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Syntaxonomic evaluation of segetal communities with *Ambrosia artemisiifolia* L. on arable fields in western Ukraine

Syntaksonomiczna ocena zbiorowisk chwastów z udziałem *Ambrosia artemisiifolia* L. na polach uprawnych w zachodniej Ukrainie

Summary. Investigations were carried out in the years 2012–2014 on arable fields in western Ukraine in order to evaluate the occurrence of *Ambrosia artemisiifolia* L. in the stands of: (1) corn (*Zea mays* L.); (2) sunflower (*Helianthus annuus* L.); (3) alfalfa (*Medicago sativa* L. subsp. *sativa*); (4) strawberry (*Fragaria x ananassa* Duchesne); (5) potato (*Solanum tuberosum* L.); (6) spring wheat (*Triticum aestivum* L.); (7) soybean (*Glycine max* (L.) Merr.) and (8) grapevine (*Vitis vinifera* L.). Phytosociological and syntaxonomic assessment of the segetal communities was carried out with the Braun-Blanquet method at the height of the vegetative season. The study demonstrated *Ambrosia artemisiifolia* to predominate amongst the weeds occurring in the analyzed crops, and that area coverage with this plant reached 85–90% in the fields of spring wheat, sunflower and corn. Weeds occurring on the investigated arable fields were identified to belong to 7 syntaxonomic classes.

Key words: *Ambrosia artemisiifolia* L., phytosociological evaluation, crops

INTRODUCTION

Ambrosia artemisiifolia originates from North America, where it had been described for the first time in 1838 in Michigan [Bassett and Crompton 1975]. It is an invasive species and spreading across all continents [Bazzaz 1974]. As reported by Bassett and Crompton [1975], in Canada *Ambrosia artemisiifolia* is recognized as the most abundant species infesting tomato, corn, potato, tobacco and onion. In Poland, this species has appeared in the XVIIIth century and its locations were dispersed and sparse [Tokarska-Guzik *et al.* 2011, 2012]. In Ukraine, it has appeared in 1914 at the research station

Kudashevka in the Dniepropietrovsk region where it was cultivated as a medicinal plant (quinine replacer), wherefrom it spread into other regions of the eastern Ukraine. Today, *Ambrosia artemisiifolia* occurs in the entire Ukraine and infests stands of various crops. According to Bassett and Crompton [1975], the best conditions for its growth and development occur on silty-clay and loamy-silty soils. The detrimental effect of common ragweed is potentiated by its high fertility [Dickerson and Sweet 1971], long seed viability in the soil (39 years and more) [Bassett and Crompton 1975], a high growth rate and capability of re-growth after cutting, as well as resistance to glyphosate [Nandula *et al.* 2005]. As reported by Vidotto *et al.* [2013], invasiveness of this species is linked with its allelophatic effect on other plant species. In turn, in the dusting period, *Ambrosia artemisiifolia* is a very strong and detrimental allergen to man [Vidotto *et al.* 2013].

As the invasive species, *Ambrosia artemisiifolia* forms spontaneous communities with different plant species. This is indicated by segetal and ruderal associations with the participation of *Ambrosia artemisiifolia*, that belong to various syntaxonomic units: class *Artemisietea vulgaris* Lohm., Prsg. et R.Tx. 1950 [Coste and Arsene 2003, Sîrbu 2008, Mârza 2010], class *Stellarietea mediae* R. Tx. et al. ex von Rochow 1951 [Milošević 2008, Abramowa 2012], class *Chenopodietea albae* Br.-Bl. 1951. em. Lohm., R. et J. Tx. 1961 [Jarić *et al*. 2011], and class *Secalietea* Br.-Bl. 1951 Solomacha *et al*. [1992].

The objective of this research was to conduct syntaxonomic evaluation of segetal plant communities with *Ambrosia artemisiifolia* L. on arable fields in the western Ukraine.

MATERIAL AND METHODS

The occurrence of *Ambrosia artemisiifolia* L. was evaluated in the years 2012–2014 on arable fields in western Ukraine (Zakarpackie Province) in crop canopy of: (1) corn (*Zea mays* L.), (2) sunflower (*Helianthus annuus* L.), (3) alfalfa (*Medicago sativa* L. subsp. *sativa*), (4) strawberry (*Fragaria x ananassa* Duchesne), (5) potato (*Solanum tuberosum* L.), (6) spring wheat (*Triticum aestivum* L.), (7) soybean (*Glycine max* (L.) Merr.), and (8) grapevine (*Vitis vinifera* L.). – Table 1. In each study year, 35 phytosociological descriptions were made on the analyzed fields. The phytosociological and syntaxonomic evaluation of weed communities was conducted in the height of the vegetative season with Braun-Blanquet method [1964]. Degrees of phytosociological constancy were evaluated with the following scale: V (80–100%), IV (60–80%), III (40–60%), II (20–40%), I (<20%). The number of weeds in crops was determined with the frame method [Woźniak and Soroka 2014] per surface area of 1 m^2 at 6 sites selected at random and located alongside field diagonal. Names and structure of syntaxons and the syntaxonomic scheme were adopted after Matuszkiewicz [2001] and Soroka [2008]. Latin names of species of vascular plants were provided according to Flora Europaea [1964–1980]. Weather conditions on the study area were depicted in Figure 1. According to the Meteorological Station in Berehowe, the average annual air temperature reaches 9.9°C, annual sum of precipitation – reaches 640 mm (average of years 2000–2014), and the vegetative season spans for 230–240 days.

Table 1. Study area in the western Ukraine, Zakarpackie Province
Tabela 1. Obszar badań w zachodniej Ukrainie, województwo zakarpackie

Study site Miejsce badań	Cultivable plant Roślina uprawna	Soil unit acc. to WRB Jednostka glebowa wg WRB
1. Wielka Byjgań; 48°14'N 22°34'E	corn kukurydza	Entic Podzols
2. Wielka Byjgań; 48°14'N 22°34'E		Entic Podzols
3. Wielka Byjgań; 48°14'N 22°34'E		Entic Podzols
4. Wielka Byjgań; 48°14'N 22°34'E		Entic Podzols
5. Kosyno; 48°15'N 22°27'E		Gleyic Podzols
6. Kosyno; 48°15'N 22°27'E		Gleyic Podzols
7. Wynogradiw; 48°09'N 23°02'E		Dystric Cambisols
8. Dyjda; 48°13'N 22°34'E		Gleyic Podzols
9. Dyjda; 48°13'N 22°34'E		Gleyic Podzols
10. Wielka Byjgań; 48°14'N 22°34'E	sunflower słonecznik	Entic Podzols
11. Wynogradiw; 48°10'N 23°03'E		Eutric Gleyic Cambisols
12. Astej; 48°10'N 22°35'E		Gleyic Podzols
13. Astej; 48°10'N 22°35'E		Gleyic Podzols
14. Wielka Byjgań; 48°14'N 22°34'E		Entic Podzols
15. Dyjda; 48°13'N 22°34'E		Mollic Gleysols
16. Kosyno; 48°15'N 22°27'E		Dystric Cambisols
17. Dyjda; 48°13'N 22°34'E		Gleyic Podzols
18. Bene; 48°10'N 22°45'E	alfalfa lucerna	Eutric Cambisols
19. Dyjda; 48°13'N 22°34'E		Gleyic Podzols
20. Bene; 48°10'N 22°45'E	strawberry truskawka	Eutric Cambisols
21. Bene; 48°10'N 22°45'E		Eutric Cambisols
22. Bene; 48°10'N 22°45'E	potato ziemniak	Eutric Cambisols
23. Bene; 48°10'N 22°45'E		Eutric Cambisols
24. Kosyno; 48°15'N 22°27'E		Dystric Cambisols
25. Kosyno; 48°15'N 22°27'E	spring wheat pszenica jara	Dystric Cambisols
26. Wynogradiw; 48°10'N 23°03'E		Eutric Cleyic Cambisols
27. Wynogradiw; 48°09'N 23°02'E		Eutric Gleyic Cambisols
28. Dyjda; 48°13'N 22°34'E		Mollic Gleysols
29. Dyjda; 48°13'N 22°34'E		Mollic Gleysols
30. Dyjda; 48°13'N 22°34'E	soybean soja	Mollic Gleysols
31. Bene; 48°10'N 22°45'E		Eutric Cambisols
32. Zatyszne; 48°13'N 22°39'E		Gleyic Podzols
33. Zatyszne; 48°13'N 22°39'E	grapevine winorośl	Gleyic Podzols
34. Zatyszne; 48°13'N 22°39'E		Gleyic Podzols
35. Wielka Byjgań; 48°14'N 22°34'E		Gleyic Podzols

WRB – World Reference Base

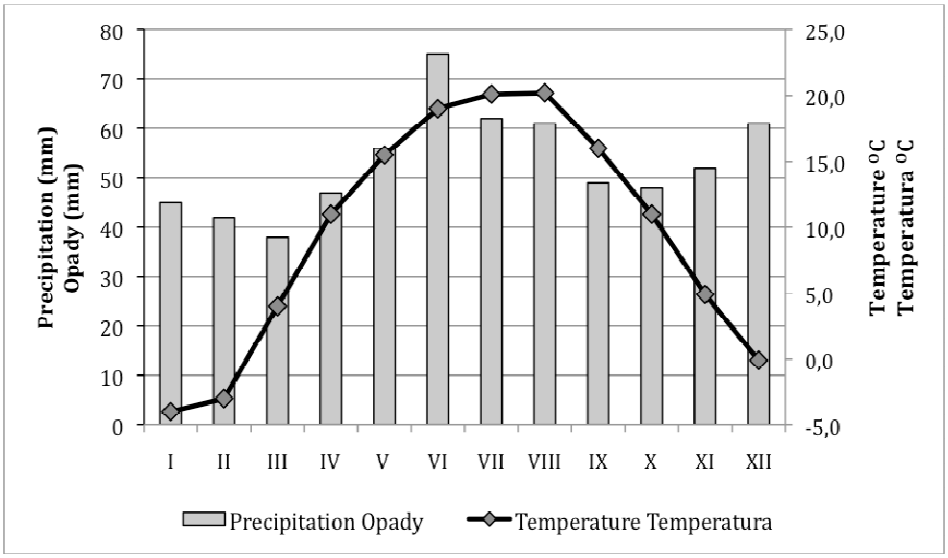

Fig. 1. Climograph of study area acc. to Meteorological Station Berehowe (average of years 2000–2014)
Rys. 1. Klimatogram obszaru badań wg Stacji Meteorologicznej Berehowe (średnio z lat 2000–2014)

Results achieved were elaborated statistically based on the analysis of variance (ANOVA), whereas significance of differences between mean values was evaluated with the Tukey's HSD test, $P < 0.05$.

RESULTS AND DISCUSSION

Weed infestation indicators

Irrespective of study year and soil conditions, significantly more weeds per m^2 occurred in wheat than in other stands (Table 2). Most of the weeds appeared in the second half of the vegetative season (June – July) and *Ambrosia artemisiifolia* was prevailing quantitatively (90% area coverage). Also in other analyzed crops, common ragweed was characterized by the highest area coverage index. Exceptions were fields of soybean and alfalfa where area coverage by *Ambrosia artemisiifolia* was lesser compared to the other crops. As reported by Walter-Shea *et al.* [1997] and Purcell [2000], these plants are characterized by a high leaf area index (LAI), which allows them to successfully suppress (overgrow) and displace weeds including the photophilic *Ambrosia artemisiifolia* [Bassett and Crompton 1975]. Those observations were also confirmed in our study which demonstrated a significantly lower number of weed species in the field of soybean compared to the other analyzed cultivable plants.

Table 2. Weed infestation indices of canopy of cultivable plants with the participation of *Ambrosia artemisiifolia* L. (average of years 2012–2014)
Tabela 2. Wskaźniki zachwaszczenia łanu roślin uprawnych z udziałem *Ambrosia artemisiifolia* L. (średnio z lat 2012–2014)

Specification Wyszczególnienie	Cultivable plant/ Roślina uprawna							
	corn kukurydza	sunflower słonecznik	alfalfa lucerna	strawberry truskawka	potato ziemniak	spring wheat pszenica jara	soybean soja	grapevine winorośl
Number of weeds per m^2 Liczba chwastów na m^2	78b*	84b	42d	65c	61c	123a	6e	85b
Area coverage by *Ambrosia artemisiifolia* (%) Pokrycie powierzchni przez *Ambrosia artemisiifolia* (%)	85a	89a	29c	60b	55b	90a	5d	65b
Number of weed species Liczba gatunków chwastów	74a	63a	37c	22d	55b	52b	9e	52b

* Mean values denoted with the same letters in rows do not differ significantly, $P < 0.05$
* Średnie oznaczone w wierszach tymi samymi literami nie różnią się istotnie, $p < 0,05$

Syntaxonomic evaluation of weed communities

Seven syntaxonomic classes were differentiated in the evaluated segetal communities. The richest complex of species of segetal plants on the evaluated area was the class *Stellarietea mediae* (Table 3). As reported by Matuszkiewicz [2001], this class includes anthropogenic communities of arable fields and annual plants of ruderal areas. In our investigations, in all study years and on all fields there occurred *Echinochloa crus-galli* and *Setaria pumila*, as well as *Chenopodium album* (except for grapevine), *Erigeron canadensis* and *Fallopia convolvulus* (except for strawberry), and *Oxalis europaea* (not in all study years). In turn, *Ambrosia artemisiifolia* was establishing communities that belonged to the class *Stellarietea mediae* order *Polygono-Chenopodietalia*, whereas in the crops of annual plants it formed the association *Echinochloo-Setarietum* Krusem et Vlieg. (1939) 1940 with high contribution of terophytes. The second group in size was formed by plants of the class *Artemisietea vulgaris* (Table 4). Out of this syntaxonomic class, the most frequently occurring was *Cirsium arvense*, except for the field with soybean. Relatively frequent was also *Cichorium intybus* and even *Arctium lappa* – namely typical species of nitrophilic ruderal habitats [Matuszkiewicz 2001]. In our study, we discriminated also a group of plants belonging to the class *Molinio-Arrhenatheretea* (Table 5). According to Matuszkiewicz [2001], representatives of this family are typical of semi-natural and anthropogenic meadow and pasture communities on mesotrophic and eutrophic soils. In our research, the most frequently occurring weed species in crops turned out to be *Polygonum aviculare* (except for the strawberry field) and *Achillea millefolium* (except for the soybean field). In the analyzed crops, we discriminated also the class *Agropyretea intermedio-repentis* (Table 6). Its representatives usually occur on

Table 3. Degrees of constancy of *Ambrosia artemisiifolia* L. and diagnostic species from the class *Stellarietea mediae*

Tabela 3. Stopnie stałości *Ambrosia artemisiifolia* L. i gatunków z klasy *Stellarietea mediae*

Species composition Skład gatunkowy	Cultivable plant/ Roślina uprawna							
	corn kukurydza	sunflower słonecznik	alfalfa lucerna	strawberry truskawka	potato ziemniak	spring wheat pszenica jara	soybean soja	grapevine winorośl
Ambrosia artemisiifolia L.	V	V	V	V	V	V	V	V
D. sp. Cl.: *a – Stellarietea mediae; b – Centauretalia cyani; c – Aperion spicae-venti; d – Aphanenion arvensis; e – Papaverion rhoeadis; f – Caucalidion lappulae; g – Polygono-Chenopodietalia; h – Panico-Setarion; i – Polygono-Chenopodion; j – Sisymbrietalia, Sisymbrion officinalis*								
a Fallopia convolvulus (L.) A.Love	I	I	III	-	II	IV	I	II
a Raphanus raphanistrum L.	I	I	I	-	I	I	-	-
a Stellaria media (L.) Vill.	I	I	IV	-	I	II	-	-
a Vicia hirsuta (L.) S.F. Gray	I	I	-	-	-	-	-	-
b Anthemis arvensis L.	II	I	-	-	-	-	-	-
b Centaurea cyanus L.	I	I	-	-	I	-	-	-
b Consolida regalis S.F. Gray	II	I	I	I	II	V	-	-
b Vicia villosa Roth.	I	I	-	-	III	I	-	-
c Apera spica-venti (L.) Beauv.	I	-	-	-	III	-	-	-
d Matricaria perforata Merat	II	I	III	II	III	I	-	-
e Papaver rhoeas L.	I	-	-	-	IV	-	-	-
f Avena fatua L.	-	-	I	I	II	-	-	-
g Capsella bursa-pastoris (L.) Medicus	III	II	I	-	II	III	-	-
g Chenopodium album L.	V	V	V	III	IV	IV	V	-
g Echinochloa crus-galli (L.) Beauv.	V	V	V	IV	V	V	V	III
g Setaria pumila (Poiret) Schultes	V	V	V	I	V	V	V	IV
g Sonchus arvensis L.	V	V	V	-	I	-	-	-
h Digitaria ischaemum (Schreber) Muhl.	-	-	-	-	-	-	-	V
i Galinsoga ciliata (Rafin.) S.F. Blake	I	-	IV	-	IV	-	-	-
i Galinsoga parviflora Cav.	I	-	IV	-	V	-	-	-
i Lamium purpureum L.	IV	II	IV	-	III	-	-	-
i Sonchus asper (L.) Hill.	I	I	-	-	-	-	-	-
i Sonchus oleraceus L.	II	I	-	I	-	-	-	-
i Veronica persica Poiret	II	II	-	-	-	-	-	-
i Oxalis europaea Jordan	I	II	IV	I	II	I	I	III
j Chenopodium polyspermum L.	I	-	-	-	-	-	-	-
J Chenopodium rubrum L.	I	-	-	-	-	-	-	-
j Descurainia sophia (L.) Webb ex Prantl	II	I	-	-	I	I	I	II
j Erigeron canadensis L.	III	IV	III	-	III	II	I	IV
j Lactuca serriola L.	I	-	-	I	II	-	-	-
j Senecio viscosus L.	I	-	-	-	II	II	-	-
j Sisymbrium officinale (L.) Scop.	I	I	-	-	-	-	-	-
j Tussilago farfara L.	II	II	-	-	II	III	-	I
j Xanthium strumarium L.	-	I	-	-	I	-	-	I
Number of species Liczba gatunków	31	24	16	9	25	15	7	9

Table 4. Degrees of constancy of diagnostic species from the class *Artemisietea vulgaris*
Tabela 4. Stopnie stałości gatunków diagnostycznych z klasy *Artemisietea vulgaris*

Species composition Skład gatunkowy	Cultivable plant/ Roślina uprawna							
	corn kukurydza	sunflower słonecznik	alfalfa lucerna	strawberry truskawka	potato ziemniak	spring wheat pszenica jara	soybean soja	grapevine winorośl
Constancy degrees/ Stopnie stałości								
D. sp. Cl.: *a – Artemisietea vulgaris; b – Atremisienea vulgaris; c – Onopordetalia acanthii, Onopordion acanthii; d – Dauco-Melilotenion; e – Artemisietalia vulgaris, Arction lappae; f – Glechometalia hederaceae, Alliarion;g – Convolvuletalia sepium, Convolvulion sepium*								
a Artemisia vulgaris L.	IV	V	-	-	-	-	-	IV
a Cirsium arvense (L.) Scop.	IV	V	V	V	V	V	-	IV
a Dipsacus laciniatus L.	I	-	-	-	-	-	-	-
b Linaria vulgaris Miller	II	I	-	-	-	III	-	I
b Silene latifolia Poiret subsp. *alba* (Miller) Greuter et Burdet	IV	III	-	-	I	-	-	II
c Artemisia absinthium L.	I	-	-	-	-	-	-	-
c Cichorium intybus L.	III	II	I	I	-	I	-	III
c Oenothera biennis L.	I	-	-	-	-	I	-	III
c Reseda lutea L.	II	I	-	-	-	II	-	-
d Berteroa incana (L.) DC.	I	-	-	-	-	II	-	-
d Tanacetum vulgare L.	III	I	-	-	-	I	-	II
e Arctium lappa L.	I	II	-	I	I	I	-	II
f Impatiens parviflora DC.	II	-	-	-	-	I	-	-
f Lapsana communis L.	IV	IV	-	-	I	-	-	III
g Epilobium roseum Schreber	I	I	-	-	-	-	-	-
g Symphytum officinale L.	I	-	-	-	I	-	-	-
Number of species Liczba gatunków	16	10	2	3	5	9	0	9

nitrophilic habitats of ruderal areas [Matuszkiewicz 2001]. As shown in Table 6, in crops of perennial plants, in the part of the complex with *Echinochloo-Setarietum* there was also established the *Convolvulo arvensis-Agropyretum repentis* Felföldy 1943 association, which includes species of hemicryptophytes, with *Convolvulus arvensis* and *Elymus repens* having the highest constancy degrees. Also in fields of perennial plants with a low degree of agrotechnical measures there appeared *Calamagrostis epigeios* from the class *Epilobietea angustifolii* – namely a species which initiates secondary succession on ruderal areas and felling sites. The other syntaxonomic classes were less abundantly represented by weed species. Amongst the companion species, the most frequently occurring were *Amaranthus retroflexus* and *Stenactis annua*.

Table 5. Degrees of constancy of diagnostic species from the class *Molinio-Arrhenatheretea*
Tabela 5. Stopnie stałości gatunków diagnostycznych z klasy *Molinio-Arrhenatheretea*

Species composition Skład gatunkowy	Cultivable plant/ Roślina uprawna							
	corn kukurydza	sunflower słonecznik	alfalfa lucerna	strawberry truskawka	potato ziemniak	spring wheat pszenica jara	soybean soja	grapevine winorośl
Constancy degrees/ Stopnie stałości								
D. sp. Cl.: *a – Molinio-Arrhenatheretea; b – Plantaginetalia majoris, Poligonion avicularis; c – Trifolio fragiferae-Agrostietalia stoloniferae, Agropyro-Rumicion crispi; d – Molinietalia caeruleae, Calthion palustris; e – Arrhenatheretalia; f – Arrhenatherion elatioris; g – Cynosurion*								
a Plantago lanceolata L.	I	III	IV	-	-	-	-	IV
a Poa pratensis L.	I	I	-	-	-	-	-	III
a Trifolium pratense L.	IV	II	-	-	III	I	-	III
b Chamomila suaveolens (Pursch) Rydb.	II	I	-	-	-	-	-	-
b Lolium perenne L.	I	III	IV	-	-	II	-	III
b Plantago major L.	III	I	I	-	I	II	-	III
b Poa annua L.	III	II	-	-	II	-	-	V
b Polygonum aviculare L.	IV	IV	III	-	IV	V	V	V
c Agrostis stolonifera L.	-	-	IV	-	-	I	-	V
c Potentilla anserina L.	I	-	-	-	-	I	-	-
c Potentilla reptans L.	-	II	-	-	-	-	-	-
c Ranunculus repens L.	I	II	II	-	III	II	-	-
c Rorippa sylvestris (L.) Besser	-	-	I	-	I	I	-	II
c Rumex crispus L.	-	-	-	I	I	I	-	I
d Trifolium hybridum L.	-	II	-	-	I	I	-	-
e Achillea millefolium L.	II	IV	III	I	III	III	-	V
e Daucus carota L.	-	II	III	-	I	-	-	II
e Taraxacum officinale Weber in Wiggers	II	III	IV	I	I	III	-	-
f Pastinaca sativa L.	-	III	II	I	-	I	-	II
g Bellis perennis L.	-	-	II	-	I	-	-	IV
g Trifolium repens L.	-	-	II	-	I	I	-	IV
Number of species Liczba gatunków	12	15	13	4	13	14	1	15

In summary, it shall be concluded that *Ambrosia artemisiifolia* is an abundant species in stands of cultivable plants of western Ukraine. Our study demonstrated that *Ambrosia artemisiifolia* formed communities well adjusted to tillage systems and developmental stages of crops. In fields of annual plants, the common rageed established the *Echinochloo-Setarietum* var. *Ambrosia artemisiifolia* association, whereas in fields of perennial plants it formed the *Convolvulo arvensis-Agropyretum repentis* var. *Ambrosia artemisiifolia* association. The least density of *Ambrosia artemisiifolia* occurred on field with soybean and alfalfa, which may be indicative of a high competitive strength of these plants compared to other species. In addition, the leguminous plants should be included in crop rotation in order to remove *Ambrosia artemisiifolia*.

Table 6. Degrees of constancy of diagnostic species from the other syntaxonomic classes
Tabela 6. Stopnie stałości gatunków diagnostycznych z pozostałych klas syntaksonomicznych

Species composition Skład gatunkowy	Cultivable plant/ Roślina uprawna							
	corn kukurydza	sunflower słonecznik	alfalfa lucerna	strawberry truskawka	potato ziemniak	spring wheat pszenica jara	soybean soja	grapevine winorośl
Constancy degrees/ Stopnie stałości								
D. sp. Cl.: *a – Agropyretea intermedio-repentis, Agropyretalia intermedio-repentis, Convolvulo-Agropyrion repentis*								
a Convolvulus arvensis L.	IV	II	V	V	V	V	-	IV
a Elymus repens (L.) Gould	II	III	IV	V	V	V	-	III
a Equisetum arvense L.	III	IV	I	-	II	IV	-	-
D. sp.Cl.: *a – Trifolio-Geranietea sanquinei, Origanetalia; b – Geranion sanquinei; c – Trifolion medii*								
a Coronilla varia L.	-	-	-	-	-	I	-	II
a Galium verum L.	-	-	-	-	-	II	-	IV
b Medicago sativa L. subsp. *falcata* (L.) Arcangeli	III	IV	-	-	II	I	-	II
c Agrimonia eupatoria L.	-	-	-	-	-	I	-	III
c Agrimonia procera Wallr.	-	II	-	-	I	-	-	II
D. sp. Cl.: *a – Epilobietea angustifolii, Atropetalia*								
a Calamagrostis epigeios (L.) Roth	-	-	-	II	II	-	-	III
D. sp. Cl.: *a –Bidentetea tripartiti, Bidentetalia tripartita, – Bidentetion tripartiti*								
a Polygonum hydropiper L.	I	-	-	-	-	-	-	-
Other species Pozostałe gatunki								
Amaranthus retroflexus L.	IV	V	-	V	V	I	-	III
Erodium cicutarium (L.) L'Her.	III	II	-	-	I	II	-	II
Galeopsis ladanum L.	I	-	-	-	-	-	-	-
Lythrum virgatum L.	IV	III	-	-	-	-	-	I
Mentha arvensis L.	II	I	-	-	-	-	-	I
Myosotis caespitosa K.F. Schultz	-	-	-	-	-	III	-	I
Polygonum persicaria L.	I	I	-	-	II	-	-	III
Senecio jakobae L.	III	IV	-	-	I	II	-	II
Stenactis annua (L.) Less.	II	IV	III	IV	V	V	-	V
Viola arvensis Murray	I	-	-	-	-	V	-	I
Number of species Liczba gatunków	14	12	4	5	11	13	-	17

REFERENCES

Abramowa L.M., 2012. O klasyfikacji soobszczestw s inwaziwnymi widami. Izwestija Samarskogo naucznoho centra Rosyjskoj Akademii Nauk 14(1/4), 945–949 (in Russian).

Bassett I.J., Crompton C.W., 1975. The biology of Canadian weeds. 11. *Ambrosia artemisiifolia* L. and *A. psilostachya* DC. Can. J. Plant Sci. 55, 463–476.

Bazzaz F.A., 1974. Ecophysiology of *Ambrosia artemisiifolia*: a successional dominant. Ecology 55, 112–119.

Braun-Blanquet J., 1964. Pflanzensoziologie. Grundzuge der Vegetationskunde. 3 Aufl. Springer, Wien–New York.

Coste I., Arsene G.G., 2003. Notes on anthropohilous flora and vegetation in the city of Timişoara. Annals of Faculty Engineering Hunedoara – Int. J. Eng. 1(4), 211–216.

Dickerson C.T., Sweet R.D., 1971. Common ragweed ecotypes. Weed Sci. 19, 64–66.

Flora Europaea 1964–1980. Flora Europaea. Eds. Tutin T.G., Heywood V.H., Burges N.A. et al., Cambridge Univ. Press 1–5.

Jarić S., Mitrović M., Vrbničanin S., Karadžić B., Djurdjević L., Kostić O., Mačukanović-Jocić M., Gajić G., Pavlović P., 2011. A contribution to studies of the ruderal vegetation of Southern Srem, Serbia. Arch. Biol. Sci. 63(4), 1181–1197.

Matuszkiewicz W., 2001. Przewodnik do oznaczania zbiorowisk roślinnych Polski. PWN, Warszawa (in Polish).

Mârza M., 2010. Flora şi vegetaţia sinantropă necultivată a Republicii Moldova. Autoreferatul tezei de doctor habilitat în biologie. Acad. de Şt. A Moldovei, Grădina Botanică – Chişinău (in Moldovan).

Milošević V., 2008. Asocijacija Panico-Ambrosietum artemisiifoliae ass. Nova. Acta Biol. Iugoslav. Serija G, Acta Herbol. 17(1), 59–67.

Nandula V.K., Reddy K.N., Duke S.O., Poston D.H., 2005. Glyphosate – resistant weeds: current status and future outlook. Outlooks Pest Manag. 16, 183–187.

Purcell L.C., 2000. Soybean canopy coverage and light interception measurements using digital imagery. Crop Sci. 40, 834–837.

Sîrbu C., 2008. Chorological and phytocoenological aspects regarding the invasion of some alien plants, on the romanian territory**.** Acta Horti Bot. Bucurest. 35, 60–68.

Solomacha W.A., Kostylow O.W., Szelag-Sosonko J.R., 1992. Synantropna roslynnist Ukrajiny. Naukova Dumka, Kyyiv (in Ukrainian).

Soroka M., 2008. Vegetation of the Ukrainian Roztochia. Monograph. House Swit, Lviv (in Ukrainian).

Tokarska-Guzik B., Bzdęga K., Koszela K., Żabińska I., Krzuś B., Sajan M., Sendek A., 2011. Allergenic invasive plant *Ambrosia artemisiifolia* L. in Poland: threat and selected aspects of biology. Biodiv. Res. Conserv. 21, 39–48.

Tokarska-Guzik B., Dajok Z., Zając M., Zając A., Urbisz A., Danielewicz W., Hołdyński C., 2012. Rośliny obcego pochodzenia w Polsce ze szczególnym uwzględnieniem gatunków inwazyjnych. Generalna Dyrekcja Ochrony Środowiska, Warszawa (in Polish).

Vidotto F., Tesio F., Ferrero A., 2013. Allelopathic effects of *Ambrosia artemisiifolia* L. in the invasive process. Crop Prot. 54, 161–167.

Walter-Shea E.A., Privette J., Cornell D., Mesarch M.A., Hays C.J., 1997. Relations between directional spectral vegetation indices and leaf area and absorbed radiation in alfalfa. Remote Sens. Environ. 61, 162–177.

Woźniak A., Soroka M., 2014. Effects of a 3-years reduced tillage on the yield and quality of grain and weed infestation of spring triticale (*Triticosecale* Wittmack). Int. J. Plant Prod. 8, 231–242.

Streszczenie. Badania przeprowadzono w latach 2012–2014 na polach uprawnych zachodniej Ukrainy. Oceniono w nich występowanie ambrozji bylicolistnej (*Ambrosia artemisiifolia* L.) w zasiewach: (1) kukurydzy (*Zea mays* L.); (2) słonecznika (*Helianthus annuus* L.); (3) lucerny siewnej (*Medicago sativa* L. subsp. *sativa*); (4) truskawki (*Fragaria x ananassa* Duchesne); (5) ziemniaka (*Solanum tuberosum* L.); (6) pszenicy jarej (*Triticum aestivum* L.); (7) soi (*Glycine max*

(L.) Merr.) i (8) winorośli właściwej (*Vitis vinifera* L.). Ocenę fitosocjologiczną oraz syntaksonomiczną zbiorowisk chwastów przeprowadzono zgodnie z metodą Braun-Blanqueta w pełni okresu wegetacji roślin. Wykazano, że wśród chwastów występujących w uprawach rolniczych większość stanowiła ambrozja bylicolistna, a wskaźnik pokrycia powierzchni tą rośliną wynosił w pszenicy, kukurydzy i słoneczniku 85–90%. Na polach uprawnych zbiorowiska roślin należały do 7 klas syntaksonomicznych. Ambrozję bylicolistną zaliczono do klasy *Artemisietea vulgaris* i związku *Dauco-Melilotenion*.

Słowa kluczowe: *Ambrosia artemisiifolia* L., ocena fitosocjologiczna, rośliny uprawne