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THE MEADOW, PSAMMOPHYTIC AND RUDERAL PLANT COMMUNITIES WITH *SOLIDAGO CANADENSIS* L. IN CHERNIHIV POLESIE (UKRAINE)

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Abstract:
In Chernihiv Polesie *Solidago canadensis* most often grows in ruderal communities of the *Berteroëtum incanae* association. Characteristic plant species of the *Artemisietea vulgaris* class have been found in many phytocenoses with *Solidago canadensis*. A typical ruderal community dominated by *S. canadensis* was found, in which characteristic species of the xero-mesophytic ruderal vegetation of the *Onopordion acanthii* are well represented. Initial communities with the *S. canadensis* coverage of 25 to 60% in combination with the species of this order and the characteristic species of other high syntaxa were found. Most of them are the transformed meadow phytocenoses of the river floodplains and less often – the psammophytic phytocenoses of pine terraces. The process of ruderalization of meadow ecosystems as a result of the invasion of *S. canadensis* in Chernihiv Polesie was revealed. This process is especially pronounced on the loess islands, where meadows change into semiruderal grasslands and herblands of the *Convolvulo arvensis–Agropyrion repentis* alliance. *S. canadensis* invasion leads to xerophytization and unification of the floodplains meadow phytocenoses grassland. The course of these processes is accelerated by anthropogenic pressure on ecosystems and has irreversible consequences. *S. canadensis* rarely occurs in the *Koelerio–Corynephoretea canescentis* class psammophytic communities.

Key words: vegetation, anthropogenic influence, Chernihiv Polesie, *Solidago canadensis* L.

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INTRODUCTION

The extent of ecosystem modification by invasive plants depends on the species and location, hence invasions of the same species may have different effects, depending on local conditions (Dassonville *et al*., 2008). *Solidago canadensis* is a violent species with significant phenotypic and phenological variability, propagated by achenes and restored by rhizomes. Due to this, it quickly colonizes disturbed areas and successfully masters various types of habitats (Burda *et al*., 2015). *S. canadensis* has an allelopathic effect on the co-occurring flora and vegetation. This is demonstrated by publications of the last years (Abhilasha *et al*., 2008). From the other hand *S. canadensis* is an important source of honey during late summer and early autumn (Stefanic *et al*., 2003).

In the southeast of Belarus *S. canadensis* invaded the plant communities of abandoned agricultural lands at the primary stages of progressive succession, and can cause its inhibition (Gusev, 2015). The *S. canadensis* communities can break regenerative plant succession in the sands of technogenic landscapes (Gusev and Shpileuskaya, 2016). Despite the slower *S. canadensis* invasion into natural plant communities, this process is more dangerous. It can lead to the inhibition and even complete extinction of native species in protected areas (Dubovik *et al*., 2019). It was found that presence of *S. canadensis* at two localities in southern (Olkusz) and eastern Poland (Siedlce) reduces a number of vascular plant species and an increase in *S. canadensis* cover results in soil degradation and habitat homogenization (Bielecka *et al*., 2020).

The study of the syntaxonomic composition of the *S. canadensis* communities is important for assessing its invasive activity in the region under consideration. Analysis of the floristic composition of geobotanical relevés with the dominance of *S. canadensis* performed in the

cities of Kursk, Bryansk and Minsk revealed that they are grouped into the *Solidaginetum serotino–canadensis* association (the *Dauco–Melilotion* alliance), the *Rudbeckio laciniatae–Solidaginetum canadensis* association (the *Dauco–Melilotion* alliance) and the *Solidago canadensis* initial community (the *Galio–Urticetea* class) (Arepieva and Kulikova, 2017). These groups depend both on humidity and richness of soils and substrates where the communities develop, and the degree of anthropogenic influence on them. In southern Belarus this species forms the *Solidago canadensis* initial community, phytocenoses of the *Calamagrostio epigeiosi–Solidaginetum canadensis* association (the *Dauco–Melilotion* alliance) and it is also a part of the *Arctio–Artemisietum vulgaris* ruderal communities (Daineka and Timofeev, 2018).

S. canadensis and its communities pose a threat to the diversity of the Chernihiv Polesie natural habitats. Our aim was to establish the syntaxonomic composition of plant communities with *S. canadensis* in this region.

REGIONAL SETTING

According to the physical and geographical zoning of Ukraine (Marynych *et al*., 2003), the northwestern part of the Chernihiv region is situated within the boundaries of Chernihiv Polesie. In the geostructural relation, the Chernihiv Polesie is located within the limits of three structural formations: the eastern slope and the foot of the Ukrainian crystalline shield, the western slope of the Voronezh crystalline massif and the Dnipro-Donets cavity located between them.

Modern landscapes of the the Chernihiv Polesie were formed in the Middle and Late Quaternary. The landscape structure of this territory is dominated by the Polesie landscape complexes (63% of the region area). The landscape complexes with forest-steppe features have a significant (up to 18%) distribution. They occur fragmentarily and are characteristic for the so-called 'loess islands'. These landscape complexes spread in a strip located to the north of the Desna River (Lukash *et al*., 2018).

The landscape features of the Chernihiv Polesie and anthropogenic influence are reflected in the current state of the regional vegetation. The forest and the meadow phytocenoses prevail in the vegetation cover of the region. The psammophytic vegetation is represented fragmentarily. It is possible to observe the adventization and apophytization of sand vegetation, one of the indicators of which is the rupture of cenotic connections between the species of the community (Lukash and Danko, 2020). The natural vegetation of the loess islands of the Chernihiv Polesie has been largely transformed due to the agricultural use and the segetal plant communities predominate. Long-term use of the arable lands led not only to the stabilization of the composition of weed synusiae of agro-phytocenoses, but also contributed to the increase of erosion and suffusion forms of the relief (Lukash *et al*., 2018). The region has an extensive hydrological network – the Dnipro River basins and its tributaries, the Desna River. Natural vegetation covers about 70% of the total river basins area.

MATERIAL AND METHODS

The materials for the article were collected during the field research of the Chernihiv Polesie vegetation in 2018–2020. The field study of the vegetation was carried out by geobotanical methods (Lavrenko and Korchagin, 1976). The vegetation descriptions were carried out during the optimum of the vegetation period in the areas of 30–100 m^2 each. Cover abundance scale is the following: + – up to 1%, 1 – 1–5%, 2 – 6–15. 3 – 16–25%, 4 – 26–50%, 5 >50%. The projective cover of *S. canadensis* is given as a percentage. 29 phytosociological relevés were taken. Syntaxa were identified according to Mucina *et al*. (2016), Matuszkiewicz (2019) (for natural vegetation), Solomakha *et al*. (1992) (for synanthropic vegetation). Syntaxon names are ordered according to Mucina *et al*. (2016). The nomeclature of the plant taxa follows the Plant List (www.theplantlist.org). The successional stages of vegetation are named after the dominant species. Geobotanical data were added to a database by means of TURBOVEG 2.79 software (Hennekens, Schamine, 2001), the interpretation of geobotanical material was carried out with use of the software package JUICE 7.0.83 (Tiche, 2002).

RESULTS AND DISCUSSION

According to the results of the field research, which took place in the Chernihiv Polesie (Figs 1 and 2), the syntaxonomic affiliation of the phytocenoses, in which *S. canadensis* grows, has been established (Table 1).

The relevés 1–6 belong to the *Berteroëtum incanae* association of the *Onopordion acanthii* alliance of the *Onopordetalia acanthii* order of the *Artemisietea vulgaris* class. The cenoses of the association occupy the largest areas on the pine-forest terraces on well-drained sandy soils of the Snov and the Stryzhen rivers. The communities are formed by such species as *Berteroa incana*, *Plantago indica* and sometimes *Centaurea diffusa*. The characteristic species of the *Artemisietea vulgaris* class are also represented. The species of the *Papaveretea rhoeadis* class (*Chenopodium album*, *Erigeron annuus*, *Erigeron canadensis*, *Lepidium densiflorum*, *Setaria pumila*, *Vicia sativa*) accompany this community. In western Europe the *Berteroetum incanae* association occurs in contact with the *Arrhenatheretalia* order communities, whereas in the eastern Europe it is more frequently found in contact with the *Festuco–Brometea* and *Sedo–Scleranthetea* class (Mucina and Brandes, 1985).

However, the structure and (or) composition of the described communities do not allow to include clearly each of them to one or another association of the *Onopordion acanthii* alliance (thistle-dominated xero-mesophytic ruderal vegetation of subcontinental central Europe and the northern Balkans). It should be noted that species of the

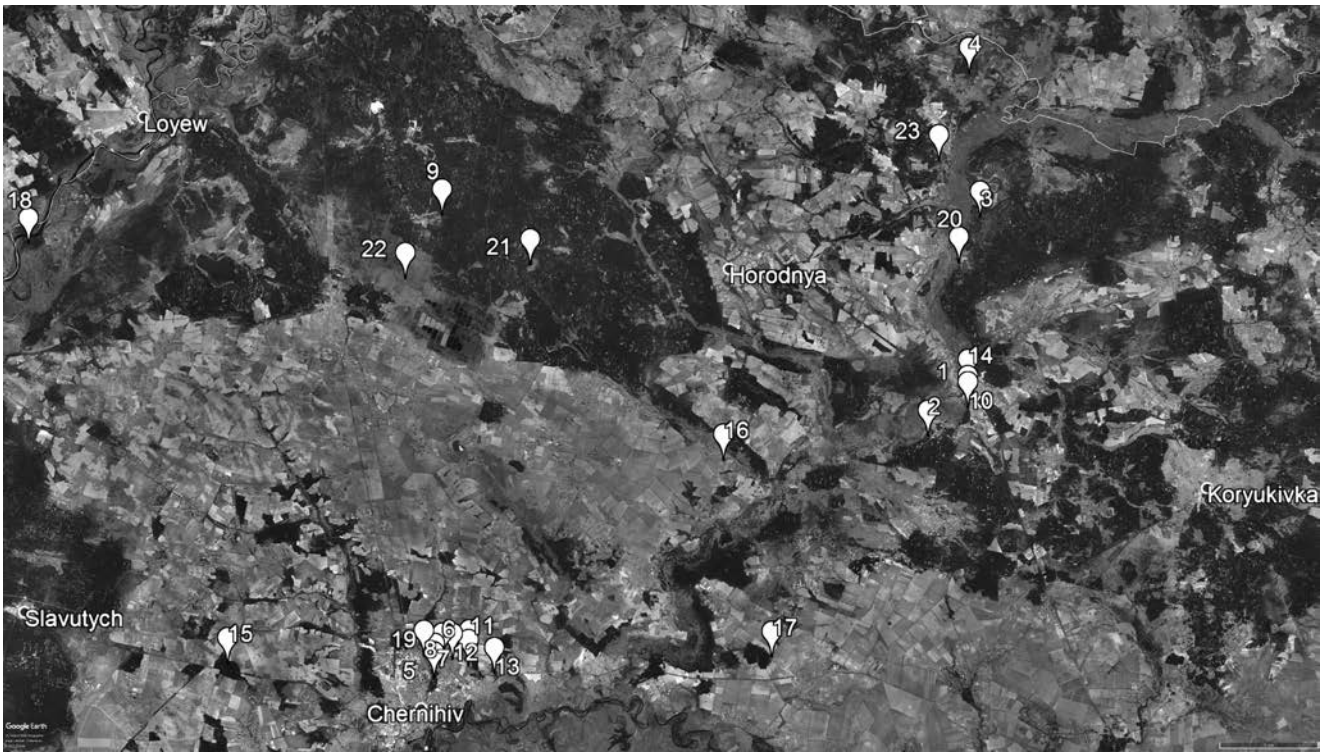

Fig. 1. Location of the investigated plant communities with *Solidago canadensis* participation.

Fig. 2. Location of the investigated plant communities with *Solidago canadensis* participation in Chernihiv.

Artemisietea vulgaris, the *Molinio–Arrhenatheretea*, the *Koelerio–Corynephoretea canescentis* and the *Epilobietea angustifolii* classes were diagnosed in the relevés 7–19. The described phytocenoses are probably the communities at early stages of succession with the domination of *S. canadensis*.

One of these communities (relevé 7) is formed by *Solidago canadensis*, which is monodominant. This community is also characterized by a high participation of biennial or perennial plants, which are characteristic species of the *Onopordetalia acanthii* order. The species of the *Artemisietea vulgaris* class accompany this community.

Table 1. Floristic structure of the plant communities with *Solidago canadensis* L.

Relevé number	**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**
Area [m^2]	100	100	100	100	50	44	100	100	100	100	60	100	100	100	100	100	100	100	100	100	60	100	100	100	100	100	100	100	100
Herb cover [%]	98	90	100	100	75	80	90	50	100	85	90	90	90	100	100	100	100	60	100	80	35	65	100	95	100	100	95	95	95
Mosses and lichens cover [%]																				10	10								
Plant community	1						2	3	4	5	6	7	8	9	10				11	12	13	14	15	16	17		18		19
Solidago canadensis L.	5	15	20	5	13	1	40	20	40	25	25	60	25	35	30	45	40	25	35	+	1	30	1	5	1	1	95	98	40
Ch., D. Ass. *Berteroëtum incanae* Siss. et Tideman in Siss. 1950																													
Anthemis ruthenica M. Bieb.	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Berteroa incana L.	2	2	1	1	2	2	•	•	•	1	+	•	•	1	•	•	•	•	+	•	+	•	•	•	•	•	•	•	+
Centaurea diffusa Lam.	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Plantago indica L.	2	2	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Ch., D. All. *Onopordion acanthii* Br.-Bl. *et al.* 1936 **Ch., D. O. *Onopordetalia acanthii* Br.-Bl. et Tx. ex Klika et Hadac 1944**																													
Artemisia absinthium L.	•	•	2	1	•	•	•	•	•	+	+	•	•	1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Cichorium intybus L.	•	•	1	1	•	+	+	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	1	•	•	•	•	•
Oenothera biennis L.	+	+	1	1	+	+	+	+	•	•	+	+	+	+	•	•	•	+	•	•	•	•	•	•	•	•	•	•	1
Oenothera rubricaulis Kleb.	•	•	•	•	•	•	•	+	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Echium vulgare L.	•	•	•	•	•	2	+	•	•	•	+	•	+	•	•	•	•	•	2	•	•	•	•	•	•	•	•	•	•
Euphorbia cyparissias L.	•	•	2	•	•	•	•	•	+	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Lactuca serriola L.	•	•	•	•	+	+	+	+	•	•	•	+	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Verbascum lychnitis L.	1	1	•	•	•	•	•	+	+	1	•	•	+	•	•	•	+	•	+	•	•	+	•	•	•	•	•	•	•
Ch., D. All. *Convolvulo arvensis–Agropyrion repentis* Görs 1967 **Ch., D. O. *Agropyretalia intermedio–repentis* T. Müller et Görs 1969**																													
Elytrigia repens (L.) Nevski	•	•	•	2	2	1	+	+	+	•	•	+	+	4	5	4	5	4	2	•	•	•	+	1	•	•	•	•	+
Bromopsis inermis (Leyss.) Holub	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1	1	+	•	•	•	•	•	•	•	•	•	•	•	•
Cerastium arvense L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•
Convolvulus arvensis L.	+	•	•	•	•	•	•	•	•	•	•	•	•	•	1	1	+	•	+	•	•	•	+	•	•	•	•	•	•
Equisetum arvense L.	•	•	•	•	•	•	2	•	•	+	•	4	+	•	2	•	1	•	•	•	•	•	•	•	•	•	•	•	•
Poa angustifolia L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2	•	•	•	•	•	•	•	•	•	•	•
Ch. Cl. *Artemisietea vulgaris* Lohmeyer *et al.* in Tx. ex von Rochow 1951																													
Artemisia vulgaris L.	+	+	2	1	+	+	+	+	+	+	+	+	+	+	1	+	+	+	+	•	•	+	•	•	+	+	•	•	+
Carduus crispus L.	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Cirsium arvense (L.) Scop.	•	•	•	•	•	•	+	•	•	•	•	+	•	+	+	+	+	•	+	•	•	•	+	•	•	•	•	•	•
Linaria vulgaris Mill.	•	•	•	•	•	+	•	•	1	•	•	•	•	+	•	•	•	+	+	1	•	•	•	•	•	•	•	•	•
Urtica dioica L.	+	•	1	1	•	•	+	•	+	•	•	+	+	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•
Ch. Cl. *Epilobietea angustifolii* Tx. et Preising ex von Rochow 1951																													
Calamagrostis epigejos (L.) Roth	2	2	•	•	•	1	+	+	4	•	5	•	4	•	•	•	•	•	2	•	•	+	•	+	•	•	•	•	•
Epilobium angustifolium L.	•	•	•	•	•	•	•	1	+	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Rubus idaeus L.	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Ch. Ass. *Koelerio–Astragaletum arenarii* Steffen 1931																													
Astragalus arenarius L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•

Relevé number	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
Area [m^2]	100	100	100	100	50	44	100	100	100	100	60	100	100	100	100	100	100	100	100	100	60	100	100	100	100	100	100	100	100
Herb cover [%]	98	90	100	100	75	80	90	50	100	85	90	90	90	100	100	100	100	60	100	80	35	65	100	95	100	100	95	95	95
Mosses and lichens cover [%]																				10	10								
Ch. Ass. *Kochietum arenariae* Fijałk. 1978																													
Bassia laniflora (S.G. Gmel.) A.J. Scott	1	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2	•	•	•	•	•	•	•	•
Ch., D. All. *Koelerion glaucae* Volk 1931																													
Koeleria glauca (Spreng.) DC.	•	•	•	•	•	•	•	•	•	1	•	•	•	1	•	•	•	•	•	+	+	•	•	•	•	•	•	•	•
Peucedanum oreoselinum (L.) Moench	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	1	+	•	•	•	•	•	•	•	•
Solidago virgaurea L.	•	2	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	2	•	•	•	•	•	•	•	•	•
Ch. Cl. *Koelerio–Corynephoretea canescentis* Klika in Klika et Novák 1941																													
Cladonia sp.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2	1	•	•	•	•	•	•	•	•
Helichrysum arenarium (L.) Moench	1	2	•	•	•	•	•	•	•	1	+	•	•	2	•	•	•	•	•	•	•	+	+	•	1	1	•	•	+
Festuca ovina L.	•	•	•	•	•	•	•	•	•			•	•	•	•	•	•	•	•	1	•	+	+	•	•	•	•	•	•
Jasione montana L.	+	+	•	•	•	•	•	•	•	+	+	•	•	+	•	•	•	•	•	•	•	+	•	•	•	•	•	•	+
Scleranthus perennis L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1	1	•	•	•	•	•	•	•	•
Thymus serpyllum L.	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	2	•	+	+	•	•	•	•	•	•
Trifolium arvense L.	•	•	+	1	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	+	•	+	+	•	•	•
Trifolium campestre Schreb.	•	•	•	•	1	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	+
Ch. All. *Arrhenatherion elatioris* Luquet 1926 **Ch. O. *Arrhenatheretalia elatioris* Tx. 1931**																													
Achillea millefolium L.	•	•	1	2	2	1	•	•	•	+	+	.	1	+	+	+	•	+	+	•	•	+	+	1	•	•	•	+	+
Campanula patula L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	+	•	•	•
Dactylis glomerata L.	•	•	•	•	•	•	•	+	•	•	•	•	+	•	•	•	+	•	•	•	•	1		2	•	•	+	•	•
Daucus carota L.	•	•	1	1	+	1	•	•	•	•	+	•	•	+	+	+	•	+	+	•	•	+	+	+	1	+	•	•	•
Knautia arvensis (L.) Coult.	•	•	•	•	•	•	+	•	•	•	•	+	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	+
Pimpinella saxifraga L.	•	•	•	•	•	1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2	2	+	•	•
Taraxacum campylodes G.E. Haglund	•	•	•	•	+	•	•	•	•	•	•	•	+	+	•	+	+	•	+	•	•	•	•	•	•	+	•	•	•
Ch., D. Ass. *Ranunculo–Alopecuretum geniculati* R. Tx. 1937																													
Alopecurus geniculatus L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	+	•	•	•
Potentilla repens L.	•	•	•	•	•	•	+	•	•	•	•	+	•	•	•	•	+	•	•	•	•	•	•	•	+	+	•	•	•
Rorippa sylvestris (L.) Besser	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	+	•	•	•
Inula britannica L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	+	•	•	•
Ch. All. *Potentillion anserinae* Tx. 1947 **Ch. O. *Potentillo–Polygonetalia avicularis* Tx. 1947**																													
Agrostis stolonifera L.	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	3	5	•	•	•
Carex hirta L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	+	•	•	•	•	•	•	+	+	•	•	3
Potentilla anserina L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	+	•	•	•	+	•	•	•
Rumex crispus L.	•	•	•	•	•	•	+	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•
Ch. Cl. *Molinio–Arrhenatheretea* Tx. 1937																													
Festuca pratensis Huds.	•	•	•	•	2	•	+	+	•	•	•	+	+	•	+	+	+	•	+	•	•	•	2	3	+	+	+	+	+
Festuca rubra L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1

Relevé number	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
Area [m^2]	100	100	100	100	50	44	100	100	100	100	60	100	100	100	100	100	100	100	100	100	60	100	100	100	100	100	100	100	100
Herb cover [%]	98	90	100	100	75	80	90	50	100	85	90	90	90	100	100	100	100	60	100	80	35	65	100	95	100	100	95	95	95
Mosses and lichens cover [%]																				10	10								
Phleum pratense L.	•	•	2		•	•	•	•	•	•	•	•	•	•	•	+	•	+	+	•	•	+	•	•	1	+	+	•	•
Plantago lanceolata L.	•	•	•	•	•	•	•	•	•	•	•	•	+	+	+	+	+	•	+	•	•	+	+	+	•	•	+	+	•
Poa pratensis L.	•	•	•	•	•	•	+	•	•	•	•	+	•	+	•	•	•	+	+	•	•	•	•	•	5	2	+		4
Ranunculus acris L.	•	•	•	•	•	•	•	•	•	•	•	+	+	•	+	+	+	•	•	•	•	+	•	•	•	•	+	+	•
Rhinanthus minor L.	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	1	•	•	•	+	•	•	•	•	•	•	•
Rumex acetosa L.	+	+	1	2	•	•	•	•	+	+	•	+	•	3	+	+	•	+	+	•	•	+	+	•	1	1	•	•	•
Trifolium pratense L.	•	•	•	•	•	•	+	•	•	•	•	•	+	+	+	+	+	•	+	•	•	•	•	•	+	+	•	+	•
Vicia cracca L.	•	•	•	+	•	•	•	•	•	•	•	+	+	+	•	•	+	+	+	•	•	+	+	•	•	•	•	•	•
Accompanying species																													
Cl. *Artemisietea vulgaris* Lohmeyer *et al.* in Tx. ex von Rochow 1951																													
Artemisia scoparia L.	3	3	•	3	2	•	+	•	•	1	3	•	2	•	•	+	+	•	4	•	•	•	•	•	•	•	•	•	•
Epilobium montanum L.	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Eupatorium cannabinum L.	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Jacobaea vulgaris Gaertn.	•	•	•	•	•	•	•	•	•	•	+	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Leonurus cardiaca L.	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Lupinus polyphyllus Lindl.	•	•	•	•	•	•	+	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Rudbeckia hirta L.	•	•	•	•	•	•	+	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Saponaria officinalis L.	•	•	•	•	•	•	•	•	+	•	•	•	•	1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Silene latifolia Poir.	•	•	2	•	•	+	+	•	•	•	•	•	•	1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Solidago gigantea Aiton	•	•	•	•	1	•	•	1	•	•	•	•	•	•	+	•	•	•	+	•	•	•	•	•	•	•	•	+	•
Tanacetum vulgare L.	1	1	2	•	•	•	+	•	•	•	•	+	•	+	•	+	•	+	•	•	•	+	•	•	•	•	•	•	•
Cl. *Papaveretea rhoeadis* S. Brullo *et al.* 2001																													
Ambrosia artemisiifolia L.	•	•	•	•	•	•	+	•	•	•	•	•	1	1	•	•	•	•	+	•	•	•	•	3	•	•	•	•	•
Apera spica-venti (L.) P. Beauv.	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Chenopodium album L.	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Erigeron annuus (L.) Pers.	•	•	1	•	•	+	+	+	1	•	+	+	•	+	+	+	+	•	+	•	•	3	•	1	+	+	•	+	+
Erigeron canadensis L.	2	1	•	•	2	3	•	3	•	•	•	•	•	•	•	•	+	+	•	•	•	•	•	•	+	+	•	•	+
Galeopsis tetrahit L.	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Lepidium densiflorum L.	1	2	•	•	•	•	•	•	•	•	•	•	•	1	•	•	•	•	•	•	1	•	•	•	•	•	•	•	•
Oxalis stricta L.	•	•	•	•	•	•	+	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Setaria pumila (Poir.) Roem & Schult.	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Vicia sativa L.	•	•	•	+	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Cl. *Robinietea* Jurko ex Hada_c et Sofron 1980																													
Acer negundo L.	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	+	•	•	1	•	•	•	•	•	•	•	•	•	•
Balota nigra L.	•	•	•	•	•	1	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•
Chelidonium majus L.	•	•	1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Cl. *Koelerio–Corynephoretea canescentis* Klika in Klika et Novák 1941																													
Chondrilla graminea M. Bieb.	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•

Relevé number	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
Area [m^2]	100	100	100	100	50	44	100	100	100	100	60	100	100	100	100	100	100	100	100	100	60	100	100	100	100	100	100	100	100
Herb cover [%]	98	90	100	100	75	80	90	50	100	85	90	90	90	100	100	100	100	60	100	80	35	65	100	95	100	100	95	95	95
Mosses and lichens cover [%]																				10	10								
Dianthus borbasii Vandas	•	•	•	•	+	•	•	•	•	1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Gypsophila paniculata L.	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Hypochaeris radicata L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	+	•	•	•
Potentilla argentea L.	•	•	2	1	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	1	1	•	•	•
Potentilla inclinata Vill.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•
Viola tricolor L.	•	•	•	•	•	+	•	•	•	•	•	•	•	+	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•
Cl. *Molinio–Arrhenatheretea* Tx. 1937																													
Agrostis capillaris L.	3	2	•	•	1	1	•	•	•	5	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	+
Anthoxanthum odoratum L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•
Carex leporina L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•
Cirsium oleraceum (L.) Scop.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•
Crepis tectorum L.	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+
Deschampsia cespitosa (L.) P. Beauv.	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	1	•	•	•	•	2	•	•	•	•	+
Dianthus deltoides L.	•	•	+	•	+	•	•	•	+	•	•	•	•	•	•	•	•	+	•	•	+	•	+	•	+	1	•	•	•
Equisetum pratense Ehrh.	•	•	•	•	•	•	•	•	•	•	•	•	•	1	•	•	•	•	•	•	•	+	•	+	•	+	•	•	+
Juncus effusus L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•
Leucanthemum vulgare Lam.	•	•	•	•	•	•	+	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Lotus corniculatus L.	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	+	•	•	•	•	•	•
Lysimachia vulgaris L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•
Lythrum salicaria L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1	•	•	•	•	•	•	•
Medicago falcata L.	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+
Stachys palustris L.	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Stellaria graminea L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•
Trifolium aureum Pollich	•	•	•	1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Veronica longifolia L.	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Cl. *Trifolio–Geranietea sanguinei* T. Müller 1962																													
Agrimonia eupatoria L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•
Galium molugo L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	1	+	•	•	•
Trifolium alpestre L.	•	•	•	•	•	1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Cl. *Calluno–Ulicetea* Br.-Bl. et Tx. ex Klika et Hadač 1944																													
Hieracium umbellatum L.	•	•	•	•	•	•	+	•	•	•	•	+	•	+	•	+	•	•	•	+	•	•	•	•	•	•	•	•	+
Hypericum maculatum Crantz	•	•	•	•	•	•	•	•	•	•	•	•	•	1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Nardus stricta L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	3	•	•	•
Pilosella officinarum Vaill.	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•
Cl. *Vaccinio–Piceetea* Br.-Bl. in Br.-Bl. *et al.* 1939																													
Betula pendula Roth	•	•	•	•	•	•	•	•	1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	+
Carex rhizina Blytt ex Lindblom	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	5	•	•	•	•	•	•
Carlina biebersteinii Bernh.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+

Relevé number	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
Area [m²]	100	100	100	100	50	44	100	100	100	100	60	100	100	100	100	100	100	100	100	100	60	100	100	100	100	100	100	100	100
Herb cover [%]	98	90	100	100	75	80	90	50	100	85	90	90	90	100	100	100	100	60	100	80	35	65	100	95	100	100	95	95	95
Mosses and lichens cover [%]																				10	10								
Chamaecytisus ruthenicus (Fisch. ex Wol.) Klask.	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+
Frangula alnus Mill.	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Jurinea cyanoides (L.) Rchb.	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1	•	•	•	•	•	•	•	•	•
Pinus sylvestris L.	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	+
Pleurozium shreberi (Willd ex Brid) Mitt.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	1	•	•	•	•	•	•	•	•
Cl. *Carpino–Fagetea sylvaticae* Jakucs ex Passarge 1968																													
Scrophularia nodosa L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•
Cl. *Alnetea glutinosae* Br.-Bl. et Tx. ex Westhoff *et al.* 1946																													
Humulus lupulus L.	•	•	1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•
Salix pentandra L.	•	•	•	•	•	•	•	•	1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Other species																													
Hypericum perforatum L.	•	•	•	•	•	•	•	•	1	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	1	+	•	•	•
Populus nigra L.	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•
Populus tremula L.	•	•	•	•	•	•	•	•	•	•	•	•	+	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Dates and localities of relevés:
1 – 11.07.2020; the pine-forest terrace of the Snov River, the town of Snovsk (the Chernihiv region); 2 – 11.07.2020; the pine-forest terrace of the Snov River, the Zaimyshche village (the Snovsk district, Chernihiv region); 3 – 11.07.2020; the pine-forest terrace of the Snov River, the Zhevid village (the Snovsk district, Chernihiv region); 4 – 11.07.2020; the pine-forest terrace of the Zheveda River, the Khrenovka village (the Snovsk district, Chernihiv region); 5 – 15.09.2020; the pine-forest terrace of the Stryzhen River, the city of Chernihiv; 6 – 13.09.2020; the Ripky-Chernihiv loess "island, the city of Chernihiv; 7 – 13.09.2020; the Ripky-Chernihiv loess "island, cemetery "Yatsevo, the city of Chernihiv; 8 – 15.09.2020; the pine-forest terrace of the Stryzhen River, the city of Chernihiv; 9 – 29.07.2020; the meadow-swamp complex "Zamglay, the Lovin village (the Ripky district, Chernihiv region); 10 – 11.07.2020; the pine-forest terrace of the Snov River, the town of Snovsk (the Chernihiv region); 11 – 13.09.2020; the Ripky-Chernihiv loess "island, the Yatsevo tract, the city of Chernihiv; 12 – 13.09.2020; the Ripky-Chernihiv loess "island, the Yatsevo cemetery, the city of Chernihiv; 13 – 13.09.2020; the Ripky-Chernihiv loess "island, the Novoselivka village (the Chernihiv district, Chernihiv region); 14 – 11.07.2020; the flood lands of the Snov River, the town of Snovsk (the Chernihiv region); 15 – 20.08.2019; the Mykhailo-Kotsiubynsk loess "island, the Zhukotki village (the Chernihiv district, Chernihiv region); 16 – 26.08.2019; the Sedniv-Tupychiv loess "island, the Smichin village (the Horodnya district, Chernihiv region); 17 – 28.07.2019; the Berezna-Mena-Sosnytsia loess "island, the town of Berezna (the Mena district, Chernihiv region); 18 – 15.08.2018; the flood lands of the Dnipro River, the Novoselki village (the Ripky district, Chernihiv region); 19 – 15.09.2020; the pine-forest terrace of the Stryzhen River, the city of Chernihiv; 20 – 11.07.2020; the pine-forest terrace of the Snov River, the Zagrebelna Sloboda village (the Snovsk district, Chernihiv region); 21 – 15.09.2020; the pine-forest terrace of the Kryukova River, the Cheretske village (the Horodnya district, Chernihiv region); 22 – 29.07.2020; the meadow and swamp complex "Zamglay, the Lovin village (the Ripky district, Chernihiv region); 23 – 11.07.2020; the pine-forest terrace of the Snov River, the Pishchanka village (the Snovsk district, Chernihiv region); 24 – 06.09.2020; the Ripky-Chernihiv loess "island, the Novoselivka village (the Chernihiv district, Chernihiv region); 25 – 11.07.2020; the flood lands of the Kryukova River, the Molozhava village (the Horodnya district, Chernihiv region); 26 – 11.07.2020; the flood lands of the Kryukova River, the Molozhava village (the Horodnya district, Chernihiv region); 27 – 13.09.2020; the Ripky-Chernihiv loess "island, the Yatsevo tract the city of Chernihiv; 28 – 15.09.2020; the pine-forest terrace of the Stryzhen River, the city of Chernihiv; 29 – 13.09.2020; the Ripky-Chernihiv loess "island, the Yatsevo tract, the city of Chernihiv.

Syntax:
1 – association *Berteroëtum incanae* Siss. et Tideman in Siss. 1950; 2 – community: *Solidago canadensis* L. [Onopordion acanthii Br.-Bl. *et al.* 1936]; 3 – initial community: *Solidago canadensis* L. – *Erigeron canadensis* L. [*Onopordion acanthii* Br.-Bl. et al. 1936]; 4 – initial community: *Solidago canadensis* L. – *Calamagrostis epigejos* (L.) Roth [*Onopordion acanthii* Br.-Bl. *et al.* 1936 + *Epilobietea angustifolii* Tx. et Preising ex von Rochow 1951]; 5 – initial community: *Solidago canadensis* L. – *Agrostis capillaris* L. [*Onopordion acanthii* Br.-Bl. *et al.* 1936+ Koelerion glaucae Volk 1931]; 6 – initial community: *Solidago canadensis* L. – *Calamagrostis epigejos* (L.) Roth [*Onopordion acanthii* Br.-Bl. *et al.* 1936 + *Koelerio–Corynephoretea canescentis* Klika in Klika et Novák 1941]; 7 – initial community: *Solidago canadensis* L. – *Equisetum arvense* L. [*Onopordion acanthii* Br.-Bl. *et al.* 1936 + *Molinio–Arrhenatheretea* Tx. 1937]; 8 – initial community: *Solidago canadensis* L. – *Calamagrostis epigejos* (L.) Roth [*Onopordion acanthii* Br.-Bl. *et al.* 1936 + *Molinio–Arrhenatheretea* Tx. 1937]; 9 – initial community: *Solidago canadensis* L. – *Elytrigia repens* (L.) Nevski [*Onopordion acanthii* Br.-Bl. *et al.* 1936 + *Molinio–Arrhenatheretea* Tx. 1937]; 10 – initial community: *Solidago canadensis* L. – *Elytrigia repens* (L.) Nevski [*Convolvulo arvensis–Agropyrion repentis* Görs 1967 + *Molinio–Arrhenatheretea* Tx. 1937]; 11 – initial community: *Solidago canadensis* L. – *Artemisia scoparia* L. [*Artemisietea vulgaris* Lohmeyer *et al.* in Tx. ex von Rochow 1951 + *Molinio–Arrhenatheretea* Tx. 1937]; 12 – association *Koelerio–Astragaletum arenarii* Steffen 1931; 13 – association *Kochietum arenariae* Fijałk. 1978; 14 – initial community: *Solidago canadensis* L. – *Erigeron annuus* (L.) Pers. [*Koelerio–Corynephoretea canescentis* Klika in Klika et Novák 1941 + *Molinio–Arrhenatheretea* Tx. 1937]; 15 – initial community: *Carex ryzina* Blytt ex Lindblom [*Koelerio–Corynephoretea canescentis* Klika in Klika et Novák 1941 + *Molinio–Arrhenatheretea* Tx. 1937]; 16 – initial community: *Festuca pratensis* Huds. – *Ambrosia artemisiifolia* L. [*Arrhenatheretalia elatioris* Tx. 1931]; 17 – association *Ranunculo–Alopecuretum geniculati* R. Tx. 1937; 18 – initial community: *Solidago canadensis* L. [*Molinio–Arrhenatheretea* Tx. 1937]; 19 – initial community: *Solidago canadensis* L. – *Poa pratensis* L. [*Molinio–Arrhenatheretea* Tx. 1937].
■ – dominant species of the initial community.

Similar communities with *S. canadensis* participation, investigated in Kursk, Bryansk, and Minsk, were described by Arepieva and Kulikova (2017). The distinctive feature of their relevés is the participation of the species, diagnosing the *Agropyretalia intermedio–repentis* order.

There is also a number of initial communities with characteristic species of the *Onopordetalia acanthii* order, where *S. canadensis* has a projective coverage from 20 to 98%, but in combination with characteristic species of other high-ranking taxa. Such species as *Equisetum arvense* (relevé 12), *Calamagrostis epigejos* (relevés 9, 11, 13), *Agrostis capillaris* (relevé 10), *Artemisia scoparia* (relevé 19) and *Elytrigia repens* (relevés 14–18) co-dominate in the initial communities. These communities are mostly the transformed meadow phytocenoses (relevés 7–11) and less often – the communities of pine-forest sands (relevés 5–6). A process of meadow ecosystems ruderalization due to invasion of *S. canadensis* is shown in the relevés 12–19. This process is especially manifested on the loess "islands" (relevés 15–18), where a gradual replacement of meadows with semiruderal grasslands and herblands of the *Convolvulo arvensis–Agropyrion repentis* alliance could be observed. The community, described in the relevé 24, is an example of the initial invasion of *S. canadensis* into the meadow phytocenosis, which had already been transformed by *Ambrosia artemisiifolia* – the species, which is widely represented in the Chernihiv-Ripky loess island phytocenoses.

The communities of the *Koelerio–Corynephoretea canescentis* class and the Koelerion glaucae alliance were described in the pine-forest terraces of the Snov (near Zagrebelna Sloboda village) and the Kryukova (near Cheretske village) rivers. The vegetation of the *Koelerio–Corynephoretea canescentis* class is widespread in a temperate zone of Europe. This sand vegetation is most abundant in northwestern Europe and in the lowlands of northern Germany and Poland. The pioneer communities are widespread under the conditions of xerophytization and anthropogenic transformation in the Chernihiv Polesie. The community (relevé 20) of the *Koelerio–Astragaletum arenarii* association is diagnosed by *Astragalus arenarius*. This species, which is included into the Red Book of the Ukraine, is rear in the Chernihiv Polesie. The *Kochietum arenariae* association, diagnosed by *Bassia laniflora*, is represented in the relevé 21. We noted earlier that the communities of synanthropic psammophytes species more resistant to anthropogenic influence, in particular *Kochietum arenariae*, are formed under urban conditions (Lukash and Danko, 2020).

Participation of *Solidago canadensis* in the psammophytic communities (relevés 20–21) of the *Koelerio–Corynephoretea canescentis* class is not significant. Characteristic species of the *Vaccinio–Piceetea* class (*Jurinea cyanoides*, *Pinus sylvestris*, *Pleurozium shreberi*) also take part in the phytocenosis formation. Characteristic species of the *Koelerion glaucae* alliance (such as *Koeleria glauca*, *Peucedanum oreoselinum*, *Solidago virgaurea*) and the *Koelerio–Corynephoretea canescentis* class (*Cladonia* sp., F*estuca ovina*, *Scleranthus perennis*, *Thymus serpyllum*) are represented in these two communities.

There are also transformed phytocenoses, possessing some features of the *Koelerio–Corynephoretea canescentis* class at different succession stages. The relevé 22 (*Solidago canadensis–Erigeron annuus* initial community) illustrates the xerophytization process of the meadow floodplain phytocenoses grassland under conditions of the *S. canadensis* invasion. The initial community is formed by the dominant species: *Solidago canadensis* (with projective coverage 30%) and *Erigeron annuus* (25%). As part of these communities, there is a number of characteristic species of the *Koelerio–Corynephoretea canescentis* (*Helichrysum arenarium*, *Festuca ovina*, *Jasione montana*, *Thymus serpyllum*) and *Molinio–Arrhenatheretea* (*Phleum pratense*, *Plantago lanceolata*, *Ranunculus acris*, *Rhinanthus minor*, *Rumex acetosa*, *Vicia cracca*) classes.

In the relevé 23, collected in the meadow and swamp complex Zamglay near Lovin village, characteristic species of the *Koelerio–Corynephoretea canescentis* class (such as *Helichrysum arenarium*, *Festuca ovina*, *Thymus serpyllum*, *Trifolium arvense*, *Trifolium campestre*) and of the *Molinio–Arrhenatheretea* class (*Festuca pratensis*, *Plantago lanceolata*, *Rumex acetosa*, *Vicia cracca*) were identified. The *Carex rhizina* initial community (*Koelerio–Corynephoretea canescentis* + *Molinio–Arrhenatheretea*) is formed by the monodominant species *Carex rhizina* with its projective coverage 90%. We think that the *Carex rhizina* initial community is a stage of overgrowth and xerophytization of the meadow-swamp complex Zamglay in the next succession series: marsh vegetation → semiruderal phytocenoses of nutrient-demanding grasses on anthropogenic transformed soils → meadow ruderal herblands with *Solidago canadensis* + other species → meadow ruderal herblands with monodomination of *Solidago canadensis* → xerophytic community.

All initial communities should be treated as successional phases of different phytocenoses under the impact of *Solidago canadensis* invasion. The *S. canadensis* spreading leads to the unification and loss of the phytocenoses traits. The relevés 8–10 represent the initial stages of successional changes under the influence of the *S. canadensis* invasion into the floodplains of small rivers, when phytocenosis originality still remains. Instead, on the loess islands this process is accelerated by the anthropogenic pressure on ecosystems and has irreversible consequences. For example, in the plant community *Poa pratensis–Festuca rubra*, *Solidago canadensis* firstly displaces *Festuca rubra* (relevé 29) and then forms the entire phytocenosis (relevés 27, 28).

CONCLUSIONS

The *Solidago canadensis* habitats in the Chernihiv Polesie are partially or completely ruderalized meadow phytocenoses of the river floodplains. Meadows with *S. canadensis* represent different stages of succession with a significant participation of characteristic species of the *Artemisietea vulgaris* class. Significant participation of the

Papaveretea rhoeadis class monocarpics testifies to the leading role of anthropogenic influence in the processes of xerophytization and unification of the meadow phytocenoses due to the *S. canadensis* invasion. Anthropogenic pressure on ecosystems accelerates the invasion of *S. canadensis* into phytocenoses and also leads to irreversible consequences. The *Berteroëtum incanae* association ruderal communities are the most common phytocenoses with *S. canadensis*. The *S. canadensis* invasion on the loess islands leads to a formation of semi-ruderal grasslands and herblands of the *Convolvulo arvensis–Agropyrion repentis* alliance. *S. canadensis* also occurs on pine terraces, in particular in the *Koelerio–Corynephoretea* class communities, which are mostly successive stages of transformation of the psammophytic herbal phytocenoses.

Thus, general trends in the distribution of communities with *Solidago canadensis* in the meadows and sands of the region are:

– Annual and biennial species would be well represented as a sign of recent disturbance of ecosystems.
– Floristic composition shows such tendencies in the development of plant communities with *S. canadensis* participation as xerophytization, ruderalization and species unification of the natural phytocenoses (of both psammophytic and meadow types).

Taking into consideration the peculiarities of the development cycle of *S. canadensis*, in order to prevent phytoinvasion, the authors consider it appropriate to carry out measures of plants mowing in places of their concentration at the beginning of mass flowering. Phytocenoses with *S. canadensis* need further attention as a possible source of late summer and autumn honey harvest.

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