

The occurrence of *Glyceria striata* (Lam.) Hitchc. in Europe and the new localities of the species in Poland

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Abstract

Glyceria striata (Lam.) Hitchc. is a North American species that has been recorded in most, semi-natural habitats in Europe, e.g. in meadows, bog springs, margins of water bodies. It is circumscribed within two taxa of lower rank: *G. striata* subsp. *striata* and *G. striata* subsp. *stricta*. Only *G. striata* subsp. *stricta* has been reported from Europe. This paper gives a list of the European localities of the species (48) and describes two newly discovered localities in Poland (the Wyżyna Małopolska upland and the Western Carpathian Mts.). The distribution of *G. striata* in Europe is mapped and potential migration routes of the species are discussed.

Keywords: *Glyceria striata*, distribution, alien species, new localities, Wyżyna Małopolska upland, Western Carpathian Mts., Poland, Europe

Introduction

Glyceria striata (Lam.) Hitchc. is a Boreo-American species native to North America, where it occurs quite commonly. Its range extends from northern Mexico [1] to Alaska, Hudson Bay and Newfoundland [2-4]. The more northward the locality, the less frequent the species becomes. *G. striata* is recorded in wet meadows, bog springs, peat bogs, shrubs, ditches and other high-moisture habitats [5].

Like many other species native to the New World, *G. striata* has also migrated to other continents. It was recorded in New Zealand [6] and in Europe, where it was first noted in France in 1849 [7]. At present it occurs in 13 countries in Europe, including Poland (Fig. 1).

European studies on *G. striata* usually report its occurrence in individual countries and characterize more or less thoroughly its localities [8-11]. The main aim of this study is to map the distribution of *G. striata* in whole European continent. The paper also presents two newly discovered localities in Poland (the Wyżyna Małopolska upland and the Western Carpathian Mts.). Its habitats were characterized by phytosociological relevés. The hypothetical migration routes of species to Europe and its placement in one of the geographic-historical groups are proposed and discussed.

Taxonomy and systematics

Glyceria striata (Lamarck) A. S. Hitchcock 1928, Proc. Biol. Soc. Wash. 41:157.

Syn.: *G. nervata* (Willd.) Trin., *G. rigida* (Rydb.) Rydb., *Poa nervata* Willd., *P. striata* Lam., *Panicularia nervata* (Willd.) Kuntze, *P. rigida* Rydb.

G. striata belongs to the family Poaceae. It is placed mostly in the genus *Glyceria*, section *Striatae* Church [12], which is identified with the section *Hydropoa* Dumort. by Conert [13] and Tzvelev [14]. In the most recent study on the taxonomy of the entire genus *Glyceria* by Tzvelev [15], it is included in the subgenus *Hydropoa* (Dumort.) Tzvelev, in the section *Striatae* Church together with *G. neogaea* Steud., *G. mexicana* (Kelso) Beetle, *G. colombiana* Giraldo-Cañas, *G. elata* (Nash) Jones, *G. canadensis* (Michx.) Trin., *G. laxa* (Scribn.) Scribn. ex Rand et Redf., *G. nubigena* W. A. Anderson, *G. obtusa* (Muhl.) Trin. and *G. melicaria* (Michx.) F. T. Hubb. Tzvelev does not differentiate taxa of lower rank within *G. striata*.

A high character variability (stem height, length of the panicle, size and pigmentation of spikelets and lemmas) was observed in *G. striata*. Many authors distinguish two lower taxa: *striata* s. str. and *stricta* considering them either as varieties (*varietas*) [3,5] or as subspecies [2,12,13]. The differences are presented in the table below (Tab. 1).

According to Holub [12], all the European localities are identified as localities of *G. striata* subsp. *stricta* (Scribner) Hultén. However, Dančák [11] suggests that *G. striata* subsp. *striata* occurs in the Czech Republic.

Material and methods

We used the regional division of Poland [16] and the methodological approaches of the Distribution Atlas of Vascular Plants in Poland (ATPOL, 10 × 10 km squares) [17] to map

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Fig. 1 Distribution of *Glyceria striata* (Lam.) Hitchc. in Europe (org.).

the new and previous localities of *Glyceria striata* known from Poland. Phytosociological relevés were done at the localities using the Braun-Blanquet method [18]. The communities were classified in classes (Cl.), orders (O.), alliances (All.) and plant associations (Ass.) based on the most recent edition of a syn-taxonomic study by Matuszkiewicz [19]. Taxon nomenclature was adopted after Mirek et al. [20].

The newly collected herbarium material from Poland was compared with the material from the two localities previously known in Poland to assure the accuracy of the identification of the taxon. The entire herbarium material of *Glyceria striata* and related taxa deposited in the herbaria KRA and KRAM were also verified.

The distribution of *G. striata* was mapped using only literature data and topographic maps of individual countries in Europe and new discoveries in Poland. A chronological list of the localities was made for each of these countries. Where the exact date of the record at a locality was not specified, we accepted the date of the first publication as the date of the species' first occurrence.

Results

Distribution in Europe

A total of 48 localities of *G. striata* scattered in 13 countries has been reported in Europe (Fig. 1), based on literature data and the new discoveries in Poland (Fig. 2). A chronological list of these localities, including the date of the first record, is given below.

FRANCE

1. 1849 Meudon near Paris [Grenier and Gordon (1856; cited in [21])];
2. 1952 Preussin (Dép. Ain) near the Swiss border [22];
3. 2000 Puvenelle national forest in Lorraine, S of Metz [23].

SWITZERLAND

4. 1953 Mategnin near Geneva [24];
5. 1957 Unterwalden between the Alps and Sarnen [25];
6. 1967 Zürich – Hüttnersee [25].

AUSTRIA

7. 1966 Glanegg by railway lines, between St. Veit and Feldkirchen in Carynthia – Kärnten [26];
8. 1982 Längsee – St. Georgen in Carynthia – Kärnten [27];
9. 1987 Nordwestlich (Windischgarsten) in Upper-Austria (Oberösterreich) [9];
10. 1990 between Eis and Wuderstätten in Carynthia – Kärnten [28];
11. 1990 Pyhrn, near a hospital in Upper-Austria (Oberösterreich) [9];
12. 1997 Steiermark in Upper-Austria (Oberösterreich) [29];
13. 2000 Salzburg in Upper-Austria (Oberösterreich) [21].

GERMANY

14. 1971 Dinkelberg close to Degerfelden in Schwarzwald [30];
15. 1979 Bad Rothenfelde near Osnabrück [31];
16. 1988 Wendland [Haeupler and Schönfelder (1988; cited in [32])];
17. 1989 Loisach-Kochelsee-Moore in Bavaria [32];
18. 1989 Staffelseegebiet in Bavaria [32];
19. 1992 Neuwied-Rodenbach between Bonn and Remagen, along the Rhine in Westphalia [33].

LICHTENSTEIN [34]

20. 1972 general date.

Tab. 1 Features that distinguish two subspecies of *Glyceria striata* (Lam.) Hitchc.

Features	<i>G. striata</i> subsp. <i>striata</i>	<i>G. striata</i> subsp. <i>stricta</i> (Scribner) Fernald.
Stems	Usually taller than 50 cm	Usually shorter than 50 cm
Leaves	Over 7 mm wide and flat; leaf sheaths not closed to the top	Up to 5 mm wide and folded; leaf sheaths closed to the top
Panicle	10-30 cm long, lax, pendant or drooping	ca. 5-15 cm long, more or less compact, pendant or drooping
Spikelets	Up to 4 mm long, usually green	Up to 4.5 mm long, usually purple or purple-tinged
Lemmas	Weakly membranous; bottom lower lemma 1.5-1.8 mm long	Widely membranous; bottom lower lemma 2-2.2 mm long

Differences according to Scoggan [3], Holub [12] and Conert [13].

SWEDEN

21. 1975 Hult, 15 km ENE of Huskvarna, Smaland region [35];
22. 1983 2-3 km N of Köping, Öland island [36];
23. 1983 2-3 km N of Gärdslösa, Öland island [36];
24. 1985 900 m SW of a farm in Väderstad, Östergötland region [36];
25. 1991 500 m ENE of Snösbäck, close to Falköping [36];
26. 1993 600 m W of Västanbäck, close Hässjö on the E coast [36].

UKRAINE

27. 1976 Belaja Cerkov near Kiev [14,37].

POLAND

28. 1981 Sieraków in the Wyzyna Częstochowska upland [8];
29. 2000 Białowieża Old-Growth Forest near the Narewka river [38];
30. 2009 3 km E of Nagłowice (Płaskowyż Jędrzejowski plateau) – a new locality;
31. 2010 Tarnawa Dolna, ca. 6 km N of Sucha Beskidzka (Beskid Makowski) – a new locality.

FINLAND

32. 1987 Suomenlinna, a town on an island S of Helsinki [39].

SLOVENIA [28]

33. 1988 between Gortina and Vuzenice in Dravska Dolina;
34. 1988 Radlje, ENE of Vuzenice;
35. 1989 Ig town and its vicinity, S of Ljubljana;
36. 1990 Drenov Grič, SW of Ljubljana (by the E61);
37. 1990 moist forest adjacent to Bevke village, SW of Ljubljana (near the E61);
38. 1994 Bevke village.

CZECH REPUBLIC [11]

39. 1995 Kateřinice, SE of Góra Chladná, Březiny valley;
40. 1996 Kateřinice, NE of the village, Březiny valley;
41. 1996 Ratiboř, on the bank of a pond, N of the village;
42. 1996 Ratiboř, E of the village;
43. 1997 Mikulůvka, W of the village;
44. 1997 Hošťalková, SW of the village, on the N slope of the Tisový mount.

ITALY [10]:

45. 1996 2.5 km NW of Civezzano (right side of the road north of Campagnaga), near Trentino.

RUSSIA

46. 1999 NW of Smolensk, around the Rytöye lake [40];
47. 2002 vicinity of Moscow, general date [38];
48. 2005 Pochinok (Smolensk region), S of Smoleńsk on the Khmara river [41].

New localities in Poland

WYŻYNA MAŁOPOLSKA UPLAND

The new locality of *Glyceria striata* in the Wyzyna Małopolska upland was discovered in 2009 during floristic studies in the Płaskowyż Jędrzejowski plateau in the Niecka Nidziańska basin macroregion. It is located near the Zdanowice-Zawodzie village, ca. 3 km east of Nagłowice (Fig. 3) in the southern part of square EE 91, 10 × 10 km (Fig. 2). There is a meadow, ca. 200 m wide, which cuts into a fairly vast complex of fresh pine forests to the northwest and reaches farming fish ponds.

G. striata occurs abundantly in a disused, slightly peaty meadow. After it was abandoned, the meadow has transformed into tall sedge reeds (*Caricion elatae*) of the order *Magnocaricion*, resembling the sharp sedge association (*Caricetum gracilis*). This is consistent with the considerable number of the representatives of the species of the class *Molinio-Arrhenatheretea* (order *Molinietales*, *Calthion* alliance) and the belt arrangement of plots corresponding to the adjacent meadow patches. The phytosociological relevé is presented below.

Relevé 1. 2010.06.11. 3 km E of Nagłowice 50°40'35.50" N/20°09'07.27" E. Area: 100 m².

C-100%: *Glyceria striata* 3. Ch.All. *Magnocaricion*: *Carex gracilis* 4; *C. rostrata* +; *Galium palustre* +. Ch.Cl. *Phragmitetea*: *Phragmites australis* +. Ch.O. *Molinietales*: *Climacium dendroides* d 2; *Angelica sylvestris* 1; *Cirsium rivulare* 1; *Equisetum palustre* 1; *Caltha palustris* +; *Crepis paludosa* +; *Lychnis flos-cuculi* +; *Polygonum bistorta* +. Ch.Cl. *Molinio-Arrhenatheretea*: *Carex distans* 2; *Ranunculus repens* 1; *Bellis perennis* +; *Cardamine pratensis* +; *Holcus lanatus* +; *Lysimachia vulgaris* +; *Plantago lanceolata* +; *Rumex acetosa* +; *Taraxacum officinale* agg. +. Other: *Carex panicea* 1; *Juncus articulatus* 1; *Carex flacca* +; *C. spicata* +; *Eleocharis uniglumis* +; *Mentha arvensis* +.

As the phytosociological relevé shows, *Glyceria striata*'s presence in this community is highly significant. It occurs in patches, stretching from the SW edge of the meadow complex to its NE border, giving the area a specific form. Purple-coloured spikelets of *G. striata* create a rippling, dark (almost black) ribbon-like strip and form of a visually distinct community. *G. striata* is also scattered throughout the meadows, although it occurs solely in wet phytocoenoses, in which mowing and cattle pasturing have been discontinued. A sample of a community of the class *Molinio-Arrhenatheretea*, represented by the *Cirsietum rivularis* association, is provided below.

Relevé 2. 2010.06.11. 3 km E of Nagłowice 50°40'22.55" N/20°09'28.02" E. Area: 100 m².

C-100%: *Glyceria striata* 1. Ch.Ass. *Cirsietum rivularis*. Ch.All. *Calthion*: *Cirsium rivulare* 3; *Polygonum bistorta* +. Ch.O. *Molinietales*: *Angelica sylvestris* 1; *Climacium dendroides* d 1; *Equisetum palustre* 1; *Galium uliginosum* 1; *Deschampsia caespitosa* +; *Lychnis flos-cuculi* +; *Lysimachia vulgaris* +. Ch.Cl. *Molinio-Arrhenatheretea*: *Holcus lanatus* 2; *Ranunculus repens* 2; *Festuca pratensis* 1; *Festuca rubra* s.l. 1; *Poa pratensis* 1; *Rumex acetosa* 1; *Cerastium holosteoides* +; *Lathyrus pratensis* +; *Plantago lanceolata* +; *Taraxacum officinale* agg. +; *Trifolium pratense* +. Ch.Cl. *Phragmitetea*: *Phragmites australis* 2; *Carex gracilis* +; *Galium palustre* +. Other: *Anthoxanthum odoratum* 2; *Geum rivale* 1; *Briza media* +; *Carex canescens* +; *C. nigra* +; *C. panicea* +; *C. spicata* +; *Polygonum amphibium* +.

The abundance of the *Glyceria striata* population at this locality in Poland is very high – over ten thousand specimens have been observed there. Based on taxonomic characters, they represent the taxa *Glyceria striata* subsp. *stricta* (Scribner) Fernald., similarly to other European localities [12].

WESTERN CARPATHIAN MTS.

The new locality of *Glyceria striata* in the Western Carpathian Mts. was found in 2010 between the Tarnawa Dolna village and Skawce village (Fig. 4), ca. 6 km north of Sucha Beskidzka in the central part of the Beskid Makowski Mts. (the Beskid

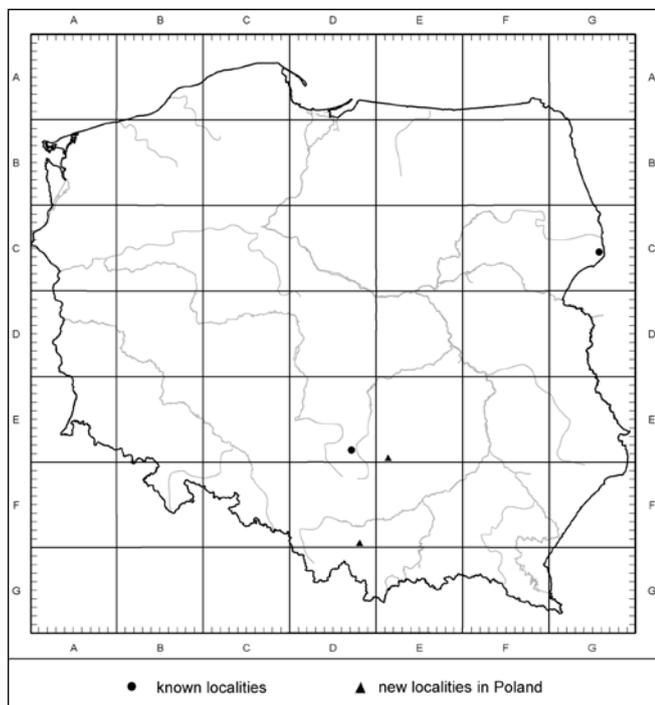


Fig. 2 Distribution of *Glyceria striata* (Lam.) Hitchc. in Poland.

Średni Mts., square DF 97 10 × 10 km, in the ATPOL grid, Fig. 2). This is the first record of the species in the Carpathian Mts. It was discovered on a wet margin of a relatively poor oak-lime-hornbeam forest growing on the orographically left slope of the Skawa river valley. The *Glyceria striata*-patch of the community is located in a small terrain depression and is adjacent to a shallow ravine of an old, disused bridle path. A new section of the national Wadowice-Nowy Sącz road, built as part of the current construction of a water reservoir in Świnna Poręba, is in its close proximity. The floristic composition of the oak-lime-hornbeam forest does not differ from other patches of the *Tilio-Carpinetum* association recorded quite commonly on the slopes of the Skawa river valley in its middle reaches. These oak-lime-hornbeam forests represent a poor variant of the association or are similar to it. Species composition of the phytocoenosis is illustrated by the phytosociological relevé presented below.

Relevé 3. 2010.08.30. Tarnawa Dolna, ca. 6 km N of Sucha Beskidzka, near the border of Skawce village, ca. 321 m a.s.l.; 49°47.672' N/19°34.945' E; area of the relevé 100 m²; NEE exposure.

A-30%: Ch.All. *Carpinion betuli*: *Carpinus betulus* 2. Other: *Acer pseudoplatanus* 1. B-5%: Ch.O. *Fagetalia*: *Corylus avellana* +. C-90%: Ch.All. *Carpinion betuli*: *Carpinus betulus* 1; *Cerasus avium* +; *Tilia cordata* +. Ch.O. *Fagetalia*: *Carex sylvatica* 3; *Galeobdolon luteum* 1; *Pulmonaria obscura* 1; *Viola reichenbachiana* 1; *Asarum europaeum* +; *Euphorbia amygdaloides* +; *Impatiens noli-tangere* +; *Polygonatum multiflorum* +; *Ranunculus lanuginosus* +; *Stachys sylvatica* +. Ch.Cl. *Quercus-Fagetea*: *Aegopodium podagraria* 2; *Brachypodium sylvaticum* 2; *Corylus avellana* 1; *Salvia glutinosa* 1; *Acer platanoides* +; *Campanula trachelium* +; *Euonymus europaea* +; *Fraxinus excelsior* +; *Poa nemoralis* +. Other: *Glyceria striata* 4; *R. repens* 3; *Cirsium palustre* 1; *Galeopsis speciosa* 1; *Juncus effusus* 1; *Tussilago farfara* 1; *Acer pseudoplatanus* +; *Ajuga reptans* +; *Alchemilla* sp. +; *Alnus incana* +; *Angelica*

sylvestris +; *Athyrium filix-femina* +; *Carex remota* +; *Carex* sp. +; *Centaureum erythraea* subsp. *erythraea* +; *Cirsium arvense* +; *C. vulgare* +; *Conyza canadensis* +; *Cornus sanguinea* +; *Crataegus* sp. +; *Daucus carota* +; *Deschampsia caespitosa* +; *Dryopteris* cfr. *carthusiana* +; *Epilobium* sp. +; *Equisetum arvense* +; *Erigeron annuus* +; *Festuca gigantea* +; *Frangula alnus* +; *Gnaphalium sylvaticum* +; *Hypericum perforatum* +; *J. tenuis* +; *Maianthemum bifolium* +; *Mentha* sp. +; *Oxalis acetosella* +; *Oxalis fontana* +; *Picris hieracioides* +; *Plantago major* +; *Polygonum* cfr. *mite* +; *P. persicaria* +; *Quercus robur* +; *Ranunculus acris* +; *Rubus caesius* +; *R. hirtus* +; *R. cfr. wimmerianus* +; *Rumex obtusifolius* +; *Salix caprea* +; *Sambucus nigra* +; *Solidago gigantea* +; *S. virgaurea* +; *Symphytum officinale* +; *Tanacetum vulgare* +; *Taraxacum officinale* agg. +; (*Anemone nemorosa* and *Poa trivialis* probably also occur in the patch but were not observed due to the timing of the relevé). D-5%: *Brachythecium rutabulum* +; *Bryum* sp. +; *Calypogeia aurea* +; *Catharinea undulata* +; *Dicranella heteromalla* +; *Eurynchium hians* +; *Fissidens adiantoides* +; *Homalothecium sericeum* +; *Polytrichastrum attenuatum* +.

The number of the species recorded in the patch is high. Some of them, such as the meadow species, are accidental taxa and come from other communities. This fact is associated with the location of the patch, which is near the edge of a forest complex. Disturbance indications are observed in the patch and a few species of anthropophytes are recorded. Phytosociologically, the patch resembles the *Tilio-Carpinetum* stachyetosum subassociation and communities belonging to the *Alno-Padion* alliance. The *Glyceria striata* patch is adjacent to patches of a typical oak-lime-hornbeam forest in which it was not recorded. It grows, however, along a small (periodical?) water course in an area without vegetation formed after the slope was partially levelled during the construction of a new road section.

Characters observed in the herbarium specimens of *Glyceria striata* collected from the Western Carpathian Mts. are typical of the subspecies (variety) *G. striata* subsp. *striata*, previously reported from Europe only from Czech Republic [11].

Remarks on migration routes

Two migration routes of *Glyceria striata* from native North America may be proposed on the basis of the map of its distribution in Europe (Fig. 1). One route runs from the northeastern part of N America across the northern Atlantic and reaches the Scandinavian Peninsula, where seven localities of *Glyceria striata* are recorded. The second route runs more southwards, reaching western and central Europe, and seems to be the source of the majority of the European populations of *G. striata*. This route is consistent with the greatest number of localities and their density in the Alps region (Switzerland, Austria, Lichtenstein, Slovenia, northern Italy and southern Germany; Fig. 1).

G. striata has probably migrated to Czech Republic (Moravia) from this region, then spread through the Moravian Gate to central and NE Poland. The species may have migrated from Poland to Ukraine and farther to Russia, although the localities in the vicinity of Moscow and Smolensk may have been a result of migrations from the Scandinavian populations. A northward migration route is also possible in Europe as the species has its localities in northern Germany (the vicinity of Bonn and in Wendland). The species may also have migrated to the Scandinavian Peninsula from there.

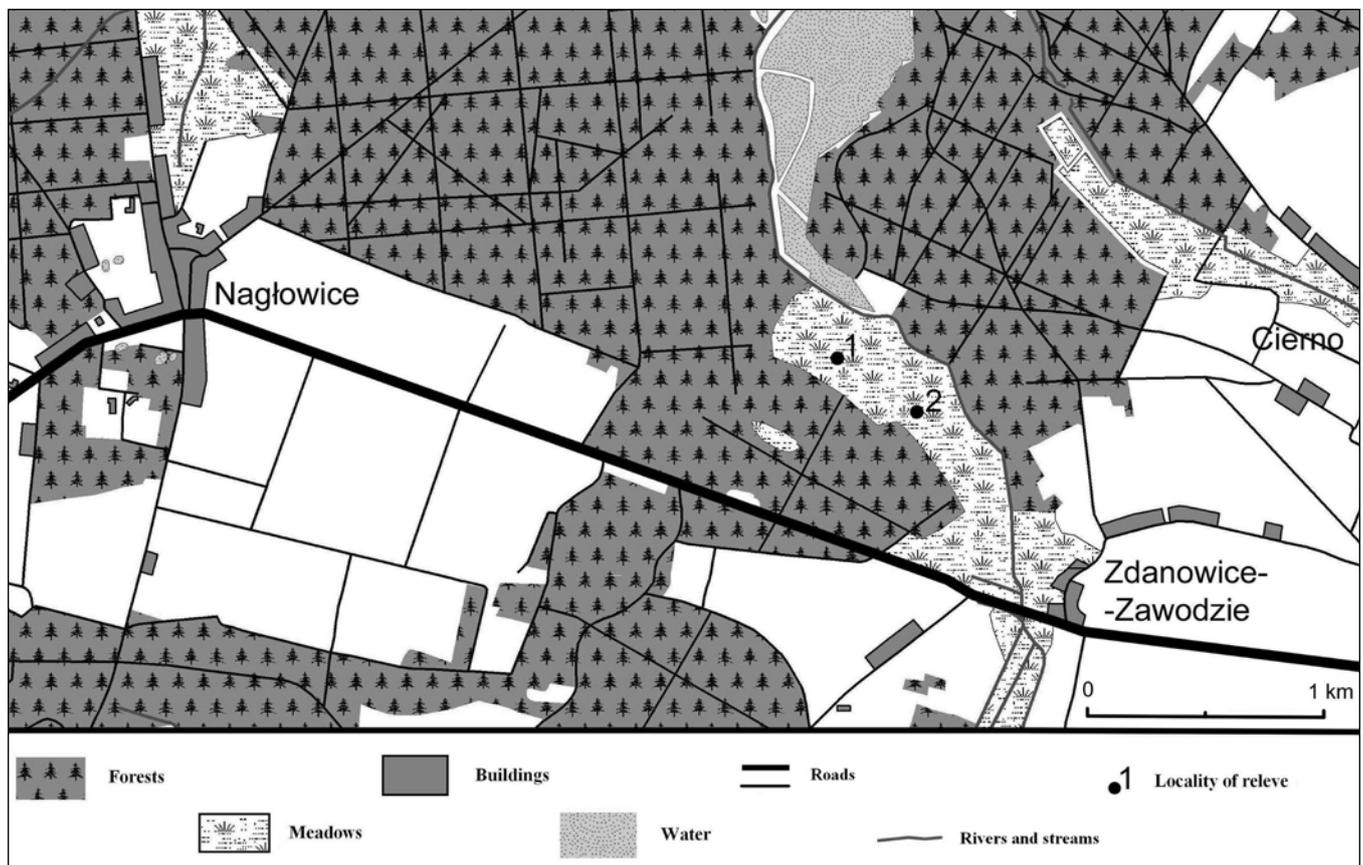


Fig. 3 A detailed location of the new locality of *Glyceria striata* (Lam.) Hitchc. in the Płaskowyz Jędrzejowski plateau (Wyżyna Małopolska upland).

These routes of migration of *G. striata* in Europe should be treated as hypothetical. It is not impossible that many European localities come directly from the species' native N America. Detailed genetic examinations of individual populations are necessary in order to determine the specific migration routes.

Status in the geographic-historical classification

Although *G. striata* occurs in frequent or common habitats at almost all its European localities, it is recorded only at very few sites. The species may not spread effectively (e.g. by wind) or it spreads very slowly, and an intermediate factor is vital for the propagation. Animals (birds) are the most likely factors responsible for macro (North America – Europe) and micro (European localities) transfer. Many European localities are situated near railway lines or buildings, and anthropogenic factors may also play an important role.

Therefore currently *G. striata* is not an expansive species and it does not have an invasive potential. It cannot be placed unequivocally in the geographic-historical classification by Kornaś [42] and Tokarska-Guzik [43]. Rutkowski [44] classifies it as an ephemerophyte and Babczyńska-Sendek and Sendek [8] as a hemigrrophyte, which seems more likely taking into account the species persistence at one site for many years. Frey and Sokołowski [38] propose to classify it as a colonophyte. *G. striata*, according to the authors of the present paper, is a hemigrrophyte at the new locality in the Wyżyna Małopolska upland.

Some localities, e.g. in Poland [38], Slovenia [28] and France [23], are in natural forest communities (streamside carrs), often nearby transport routes. Other localities are on forest borders

(e.g. [11]). *G. striata* may slowly penetrate natural systems becoming a holoagrrophyte rather than a hemigrrophyte. This is the case in the second new locality in Poland in Tarnawa Dolna. The species, however, does not pose a major risk to native floras and it does not seem to expand or displace other species.

Discussion

Migration routes of *Glyceria striata* to Europe have not been fully explained. A likely and simple route is the transfer of seeds on bird feathers as suggested by Melzer [26], Haeupler [30] or Babczyńska-Sendek and Sendek [8]. However, birds mostly travel along a north-south line and flights along a horizontal line (Europe – America) are observed very rarely. Long-distance propagation by birds may be possible as diaspores could be transferred by avifauna on transatlantic cargo and passenger ships. As birds stop at wet meadows, pond banks, lakes, it is also highly probable that they play an important role in transporting seeds in the micro scale, that is within one continent.

G. striata propagules may have also travelled to Europe with seedlings of huckleberry [45] and as a component in mixes of high-yield grasses imported from the USA [9,27,46,47]. If this is the case, *G. striata* would be more frequent across Europe and would occur in vast, intensively cultivated meadows more commonly.

However, observations of the species at new localities and literature reports provide much different data on the sites of its occurrence. In Poland, *G. striata* occurs in small

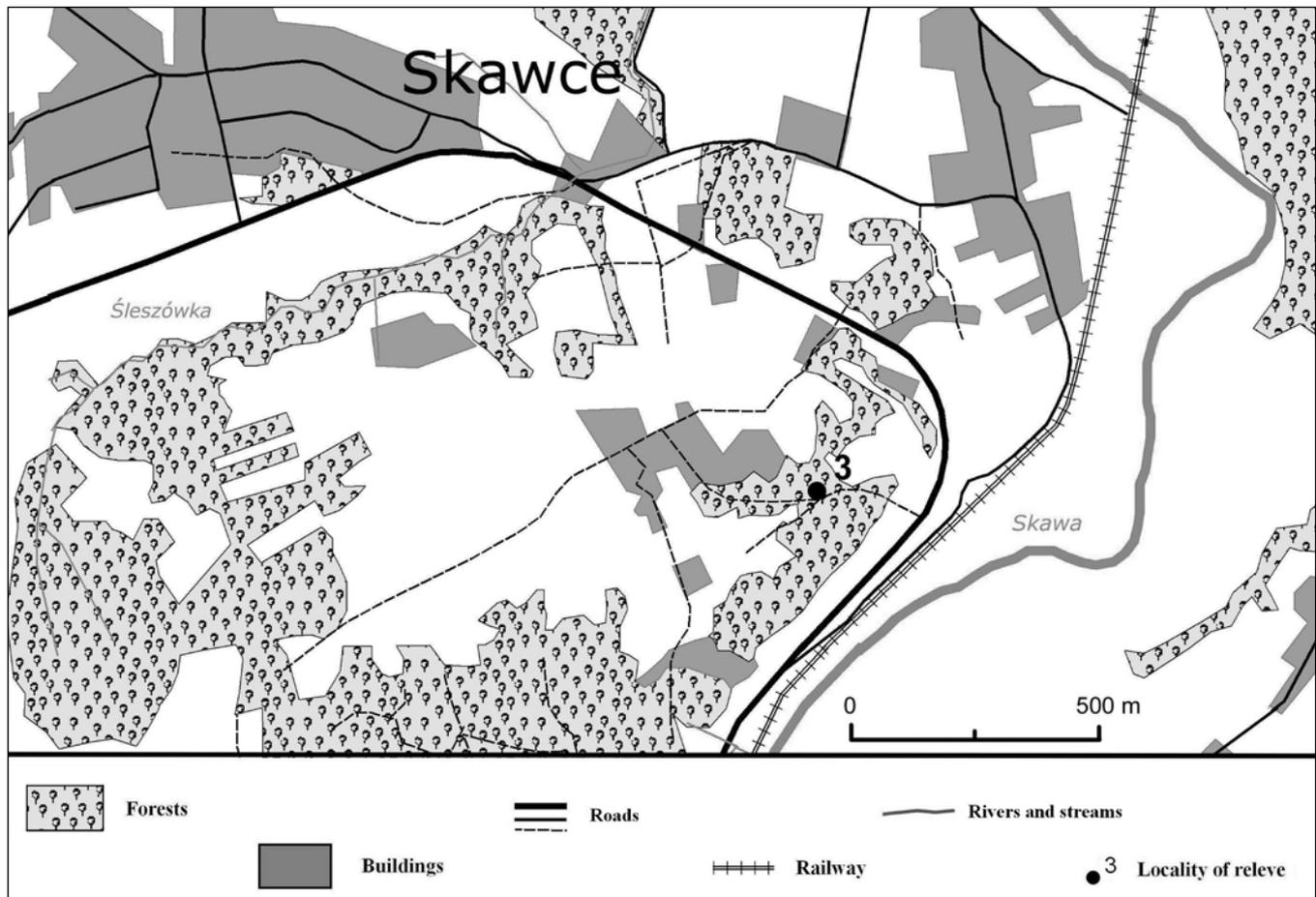


Fig. 4 A detailed location of the new locality of *Glyceria striata* (Lam.) Hitchc. in the Beskid Makowski Mts. (the Beskid Średni Mts.).

meadows surrounded by forests [8] and the streamside car in the Białowieża Old-Growth Forest [38]. In Germany, the species occurs in wet, narrow meadow patches in the Rhine valley [33] or near Osnabrück [31]. In the Alps region, *G. striata* is often recorded in small, local terrain depressions [9,21,26,28,32]. It is recorded at similar sites in Sweden [35,36], where it grows, e.g., in peat bogs surrounded by coniferous forests, in remote locations away from towns or villages. Synanthropic localities of *G. striata*, e.g. by railway lines [26], in wet habitats in towns and villages [28,39] or in their close proximity [9,11] have also been reported in the literature.

Korneck and Schnittler [33] also proposed that seeds and sterile parts of *G. striata* were present in imported horse fodder and suggested it may spread by horse hooves. However, today horses are used on farms infrequently, if not sporadically, and are mostly employed for leisure activities or in the tourist industry (horse riding, horse sleighs, etc.). This type of propagation over long distances seems not likely.

Raabe [31] proposes that seeds are transferred on car wheels or by railway transport. This would explain the occurrence of the species at synanthropic localities and at some forest localities (vehicles used in forest management works). This is also confirmed by Dančák [11] for some Czech localities.

Conclusion

Glyceria striata (Lam.) Hitchc. is a newcomer with interesting chorology in Europe. It occurs in wet sites, meadows, peat bogs, on the banks of ponds and rivers, and in local terrain

depressions, that are often located in synanthropic areas. Literature data show that habitats occupied by the species are acidic. Habitats of this type are very frequent in Europe but *G. striata* occurs only at a few sites and covers a relatively small area. This is probably caused by its difficulty in spreading and its low expansion potential.

The similarity between *G. striata*, especially *G. striata* subsp. *stricta*, and species of the genus *Poa* is a very important factor that influences the current knowledge of the species' distribution in Europe. It may be often mistaken or overlooked and ignored by inexperienced botanists. In Europe *G. striata* may potentially occur in: Great Britain, Holland, Belgium, Denmark, Norway, Slovakia, Hungary, Belarus, and Lithuania, Latvia and Estonia. The species is likely to be already occurring in these countries with its localities still to be discovered.

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