ANNALES
UNIVERSITATIS MARIAE CURIE-SKŁODOWSKA
LUBLIN – POLONIA
VOL. LV SECTIO C 2000

Instytut Biologii UMCS
Zakład Systematyki Roślin

DOMINIK FIJAŁKOWSKI, KAZIMIERZ KARCZMARZ

Atlantic plants in the flora of the Lublin Region

Rośliny atlantyckie we florze Lubelszczyzny

INTRODUCTION

Atlantic plants are also distinguished as an Atlantic element. They represent in the Lublin Region the relict flora which predominated in the postglacial period of the Atlantic climate (before 7700-5100 B.P.). This has been documented by detailed palinological researches in Poland (14). Due to progressing temperature decrease the number of their species decreased in favour of central European boreal and cosmopolitic plants.

Studies of atlantic plants are significant not only from the scientific and paleoclimatic but also from the economic point of view. Therefore, they can be good indicators of the climatic, pedological and water conditions. Numerous species of these plants can determine areas for plant cultivation. In forestry they concern cultivation of beech , fir, maple and broad leaved lime trees. Oligotrophic water reservoirs are places of the occurrence, e.g., of: *Myriophyllum alterniflorum, Potamogeton perfoliatus* and *Isoëtes lacustris*. Acid peat bogs are determined by the presence, e.g., of: *Drosera intermedia, Hydrocotyle vulgaris* and *Rhynchospora fusca*. Sands, however, are habitats of *Anthoxanthum aristatum, Hypochoeris glabra, Ornithopus perpusillus, Teesdalea nudicaulis* and moist localities, e.g., of *Illecebrum verticillatum* and *Radiola linoides*.

METHODS

The basis for analysis of the atlantic species were publications prepared from field studies and summarized in synthetic works largely by Fijałkowski (5-6), Fijałkowski and Izdebski (7), Karczmarz and Paczos (8). The classification of the species dealt with was based on the

publications of: Czeczott (1), Czubiński (2), Fijałkowski (5), Matuszkiewicz (9), Piotrowska (11) and Sulma (13).

By the dot method the authors have listed in Figure 1: 2,180 localities, 27 species of 31 rarer ones classified into the atlantic groups of a broad ecological amplitude. Atlantic plant groups of similar ecological requirements are listed in Figures 2-5. The nomenclature of species has been given according to Mirek et al. (10).

A LIST OF ATLANTIC PLANTS

Atlantic plants are differentiated into three groups: euatlantic, subatlantic and pseudoatlantic. The first group is represented in the Lublin Region only by *Ornithopus perpusillus*. To the second group belong 16 species, and 14 to the third one. In the alphabetic order these species are:

1. *Aldrovanda vesiculosa* L. – o
2. *Anthoxanthum aristatum* Boiss.
3. *Carex punctata* Gaudin
4. *Cladium mariscus* (L.) Pohl
5. *Corynephorus canescens* (L.) P. Beauv.
6. *Drosera intermedia* Hayne – o
7. *Elatine hydropiper* L. em. Oeder
8. *Euphrasia nemorosa* (Pers.) Wallr.
9. *Galium sylvaticum* L.
10. *Groenlandia densa* (L.) Fourr.
11. *Hydrocotyle vulgaris* L.
12. *Hypericum humifusum* L.
13. *Hypochoeris glabra* L.
14. *Illecebrum verticillatum* L.
15. *Isoëtes lacustris* L. – o
16. *Isolepis setacea* (L.) R. Br.
17. *Juncus squarrosus* L.
18. *Littorella uniflora* (L.) Asch. – o
19. *Lycopodiella inundata* (L.) Holub
20. *Myriophyllum alterniflorum* DC.
21. *Najas flexilis* (Willd) Rostk. & W. L. Schmidt
22. *Ornithopus perpusillus* L.
23. *Osmunda regalis* L. – o
24. *Pedicularis sylvatica* L.
25. *Radiola linoides* Roth
26. *Rhynchospora fusca* (L.) W. T. Aiton – o
27. *Sarothamnus scoparius* (L.) Wimm.
28. *Sparganium minimum* Wallr.

29. *Spergula morisonii* Boreau
30. *Teesdalea nudicaulis* (L.) R. Br.
31. *Utricularia ochroleuca* R. W. Hartm.

"o" = this species is protected by law.

Table 1 presents the percentage of the particular Atlantic species in the classes of plant associations, while Table 2 shows the quantitative occurrence of Atlantic plant stands in the geobotanical areas of the Lublin Region.

As it appears from Table 2 and Figure 1 the most numerous Atlantic species are found in the Łęczna-Włodawa Lake District (461 stands) and Puszczańska Plane (325). Their localities are much less numerous on the Chełm Hillocks (143), Łuków-Siedlce Elevation (233), in Łomazy Depression (138) and Central Roztocze (103).

Atlantic species (Fig. 1) are concentrated largely on acid and wet soil covered with plants of the class *Nardo-Callunetea* and *Scheuchzerio-Caricetea fuscae* (11 and 9 species). They occur a little more rarely in communities of the classes *Lemnetea*, *Potamogetonetea* (8), *Phragmitetea* (6) and very local in arable fields amongst segetal vegetation of the class *Secalietea* (Table 1).

In Figures 2-5 localities of plants have been summarized according to the ecological groups of species associated with: a water habitat (Fig. 2), wet mineral and mineral-peaty ground (Fig. 3), forest and brushwood (Fig. 4) and synanthropic habitat (Fig. 5). Main concentrations of water and water-peaty species (Fig. 2) are observed in the Łęczna-Włodawa Lake District and on the Puszczańska Plane. Single localities of these species occur in other regions. Identical groups are formed by peaty plants which still penetrate to Central Roztocze onto carbonate peat-bogs of the Chełm Hillocks. Carbonate peat-bogs are characterized by a saw sedge concentration of many hectars as unique in Eastern Europe.

Two distinct concentration groups of Atlantic species localities are connected with forest and brushwood habitats (*Osmunda regalis*, *Euphrasia nemorosa*, *Galium sylvaticum*, *Sarothamnus scoparius*). The three last species often occur in the whole northern Lublin Region, the Chodel Valley and Central Roztocze (the Wieprz river valley).

The Atlantic plants form two large groups associated with sandy soils of the subregions: Little Mazovia, Polesie and Podlasie. They are separated southwards by the Lublin Upland and Roztocze. Very numerous localities of these plants predominate on the Puszczańska Plane.

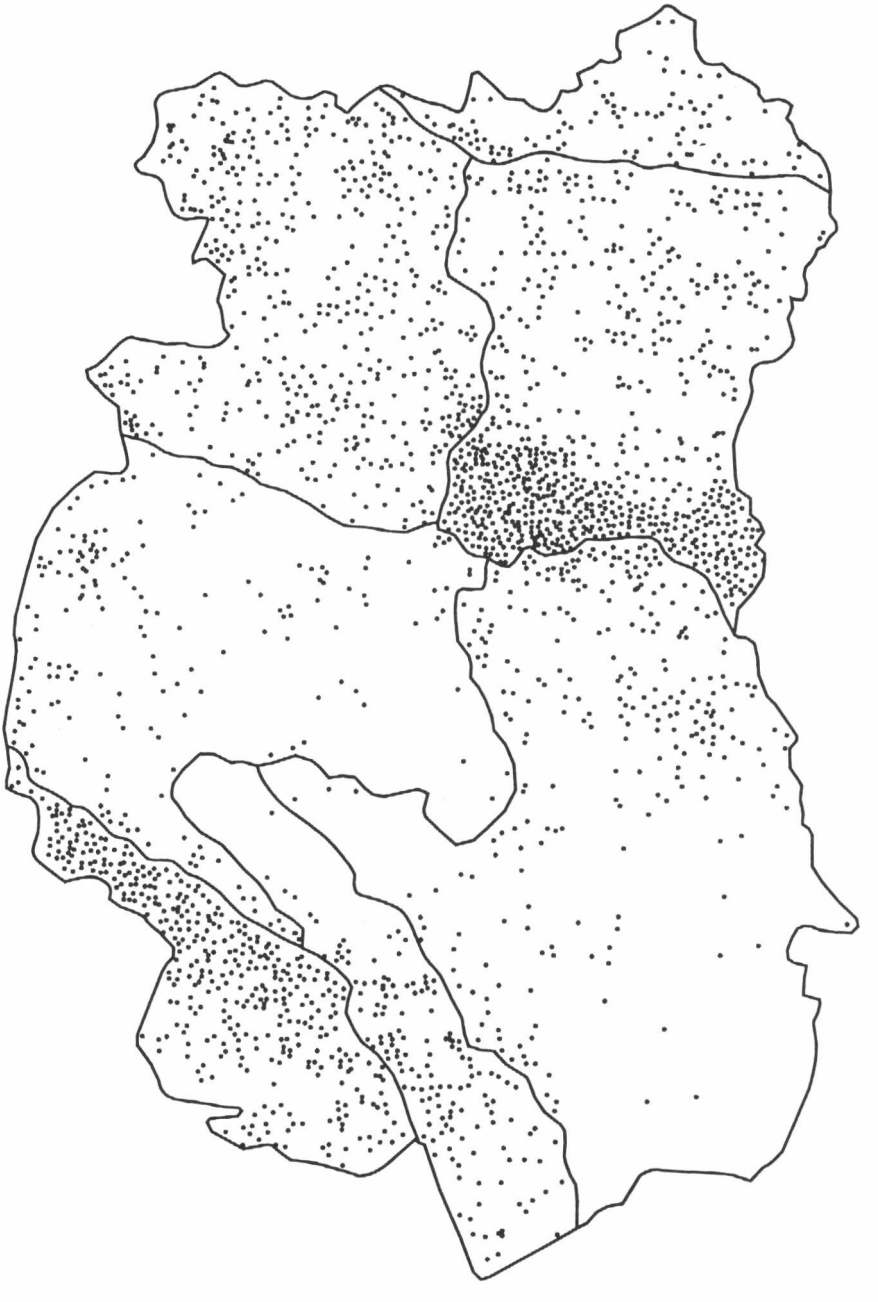

Fig. 1. General distribution of localities of 31 atlantic species

Table 1. Correllation of Atlantic species with the basic classes of plant associations

Species / Classes	Lemnetea, Potamogetonetea	Phragmitetea	Molinio-Arrhenatheretea	Scheuchzerio-Caricetea fuscae	Alnetea glutinosae	Salicetea purpureae i Alno-Padion	Querco-Fagetea	Nardo-Callunetea	Vaccinio-Piceetea	Sedo-Scleranthetea	Ruderal synanthropes	Segetal synathropes	General resources in ares
Aldrovanda vesiculosa	1	10	.	.	.	.	.	.	.	.	.	.	30
Anthoxanthum aristatum	.	.	.	.	.	.	.	.	.	.	.	10	30,000
Carex punctata	.	.	10	.	.	.	.	.	.	.	.	.	+
Cladium mariscus	.	8	2	.	.	.	.	.	.	.	.	.	90,000
Corynephorus canescens	.	.	.	.	.	.	.	+	1	9	.	.	50,000
Drosea intermedia	.	.	.	10	.	.	.	.	.	.	.	.	500
Elatine hydropiper	5	5	.	.	.	.	.	.	.	.	.	.	+
Euphrasia nemorosa	.	.	5	.	3	.	.	2	.	.	.	.	+
Galium sylvaticum	.	.	.	.	.	.	10	.	.	.	.	.	+
Groenlandia densa	10	.	.	.	.	.	.	.	.	.	.	.	+
Hydrocotyle vulgaris	.	.	2	5	+	+	.	3	+	.	.	.	250
Hypericum humifusum	.	.	.	.	.	.	.	1	.	.	.	9	400
Hypochoeris glabra	.	.	.	.	.	.	.	.	.	.	3	7	20
Illecebrum verticillatum	.	.	.	.	.	.	.	1	.	.	.	9	5
Isoetes lacustris	10	.	.	.	.	.	.	.	.	.	.	.	10
Isolepis setacea	.	.	.	6	.	.	.	4	.	.	.	.	1
Juncus squarrosus	.	.	.	2	.	.	.	8	.	.	.	.	25
Littorella uniflora	.	.	.	6	.	.	.	3	.	.	.	.	+
Lycopodiella inundata	.	.	.	7	.	.	.	4	.	.	.	.	10
Myriophyllum alternifolium	8	2	.	.	.	.	.	.	.	.	.	.	1,500
Najas flexilis	8	2	.	.	.	.	.	.	.	.	.	.	+
Ornithopus perpusillus	.	.	.	.	.	.	.	.	.	.	.	10	1
Osmunda regalis	.	.	.	.	8	.	2	+	.	.	.	.	3
Pedicularis sylvatica	.	.	.	10	.	.	.	.	.	.	.	.	+
Radiola linoides	.	.	.	1	.	.	.	.	.	.	.	8	400
Rhynchospora fusca	.	.	.	10	.	.	.	.	.	.	.	.	4
Sarothamnus scoparius	.	.	.	.	.	.	.	.	.	10	+	.	500
Sparganium minimum	10	.	.	.	.	.	.	.	.	.	.	.	2
Spergula morisonii	.	.	.	.	.	.	.	.	+	10	.	.	200
Teesdalea nudicaulis	.	.	.	.	.	.	.	+	.	3	.	7	900
Utricularia ochroleuca	5	5	.	.	.	.	.	.	.	.	.	.	+
Total	8	6	4	9	3	1	2	11	3	4	2	7	

Table 2. A list of Atlantic species and the number of their localities in geobotanical regions

Geobotanical regions / Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
Wysoczyzna Łukowsko-Siedlecka	.	5	.	.	56	5	.	1	1	.	13	x	32	1	.	.	29	.	7	.	.	4	.	1	x	.	21	4	x	53	.	233
Równina Lubartowska	.	3	.	.	63	11	.	4	2	.	4	x	21	.	.	4	22	1	3	.	3	2	.	.	x	.	17	16	x	28	.	204
Podokręg Białopodlaski	.	.	.	.	20	3	.	1	1	.	3	x	12	.	.	.	16	1	2	.	.	.	.	.	x	.	11	1	x	22	.	93
Zaklęsłość Łomaska	.	2	.	.	42	4	.	1	.	.	6	x	12	.	.	.	20	.	5	.	.	2	.	.	x	.	19	3	x	22	.	138
Wyniosłość Parczewska	.	.	.	.	32	4	.	1	.	.	1	x	12	.	.	.	15	.	2	.	1	2	.	.	x	.	16	.	x	22	.	108
Poj. Łęczyńsko-Włodawskie	40	.	2	2	46	70	.	3	.	4	23	x	16	2	2	11	70	2	13	33	5	1	.	3	x	2	20	60	x	33	2	465
Obniżenie Dubienki	.	.	.	17	7	4	.	.	.	.	.	x	2	.	.	.	1	.	.	.	1	.	.	2	x	.	9	2	x	5	.	50
Pagóry Chełmskie	4	1	.	21	26	13	1	.	3	.	.	x	4	.	.	2	10	.	3	.	.	.	.	4	x	.	13	20	x	17	1	143
Działy Grabowieckie	.	.	.	.	2	3	.	.	.	.	.	x	.	.	.	.	1	.	.	.	.	.	.	.	x	.	5	2	x	1	.	14
Grzęda Hrubieszowska	.	.	.	.	.	.	.	.	1	.	.	x	.	.	.	.	.	.	.	.	.	.	.	.	x	.	2	.	x	.	.	3
Padół Zamojski	.	.	.	3	3	1	.	.	.	.	.	x	1	.	.	.	2	.	1	.	.	.	.	5	x	.	7	4	x	1	.	28
Grzęda Łaszczowska	.	.	.	.	.	1	.	.	.	.	4	x	.	.	.	.	6	.	.	.	.	.	.	.	x	.	4	5	x	2	.	22
Płaskowyż Nałęczowski	.	.	.	.	2	.	.	1	2	.	2	x	1	.	.	1	.	.	1	.	.	.	.	.	x	.	4	2	x	4	.	20
Równina Bełżycka	.	.	.	.	4	.	.	1	.	.	1	x	1	.	.	1	1	.	.	.	.	.	.	.	x	.	5	.	x	2	.	16
Kotlina Chodelska	.	.	.	.	10	2	.	.	1	.	.	x	1	.	.	2	5	.	.	.	.	.	.	.	x	.	5	4	x	8	.	38
Wyniosłość Urzędowska	.	1	.	.	13	5	.	.	.	.	4	x	4	.	.	1	6	.	2	.	.	4	.	2	x	.	17	3	x	1	.	63
Płaskowyż Świdnicki	.	.	.	1	3	2	.	.	.	.	.	x	.	.	.	.	1	.	.	1	.	.	.	.	x	.	7	1	x	4	.	20
Wyniosłość Giełczewska	.	.	.	1	1	1	.	.	1	.	.	x	1	.	.	.	.	.	.	.	.	.	.	.	x	.	2	1	x	.	.	8
Podokręg Gorajski	.	.	.	.	.	.	.	.	.	.	1	x	2	.	.	.	1	.	.	.	.	.	.	.	x	.	1	1	x	.	.	6
Podokręg Szczebrzeszyński	.	.	.	.	4	2	.	.	.	.	2	x	1	.	.	.	1	.	.	.	.	.	.	1	x	.	.	1	x	.	.	12
Podokręg Zwierzyniecki	.	.	.	.	9	6	.	.	.	.	4	x	1	.	.	.	9	.	6	.	.	.	.	1	x	3	4	2	x	2	.	47
Podokręg Tomaszowski	.	.	.	.	16	4	.	.	.	.	4	x	3	.	.	1	8	.	4	.	.	1	1	1	x	1	7	3	x	2	.	56
Podokręg Horyniecki	22	.	.	.	12	2	.	.	.	.	.	x	.	.	.	.	5	.	.	.	.	.	.	.	x	.	6	.	x	1	.	26
Równina Puszczańska	.	16	.	.	53	31	.	1	.	.	34	x	18	20	.	1	41	.	22	.	.	1	1	3	x	10	13	27	x	33	.	325
Płaskowyż Tarnogórski	.	.	.	.	10	.	.	.	.	.	8	x	3	5	.	.	11	.	2	.	.	.	.	.	x	.	1	.	x	4	.	44
No. of species	44	28	2	45	434	174	1	14	12	4	114	x	148	28	2	24	281	4	73	34	10	17	2	23	x	16	216	162	x	267	3	2,182

x - very numerous localities

ECOLOGICAL AND PHYTOSOCIOLOGICAL CHARACTERISTICS OF ATLANTIC PLANTS

1. *Aldrovanda vesiculosa* L. – Bladder aldrovanda occurred aboundantly in the Łęczna-Włodawa Lake District as late as 30 years ago. At present not even one thousandth of its resources has remained. At several localities it has completely died out (e.g., on shores of the lakes: Brzeziczno, Turowolskie, Dratów and Nadrybie). It also became extinct in many peat ditches. Its already poor localities have been preserved largely on shores of the lakes: Uściwierz, Łukie, Moszne and Długie. It occurs there in shallow water among rushes of *Phragmition* alliance and crubs of *Sphagno-Salicetum cinereae* association, occupying local water patches together with *Utricularia intermedia, U. minor, Sphagnum palustre* and *S. squarrosum* (3) (Fig. 2).

2. *Anthoxanthum aristatum* Boiss. – Sweet scandet. It occurs most frequently in dense turfs of many areas on loose and weakly loamy sands. It accompanies fallows of many years – most frequently unseeded with rye. It also grows in other arable areas of low agriculture standard. The lagest patches with this predominating species were found on the Puszczańska Plane and in the Polesie National Park (Fig. 5).

3. *Carex punctata* Gaudin – Dotted sedge. It was found only in a dry meadow on the lake Czarne Włodawskie. This rare sedge occurs not numerously among communities of the *Cynosurion* alliance and the *Nardo-Callunetea* class (Fig. 3).

4. *Cladium mariscus* (L.) Pohl – Saw sedge. It is the most common Atlantic plant in regard to the areas it occupies, forming dense patches of many hectares most frequently accompanied by *Carex elata* and *Schoenus ferrugineus*. Over 80% of its areas have been drained and changed to hay-growing meadows which have been changed into communities of synanthropic plants totally useless from the point of agriculture. In the Lublin Region it accompanies more flooded communities of *Magnocaricion* alliance, connected with a high content (over 1%) of calcium carbonate. Hence these habitats known as carbonate fens. The largest dense stands of saw sedge under reservation protection occur in the environs of Chełm (Zawadówka, Brzeźno, Rozkosz, Bagno Bubnów) (Fig. 3).

5. *Corynephorus canescens* (L.) P. Beauv. – Clubawngrass. It often grows on sand dunes among communities of *Sedo-Scleranthetea* class. Here, it forms dense turfs together with *Calluna vulgaris, Festuca psammophila* and *Scleranthus perennis*. It occurs only on deforested patches of loose sands in the whole Lublin Region.

6. *Drosera intermedia* Hayne – Long-leaved sundew. Not long ago this plant was very numerous and frequently found in the Lublin Region. It was more abundant than round-leaved sundew. Due to draining of transitional bogs its numerosity decreased by over 80%. It appears almost solely in communities of

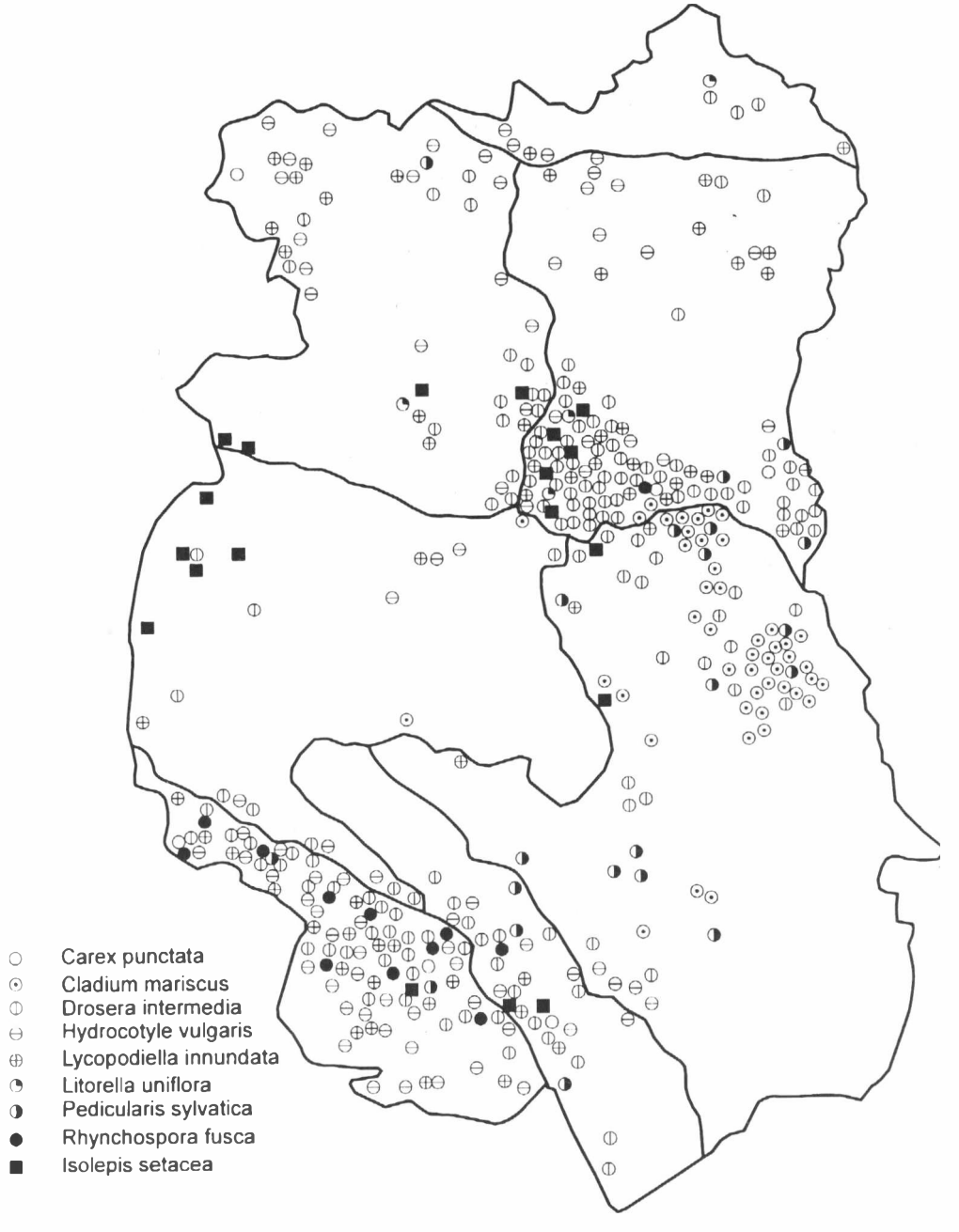

Fig. 2. Localities of 8 atlantic species of aquatic habitats

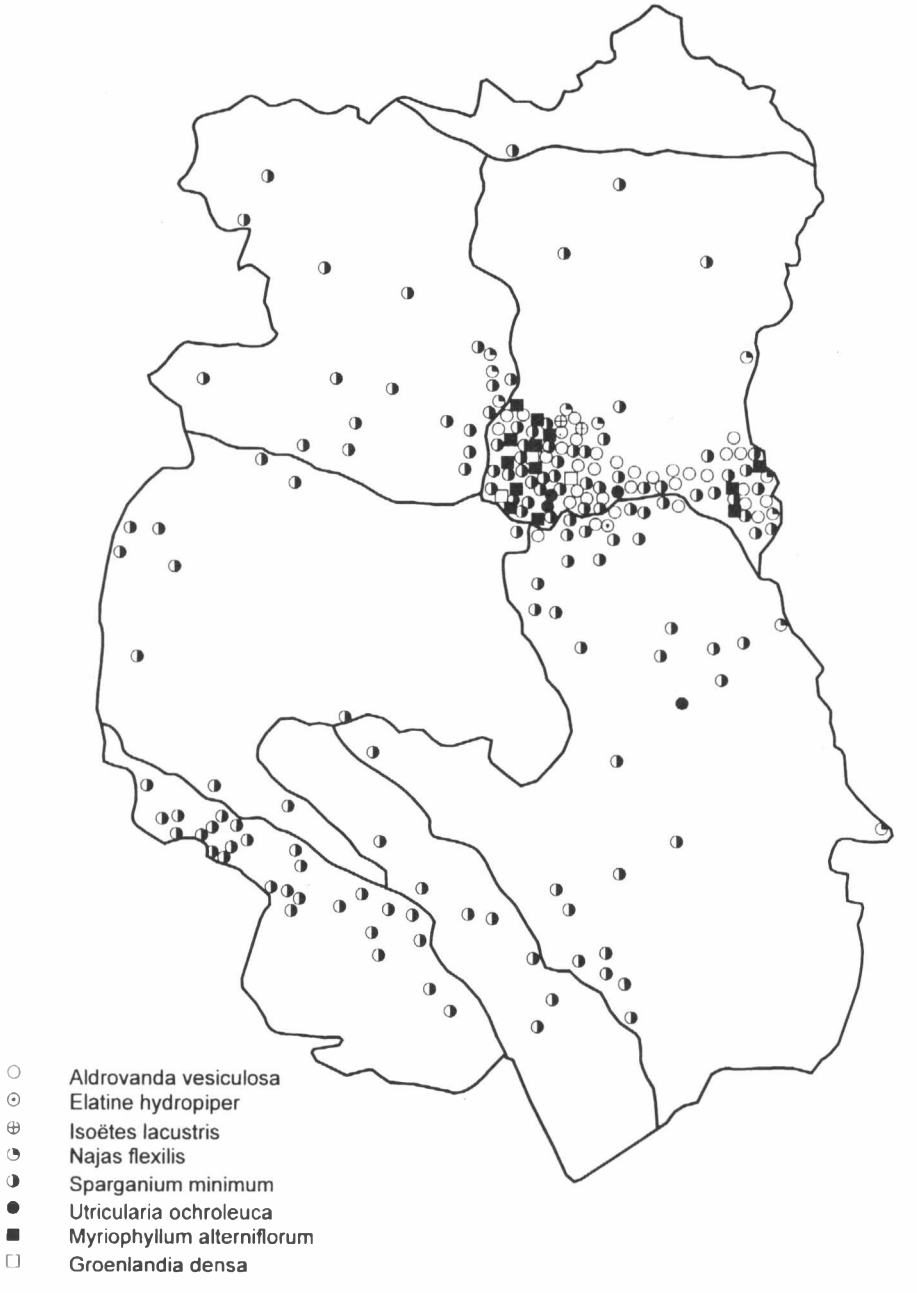

Fig. 3. Localities of 9 atlantic species of peaty and mineral-peaty habitats

the *Scheuchzerio-Caricetea fuscae* class, where it forms dense and loose sods. In the places of a too dense cover of *Sphagnum* species it transfers to dwelling places of wild pigs. It is also found numerously on exposed community sods of the *Nardo-Callunetea* class. Sometimes it occurs numerously (e.g. near Frampol) on little frequented banks of artificial water reservoirs, on sandy and acid wet ground (Fig. 3).

7. *Elatine hydropiper* L. em. Oeder – Waterwort. This plant was found unnumerously on the western shores of Piaseczno and Bialskie lake. They are eutrophizing oligotrophic reservoirs. Due to their development for recreational purposes this species has probably died out (Fig. 2).

8. *Euphrasia nemorosa* (Pers.) Wallr. – Wood eye-bright. Its single specimens occur most frequently in the zone of pine forests transition to purple mat-grass tufts of the *Nardo-Callunetea* class. The distribution of this plant requires further studies (Fig 4).

9. *Galium sylvaticum* L. – Wood Bedstraw. It occurs sporadically in light oak and mixed pine forests (*Serratulo-Pinetum*) (Fig. 4).

10. *Groenlandia densa* (L.) Fourr. (*Potamogeton densus* L.) – Dense pondweed. It was found in several lakes of the Łęczna-Włodawa Lake District, where it occurs very numerously in eutrophic waters. It is a disappearing species (Fig. 2).

11. *Hydrocotyle vulgaris* L. – Pennywort. It occurs frequently and numerously in very local damp or wet places. Rich localities have been preserved in transition bogs of the *Scheuchzerio-Caricetea fuscae*, high moor of the *Oxycocco-Sphagnetea* and in wet grasses of the *Nardo-Callunetea* class. On some lakes of the Łęczna-Włodawa Lake District (e.g.: Czarne Sosnowickie, Bialskie, Białe Sosnowickie) it grows in clusters in the zone of maximal range of lake waters. However, it has been trampled by men. Maximal concentration of its localities occurs only on the Puszczańska Plane (Fig. 3).

12. *Hypericum humifusum* L. – Trailing St. John's wort. A frequent plant growing numerously in corn-growing, rarely root crop places. It is always associated with wet soils, particularly in their zone adhering to river valleys and local depressions, most frequently preferring weakly-loamy sands.

13. *Hypochoeris glabra* L. – Smooth cat's ear. Not long ago it was a frequent plant growing in segetal habitats of the *Sisymbrietea* class on loose sands. It is associated with rye and potato cultivation, rarely lupin on dry sands. As it is very sensitive to herbicides its stands have been impoverished (Fig. 5).

14. *Illecebrum verticillatum* L. – Illecebrum. This species occurs sporadically but very numerously in some habitats of the Puszczańska Plane. It is associated largely with rye cultivation on wet, loose and weakly loamy sands of weak acid reaction (Fig. 5).

15. *Isoëtes lacustris* L. – Lacustrine quillwort. This very rare and disappearing species was found only in two lakes: Bialskie, Czarne Sosnowickie at

a depth of about 3 m. In them it is associated with sandy bottoms and oligotrophic and eutrophic water (Fig. 2).

16. *Isolepis setacea* (L.) R. Br. – Bristle *Scirpus*. It occurs sporadically on sandy banks of lakes, rarely of ponds, in the zone of the upper range of top waters. Due to recreational utilization of waters by holidey makers it has totally been trampled (Fig. 3).

17. *Juncus squarrosus* L. – Heath rush. It is frequently found on the Puszczańska Plane, rarely in the Łęczna-Włodawa Lake District. It is associated largely with acid (pH 3.5-4.5) and wet grass communities of the *Nardo-Callunetea* class. Sometimes it is attached in the transition zone of bog pine forests to purple moor-grass forests or young ones (Fig. 4).

18. *Litorella uniflora* (L.) Asch. – Shore-weed. It was found on the shore of Czarne Sosnowickie lake, growing on wet and acid sand in the upper range zone of lake waters (Fig. 3).

19. *Lycopodiella inundata* (L.) Holub – Marsh clubmoss. This small plant occurs relatively frequently, in some places commonly on the Puszczańska Plane, more rarely in the Łęczna-Włodawa Lake District. It is associated with wet and acid (pH 3.5-4.5) sands. Its most frequent occurrence is in turfs of the *Nardo-Callunetea* class, more rarely – *Scheuchzerio-Caricetea fuscae*. Dense clusters of it are formed on some banks of artificial water reservoirs, in the bottom of old ponds an in other places with ruined acid and wet turfs (Fig. 3).

20. *Myriophyllum alterniflorum* DC. – Alternate-flowered water milfoil. It occurs only in oligotrophic and oligotrophic-eutrophic lakes of the Łęczna-Włodawa Lake District (e.g.: Piaseczno, Bialskie, Łukcze, Obradowskie), most frequently forming a subaqueous dense carpets at a depth of 50-150 cm. It grows most often in the company of *Ceratophyllum demersum* and *Myriophyllum spicatum* (4) (Fig. 2).

21. *Najas flexilis* (Willd.) Rostk. & W. L. Schmidt – Slender naiad. In a few lakes and ponds of the Łęczna-Włodawa Lake District of eutrophic character (6) (Fig. 2).

22. *Ornithopus perpusillus* L. – Birdsfoot. It grows sporadically in rye cultivations on loose sands (Fig. 5).

23. *Osmunda regalis* L. – Royal fern. It was found only in two localities of the Puszczańska Plane near Huta Krzeszowska and Susiec. It accompanies light alder swamps and wet forests (*Molinio-Pinetum*). The former locality is the richest (Fig. 4).

24. *Pedicularis sylvatica* L. – Lousewort. There are several localities of its occurrence largely in the Łęczna-Włodawa Lake District. It is associated with transion bogs of the *Scheuchzerio-Caricetea fuscae* class (Fig. 3).

25. *Radiola linoides* Roth – All-seed, a plant of the flax family. It is a widespread species in the whole Lublin Region, but it is readily killed by herbicides. Its occurrence is numerous in wet stubble fields, particularly rye

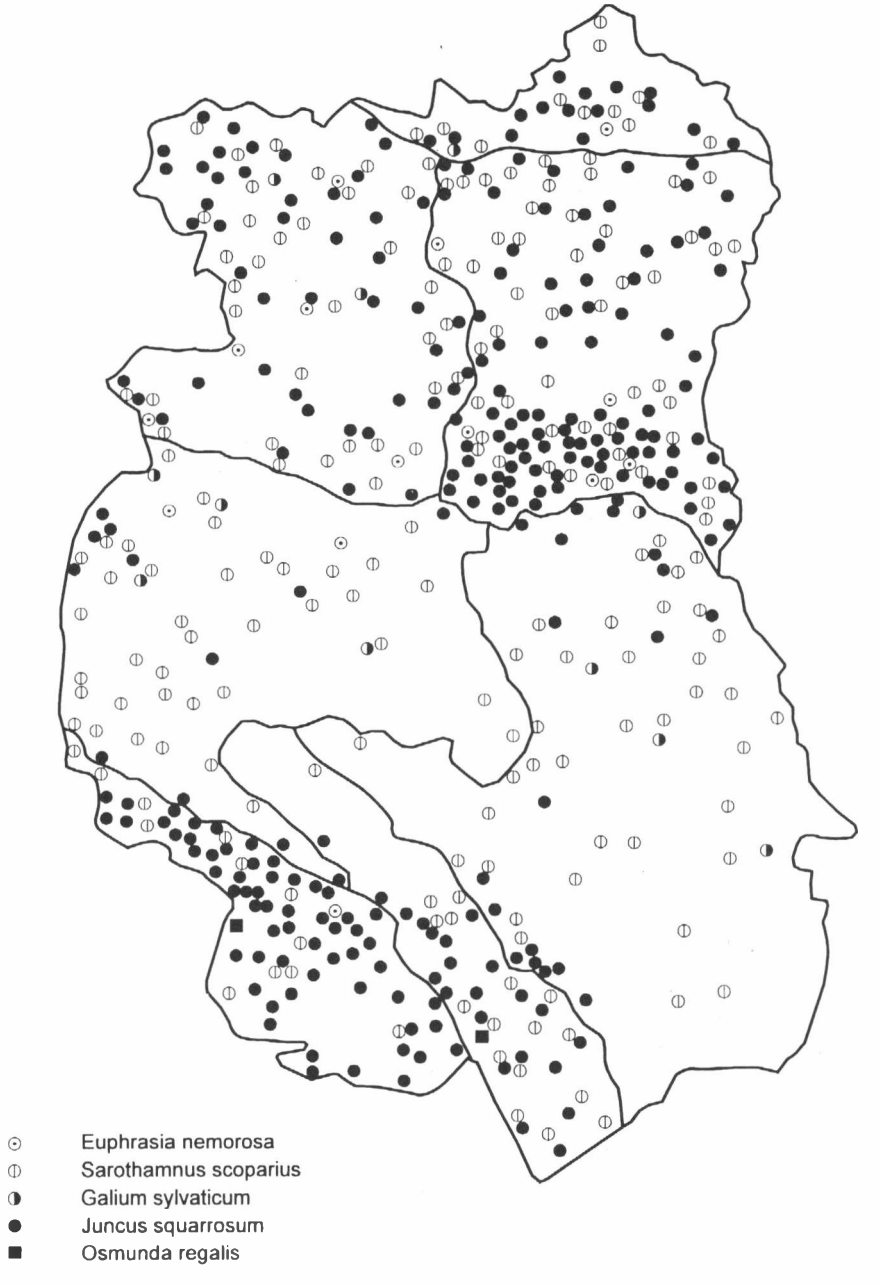

Fig. 4. Localities of 5 Atlantic species of forest and scrub habitats

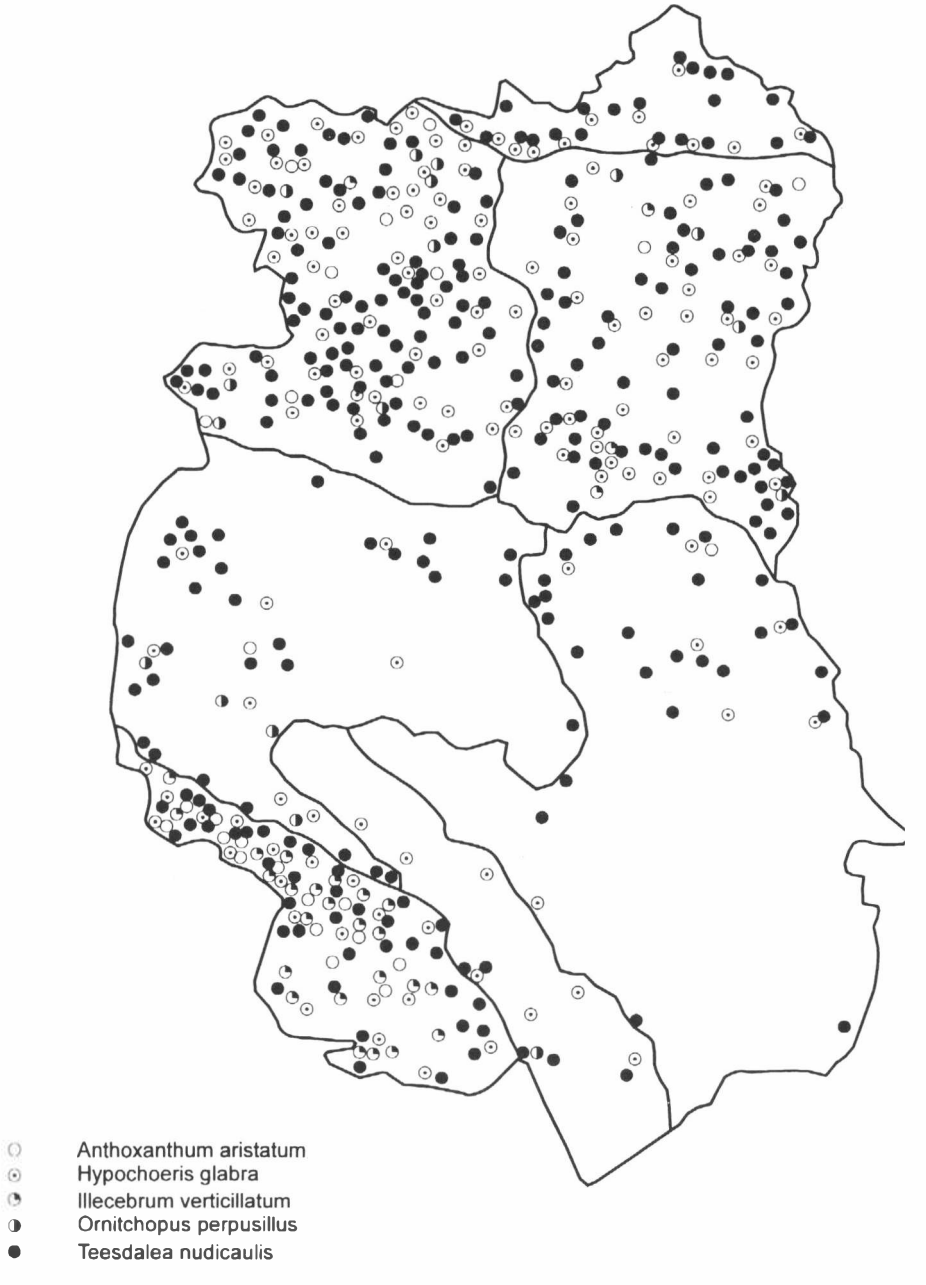

Fig. 5. Localities of 5 Atlantic sandy species of segetal habitats

areas, on wet sands after ruining or damaging them in turf associations of the *Nardo-Callunetea* and *Scheuchzerio-Caricetea fuscae* class. It always accompanies weak-acid habitats of pH 4.0-6.0.

26. *Rhynchospora fusca* (L.) W. T. Aiton – Brown beak-sedge. Its localities are numerous on the Puszczańska Plane, sporadic in the Łęczna-Włodawa Lake District. It grows very frequently in places (e.g. near Zaklików). It usually occurs on sandy-organic ground constantly waterlogged and acid (pH 3.5-4.5). Most frequently it is associated with the transition zone of high moor and boggy forests to purple moor-grass forests. Locally abundant, in old ponds at Wilczów SE of Zaklików it forms dense stands of several areas (Fig. 3).

27. *Sarothamnus scoparius* (L.) Wimm. – Broom. It occur all over the Lublin Region as a ruderal shrub of forest roadsides, edges and high railway embankments. It freezes periodically and displaces to other localities. It is associated with sands of weakly acid or neutral reaction (Fig. 4).

28. *Sparganium minimum* Wallr. – Small bur-reed. It grows sporadically in small clusters, largely on the Puszczańska Plane and in the Łęczna-Włodawa Lake District. It is associated with small water patches occurring among peat sedges of the *Magnocaricion* alliance and waterlogged valleys of small rivers and streams. Sporadically it accompanies lake shores in similar habitats (Fig. 2).

29. *Spergula morisonii* Boreau – Morison's spurrey. It occurs frequently in light and dry pine forests (*Cladonio-Pinetum*) and in dry sandy places of the *Sedo-Scleranthetea* class.

30. *Teesdalea nudicaulis* (L.) R. Br. – Shepherd's cress. It occurs frequently, in places numerously largely in the northern and southern part of the Lublin Region. Most frequently it grows on sandy soils invaded by comminities of the *Sedo-Scleranthetea* class. It is also found frequently in cultivations, particularly of rye on podzolic and grey-brown podzolic soil. Forest edges and turfs of the *Nardo-Callunetea* class are accompanied by this plant. It is very sensitive to herbicides hence its population decreases rapidly (Fig. 5).

31. *Utricularia ochroleuca* R. W. Hartm. – Yellow bladderwort. It occurs sporadically on waterlogged lake banks of the Łęczna-Włodawa Lake District, largely in the zone of high peat bog in the *Magnocaricion* alliace of weak-acid reaction (Fig. 2).

CONCLUSIONS

The Atlantic element comprises 31 (1.92%) of species in the Lublin Region. The localities of the particular species have been listed in 4 ecological groups: aquatic (Fig. 2), peaty and mineral peaty (Fig. 3), forest and scrub (Fig. 4) and sandy habitats (Fig. 5). Localities of frequent species such as *Hypericum humifusum*, *Radiola linoides* and *Spergula morisonii* have not been marked on the

maps. In Figure 1, however there have been listed all localities of Atlantic plants according to the geobotanical units. This figure shows that the most numerous localities of this plants are in the Łęczna-Włodawa Lake District (461 stands) and the Puszczańska Plane (325). They are much less numerous in the Małe Mazowsze (Little Mazovia) (233) and the Central Roztocze (56), but the poorest in the Lublin Upland. Most Atlantic species are associated with habitats of the *Nardo-Callunetea* class (12), *Scheuchzerio-Caricetea fuscae* (9), synanthropic water ones – 7 species each, and *Phragmitetea* class (6).

Among the Atlantic plants of the Lublin Region flora four other groups can be distinguished: 1) relict species from the warmer periods and disappearing now: *Aldrovanda vesiculosa, Cladium mariscus, Isoëtes lacustris* and *Najas flexilis*. According to Środoń (14) in the interglacials of Poland they were, besides those already died out, plants indicating warm climate; 2) dying out and threatened: *Aldrovanda vesiculosa, Groenlandia densa, Isoëtes lacustris*; 3) sensitive to herbicides: *Hypochoeris glabra, Radiola linoides, Teesdalea nudicaulis*; 4) sensitive to tramping: *Hydrocotyle vulgaris* and *Isolepis setacea*.

REFERENCES

1. Czeczott H.: The Atlantic element in the flora of Poland. Bull. Acad. Pol. Sci. et Lettres, sér. B, 361-407 (1926).
2. Czubiński Z.: Zagadnienia geobotaniczne Pomorza. Bad. Fizjogr. nad Polską Zachodnią, **2**, 439-658 (1950).
3. Fijałkowski D.: Badania nad rozmieszczeniem i ekologią aldrowandy pęcherzykowatej (*Aldrovanda vesiculosa* L.) na Pojezierzu Łęczyńsko-Włodawskim. Acta Soc. Bot. Pol. **27**, 597-604 (1958).
4. Fijałkowski D.: Wywłócznik skrętoległy (*Myriophyllum alterniflorum* DC.) na Pojezierzu Łęczyńsko-Włodawskim. Fragm. Flor. Geobot. **5**, 37-45 (1959).
5. Fijałkowski D.: Stosunki geobotaniczne Lubelszczyzny. Lub. Tow. Nauk., Zakł. Nar. im. Ossolińskich, Wrocław (1972).
6. Fijałkowski D.: Flora roślin naczyniowych Lubelszczyzny. t. 1, 2. Lub. Tow. Nauk., Lublin (1994, 1995).
7. Fijałkowski D., Izdebski K.: Szata roślinna Lubelszczyzny. Lub. Tow. Nauk., Lublin (1996).
8. Karczmarz K., Paczos S.: Zależność rozmieszczenia subatlantyckich i pseudoatlantyckich roślin od stosunków opadowych w Kotlinie Sandomierskiej i na zachodniej krawędzi Roztocza. Roczn. Przemyski **17/18**, 341-360 (1977).
9. Matuszkiewicz J.: Krajobrazy roślinne i regiony geobotaniczne Polski. Inst. Geogr. i Przestrz. Zagospodarowania PAN, Warszawa (1993).
10. Mirek Z., Piękoś-Mirek H., Zając A., Zając M.: Vascular plants of Poland. A checklist. Pol. Bot. Stud. **15**, 7-303 (1995).
11. Piotrowska M.: Stosunki geobotaniczne wysp Wolina i południowo-wschodniego Uznamu. Monogr. Bot. **22**, 1-157 (1966).
12. Polakowski B.: Stosunki geobotaniczne Pomorza Wschodniego. Zesz. Nauk. WSR w Olsztynie **15**, 1-167 (1963).

13. Sulma T.: Główne problemy geobotaniczne Pomorza. Soc. Sci. Gedan., Acta Biol. Med. 3 (2), 20-72 (1959).
14. Środoń A.: Roślinność Polski w czwartorzędzie. [w:] Szata roślinna Polski, W. Szafer i K. Zarzycki (red.), t. 1. PWN, Warszawa (1972).

STRESZCZENIE

Element atlantycki flory roślin naczyniowych Lubelszczyzny obejmuje 31 (1,92%) gatunków zaliczanych głównie do grupy subatlantyckiej i pseudoatlantyckiej. Występowanie roślin atlantyckich wykazuje zależność od wilgotności podłoża i zespołów roślinnych (tab. 1) i nie jest równomierne na badanym obszarze (tab. 2). Stwierdzone gatunki należą do czterech grup ekologicznych: wodnych (ryc. 2), torfowiskowych i mineralno-torfowiskowych (ryc. 3), leśnych i zaroślowych (ryc. 4), segetalnych (ryc. 5). Pod względem stopnia zagrożenia wszystkie gatunki reprezentują cztery grupy: 1) reliktowe, 2) zagrożone i wymierające, 3) wrażliwe na herbicydy, 4) wrażliwe na wydeptywanie.