



NEW FLORISTIC RECORDS FROM THE POLISH PART OF THE LITHUANIAN LAKELAND (NE POLAND)

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ABSTRACT. This paper provides a floristic list of 111 vascular plant species recorded in the Polish part of the Lithuanian Lakeland in 2012–2014, using the ATPOL cartogram method. There are 36 native species, 53 established alien species, and 22 casual alien species. Among the established alien species there are 13 species native to Poland which have no natural geographical range in the Polish part of the Lithuanian Lakeland, and they appear to be kenophytes on a regional scale. 16 species are new to the regional flora. Some of the most interesting are: *Amaranthus albus*, *Anthemis ruthenica*, *Avena strigosa*, *Bromus benekeii*, *Campanula rapunculus*, *Erysimum hieraciifolium*, *Nonea pulla*, *Seseli annuum*, *Sisymbrium strictissimum*, *Stachys annua*, and *Tragopogon dubius*.

KEY WORDS: floristics, vascular plants, alien species, ATPOL cartogram method, Suwałki, Lithuanian Lakeland, Poland

INTRODUCTION

The Lithuanian Lakeland, situated in the Neman River basin, is an Eastern European transnational macroregion between Poland, Russia (Kaliningrad Oblast), Lithuania, and Belarus. The Polish part of the Lithuanian Lakeland (sometimes called the Suwałki Lakeland) comprises four mesoregions, i.e. Romincka Forest, Western Suwałki Lakeland, Eastern Suwałki Lakeland, and Augustów Plain (KONDRACKI 1994). It is characterized by early post-glacial landscape (after the Vistula Glaciation) with the predominance of morain hills, sandurs, tunnel valleys, ribbon lakes and kettle lakes (BER 1981). It lies in a transitory temperate climate zone with an influence of continental climate (GÓRNIAK 2000) where the native vegetation is dominated by nemoral forest communities with boreal and subboreal influences. This area is highly deforested (except the Romincka Forest and Augustów Plain) and has agricultural character. The major towns are Suwałki, Augustów, Gołdap, and Sejny.

The first effort towards the flora of the Polish part of the Lithuanian Lakeland was a list of vascular

plants recorded by professor Dogiel and his students in the town of Sejny and its environs in 1827–1830 (ROSTAFIŃSKI 1885). Another early floristic explorer of the region was JASTRZĘBOWSKI (1829). Between the late nineteenth century and the early twentieth century there was increased exploration of the vascular plant flora in the Romincka Forest and north-western part of the Western Suwałki Lakeland thanks to the Prussian botanists (ABROMEIT et al. 1898–1940). In addition to the regional flora, interesting chorological data of some rare vascular plants were published in the early 1920s and 1930s (HRYNIEWIECKI 1922, 1932). Following this period, numerous floristic records are found in the literature from the second half of the twentieth century (SOKOŁOWSKI 1965, 1973, 1988a, b, CZERWIŃSKI 1967, MAZUR et al. 1978, KŁOSOWSKI & TOMASZEWICZ 1979, PAWLUS & SOKOŁOWSKI 1982, KAWECKA 1991). Over the last 14 years significant floristic contributions have been made (JUTRZENKA-TRZEBIATOWSKI et al. 2002a, 2002b, BIELSKA et al. 2004, KIRPLUK & BIELSKA 2004, JABŁOŃSKA 2005, PAWLIKOWSKI 2005, 2008a, b, c, d, 2010, 2011, PAWLIKOWSKI & JARZOMBKOWSKI 2009, 2010a, b, PAWLIKOWSKI et al. 2009, 2010, 2011, 2013, BERNACKI & PAWLIKOWSKI 2010, LAZARUS et

al. 2010, HARMUSZKIEWICZ 2011, BIEREŃNOJ 2012, PLISZKO 2009, 2010a, b, c, d, 2011a, b, c, 2012, 2013a, b, c, 2014a, c). Aside from these papers, there is still a lack of recognition of regional flora in the Polish part of the Lithuanian Lakeland, and only for the flora of the Western Suwałki Lakeland a modern comprehensive compilation was achieved (PLISZKO 2014b).

MATERIAL AND METHODS

Field inventories and collections were carried out in 2012–2014, mostly in the major towns of the Polish part of the Lithuanian Lakeland, using the ATPOL cartogram method (ZAJĄC 1978). The area of study is located within 23 smaller squares (2.5 km×2.5 km) and within nine larger squares (10 km×10 km) of the ATPOL cartogram grid (Fig. 1). Nomenclature follows MIREK et al. (2002) and GIL-AD (1997), geo-

graphical-historical status of the taxa follows TOKARSKA-GUZIĆ et al. (2012). The recognition of native species in Poland, which are most likely alien in the Polish part of the Lithuanian Lakeland, was based on the data provided by ZAJĄC & ZAJĄC (2001) and on own observations. Species protected by law in Poland follow enactment Directive (ROZPORZĄDZENIE... 2014). Processed herbarium specimens of selected species are deposited in the Herbarium of Institute of Botany of Jagiellonian University in Kraków (KRA).

RESULTS

The floristic list contains 111 vascular plant species (including three subspecies). There are 36 native species, 53 established alien species, and 22 casual alien species, respectively. Among the established alien species there are 13 species native to Poland

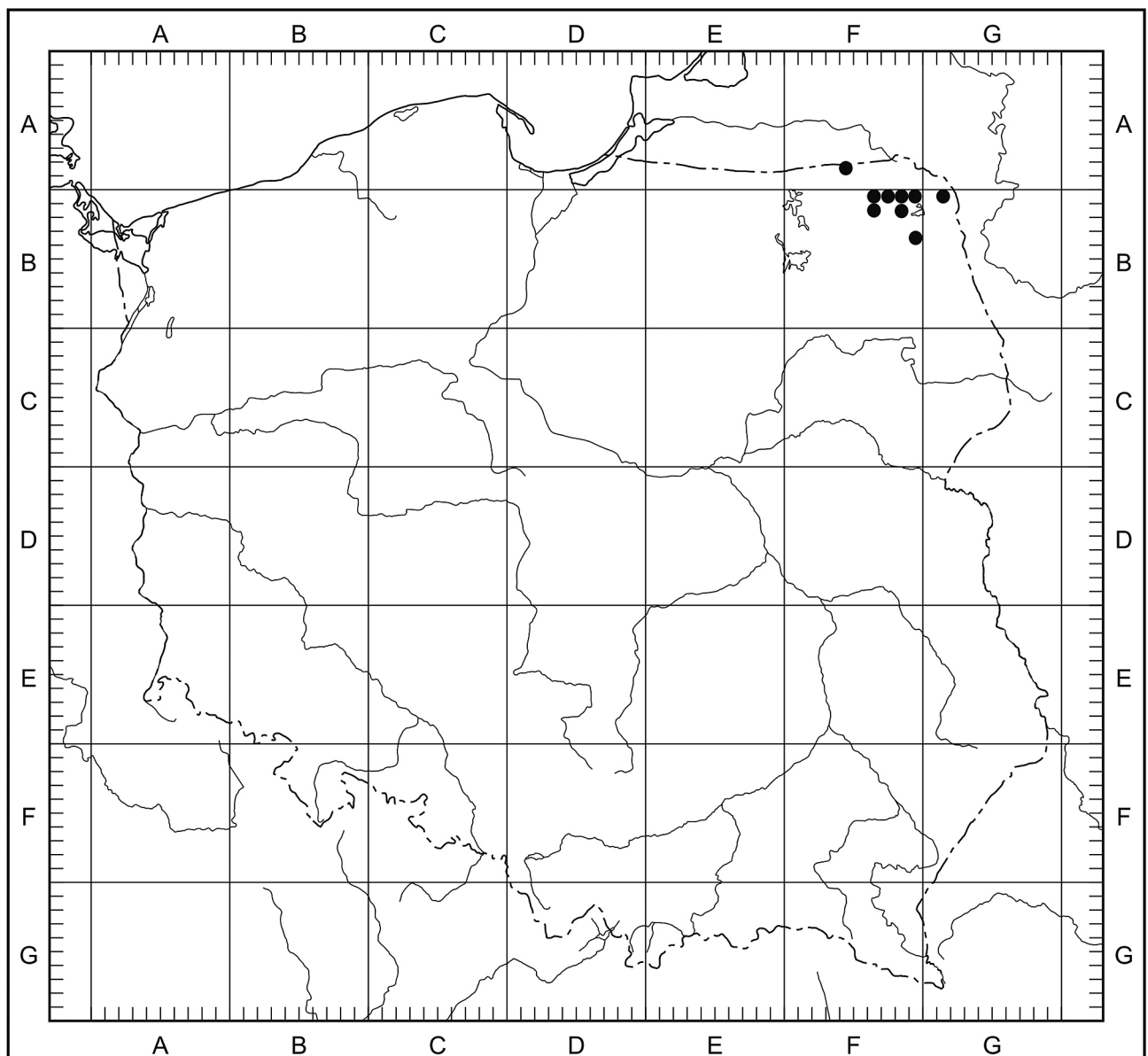


Fig. 1. Location of the investigated area within the ATPOL cartogram grid

which have no natural geographical range in the Polish part of the Lithuanian Lakeland. The casual alien species are mostly represented by garden escapes. Among the native taxa there are five species partially protected in Poland and one species strictly protected. Moreover, there are 16 species new to the flora of the Polish part of the Lithuanian Lakeland.

LIST OF SPECIES AND LOWER TAXA

The floristic list is arranged alphabetically, names of the taxa are indicated with italics and boldface. Species new to the Polish part of the Lithuanian Lakeland are indicated with underline. For each species type of habitat is given. The ATPOL cartogram unit codes (corresponding to the squares of side 2.5 km) are presented in brackets after the administrative names of localities.

Explanations of special signs and abbreviations:
* – established alien species in Poland, ** – casual alien; ! – native species in Poland, but established alien within the Polish part of the Lithuanian Lakeland; no special sign indicates that the taxon is native to the regional flora; N, S, E, W – geographical directions; RC – species under strict protection in Poland; Rc – species under partial protection in Poland.

** *Alcea rosea* – fallow lands, roadside verges, rubbish heap: Suwałki town [FB0822, FB0831, FB1803], Augustów town [FB3921].

Alliaria petiolata – roadside verges: E of Suwałki town [FB0833], N of Augustów town [FB3921].

** *Allium schoenoprasum* – roadside verges, fallow land, former sand and gravel pit: Suwałki town [FB0823, FB0831].

* *Amaranthus albus* – railway embankments, parking space near railway station: E of Suwałki town [FB0833].

* *Amaranthus lividus* – pavement, lawn: the centre of Suwałki town [FB0832].

** *Ammi majus* – vegetable garden, among parsley crop: Garbas Pierwszy village [FB0612].

Androsace septentrionalis – railway embankments, former sand and gravel pit, sandy dry grassland: Suwałki town [FB0833, FB1803], Nowa Wieś village [FB0921], Augustów town [FB3921].

* *Anthemis ruthenica* – railway embankment: Okuniewicz village near Suwałki town [FB0823].

** *Aster laevis* – roadside verge: Piecki village [FB0702].

! *Astragalus cicer* – railway embankments: the centre of Gołdap town [FA8421, FA8422].

* *Atriplex nitens* – roadside verge, recultivated landfill: SE of Suwałki town near Sobolewo village [FB1803].

* *Avena strigosa* – roadside verge in pine forest: the Garbas forest near Plewki village [FB0622].

Berula erecta – waterside: the Czarna Hańcza river in the centre of Suwałki town [FB0832].

* *Bidens frondosa* – watersides, cemetery: the Czarna Hańcza river and the centre of Suwałki town [FB0832], the Sobolewo Reservoir near Sobolewo village [FB1803], the Bystry Canal in Augustów town [FB3921].

Bromus benekenii – mixed forest: the Dąbrówki forest near Bakalarzewo village [FB0633].

* *Bromus carinatus* – lawn: Garbas Pierwszy village [FB0612].

* *Bromus tectorum* – former sand and gravel pit: Sobolewo village [FB1803].

* *Bunias orientalis* – roadside verge: SE of Suwałki town near Sobolewo village [FB1803].

Butomus umbellatus – waterside: the Bystry Canal in Augustów town [FB3921].

Calystegia sepium – river bank, roadside verge, rubbish heap: the Gołdapa river in the centre of Gołdap town [FA8422, FA8432], N of Suwałki town [FB0822].

* *Camelina microcarpa* subsp. *sylvestris* – arable fields, steep roadside bank: SE of Suwałki town and Sobolewo village [FB1803].

* *Campanula rapunculus* – mesic meadow: N of Krzywólka village near Suwałki town [FB0822].

* *Carduus acanthoides* – roadside verges, railway embankments, rubbish heaps: Suwałki town [FB0831, FB0832, FB0833, FB1803], Augustów town [FB3921].

* *Carduus nutans* – clearing in mixed forest: N of Augustów town [FB3921].

Catabrosa aquatica – melioration ditch: the Rospuda river valley in Garbas Pierwszy village [FB0612] and Filipów Pierwszy village [FB0602].

* *Chenopodium hybridum* – roadside verges, rubbish heaps: Suwałki town [FB0831], Augustów town [FB3921], Sejny town [GB0121].

* *Chenopodium pedunculare* – arable fields, among potato crops: Garbas Pierwszy village [FB0612], Szafranki village [FB0613].

Chenopodium polyspermum – roadside verge: the centre of Suwałki town [FB0832].

* *Chenopodium strictum* – roadside verges, pavements: the centre of Gołdap town [FA8422], Suwałki town [FB0832, FB0833, FB1803].

* *Corispermum leptopterum* – former sand and gravel pits, sandy roadside verges and railway embankments: Suwałki town [FB0831, FB1803], N of Augustów town [FB3921].

Coronilla varia – roadside verges, railway embankments: Suwałki town [FB0832, FB1803], N of Augustów town [FB3921].

** *Cosmos bipinnatus* – rubbish heap: N of Suwałki town [FB0822].

Dactylorhiza incarnata subsp. *incarnata* – wet meadow in former sand and gravel pit: NW of Suwałki town near Krzywólka village [FB0822]. Rc.

Dactylorhiza majalis – wet meadow in former sand and gravel pit: NW of Suwałki town near Krzywólka village [FB0822]. Rc.

Digitalis grandiflora – old fallow land under secondary succession of pine forest: S of Suwałki town near Suwałki forest [FB1803]. Rc.

* *Digitaria sanguinalis* – roadside verges, pavements, lawns, cemeteries: Suwałki town [FB0832], Sejny town [GB0121].

* *Diploaxis muralis* – roadside verges, lawns, pavements, cemeteries: Suwałki town [FB0832, FB0833], Augustów town [FB3921], Sejny town [GB0121].

! *Dipsacus sylvestris* – fallow land, rubbish heap in former sand and gravel pit: NW of Suwałki town [FB0822, FB0831].

* *Echinocystis lobata* – river banks, railway embankment, rubbish heap: Gołdap town [FA8422], Suwałki town [FB0822, FB0832, FB0833, FB1803], N of Augustów town [FB3921].

* *Echinops sphaerocephalus* – roadside verge, former sand and gravel pit, Sobolewo village [FB1803].

Epipactis helleborine – roadside verge in pine forest: Bakalarzewo village near Czerwonka hamlet [FB1603]. Rc.

Equisetum hyemale – former sand and gravel pit: NW of Suwałki town [FB0831].

* *Eragrostis minor* – roadside verges, pavements, railway embankments, lawns: Suwałki town [FB0832, FB0833], Augustów town [FB3921], Sejny town [GB0121].

! *Eryngium planum* – roadside verges: NW of Suwałki town [FB0832], Sobolewo village [FB1803].

! *Erysimum hieraciifolium* – fallow land near former railway embankment, former sand and gravel pit: NW of Suwałki town [FB0831, FB0832].

** *Eschscholtzia californica* – rubbish heap: NE of Suwałki town [FB0823].

** *Euphorbia marginata* – roadside verge: SE of Gołdap town [FA8432].

** *Fragaria × ananassa* – fallow lands: NW of Suwałki town [FB0822, FB0832].

* *Galeopsis angustifolia* – roadside verge near railway track: E of Suwałki town [FB0833].

Galeopsis pubescens – roadside verges, clearing in mixed forest: SE of Gołdap town [FA8432], N of Augustów town [FB3921].

* *Geranium molle* – roadside verge: NW of Suwałki town near Krzywólka village [FB0822].

* *Geranium pyrenaicum* – roadside verges, railway embankment, rubbish heap: Suwałki town [FB0831], N of Augustów town [FB3921], Sejny town [GB0121].

* *Geranium sibiricum* – roadside verges, railway embankments, lawns, cemeteries: Suwałki town [FB0832, FB0833], Augustów town [FB3921].

* *Helianthus tuberosus* – fallow lands, rubbish heaps: Suwałki town [FB0822, FB0831].

** *Heliopsis scabra* – fallow land, rubbish heap: Suwałki town [FB0822, FB0831].

** *Hemerocallis fulva* – roadside verges, former sand and gravel pit: NW of Suwałki town [FB0831], SE of Suwałki town near Sobolewo village [FB1803].

Inula britannica – roadside verges, waterside: Suwałki town [FB0832], Sobolewo village near the Sobolewo Reservoir [FB1803].

Inula salicina – roadside verge: Okuniowiec village near Suwałki town [FB0823].

* *Lepidium densiflorum* – roadside verges, railway embankment: the centre of Gołdap town [FA8422], Suwałki town [FB0833].

** *Lonicera tatarica* – rubbish heap, roadside verge: Suwałki town [FB0822, FB0833].

** *Lychnis coronaria* – fallow land: NW of Suwałki town [FB0832].

** *Lycopersicon esculentum* – rubbish heap, railway embankment: Suwałki town [FB0822, FB0833].

** *Lysimachia punctata* – rubbish heap: NW of Suwałki town [FB0822].

Mentha longifolia – waterside: the Sobolewo Reservoir near Sobolewo village [FB1803].

* *Mentha × niliaca* – roadside verge, former sand and gravel pit, rubbish heaps: Gołdap town [FA8432], Suwałki town [FB0831], Augustów town [FB3921].

Myosotis sparsiflora – railway embankments: N of Augustów town [FB3921].

* *Nepeta cataria* – roadside verge: SE of Suwałki town near Sobolewo village [FB1803].

! *Nonea pulla* – edge of pine forest: Okuniowiec village near Suwałki town [FB0823].

* *Oenothera depressa* – former sand and gravel pit, fallow land: Suwałki town [FB0831, FB0832].

Oenothera rubricaulis – fallow land: Polule village [FB0911].

* *Onopordum acanthium* – roadside verges, rubbish heap: N of Suwałki town [FB0821, FB0823, FB0831].

* *Oxalis corniculata* – railway embankment: Augustów town [FB3921].

Oxytropis pilosa – roadside verge, former sand and gravel pit: Garbas Pierwszy village near Mieruniszki village [FB0611], SE of Suwałki town on the Sobolewo Reservoir [FB1803]. Rc.

** *Papaver orientale* – lawn: Suwałki town [FB0833].

* *Physalis alkekengi* – roadside verges, rubbish heap: Suwałki town [FB0833], Sejny town [GB0121].

Plantago arenaria – lawn: the centre of Suwałki town [FB0833].

Potentilla collina – xerothermic grassland at the edge of pine forest: Okuniowiec village near Suwałki town [FB0823].

Potentilla heptaphylla – xerothermic grassland, railway embankment: Okuniowiec village near Suwałki town [FB0823].

! *Potentilla recta* – fallow land: NW of Suwałki town [FB0822].

Potentilla reptans – river bank: the Czarna Hańcza river in the centre of Suwałki town [FB0832].

Prunus spinosa – railway embankments: Suwałki town [FB0833].

! *Puccinellia distans* – roadside verges, pavements: Gołdap town [FA8422, FA8432], Suwałki town

[FB0831, FB0832, FB0833, FB1802, FB1803], Augustów town [FB3921], Sejny town [GB0121].

Pyrola rotundifolia – thickets in former sand and gravel pit: NW of Suwałki town [FB0831]. Rc.

! *Reseda lutea* – roadside verges, railway embankments: Gołdap town [FA8422], Suwałki town [FB0831, FB0833], Augustów town [FB3921].

* *Rosa rugosa* – thicket in former sand and gravel pit: Sobolewo village on the Sobolewo Reservoir [FB1803].

* *Rudbeckia hirta* – roadside verges, former sand and gravel pit, fallow lands, rubbish heaps: Gołdap town [FA8422], NW of Suwałki town [FB0822, FB0831].

* *Rumex confertus* – roadside verges, railway embankments: Suwałki town [FB0832, FB0833], Augustów town [FB3921].

Rumex maritimus – river bank: the Gołdapa river in centre of Gołdap town [FA8422].

** *Ruta graveolens* – rubbish heap in former sand and gravel pit: NW of Suwałki town [FB0831].

Salix × *dasyclados* – former sand and gravel pit: NW of Suwałki town [FB0831].

Sanguisorba muricata – xerothermic grassland, former sand and gravel pit: NE of Suwałki town and Okuniowiec village [FB0823].

Saxifraga tridactylites – railway embankments: Okuniowiec village near Suwałki town [FB0823].

Scabiosa ochroleuca – former sand and gravel pit: NW of Suwałki town [FB0831].

** *Sedum hispanicum* – roadside verge: the centre of Suwałki town [FB0833].

** *Sedum spurium* – former sand and gravel pit: NW of Suwałki town [FB0831].

! *Senecio viscosus* – railway embankments, rubbish heap: Suwałki town [FB0823, FB0833, FB1803], N of Augustów town [FB3921].

! *Seseli annuum* – roadside verge, railway embankment: N of Augustów town near the former Augustów Port station [FB3921].

** *Silene armeria* – roadside verge, pavement: the centre of Augustów town [FB3921].

Silene nutans subsp. *glabra* – edge of pine forest near railway track: N of Augustów town [FB3921].

* *Sisymbrium altissimum* – roadside verges, railway embankments, recultivated landfill, rubbish heap: Suwałki town [FB0832, FB0833, FB1803], N of Augustów town [FB3921].

* *Sisymbrium loeselii* – roadside verges, railway embankments, recultivated landfill, rubbish heap: Suwałki town [FB0832, FB0833, FB1803], N of Augustów town [FB3921].

! *Sisymbrium strictissimum* – thicket, water-side: Sobolewo village on the Sobolewo Reservoir [FB1803].

* *Stachys annua* – roadside verge and railway embankment: the centre of Suwałki town [FB0833].

** *Tanacetum balsamita* – roadside verge: Mieruniszki village [FB0611].

** *Thuja occidentalis* – former sand and gravel pit, cemetery wall, railway embankment: Suwałki town [FB0831, FB0832], N of Augustów town [FB3921].

! *Tragopogon dubius* – roadside verges, railway embankments, former sand and gravel pits, fallow lands, lawns: Suwałki town [FB0831, FB0832, FB0833, FB1803], N of Augustów town [FB3921].

Trifolium campestre – fallow land: SW of Suwałki town [FB1802].

Trifolium rubens – xerothermic grassland: E of Suwałki town [FB0823].

! *Veronica hederifolia* – roadside verge: SE of Suwałki town [FB1803].

Vicia tenuifolia – former sand and gravel pit: SE of Suwałki town near the Sobolewo Reservoir [FB1803].

** *Viola sororia* – rubbish heap in former sand and gravel pit: NW of Suwałki town [FB0831].

COMMENTARY TO THE LIST

In the floristic list the geographical-historical status of established alien species is presented without determination of archaeophytes and kenophytes. For alien vascular plants in Poland this determination can be easily found in the publication by TOKARSKA-GUZIĆ et al. (2012). However, native vascular plants in Poland that have no natural geographical range in the Polish part of the Lithuanian Lakeland (ZAJĄC & ZAJĄC 2001) appear to be kenophytes on a regional scale. The interesting thing is that most of them were unintentionally introduced via road and rail transport, i.e. *Astragalus cicer*, *Erysimum hieraciifolium*, *Puccinellia distans*, *Reseda lutea*, *Senecio viscosus*, *Seseli annuum*, and *Tragopogon dubius*. These pathways of introduction correspond to the spread of some alien species in Poland, i.e. *Amaranthus albus*, *Anthemis ruthenica*, *Galeopsis angustifolia*, and *Rumex confertus*. Furthermore, five species cultivated as ornamental are naturalized in some places, i.e. *Dipsacus sylvestris*, *Echinops sphaerocephalus*, *Eryngium planum*, *Mentha ×niliaca*, and *Rudbeckia hirta*. Due to their relentless presence on fallow lands (during three seasons), other garden escapes are on a good way to the naturalization in the regional flora, i.e. *Allium schoenoprasum*, *Heliopsis scabra*, and *Lychnis coronaria*. One casual alien, *Viola sororia*, was left out in the Polish checklist of vascular plants (MIREK et al. 2002). Two species of rare archaeophytes in the floristic list, i.e. *Avena stri-gosa* and *Stachys annua*, lose their localities in Poland (TOKARSKA-GUZIĆ et al. 2012). It is also worth mentioning that a new locality of *Sisymbrium strictissimum* in the Eastern Suwałki Lakeland is the northeasternmost known point of distribution of this species in Poland outside the Vistula and Bug river valleys (ZAJĄC & ZAJĄC 2001).

Comparing the floristic list with the recent data (PLISZKO 2014b), six species are new to the flora of the Western Suwałki Lakeland, i.e. *Ammi majus*, *Aster*

laevis, *Bromus benekenii*, *Catabrosa aquatica*, *Chenopodium pedunculare*, and *Epipactis helleborine*, one species is confirmed with a new locality, i.e. *Avena strigosa*, and for three other species, i.e. *Bromus carinatus*, *Oxytropis pilosa*, and *Tanacetum balsamita*, the new localities have been found.

The composition of synanthropic flora of the towns of Suwałki, Augustów, Gołdap, and Sejny needs further intensive study. The new floristic records from the Polish part of the Lithuanian Lakeland complete the distribution of vascular plants in Poland, and give valuable information about introduction pathways of some alien species.

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