T	common
178. ***Lamium album*** L.	Ar	P	T	very rare
179. ***L. ampexicaule*** L.	Ar	A	T	rather rare
180. ***L. purpureum*** L.	Ar	A	T(H)	frequent
181. ***Ballota nigra*** L.	Ar	P	H	very rare
182. ***Stachys annua*** L.	Ar	A	T	very rare
183. ***S. palustris*** L.	Am (w)	P	G	rather common
184. ***Glechoma hederacea*** L.	Am	P	H	rare
185. ***Prunella vulgaris*** L.	Am	P	H	rare
186. ***Thymus serpyllum*** L. M.Fr.	As	P	H	very rare
187. ***Lycopus europeus*** L.	Aw	P	H	very rare

188. ***Mentha arvensis*** L.	Aw	P	G	common
189. ***Elsholtzia ciliata*** (Thunb.) Hyl.	Ep	A	T	very rare
Solanaceae				
190. ***Solanum dulcamara*** L.	Aw	P	H	very rare
191. ***S. nigrum*** L. em. Mill.	Ar	A	T	rare
192. ***Datura stramonium*** L.	Ep	A	T	very rare
Scrophulariaceae				
193. ***Verbascum nigrum*** L.	Af	A	H	very rare
194. ***Scrophularia nodosa*** L.	Af	P	H	very rare
195. ***Chaenorhinum minus*** (L.) Lange	At	A	T	rare
196. ***Linaria vulgaris*** Mill.	As	P	G	rare
197. ***Veronica serpyllifolia*** L.	Am	P	H	rather rare
198. ***V. triphyllos*** L.	Ar	A	T	very rare
199. ***V. arvensis*** L.	Ar	A	T	very common
200. ***V. verna*** L.	As	A	T	very rare
201. ***V dillenii*** Crantz	As	A	T	rare
202. ***V. hederifolia*** L. s.str.	Af	A	T	very rare
203. ***V. persica*** Poir.	Ep	A	T	frequent
204. ***V. agrestis*** L.	Ar	A	T	rather rare
205. ***V. polita*** Fr.	Ar	A	T	rare
206. ***V. opaca*** Fr.	Ar	A	T	very rare
207. ***V. chamaedrys*** L. s.str.	Am	P	H	very rare
208. ***Odontites verna*** (Bellardi) Dummort.	Ar	A	T	very rare
209. ***O. serotina*** (Lam.) Rchb. s.str.	Am	A	T	rather rare
210. ***Rhinanthus serotinus*** (Schönh.) Oborný	Ar	A	T	frequent
Plantaginaceae				
211. ***Plantago media*** L. s.str.	Am	P	H	very rare
212. ***P. major*** L.	Af	P	H	rather common
213. ***P. intermedia*** Gilib.	Aw	P	H	common
214. ***P. lanceolata*** L.	Am	P	H	frequent
Dipsacaceae				
215. ***Knautia arvensis*** (L.) J.M. Coult.	Am	P	H	rather rare
Campanulaceae				
216. ***Campanula patula*** L. s.str.	Am	P	H	very rare
217. ***C. rapunculoides*** L.	At	P	G(H)	very rare
218. ***Jasione montana*** L.	As	A	H	rare
Asteraceae				
219. ***Eupatorium canabinum*** L.	Aw	P	H	very rare
220. ***Erigeron acris*** L.	As	A	T(H)	rather rare
221. ***Conyza canadensis*** (L.) Cronquist	Ep	A	T	common
222. ***Filago minima*** (Sm.) Pers.	As	A	T	very rare
223. ***Gnaphalium sylvaticum*** L.	Af	P	H	very rare
224. ***G. uliginosum*** L.	Aw	A	T	common
225. ***Helichrysum arenarium*** (L.) Moench	As	A	H	very rare

226. ***Inula britannica*** L.	Aw	P	H	very rare
227. ***Bidens tripartita*** L.	Aw	A	T	rather rare
228. ***Helianthus annuus*** L.	Ar	A	T	very rare
229. ***H. tuberosus*** L.	Er	P	G	very rare
230. ***Galinsoga parviflora*** Cav.	Ep	A	T	common
231. ***G. ciliata*** (Raf.) S.F.Blake	Ep	A	T	frequent
232. ***Anthemis arvensis*** L.	Ar	A	T	very common
233. ***Achillea ptarmica*** L.	Am	P	H	very rare
234. ***A. millefolium*** L. s.str.	Am	P	H	common
235. ***Matricaria maritima*** L. subsp. ***inodora*** (L.) Dostál	Ar	A	T(H)	very common
236. ***Chamomilla recutita*** (L.) Rauschert	Ar	A	T	rare
237. ***Ch. suaveolens*** (Pursh) Rydb.	Ep	A	T	rather rare
238. ***Tanacetum vulgare*** L.	Af (w)	P	H	rare
239. ***Artemisia absinthium*** L.	Ar	P	H	rare
240. ***A. vulgaris*** L.	Am (w)	P	H	common
241. ***A. campestris*** L.	As	P	H	rare
242. ***Tussilago farfara*** L.	Aw	P	G	very rare
243. ***Senecio vulgaris*** L.	Ar	A	T(H)	rare
244. ***S. vernalis*** Waldst. et Kit.	Ep	A	T(H)	very rare
245. ***Arctium lappa*** L.	Af	A	H	rare
246. ***Carduus acanthoides*** L.	Ar	A	H	rare
247. ***C. crispus*** L.	Ep	A	H	very rare
248. ***Cirsium vulgare*** (Savi) Ten.	Af	P	H	very rare
249. ***C. arvense*** (L.) Scop.	Af	P	G	very common
250. ***Centaurea cyanus*** L.	Ar	A	T	very common
251. ***C. stoebe*** L.	At	A	H	very rare
252. ***C. jacea*** L.	Am	P	H	rare
253. ***Cichorium intybus*** L.	Ar	P	G	rare
254. ***Arnoseris minima*** (L.) Schweigg. et Körte	As	A	T	frequent
255. ***Hypochoeris radicata*** L.	Am	P	H	rare
256. ***H. glabra*** L.	As	A	T	very rare
257. ***Leontodon autumnalis*** L.	Am	P	H	rare
258. ***Tragopogon dubius*** Scop.	As	A	T	very rare
259. ***Sonchus oleraceus*** L.	Ar	A	T(H)	rather rare
260. ***S. asper*** (L.) Hill	Ar	A	T	frequent
261. ***S. arvensis*** L. subsp. ***arvensis***	Aw	A	G(H)	common
262. ***Lactuca serriola*** L.	Ar	A	H	rare
263. ***Taraxacum officinale*** F.H. Wigg.	Am	P	H	common
264. ***Lapsana communis*** L. s. str.	Af	A	T(H)	rather rare
265. ***Crepis tectorum*** L.	As	A	T	rather rare
266. ***C. capillaris*** (L.) Wallr.	Am	A	T	rare
267. ***Hieracium pilosella*** L.	As	P	H	rare
268. ***H. umbellatum*** L.	Am	P	H	very rare
Liliaceae				
269. ***Allium vineale*** L.	At	P	G	rare

Juncaceae				
270. ***Juncus capitatus*** Weigel	Aw	A	T	rare
271. ***J. bufonius*** L.	Aw	A	T	frequent
Poaceae				
272. ***Festuca pratensis*** Huds.	Am	P	H	very rare
273. ***F. rubra*** L. s. str.	Am	P	H	very rare
274. ***F. ovina*** **L.** s. str.	Af	P	H	very rare
275. ***Lolium perenne*** L.	Am	P	H	rare
276. ***Poa annua*** L.	Am	A	T(H)	frequent
277. ***P. pratensis*** L. s. str.	Am	P	H	rare
278. ***P. palustris*** L.	Aw	P	H	very rare
279. ***Dactylis glomerata*** L.	Am	P	H	rare
280. ***Apera spica-venti*** (L.) P. Beauv.	Ar	A	T	very common
281. ***Bromus inermis*** Leyss.	At	P	H	very rare
282. ***B. secalinus*** L.	Ar	A	T	frequent
283. ***B. hordeaceus*** L.	Am	P	H	very rare
284. ***Elymus repens*** (L.) Gould	Aw	P	G	very common
285. ***Avena strigosa*** Schreb.	Ar	A	T	rather common
286. ***A. fatua*** L.	Ar	A	T	frequent
287. ***Anthoxanthum aristatum*** Boiss.	Ep	A	T	rare
288. ***Holcus lanatus*** L.	Am	P	H	rare
289. ***H. mollis*** L.	Af	P	H	rare
290. ***Corynephorus canescens*** (L.) P. Beauv.	As	P	H	very rare
291. ***Agrostis gigantea*** Roth	Am	P	H	rare
292. ***A. stolonifera*** L.	Am	P	H	common
293. ***Phleum pratense*** L.	Am	P	H	rare
294. ***Alopecurus geniculatus*** L.	Am	P	G(H)	rare
295. ***A. myosuroides*** Huds.	Am	P	G(H)	very rare
296. ***A. pratensis*** L.	Am	P	G(H)	very rare
297. ***Phalaris arundinacea*** L.	Aw	P	H	very rare
298. ***Phragmites australis*** (Cav.) Trin. ex Steud.	Aw	P	G	rare
299. ***Nardus stricta*** L.	As	P	H	very rare
300. ***Echinochloa crus-galli*** (L.) P. Beauv.	Ar	A	T	very common
301. ***Digitaria ischaemum*** (Schreb.) H.L. Mühl.	Ar	A	T	rather common
302. ***D. sanguinalis*** (L.) Scop.	Ar	A	T	very rare
303. ***Setaria pumila*** (Poir.) Roem et Schult.	Ar	A	T	rather common
304. ***S. viridis*** (L.) P. Beauv .	Ar	A	T	frequent
Cyperaceae				
305. ***Carex hirta*** L.	Am	P	G	very rare

Comments: Am – apophytes of meadow habitats, Af – apophytes of forest, As – apophytes of dunes and sands, At – apophytes of thermophilous grasslands, Aw – apophytes of waterside and marshy habitat, Ar – archeophytes, Ep – epecophytes, Er – ergasiophytes, A – annual and biennial species, P – perennial species, T – therophytes, H – hemicryptophytes, Ch – chamaephytes, G – geophytes.

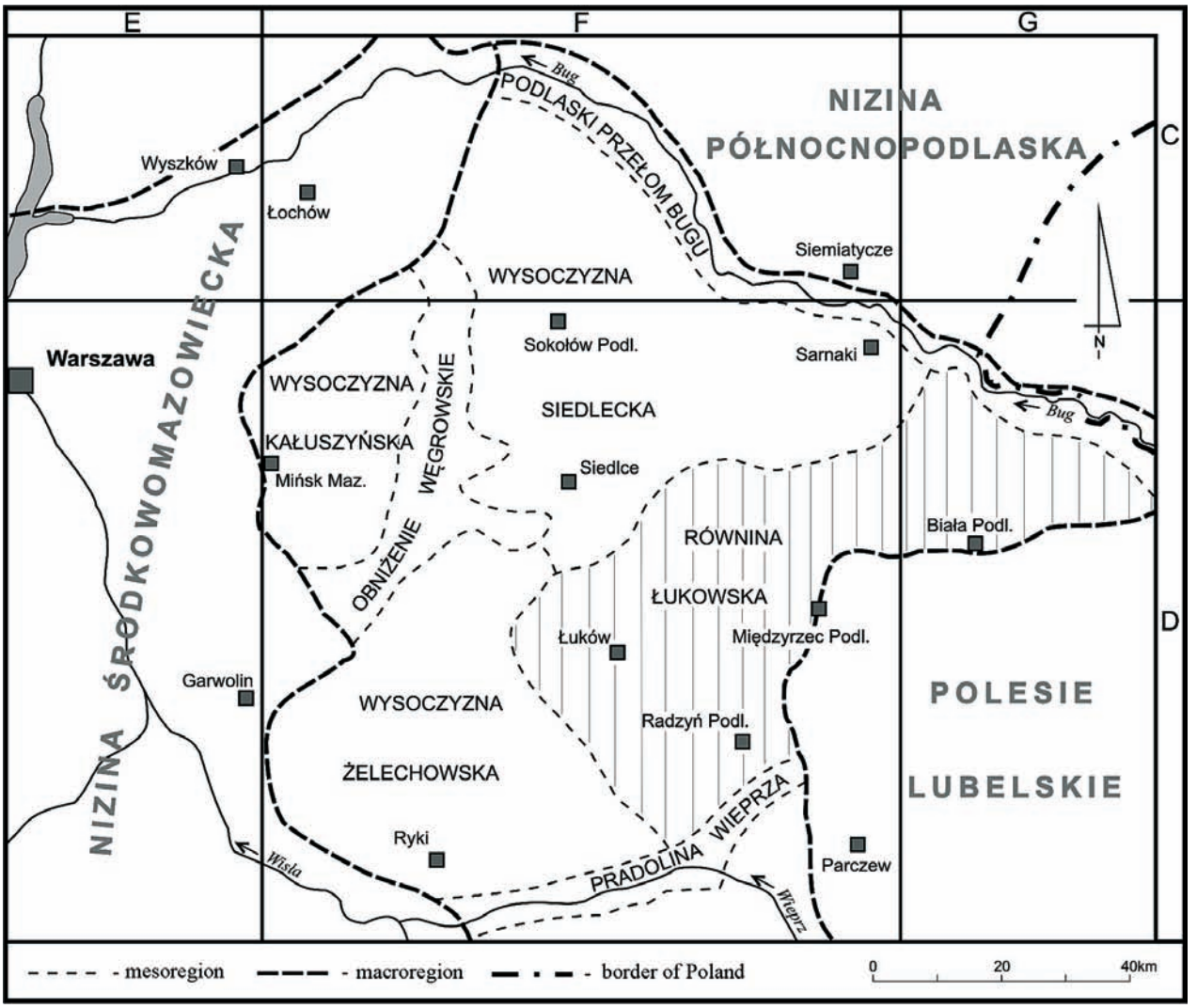

Fig. 1. Location of the Łuków Plain against a background of physical-geographic division of Poland

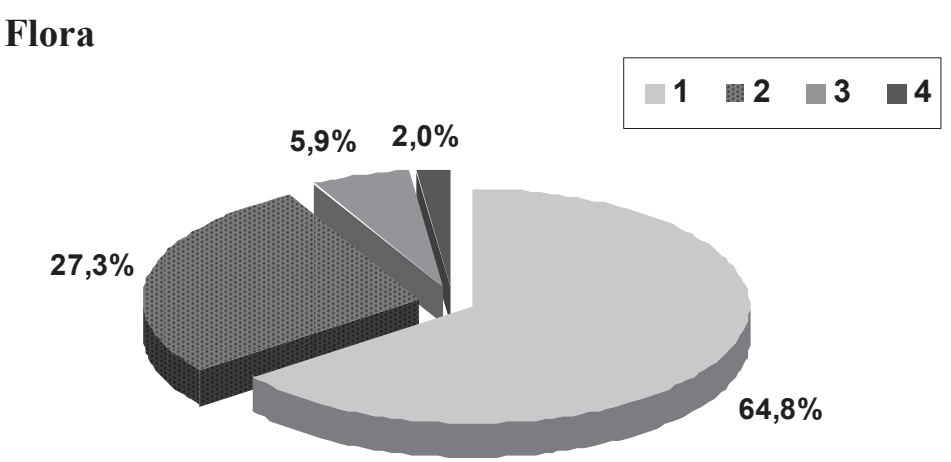

Fig. 2. Proportions of geographical-historical groups in the segetal flora of the Łuków Plain 1 – apophytes, 2 – archeophytes, 3 – epecophytes, 4 – ergasiophytes

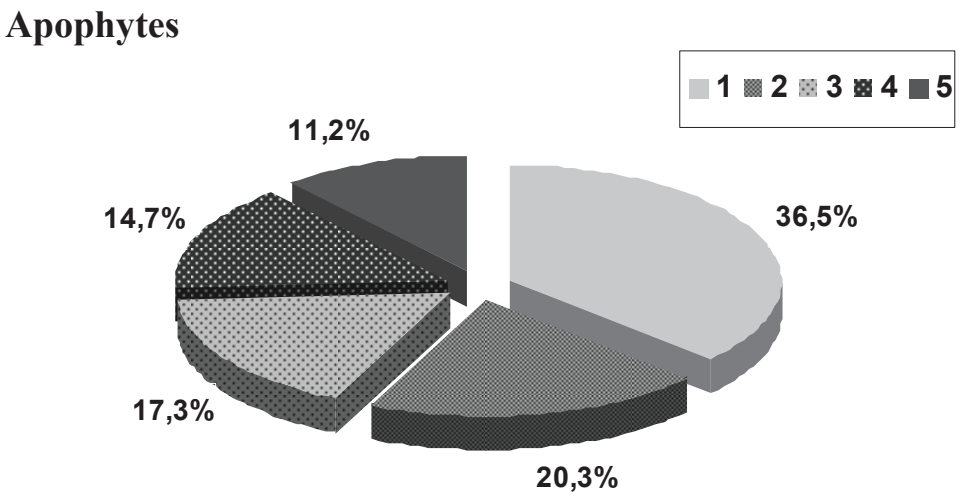

Fig. 3. Origin of apophytes of the segetal flora of the Łuków Plain 1 – meadows habitats, 2 – waterside and marshy habitats, 3 – dunes and sands, 4 – forest and bushes, 5 – thermophilous grasslands

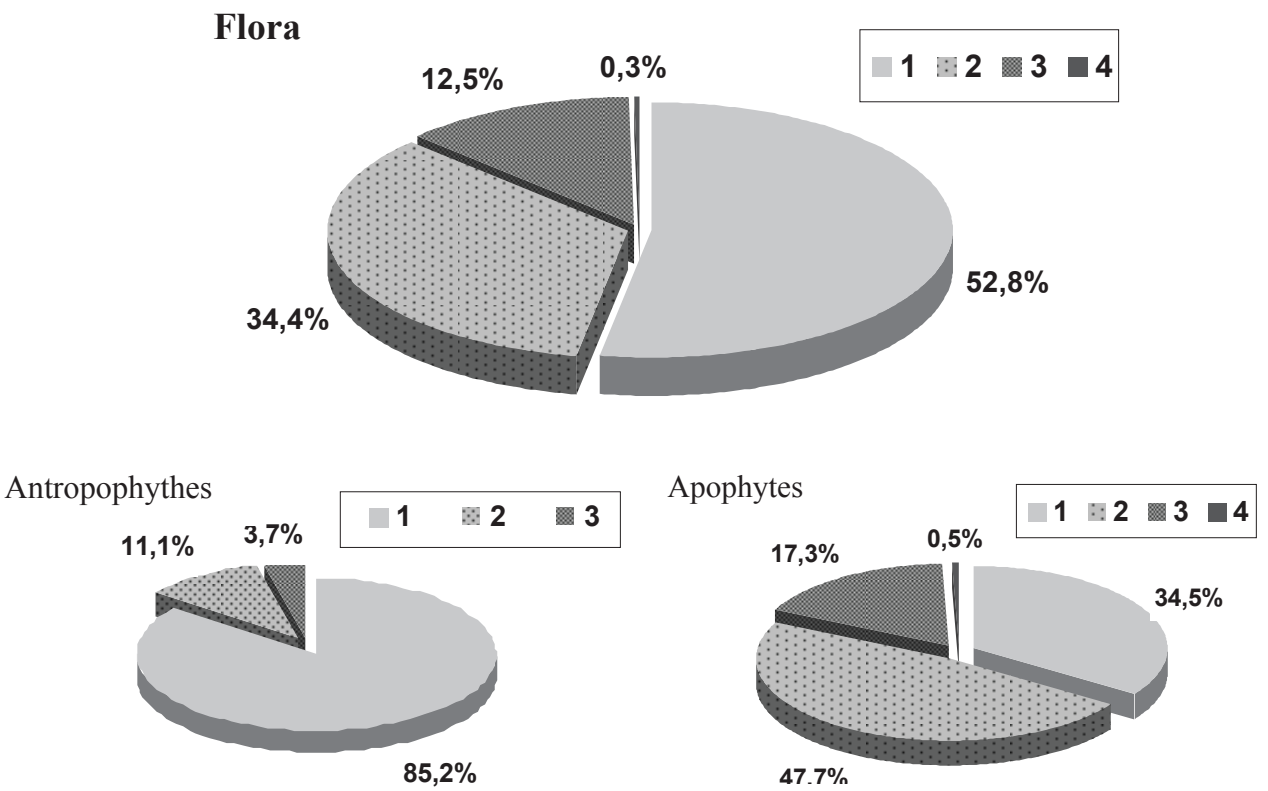

Fig. 4. Proportions of life forms in the segetal flora of the Łuków Plain 1 – therophytes, 2 – hemicryptophytes, 3 – geophytes, 4 – chamaephytes

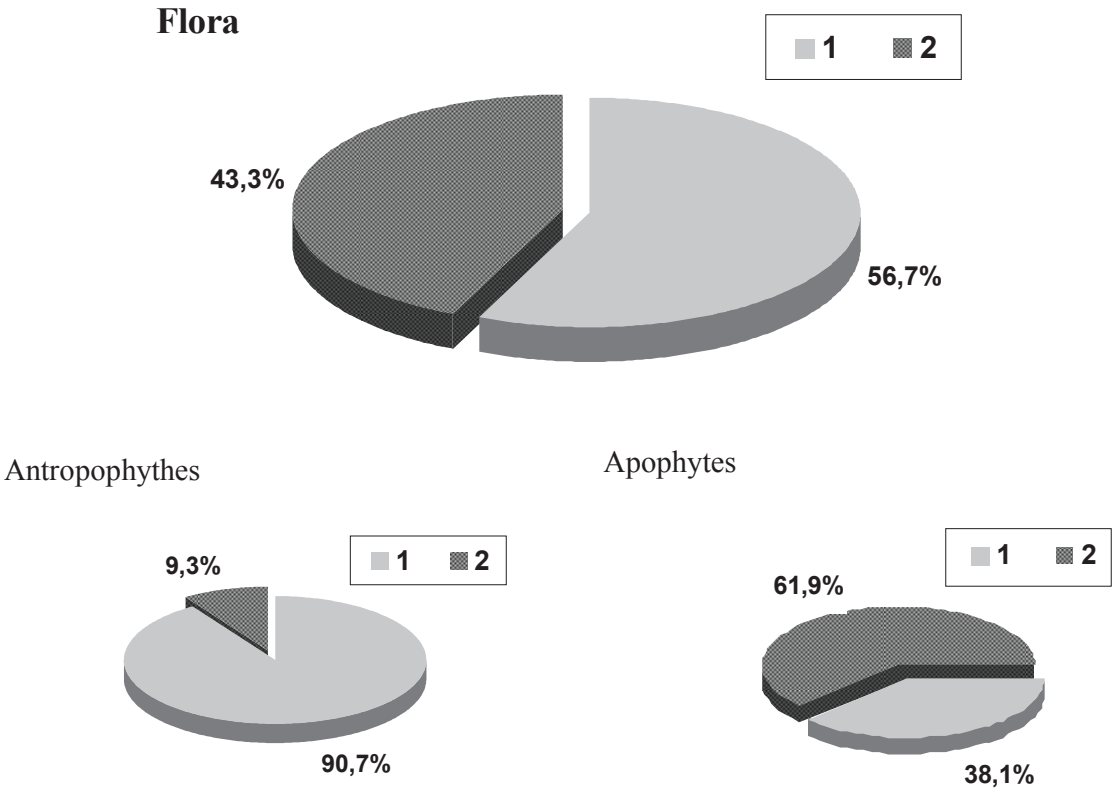

Fig. 5. Life span of species in the segetal flora of the Łuków Plain 1 – annual and biennial species, 2 – perennial species

DISCUSSION

The segetal flora of the Łuków Plain is abundant and diverse. When it comes to the number of species, it is far above the florae of Żuławy Wiślane Region (Hołdyński, 1991) and Wielkopolska Region (Latowski et al. 1979) or the area of arable lands of Bolimowska Primeval Forest (Warcholińska, 1988) and others. However, the number of species recorded in the investigated area is slightly lower than in the segetal florae of the neighbouring mesoregions: considerably smaller than that of Podlaski Przełom Bugu – 346 species (Skrzyczyńska and Rzymowska, 2001), and similarly compared to the Siedlce Upland area – 320 species (Skrzyczyńska, 1994). The floristic abundance of the area under study stems not only from its considerable size but also from the diversity of habitats, the patch-like system of small fields, and relatively traditional agriculture. The influence of similar factors on segetal florae has also been mentioned by: Korniak (1992), Skrzyczyńska and Rzymowska (2001), Warcholińska (1991), and others. Most of the above-mentioned factors also result in the prevalence of apophytes over alien species. These correlations are confirmed by investigations from other regions of Poland (Korniak, 1992; Bomanowska, 2006; Warcholińska, 1991). The significance of the considerable contribution of light and acid soils in the Łuków Plain is also undeniable, as they make a favourable habitat for native species that occur here abundantly, especially those from sand habitats and dunes. The phenomenon of dominance of apophytes was observed in the Masovian Region by Wójcik (1968), who is of the opinion that in these habitats apophytes successfully compete with specialised, typical field weeds, particularly archaeophytes.

The extensive method of farming and habitat characteristics also influence the biological spectrum and stability of the species. The proportion of therophytes is slightly over 50%, with a substantial representation of hemicryptophytes and geophytes. The percentage structure of life-forms is similar to that observed in Podlachian Bug River Gap (Skrzyczyńska and Rzymowska, 2001) and north-eastern Poland (Korniak, 1992). Szotkowski (1989) explains the decreasing rate of hemicryptophytes by the effect of human activity defined as changes in agro-technology. A relatively small prevalence of annuals and biennials over perennials was observed in the investigated area. This fact indirectly stems from the dominance of apophytes and a considerable representation of hemicryptophytes and geophytes, which is caused by the same factors that contribute to the prevalence of apophytes over anthropophytes.

In the flora in question, the most numerously represented families are Asteraceae and Poaceae. The same tendency is observed not only in the segetal florae of different regions of Poland (Ratuszniak and Sobisz, 2006; Skrzyczyńska, 1994; Bomanowska, 2006), but also in the florae of other European countries, both in the south and north of Europe (Glemnitz et al. 2000).

Sub-Atlantic species occur in the Łuków Plain with different frequency. *Arnoseris minima* is a frequent species; though, it is less frequent in the east of the mesoregion, whereas *Teesdalea nudicaulis* is a very rare species. Stands of the latter species in the area under study were recorded by Ciosek and Skrzyczyńska (1989) and Ciosek et al. (1997). The narrow ecological amplitude and the decrease in the area of poor, acidic habitats (afforestation, fields lying fallow) result in regression of these species. Another reason for their disappearance is the high fertilization level and use of herbicides. The above mentioned species are considered to be rare components of the flora that are threatened with extinction in many regions of Poland and in Europe (Fijałkowski and Nycz, 1998; Urbisz et al. 1998; Siciński, 1998; Kubat and Kaplan, 2001, Prasse et al. 2001; Cheffings and Farrell, 2005; Pinke et al. 2006). *Anthoxanthum aristatum* also belongs to rare species. When studying rare species in the South Podlachian Lowland, Ciosek and Skrzyczyńska (1989) did not record stands of this species in the Łuków Plain.

The characteristic feature of the investigated area is the occurrence of abundant populations of rare speirochoric species that are becoming extinct in Poland, such as *Agrostemma githago*, *Bromus secalinus,* and *Avena strigosa*. These species are in regression in Poland as a result of use of certified seed material (Warcholińska, 1981, 2002; Frey, 1989; Żukowski and Jackowiak, 1995; Anioł-Kwiatkowska, 1998; Siciński, 1998; Nowak et al. 2003). The persistence of these species in the agrocenoses of the Łuków Plain arises from traditional farming methods, particularly from the growers' use of their own badly-cleaned sowing material, which results from poor financial conditions of many farms in the region. The connection between rare speirochoric species and extensive agriculture has been mentioned by Kornaś (1972, 1987), Hołdyński and Woźniak (1994), Hochół (1990), and others.

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Flora segetalna Równiny Łukowskiej

Streszczenie

Celem pracy była charakterystyka i analiza flory segetalnej Równiny Łukowskiej. Badania prowadzono w latach 2003-2006 na terenie 182 miejscowości. Flora naczyniowa pól uprawnych badanego terenu liczy 305 gatunków należących do 39 rodzin i 168 rodzajów. Na bogactwo gatunkowe ma wpływ zróżnicowanie siedlisk, rozdrobnienie gospodarstw i tradycyjny system gospodarowania.

Analizowana flora cechuje się przewagą gatunków rodzimych (64,6%) nad taksonami obcego pochodzenia (35,4%). Wśród antropofitów dominują archeofity (27,2% flory) a z apofitów najczęściej notowano gatunki łąkowe (23,6% flory). Gatunki krótkotrwałe mają niewielką przewagę nad wieloletnimi. W obrębie form życiowych dominują terofity (52,8%), zwłaszcza wśród antropofitów (85,2% gatunków tej grupy), ale stosunkowo dużo jest hemikryptofitów (34,4%) i geofitów (12,5%). W analizowanej florze największy udział mają gatunki bardzo rzadkie i rzadkie (61,6% flory), natomiast pospolitych i bardzo pospolitych jest 13,1%.

Cechą charakterystyczną jest liczne występowanie gatunków speirochorycznych związanych z ekstensywnym rolnictwem: *Agrostemma githago*, *Bromus secalinus* i *Avena strigosa*. Z gatunków subatlantyckich częstym taksonem jest *Arnoseris minima*, rzadkim *Anthoxanthum aristatum,* a *Teesdalea nudicaulis* występuje bardzo rzadko na badanym terenie.