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CHOROLOGICAL, ECOLOGICAL AND COENOTIC CHARACTERISTICS OF *SYMPHYOTRICHUM CILIATUM* (LINDL.) NESOM (ASTERACEAE) IN THE BUKOVINIAN CIS-CARPATHIAN

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The results of study on distribution, ecological and coenotic characteristics of alien species *Symphyotrichum ciliatum* (Lindl.) Nesom (*Asteraceae*) in the Bukovinian Cis-Carpathian (Chernivtsi Region, Ukraine) are presented. Five associations of synanthropic vegetation species were found in the region namely: *Eragrostio-Amaranthetum albi* Morariu 1943, class *Digitario sanguinalis-Eragrostietea minoris* Mucina, Lososová et Šilc in Mucina et al. 2016, *Lolio-Plantaginetum majoris* (Linkola 1921) Beger and *Polygonetum arenastri* Gams 1927, class *Polygono-Poetea annuae* Rivas-Mart. 1975, *Odontito-Ambrosietum artemisiifoliae* Mucina 1993 and *Convolvulo-Agropyretum repentis* Felföldy 1943, class *Artemisietea vulgaris* Lohmeyer et al. in Tx. ex von Rochow 1951. These species are noted in the anthropogenic ecotopes and in habitat of Nature 2000. The indices of main edaphic and climatic factors for the species were determined for the first time. According to the main climatic indices, such as thermoregulation, ombrorezhime and criorezhime, *S. ciliatum* is characterized by stenotopic amplitude and belongs to submezoterms, subaridophytes and hemicriophytes, etc. *S. ciliatum* in the region is characterized as potential invasive species.

Keywords: *Symphyotrichum ciliatum*, *Asteraceae,* distribution, ecological and coenotic characteristics, the Bukovinian Cis-Carpathian, Ukraine

INTRODUCTION

Symphyotrichum ciliatum (Lindl.) Nesom (*Brachyactis ciliata* (Ledeb.) Ledeb.) is an alien species with the debatable systematic position caused its high variability, vague diagnostic morphological features, disjunctive area etc. Previously florists and taxonomists have considered this species as a member of different genera, e.g. *Aster* L.,

Erigeron L., *Conyza* Less., *Tripolium* Nees. In Europe it was often referred to the genus *Brachyactis* Ledeb. [12, 26, 32] or to the genus *Symphyotrichum* Nees [2, 17, 23, 31]. Due to the karyological studies carried out by Nesom [17] it was established that species of genera *Symphyotrichum* and *Brachyactis* had the different number of chromosomes, (2n=14) and (2n = 18) respectively. This and also significant distinction between taxa have been allowed consider the studied species as a member of the section *Conyzopsis* (Torr & A. Gray) G.L. Nesom, subgenus *Symphyotrichum*, genus *Symphyotrichum* [2, 17, 23, 31].

An interpretation of the origin of this species is also debatable: as *S. ciliatum*, sub nom. *B. ciliate* it maybe Asian [1, 9–10, 12, 24–26, 32] or North American [13]; as *S. ciliatum* it maybe North American, North and Middle Asian [30]. However study conducted by G.L. Nesom [17] showed that European populations as well as North American ones have the number of chromosomes 2n=14 and therefore it is necessarily to include them in the genus *Symphyotrichum*.

The natural area of *S. ciliatum* is North America (Rocky Mountains) where it grows in dry places. Later the species migrated to the prairie of the Great Plains, and also through Alaska and the Bering Strait to the North-Eastern of Asia.

The general area of *S. ciliatum* is Circumpolar, disjunctive. It distributes in North America, West and East Sibirian, Fare East and Central Asia [2, 12, 17, 26]. At present its active distribution is observed in the East of the American continent [4] and in Europe (Ukraine, Moldova, Romania, Poland, Slovakia, Russia) [7–10, 18, 24, 31], where *S. ciliatum* manifests a wide ecological amplitude growing on different substrata from dry sands to saline, moist soils, but mostly prefers some anthropogenic habitats.

In Ukraine, *S. ciliatum* (sub nom. *B. ciliate*) was first recorded in Danube Biosphere Reserve [7]. Later it has been found in Steppe, mainly in the anthropogenic and semi-natural (coastal, seaside and steppe) ecotopes [21]. According to *CHER* and *KW* herbarium collections, it is also known from Transcarpathia, Bukovinian Cis-Carpathian, Prut-Dnister interfluve, Zhytomyr Polissia and Roztochchya [13].

In Bukovinian Cis-Carpathian, *S. ciliatum* was first recorded in 2007 [22]. Later some more new localities were found. Very likely, this species penetrated in the The Bukovinian Cis-Carpathian from Romania where it had been determined as potential invasive [24-25]. The status of the species in Poland the same [30].

The aim of the article is to study of current distribution of *S. ciliatum* in the Bukovinian Cis-Carpathian, rate and character of dispersal, to determine ecological and coenotic characteristics and estimate the possible consequences of its naturalization in the region.

MATERIAL AND METHODS

Investigations are based on the original data obtained during fieldwork over the years 2007–2016 and an examination of herbarium collections of the Yuryi Fedkovych Chernivtsi National University (*CHER*) and M.G. Kholodny Institute of Botany, NAS of Ukraine (*KW*).

The schematic map of the *S. ciliatum* distribution in the The Bukovinian Cis-Carpathian was prepared by the grid method of plant mapping using MapInfo Professional version 12.5 software packages, according to Atlas Florae European adapted for regional territories [3]. The phytosociological surveys were performed with using ecological and floristic criteria of plant community releves. The phytosociological releves were carried out by the method of transformation of phytocoenotic tables with using the program

package FICEN 2 [28]. The calculation of score synphytoindication indices was performed with the use of JUICE 6.5 program [29].

Ecological analysis was made according to the phytoindicatory scales [6, 20]. Syntaxonomic scheme of plant communities with the participation of *S. ciliatum* was compiled following by Vegetation of Europe [14–16].

RESULTS

The information on the distribution of *S. ciliatum* in the The Bukovinian Cis-Carpathian generalized on based of the herbarium collections *CHER* and *KW* data and fieldwork is given in fig. 1 and list mentioned below.

List of localities of *S. ciliatum* in Chernivtsi Region:

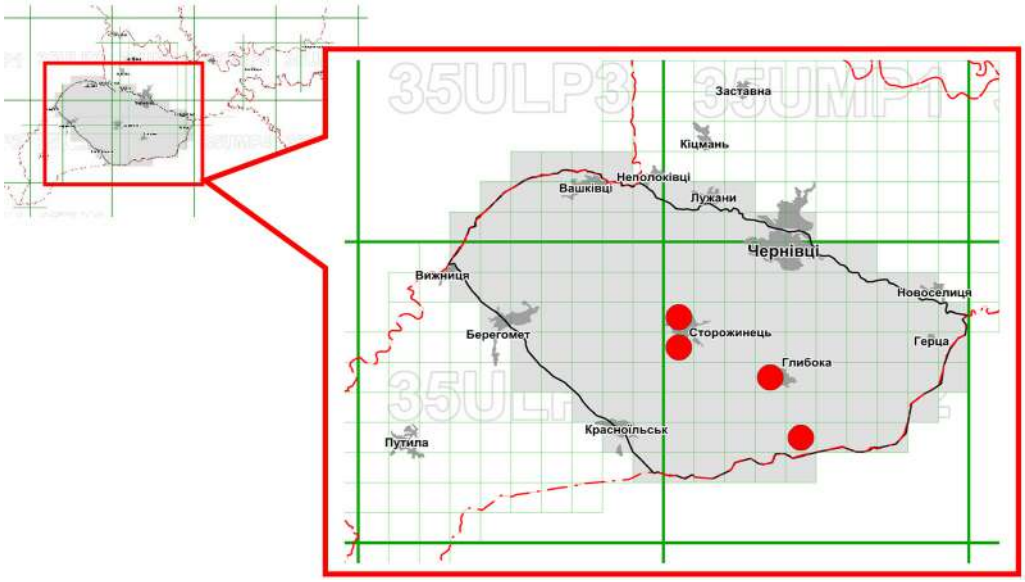
1. Glyboka Distr., Glyboka-Bukovynska station, along railway tracks, 12.10. 2007, I. Chorney, V. Budzhak, A. Tokaryuk (*CHER*); the same, 12.10. 2007, V.V. Protopopova, M.V. Shevera (*KW*).
2. Glyboka Distr., vicinity of Cherepkivtsi vill., Vadul-Seret railway station, along railway tracks, 12.10. 2007, I. Chorney, V. Budzhak, A. Tokaryuk (*CHER*); the same, 12.10. 2007, V.V. Protopopova, M.V. Shevera (*KW*).
3. Storozhynets Distr., Storozhynets, railway station, 20.09. 2009, A. Tokaryuk (*CHER*).
   - Storozhynets Distr., Storozhynets, along railway, 18.10. 2009, A. Tokaryuk (*CHER*).
4. Storozhynets Distr., Storozhynets, along road, 21.11. 2009, A. Tokaryuk (*CHER*);
   - Storozhynets Distr., Storozhynets, along field road, 03.11. 2013, A. Tokaryuk (*CHER*).
5. Storozhynets Distr., Storozhynets city, left bank of Siret River, 30.09. 2012, A. Tokaryuk (*CHER*).

S. ciliatum actively distributes in the The Bukovinian Cis-Carpathian in anthropogenic transformed plant communities. In an early stage of invasion and colonization of ruderalized plots with denuded soil by this species it is characterized by high density and number. In the overgrowing stage of the plots, when the total cover of grass increases and vegetation becomes closer, the mentioned population indices of the species decrease.

The species is an annual/terophyte. Due to some biological characteristics such as the short period of ontogenesis and high reproductively it can extend to rather a long distance from parent individuals mainly by virtue of disturbed plots with a significant proportion of denuded soil. However, a long keep of colonizing territory do not observed especially in case of the process of overgrowing.

The densest and numerous populations of *S. ciliatum* in the The Bukovinian Cis-Carpathian were revealed in Glyboka city in plant community related to artificial rubble plots between railway tracks within the Glyboka-Bukivynska railway station. Floristic composition of the community is rather poor and composed of 19 species. Its total projective cover comes to 30–40 % and projective cover of *S. ciliatum* to 5–7 %. Diagnostic *Eragrostis minor* Host and *Amaranthus albus* L. dominated. Among the invasion species there are *Conyza canadensis* (L.) Cronq.), *Echinochloa crusgalli* (L.) P. Beauv., *Galinsoga parviflora* Cav. and *Phalacroloma annuum* (L.) Dumort. (Table 1, relevél 1). According to ecological and floristic classification, the plant community belongs to

association *Eragrostio-Amaranthetum albi* Morariu 1943, alliance Eragrostion *cilianensi-minoris* Tx. ex Oberd. 1954, order *Eragrostietalia* J. Tx. ex Poli 1966 and class *Digitario sanguinalis-Eragrostietea minoris* Mucina, Lososová et Šilc in Mucina et al. 2016.



Map of localitets of *Symphyotrichum ciliatum* (Lindl.) Nesom in the Bukovinian Cis-Carpathian
Карта поширення *Symphyotrichum ciliatum* (Lindl.) Nesom у Буковинському Передкарпатті

Table 1. **Phytocoenotic characteristics of plant communities with participation of *Symphyotrichum ciliatum* (Lindl.) Nesom in the Bukovinian Cis-Carpathian**

Таблиця 1. **Фітоценотична характеристика рослинних угруповань за участю *Symphyotrichum ciliatum* (Lindl.) Nesom у Буковинському Передкарпатті**

Number of relevés	1	2	3	4	5	6
Total projective cover, %	30–40	70	50	70		100
Total number of species	19	24	24	20	30	26
Number of syntaxa	1	2		3	4	5
Symphyotrichum ciliatum	**2**	**1**	**+**	**+**	**2**	**+**
D.s. Ass. *Eragrostio-Amaranthetum albi*						
Eragrostis minor	2	.	.	.	.	.
Amaranthus albus	1	.	.	.	.	.
D.s. Cl. *Digitario sanguinalis-Eragrostietea minoris*						
Echinochloa crusgalli	+	.	1	1	.	.
Setaria glauca	.	.	.	1	+	.
Portulaca oleracea	+	.	.	.	.	.
D.s. Ass. *Lolio-Plantaginetum majoris*						
Plantago major	.	2	3	4	.	+
Lolium perenne	.	1	.	.	.	.
Lepidotheca suaveolens	.	+	.	.	.	.

D.s. Ass. *Polygonetum avicularis*						
Polygonum aviculare	.	1	2	2	.	.
Poa annua	.	.	1	.	.	.
D.s. Cl. *Polygono-Poetea annua*						
Taraxacum officinale	+	+	+	+	+	+
Medicago lupulina	+	1	+	.	+	.
Lepidium ruderale	.	+	.	.	.	.
Potentilla anserina	.	.	.	+	.	.
D.s. Ass. *Odontito-Ambrosietum artemisiifoliae*						
Ambrosia artemisiifolia	.	5	2	2	3	1
Odontites vulgaris	.	.	.	.	1	.
D.s. Ass. *Convolvulo-Agropyretum repentis*						
Calamagrostis epigeios	.	.	.	.	.	1
Elytrigia repens	.	1	.	.	1	4
D.s. Cl. *Artemisietea vulgaris*						
Phalacroloma annuum	1	+	+	1	1	1
Artemisia vulgaris	1	+	.	+	.	+
Erigeron canadensis	+	.	+	+	+	.
Daucus carota	.	1	.	1	+	1
Cirsium arvense	+	.	.	+	.	.
Arctium lappa	.	.	.	+	.	1
Cichorium intybus	.	.	.	.	+	+
Arctium tomentosum	.	+	.	.	.	.
Lactuca serriola	.	.	+	.	.	.
Linaria vulgaris	.	.	.	.	+	.
Melilotus officinalis	.	.	.	.	.	+
D.s. Cl. *Sisymbrietea*						
Amaranthus retroflexus	.	.	+	+	+	.
Galinsoga urticifolia	.	+	+	.	.	.
Matricaria perforata	.	+	+	.	.	.
Atriplex patula	+	.	.	.	.	.
Chenopodium album	+	.	.	.	.	.
Galinsoga parviflora	1	.	.	.	.	.
Ranunculus sardous	+	.	.	.	.	.
Xanthoxalis dillenii	.	.	+	.	.	.
D.s. Cl. *Epilobietea angustifolii*						
Galega officinalis	.	+	.	.	.	+
Glechoma hederacea	.	+	.	.	.	.
Urtica dioica	.	+	.	.	.	.
Ranunculus repens	.	.	.	.	+	.
Rumex confertus	.	.	.	.	.	+

D.s. Cl. *Molinio-Arrhenatheretea*						
Plantago lanceolata	.	.	1	1	1	+
Trifolium repens	.	1	1	.	+	.
Trifolium pratense	.	.	+	.	+	+
Poa pratensis	.	.	+	1	.	1
Agrostis tenuis	.	.	.	.	1	1
Festuca pratensis	.	.	.	.	.	+
Phleum pratense	.	.	.	.	.	1
Dactylis glomerata	.	.	.	.	.	2
Cerastium holosteoides	+	.	.	.	.	.
Trifolium hybridum	.	.	.	+	.	.
Mentha arvensis	.	.	.	+	.	.
Other species:						
Achillea submillefolium	+	.	+	.	+	+
Lotus ucrainicus	.	.	+	.	+	1
Polygonum persicaria	.	+	.	.	.	+
Bidens tripartita	1	.	+	.	.	.
Barkhausia setosa	.	.	+	.	+	.
Chaenorhinum minus	.	.	+	.	+	.
Potentilla reptans	.	.	.	.	+	+

The species occurred only in one relevé: *Anchusa officinalis* (5 [+]); *Anisantha tectorum* (2 [1]); *Berteroa incana* (5 [+]); *Echium vulgare* (5 [+]); *Eragrostis pilosa* (4 [1]); *Galium verum* (5 [+]); *Geum urbanum* (6 [+]); *Inula britannica* (2 [+]); *Juncus bufonius* (2 [1]); *Juncus tenuis* (6 [+]); *Lepidium densiflorum* (5 [+]); *Oenothera biennis* (5 [+]); *Poa compressa* (3 [+]); *Polygonum convolvulus* (1 [+]); *Potentilla supina* (4 [+]); *Swida sanquinea* (5 [+]); *Xanthium albinum* (5 [1])

Види, які трапляються в одному описі: *Anchusa officinalis* (5 [+]); *Anisantha tectorum* (2 [1]); *Berteroa incana* (5 [+]); *Echium vulgare* (5 [+]); *Eragrostis pilosa* (4 [1]); *Galium verum* (5 [+]); *Geum urbanum* (6 [+]); *Inula britannica* (2 [+]); *Juncus bufonius* (2 [1]); *Juncus tenuis* (6 [+]); *Lepidium densiflorum* (5 [+]); *Oenothera biennis* (5 [+]); *Poa compressa* (3 [+]); *Polygonum convolvulus* (1 [+]); *Potentilla supina* (4 [+]); *Swida sanquinea* (5 [+]); *Xanthium albinum* (5 [1])

Association localities of the relevés:
1. Glyboka, railway station, along railway, 12.10. 2007, A. Tokaryuk;
2. Glyboka, railway station, along railway, 29.07. 2008, A. Tokaryuk;
3. Storozhynets, railway station, 21.09. 2009, A. Tokaryuk;
4. Storozhynets, railway station, 21.09.2 009, A. Tokaryuk;
5. Glybotskyi Distr., Cherepkivtsi vill., Vadul-Siret railway station, 12.10. 2007, A. Tokaryuk;
6. Glyboka, railway station, 12.10. 2007; 29.07. 2008, A. Tokaryuk.

Описи виконано:
1. смт Глибока, залізничний вокзал, уздовж залізничної колії, 12.10. 2007, А. Токарюк;
2. смт Глибока, залізничний вокзал, уздовж залізничної колії, 29.07. 2008, А. Токарюк;
3. м. Сторожинець, залізничний вокзал, 21.09. 2009, А. Токарюк;
4. м. Сторожинець, залізничний вокзал, 21.09.2 009, А. Токарюк;
5. Глибоцький р-н, с. Черепківці, залізнична станція Вадул-Сірет, 12.10. 2007, А. Токарюк;
6. смт Глибока, залізничний вокзал, 12.10. 2007, 29.07. 2008, А.Токарюк.

Number of syntaxa: 1 – *Eragrostio-Amaranthetum albi*; 2 – *Lolio-Plantaginetum majoris*; 3 – *Polygonetum arenastri*; 4 – *Odontito-Ambrosietum artemisiifoliae*; 5 – *Convolvulo-Agropyretum repentis*.

Номери синтаксонів: 1 – *Eragrostio-Amaranthetum albi*; 2 – *Lolio-Plantaginetum majoris*; 3 – *Polygonetum arenastri*; 4 – *Odontito-Ambrosietum artemisiifoliae*; 5 – *Convolvulo-Agropyretum repentis*.

The plant community of association *Lolio-Plantaginetum majoris* (Linkola 1921) Beger with participation of *S. ciliatum* was found along a path at a beet collection in the territory Glyboka-Bukovynska station. Its total projective cover comes to 80 % and projective cover of *S. ciliatum* is 1–2 %. Floristic composition of association composed of 24 species. The diagnostic *Lolium perenne* L., *Plantago major* L. and *Lepidotheca suaveolens* (Pursh) Nuttm dominate. Components of the plant community are invasive *Ambrosia artemisiifolia* L. (50–60 %), *Galinsoga urticifolia* (Kunth) Benth. and *Phalacroloma annuum* (Table 1, relevé 2).

The association belongs to alliance *Polygono-Coronopodion* Sissingh 1969 order *Polygono arenastri-Poetalia annuae* Tx. in Géhu et al. 1972 corr. Rivas-Mart. et al. 1991, class *Polygono-Poetea annuae* Rivas-Mart. 1975 [26].

Within alliance *Polygono-Coronopodion S. ciliatum* have been found in plant community of association *Polygonetum arenastri* Gams 1927 confined to a roadside on the territory of Storozhynets railway station. The number of species in the coenosis varies from 20 to 25. Its total projective cover is 50–70 %. Diagnostic species of association *Plantago major* L. (20–50 %), *Poa annua* L. (2–3 %), and *Polygonum aviculare* L. (5–7 %) dominate. *S. ciliatum* occurs rare. Among invasive species *Ambrosia artemisiifolia* (5–7 %), *Conyza canadensis*, *Echinochloa crusgalli* (2–3 %), *Galinsoga urticifolia*, *Phalacroloma annuum*, *Setaria glauca* (L.) P. Beauv. (2–3 %), and *Xanthoxalis dillenii* (Jacq.) Holub are observed (Tabl. 1, relevés 3–4).

Plant community of association *Odontito-Ambrosietum artemisiifoliae* Mucina 1993 with participation of *S. ciliatum* was revealed in Vadul-Siret railway station near Cherepkivtsi village of Glyboka District related to open places along path between railway tracks. Total projective cover is 80 %, projective cover of *S. ciliatum* is 1–2 %. Diagnostic species: *Ambrosia artemisifolia* is dominant and *Odontites vulgaris* Moench is co-dominant in the plant community. The plant community composes of 30 species of vascular plants, including invasive *Cichorium intybus* L., *Conyza canadensis*, *Phalacroloma annuum*, *Setaria glauca* and *Xanthium albinum* (Widder) H.Scholz (Table 1, relevél 5). It belongs to alliance *Onopordion acanthii* Br.-Bl. 1926, order *Onopordetalia acanthii* Br.-Bl. et Tx. ex Klika et Hadač 1944, class *Artemisietea vulgaris* Lohmeyer et al. ex von Rochow 1951 [11].

The isolated individuals of *S. ciliatum* occurs also in plant community of association *Convolvulo-Agropyretum repentis* Felföldy 1943 distributed along ground roads within the Glyboko-Bukovynska railway station territory. In this plant community (total projective cover 100 %) *Elytrigia repens* dominates with neglegiable dirt of *Agrostis capillaris* L., *Calamagrostis epigeios* (L.) Roth, *Dactylis glomerata* L., *Festuca pratensis* Huds., *Phleum pratense* L., and *Poa pratensis* L. Components of the association are invasive *Ambrosia artemisiifolia*, *Cichorium intybus*, *Phalacroloma annuum* and *Juncus tenuis* Willd. (Table 1, relevé 6). Plant community of association belongs to alliance *Convolvulo arvensis-Agropyrion repentis* Görs 1967, order *Agropyretalia intermedio-repentis* T. Müller et Görs 1969, class *Artemisietea vulgaris* Lohmeyer et al. in Tx. ex von Rochow 1951.

Thus, on the basis of phytosociological relevél it was established that *S. ciliatum* in the Bukovinian Cis-Carpathian grows in five association, four order and three classes of synanthropic vegetation. The syntaxonomic scheme of plant community with participation of *S. ciliatum* in the region is given.

Syntaxonomic scheme of plant community with participation of *Symphyotrichum ciliatum* (Lindl.) Nesom in Bukovinian Cis-Carpathian

Синтаксономічна схема рослинних угруповань за участю *Symphyotrichum ciliatum* (Lindl.) Nesom у Буковинському *Передкарпатті*

Cl. *Digitario sanguinalis-Eragrostietea minoris* Mucina, Lososová et Šilc in Mucina et al. 2016

Ord. *Eragrostietalia* J. Tx. ex Poli 1966

All. *Eragrostion cilianensi-minoris* Tx. ex Oberd. 1954

Ass. *Eragrostio-Amaranthetum albi* Morariu 1943

Cl. *Polygono-Poetea annuae* Rivas-Mart. 1975

Ord. *Polygono arenastri-Poetalia annuae* Tx. in Géhu et al. 1972 corr. Rivas-Mart. et al. 1991

All. *Polygono-Coronopodion* Sissingh 1969

Ass. *Lolio-Plantaginetum majoris* (Linkola 1921) Beger

Ass. *Polygonetum arenastri* Gams 1927

Cl. *Artemisietea vulgaris* Lohmeyer et al. in Tx. ex von Rochow 1951

Ord. *Meliloto-Artemisitalia absinthii* Elias 1979

All. *Dauco-Melilotion albi* Gors em Elias 1980

Ass. *Odontito-Ambrosietum artemisiifoliae* Mucina 1993

Ord. *Agropyretalia intermedio-repentis* T. Müller et Görs 1969

All. *Convolvulo arvensis-Agropyrion repentis* Görs 1967

Ass. *Convolvulo-Agropyretum repentis* Felföldy 1943

According to the main climatic indices, such as thermoregulation, ombrorezhime and criorezhime, *S. ciliatum* is characterized by stenotopic amplitude and belongs to submezoterms, subaridophytes and hemicriophytes (Table 2).

Table 2. **Ecological characteristic (climatop) of *Symphyotrichum ciliatum* (Lindl.) Nesom in the Bukovinian Cis-Carpathian**

Таблиця 2. **Екологічна характеристика (кліматоп) *Symphyotrichum ciliatum* (Lindl.) Nesom у Буковинському Передкарпатті**

Indices of climatic factors (points), ecological groups, width of ecological amplitude			
Tm*	Om	Kn	Cr
8.78–9.90 9.26	11.07–11.65 11.38	8.45–9.11 8.79	8.17–8.93 8.56
Stenotopic submezoterm	Stenotopic subarridophyte	Stenotopic hemicontinental	Stenotopic hemicriophyte

Comment: Tm – termorezhime, Om – ombrorezhime, Kn – continental climate, Cr – criorezhime; its and in the table 3 indicated: in numerator – value of tolerance amplitude, in denominator – mean value of tolerance amplitude to ecological factor

Примітка: Tm – терморежим, Om – омброрежим, Kn – континентальність клімату, Cr – кріорежим; тут і в таблиці 3 – у чисельнику вказується величина амплітуди толерантності, у знаменнику – середнє значення амплітуди толерантності до цього екологічного фактора

In the region the in relation to the water regime of the soil and the variability of moisture *S. ciliatum* is stenotypic mesophyte and hemihydroconstrastophile and grows

in forest-meadow ecotopes with complete blotting root zone and melted water (Wnp = 100–145 mm) (Table 3). It grows on slightly acidic (pH = 5.5–6.5), enriched with salts, relatively nitrogen poor soils of mineral nitrogen and avoids carbonate substrates.

Table 3. **Ecological characteristic (edaphotop) of *Symphyotrichum ciliatum* (Lindl.) Nesom in the Bukovinian Cis-Carpathian**

Таблиця 3. **Екологічна характеристика (едафотоп) *Symphyotrichum ciliatum* (Lindl.) Nesom у Буковинському Передкарпатті**

Indices of edaphic factors (pointsy), ecological groups, wide of ecological amplitude						
Hd*	fH	Rc	Tr (Sl)	Ca	Nt	Ae
10.73–11.60 11.27	7.04–7.75 7.38	7.79–8.05 7.94	7.78–8.32 8.15	6.22–7.13 6.82	5.88–6.82 6.45	6.25–7.16 6.84
stenotopic тmezophyte	c stenotopic hemihydro-contrastophyte	stenotopic subacidophile	stenotopic semieuritope	stenotopic hemicarbonatophyle	stenotopic heminitrophyloe	Hemistenotopic subaerophobe

Comment: Hd – humidity of soil, fH – moisture change, Rc – soil acidity, Sl – soil salinity, Ca – content of carbonates in soil, Nt – content of nitrogen in soil, Ae – soil aeration

Примітка: Hd – вологість ґрунту, fH – змінність зволоження, Rc – кислотність ґрунту, Sl – засоленість ґрунту, Ca – вміст у ґрунті карбонатів, Nt – вміст азоту у ґрунті, Ae – аерація ґрунту

As to rate and character of distribution in the Bukowinian Cis-Carpathian *S. ciliatum* is potential invasive species.

According to the classification of habitats on the territory of Ukrainian Carpathians and Transcarpathian Lowlands [4], plant communities with *S. ciliatum* are comprised of the next habitats: “Sand-clay deposits (shifts) of quarries and anthropogenic substrates of a moving type”; “Seliteb area”; “Areas with ruderal xeromesophyte vegetation (beyond the seliteb area)”; ***“***Muddy river banks with *Chenopodion rubri* p. p. and *Bidention* p. p. Vegetation”. Last one is under threat of disappearance and need the protection on European level because of its presence in the Natura 2000, in particular, 3270 ***“***Muddy river banks with *Chenopodion rubri* p. p. and *Bidention* p. p. Vegetation***”*** [19].

CONCLUSION

The *S. ciliatum* in the Bukovinian Cis-carpathian occurs in five associations, four unions, four orders, and three classes of synanthropic vegetation: Ass. *Eragrostio-Amaranthetum albi* Cl. *Digitario sanguinalis-Eragrostietea minoris*, Ass. *Lolio-Plantaginetum majoris* and *Polygonetum arenastri* Cl. *Polygono-Poetea annuae*, Ass. *Odontito-Ambrosietum artemisiifoliae* and *Convolvulo-Agropyretum repentis* Cl. *Artemisietea vulgaris*.

The species in the region has stenotope ecological amplitude and according to main climatic and edaphic indices is submezoterm, subaridophyte, hemicontinental, hemicriophyte, mesophyte, hemihydroconstrastophile, subacidophile, semievitrophe, gemicarbonatophyte, heminitrophylous and subaeroophobe. One can consider this species as potential invasive.

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ХОРОЛОГІЧНІ ТА ЕКОЛОГО-ЦЕНОТИЧНІ ОСОБЛИВОСТІ *SYMPHYOTRICHUM CILIATUM* (LINDL.) NESOM (*ASTERACEAE*) У БУКОВИНСЬКОМУ ПЕРЕДКАРПАТТІ

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Представлено результати вивчення поширення та еколого-ценотичної приуроченості адвентивного виду *Symphyotrichum ciliatum* (Lindl.) Nesom (*Asteraceae*) у Буковинському Передкарпатті (Україна). Виявлено нові локалітети виду в регіоні, у т.ч. у складі оселищ Natura 2000.

Уперше з'ясовано бальні показники провідних едафічно-кліматичних факторів виду. Встановлено, що вид вирізняється здебільшого стенотопною екологічною амплітудою. Відмічений у складі угруповань асоціації *Eragrostio-Amaranthetum albi* Morariu 1943 класу *Digitario sanguinalis-Eragrostietea minoris* Mucina, Lososová et Šilc in Mucina et al. 2016, асоціацій *Lolio-Plantaginetum majoris* (Linkola 1921) Beger та *Polygonetum arenastri* Gams 1927 класу *Polygono-Poetea annuae* Rivas-Mart. 1975, асоціацій *Odontito-Ambrosietum artemisiifoliae* Mucina 1993 та *Convolvulo-Agropyretum repentis* Felföldy 1943 класу *Artemisietea vulgaris* Lohmeyer et al. in Tx. ex von Rochow 1951, які приурочені до мезофітних, гемігідроконтрастофільних, субацидофільних, семіевтрофних, гемікарбонатофобних, гемінітрофільних умов.

Ключові слова*:* *Symphyotrichum ciliatum*, *Asteraceae*, *п*оширення, еколого-ценотична приуроченість, Буковинське Передкарпаття, Україна

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