

THE FIRE BREAK IN BIALOWIEZA NATIONAL PARK AS A REFUGE OF THE SEGETAL FLORA

Key words: abandoned fields, changes in land use, decline of species, weeds, Białowieża National Park, Poland

Abstract. Taking into account the extensive scale of farmland abandonment in the area of the Białowieża Primeval Forest, the authors decided to investigate the flora of the fire break in Białowieża National Park as potential refuge for segetal flora. One hundred and thirty-six plant taxa have been found to occur on the fire break, including 101 common to the segetal flora of the Białowieża Clearing. The most widespread species are *Anthemis arvensis*, *Juncus bufonius* and *Scleranthus annuus*; the most interesting are *Peplis portula* and *Ranunculus sardous*, formerly growing in wet furrows. Our results show that the ploughed fire break could be a refuge for segetal flora.

Introduction

The Białowieża Primeval Forest, located in the mixed deciduous forest zone, is a remnant of a larger forest tract of Central Eastern Europe. It occupies an area of 1250 km² along the Polish-Belarusian border. Since 1921 the most valuable fragment of the forest has been protected as Białowieża National Park. The total area of the park is 10 502 ha, of which 4 747 ha are strictly protected (Okolów et al., 2009).

To the south of the national park, a clearing with a group of settlements named Białowieża is located. The Białowieża Clearing was established at the end of the 16th century, and has been gradually extended by continuous forest cutting (Faliński, 1966; Okolów et al., 2009). Now it occupies an area of 13.67 km² and is the largest settlement clearing located in the interior of the Białowieża Primeval Forest.

During the last half century, significant changes in land use have taken place in the Białowieża Clearing — the percentage of arable fields has decreased from 56 % in 1953 to 5 % in 2005 (Pabjanek, 1999; Bomanowska et al., 2008). Moreover, the northern part of the clearing was acquired by Białowieża National Park in the 1980s and turned into a buffer zone between the settlement of Białowieża and the Strictly Protected Area.

Due to these changes, many arable weeds have become rare or even extinct in the Białowieża Clearing, e.g.

Agrostemma githago L., *Bromus secalinus* L., and *Myosurus minimus* L. (Pabjanek, 1996; Bomanowska et al., 2008). One result of the abandonment of the furrow-bed cultivation method and the area's domination by spring cereals was the disappearance of *Ranunculo-Myosuretum minimi* association (Pabjanek, 1996). The objective of the study was to present the floristic composition of weeds occurring in the fire break in Białowieża National Park (BNP).

Materials and methods

The fire break in Białowieża National Park was established circa 1995. It is a belt of mineralized soil, 3 m wide and ca. 2 km long (estimated area ca. 0.6 ha) lying along the southern border of the protected zone of BNP. The fire break is managed by yearly autumn ploughing.

Detailed floristic studies on the vascular flora of the fire break were carried out between May 2009 and June 2010. Data were collected as floristic lists with information on the abundance of particular species. The frequency of occurrence for each species was determined using a conventional scale: sporadic — species spotted no more than 3 times, rare — spotted no more than 10 times, common — dispersed more or less evenly along the whole fire break, mass — main components of plant cover.

Based on floristic data derived from field studies, a complete list of vascular taxa occurring in the ploughed area of the fire break was prepared. This study focused on the occurrence of segetal (arable-land) species. In our list we included segetal weeds in a broad sense, i.e. all plants growing in arable fields and accompanying crop plants (Mowszowicz, 1955). Historical and recent data on the segetal flora of the Białowieża Clearing (Faliński, 1966; Pabjanek, 1996; Bomanowska et al., 2008; BSG herbarium) were used for comparison.

Plant names used here mainly follow Mirek et al. (2002) and syntaxonomic classification of species was given by Matuszkiewicz (2001). Life forms of species were accepted after Zarzycki et al. (2002).

The study implements geographical-historical classification of the flora in the classification proposed by Корна́ (1981). Anthropophytes were defined as species having no natural sites of occurrence in the Bialowieza Forest (Sokołowski, 1995) and their status was determined according to studies by Zajac (1979), Mirek et al. (2002), and Tokarska-Guzik (2005).

Results and discussion

Of the total number of 136 species found on the fire break during our study, as many as 102 (75 %) represent segetal weeds in a broad sense (Table). The floristic component common to the segetal flora of the Bialowieza Clearing and the fire break includes 101 species (62 % of the total segetal flora actually occurring in the clearing; Bomanowska et al., 2008).

The distinguished group of plants belongs to 28 botanical families. The most numerous in terms of species are: *Asteraceae* — 22 species; *Poaceae* — 15 and *Fabaceae* — 11 (Table, Fig. 1). The five families richest in species collectively include 64 species.

More than half (56) of the species occurred rarely (Fig. 2). There were plants from the Polish Red List of threatened weeds (Warcholińska, 1998): *Centaurea cyanus* L. (I category), *Geranium pusillum* Burm. f. ex L. (I), *Ranunculus sardous* Crantz (I), and *Chamomilla recutita* (L.) Rauschert, very rare in the whole of NE Poland (Zajac, Zajac, 2001) and in the Bialowieza Forest known only from ruderal habitats (Sokołowski, 1995; BGS herbarium).

Among 37 common species (Fig. 2) the most interesting is *Peplis portula* L. (*Lythrum portula* (L.) D.A. Webb), threatened on segetal habitats in Poland (V category; Warcholińska, 1998) and in the Bialowieza Clearing (E category; Pabjanek, 1996), formerly growing in wet furrows (Faliński, 1966) and not found recently on arable fields (Bomanowska et al., 2008).

Amongst the most widespread species found on the fire break were *Anthemis arvensis* L., *Juncus bufonius* L., *Polygonum hydropiper* L. and *Scleranthus annuus* L. (Table). They are mainly common and troublesome arable weeds, both in the Bialowieza Clearing and in other parts of Poland (Korniak, 1992; Skrzyczyńska, 1994; Pabjanek, 1996).

The share of particular geographical-historical groups in the investigated flora is similar to data from the whole of the Bialowieza Clearing (Faliński, 1966; Pabjanek, 1996; Bomanowska et al., 2008) and is characterized by a prevalence of native species (72; 70.6 %) over alien newcomers (Fig. 3). Species composition and phy-

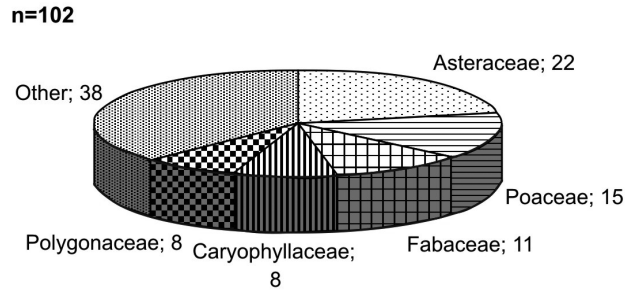


Fig. 1. Most important families in the segetal flora of the fire break

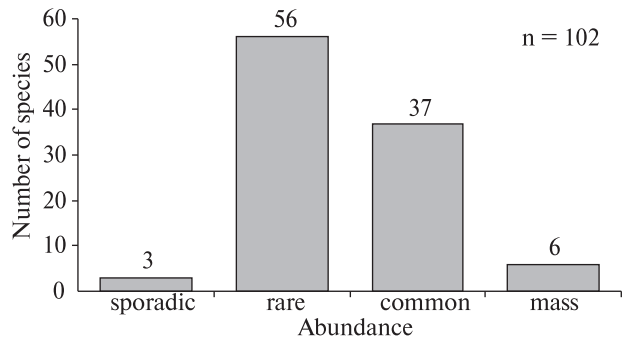


Fig. 2. Abundance classes in the segetal flora of the fire break

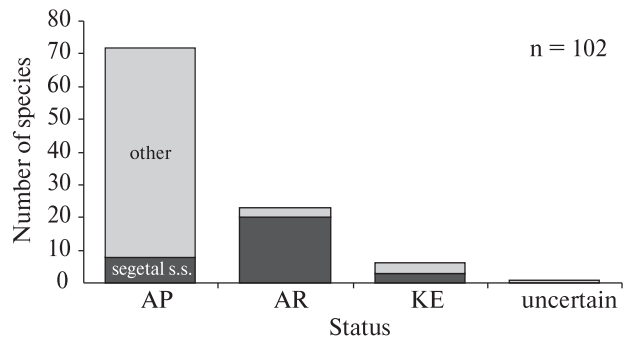


Fig. 3. Geographical-historical groups in the segetal flora of the fire break: AP — apophytes, AR — archeophytes, KE — kenophytes, uncertain — status uncertain in the Polish flora

tosociological character are representative of the habitat conditions of the study area. Meadow species (e.g. *Achillea millefolium* L., *Trifolium repens* L.) and taxa from wet habitats (e.g. *Juncus bufonius* L., *Bidens tripartita* L.) are prevalent.

Among anthropophytes, archaeophytes predominate (23; Fig. 3). Here belong characteristic species of the *Stellarietea mediae* class, among them rare and threatened species, both in Poland and the Bialowieza Clearing, such as *Anchusa arvensis* (L.) M. Bieb., *Centaurea cyanus* and *Geranium pusillum* (Pabjanek, 1996; Warcho-

Segetal flora of fire break

Species	Familia	Syntaxon	GHG	LF	Abundance
<i>Achillea millefolium</i> L.	<i>Asteraceae</i>	Ch <i>Arrhenatheretalia</i>	AP	H	common
<i>Agrostis gigantea</i> Roth	<i>Poaceae</i>	Ch <i>Molinio-Arrhenatheretea</i>	AP	H	rare
<i>Alopecurus geniculatus</i> L.	<i>Poaceae</i>	Ch <i>Agropyro-Rumicion crispi</i>	AP	H	common
<i>Alopecurus pratensis</i> L.	<i>Poaceae</i>	Ch <i>Molinio-Arrhenatheretea</i>	AP	H	rare
<i>Anagallis arvensis</i> L.	<i>Primulaceae</i>	Ch <i>Stellarietea mediae</i>	AR	T	common
<i>Anchusa arvensis</i> (L.) M. Bieb.	<i>Boraginaceae</i>	Ch <i>Stellarietea mediae</i>	AP	T	sporadic
<i>Anthemis arvensis</i> L.	<i>Asteraceae</i>	Ch <i>Centauretalia cyani</i>	AR	T	mass
<i>Arabidopsis thaliana</i> (L.) Heynh.	<i>Brassicaceae</i>	Ch <i>Papaveretum argemones</i>	AP	T, H	rare
<i>Arrhenatherum elatius</i> (L.) P.Beauv. ex J.Presl & C.Presl	<i>Poaceae</i>	Ch <i>Arrhenatherion</i>	AP	H	rare
<i>Artemisia vulgaris</i> L.	<i>Asteraceae</i>	Ch <i>Artemisietea vulgaris</i>	AP	H	rare
<i>Bidens tripartita</i> L.	<i>Asteraceae</i>	Ch <i>Bidentetea tripartiti</i>	AP	T	common
<i>Campanula patula</i> L. s.str.	<i>Campanulaceae</i>	Ch <i>Arrhenatherion</i>	AP	H	rare
<i>Capsella bursa-pastoris</i> (L.) Medik.	<i>Brassicaceae</i>		AR	T, H	common
<i>Carex hirta</i> L.	<i>Cyperaceae</i>	Ch <i>Agropyro-Rumicion crispi</i>	AP	G	rare
<i>Centaurea cyanus</i> L.	<i>Asteraceae</i>	Ch <i>Centauretalia cyani</i>	AR	T	rare
<i>Centaurea jacea</i> L.	<i>Asteraceae</i>	Ch <i>Molinio-Arrhenatheretea</i>	AP	H	rare
<i>Cerastium holosteoides</i> Fr.emend.Hyl.	<i>Caryophyllaceae</i>	Ch <i>Molinio-Arrhenatheretea</i>	AP	C, H	rare
<i>Chamomilla recutita</i> (L.) Rauschert	<i>Asteraceae</i>	Ch <i>Centauretalia cyani</i>	KE	T	sporadic
<i>Chenopodium album</i> L.	<i>Chenopodiaceae</i>	Ch <i>Polygono-Chenopodietalia</i>	AP	T	common
<i>Cichorium intybus</i> L.	<i>Asteraceae</i>	Ch <i>Onopordetalia</i>	AR	H	common
<i>Cirsium arvense</i> (L.) Scop.	<i>Asteraceae</i>	Ch <i>Artemisietea vulgaris</i>	AP	G	common
<i>Convolvulus arvensis</i> L.	<i>Convolvulaceae</i>	Ch <i>Agropyretea</i>	AP	G, H	common
<i>Conyza canadensis</i> (L.) Cronquist	<i>Asteraceae</i>	D. <i>Sisymbion</i>	KE	T, H	common
<i>Daucus carota</i> L.	<i>Apiaceae</i>	Ch <i>Arrhenatheretalia</i>	AP	H	common
<i>Echinochloa crus-galli</i> (L.) P.Beauv.	<i>Poaceae</i>	Ch <i>Polygono-Chenopodietalia</i>	AR	T	common
<i>Elymus repens</i> (L.) Gould	<i>Poaceae</i>	Ch <i>Agropyretea</i>	AP	G	common
<i>Epilobium parviflorum</i> Schreb.	<i>Oenotheraceae</i>	Ch <i>Calystegio-Epilobietum hirsuti</i>	AP	H	rare
<i>Equisetum arvense</i> L.	<i>Equisetaceae</i>	Ch <i>Agropyretea</i>	AP	G	rare
<i>Equisetum pratense</i> Ehrh.	<i>Equisetaceae</i>		AP	G	common
<i>Erigeron ramosus</i> (Walters) Britton, Sterns & Poggenb.	<i>Asteraceae</i>	Ch <i>Erysimo-Melilotetum</i>	KE	T, H	rare
<i>Erodium cicutarium</i> (L.) L'Her.	<i>Geraniaceae</i>		AP	T, H	rare
<i>Euphorbia helioscopia</i> L.	<i>Euphorbiaceae</i>	Ch <i>Polygono-Chenopodietalia</i>	AR	T	common
<i>Fallopia convolvulus</i> (L.) Å. Löve	<i>Polygonaceae</i>	Ch <i>Stellarietea mediae</i>	AR	T	rare
<i>Galeopsis bifida</i> Boenn.	<i>Lamiaceae</i>		AP	T	rare
<i>Galinsoga ciliata</i> (Raf.) S.F.Blake	<i>Asteraceae</i>	Ch <i>Polygono-Chenopodietalia</i>	KE	T	rare
<i>Galium aparine</i> L.	<i>Rubiaceae</i>	Ch <i>Galio-Urticenea</i>	AP	T, H	rare
<i>Geranium pusillum</i> Burm. f. ex. L.	<i>Geraniaceae</i>	Ch <i>Polygono-Chenopodietalia</i>	AR	T	rare
<i>Gnaphalium uliginosum</i> L.	<i>Asteraceae</i>	Ch <i>Molinietalia</i>	AP	T	common
<i>Gypsophila muralis</i> L.	<i>Caryophyllaceae</i>	Ch <i>Radiolion linoidis</i>	AP	T	common
<i>Holcus lanatus</i> L.	<i>Poaceae</i>	Ch <i>Molinio-Arrhenatheretea</i>	AP	H	rare

Species	Familia	Syntaxon	GHG	LF	Abundance
<i>Holcus mollis</i> L.	<i>Poaceae</i>	Ch <i>Quercetea robori-petraeae</i>	AP	G, H	common
<i>Hypericum perforatum</i> L.	<i>Guttiferae</i>		AP	H	rare
<i>Juncus bufonius</i> L.	<i>Juncaceae</i>	Ch <i>Isoeto-Nanojuncetea</i>	AP	T	mass
<i>Lamium purpureum</i> L.	<i>Lamiaceae</i>	Ch <i>Polygono-Chenopodion</i>	AR	T, H	common
<i>Lapsana communis</i> L. s.str.	<i>Asteraceae</i>	Ch <i>Stellarietea mediae</i>	AP	T, H	rare
<i>Lathyrus pratensis</i> L.	<i>Fabaceae</i>	Ch <i>Molinio-Arrhenatheretea</i>	AP	H	rare
<i>Leontodon autumnalis</i> L.	<i>Asteraceae</i>	Ch <i>Cynosurion</i>	AP	H	rare
<i>Leucanthemum vulgare</i> Lam. s.str.	<i>Asteraceae</i>	Ch <i>Arrhenatheretalia</i>	AP	H	rare
<i>Lolium perenne</i> L.	<i>Poaceae</i>	Ch <i>Polygonion avicularis</i>	AP	H	common
<i>Lotus corniculatus</i> L.	<i>Fabaceae</i>	Ch <i>Arrhenatheretalia</i>	AP	H	rare
<i>Lysimachia vulgaris</i> L.	<i>Primulaceae</i>	Ch <i>Filipendulion</i>	AP	H	rare
<i>Matricaria maritima</i> L. subsp. <i>inodora</i> (L.) Dostál	<i>Asteraceae</i>	Ch <i>Stellarietea mediae</i>	AR	T	common
<i>Medicago lupulina</i> L.	<i>Fabaceae</i>		AP	T, H	rare
<i>Melandrium album</i> (Mill.) Garcke	<i>Caryophyllaceae</i>	Ch <i>Artemisienea</i>	[*]	T, H	rare
<i>Mentha arvensis</i> L.	<i>Lamiaceae</i>		AP	G, Hy	common
<i>Myosotis arvensis</i> (L.) Hill	<i>Boraginaceae</i>	Ch <i>Stellarietea mediae</i>	AR	T, H	common
<i>Peplis portula</i> L.	<i>Lythraceae</i>		AP	T	common
<i>Phleum pratense</i> L.	<i>Poaceae</i>	Ch <i>Molinio-Arrhenatheretea</i>	AP	H	rare
<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	<i>Poaceae</i>	Ch <i>Phragmitetea</i>	AP	G, Hy	rare
<i>Plantago intermedia</i> Gilib.	<i>Plantaginaceae</i>	Ch <i>Isoeto-Nanojuncetea</i>	AP	T, H	rare
<i>Poa annua</i> L.	<i>Poaceae</i>		AP	T, H	common
<i>Poa palustris</i> L.	<i>Poaceae</i>	Ch <i>Magnocaricion</i>	AP	H	rare
<i>Poa trivialis</i> L.	<i>Poaceae</i>	Ch <i>Molinio-Arrhenatheretea</i>	AP	H	rare
<i>Polygonum aviculare</i> L.	<i>Polygonaceae</i>	Ch <i>Stellarietea mediae</i>	AP	T	common
<i>Polygonum hydropiper</i> L.	<i>Polygonaceae</i>	Ch <i>Polygono-Bidentetum</i>	AP	T	mass
<i>Polygonum persicaria</i> L.	<i>Polygonaceae</i>		AP	T	common
<i>Potentilla anserine</i> L.	<i>Rosaceae</i>	Ch <i>Agropyro-Rumicion crispi</i>	AP	H	common
<i>Prunella vulgaris</i> L.	<i>Lamiaceae</i>	Ch <i>Molinio-Arrhenatheretea</i>	AP	H	rare
<i>Quercus rubra</i> L.	<i>Fagaceae</i>		KE	F	sporadic
<i>Ranunculus acris</i> L. s.str.	<i>Ranunculaceae</i>	Ch <i>Molinio-Arrhenatheretea</i>	AP	H	rare
<i>Ranunculus repens</i> L.	<i>Ranunculaceae</i>	Ch <i>Agropyro-Rumicion crispi</i>	AP	H	common
<i>Ranunculus sardous</i> Crantz	<i>Ranunculaceae</i>	Ch, D <i>Ranunculo-Myosuretum</i>	AP	T, H	rare
<i>Rorippa sylvestris</i> (L.) Besser	<i>Brassicaceae</i>	Ch <i>Agropyro-Rumicion crispi</i>	AP	G, H	rare
<i>Rumex acetosa</i> L.	<i>Polygonaceae</i>	Ch <i>Molinio-Arrhenatheretea</i>	AP	H	rare
<i>Rumex acetosella</i> L.	<i>Polygonaceae</i>	D <i>Panico-Setarion</i>	AP	G, H, T	mass
<i>Rumex crispus</i> L.	<i>Polygonaceae</i>	Ch <i>Agropyro-Rumicion crispi</i>	AP	H	common
<i>Rumex obtusifolius</i> L.	<i>Polygonaceae</i>	Ch <i>Artemisietea vulgaris</i>	AP	H	rare
<i>Scleranthus annuus</i> L.	<i>Caryophyllaceae</i>	Ch <i>Aperion</i>	AR	T	mass
<i>Setaria pumila</i> (Poir.) Roem. & Schult.	<i>Poaceae</i>	Ch <i>Panico-Setarion</i>	AR	T	common
<i>Sinapis arvensis</i> L.	<i>Brassicaceae</i>	Ch <i>Stellarietea mediae</i>	AR	T	rare
<i>Sonchus arvensis</i> L.	<i>Asteraceae</i>	DP <i>Polygono-Chenopodietalia</i>	AP	G, H	common

Species	Familia	Syntaxon	GHG	LF	Abundance
<i>Sonchus oleraceus</i> L.	Asteraceae	Ch <i>Polygono-Chenopodion</i>	AR	T, H	rare
<i>Spergula arvensis</i> L.	Caryophyllaceae	Ch <i>Stellarietea mediae</i>	AR	T	common
<i>Spergularia rubra</i> (L.) J.Presl & C.Presl	Caryophyllaceae	Ch <i>Radiolion linoidis</i>	AP	T, H	rare
<i>Stachys palustris</i> L.	Lamiaceae	Ch <i>Filipendulion</i>	AP	G	rare
<i>Stellaria graminea</i> L.	Caryophyllaceae		AP	H	rare
<i>Stellaria media</i> (L.) Vill.	Caryophyllaceae	Ch <i>Stellarietea mediae</i>	AP	T	mass
<i>Tanacetum vulgare</i> L.	Asteraceae	Ch <i>Artemisio-Tanacetetum</i>	AP	H	rare
<i>Taraxacum officinale</i> F.H.Wigg.	Asteraceae	Ch <i>Arrhenatheretalia</i>	AP	H	rare
<i>Thlaspi arvense</i> L.	Brassicaceae	Ch <i>Stellarietea mediae</i>	AR	T	common
<i>Trifolium arvense</i> L.	Fabaceae	Ch <i>Koelerio-Coryneporetea</i>	AP	T	rare
<i>Trifolium campestre</i> Schreb.	Fabaceae	Ch <i>Koelerio-Coryneporetea</i>	AP	T	rare
<i>Trifolium dubium</i> Sibth.	Fabaceae	Ch <i>Arrhenatheretalia</i>	AP	T	rare
<i>Trifolium hybridum</i> L.	Fabaceae	Ch <i>Calthion</i>	AP	H	rare
<i>Trifolium repens</i> L.	Fabaceae	Ch <i>Lolio-Cynosuretum</i>	AP	C, H	common
<i>Tussilago farfara</i> L.	Asteraceae		AP	G	rare
<i>Veronica arvensis</i> L.	Scrophulariaceae		AR	T	rare
<i>Veronica persica</i> Poir.	Scrophulariaceae	Ch <i>Polygono-Chenopodion</i>	KE	T	common
<i>Vicia angustifolia</i> L.	Fabaceae	Ch <i>Aperion</i>	AR	T	rare
<i>Vicia hirsuta</i> (L.) Gray	Fabaceae	Ch <i>Stellarietea mediae</i>	AR	T	rare
<i>Vicia tetrasperma</i> (L.) Schreb.	Fabaceae	Ch <i>Vicietum tetraspermae</i>	AR	T	rare
<i>Viola arvensis</i> Murray	Violaceae	Ch <i>Stellarietea mediae</i>	AR	T	common

Abbreviations: GHG — geographic-historical group, LF — life form, Ch — characteristic species, D — differential species, AP — apophyte, AR — archeophyte, KE — kenophyte, [*] — status uncertain in Polish flora, T — therophyte, H — hemicyptophyte, G — geophyte, C — chamephyte, P — phanerophyte

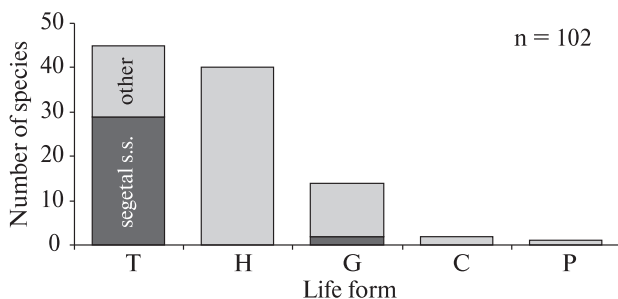


Fig. 4. Raunkiauer's life forms in the segetal flora of the fire break: T — therophytes, H — hemicyptophytes, G — geophytes, C — chamephytes, P — phanerophytes

lińska, 1998). Kenophytes are represented by only 6 taxa; among them *Conyza canadensis* (L.) Cronquist and *Veronica persica* Poir. are the most common.

As in the segetal flora of the Bialowieza Clearing (Faliński, 1966; Pabjanek, 1996), therophytes (45 species) also prevail over other life forms in the segetal flora

of the fire break. This group is particularly rich among obligatory weeds (29 species; Fig. 4). The great share of hemicyptophytes (40 species) is also characteristic, due to the immediate vicinity of abandoned farmlands, covered by meadow-like vegetation.

In the analysed group there are 31 species characteristic or distinguishing for the *Stellarietea mediae* class and its lower syntaxa (Table). Species characteristic and distinguishing for root crop communities from the *Polygono-Chenopodietalia* order were more numerous (10 species) than species connected with cereals from the *Centauretalia cyani* order (7 species; Table 1). Similar proportions were found in the segetal flora of the Bialowieza Clearing (Pabjanek, 1996; Bomanowska et al., 2008).

Despite the small area and simplified management, the flora of the fire break is surprisingly rich in species. This is the result of direct contact with different types of vegetation (natural, semi-natural and ruderal), acting as propagule sources for the ploughed area.

The weed flora of the fire break has a similar spectrum of life forms as and share of geographical-historical groups with the floras of typical agrocenoses (Skrzyczyńska, 1994; Korniak, 1992; Pabjanek, 1996): native plants prevail over alien newcomers, and therophytes prevail over other life forms.

The results of the study show that some segetal species have a tendency to move from arable fields into substitutional habitats, which was also observed in the Białowieża Clearing (Pabjanek, 1996 and the authors' personal observations) and other regions of Poland and Europe (Sutcliffe, Kay, 2000; Kirpluk, Bomanowska, 2008). In our study here belong other hygrophilous therophytes linked to stubble communities of the order *Nanocyperion flavescentis* (*Isoëto-Nanojuncetea* class) growing on wet mineral soils (Matuszkiewicz, 2001).

Populations of many weeds on the fire break are abundant, and plants flower and fruit freely in most cases. The results of a long-term experiment by Balcerkiewicz and Pawlak (2009) in Wielkopolski National Park show that segetal species and segetal phytocoenoses need only frequent (once or twice a year) mechanical tillage, and it is not necessary to supply weeds with propagules from outside the fields. It is highly probable that the annual ploughing of the break will allow segetal species to persist in this habitat for many years.

Conclusions

1. The obtained results of the study show that the vascular flora of the fire break in Białowieża National Park is to a great extent similar to the arable weed flora of the Białowieża Clearing.

2. The weed flora of the fire break has a similar composition and structure to typical flora of agricultural land.

3. Seven rare and threatened segetal species on the national and local scales were found in the area: *Anchusa arvensis*, *Centaurea cyanus*, *Chamomilla recutita*, *Geranium pusillum*, *Peplis portula*, *Ranunculus sardous*, and *Sinapis arvensis*. The most valuable species are weeds of wet habitats formerly growing in wet furrows and not found recently on arable fields: *Peplis portula* and *Ranunculus sardous*.

4. The ploughed plots of the fire break could be a partial refuge for the disappearing segetal flora of the Białowieża Clearing.

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В ОГНЕЗАХИСНІ СМУГИ В БЕЛОВЕЖЬКОМУ НАЦІОНАЛЬНОМУ ПАРКУ ЯК РЕФУГІУМ СЕГЕТАЛЬНОЇ ФЛОРИ

Враховуючи широкі масштаби занедбаних сільськогосподарських угідь, автори досліджували флору вогнезахисних смуг Біловезького національного парку як потенційного осередку сегетальної флори. Виявлено 136 таксонів судинних рослин, у т.ч. 101 спільний для сегетальної флори вирубок Біловежі. Найбільш поширеними видами є *Anthemis arvensis*, *Juncus bufonius* і *Scleranthus annuus*, найбільш цікавими — *Peplis portula* і *Ranunculus sardous*, які раніше росли у вологих борознах. Наші результати вказують, що зорані вогнезахисні смуги можуть бути рефугіумом сегетальної флори.

Ключові слова: занедбані поля, зміни в землекористуванні, зникнення видів, бур'яни, Біловезький національний парк, Польща.

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ОГНЕЗАЩИТНЫЕ ПОЛОСЫ В БЕЛОВЕЖСКОМ НАЦИОНАЛЬНОМ ПАРКЕ КАК РЕФУГИУМ СЕГЕТАЛЬНОЙ ФЛОРЫ

Учитывая широкие масштабы запущенных сельскохозяйственных угодий, авторы исследовали флору огнезащитных полос в Беловежском национальном парке как потенциальный рефугиум сегетальной флоры. Выявлено 136 таксонов сосудистых растений, в т.ч. 101 общий для сегетальной флоры вырубок Беловежи. Наиболее распространенными видами являются *Anthemis arvensis*, *Juncus bufonius* и *Scleranthus annuus*, наиболее интересными — *Peplis portula* и *Ranunculus sardous*, которые раньше произрастали во влажных бороздах. Наши результаты указывают на то, что вспаханные огнезащитные полосы могут служить рефугиумом сегетальной флоры.

Ключевые слова: запущенные поля, смены в землепользовании, исчезновение видов, сорняки, Беловежский национальный парк, Польша.

НОВІ ВИДАННЯ

Практикум з ботаніки. 7-е вид., перероблене і доповнене / Якубенко Б.Є., Алейніков І.М., Лушпа В.І., Шабарова С.І., Царенко П.М. // Національний Університет біоресурсів і природокористування України, Інститут ботаніки ім. М.Г. Холодного НАН України. — К., Фітосоціоцентр, 2012. — 322 с.

Викладено методичні поради щодо виконання 61 лабораторно-практичної роботи з цитології, гістології, морфології та анатомії вегетативних органів, а також систематики рослин. Коротко висвітлено теоретичні відомості стосовно будови рослин, їхніх клітин, тканин, органів і різноманітності рослинного світу.

Видання розраховане на викладачів, аспірантів, студентів природничих спеціальностей.