

SEGETAL COMMUNITIES OF CEREAL CROPS OF THE MAZOWIECKI LANDSCAPE PARK

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Abstract

The characteristics of communities developing in cereal crops of the Mazowiecki Landscape Park are presented in the paper. The traditional methods of cultivation, a mosaic of fields, meadows and forests as well as a specific microclimate affect the occurrence of species-rich, syntaxonomically differentiated agrophytocoenoses. The occurrence of 4 associations and 2 communities in the area of the Park was noted. On the poorest soils, the association *Arnosserido-Scleranthesetum* was the most widespread and internally differentiated, whereas in more fertile habitats the association *Vicietum tetraspermae* was the commonest. The above mentioned associations were noted more frequently in winter crops than in spring cereals. Plots of the association *Papaveretum argemones* and intermediate communities, between *Arnosserido-Scleranthesetum* and *Papaveretum argemones*, were seldom observed in the studied area. Plots with domination of species diagnostic for the order *Polygono-Chenopodietalia* occurred rarely in spring cereals, mainly in the protection zone of the Landscape Park. Single, impoverished plots of *Aphano-Matricarietum* were recorded in the south-eastern part of the Park.

Key words: segetal vegetation, cereal associations, intermediate communities, Mazowiecki Landscape Park

INTRODUCTION

The Mazowiecki Landscape Park was established in 1986. The Park is situated in the central-eastern part of Mazowsze Province. It covers an area of 15710 ha.

Arable lands occupy only a little part of the Mazowiecki Landscape Park (20% of its area). They are situated mainly in the environs of Polana Ponurzycka (in the southern part of the Park), in the vicinity of Aleksandrów (in its northern part), as well as in its agricultural buffer zone. The acreage of arable lands constantly decreases, which is the result of cultivation abandonment and intensive residential building development.

Arable lands are differentiated as to their agricultural value and farming intensity. Soils of rye complexes: very poor, poor and good, as well as a poor cereal-grazing complex prevail in the study area. Small fragments of agriculturally favourable, more productive soils of very good rye and good wheat complexes were rarely observed, especially in the south-eastern part of the Park, in the environs of Regut village. Peatbogs and boggy soils occurring between the localities Brzezinka and Całowanie in the west and Tabor and Podbiel in the east of the Park were also noted. Small and medium-sized farms with traditional methods of cultivation dominate in the area of the Landscape Park. The occurrence of well developed, floristically differentiated communities in cereal agrocenoses is the result of extensive farming methods.

The aim of the work is phytosociological classification of patches of vegetation occurring in cereal agrocenoses as well as the characteristics of internal differentiation of syntaxa against a background of habitat conditions.

METHODS

Field studies were carried out between 2003 and 2007 in agrocenoses of the Mazowiecki Landscape Park and its buffer zone. In total, in cereal crops of the studied area 119 phytosociological relevés were made according to the Braun-Blanquet method (Pawłowski, 1972). Soil type was determined on the basis of soil-agricultural maps at a scale of 1:5000. Collected documentation material was systematized according to the Matuszkiewicz classification (2001). Species nomenclature followed Mirek et al. (2005). The distribution of the studied localities is presented at Fig. 1.

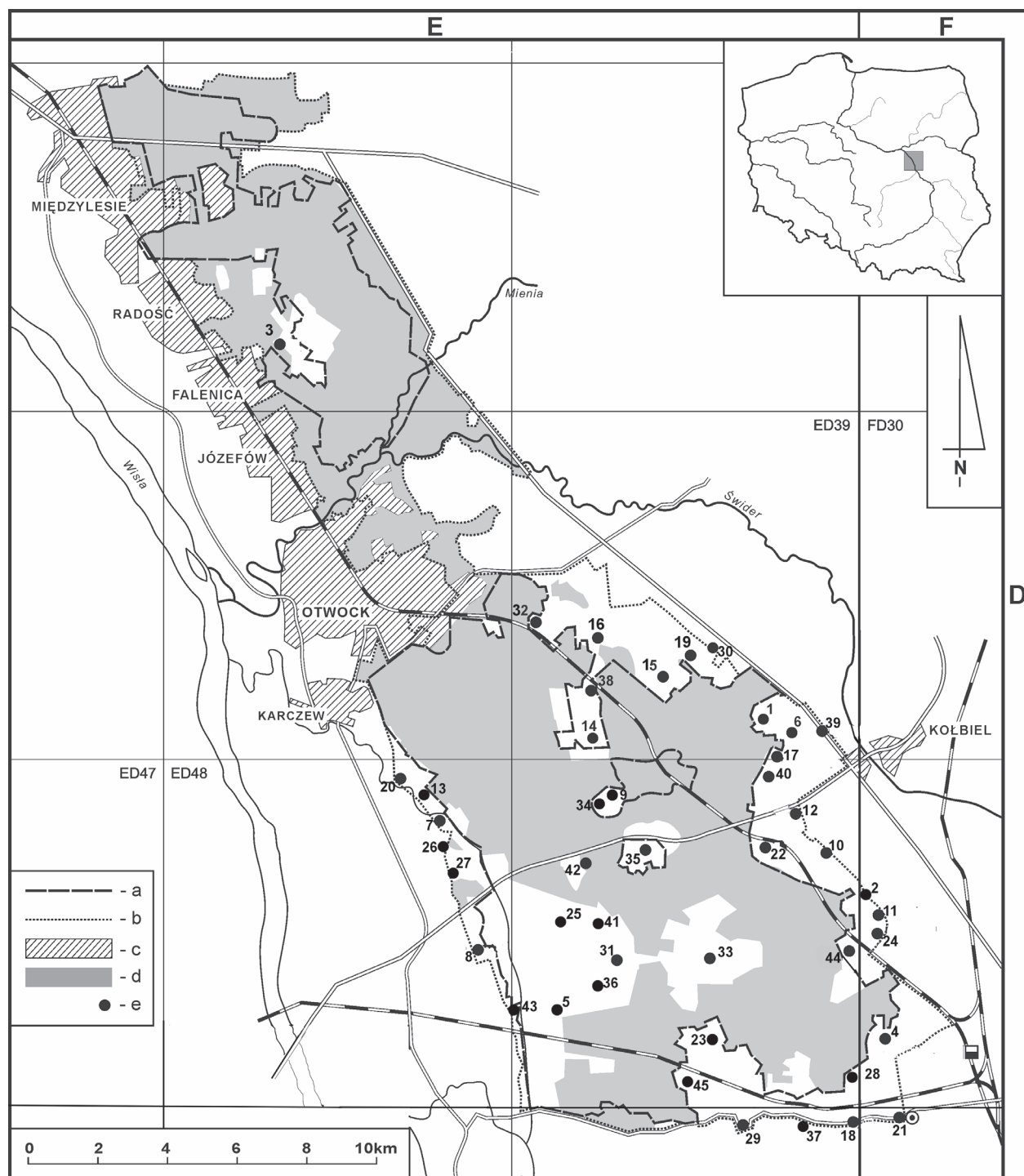


Fig. 1. Study area

a – borders of the Landscape Park; b – borders of the protected zone; c – building land; d – forest complexes; e – localities, investigated areas.

1 – Anielinek, 2 – Antoninek, 3 – Aleksandrówka, 4 – Augustówka, 5 – Bąki, 6 – Bocian, 7 – Brzezinka, 8 – Całowanie, 9 – Celestynów, 10 – Chrosna, 11 – Chrząszczówka, 12 – Człekówka, 13 – Dąbrowa, 14 – Dąbrówka, 15 – Dyzin, 16 – Głina, 17 – Gózd, 18 – Grabianka, 19 – Jatne, 20 – Janów, 21 – Jaźwiny, 22 – Karpiska, 23 – Kaćiki, 24 – Kąty, 25 – Kominki, 26 – Kozłówka, 27 – Łukowiec, 28 – Ocznia, 29 – Osieck, 30 – Ostrowik, 31 – Podbiel, 32 – Pogorzelski, 33 – Ponurzyca, 34 – Radzyń, 35 – Regut, 36 – Rosłańce, 37 – Rudnik, 38 – Stara Wieś, 39 – Stara Wieś II, 40 – Skorupy, 41 – Szatany, 42 – Tabor, 43 – Warszówka, 44 – Zabiczki, 45 – Zawada.

RESULTS

Systematic of the distinguished cereal associations and communities

Class: *Stellarietea mediae* Tx., Lohm. et Prst. 1950

Order: *Centauretalia cyani* R. Tx. 1950

Alliance: *Aperion spicae-venti* R. Tx. et. J. Tx. 1960

1. Association: *Arnosserido-Scleranthetum* (Edouard 1925) R. Tx. 1937

a. typical variant

b. variant with *Polygonum hydropiper*

c. variant with *Anthoxanthum aristatum*

Intermediate community *Arnosserido-Scleranthetum* (Edouard 1925) R. Tx. 1937 –

Papaveretum argemones (Libb. 1932)

Krusem. et Vlieg. 1939

2. Association: *Papaveretum argemones* (Libb. 1932) Krusem. et Vlieg. 1939

3. Association: *Vicietum tetraspermae* (Krusem. et Vlieg. 1939) Kornaś 1950

a. typical variant

b. variant with *Juncus bufonius*

c. variant with *Anthoxanthum aristatum*

d. variant with *Rhinanthus serotinus*

– subvariant with *Myosurus minimus*

4. Association: *Aphano-Matricarietum* R. Tx. 1937

Community with species characteristic for *Polygono – Chenopodium*

Characteristics of the distinguished associations and communities

Arnosserido-Scleranthetum (Edouard 1925) R. Tx. 1937

Patches of *Arnosserido-Scleranthetum* were observed commonly in agrocenoses of the Landscape Park. They developed on the poorest soils, formed from non-cohesive and poor-clayey sands classified as very poor and poor rye complexes and poor cereal-grazing complex, noted in thinned out rye crops on mid-forest dunes. These phytocenoses were described based on 30 phytosociological relevés (Tab. 1). The differentiation of habitats, in which the association was noted, affects the division of *Arnosserido-Scleranthetum* into 3 variants: with *Anthoxanthum aristatum*, typical and with *Polygonum hydropiper*. *Arnosserido-Scleranthetum* was noted on the borders of the Park and within its protection zone. The floristically-poorest phytocenoses were dominated by *Anthoxanthum aristatum* (mean cover in the plot was about 40%). In the typical variant, species characteristic for the association *Arnosseris minima* and *Teesdalea nudicaulis* reached the largest cover. Patches of the variant with *Polygonum hydropiper* developed on silt-peat and boggy soils situated in local depressions. Higrophilous species, such as *Bidens tripartita*, *Jun-*

cus bufonius, *Equisetum sylvaticum* and others, were the frequent components of this variant. That was the most species-rich phytocenosis of the *Arnosserido-Scleranthetum* associations, made up of 64 species, on average 24 species in one plot. Species such as *Apera spica-venti*, *Centaurea cyanus* and *Anthemis arvensis* occurred most frequently and with the largest cover.

Arnosserido-Scleranthetum (Eduard 1925)R.Tx 1937 – ***Papaveretum argemones*** (Libb. 1932) Krusem. Et Vlieg. 1939

Small patches of phytocenoses of intermediate character, classified in the alliance *Aperion spicae-venti*, were noted rarely. They developed in habitats characteristic for typical patches of *Arnosserido-Scleranthetum* and acidophilous patches of *Papaveretum argemones* (Tab. 2). These phytocenoses were distinguishable by a large share of species characteristic for both the association *Arnosserido-Scleranthetum* (*Arnosseris minima*, *Teesdalea nudicaulis*) and *Papaveretum argemones* (*Arabidopsis thaliana*, *Veronica triphyllos* and *Papaver argemone*).

Papaveretum argemones (Libb. 1932) Krusem. et Vlieg. 1939

Patches of the the *Papaveretum argemones* association were noted mainly at Polana Ponurzycka and rarely in the buffer zone of the Park, in the vicinity of Osieck and Stara Wieś (Tab. 3). The phytocenoses of *Papaveretum argemones* were found in rye crops, in well insolated areas, at local elevations. They developed mainly on brown lixiviated soils composed of gravels and light loamy sands classified as poor and good rye complexes. The phytocenoses were distinguishable by large phenological variability, e.g. the numerous occurrence of characteristic species: *Arabidopsis thaliana* and *Veronica hederifolia* in spring, and *Papaver argemone* – in summer.

Vicietum tetraspermae (Krusem. et Vlieg. 1939) Kornaś 1950

In cereal crops of the Mazowiecki Landscape Park and its buffer zone, phytocenoses of *Vicietum tetraspermae* were noted frequently. From among the diagnostic species of the association, *Vicia tetrasperma* was noted most frequently, less frequently – *Polygonum lapathifolium* subsp. *pallidum*, sporadically – *Bromus secalinus*. A large affiliation of distinguishing species – *Vicia villosa* to the *Vicietum tetraspermae* association was also observed. A various combination of accompanying species is the reason for the internal division of the association (Tabs 4, 5).

Table 2

Community *Arnosserido-Scleranthetum* (Edouard 1925) R. Tx 1937 – *Papaveretum argemones* (Libb. 1932) Kruzem. Et Vlieg. 1939.

Releve no. in the table	1	2	3	4	5	6	7	8	9	10	Mean number of species in the releve	
Releve no. in nature	57	58	25	52	111	26	112	43	99	44		
Date: month	7	6	7	6	6	7	6	6	7	6		
year	.03	.04	.03	.04	.04	.03	.04	.03	.05	.06		
Locality	22	22	11	21	44	11	44	18	33	18		
Cultivated plant	Sc	Sc	Sc	Sc	Sc	Sc	Sc	Sc	Sc	Sc		
Percent ground cover by the cultivated plant	50	70	60	70	60	70	55	90	60	90		
Percent ground cover by weeds	60	15	35	50	25	30	25	10	25	10		
Soil unit	6 Bw ps	5Bwpgl:ps	5Bwpgl:pl	5Bwpgl:pps	5Bwpgl:ps	6 Bw ps	5Bwpgm. Pl	6 Bw ps:pl	6 Bw ps	6 Bw ps:pl		
Number of species in the releve	20	16	16	17	16	23	15	21	22	20		19
I. Ch. D. <i>Arnosserido-Scleranthetum</i>												
<i>Arnosseris minima</i>	3	+	1	2	+	1	1	1	+	1	V	830
<i>Teesdalea nudicaulis</i>	1	1	2	1	2	2			1		IV	725
II. Ch.D. <i>Arnosseridenion minima</i>												
<i>Veronica dillenii</i>	1	+			+	+		+	+	+	IV	110
<i>Anthoxanthum aristatum</i>				+		+		+		+	II	40
<i>Scleranthus annuus</i>						+		+		+	II	30
<i>Spergula morisonii</i>	1		+		+			+			II	80
III. Ch. D. <i>Papaveretum argemones</i>												
<i>Arabidopsis thaliana</i>	+	+	+	+	+	+	1	1	1	+	V	220
<i>Veronica triphyllos</i>	+	1	1	1	+	+	1	1	+	+	V	300
<i>Papaver argemone</i>	1		+	+		+		1	+	+	IV	160
IV. Ch. <i>Aperion spicae-venti</i>												
<i>Centauretia cyani</i>												
<i>Centaurea cyanus</i>	+	+		+		+		+		+	III	60
<i>Apera spica-venti</i>				+			+		1		II	70
<i>Anthemis arvensis</i>			+		+	+	+				II	40
<i>Vicia angustifolia</i>					+		+		+		II	30
V. Ch. <i>Stellarietea mediae</i>												
<i>Fallopia convolvulus</i>	+		+	+	+	+					III	50
<i>Myosotis arvensis</i>			+		+	+	+		+		III	50
<i>Viola arvensis</i>				+		+	+		1		II	80
<i>Spergula arvensis</i>	+				+			+		+	II	40
<i>Polygonum aviculare</i>			+			+		+		+	II	40
<i>Raphanus raphanistrum</i>			+					+		+	II	30
<i>Polygonum lapathifolium subsp. pallidum</i>								+	+	+	II	30
VI. Accompanying species												
<i>Rumex acetosella</i>	+		+	+	+	+	+		+		IV	70
<i>Myosotis stricta</i>	+			1	+	+	+		+		III	100
<i>Veronica arvensis</i>	+	+	+			+	1		+		III	100
<i>Erophila verna</i>	+	+		+			1		+		III	90
<i>Taraxacum officinale</i>	+	+				+		+		+	III	50
<i>Cirsium arvense</i>	+	+	+								II	30
<i>Trifolium repens</i>			+		+				+		II	30
<i>Equisetum arvense</i>	+					+		+		+	II	30
<i>Galeopsis tetrahit</i>								+	1	+	II	70

Sporadic species: **III** – *Papaver dubium* 8(+), 10(+); **IV** – *Anchusa arvensis* 6(r); *Rhinanthus serotinus* 2(+); *Vicia villosa* 7(+); **V** – *Conyza canadensis* 8(+), 10(+); *Stellaria media* 4(+), 9(+); *Chenopodium album* 4(+), 9(+); *Capsella bursa-pastoris* 8(+), 10(+); *Geranium pusillum* 5(+); **VI** – *Erodium cicutarium* 1(+), 6(+); *Achillea millefolium* 1(+), 4(+); *Cerastium holosteoides* 3(+), 5(+); *Myosurus minimus* 3(+), 7(+); *Equisetum sylvaticum* (+); *Luzula arvensis* 9(+); *Galium aparine* 9(+); *Cardaminopsis arenosa* 9(+); *Cerinthe minor* 2(+); *Ranunculus sardous* 3(+); *Agrostis stolonifera* 4(+); *Sedum maximum* 9(+); *Knautia arvensis* 8(+), 10(+); *Veronica verna* 8(+), 10(+); *Convolvulus arvensis* 6(+); *Allium vineale* 6(+); *Elymus repens* 1(+);

Comments: numbers after species inform about the releve in the table.

S – phytosociological constancy, D – coverage index.

Table 3
Papaveretum argemones (Libb. 1932) Krusem. Et Vlieg. 1939.

Releve no. in the table	1	2	3	4	5	6	7	8	9	10	Mean number of species in the releve	
Releve no. in nature	104	97	98	82	33	13	110	103	83	34		
Date: month	7	7	7	6	6	7	6	6	7	7		
year	.05	.05	.03	.04	.04	.03	.04	.03	.03	.06		
Locality	39	33	33	29	41	25	42	39	29	16		
Cultivated plant	Sc	Sc	Sc	Sc	Sc	Miesz.j	Sc	Sc	Sc	Sc		
Percent ground cover by the cultivated plant	80	60	75	60	60	75	60	80	60	60		
Percent ground cover by weeds	35	45	45	10	50	5	15	35	10	50		
Soil unit	6Bw ps:pl	5Bwpgl:p:pl	6Apgl:pl	6Bwz:ps	6Bwz:ps	5Bw pg!gl	5Bw pg!pl	6z:p:pl	6z:p:pl	6 M pg!gl		
Number of species in the releve	16	20	25	27	23	22	17	17	30	24		S D
I. Ch. <i>Papaveretum argemones</i>												
<i>Papaver argemone</i>	2	2	1	1	1	1	1	2	2	1	V	1000
<i>Arabidopsis thaliana</i>	1	+	1		+	+		1	1	1	IV	280
<i>Veronica triphyllos</i>		+	1		+	+	1		+	1	IV	190
II. Ch. <i>Aperion spicae-venti</i>												
<i>Centaurealia cyanii</i>:												
<i>Apera spica-venti</i>	+	1	+	+	+	+	+	+	+	+	V	140
<i>Anthemis arvensis</i>	+	+	+	+	+		+	+	+	1	IV	130
<i>Centaurea cyanus</i>	+	1	+		1.1		+	+		1	IV	190
<i>Lithospermum arvense</i>	+		1		3			+		2	III	620
<i>Vicia hirsuta</i>	+		+	+				+	+		III	50
<i>Vicia tetrasperma</i>					+	+				+	III	30
<i>Veronica dillenii</i>			+		+					+	II	30
<i>Vicia villosa</i>					+		+			+	II	30
<i>Vicia angustifolia</i>			+	+					+		II	30
<i>Rumex acetosella</i>			+	+					+		II	30
III. Ch. <i>Stellarietea mediae</i>												
<i>Myosotis arvensis</i>	+	+	+	+	+	+	+	+	+	+	V	100
<i>Viola arvensis</i>	+	1	+		+	+		+		+	IV	110
<i>Geranium pusillum</i>	+		+		+		+	+		+	III	60
<i>Capsella bursa-pastoris</i>		+		+			+		+		II	40
<i>Fallopia convolvulus</i>		+			+		+			+	II	40
<i>Spergula arvensis</i>			+	+		+			+		II	40
<i>Conyza canadensis</i>		+		+		+			+		II	40
<i>Matricaria maritima subsp. inodora</i>					+	+				+	II	30
<i>Chenopodium album</i>			+	+					+		II	30
IV. Accompanying species												
<i>Arenaria serpyllifolia</i>	1	+	1		+	+	+	1	2	1	V	415
<i>Myosotis stricta</i>	+	+	+	1	+	+	+	+	1	1	V	220
<i>Erophila verna</i>		+	1	+	+		+	1	+	+	IV	160
<i>Veronica arvensis</i>	+	1		+		+		+	+	+	IV	110
<i>Equisetum arvense</i>		+	+	+	+				+	+	III	60
<i>Galium aparine</i>				+	+		+		+	+	III	50
<i>Trifolium repens</i>				+		+			+		II	30
<i>Melandrium album</i>				+		+			+		II	30
<i>Erodium cicutarium</i>				+		+			+		II	30
<i>Allium vineale</i>			+		+					+	II	30
<i>Rhinanthus serotinus</i>		+		+					+		II	30

Sporadic species: **II** – *Agrostemma githago* 3(+), 6(+); *Scleranthus annuus* 2(+), 3(+); *Arnooseris minima* 6(+); **III** – *Sonchus arvensis* 4(+), 9(+); *Sinapis arvensis* 4(+), 9(+); *Melandrium noctiflorum* 4(+), 9(+); *Sinapis arvensis* 4(+), 9(+); *Papaver rhoeas* 4(+), 9(+); *Lamium amplexicaule* 6(+), 7(+); *Stellaria media* 6(+); *Rumex crispus* 7(+); **IV** – *Achillea millefolium* 5(+), 10(+); *Sedum acre* 5(+), 10(+); *Artemisia arvensis* 4(+), 9(+); *Daucus carota* 4(+), 9(+); *Vicia cracca* 4(+), 9(+); *Knautia arvensis* 1(+), 8(+); *Hypericum perforatum* 1(+), 8(+); *Pimpinella saxifraga* 1(+), 8(+); *Tanacetum vulgare* 6(+); *Potentilla argentea* 7(+); *Taraxacum officinale* 6(+); *Senecio vernalis* 3(+); *Hieracium pilosella* 3(+); *Trifolium dubium* 2(+); *Trifolium medium* 2(+);

Comments: numbers after species inform about the releve in the table.
 S – phytosociological constancy, D – coverage index. Sc-Secale cereale

Table 4
Vicietum tetraspermae (Krusem. et Vlieg. 1939) Kornas 1950 typicum.

Variant	with <i>Anthoxanthum aristatum</i>										with <i>Rhinanthus scrotinus</i>										Mean number of species in the releve										
	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
Releve no. in the table	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	
Releve no. in nature	53	28	54	100	14	108	101	102	77	39	64	7	32	2	12	15	89	91	6	78	19	99	96	67	20	68	9	41	56	21	
Date: month	6	7	6	6	6	6	6	6	7	6	6	6	7	6	6	7	6	6	6	7	5	5	6	6	6	7	6	6	6	5	
year	.04	.04	.03	.04	.04	.03	.04	.05	.05	.06	.03	.03	.03	.04	.04	.05	.04	.03	.05	.06	.05	.05	.05	.04	.04	.03	.04	.05	.03	.06	
Locality	22	22	22	39	11	40	38	38	29	18	12	4	15	3	7	10	32	33	4	29	10	35	31	24	10	24	23	18	22	10	
Cultivated plant	Sc	Sc	Sc	Sc	Sc	Sc	Sc	Sc	Tc	Sc	Sc	Sc	Sc	Sc	Sc	Sc	Tc	Sc	Sc	Sc	Sc	Sc	Sc	Sc	Sc	Sc	Sc	Sc	Sc		
Percent ground cover by the cultivated plant	70	70	70	70	60	70	70	80	75	55	70	70	70	70	80	80	80	85	75	70	70	60	60	60	60	70	60	55	90	60	
Percent ground cover by weeds	35	40	45	50	45	50	15	40	20	65	35	90	30	30	40	45	60	25	55	45	35	20		60	70	50	55	65	40	60	
Soil unit	6Mps:pl	6Mps:pl	6Mpl:pl	6Apl:pl	5Bwpl:ps	6Bwps:pl	6Bwps:pl	6Bwps:pl	6Apl:ps	6Bwpl:pl	4Apl:gs	6Mps:pl	5Apl:gl	6Mps:gl	6Apl:ps	9Mps:pl	9Fplz:psp	9Fplz:psp	5Apl:gl	6Apl:ps	4Bwpl:gs	8Dzpl:ps	5Fplz:ps2Dzpl:ps	2Bwgl	2Bwgl:gs	8Fpl:ps	4Bwpl:gs	8Dzpl:pl	4Bwpl:pl		
Number of species in the releve	19	15	15	19	16	23	14	18	24	20	18	18	17	13	17	17	19	21	19	23	18	29	25	35	34	27	34	34	24	28	29
I. Ch. <i>Vicietum tetraspermae</i>																															
<i>Vicia tetrasperma</i>																															
<i>Polygonum lapathifolium</i> subsp. <i>pallidum</i>																															
<i>Vicia villosa</i>																															
II. D. var. with <i>Anthoxanthum aristatum</i>																															
<i>Anthoxanthum aristatum</i>																															
<i>Scleranthus annuus</i>																															
III. D. var. with <i>Rhinanthus scrotinus</i>																															
<i>Rhinanthus scrotinus</i>																															
IV. D. var. with <i>Myosurus minimus</i>																															
<i>Myosurus minimus</i>																															
<i>Rorippa sylvestris</i>																															
<i>Mentha arvensis</i>																															
<i>Juncus bufonius</i>																															
<i>Veronica serpyllifolia</i>																															
<i>Bidens tripartita</i>																															
<i>Plantago intermedia</i>																															
<i>Ranunculus repens</i>																															
<i>Trifolium repens</i>																															
<i>Phragmites australis</i>																															
<i>Equisetum sylvaticum</i>																															

Table 6
Aphano-Matricarietum R.Tx. 1937.

No of picture in table	1	2	3	4	5	6	7	8		
No of picture in nature	59	105	9	10	11	61	106	107		
Date: month	6	7	7	7	6	6	6	6		
year	05.	07.	06.	07.	06.	06.	05.	06.		
Locality	24	40	4	28	28	4	12	2		
Cultivated plant	Sc	Sc	Sc	Sc	Sc	Sc	Sc	Sc		
Range of cultivated plant over field in %	70	55	70	65	60	70	55	65		
Range of weeds over field in %	45	75	30	35	40	50	30	30		
Soil unite	9Mpgl.pl	9Mpgl.pl	6Mpl	6Epl.pl	6Epl.pl	6Epl.pl	6Bkps.pl	9Mpgl.pl	Mean numbers of species within the picture	
Numbers of species with the picture	19	18	21	20	18	25	23	16	n	W
I.CH.D. Aphano-Matricarietum										
<i>Aphanes arvensis</i>	1	3	1	2	3	3	1	1	8	1500
<i>Veronica hederifolia</i>				+	+	r	+		4	37
<i>Matricaria maritima</i> subsp. <i>inodora</i>				+	+	1			3	87
II. Ch. Aperion spicae-venti										
<i>Centaurea cyanii</i>										
<i>Anthemis arvensis</i>	+	+	+	+	+	+		+	7	87
<i>Apera spica-venti</i>		2		1	1	1	1	+	6	481
<i>Scleranthus annuus</i>	1	+		+		+	+		5	112
<i>Teesdalea nudicaulis</i>	1		1		+		+		4	150
<i>Arnoseris minima</i>	+	+				+		r	4	37
<i>Lithospermum arvense</i>				1	+	+	1		4	150
<i>Arabidopsis thaliana</i>			1			+	+		3	87
<i>Vicia angustifolia</i>	+				+		+		3	37
<i>Vicia villosa</i>	+		+			+			3	37
<i>Veronica dillenii</i>			1			1	+		3	137
<i>Centaurea cyanus</i>	+					+		+	3	37
III. Stellarietea mediae										
<i>Viola arvensis</i>	+	+	+	+	+	+	+	+	8	100
<i>Geranium pusillum</i>			+	+		+	+		4	50
<i>Spergula arvensis</i>			+	+	+			+	4	50
<i>Fallopia convolvulus</i>				+		+	+	+	4	50
<i>Conyza canadensis</i>					+		+		2	25
IV. Accompanyig species										
<i>Veronica arvensis</i>			+	+		+	+	+	5	62
<i>Juncus bufonius</i>	+	1	+			+			4	100
<i>Galium aparine</i>	+		+	+		+			4	50
<i>Anthoxanthum aristatum</i>		2		+			+	+	4	256
<i>Poa annua</i>			+	+		+		+	4	40
<i>Galeopsis ladanum</i>		+		+			+		3	37
<i>Rhinanthus serotinus</i>	2		1				+		3	287
<i>Cerastium holosteoides</i>		+	+		+				3	37
<i>Rumex acetosella</i>				+		+		+	3	37
<i>Leontodon autumnalis</i>	+			+			+		3	37
<i>Hypochoeris glabra</i>		+	+				+		3	37
<i>Holcus lanatus</i>				+		+	+		3	37
<i>Polygonum hydropiper</i>			+		+				2	25
<i>Elymus repens</i>		+				+			2	25
<i>Ranunculus repens</i>		+	+						2	25
<i>Bidens tripartita</i>	+	1							2	75
<i>Polygonum hydropiper</i>	1	1							2	125
<i>Carex hirta</i>	+					+			2	25
<i>Vicia tetrasperma</i>	+	+							2	25
<i>Veronica verna</i>	+						+		2	25
<i>Plantago lanceolata</i>	+					+			2	25
<i>Ranunculus sardous</i>				+				+	2	25
<i>Convolvulus arvensis</i>					+			+	2	25

Sporadic species: **III** – *Capsella bursa-pastoris* 5(+); **IV** – *Plantago intermedia* 3(+); *Luzula arvensis* 1(+); *Trifolium dubium* 3(+); *Tanacetum vulgare* 3(+); *Equisetum arvense* 7(+); *Spergularia rubra* 2(+); *Lisymachia vulgaris* 2(+); *Potentilla anserina* 5(+); *Taraxacum officinale* 5(+); *Rorippa sylvestris* 5(+); *Polygonum aviculare* 7(+); *Cirsium arvense* 8(+); *Erodium cicutarium* 8(+); *Vicia hirsuta* 6(+);

Comments: numbers after species inform about the releve in the table. S – phytosociological constancy, D – coverage index.

Table 7
Community with species characteristic for Polygono-Chenopodion.

Releve no. in the table	1	2	3	4	5	6	7	8	9	10	Mean number of species in the releve	
Releve no. in nature	109	30	22	71	31	81	42	115	70	116		
Date: month	7	7	6	7	6	5	5	6	7	7		
year	04.	05.	06.	05.	06.	06.	05.	03.	04.	04.		
Locality	38	12	10	24	12	29	18	44	24	39		
Cultivated plant	HsvAs	Tc	As	Hs,As	Hv	Tv	As	Sc	Sc	Hs,As		
Percent ground cover by the cultivated plant	90	95	80	70	80	70	65	60	90	85		
Percent ground cover by weeds	20	30	20	55	25	20	55	30	35	20		
Soil unit	2Bw pgrm:gs	2Fpl:pl	4Bwplz:pgl	8Dzqgm	2bwplz:gl	2bw:gl	8Dzqgm:gl	4Dzq:gs	4Dzqgl:gl	2Bwpgl:gs		
Number of species in the releve	18	29	17	28	22	31	25	24	25	21		24
I. Ch. Polygono-Chenopodion												
Polygono-Chenopodietalia												
<i>Veronica persica</i>	1	1		2		1	2	+	+	1	IV	570
<i>Stellaria media</i>	1	1	+			1		1	+	+	IV	230
<i>Chenopodium album</i>	+	+	1	1	1	+			+	+	IV	200
<i>Lamium purpureum</i>	+	+	+	+	1	+				+	IV	110
<i>Matricaria maritima subsp. inodora</i>	+	+	+	1	+	+			+	+	IV	120
<i>Lamium amplexicaule</i>	+	+				+	+	+	+	+	IV	70
<i>Veronica polita</i>	+	2		+			1			+	III	255
<i>Thlaspi arvense</i>	1	+		1				+	+	+	III	140
<i>Veronica agrestis</i>		1		1	+		+			+	III	130
<i>Anagallis arvensis</i>	+			+				+	1	+	III	90
<i>Euphorbia helioscopia</i>		+			+	+	+			1	III	90
<i>Chenopodium polyspermum</i>	+			+	+		+			+	III	50
<i>Sinapis arvensis</i>	+			+		+	+			+	III	50
<i>Sonchus oleraceus</i>				+		+	+				II	30
<i>Sonchus asper</i>		+			+			+			II	30
II. Ch. Aperia spicae-venti												
Centauretalia cyanii												
<i>Vicia angustifolia</i>	+	+	+		+	+		+		+	IV	70
<i>Centaurea cyanus</i>			+		+		+	+	+		III	50
<i>Polygonum lapathifolium subsp. pallidum</i>				+	+	+	+				II	40
<i>Anthemis arvensis</i>				+	+			+			II	30
<i>Vicia sativa</i>		+	+	+							II	30
III. Ch. Stellaria mediae												
<i>Viola arvensis</i>		+	+		+		+	1	1		III	140
<i>Myosotis arvensis</i>	+	+	+	+					+	+	III	60
<i>Capsella bursa-pastoris</i>		+	+	+	1	+					III	90
<i>Fallopia convolvulus</i>			+		1	+	+				II	80
<i>Spergula arvensis</i>		+	+	+		+					II	40
<i>Geranium pusillum</i>		+			+			+			II	30
<i>Raphanus raphanistrum</i>				+			+	+			II	30
IV. Accompanying species												
<i>Galium aparine</i>	1			1		+			+	1	III	170
<i>Veronica arvensis</i>		+	1	1	+	+		+	+		IV	150
<i>Artemisia vulgaris</i>		+				+	1				II	70
<i>Polygonum lapathifolium subsp. lapathifolium</i>		+	1			+					II	70
<i>Taraxacum officinale</i>			+	+		+			+		II	40
<i>Equisetum arvense</i>			+		+			+	+		II	40
<i>Plantago intermedia</i>	+			+		+				+	II	40
<i>Alopecurus geniculatus</i>	+			+						+	II	30

Sporadic species: **I** – *Galinsoga parviflora* 6(1), 10(+); *Melandrium noctiflorum* 5(+), 9(+); *Rumex crispus* 9(+); **II** – *Apera spica-venti* 7(+), 9(2); *Arabidopsis thaliana* 8(1), 9(+); *Vicia hirsuta* 2(1), 5(+); *Veronica hederifolia* 9(+); *Vicia villosa* 8(+); **III** – *Polygonum aviculare* 4(+), 6(+); *Echinochloa crus-galli* 7(+); *Senecio vulgaris* 6(+); *Rumex acetosella* 5(+); **IV** – *Myosotis stricta* 8 (1), 9(1); *Plantago major* 2(+), 6(+); *Cirsium arvense* 2(+), 6(+); *Erodium cicutarium* 5(+), 9(+); *Stellaria graminea* 7(+), 9(+); *Trifolium repens* 2(+), 6(+); *Cerastium holosteoides* 8(+), 9(+); *Erophila verna* 8(1), 9(+); *Poa annua* 1(+), 10(+); *Elymus repens* 6(+), 7(+); *Galeopsis tetrahit* 4(+), 6(+); *Convolvulus arvensis* 2(+), 5(+); *Myosurus minimus* 8(1), 9(+); *Juncus bufonius* 1(+), 10(+); *Lappa minor* 3(+); *Polygonum persicaria* 4(+); *Matricaria suaveolens* 4(+); *Chenopodium hybridum* 6(+); *Hypochoeris glabra* 7(+); *Tanacetum vulgare* 6(+), 7(+); *Helichrysum arenarium* 8(+); *Senecio vernalis* 8(+); *Viola tricolor* 8(+); *Leontodon autumnalis* 7(+); *Polygonum hydropiper* 7(2); *Potentilla anserina* 2(+); *Rorippa sylvestris* 2(+); *Trifolium dubium* 4(+); *Galeopsis ladanum* 7(+); *Galeopsis pubescens* 2(+); *Rumex acetosa* 7(+); *Achillea millefolium* 7(+); *Daucus carota* 6(+); *Festuca rubra* 8(+); Comments: numbers after species inform about the releve in the table.

Typical patches of *Vicietum tetraspermae* were rarely noted in the study area. They were distinguishable by higher cover of characteristic species and the lack of acidophilous, calcareous and hygrophilous species. These phytocenoses developed on brown lixiviated soils, alluvial soils, and degraded black soils, classified as good and very good rye complexes. They were distinguishable by higher cover of *Vicia hirsuta* and *Centaurea cyanus*.

Patches with the participation of hygrophilous species were noted much more frequently. The plots of this variant were the floristically richest phytocenoses in cereal crops of the Park. They were built up of 88 species, and the mean number of species in one plot was on average 27. The patches were distinguishable by the occurrence of a numerous group of hygrophilous species, of which the highest persistence and cover reached the following: *Juncus bufonius*, *Myosurus minimus*, *Plantago intermedia*, *Ranunculus repens* and *Trifolium repens*. These phytocenoses, comparing with the typical ones, were also characterised by a larger share of *Apera spica-venti*.

On the poorest soils, classified as poor and good rye complexes, phytocenoses with the mass occurrence of *Anthoxanthum aristatum* (cover frequently over 30%) were observed. These floristically poorest patches, considering the phytocenoses of *Vicietum tetraspermae*, were also distinguishable by the smallest cover of characteristic species.

The frequent occurrence of *Rhinanthus serotinus* in some patches of *Vicietum tetraspermae* resulted in different physiognomy of the community. That specific combination of species is presented as the variant with *Rhinanthus serotinus*. Typical phytocenoses of the variant with *Rhinanthus serotinus* were developing in habitats similar in trophy to those of the variant with *Anthoxanthum aristatum*. They were also floristically poor. Some plots, classified as the subvariant with *Myosurus minimus*, were characterised by the occurrence of hygrophilous species. These phytocenoses, contrary to those mentioned above, developed on rich soils, included in a very good rye complex, wheat good and cereal-grazing complexes, formed of clayey sands, dusts and loam. The analyzed plots were distinguishable by the occurrence of hygrophilous species, e.g.: *Myosurus minimus*, *Juncus bufonius*, *Plantago intermedia*, *Mentha arvensis*, *Rorippa sylvestris*. In some patches *Agrostemma githago* and *Centaurea cyanus* dominated.

***Aphano-Matricarietum* R. Tx. 1937**

In cereal crops of mid-forest clearings of the following villages: Kąty, Skorupy, Augustówka, Człkówka and Ocznia, phytocenoses with *Aphanes arvensis* were recorded. *Matricaria maritima* subsp.

inodora, noted frequently in other communities, occurred in the analyzed patches with a little cover. The presence of *Veronica hederifolia*, a rare taxon in the phytocenoses of the Landscape Park, was also sporadically observed in them. No stand of *Chamomilla recutita*, reported as a characteristic species of *Aphano-Matricarietum* (Matuszkiewicz, 2001), was recorded in the study area. Phytocenoses of *Aphano-Matricarietum* were observed mainly in rye crops on sandy, boggy and silt-peat soils of poor rye and poor cereal-grazing complexes. They developed on poor and periodically excessively wetted soils with a large share of acidophilous: *Scleranthus annuus*, *Rumex acetosella*, *Arnoseria minima*, *Teesdalea nudicaulis*, *Anthemis arvensis*, and hygrophilous species: *Juncus bufonius*, *Polygonum hydropiper*, *Bidens tripartita* and others. Moreover, *Rhinanthus serotinus*, numerously noted in different phytocenoses, was also frequently recorded in that association.

Communities with species characteristic for the *Polygono-Chenopodium* alliance

In spring cereal crops, on the most fertile soils of the studied area, classified as a very good rye complex, good wheat complex and strong cereal-grazing complex, communities with a large share of species characteristic for the *Polygono-Chenopodium* alliance (Tab. 7) were noted. Species such as *Veronica persica*, *Lamium purpureum*, *Matricaria maritima* subsp. *inodora* and *Euphorbia helioscopia* were most frequent. In the floristic composition of these patches, the occurrence of nitrophilous species characteristic for higher syntaxonomical units, e.g. *Lamium amplexicaule*, *Stellaria media*, *Thlaspi arvensis*, *Anagallis arvensis* and *Veronica agrestis*, as well as accompanying species: *Galium aparine* and *Veronica arvensis*, was observed.

DISCUSSION

Segetal vegetation undergoes constant, dynamic transformations which significantly affect the development of communities without diagnostic species of defined associations (Anioł-Kwiatkowska, 1990; Hołdyński, 1991; Siciński, 2003; Skrajna and Skrzyczyńska, 2006).

Syntaxonomically differentiated and species-rich phytocenoses accompanying cereal crops in the area of Mazowiecki Landscape Park retained the characteristic combination of species.

The poorest habitats of the study area were occupied by the commonly noted phytocenoses of *Arnoserido-Scleranthetum*. That sub-Atlantic association reaches in Poland its north-eastern geographical range (Matuszkiewicz, 2001). Patches of *Arnoserido-Scleranthetum* observed in the area of

the Park were similar in their floristic composition to phytocenoses reported from central and western Poland (Anioł-Kwiatkowska 1990; Siciński, 1986, 2003; Skrzyczyńska and Skrajna, 2004; Warcholińska, 1995; Wójcik, 1965), however, they were better developed and floristically richer than those occurring in the north-eastern part of the lowland Nizina Południowopodlaska (Skrzyczyńska, 1994; Skrzyczyńska and Rzymowska, 2005). Most frequently, similarly like in many regions of Poland, patches of *Vicietum tetraspermae* were noted. However, due to the domination of poor habitats and a large share of rye crops in the crop structure, patches of the variants characterised by the mass occurrence of *Anthoxanthum aristatum*, *Rhinanthus serotinus* and hygrophilous species were noted. Floristically similar patches of *Vicietum tertaspermae* were recorded in the Mazowsze region by Wójcik (1965), in the Wysoczyzna Kałuszyńska upland by Skrzyczyńska and Skrajna (2004) and in the Podlaski Przełom Bugu mesoregion by Skrzyczyńska and Rzymowska (2005).

The large fragmentation of arable areas, the close proximity of associations of similar habitat requirements and an increase in fertilization level (especially on light soils) resulted in the development of phytocenoses of intermediate character (Siciński, 2003). Phytocenoses characterized by the occurrence of characteristic species of both the associations: *Arnosserido-Scleranthetum* and *Papaveretum argemones* were rarely noted. Similar communities of intermediate character were reported from various regions of Poland by the following authors: Wójcik (1965) from the Mazowsze region, Skrajna and Skrzyczyńska (2006) from the Wysoczyzna Kałuszyńska upland, Siciński (1986) from the Załęczański Landscape Park, Hołdyński and Korniak (1994), Ratuszniak and Sobisz (1999) and so on. As a result of a small share of warm and calcareous habitats, the *Papaveretum argemones* association in agroecosystems of the Mazowiecki Landscape Park was observed seldom. The phytocenosis is widespread in southern and central Poland (Anioł-Kwiatkowska, 1990; Siciński, 2003; Warcholińska, 1988; Wnuk, 1976). The floristically poorest form of the association, which differed in the occurrence of only the summer vegetation aspect, was described in the Suwałki Lake District (Wójcik, 2000).

In rye crops, impoverished patches of *Aphano-Matricarietum* – a substitute community to *Vicietum tetraspermae*, occurring commonly in cereal crops in north-western Poland, were noted very seldom (Matuszkiewicz, 2001).

In spring cereal crops, favourable temperature and light conditions affected the development

of vegetation patches similar in species composition to communities of the order *Polygono-Chenopodietalia*, accompanying root cultivations (Siciński, 2003; Hołdyński, 1991; Skrajna and Skrzyczyńska, 2006). In the agroecosystems of the Mazowiecki Landscape Park, they were mainly observed on more fertile soils in the agricultural buffer zone of the Park.

CONCLUSIONS

1. Four plant communities, *Arnosserido-Scleranthetum*, *Papaveretum argemones*, *Vicietum tetraspermae* and *Aphano-Matricarietum*, divided into lower syntaxonomical units, were identified in cereal agroecosystems of the Mazowiecki Landscape Park.
2. The *Arnosserido-Scleranthetum* association was common in poor habitats, whereas the association *Vicietum tetraspermae* was widespread in more fertile ones.
3. Fully-developed plots of the association *Papaveretum argemones* and patches of the community of intermediate character *Arnosserido-Scleranthetum-Papaveretum argemones* were rarely noted in the study area.
4. Isolated patches of *Aphano-Matricarietum* were noted in the south-eastern part of the Park.

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Zbiorowiska segetalne zbóż Mazowieckiego Parku Krajobrazowego

Streszczenie

W pracy przedstawiono charakterystykę zbiorowisk wykształcających się w zasiewach zbóż na terenie Mazowieckiego Parku Krajobrazowego. Tradycyjne metody uprawy, duża mozaika pól, łąk i lasów oraz specyficzny mikroklimat, sprzyjają wykształcaniu się bogatych florystycznie i zróżnicowanych syntaksonomicznie agrofitycenozy. Na terenie Parku stwierdzono występowanie 4 zespołów (*Arnosserido-Scleranthetum*, *Vicietum tetraspermae*, *Papaveretum argemones*, *Aphano-Matricarietum*) i 2 zbiorowisk (*Arnosserido-Scleranthetum* i *Papaveretum argemones*, z dominacją gatunków charakterystycznych rzędu *Polygono-Chenopodietalia*). Najbardziej rozpowszechnionym i zróżnicowanym wewnątrz był na glebach najsłabszych *Arnosserido-Scleranthetum*, a na zasobniejszych troficznie zespół *Vicietum tetraspermae*. Wymienione asocjacje częściej wykształcały się w oziminach sporadycznie w łąkach zbóż jarych. Rzadko na badanym terenie spotykano płaty *Papaveretum argemones* oraz zbiorowiska o charakterze pośrednim. Płaty z dominacją gatunków charakterystycznych dla rzędu *Polygono-Chenopodietalia* notowano jedynie w łąkach zbóż jarych głównie w otulinie Parku. W południowo-wschodniej części Parku występowały pojedyncze płaty *Aphano-Matricarietum*.