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Materials for the distribution and ecology of the mistletoe (*Viscum album* subsp. *album*) in central-eastern Poland. V. Vicinity of Mielec

Materiały do rozmieszczenia i ekologii jemioły pospolitej typowej (*Viscum album* subsp. *album*) w środkowo-wschodniej Polsce V. Okolice Mielca

SUMMARY

This paper is one of a series of articles concerned with the results of investigations on the distribution and ecology of the mistletoe in the strictly defined area in the vicinity of towns. The investigations relate to one of mistletoe subspecies *Viscum album* subsp. *album*. The presented investigations were conducted in 2001–2003 in the vicinity of the town of Mielec in the area of 256 km^2. 141 single-specimen and specimen-group stations of the mistletoe were located, parasitizing on 22 host taxa with varied taxonomic ranks. A similar range of investigations on the mistletoe in central-eastern Poland has so far been conducted in the vicinity of Tarnobrzeg, Stalowa Wola, Kraśnik (Stary), and Sandomierz.

STRESZCZENIE

Przedstawiono strukturę przestrzennego rozmieszczenia i ekologii jemioły pospolitej typowej (*Viscum album* subsp. *album*) w rejonie miasta Mielec na obszarze 256 km^2. Badania te przeprowadzono w latach 2001–2003. W sumie zlokalizowano 141 pojedynczych i grupowych stanowisk jemioły o charakterystycznym ich przestrzennym rozmieszczeniu. Pasożytuje ona na 22 taksonach żywicieli o różnej randze taksonomicznej. Odnosi się to głównie do drzew i to tych, które rosną na stanowiskach synantropijnych. Częstość i liczebność występowania badanej jemioły w rejonie miasta Mielca jest również bardzo zróżnicowana.

Stwierdzono różnego rodzaju przypadki mechanicznego niszczenia osobników i całych stanowisk jemioły. Zauważono również przypadki naturalnego rozprzestrzeniania się tej rośliny na stanowiskach pierwotnych i nowych. Wcześniej podobny zakres badań nad jemiołą w środkowo-

-wschodniej części Polski zostały przeprowadzone w rejonie miast: Tarnobrzeg, Stalowa Wola, Kraśnik (Stary) i Sandomierz.

Key words: Misletoe (*Viscum album* subsp. *album*), stations and ecology, Mielec, Poland.

THE PURPOSE AND SCOPE OF STUDY

This paper is one of series of successively published data on the distribution and ecology of the mistletoe in strictly defined areas in the vicinity of towns situated in the central-eastern part of Poland (13–16). They are actually concerned with one subspecies of the typical common mistletoe (*Viscum album* subsp. *album*) (12). The purpose of the present study is to characterize the distribution and ecology of the aforementioned mistletoe species in the vicinity of the town of Mielec in the area of 256 km^2. Studies were conducted in 2001–2003. The introductory part of the paper gives basic information about the environment of the investigated territory. Data on mistletoe occurrence in the studied area have so far been only general (1, 20). The essential part of this study contains the description of mistletoe stations. They were located against the background of the town's major elements, such as streets, parks, cemeteries and the stream network. The following data concerning mistletoe stations were also taken into consideration: built-up and tree-coverage conditions and the mutual ratios of individual hosts and the extent of their infestation by mistletoe specimens (shrubs). The comprehensive data on the quantitative structure of mistletoe stations was specified in Table 1. The map of the investigated area with all mistletoe stations located in it was also appended (Fig. 1). The final part of the paper contains the summing up of results. The naming of taxa of mistletoe hosts was given according to Seneta and Dolatowski (10).

EXPLANATIONS OF ABBREVIATED DENOTATIONS

In the descriptions of mistletoe stations the following letter denotations for its host taxa were adopted in the alphabetical order.

A — *Acer negundo* L.
B — *Acer platanoides* L
C — *Acer saccharinum* L.
D — *Betula pendula* Roth
E — *Crataegus x media* Bechst.
F — *Fraximus excelsior* L.
G — *Malus domestica* Borkh.
H — *Pinus sylvestris* L.
I — *Populus* x *berolinensis* (K. Koch) Dippel '*Berlin*'
JM — *Populus* x *euamericana* (Dode) Guinier '*Marilandica*'
JR — *Populus* x *euamericana* (Dode) Guinier '*Robusta*'
JS — *Populus* x *euamericana* (Dode) Guinier '*Serotina*'
KA — *Populus maximowiczii* Henry 'NE 42' ('*Hybrida 257*')
KB — *Populus maximowiczii* Henry 'NE 49' ('*Hybrida 149*')
L — *Populus simonii* Carrierére
M — *Robinia pseudoacaccia* L.
N — *Salix fragilis* L.
O — *Salix x sepulcralis* Simonk.
P — *Sorbus aucuparia* L. '*Edulis*'

Q — *Sorbus intermedia* (Ehrh.) Pers.
R — *Tilia cordata* Mill.
S — *Tilia plathyphyllos* Scop.

The number given before a particular taxon of 22 hosts (A — S) refers to the overall number of host specimens, on which mistletoe occurrence was reported. The numbers given after the slash "/" sign refer to the number of mistletoe specimens living on individual specimens of a specific host taxon.

The afore-mentioned data permit us to read the overall number of both host taxa occurring in a given stations and the overall number of mistletoe specimens parasitizing on them.

Additional denotations:

ca. — circa; * — mistletoe host specimen cut down during investigations or after their completion.

Table 1. The structure of mistletoe (*Viscum album* subsp. *album*) occurrence in the vicinity of the town of Mielec

The host of *Viscum album* subsp. *album* and the tree letter denotations in station descriptions	Number of specimens		
	stations	host taxon	*Viscum album* ssp. *album*
A — *Acer negundo*	1	1	3
B — *Acer platanoides*	1	1	9
C — *Acer saccharinum*	10	18	231
D — *Betula pendula*	20	31	385
E — *Crataegus x media*	1	2	2
F — *Fraxinus excelsior*	1	1	1
G — *Malus domestica*	1	1	4
H — *Pinus sylvestris*	1	1	1
I — *Populus* x *berolinensis 'Berlin'*	11	44	689
JM — *Populus* x *euamericana 'Marilandica'*	6	36	248
JR — *Populus* x *euamericana 'Robusta'*	24	109	4,127
JS — *Populus* x *euamericana 'Serotina'*	14	45	1,870
KA — *Populus maximowiczii* 'NE 42' ('*Hybrida 257*')	2	7	18
KB — *Populus maximowiczii* 'NE 49' ('*Hybrida 149*')	1	1	2
L — *Populus simonii*	4	7	13
M — *Robinia pseudoacaccia*	22	32	119
N — *Salix fragilis*	4	5	22
O — *Salix x sepulcralis*	1	1	3
P — *Sorbus aucuparia 'Edulis'*	10	12	105
Q — *Sorbus intermedia*	2	2	10
R — *Tilia cordata*	3	5	13
S — *Tilia plathyphyllos*	1	1	1
Total	141	363	7,876

AREA OF INVESTIGATIONS

Studies on the occurrence and ecology of the mistletoe were conducted in the town of Mielec and in its close vicinity (Fig. 1). This area has been delimited as a square of 256 km^2. It is

situated against the ATPOL grid squares pattern marked as FE 30 and FE 40. Within its present administrative borders Mielec covers the area of 4,737 ha and has 64,267 inhabitants (6, 7). The town is situated in the Sandomierz Basin macroregion and the Wisłoka Valley mesoregion. (4, 11, 18). The investigated area is characterized by favourable climatic conditions (3, 8, 9). It lies in the region with the highest insolation in Poland. There are relatively warm summers and mild winters in the area. The average annual air temperature is ca. 8.6oC. The average annual precipitation total reaches 730 mm. The snow cover lasts on average 60 days per year. Vegetation period lasts ca. 223 days. Western (20.4%), southern (13.2%) and south-western (12.9%) winds predominate in the investigated area.

The studied territory of Mielec surroundings is situated on the wide, right-bank Wisłoka valley on the vast ridges of higher riverside terraces at the height of 164.3–188.5 m above sea level. This is basically a flatland area with several isolated hilly forms of washed-out dunes with relative heights of 15 m. The habitat conditions of the studied area are fairly characteristically diversified (5, 6, 18). The oldest Tertiary bedrock of clay, silt and slate types lies at the depth of several to over a dozen metres. The Quaternary cover is made up of fluvial and fluvioglacial deposits. They form a complex mosaic of gravel, loamy and dusty deposits with varied degrees of sandification. The local fringe of the Wisłoka river-bed is spatially dominated by silty-sandy alluvial soils. In accordance with the kinds of Quaternary deposits and river conditions there are corresponding soil types (2, 17). In drier and higher-lying places, less abundant dusty-sandy soils predominate, which are related to podzolic soils to varying degrees. In lower inundation areas of the Wisłoka river, various forms of fertile alluvial soils, mainly sandy-silty, are widespread.

In the Mielec area the stream network is composed of the Wisłoka and Babulówka rivers with a few small streams and dewatering channels. Worth noting are water bodies, scanty in number and of different sizes, and numerous small-sized flooded places (tiny ponds). During high and low water stages, the Wisłoka alternately drains and feeds ground waters. These waters run shallow and are usually strongly contaminated, mainly with selenium, manganese and ammonia compounds. During rainy seasons the ground waters are fed with water, while they most often disappear during long--term drought. On the outskirts of Mielec rural farmland spatially predominates with ploughland and meadows and scattered farm buildings surrounded with orchards and gardens. On the opposite flanks of the studied area, from the north-east and south-west sides there are vast complexes of pine and oak forests. Within Mielec's administrative borders there is an overwhelming predominance of urban and suburban housing areas (44%) and arable land (42%) over wooded areas (14%) (6, 7). Within the limits of the densely built-up town worth noting are numerous heavily tree-covered sites used as parks, greens, and cemeteries. There are also numerous tree concentrations on the rims of roads and by-streets and in housing estate squares and industrial yards, on the fringes of sports facilities etc.

STATIONS OF THE MISTLETOE

1. At the junction of Wojsławicka St. and Kościuszki St. The area with very few buildings, fairly heavily tree-covered. Next to the highway on two specimens of isolated trees: 2JS/7, 18.
2. Near the Wisłoka river embankment, next to St. Mark church. A sparsely built-up square, heavily tree-covered, on one tree: M/1.
3. Osiedle Kościuszki [Kościuszki Estate], SW of the junction of Legionów St. and Lenartowicza St. The Oborsk Dworek [Manor] park, with several buildings, heavily tree-covered. The park fringe, next to the fence on two tree specimens: 2JR/7, 3.
4. E of the junction of Kościuszki St. with Jędrusiów St. and Rzeczna St., in the vicinity of High School buildings. A square between buildings, sparsely tree-covered. Next to the fence near the highway, on one specimen in a tree row: JR/4.

5. Near the junction of Długosza St. with Sienkiewicza St. and Niepodległości Ave. The parish cemetery, densely, irregularly tree-covered. In a tree row, on one specimen: D/1.
6. NW of the junction of Warszawska St. with Żwirki i Wigury St. A square near the "Gryf" Sports Club pitch, sparsely tree-covered, on one tree: JM/1.
7. E-side of Wiejska St. at its junction with a country road. A sparsely built-up and tree-covered area. On the driveway to a building. On one tree: D/3
8. On W-side of the Wisłoka river, W of Wiejska St. An unbuilt area, fairly densely but irregularly tree-covered. Along the Wisłoka valley, in a dense tree belt on 20 specimens: 20JM/1, 1, 2, 2, 1, 3, 4, 9, 3, 2, 5, 1, 2, 10, 6, 4, 2, 1.
9. NE of a country road, near Wiejska St., between meeting drainage ditches. The area of ploughland and meadows, sparsely built-up and tree-covered. Next to buildings on two trees: 2N/4, 7.
10. W of the intersection of Pisarska St. with an intra-estate road. The playground next to the kindergarten buildings, unevenly tree-covered. Next to the playground fence in a tree cluster, on 5 specimens: 5KA/7, 3, 1, 4 + 1.
11. NW of the intersection of Kilińskiego St. with Bajana St. The fringe of ploughland, sparsely and irregularly tree-covered. At the fence of a square, in a tree row on 2 specimens: 2D/1, 12.
12. W-side of Kilińskiego St. The area adjacent to Allotment Gardens, sparsely and irregularly built-up and tree-covered. Next to the highway on 2 isolated trees: 2JR/1, 4.
13. At the junction of Ducha Świętego Ave. With intra-estate roads near a parking, next to an MKS bus stop. A square sparsely and irregularly tree-covered. The edge of a large tree cluster on 1 specimen: P/21
14. S of the intersection of Tańskiego St. with Ducha Świętego Ave. The playground next to the creche buildings, sparsely and irregularly tree-covered. A not very dense tree concentration, on 1 specimen: O/3.
15. SE of the intersection of Tańskiego St. and Ducha Świętego Ave. A small square next to the "Zenit" department store, sparsely tree-covered. Next to a building on 2 nearby trees: 2K/1, 1.
16. SE of the intersection of Tańskiego St. with Ducha Świętego Ave., on E-side of Zielona St. A thinly, irregularly tree-covered square. Next to the fence of the square, in a tree row on 2 specimens: 2I/2, 3.
17. SE of the intersection of Sienkiewicza St. with Nałkowskiej St., near the railway crossing. A square between Used Cars Dealer's buildings and the petrol station. A heavily tree-covered area with scattered tree specimens, on 2 isolated specimens: 2M/7, 6.
18. SE of the intersection of Sienkiewicza St. with Traugutta St., in the vicinity of railway tracks. A square with very few buildings and scattered trees. In two sites. N of the buildings, next to the fence on 1 tree: D/13. S-side of buildings, next to the tracks on 2 nearby trees: 2D/6, M/4.
19. Both sides of Jagiełły St. and N of its intersection with Traugutta St. The area with gardens and wasteland, sparsely and irregularly built-up and tree-covered. In two sites: next to the buildings on an isolated tree: P/3. Outside the buildings, on an isolated tree: N/4.
20. On NE-side of Traugutta St., NW of its intersection with Nałkowskiej St. In a dense row of roadside trees on 1 specimen: I/1.
21. In Traugutta St., E-edge of the petrol station square. The square with several buildings, thinly and irregularly tree-covered. Next to the fence, in a dense tree row on 2 specimens: 2I/1, 2.
22. E of the intersection of Sienkiewicza St. and Bema St., near the railway tracks and an MKS bus stop. The roadside area with very few buildings and tree rows. On 3 trees: 3JR/12, 3, 11.

23. W-side of Cyrankowska St., N of its intersection with Wojska Polskiego St. A square with very few buildings and trees. On 2 isolated trees: 2JS/17, 2.
24. Between the "BBW" company and railway tracks. A factory square with several buildings, sparsely and irregularly tree-covered. Next to the highway, in a dense tree row on 1 specimen: M/2.
25. Between the industrial hall buildings and railway tracks. A densely built-up square, irregularly tree-covered. In a dense tree row on 2 specimens: 2E/1,1.
26. Between the industrial hall building and railway tracks. A densely built-up square, thinly and irregularly tree-covered. On an isolated tree: JR/9.
27. Between the industrial hall buildings and railway tracks, at the intersection of intra-estate roads. A densely built-up square, sparsely and irregularly tree-covered. On the street junction, among a small tree cluster on 1 specimen: JR/1.
28. Between the industrial hall building and railway tracks. The square on either side of the street, densely built-up, heavily irregularly tree-covered. Next to the highway, in two isolated, opposite-lying tree concentrations on 2 specimens: C/1: M/1.
29. Between the industrial hall building and railway tracks, at the junction of intra-estate roads. A densely built-up square, heavily irregularly tree-covered. Between the highway and the square fence, in a dense tree row on 2 specimens: 2C/32, 41.
30. N of the intersection of Przemysłowa St. and Wojska Polskiego St. The square next to the Fire Brigade building, thinly, irregularly tree covered. In a dense tree row on 1 specimen: S/1.
31. Between the "Press-Media" Publishers buildings and Wojska Polskiego St. A square with several buildings, sparsely irregularly tree-covered. Next to the highway, in a dense tree row on 1 specimen: R/4.
32. Between the "Boening" company buildings and the intersection of intra-estate roads. A densely built-up square, heavily and irregularly tree-covered. Among an isolated tree concentration on 1 specimen: M/1.
33. Between the "Komandor" company buildings and the junction of intra-estate roads. Along the road and drainage ditch, in a dense tree row on 1 specimen: B/9.
34. E-side of the "Fakro" MDF H-1 industrial hall. A densely built-up square and heavily irregularly tree-row covered. On the drainage ditch among tree rows on 3 specimens: M/1, 2C/9, 11.
35. W-side of the "BRW" office building. A densely built-up square and irregularly, medium tree-covered. Next to the highway among an isolated sparse tree cluster on 1 specimen: C/1.
36. S of the "Polska Folia" H-11 industrial hall buildings, at the junction of intra-estate streets. A densely built-up area, heavily irregularly tree-covered. In a dense tree-row on 4 specimens in 2 sites: 2M/3,2 + 2M/2,1.
37. Between the "Meknox-Kronowood" H-33 industrial hall buildings and railway tracks. An unbuilt square, heavily irregularly tree-covered. On 2 nearby trees: 2D/2, 4.
38. Between the "Joongpol" H-35 industrial hall buildings and the intersection of intra-estate streets. A densely built-up square, heavily tree-covered. Along the drainage ditch and the highway, in a dense tree row on 2 specimens: A/3, M/1.
39. S of the intersection of Wojska Polskiego St. with Pogodna St. and Rudnik St., near the airfield area. The square next to Elementary School with several buildings and irregularly tree-covered. Along the fence of the square and the highway, in a dense tree row on 2 specimens: JR/22, KB/2.
40. E of the intersection of Pogodna St. and Dolinna St., near the airfield area. Next to the housing estate buildings, on the edge of pine and oak forest, on a sandy scarp on 1 tree: H/1.

41. E of the junction of Rudnik St. and Wiesiołowskiego St., NW-side of Cyranowskie Stawy [Ponds]. An unbuilt square, densely tree-covered. Near the highway, in a sparse tree cluster on 1 specimen: D/5.
42. E of Kwiatkowskiego Ave., next to its intersection with Wojska Polskiego St. and Partyzantów St. A sparsely built-up square, irregularly tree-covered. Along the highway and the square fence, in a dense tree row on 1 specimen: JR/2.
43. Near the Allotment Gardens, S of the intersection of Partyzantów St. and the intra-estate road. A sparsely built-up and tree-covered square. Next to the square fence, in a dense tree row on 1 specimen: JR/1.
44. SE-side of Kwiatkowskiego Ave., S of its junction with Wojska Polskiego St. and Partyzantów St. A sparsely built-up and tree-covered square. In a dense tree row on 1 specimen: JR/1.
45. SE of Kwiatkowskiego Ave. A sparsely built-up and tree-covered square. In the vicinity of the square fence and drainage ditch, in a dense and widespread tree row on 1 specimen: JR/1.
46. Between Kwiatkowskiego Ave and the "Trześń Mała" canal. A sparsely built-up and tree--covered square. In a dense tree row on 1 specimen: JR/1
47. W-side of Przemysłowa St., N of its intersection with Kwiatkowskiego Ave., next to the CPN petrol station buildings. A sparsely built-up, irregularly tree-covered square. In a dense tree row on 1 specimen: D/17.
48. N of the intersection of Nowa St. with Wolności St. The area of single-family houses, sparsely built-up and tree-covered. Next to the highway among several trees on 1 specimen: G/4.
49. N-side of Królowej Jadwigi St., E of its junction with Partyzantów St. and Wolności St. Between buildings and a pine forest. A sparsely built-up and tree-covered square. Along the highway in the vicinity of buildings, in a dense tree row on 9 specimens: 9JM/12, 9, 1, 1, 2, 1, 2,1, 4.
50. S-side of Królowej Jadwigi St., W. of Municipal Cemetery, next to the parking site. An unbuilt square, fairly densely, irregularly tree-covered, on one isolated tree: JS/32.
51. S of Królowej Jadwigi St., near an MKS bus stop. Municipal Cemetery. In part of it, heavily, irregularly tree-covered. In 2 distant sites among thin tree clusters on 4 specimens: 3D/3, 1, 51+P/2.
52. SW-side of the intersection of Wolności St and Majowa St., near an MKS bus stop. A sparsely built-up and irregularly tree-covered square. On an isolated tree: M/1.
53. SW-side of Majowa St., S of its intersection with Wolności St., next to a country road. An unbuilt square, fairly densely and irregularly tree-covered. On both sides of the square fence, in a dense tree row on 2 specimens: 2M/17, 5.
54. SW-side of Wolności St., S of its intersection with an intra-estate street, near the CPN square. The square unbuilt and irregularly tree-covered. In an isolated row of several trees on 1 specimen: D/3.
55. S of the intersection of K. Wyszyńskiego St. and Smoczka St. The Elementary School square, its E-side with several buildings, sparsely and irregularly tree-covered. In a small tree cluster on 1 specimen: D/1.
56. Between Witosa St. and railway tracks, near the Allotment Gardens. A sparsely built-up and tree-covered square. On both sides of the square fence, in a dense tree row on 3 specimens: 3JR/ 1, 2, 1.
57. NE-side of Korczaka St. near its intersection with Krańcowa St. and the CPN petrol station square. The square medium densely built-up and irregularly tree-covered. Along the street, in a dense tree row on 4 specimens: 4JR/1,1, 3, 7.
58. On either side of Ćwiklińskiej St. near its intersection with Korczaka St. A roadside square with very few buildings and heavily, irregularly tree-covered. Along the street in a dense tree row on 4 specimens: 4JR/5, 2, 32, 27.

59. SW of the intersection of Korczaka St. with Polna St., next to railway tracks. A square with several buildings, densely, irregularly tree-covered. Along the railway tracks, in a dense tree row on 7 specimens: 7JR/2, 1, 3, 38, 3, 4, 2.
60. E of the Piaskowa St. exit, E-side of railway tracks. A heavily built-up and tree-covered square. Along the square fence, in a wide, dense tree row on 2 specimens: 2JR/3, 1.
61. SW-side of Piaskowa St., E of railway tracks. A square with many scattered trees. Among several roadside trees, on 1 specimen: M/6.
62. W-side of Czecha St., NW of its intersection with Gałczyńskiego St. A square with several industrial hall buildings, irregularly tree-covered. In a row of several trees on 2 specimens: 2JM/38, JR/1.
63. SW side of Piaskowa St., near the "Aetk" market parking place, near railway tracks. A square between several buildings, thinly, irregularly tree-covered. In a not very dense row of several trees on 1 specimen: JM/7.
64. S of Wolności St, near the animal shelter. A square between buildings and railway tracks, heavily irregularly tree-covered. Next to the railway tracks, in dense tree row, on 1 specimen: M/6.
65. NE of the intersection of Targowa St. and Pasieczna St. A square between buildings and railway tracks, thinly, irregularly tree covered. On an isolated tree: JS/124.
66. NE of the intersection of Targowa St. with Narutowicza St. A square between buildings, heavily tree-covered. In 3 sites. Along the fence of a housing estate square and railway tracks, in a tree row on 1 specimen: M/7. Near the "Kosmos" building on an isolated tree: P/8. Next to a driveway on an isolated tree: L/4.
67. NW of the junction Wolności St. with Narutowicza St., Żeromskiego St., and Torowa St. A square between buildings and the highway and railway tracks, thinly and irregularly tree--covered. Next to the railway tracks, in a scattered tree cluster on 1 specimen: JS/111.
68. N of intersection of Wolności St. with intra-estate streets. A square between buildings, thinly, irregularly tree covered. In two sites. The square next to a housing estate building among several trees, on 2 specimens: D/1, JS/4. Next to the main road, in a thin tree row, on 3 specimen: 3JS/2, 11, 53.
69. E-side of the junction of Kościuszki St. with Czecha St. and Wolności St, near the Cemetery of Soviet Soldiers. Next to the cemetery fence, the edge of a small, not very dense forest on 1 tree: M/1.
70. E-side of the junction of Korczaka St. with Czecha St. and Wolności St. A square between buildings and the highway, thinly, irregularly tree covered. Next to the highway, in a cluster of several trees, on 1 specimen: JS/48.
71. N-side of Wolności St, NW of its junction with Narutowicza St. The Rest and Culture Park [Wypoczynku i Kultury], unbuilt, fairly densely tree-covered. Next to the highway, in a thin row of trees, on 1 specimen: N/1
72. N of Wolności St. A square between buildings and the Cemetery of Soviet Soldiers. In a wide, dense belt of trees, on 1 specimen: JS/2
73. NE of the junction of Wolności St. with K. Jagiellończyka St., E-side of the *Powiat* [County] Hospital buildings. A square between the buildings and the pine forest, thinly built-up, fairly densely and irregularly tree-covered. In 3 sites. Along the driveway in dense tree row, on 6 specimens: 4JS/102, 6, 3, 1; 2I/3, 10. On the edge of a square in two isolated tree clusters on 5 specimens: 5JS/1, 3, 2, 3, 3. At the far end of the square, on an isolated tree: JS/7.
74. SE of the junction of Kędziora St. with Wyspiańskiego St., near the pharmacy building. A square between buildings, the highway and the promenade, medium densely tree-covered. In a dense tree group on 1 specimen: D/1.

75. Between Kraszewskiego St. and Konopnickiej St. The playground next to the creche buildings, medium densely tree-covered, mainly in rows. In 2 sites. Next to the highway in a thin row of trees, on 3 specimens: 3C/31, 2, 4. In the middle of the playground, in a not very dense group of a dozen-odd scattered trees on 1 specimen: D/5.
76. E-side of Konopnickiej St. near Kraszewskiego St. and Kochanowskiego St., next to the Kindergarten buildings. A square between the buildings and the highway, fairly densely tree-covered, mainly in rows. Next to the highway, in a thin row of trees on 4 specimens: 3I/7, 3, 4; JS/12.
77. E-side of Fredry St. near Skłodowskiej-Curie St. and Konopnickiej St. A housing estate square with several buildings, heavily, irregularly tree-covered. In a thin row of trees on 3 specimens: I/4; 2R/4, 3.
78. Near the buildings of *Powiat* Authority Offices. A heavily built-up square, fairly densely, irregularly tree-covered. On either side of the highway, among thin rows of trees on 2 specimens growing opposite one another: 2R/1,1.
79. W of Konopnickiej St. near its junction with Kołłątaja St. and Przerwy-Tetmajera St. A square between buildings, densely, irregularly tree-covered. Next to the highway, in a thin row of trees on 2 specimens: 2D/1,1.
80. E-side of Chopina St. near its intersection with M. Skłodowskiej-Curie St. A square between buildings, thinly tree-covered. In 2 sites. In the corner of highways in a thin row of trees on 1 specimen: I/5. NE-side of the highway in a thin row of trees on 2 specimens: 2I/3, 7.
81. E-side of Niepodległości Ave. near the Konopnickiej St. exit. A square between buildings fairly densely tree-covered, mainly in rows. Next to the highway, in a thin row of trees on 1 specimen: C/1.
82. In the vicinity of central sections of Niepodległości Ave., J. Kusocińskiego St., Sikorskiego St., and L. Staffa St. The edge of a square, irregularly tree-covered, between housing estate buildings and a supermarket. On an isolated tree: I/9.
83. W-side of L. Staffa St., NE of its junction with P. Skargi St. A square between two buildings and the highway, heavily irregularly tree-covered. In a scanty group of trees on 1 specimen: D/1.
84. Near Kossaka St. and K. Jagiellończyka St. The edge of the park with irregular, mainly cluster--like tree coverage. In a large group of trees on 1 specimen: D/1.
85. SE of the intersection of Kopernika St. with P. Skargi St. A square between buildings, thinly tree-covered. In a scanty tree cluster on 1 specimen: C/3.
86. NE-side of Kopernika St. near its junction with P. Skargi St. A square between buildings, fairly heavily tree-covered. In 4 sites. Next to the highway in a thin row of trees on 2 specimens: 2C/4, 24. Next to the pavement, in a thin row of trees on 1 specimen: F/1. Along the fence of sports fields, in a wide tree belt on 1 specimen: M/1. In an isolated group of trees on 1 specimen: C/4.
87. SW of the junction of Kopernika St. with Kusocińskiego St., next to the Elementary School sports field. A square between the sports field fence and the highway, medium densely tree--covered. In a dense row of trees on 3 specimens: 3C/4, 36, 5.
88. NE of the intersection of Kopernika St. with P. Skargi St., near the car park. A square between buildings, medium densely tree-covered. Next to the highway, in a thin row of trees on 2 specimens: 2C/1, 25.
89. NE of P. Skargi St. near the buildings of the City Clinic. A square between buildings and meeting streets, densely tree-covered. In 2 sites. Near the City Clinic, in small group of trees on 2 specimens: 2P/12, 5. Next to the highway, in a thin row of trees on 2 specimens: Q/1, P/42.

90. E-side of K. Jagiellończyka St., near its intersection with P. Skargi St. A square between buildings and the highway, near railway tracks, irregularly tree-covered. Next to the building in a thin row of trees on 1 specimen: P/3.
91. E-side of K. Jagiellończyka St. near the buildings of Dermatological Hospital and railway tracks. A square near the buildings, thinly, irregularly tree covered. In 2 nearby sites in a thin row of trees on 3 specimens: 2L/3, 1 + P/2.
92. E-side of K. Jagiellończyka St. and railway tracks. A square between buildings and the highway, covered with thin tree rows. Next to the highway in a thin row of trees on 1 specimen: L/1.
93. W of K. Jagiellończyka St. and railway tracks. A square between the road and garages, irregularly tree-covered. In a thin row of trees on 1 specimen: M/2.
94. E-side of K. Jagiellończyka St. A square between buildings and the highway and car park, thinly, irregularly tree-covered. In 2 sites. In a thin row of trees on 3 specimens: 3L/2, 1, 1. Between housing estate buildings, in a thin row of trees on 1 specimen: P/2.
95. E-side of Spółdzielcza St., SW of its intersection with Kusocińskiego St. A square between housing estate buildings, heavily irregularly tree-covered. In a thin row of trees on 2 specimens: P/1; M/1.
96. SW of Kusocińskiego St. near the Sports Hall buildings. A square between buildings, thinly, irregularly tree-covered. On an isolated tree: P/4.
97. E-side of J. Kusocińskiego St. near its junction with Grunwaldzka St. A square between housing estate buildings and the „Stal Mielec" sports stadium. In a wide belt of densely growing trees on 16 specimens: 16JR/66, 51, 37, 49, 32, 21, 48, 46, 41, 53, 39, 43, 57, 36, 24, 69.
98. Between J. Kusocińskiego St., Solskiego St., Grunwaldzka St. and L. Staffa St. A heavily built-up square, irregularly tree-covered. Among clusters and rows of trees on 20 specimens: 7JS/86, 47, 103, 9, 46, 5, 21; 13I/7, 2, 5, 9, 6, 5, 3, 8, 4, 6, 17, 29, 14.
99. W-side of Solskiego St. near its junction with Grunwaldzka St. A square fairly heavily built--up and tree-covered. Next to sports fields, in a wide dense belt of trees on 22 specimens: 22JR/22, 37, 23, 16, 19, 52, 64, 56, 53, 77, 12, 5, 101, 82, 107, 93, 120, 74, 96, 104, 79.
100. Between Solskiego St., Biernackiego St., Grunwaldzka St. and Kopernika St. A square between housing estate buildings and the Kindergarten building, unevenly tree-covered. In 2 sites. In a wide dense belt of trees on 3 specimens: 3M/1, 2, 1. In the middle of the square, in a dense group of trees on 3 specimens: 3JS/53, 29, 62.
101. Near Biernackiego St., W of its intersection with Baczyńskiego St, next to the Hotel building. In the corner of highways near several buildings. Next to the highway, in a sparse cluster of trees on 1 specimen: D/4.
102. SW-side of the Krzywa St. exit, SE of its intersection with Sucharskiego St. and Biernackiego St. A square next to single-family houses, thinly tree-covered. In a sparse group of trees on 1 specimen: D/4.
103. E-side of Biernackiego St. and W-side of Krzywa St., near the school sports field next to the garages. A square with single-family houses, thinly tree-covered. Along the school square fence, among two rows of trees on 1 specimen: M/4.
104. E-side of Biernackiego St., SE of its intersection with Grunwaldzka St., near the Grammar School building. A square between buildings, irregularly tree-covered. Next to the shed, in a row of several trees on 1 specimen: JS/3.
105. In the corner of Kwiatkowskiego Ave. and Biernackiego St., near the City Clinic buildings. A square between the buildings, irregularly tree-covered. Among tree clusters on 32 specimens: 6D/27, 16, 13, 5, 26,11; 11I/36, 27,, 12, 19, 37, 48, 23, 19, 81, 64, 75; 5M/ 14, 3, 5, 4, 4; 10JS/40, 83, 14, 19, 105, 112, 121, 131, 119, 88.

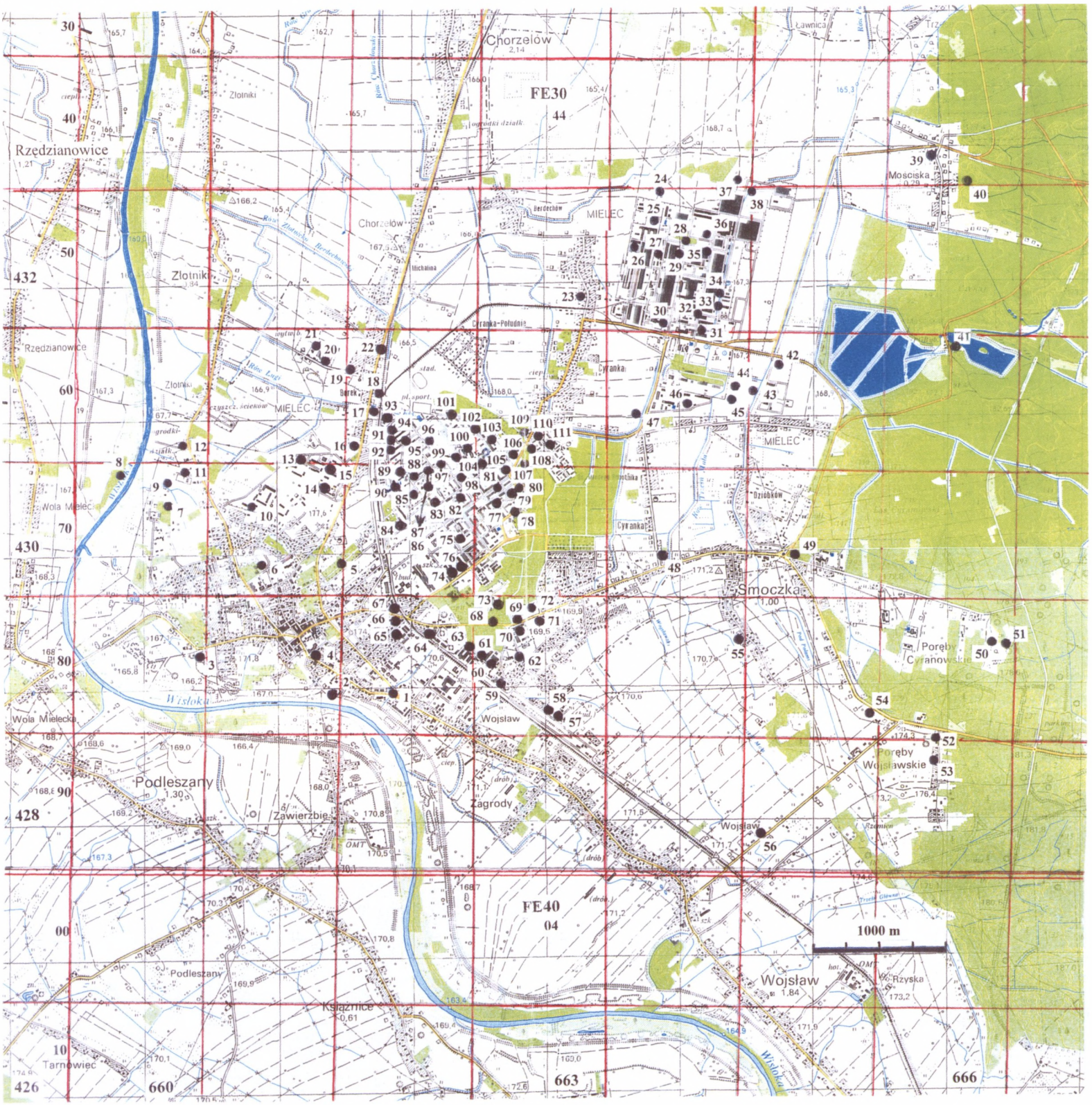

Fig. 1. Map of 111 mistletoe stands (*Viscum album* subsp. *album*) in the region of Mielec. Attention: On the map the area of investigations is situated against the ATPOL grid squares pattern marked as FE 30 and FE 40 (19) Florian Święs, Andrzej Majkut, Jaroslaw Bargiel

Fig. 2. Mistletoe (*Viscum album* subsp. *album*) in the crowns of poplar (*Populus x euamericana* "Marilandica"). Mielec, at Królowej Jadwigi St., stand no. 49. Photo by J. Bargiel, March 2003

Fig. 3. Mistletoe (*Viscum album* subsp. *album*) in the crowns of maple (*Acer saccharinum*). Mielec, at the junction of Kopernika St. and Kusocińskiego St., stand no. 87. Photo by J. Bargiel, March 2003

Fig. 4. Mistletoe (*Viscum album* subsp. *album*) in the crowns of poplar (*Populus x euamericana* "Robusta"). Mielec, at the junction of Solskiego St. and Grunwaldzka St., near the stadium, stand no. 99. Photo by J. Bargiel, F. Święs, March 2003

Fig. 5. Mistletoe (*Viscum album* subsp. *album*) in the crowns of poplar (*Populus x euamericana* "Robusta"). Mielec, at Kwiatkowskiego Av., stand no. 110. Photo by J. Bargiel, F. Święs, March 2003

106. NW-side of Kwiatkowskiego Ave., SW of its junction with Krzywa St. and Westerplatte St. A square with several buildings, irregularly tree-covered. Next to the highway, among parallel rows of trees in 1 row on 5 specimens: 5I/7, 13, 4, 16, 29.
107. SE of Kwiatkowskiego Ave., on the slope of Górka Cyrankowska hill. A square in the vicinity of the pine forest, with many garages and buildings, irregularly tree-covered, mainly in rows. In 2 sites. Next to the driveway to the garages in a row of trees on 3 specimens: 3JM/54, 29, 25. Near the garages in a dense belt of trees on 11 specimens: 11JR/21, 3, 14, 8, 26, 7, 12, 24, 35, 29, 11.
108. SE of Kwiatkowskiego Ave., W-side of a housing estate street. A square between buildings, fairly densely irregularly tree-covered. In a thin group of trees on 2 specimens: D/1, M/3.
109. Next to the intersection of Cyrankowska St. with Kwiatkowskiego Ave. A square sparsely built-up, irregularly tree-covered. In 2 sites. In Cyrankowska St. among a large group of trees on 4 specimens: 4JR/87, 96, 18, 57. In the far end of the square on an isolated tree: JR/ 142.
110. SE of Kwiatkowskiego Ave., E of its intersection with a housing estate street. A square heavily built-up, with a thin cluster of trees. Near the highway, in a large and many-tree group on 19 specimens: 19JR/84, 32, 36, 71, 63, 67, 54, 46, 15, 20, 48, 92, 56, 21, 45, 109, 137, 86, 68.
111. S of Kwiatkowskiego Ave., E of its junction with Przemysłowa St. A medium densely built-up square, heavily irregularly tree-covered. Next to the fence of the PKS bus depot, in a thin row of trees on 3 specimens: JR/128; N/6; Q/9.

RESULTS

In the delimited region of the town of Mielec with an area of 256 km^2 the occurrence of one subspecies of mistletoe (*Viscum album* subsp. *album*) was reported on 141 single-specimen and specimen-group stands (Fig. 1). Worth noting is the characteristic spatial distribution of the located stations of this mistletoe. The largest grouping of stations of this plant can be observed in the central-western and central-northern part of the town. In other parts of the investigated area, especially on its outskirts, the mistletoe usually occurs in very few and scattered stations. This happens mainly in the north-eastern, south--eastern and central-western parts of the town. The locally largest concentrations of mistletoe stations are located in the most densely built-up zones. In these places the mistletoe may well be favoured either by a greater number of birds staying there or by higher air temperature. In the surrounding group of buildings this plant almost never occurs in agriculturally managed areas among farm fields, meadows, etc. Worth noting is also the sporadic occurrence of mistletoe in the area of the river network, streams, drainage channels and on the ponds, and in the vicinity of the railway line. This plant species occurs most frequently along the town's main and secondary streets. It was often reported within the town in heavily tree-covered sites, for example in parks and in cemeteries. There are definitely no mistletoe stations within dense, shady forest complexes. The absence of this

mistletoe subspecies in the forests may probably be caused by its photophilous property.

Altogether, in the investigated area, the mistletoe parasitizes on 22 specific hosts numbering 363 specimens (Table 1). In the studied area a total of 7,876 mistletoe specimens (shrubs) were reported. On one host specimen there are from 1 to 142 specimens of this half-parasitic plant. The mistletoe usually parasitizes on mean-age trees, ca. 30–50 years old. It was not reported on the youngest or oldest tree specimens. It is sporadically found on fruit trees. With the exception of *Salix fragilis*, all the other taxa of local mistletoe hosts come from planting. The most important local hosts include first of all hybrids of the genus *Populus*. They are mainly: *Populus* x *euamericana* in the forms of *'Robusta'*, *'Serotina'*, *'Marilandica'*, and *Populus* x *berolinensis 'Berlin'*. The mistletoe in turn occurs most often on *Betula pendula, Robinia pseudoaccacia, Sorbus aucuparia* and *Acer saccharinum*. It was not reported very often on *Salix fragilis, Populus simonii* and *Tilia cordata*. It is found sporadically parasitizing on *Acer negundo, A. platanoides, Crataegus* x *media, Fraximus excelsior, Malus domestica, Pinus sylvestris, Salix* x *sepulcralis, Sorbus intermedia* and *Tilia platyphyllos*. No distinct regularities were found between stations of mistletoe hosts and their habitat conditions. In general, the occurrence of the mistletoe subspecies investigated depends on the presence of its most suitable hosts, possibly growing under heavily contaminated and polluted edaphic and atmospheric conditions. This applies first of all to hosts planted along the busiest highways, in the vicinity of heavily built-up and industrialized areas. Mistletoe hosts are usually weakened in such places. It was found that the majority of hosts infested with the mistletoe unfold leaves much later than the same potential hosts without mistletoe specimens do. Frequent cases were also reported of the slow process of expansion of mistletoe both on the same and on its new stations. There are also increasingly more frequent cases of mechanical destruction of mistletoe stations, both its specimens alone or together with its hosts.

A similarly complex structure of the occurrence of stations of the studied mistletoe subspecies has also been reported earlier in the vicinity of Tarnobrzeg, Stalowa Wola, Kraśnik, and Sandomierz (14–16).

REFERENCES

1. Boratyński K., Boratyńska A. 1976. 65. *Viscum album* L. — Jemioła pospolita. 66. *Viscum abietis Beck* — Jemioła jodłowa. 67. *Viscum laxum* Boiss. — Jemioła rozpierzchła. In: Atlas rozmieszczenia drzew i krzewów w Polsce. K. Borowicz (eds.). PWN, Warszawa–Poznań, 19.
2. Dobrzański B., Uziak S. 1957. Zasobność gleb województwa rzeszowskiego w łatwo dostępny fosfor i potas. Ann. UMCS, sectio E, 12: 93–124.

3. Karczmarz K., Paczos S. 1983 (1985). Zależność rozmieszczenia subatlantyckich i pesudoatlantyckich roślin od stosunków opadów w Kotlinie Sandomierskiej i na zachodniej krawędzi Roztocza. Rocznik Przemyski, 17/18: 73–103.
4. Kondracki J. 1994. Geografia Plaski. Mezoregiony fizyczno-geograficzne. PWN, Warszawa.
5. Kucharczyk M. Zbiorowiska ruderalne Mielca. Ann. UMCS, sectio C, 24: 257–290.
6. Lach J., Michalik A. 1984. Środowisko geograficzne miasta Mielca. [In:] Mielec — dzieje miasta, regionu pod red. F. Kiryka. Krajowa Agencja Wydawnicza w Rzeszowie. Rzeszów. 1: 13–41.
7. Lawera H., Bata A. 1988. Mielec i okolice. Wyd. PUW „Roksana" Krosno.
8. Michna E. 1973. Z badań nad klimatem województwa rzeszowskiego w świetle potrzeb rolnictwa, turystyki i wypoczynku. In: Prawnicze, administracyjne i ekonomiczne studia wyższe w Rzeszowie. Filia UMCS, Rzeszów.
9. Niedziałek H. 1973. Promieniowanie słoneczne na obszarze województwa rzeszowskiego w latach 1951–1970. Folia Soc. Sci. Lublinensis, seria D, 15 (1): 27–35.
10. Seneta W., Dolatowski I. 1997. Dendrologia. PWN, Warszawa.
11. Starkel L. 1972. Kotlina sandomierska [In:] Geomorfologia Polski, pod red. M. Klimaszewskiego. PWN, Warszawa, 1: 138–166.
12. Stypiński P. T. 1997. Biologia i ekologia jemioły pospolitej (*Viscum album, Viscaceae*) w Polsce. Fragmenta Floristica et Geobotanica, seria Polonica, Supl. 1: 1–117.
13. Święs F. 2001. Materials for the distribution and Ecology of the Mistletoe (*Viscum album* L. subsp. *album* P. W. Ball.) in central-eastern Poland. III. Vicinity of Kraśnik (Stary). Ann. UMCS, Lublin, 2: 9–12.
14. Święs F., Majkut A. 1999. Materiały do rozmieszczenia i ekologii jemioły pospolitej (*Viscum album* L. subsp. *album* P. W. Ball.) w środkowo-wschodniej Polsce. I. Okolice Tarnobrzega. In: Bioróżnorodność obszarów stykowych Kotliny Sandomierskiej, Wyżyny Kielecko-Sandomierskiej oraz Wyżyny Lubelskiej. T. Puszkar (ed.). Tow. Nauk. Sandomierskie, Wyższa Szkoła Humanistyczno-Przyrodnicza, Sandomierz: 144–165.
15. Święs F., Krawczyk B., Majkut A. 2000. Materiały do rozmieszczenia i ekologii jemioły pospolitej (*Viscum album* L. subsp. *album* P. W. Ball.) w środkowo-wschodniej Polsce. II. Okolice Stalowej Woli. In: Przyroda obszarów stykowych Ziemi Sandomierskiej i Polski południowo-wschodniej, Eds. T. Puszkar, L. Puszkar (eds.). Tow. Nauk. Sandomierskie, Wyższa Szkoła Humanistyczno-Przyrodnicza, Sandomierz: 26–40.
16. Święs F., Majkut A. 2003. Materials for the distribution and ecology of the Mistletoe (*Viscum album* L. subsp. *album* P. W. Ball.) in central-eastern Poland. IV. Vicinity of Sandomierz. Ann. UMCS, Lublin, sectio C, 58: 87–98.
17. Uziak S., Pomian J. 1967. Gleby północno-zachodniej części byłej Puszczy Sandomierskiej. Ann. UMCS, sectio E, 22: 68–89.
18. Wojtanowicz J. 1989/90. Podział fizyczno-geograficzny Kotliny Sandomierskiej. Ann. UMCS, sectio B, 44/45: 67–93.
19. Zając A. 1979. Atlas of Distribution of Vascular Plants in Poland. (ATPOL). Taxon 27(5/6): 481–484.
20. Zając A., Zając M. (eds.). 2001. Distribution Atlas of Vascular Plants in Poland. Edited by Laboratory of Computer Chorology, Institute of Botany, Jagiellonian University, Kraków.