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Genus *Oenothera* L. in the territory of Lublin

Rodzaj *Oenothera* L. na terenie Lublina

SUMMARY

The structure of spatial distribution of stations of genus *Oenothera* L. plants in the city of Lublin was described. The study covered 23 taxa of different rank. The presented information on these plant stations was based on the published and unpublished data on the subject. With each taxon of the plants examined, its affiliation to a specific genetic, ecological and geographical-historical element was described.

STRESZCZENIE

Na obszarze miasta Lublina stwierdzono stanowiska 22 różnej rangi taksonów z rodzaju *Oenothera* L. Są to rośliny pochodzenia amerykańskiego (7 taksonów), europejskiego (3 taksony). Ponadto do omawianej flory wiesiołków należą taksony reprezentowane przez okazy mieszańcowego pochodzenia, hybrydy (5 taksonów), spontaniczne mieszańce międzygatunkowe o pośrednich cechach (6 taksonów) i osobniki uznane za odmiany (3 taksony).

Stwierdzono, że o przestrzennym rozmieszczeniu stanowisk poszczególnych taksonów z rodzaju *Oenothera* L. na terenie miasta Lublina, decydują przede wszystkim warunki siedliskowe. Rosną one przeważnie na podłożu suchym, typu piaszczysto-żwirowego oraz zwykle wśród słabo zwartej pokrywy roślinnej. Najczęściej rośliny te notowano na stanowiskach pojedynczych i nielicznych (17 taksonów), rzadko na stanowiskach liczniejszych (6 taksonów). Rosną one zwykle pojedynczo lub w niewielkich, luźnych skupieniach. Rzadko i tylko nieliczne z tych roślin tworzą większe zwarte płaty.

Na obszarze Lublina zwracają uwagę, stosunkowo liczne stanowiska określonych taksonów wiesiołków uchodzących za rzadkie w innych częściach Polski. Odnosi się to przede wszystkim do *Oe. hoelscheri* (25 stan.) i *Oe. wienii* (8 stan.). Wiesiołki, jak: *Oe. glazoviana, Oe. paradoxa, Oe.*

victorinii, nie były dotąd podawane ze środkowo-wschodniej części kraju. Poza tym do wiesiołków najrzadziej spotykanych na badanym terenie, poza wymienionymi, należą: *Oe. acutifolia*, *Oe. paradoxa*, *Oe. royfraseri* (po 4 stan.), *Oe. issleri* (3 stan.), *Oe. flaemingina* i *Oe. subterminalis* (po 2 stan.). Do tych roślin odnotowanych tylko na jednym stanowisku należą *Oe. pycnocarpa, Oe. biennis x Oe. hoelscheri, Oe. biennis x Oe. paradoxa, Oe. biennis x Oe. flaemingina, Oe. biennis x Oe. salicifolia, Oe. biennis x Oe. royfraseri.*

Key words: flora of genus *Oenothera* L., stations, habitats, genetic elements, taxonomy.

INTRODUCTION

The genus of evening primrose (*Oenothera* L.) is diversified into 12 sections comprising ca. 100 taxa with a rank of typical species and more or less established hybrids (11, 27, 28). Out of the total body of these plants, four species represent the element of European origin, while 16 others — the American element. *Oenothera* of American and European origin have settled in all continents in temperate and warmer climatic zones. In Europe, there are 70 taxa of *Oenothera* genus, and in Poland's flora — ca. 30 (18). Published data on *Oenothera* stations in Lublin and in the surrounding Lublin macroregion have so far been given mainly by Fijałkowski (2, 3), Fijałkowski and Rostański (18) and by Zając et al. (32), Święs and Wrzesień (23–25) and by Kucharczyk (8). *Oenothera* species generally belong to critical taxa, often with indeterminate taxonomy and systematics. It should also be mentioned that Professor Krzysztof Rostański of Katowice University belongs to the circle of the most authoritative experts on the flora of genus *Oenothera* L.

THE PURPOSE AND METHOD OF INVESTIGATIONS

The purpose of this study is to present the distribution and ecology of all taxa of genus *Oenothera* L. located within Lublin's administrative borders (Fig. 1). First of all, the description of stations of these species was given in the text, and their location on the appended situation maps (Fig. 2–21). Affiliation of *Oenothera* to separate ecological and geographical elements was determined according to (18, 33). The station maps of the studied *Oenothera* taxa were presented against the ATPOL grid squares with a side of 1 km×1 km (31). Intensive studies on the occurrence of *Oenothera* species in the territory of Lublin were carried out by the authors during the vegetation seasons of 2000–2003. The conducted investigations on the distribution of *Oenothera* in the territory of Lublin were documented with a total of ca. 500 herbarium specimens collected from ca. 300 stations (Fig. 2–21). The nomenclature of *Oenothera* species was given according to Mirek et al. (1995). While determining genus *Oenothera* plants in herbarium specimen form, the studies by Rostański (12–14, 16); Rostański, Witosławski (19), Tacik (26) and by Haeupler, Muer (4) were used. All determinations of the critical taxa of genus *Oenothera* L. were revised by Prof. Dr hab. Krzysztof Rostański.

An extensive geobotanical analysis of the whole of Lublin's flora is under in-house preparation (20). The assembled herbarium collections are deposited in the Department of Herbarium Geobotany, Institute of Biology, Maria Curie-Skłodowska University, Lublin.

Explanations of abbreviations: St. — street; Av. — avenue; Fig. — figure.

DESCRIPTION OF THE AREA OF INVESTIGATIONS

The city of Lublin in its present administrative borders covers the area of 148 km^2 with 300,000 permanent residents. It is the capital of the Lublin voivodship (province). The city is

situated in the central-northern part of the macroregion of Lublin (Lublin–Lvov) Upland on the border of four macroregions: Nałęczów Plateau, Bełżyce Plain, Świdnik Plateau and Giełczeska Elevation (1, 7).

Lublin's built-up areas are situated on a highly undulating upland area, 170–220 m above sea level. This is an area dissected by numerous loess ravines and several stream valleys. The main stream network is composed of the Bystrzyca river with the Czechówka, Czerniejówka and Krężniczanka tributaries and Zemborzycki Lake made on the Bystrzyca river (21).

Densely built-up areas predominate in the central part of Lublin. Worth noting are several highly tree-covered city parks, cemeteries, housing-estate grounds etc. On the outskirts of the city there is mainly the rural landscape with farmland, meadows, and orchards predominating over several natural woodland complexes of varied size.

The city of Lublin is characterized by fairly specific climatic properties (6). The average annual air temperature is 7.9°C. The coldest month is January and the warmest July with average air temperatures being 3.6°C and 18.6°C respectively. The average annual precipitation is 556 mm. The highest precipitation figure falls on July (ca. 77.0 mm), the lowest on January (ca. 29.6 mm). The average annual insolation is 4.5 hours per day. Snow cover lies 60–80 days per year. The average vegetation period in the Lublin area lasts 209 days (21).

In the territory of Lublin the essential Quaternary substratum is composed of loess, and loess--like and clay covers (1, 7). The former sediments predominate in the western part and the latter in the southern part of the city. The borderland between these covers is the Bystrzyca river valley in the general outline.

Different soil types are found in the territory of Lublin (30). The prevalent types are clay--dusty and sandy-dusty brown and grey-brown soils. In the river network valleys there are mosaic occurrences of alluvial and black soils, sporadically marshy and peat soils. The soils within Lublin's densely built-up areas are usually highly anthropogenically degraded soils in respect of their physical and chemical properties. Most often these are soils of urban and industrial type with a different degree of pollution and contamination (9, 30). In the arable land widespread around the city's central part there predominate highly productive soils of anthropogenic type.

THE REVIEW OF GENUS *OENOTHERA* L.

Twenty-three taxons of the kind *Oenothera* L. on the ground of the city of Lublin can be presented as follows (18, 27, 29).

Class: *Magnoliopsida (= Dicotyledones)*
Subclass: *Rosidae*
Order: *Myrtales*
Family: *Onagraceae* A. L. de Jussieu 1789
Genus: *Oenothera* L.
Section: *Oenothera*
Subsection: *Oenothera* [= *Euoenothera* (Torr. et Gray) Dietrich]
Series: *Oenothera* Rostański *the cheese.* nov. (= *Strictae Renner*)

1. *Oe. acutifolia* Rostański
2. *Oe. biennis* L.
3. *Oe. casimiri* Rostański
4. *Oe. biennis* L. var. *brevihypantialis*
5. *Oe. biennis* x *Oe. hoelscheri*
6. *Oe. biennis* x *Oe. salicifolia*
7. *Oe. biennis* x *Oe. flemingina*

8. *Oe. biennis* x *Oe. royfraseri*
9. *Oe. biennis* x *Oe. pycnocarpa*
10. *Oe. glazioviana* Micheli in. Mart.
11. *Oe. hoelscheri* Renner ex Rostański
12. *Oe. hoelscheri* Renner ex Rostański var. *rubrybcalyx*
13. *Oe. royfraseri* Gates
14. *Oe. rubricaulis* Kleb.
15. *Oe. flaemingina* Hudziok
16. *Oe. paradoxa* Hudziok
17. *Oe. pycnocarpa* Atk & Bartl.
18. *Oe. victorini* R. R. Gates & Catches

Series: *Devriesia* Rostański, *the cheese.* nov. (= *Strigosae* Cleland)

19. *Oe. salicifolia* Desf. ex G. Don
20. *Oe. salicifolia* Desf. ex. G. Don. the handicap. *angustifolia*
21. *Oe. wienii* Renner ex Rostański

Series: *Rugglesia* Rostański, *the cheese.* nov. (= *Parviflora*e Rostański; = *Cernuae* Renner)

21. *Oe. issleri* Renner ex Rostański
22. *Oe. subterminalis* R. R. Gates

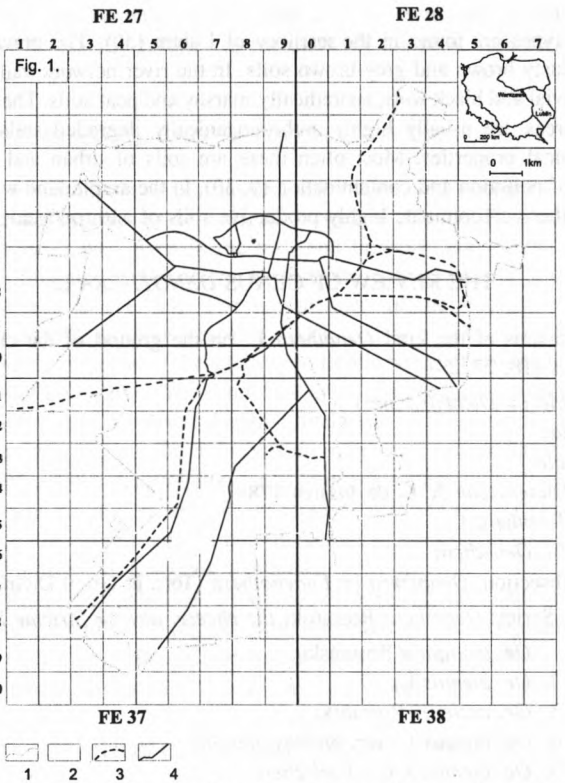


Fig. 1. Situational map of Lublin city against the ATPOL grid. 1 — boundaries of the city, 2 — water network, 3 — railway line, 4 — main highways

THE LIST OF TAXONS AND THEIR POSITIONS

1. ***Oenothera acutifolia*** **Rostański** — Antropogena (Fig. 2)

5 the state.: FE2799 — The Central Railway Station, the central part, the edge of the railway track, the sandy pavement impure the broken stone; **FE2881** — The Northern Railway Station, the slope of the embankment for the railway track, the pavement stony-gravely; Zadębie district, at Chemiczna St. not used the railway track, the pavement sandy-loamy; **FE2883** — Zadębie district, the transfer railway station, the center-piece, the place between railway tracks, the pavement sandy--gravely (Święs, Wrzesień 2003); **FE2893** — Zadębie district, the place between railway tracks, the sandy pavement fixed with gravel.

2. ***Oenothera biennis*** **L.s.s.** — Europe species (Fig. 3)

68 the state.: FE2746 — Górki Czechowskie at Poligonowa St., the ruderal square, the pavement loamy-sandy; **FE2758** — Bursaki district, on three distant positions: Bursaki St., the green belt at the pavement; Związkowa St., the ruderal square, the pavement loamy-stony; Związkowa St. at the crossing with Chodźki St., the ruderal square, the pavement sandy--loamy; **FE2759** — Bursaki district, Bursaki St., the ruderal square, the pavement sandy-loamy; Walecznych St. at the outlet of Wiejska St., the ruderal square, the pavement loamy-sandy; **FE2765** — Sławin district, The Botanical Garden UMCS, the pavement sandy-loamy; **FE2766** — Czechów district, Poligonowa St., on the verge of the coppice, the pavement sandy-loamy; Tysiąclecia Av. at the outlet of Sikorskiego St., the green belt between roads, the pavement sandy--loamy; **FE2769** — Śródmieście district, Kalinowa St., sandy slope at the St.; Śródmieście district, Walecznych St., the ground of the cemetery, the sandy square; **FE2775** — Sławin district, at Baśniowa St., the ruderal square, the loamy pavement; Śródmieście district, at the intersection of Głęboka St. with Kraśnicka Av., the green belt between roads, the pavement sandy-loamy; **FE2776** — Śródmieście district, Głęboka St. at the intersection with Kraśnicka Av., at the UMCS building, the ruderal square, the pavement sandy-loamy; **FE2779** — Śródmieście district, Tysiąclecia Av., at the Central Bus Station, the side-space of the road, the pavement sandy-loamy; **FE2783** — Konstantynów district, at Wojciechowska St., the pavement sandy-loamy; **FE2784** — Konstantynów district, at the intersection Bohaterów Monte Cassino St. and Kraśnicka Av., the side-space of the road, the sandy pavement; **FE2785** — LSM district, at Zana St., the local heap of rubble, sandy-loamy; **FE2786** — Śródmieście district, Głęboka St. at the intersection with Wileńska St., the side-space paths, the sandy pavement; **FE2787** — Śródmieście district, Akademicka St., at the building of the Department of the Biology UMCS, the low slope at the St., the sandy pavement; **FE2792** — Węglin district, at Raszyńska St., the side-space of the road, the pavement sandy-loamy; **FE2793** — Konstantynów district, at Wojciechowska St., the pavement sandy-loamy; Węglin district, at Lipniak St., the side-space of the road, the pavement loamy; **FE2796** — LSM district, Jana Sawy St., levelled ruderal square, the pavement sandy-loamy; LSM district, the brim at the intersection Zana St. and Filaretów St., the ruderal square, the pavement loamy-sandy; **FE2797** — Czuby district, Zana St. at the intersection with Nadbystrzycka St., the slope of the loess ravine, the loamy pavement; Zakole St., the heap of rubble, the pavement loamy-stony; Czuby district, at Nadbystrzycka St., the side-space of the road, the loamy pavement; Wapienna St., in the region of allotments "Bystrzyca", the ruderal square, the pavement loamy--sandy; Czuby district, Nadbystrzycka St. below outlets with Zana St., not used flower-bed, the pavement sandy-loamy; Rury district, the ground of the Sugar Factory Lublin, S. A., the branch track, the pavement sandy filled up with the broken stone; Czuby district, Sympatyczna St., the burghal lawn, the pavement loamy-sandy; **FE2798** — Czuby district, Nadbystrzycka St. at the intersection with Zachodnia St., the side-space of the road, the loamy pavement; **FE2799** — The

Central Railway Station, the edge of the railway track, the pavement sandy-loamy; **FE2842** — Rudnik, the steep slope of the embankment for railway tracks, the pavement sandy-loamy; **FE2851** — Ponikwoda district, the edge of the railway track, the pavement sandy-broken stone; **FE2861** — Zadębie district, Turystyczna St. at the intersection with Mełgiewska St., the ruderal square, the sandy pavement; Kalinowszczyzna district, Zawilcowa St., at allotments "Kalina", the slope of the loess slope, the pavement sandy-loamy; Turystyczna St., the ruderal square, the pavement loamy-sandy; **FE2862** — Turystyczna St., the ruderal square at the road, the sandy pavement; **FE2871** — Turystyczna St., the ruderal square coated with concrete slabs, the sandy pavement impure the rubble, gravel; **FE2872** — Zadębie district, at Mełgiewska St., the railway track, the slag-pavement; **FE2881** — Zadębie district, at Chemiczna St., the edge of not used railway track, the pavement sandy-loamy; **FE2883** — Majdan Tatarski district, FSC, the place between railway tracks, the pavement sandy-gravely; **FE2884** — Zadębie district, the edge of the embankment for the railway track, the pavement sandy-gravely; **FE2892** — Majdan Tatarski district, Grygowa St., ruderal square, the pavement loamy-stony; **FE3704** — Węglin district, Węglin St., drit-track, pavement sandy-loamy; Węglin district, the railway line toward Puławy, the slope of the embankment for the railway track, the pavement broken stone; Węglin district, Łomżyńska St., the ruderal square, the pavement sandy-loamy; **FE3705** — Czuby district on two distant positions: at Jana Pawła II St., the steep slope of the loess ravine, the pavement sandy-loamy; Jana Pawła II St., from the side housing estate "Górki", the base of the steep slope, the pavement sandy-loamy; **FE3706** — Housing estate "Górki", Wyżynna St., the ruderal square, the pavement sandy-loamy; **FE3707** — Piaski district, Dzierżawna St. 22, the ruderal square, the pavement loamy-stony; Wrotków district, Wrotkowska St., at the filling station, the ruderal square, the pavement sandy--loamy; **FE3708** — Wrotków district, Smoluchowskiego St., the green belt between the sidewalk, and with the road, the pavement loamy-sandy; Rury district, Przeskok St., the ruderal square, the sandy pavement; **FE3714** — Węglin district on two distant positions: Węglin St., drite-track on the loess basis, the pavement sandy-loamy; Węglin St. at the intersection with Gęsia St., drite-track the pavement sandy-loamy; **FE3718** — Wrotków district, Diamentowa St., in the region of railway tracks, the sandy pavement; **FE3719** — Wrotków district, Biernata z Lublina St., the side-space of the road, the loamy pavement; **FE3727** — Wrotków district, Nałkowskich St., the berm, the loamy pavement; **FE3728** — Wrotków district, Budowlana St. 44, the ruderal square, the pavement loamy-stony; **FE3729** — Zemborzyce district, Zamenhoffa St., the sandy side-space of the road; **FE3737** — Zemborzyce district, Żeglarska St., the fallow, the pavement sandy-loamy; **FE3755** — Zemborzyce district, the slope of the embankment for the railway track, the pavement sandy-loamy; **FE3773** — Zemborzyce district, the slope of the embankment for the railway track, the pavement sandy-loamy; **FE3802** — Felin district, on the ground of the service car, the sandy coated square with concrete slabs.

3. ***Oenothera biennis* var. *brevihypantialis*** (Fig. 4)

1 the state.: FE2797 — Czuby district, Zachodnia St. at the intersection with Nadbystrzycka St., at the Engineering College of Lublin, the lawn at the sidewalk, the pavement sandy-loamy.

4. ***Oenothera casimiri* Rostański** Antropogena (Fig. 5)

48 the state.: FE2747 — Choiny district, Beskidzka St., the berm, the pavement sandy--loamy; **FE2749** — Bursaki district, Do Dysa St., the side-space of the road, the pavement sandy-loamy; Spółdzielczości Pracy Av., at Do Dysa St., the ruderal square, the pavement sandy--loamy; **FE2754** — Sławin district, Jemiołowa St. at the intersection with Skowronkowa St., the ruderal square, the pavement sandy-loamy; **FE2756** — Czechów district, Poligonowa St., the ruderal square, the pavement sandy-loamy; **FE2758** — Bursaki district, the green belt

between the sidewalk and the road, the loamy pavement; **FE2759** — Bazylianówka district, Spółdzielczości Pracy Av. at the outlet of Związkowa St., the old orchard, the pavement sandy--loamy; Bursaki district, Bursaki St. behind the Trade Center "Olympus", the ruderal square, the pavement sandy-loamy; Spółdzielczości Pracy Av. the intersection with Magnoliowa St., the ruderal square the pavement sandy-loamy; **FE2764** — Sławin district, Warszawska Av., at The Botanical Garden UMCS, the side-space of the road, the sandy pavement; **FE2766** — Czechów district, Poligonowa St., on the verge of the coppice, the pavement sandy-loamy; **FE2774** — Zimne Doły district, Nałęczowska St., the side-space of the road, the pavement sandy-loamy; Sławin district, Cisowa St., on the ground of the Cooperative of the Crippled "Elremed", the heap of the ground and the rubble; Al. Warszawska at the intersection with Mgielna St., the side-space of the road, the sandy pavement; Łużyczan St., sandy-loamy side-space of the road; **FE2775** — Sławin district, at Baśniowa St., the local heap of rubble, the loamy pavement; Śródmieście district, at Głęboka St. at the intersection with Kraśnicka Av., the green belt between roads, the pavement loamy-sandy; **FE2787** — Śródmieście district, at Akademicka St. 19, at the building of the Department of Biology UMCS, the berm, the loamy pavement; **FE2792** — Węglin district, at Raszyńska St., the side-space of the road, the pavement sandy-loamy; **FE2793** — Węglin district, Kraśnicka Av. at the intersection with Orkana St., the side-space of the road, the pavement sandy-loamy; Kraśnicka Av., at allotments, the side-space of the road, the pavement sandy-loamy; **FE2795** — LSM district, at Zana St., the ruderal square, the pavement sandy-loamy; **FE2796** — Czuby district, Jana Sawy St., the ruderal square the pavement sandy-loamy; **FE2797** — LSM district, Nadbystrzycka St. at the outlet of Zana St., the ruderal square at the road, the pavement sandy--loamy; **FE2799** — The Central Railway Station, the trans-shipping loading platform, the edge of the railway track, the sandy pavement; **FE2861** — Kalinowszczyzna district, at Zawilcowa St., on the ground of the car parking space, the pavement sandy-gravely; **FE2862** — E part, Turystyczna St., in the region of meat-works, the ruderal square at the road, the sandy pavement; **FE2863** — Turystyczna St., the side-space of the road, the sandy pavement; **FE2871** — E part, Turystyczna St., the ruderal square coated with concrete slabs, the sandy pavement with the admixture of rubble and gravel; **FE2872** — Zadębie district, Mełgiewska St., at the glue viaduct, the edge of the railway track, sandy coated pavement with the slag; **FE2881** — Zadębie district, at Chemiczna St., not used railway tracks, the pavement sandy-loamy; the Northern Railway Station, the railway track-way, the pavement sandy-gravely; **FE2882** — Turystyczna St., in dear way region of escape with Lublin, the side-space of the road, between concrete slabs, the sandy pavement; **FE2884** — Zadębie district, at metallurgical Works "Ursus", the edge of the embankment for the railway track, the pavement sandy-gravely; **FE2891** — Majdan Tatarski district, L. Herc St., the coated square with concrete slabs, the pavement sandy-loamy; **FE3705** — Węglin district, Węglin St., drite-track on the loess basis, the pavement sandy-loamy; Czuby district, at Jana Pawła II St., the steep slope of the loess ravine, the pavement sandy-loamy; **FE3707** — Rury district, Diamentowa St., at the enclosure of LKJ, the ruderal square sandy-loamy; Uśmiechu St., the burghal lawn, the sandy pavement; **FE3708** — Wrotków district, Smoluchowskiego St., at the enclosure of "Polmos" the ruderal square, the pavement loamy-sandy; Wrotków district, Smoluchowskiego St., between plates of the sidewalk, the pavement sandy-loamy; **FE3709** — Abramowice district, Żeromskiego St., the side-space of the road, the sandy pavement; **FE3718** — Wrotków district, Diamentowa St., at the building "Herbapol", the ruderal square, the pavement sandy-loamy; **FE3719** — Wrotków district, Biernata z Lublina St., the side-space of the road, the loamy pavement; **FE3727** — Wrotków district, Nałkowskich St., the berm, the loamy pavement; **FE3802** — Felin district, on the ground of the car service, the coated square with concrete slabs, the sandy pavement; **FE3840** — Abramowice district, Abramowicka St., the ruderal square at the road, the stony pavement; **FE3850** — Abramowice district, Abramowicka St., the ruderal square, the sandy pavement filled up with stones; **FE3851** — Abramowice district, Głuska St.

at the intersection with Stojanowskiego St., the ruderal square on the loess basis, the pavement sandy-loamy.

5. ***Oenothera biennis* x *Oenothera hoelscheri*** (Fig. 6)

1 the state.: FE2767 — Sławin district, at the intersection, Sikorskiego St. and Powstańców Śląskich St., the slope at the sidewalk, the pavement sandy-loamy.

6. ***Oenothera biennis* x *Oenothera salicifolia*** (Fig. 7)

1 the state.: FE2746 — Górki Czechowskie at Poligonowa St., the ruderal square, the pavement loamy-sandy.

7. ***Oenothera biennis* x *Oenothera flemingina*** (Fig. 8)

1 the state.: FE3802 — Felin district, on the ground of the service car, the sandy coated square with concrete slabs, the pavement sandy-loamy.

8. ***Oenothera biennis* x *Oenothera royfraseri*** (Fig. 9)

2 the state.: FE2861 — Kalinowszczyzna district, Zawilcowa St., at the Refinery of Sewage, the pavement sandy-loamy; **FE2763** — Węglinek district, Wądolna St., the ruderal square, the pavement loamy-sandy.

9. ***Oenothera biennis* x *Oenothera pycnocarpa*** (Fig. 10)

1 the state.: FE2794 — Węglin district, Kraśnicka Av., the side-space of the road, the pavement sandy-loamy.

10. ***Oenothera glazoviana* Micheli in Mart.** North America species (Fig. 11)

2 the state.: FE2744 — Sławin district, Fiołkowa St., the side-space of the road, the loamy pavement; **FE2870** — Kalinowszczyzna district, Krokusowa St., the top of the degraded loess ravine, the pavement sandy-loamy.

11. ***Oenothera hoelscheri*** Renner ex Rostański Antropogena (Fig. 12)

26 the state.: FE2748 — Bursaki district, Stefczyka St., the old fallow, the loamy pavement; **FE2766** — Sławin district, Jagiellońska St., at the household garden, the pavement loamy-sandy; **FE2777** — Śródmieście district, Akademicka St., at the building of the Department of Chemistry UMCS, the loamy pavement; **FE2785** — LSM district, at Zana St., the ruderal square, the loamy pavement; **FE2787** — Śródmieście district, Akademicka St. 19, at the building of the Department of Biology UMCS, the low slope at the building, the sandy pavement; **FE2797** — Czuby district, at Nadbystrzycka St., the ruderal square, the pavement sandy-loamy; **FE2872** — Zadębie district, at Mełgiewska St., the edge of the railway track, the sandy pavement impure the slag; **FE2880** — Tatary, in the region of the railway station, the branch track, the slope of the high embankment for the railway track, the sandy pavement; **FE2881** — the Northern Railway Station, at five distant positions: the slope of the embankment for the railway track, the pavement, gravely-broken stone; the back of the embankment for the railway track, the pavement fixed with the broken stone; the place between railway tracks, the sandy pavement; the slope of the high embankment of the railway track, the pavement sandy-loamy; the place between railway tracks, the pavement sandy--loamy; Zadębie district, at Chemiczna St., not used railway track, the pavement sandy-loamy; **FE2882** — the Northern Railway Station, the slope of the high embankment of the railway track,

the sandy pavement; **FE2883** — Zadębie district, the transfer station PKP, the centre-piece, the place between railway tracks, the pavement sandy-gravely (Święs, Wrzesień 2003); **FE2891** — Majdan Tatarski district, L. Herc St., the square parking space, coated with concrete slabs, the sandy pavement; **FE3703** — Węglin district, Gęsia St., the berm on the loess basis, the sandy pavement; **FE3704** — Węglin district, at the intersection Węglin St. with Topazowa St., the ruderal square, the pavement loamy-sandy with the admixture of the rubble; **FE3705** — Czuby district, between Bursztynowa St., and with the forest "Stary Gaj", the loess slope of the ravine about the exhibition S, the pavement sandy-loamy; **FE3707** — Zemborzyce district, near the viaduct at Janowska St., the back of the embankment for the railway track, the pavement sandy-loamy; Czuby district, at two distant positions: between the bridge over Nadbystrzycka St., and with allotments "Stary Gaj", the place between railway tracks, the pavement, stony-broken stone; between Diamentowa St., and with allotments "Stary Gaj", the sandy slope of the embankment for the railway track; **FE3717** — Zemborzyce district, near the fork of railway tracks, the edge of the railway track, the pavement, gravely-broken stone; **FE3736** — Zemborzyce district, Żeglarska St. 200 m to E of Janowska St., the ram part on the side-space of the road, the loamy pavement; **FE3802** — Felin district, on the ground of the car service the square parking space coated with concrete slabs, the sandy loamy-pavement; **FE3820** — Abramowice district, Głuska St., the dry meadow, the pavement loamy-sandy.

12. ***Oenothera hoelscheri*** **Renner ex Rostański var.** ***rubrycalyx*****. Rostański** (Fig. 13)

1 the state.: FE2884 — Zadębie district, E part, the place between railway tracks, the pavement sandy-gravely.

13. ***Oenothera royfraseri*** **R. R. Gates** — North America species (Fig. 14)

4 the state.: FE2783 — Konstantynów district, W part, at Wojciechowska St., the side-space of the road, the pavement sandy-loamy; **FE2796** — LSM district, at Filaretów St., the ruderal square at St Joseph's church, the sandy pavement; **FE2880** — Tatary, toward SW of the Northern Railway Station Lublin, between railway tracks, the pavement sandy-loamy; **FE2881** — Majdan Tatarski district, the corner of Chemiczna St. and Witosa St., the littery side-space of the road, the pavement sandy-loamy.

14. ***Oenothera rubricaulis*** **Kleb.** — Europe species (Fig. 15)

77 the state.: FE2746 — Górki Czechowskie at Poligonowa St., the ruderal square, the pavement loamy-sandy; **FE2747** — Choiny district, Beskidzka St., the berm, the pavement sandy--loamy; **FE2749** — Bursaki district, at two distant positions: at Spółdzielczości Pracy Av., near Związkowa St., the side-space of the road, the pavement sandy-loamy; at Ceramiczna St., the berm, the pavement sandy-loamy; **FE2752** — Nałęczowska St., the escape-route from Lublin, the side-space of the road, the pavement sandy-loamy; **FE2754** — Sławin district, Jemiołowa St. at the intersection with Skowronkowa St., the ruderal square, the pavement sandy-loamy; **FE2758** — Bursaki district, Związkowa St., behind the shop "Stokrotka", the ruderal square, the pavement loamy-stony; Czechów district, Górska St. 5, the ruderal square, the pavement sandy-loamy; **FE2765** — Tysiąclecia Av., at the bridge on the Czechówka river, the slope of the dam, the loamy pavement; Sławin district, The Botanical Garden UMCS, arboretum, the pavement loamy-sandy; **FE2767** — Sławin district, at the intersection of Sikorskiego St. and Powstańcow Śląskich St., the slope at the sidewalk, the pavement sandy-loamy; **FE2769** — Lemszczyzna, Smorawińskiego St., at the enclosure of allotments "Lemszczyzna", the slope of the low slope, the pavement loessly-humus; Kalinowszczyzna district, at Zawilcowa St., on the ground of the car

parking space, the pavement sandy-gravely; **FE2773** — Zimne Doły district, Sobótki St., from the side of Nałęczowska St., the side-space of the road, the pavement sandy-loamy; **FE2775** — Baśniowa St., the ruderal square, the pavement loamy-sandy impure the rubble; **FE2783** — Konstantynów district, at Wojciechowska St., the pavement sandy-loamy; **FE2785** — LSM district, at Zana St., the ruderal square, the pavement sandy-loamy; **FE2787** — Śródmieście district, Akademicka St., low slope at the street, the pavement sandy-loamy; **FE2793** — Konstantynów district, at the intersection of Konstantynów district St. with Kraśnicka Av., the ruderal square, the loamy pavement; Kraśnicka Av. in the region of the outlet of Orkana St., the side-space of the road the loamy pavement; **FE2795** — LSM district, at the brim at the intersection of Zana St. with Filaretów St., the side-space of the road, the sandy pavement; **FE2796** — Czuby district, Jana Sawy St., the ruderal square, the pavement sandy-loamy; **FE2797** — LSM district, Nadbystrzycka St. at the outlet of Zana St., at the road, the pavement sandy-loamy; Rury district, Wapienna St., at allotments "Bystrzyca", the ruderal square, the pavement sandy-loamy; Czuby district, Nadbystrzycka St. at the intersection with Zachodnia St., the side-space of the road and the loamy pavement; **FE2798** — The Central Railway Station, the place between railway tracks, the pavement sandy-gravely; **FE2832** — Rudnik, about 500 from the railway station into the side of the city, the slope of the loess ravine at the railway track, the pavement sandy--loamy; **FE2861** — Turystyczna St., at two distant positions: the ruderal square, the pavement loamy-sandy; at the intersection with Mełgiewska St., the ruderal square, the sandy pavement; Kalinowszczyzna district, Zawilcowa St., at two distant positions: the slope of the loess slope, the pavement sandy-loamy; ruderal square, the sandy pavement. **FE2862** — Turystyczna St., at two distant positions: the ruderal square at the road, the sandy pavement; at the city line, the side--space of the road, between concrete slabs, the pavement sandy-gravely; Kalinowszczyzna district, the fore-edge of the river Bystrzyca heap of carbonate, the pavement loamy-stony; Zawilcowa St., at the fence, the pavement loamy-sandy; **FE2863** — Turystyczna St., the side-space of the road, the pavement sandy-loamy; **FE2871** — Turystyczna St., the side-space of the road, the pavement sandy-loamy; **FE2880** — the Northern Railway Station, the viaduct over Mełgiewska St., the place between railway tracks, the pavement sandy-gravely; **FE2881** — the Northern Railway Station, the top of the embankment for the railway track, the pavement stony-gravely; Zadębie district at Chemiczna St., not used railway tracks, the pavement sandy-loamy; **FE2883** — Zadębie district, E part, at metallurgical Works "Ursus ", the railway track, the pavement broken stone; Majdan Tatarski district, near FSC, the place between railway tracks, the pavement sandy-gravely; **FE2884** — Zadębie district, at five distant positions: the centre of the station, at the trans--shipping loading platform, the railway track, the pavement, broken stone; at Mełgiewska St., the edge of the railway track, the pavement sandy-loamy; at metallurgical Works "Ursus ", the pavement sandy-gravely, the edge of the embankment for the railway track; E part, approx. 500 m from metallurgical Works "Ursus ", the railway track, the pavement sandy-broken stone; E part, at metallurgical Works "Ursus", the place between railway tracks, the pavement sandy--gravely; **FE2890** — Kośminek, Elektryczna St., the littery, sandy ruderal square, the pavement sandy-loamy; **FE3703** — Jana Pawła II St., in the region of the bus-loop, the ruderal square, the pavement loamy-sandy, impure rubble; Węglin district, Gęsia St., at the gate of allotments "Węglin district", the side-space of field-dear way on the loess basis, the pavement sandy-loamy; Szafirowa St., the ruderal square, the pavement sandy-loamy; **FE3704** — Węglin district, at four distant positions: at the intersection of Węglin St. with Topazowa St., the ruderal square, the pavement loamy-sandy impure the rubble; Białostocka St. at the intersection with Łomżyńska St., the ruderal square, the pavement loamy-sandy impure the rubble; Gdańska St., the ruderal square, the pavement loamy-sandy, impure rubble; Węglin St., the side-space of the field-dear way, the pavement sandy-loamy; **FE3705** — Czuby district, at Jana Pawła II St., the base, the steep slope of the loess ravine, the pavement sandy-loamy; Węglin St., the beginning of buildings,

the side-space of field-dear way on the loess basis, the loamy pavement; Szafirowa St., the top of the loess ravine; **FE3707** — Śródmieście district, Nadbystrzycka St. at the intersection with Janowska St., the embankment for the railway track, the pavement sandy-loamy; **FE3708** — Wrotków district, Smoluchowskiego St., the green belt between the sidewalk, and the road, the pavement loamy-sandy; **FE3709** — Abramowice district, Żeromskiego St., the side-space of the road, the sandy pavement; **FE3714** — Węglin St., next door to of buildings, the side-space of field-dear way on the loess basis, the pavement sandy-loamy; at the intersection of Węglin St. with Gęsia St., the side-space of field-dear way on the loess basis of the loamy pavement; **FE3716** — the Forest "Stary Gaj", humus pavement; **FE3717** — Wrotków district, Przy Bocznicy St., the edge of the railway track, the pavement sandy-broken stone; **FE3718** — Wrotków district, at four distant positions: Diamentowa St., in the region of railway tracks, at the road, the sandy pavement; Diamentowa St. at the building of "Herbapol", the ruderal square, the pavement sandy-loamy; Inżynierska St., near railway tracks at the heat and power generating plant, on the side-space of dear way the gravel surface; Janowska St., the high slope of the embankment for the railway track, the pavement sandy-loamy; **FE3729** — Zemborzyce district, Zamenhoffa St., the side--space of the road, the pavement sandy-loamy; **FE3736** — Zemborzyce district, Żeglarska St. 200 to E of Janowska St., the loamy ram part on the side-space of the road; **FE3764** — Zemborzyce district, the railway track, the pavement sandy-gravely; **FE3773** — Zemborzyce district, the gentle slope of the embankment for the railway track, the sandy pavement fixed with the broken stone; **FE3774** — Zemborzyce district, the square at railway tracks, the pavement sandy-gravely; **FE3802** — Felin district, on the ground of the service car, the sandy coated square with concrete slabs; **FE3810** — Kośminek, at Wilcza St. at the intersection with Robotnicza St., the ruderal square, the loamy pavement; **FE3840** — Abramowice district, Abramowicka St., the ruderal square at the road, the stony pavement; **FE3851** — Abramowice district, Głuska St. at the intersection with Stojanowskiego St., the ruderal square on the loess basis, the pavement sandy-loamy.

15. ***Oenothera flaemingina*** **Hudziok** — Antropogena (Fig. 16)

2 the state.: FE2891 — Majdan Tatarski district, L. Herc St., the coated square with concrete slabs, the sandy pavement; **FE3802** — Felin district, on the ground of the car service, the coated square with concrete slabs, the sandy pavement.

16. ***Oenothera paradoxa*** **Hudziok** — Antropogena (Fig. 17)

4 the state.: FE2754 — Sławin district, Zbożowa St., the ruderal square, the pavement sandy--loamy; **FE2773** — Zimne Doły district, Sobótki St. from the side of Nałęczowska St., the side--space of the road, the pavement sandy-loamy; **FE2788** — Śródmieście district, Graniczna St. at the intersection with Narutowicza St., between sidewalk plates, the pavement loamy-sandy; **FE2797** — Rury district, Wapienna St., the ruderal square, the pavement loamy-sandy.

17. ***Oenothera pycnocarpa*** **Atk. & Bartl.** — North America species (Fig. 18)

2 the state.: FE2880 — Tatary, Bystrzyca river valley, at allotments "Robotnik" on bay terrace, 10 m from the flood plain, the loamy pavement; **FE3704** — Poręba, Gęsia St., the side-space of field-dear way on the loess basis, the pavement sandy-loamy.

18. ***Oenothera victorini*** **R. R. Gates & Catches** — North America species (Fig. 19)

1 the state.: FE2882 — the Lublin Northern Railway Station, at The Car Factory, the slope of the high embankment of the railway track, the pavement sandy-loamy.

19. ***Oenothera salicifolia*** **Desf. ex. G. Don.** — North America species (Fig. 20)

16 the state.: FE2759 — Spółdzielczości Pracy Av. at the intersection with Magnoliowa St., the ruderal square, the pavement sandy-loamy; **FE2766** — Śródmieście district, Sikorskiego St., the high slope at the sidewalk, the pavement loamy-sandy; **FE2776** — Śródmieście district, Sikorskiego St., at the intersection with Kraśnicka Av., the side-space of the road, the pavement loamy-sandy; **FE2861** — Turystyczna St., the side-space of the road, the pavement sandy-loamy; **FE2880** — Tatary, at three distant positions: in the region of the Railway Station, the base of the high embankment for the glue track, the sandy pavement; SW the edge of the Railway Station, the heap between railway tracks, the sandy pavement; 250 toward SW from the Railway Station, the place between railway tracks, the sandy pavement; **FE2881** — the Northern Railway Station, at two distant positions: the slope of the embankment for the railway track, the pavement stonely--gravely; the place between railway tracks, the sandy pavement impure gravel and the broken stone; **FE2883** — Majdan Tatarski district, ahigh FSC, the place between railway tracks, the pavement sandy-gravely; Zadębie district, at metallurgical Works "Ursus ", the railway track, the pavement, broken stone; **FE2884** — Zadębie district, at metallurgical Works "Ursus ", the edge of the embankment for the railway track the pavement sandy-gravely; **FE2891** — Majdan Tatarski district, Witos Av. in the region of Wylotowa St., the slope at the St., the pavement sandy-loamy; **FE3707** — Wrotków district, at Krochmalna St., the edge of the road, the pavement sandy-loamy; **FE3709** — Abramowice district, Żeromskiego St., the edge of the road, the pavement sandy-loamy; **FE3736** — Zemborzyce district, Bryńskiego St., at the nautical harbour, the ruderal square, the sandy pavement.

20. ***Oenothera salicifolia*** **Desf. ex. G. Don.** form. ***angustifolia*** (Fig. 21)

1 the state.: FE2881 — 250 m toward SW from the Northern Railway Station, the place between railway tracks, the pavement sandy-gravely.

21. ***Oenothera wienii*** **Renner ex Rostański** — Antropogena (Fig. 22)

9 the state.: FE2746 — Górki Czechowskie, Poligonowa St., the ruderal square the pavement sandy-loamy; **FE2785** — LSM district, at Zana St., the ruderal square, the pavement sandy-loamy; **FE2861** — Kalinowszczyzna district, Zawilcowa St., the pavement loamy-sandy; **FE2880** — Tatary, toward SW from the Northern Railway Station heap of clay and the rubble between railway tracks; Tatary, Bystrzyca river valley, at allotments. "Robotnik", bay terrace of the river, the loamy pavement; **FE2881** — the Northern Railway Station, on two distant positions: the slope of the embankment for the railway track, the pavement stonely-gravely; at the heat and power generating plant, the top of the slope of the embankment for the railway track, the pavement stonely-gravely; **FE2883** — Majdan Tatarski district, the transfer station PKP, the centre-piece, the edge of the railway track, the pavement sandy-gravely (Święs, Wrzesień 2003). **FE3737** — Zemborzyce district, Żeglarska St., at allotments, the ruderal square, the pavement sandy--loamy.

22. ***Oenothera issleri*** **Renner ex Rostański** — Antropogena (Fig. 23)

3 the state.: FE2795 — LSM district, at Zana St., the ruderal square, the pavement sandy--loamy; **FE2796** — LSM district, at Emancypantek St., the bottom of the loess ravine, the pavement sandy-loamy; **FE2797** — LSM district, at Nadbystrzycka St., next door to Zana St., the ruderal square on the loess basis, the pavement loamy-gravely.

23. ***Oenothera subterminalis* R. R. Gates.** North America species (Fig. 24)

2 the state.: FE2862 — Hajdów district, Bystrzyca river valley, Łagiewnicka St., bay terrace of the river, the loamy pavement; **FE2872** — Zadębie district, Mełgiewska St., the side-space of the road next door to of railway tracks, the pavement loamy-gravely.

DISCUSSION

The presence of 23 taxa of genus *Oenothera* L. was reported on the territory of Lublin. They occur within single ATPOL grid squares of 1 km×1 km, most often in 1–3 stations, less frequently in 4–7 stations, sporadically in 8 or more stations (Fig. 26).

In the *Oenothera* flora of Lublin three species of European origin and seven species of American origin were reported (8, 19). The European species are represented by: *Oe. rubricaulis, Oe. biennis, Oenothera issleri.* The American species comprise: *Oe. salicifolia, Oe. subterminalis, Oe. parviflora, Oe. pycnocarpa, Oe. victorini, Oe. glazoviana,* and *Oe. royfraserii.* Six taxa have the character of established hybrids anthropogenically formed: *Oe. acutifolia, Oe. casimiri, Oe. flaemingina, Oe. hoelscheri, Oe. paradoxa,* and *Oe. wienii,* while five others are spontaneous interspecific hybrids with intermediate features: *Oe. biennis* x *Oe. salicifolia, Oe. biennis* x *Oe. flaemingina, Oe. biennis* x *Oe. hoelscheri, Oe. biennis* x *Oe. pycnocarpa, Oe. biennis* x *Oe. royfraserii.* Two taxa: *Oe. hoelscheri* var. *rubrycalyx* and *Oe. biennis* var. *brevihypantialis* are classified as varieties. However, *Oe. salicifolia for. angustifolia* was distinguished as a form.

The analysis of membership of life-forms permits to classify all genus *Oenothera* L. taxa found in the territory of Lublin as hemicryptophytes (33).

The spatial distribution of evening primroses (*Oenothera* L.) in the area of Lublin is determined first of all by habitat conditions. *Oenothera* species grow most often on a dry, highly sun-heated, permeable substratum of a gravel--sandy, sandy-dusty or sandy character. This taxon most often grows scattered, in clusters of several or over a dozen specimens. Sporadically it forms larger, dense concentrations. It grows as a rule in a less dense plant cover of the grass or herbaceous type.

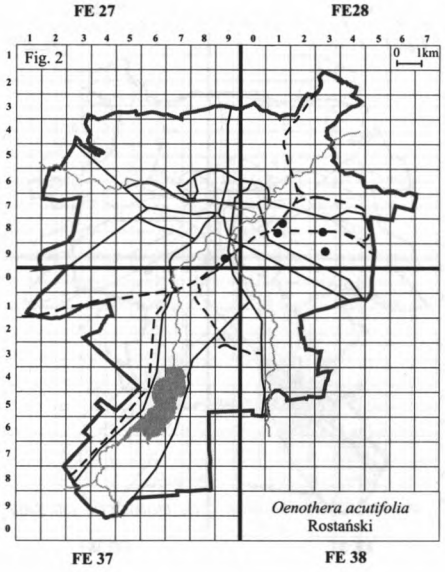
The analysis of distribution of the genus *Oenothera* L. stations in the territory of Lublin indicates the connection of this taxon with railway line areas. *Oe. victorini* was reported to occur exclusively in railway line habitats. More often in the railway areas than outside them there occur *Oe. acutifolia, Oe. salicifolia,* and *Oe. wienii. Oe. casimiri* is reported less frequently in railway track habitats than outside them. Exclusively outside the railway grounds there occur: *Oe. flaemingina, Oe. glazoviana, Oe. paradoxa, Oe. pycnocarpa, Oe. subterminalis,*

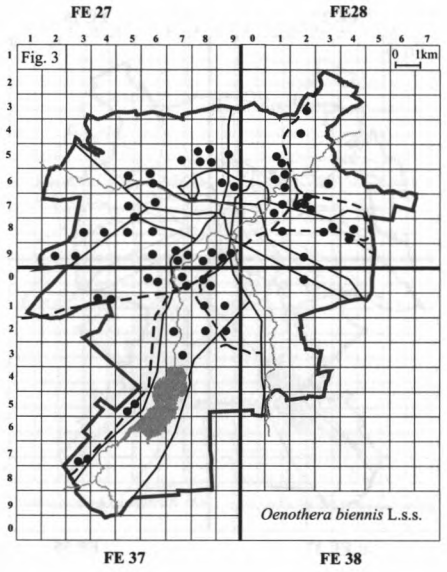
Oe. biennis x *Oe. salicifolia, Oe. biennis* x *Oe. flaemingina, Oe. biennis* x *Oe. royfraseri, Oe. biennis* x *Oe. paradoxa,* and *Oe. biennis* x *Oe. hoelscheri. Oe biennis, Oe. hoelscheri, Oe. royfraseri,* and *Oe. rubricaulis* were reported almost equally frequently in the railway areas and outside them.

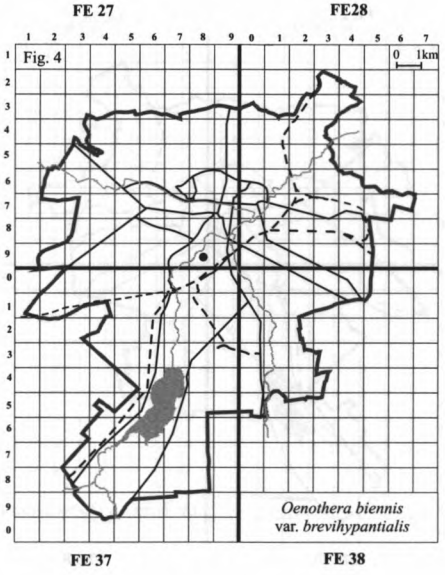
Stations of *Oenothera* taxa are concentrated in specific parts of Lublin — the majority being in the central and northern part and in the south-western and south-eastern parts. Especially interesting is the distribution of spontaneous hybrids between taxa. They appear in the areas of occurrence of typical species or in their close vicinity (Fig. 27). This constitutes evidence of gene exchange and spontaneous formation of hybrids with intermediate features. This phenomenon should certainly be observed in time.

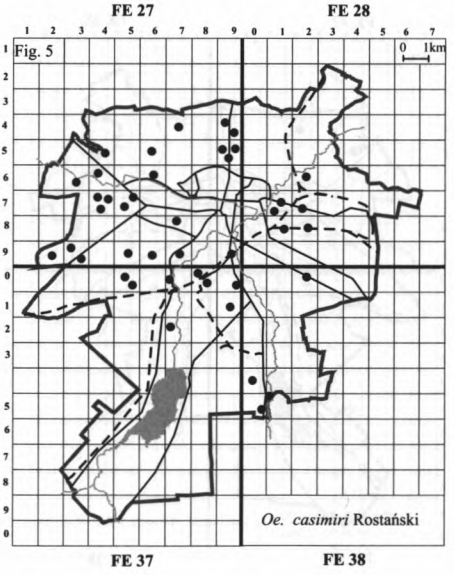
In respect of frequency of *Oenothera* occurrence in the area investigated, three groups can be distinguished. The most common *Oenothera* include: *Oe. rubricaulis* (77 stations), *Oe. biennis* (68 stations), *Oe. casimiri* (48 stations), *Oe. hoelscheri* (26 stations). Far less frequent are *Oe. salicifolia* (16 stations), *Oe. wienii* (9 stations), *Oe. acutifolia* (5 stations), *Oe. royfraseri, Oe. paradoxa* (4 stations each), and *Oe. issleri* (3 stations). Only one or two stations were reported for *Oe. flaemingina, Oe. subterminalis, Oe. pycnocarpa, Oe. glazoviana, Oe. victorini, Oe. biennis* x *Oe. salicifolia, Oe. biennis* x *Oe. flaemingina, Oe. biennis* x *Oe. hoelscheri, Oe. biennis* x *Oe. paradoxa,* and *Oe. biennis* x *Oe. royfraserii.*

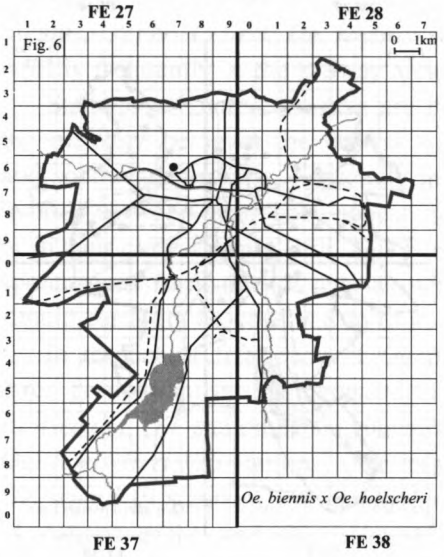
The observed stations of *Oe. glazoviana, Oe. paradoxa,* and *Oe. victorini* have not been reported previously in the territory of the Lublin macroregion. They also belong to rare species in the scale of Poland (3, 17, 32). When describing the *Oenothera* flora in Lublin, *Oe. parviflora* was not taken into consideration. According to Fijałkowski's report (17) and observations by Święs several specimens of *Oe. parviflora* grew in the central part of Lublin in 1980–1988. This occurred on a loess scarp near the UMCS Faculty of Biology and Earth Sciences building. The station was located in the ATPOL grid square FE 2787. This species may have probably been brought in accidentally with a large concrete block transported from Katowice for the extension of the particular University building. This *Oenothera* station that lasted several years was probably mechanically destroyed. It should be emphasized that the identified flora of evening primroses (*Oenothera*) in the territory of Lublin does not show too great similarity with regard to the taxa number and their stations to the *Oenothera* flora published from other towns in Poland. For example, in Warsaw and Poznań the occurrence of five and four taxa, respectively, of these plants was reported, only at very few stations (5, 22).

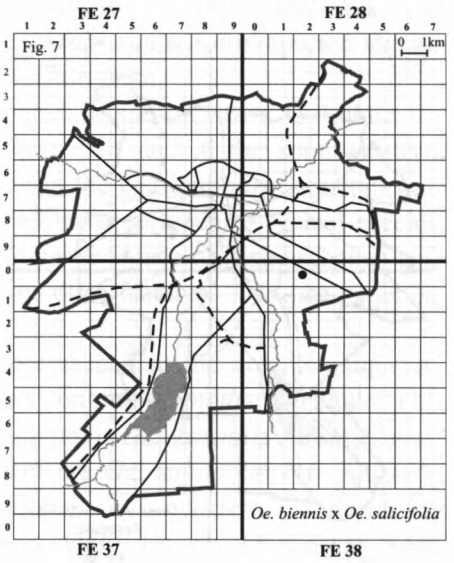

FE 27
FE28
Fig. 2
0 1km
Oenothera acutifolia
Rostański
FE 37
FE 38

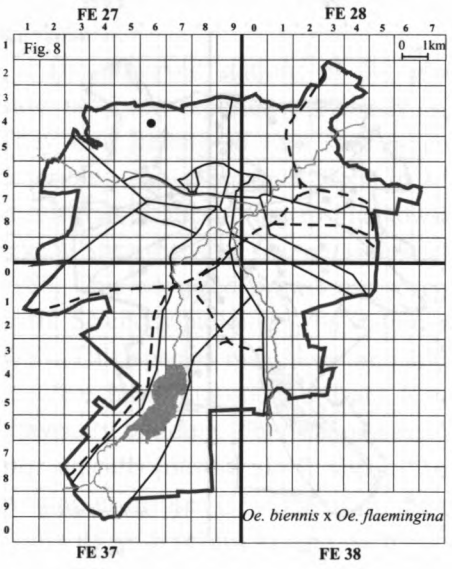

FE 27
FE28
Fig. 3
0 1km
Oenothera biennis L.s.s.
FE 37
FE 38

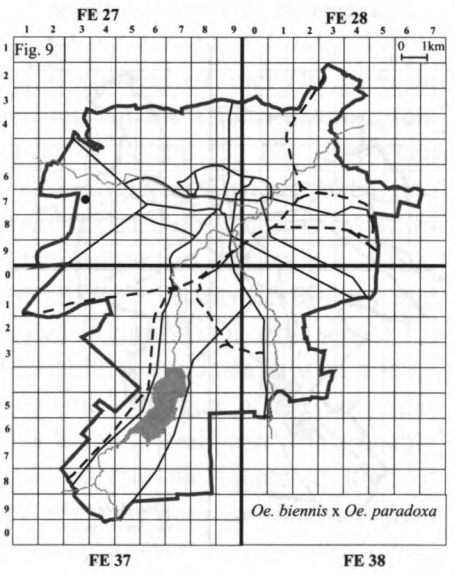

FE 27
FE28
Fig. 4
0 1km
Oenothera biennis
var. brevihypantialis
FE 37
FE 38

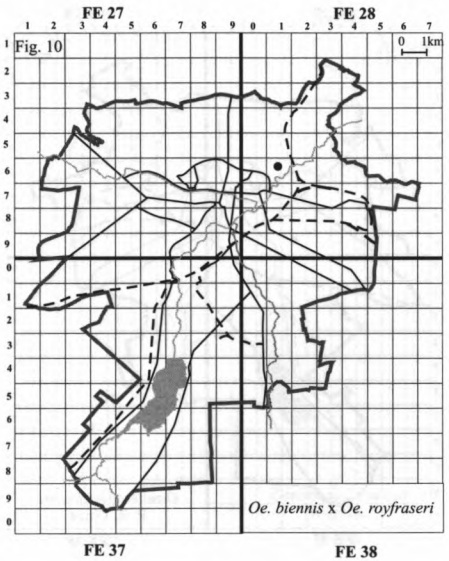

FE 27
FE 28
Fig. 5
0 1km
Oe. casimiri Rostański
FE 37
FE 38

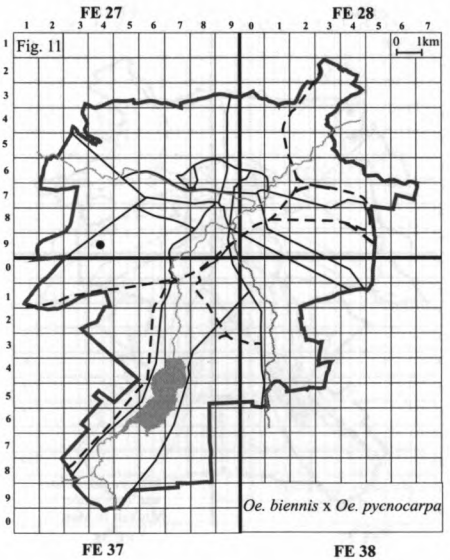

FE 27
FE 28
Fig. 6
0 1km
Oe. biennis x Oe. hoelscheri
FE 37
FE 38

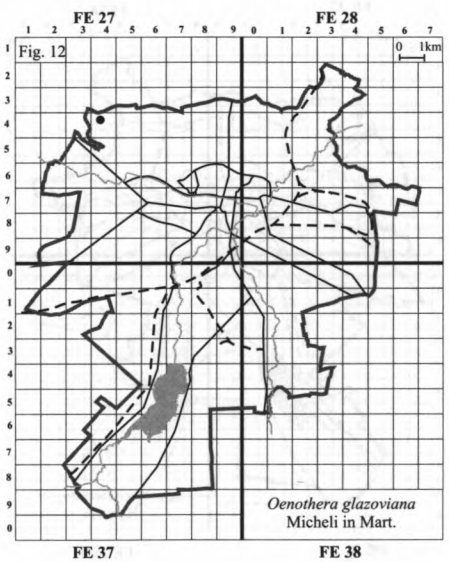

FE 27
FE 28
Fig. 7
0 1km
Oe. biennis x Oe. salicifolia
FE 37
FE 38

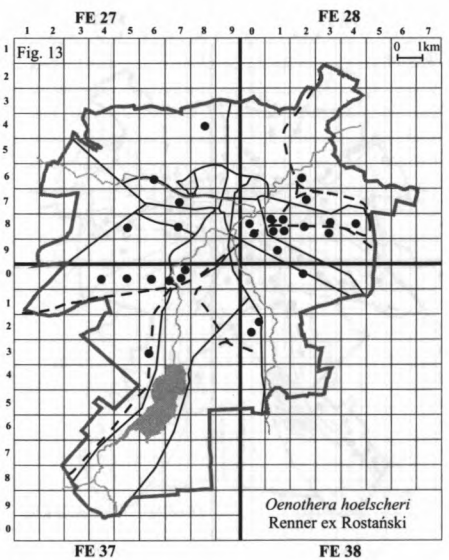

FE 27
FE 28
Fig. 8
0 1km
Oe. biennis x Oe. flaemingina
FE 37
FE 38

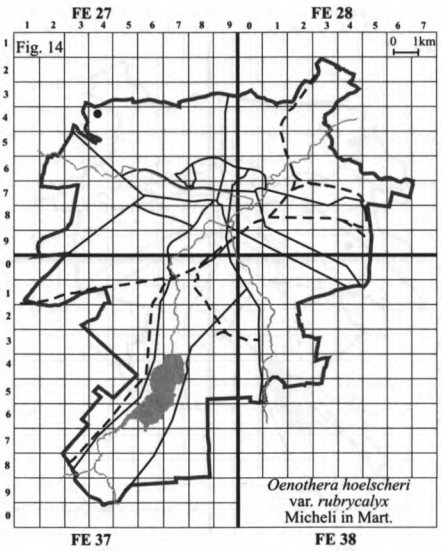

FE 27
FE 28
Fig. 9
0 1km
Oe. biennis x Oe. paradoxa
FE 37
FE 38

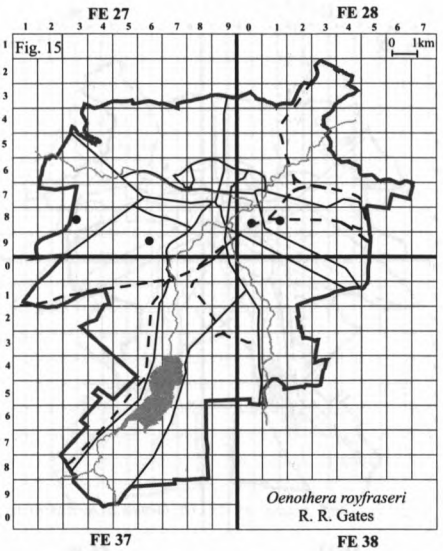

FE 27
FE 28
Fig. 10
0 1km
Oe. biennis x Oe. royfraseri
FE 37
FE 38

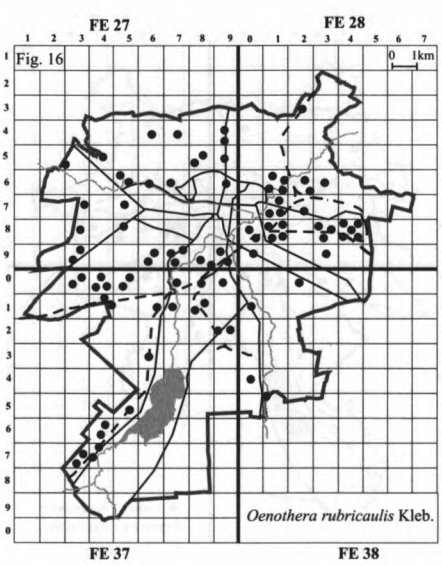

FE 27
FE 28
Fig. 11
0 1km
Oe. biennis x Oe. pycnocarpa
FE 37
FE 38

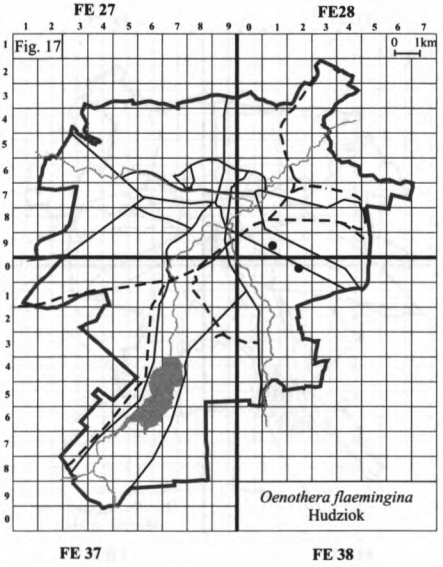

FE 27
FE 28
Fig. 12
0 1km
Oenothera glazoviana
Micheli in Mart.
FE 37
FE 38

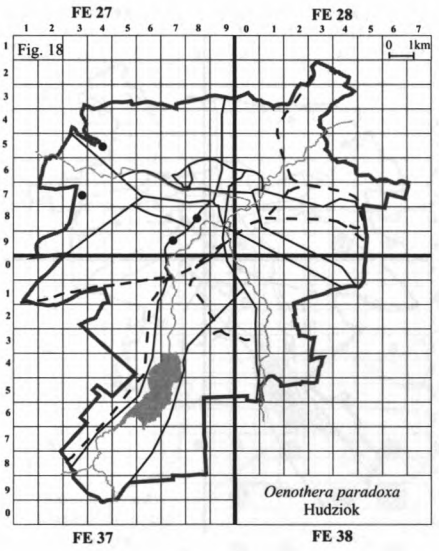

FE 27
FE 28
Fig. 13
0 1km
Oenothera hoelscheri
Renner ex Rostański
FE 37
FE 38


FE 27
FE 28
Fig. 14
0 1km
Oenothera hoelscheri
var. rubrycalyx
Micheli in Mart.
FE 37
FE 38

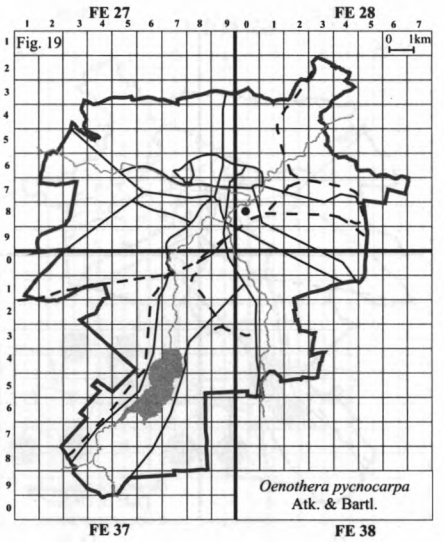

FE 27
FE 28
Fig. 15
0 1km
Oenothera royfraseri
R. R. Gates
FE 37
FE 38

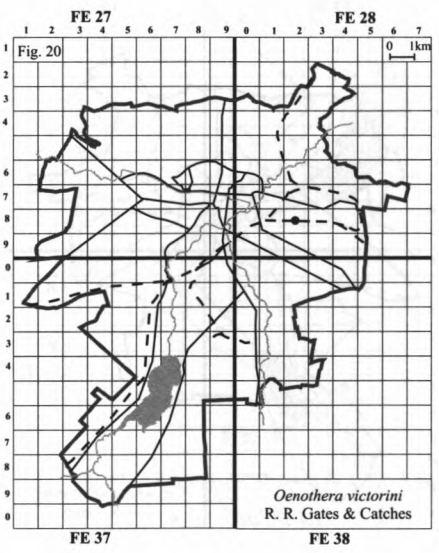

FE 27
FE 28
Fig. 16
0 1km
Oenothera rubricaulis Kleb.
FE 37
FE 38

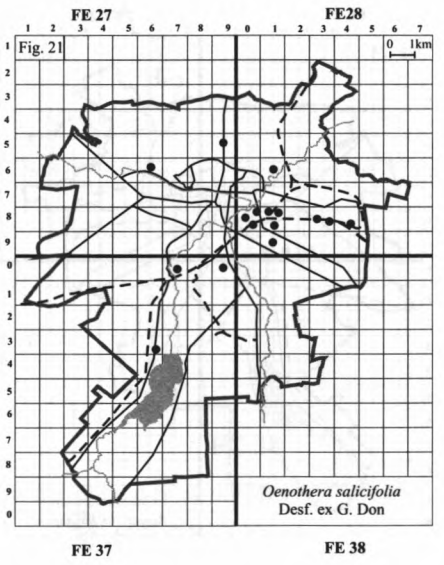

FE 27
FE28
Fig. 17
0 1km
Oenothera flaemingina
Hudziok
FE 37
FE 38

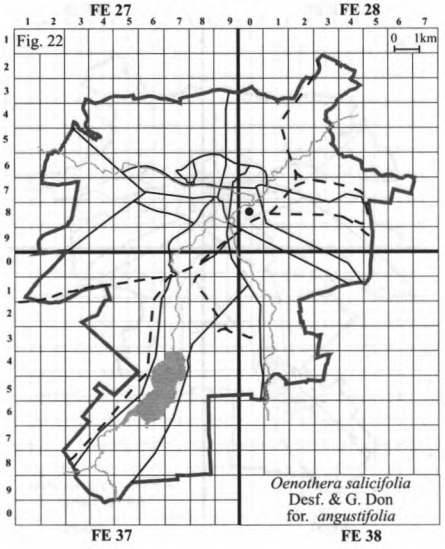

FE 27
FE 28
Fig. 18
0 1km
Oenothera paradoxa
Hudziok
FE 37
FE 38

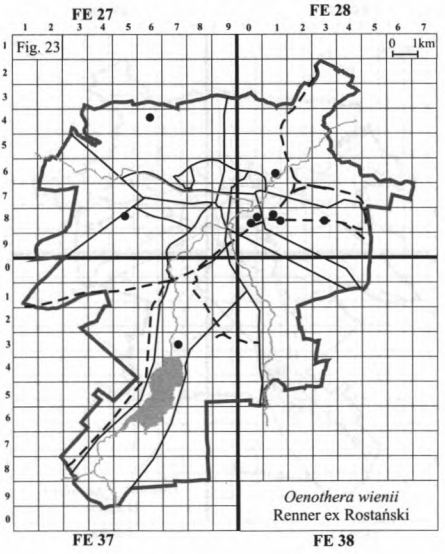
0 1km

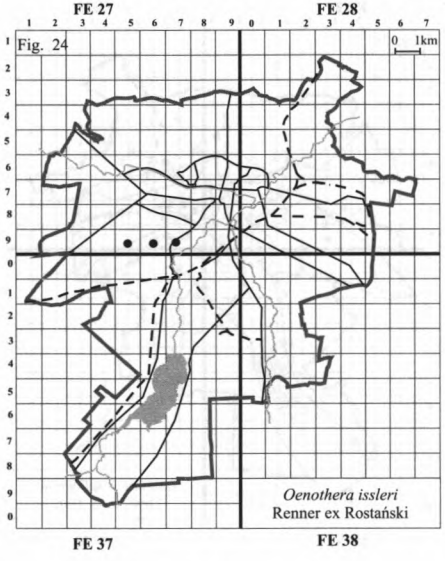

FE 27
FE 28
Fig. 19
0 1km
Oenothera pycnocarpa
Atk. & Bartl.
FE 37
FE 38

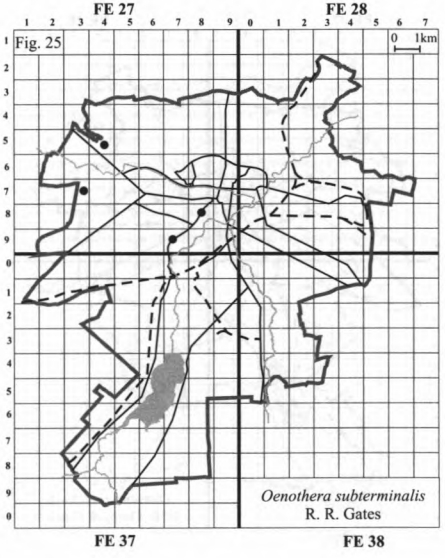

FE 27
FE 28
Fig. 20
0 1km
Oenothera victorini
R. R. Gates & Catches
FE 37
FE 38


FE 27
FE28
Fig. 21
0 1km
Oenothera salicifolia
Desf. ex G. Don
FE 37
FE 38


FE 27
FE 28
Fig. 22
0 1km
Oenothera salicifolia
Desf. & G. Don
for. angustifolia
FE 37
FE 38


FE 27
FE 28
Fig. 23
0 1km
Oenothera wienii
Renner ex Rostański
FE 37
FE 38


FE 27
FE 28
Fig. 24
0 1km
Oenothera issleri
Renner ex Rostański
FE 37
FE 38


FE 27
FE 28
Fig. 25
0 1km
Oenothera subterminalis
R. R. Gates
FE 37
FE 38

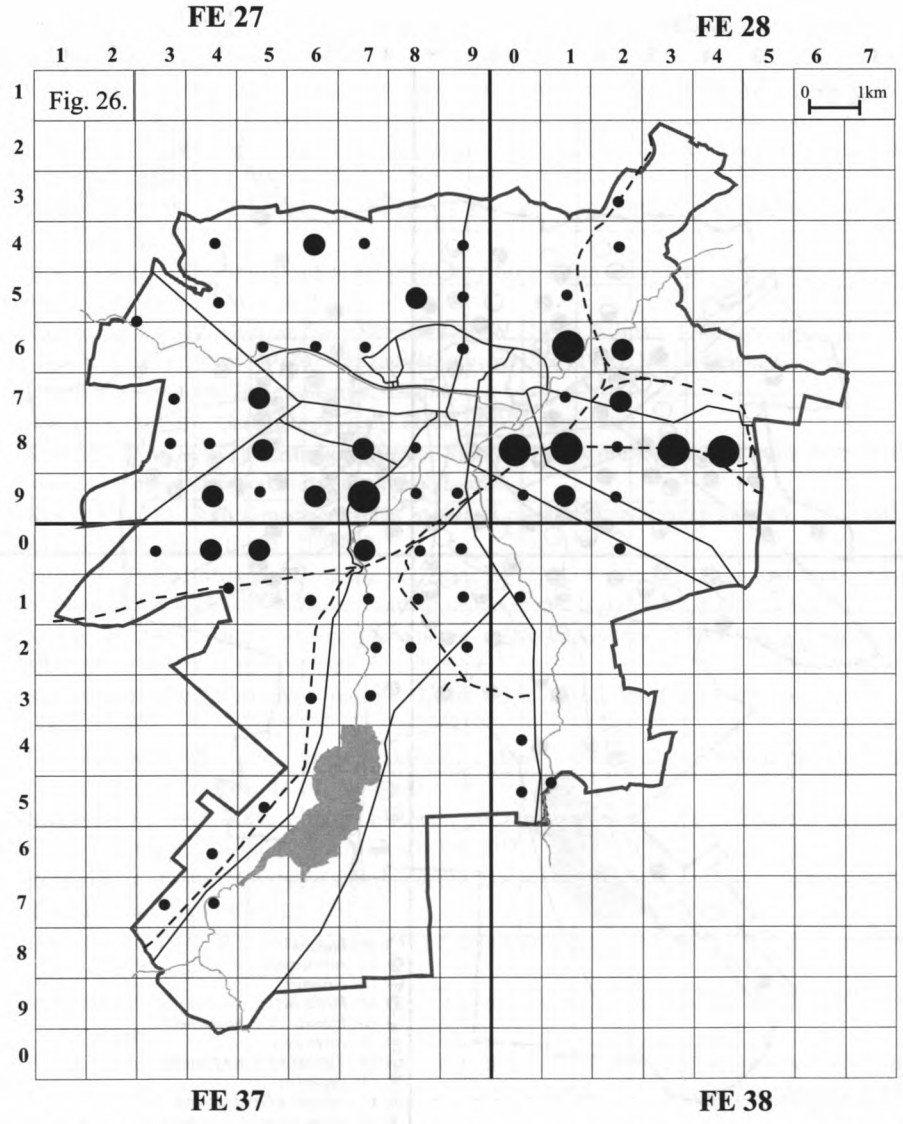


Fig. 26. Condensation map of *Oenothera* L. genus in Lublin city against the ATPOL grid.
• 1–3 stations, ● 4–7 stations, ● over 8 stations

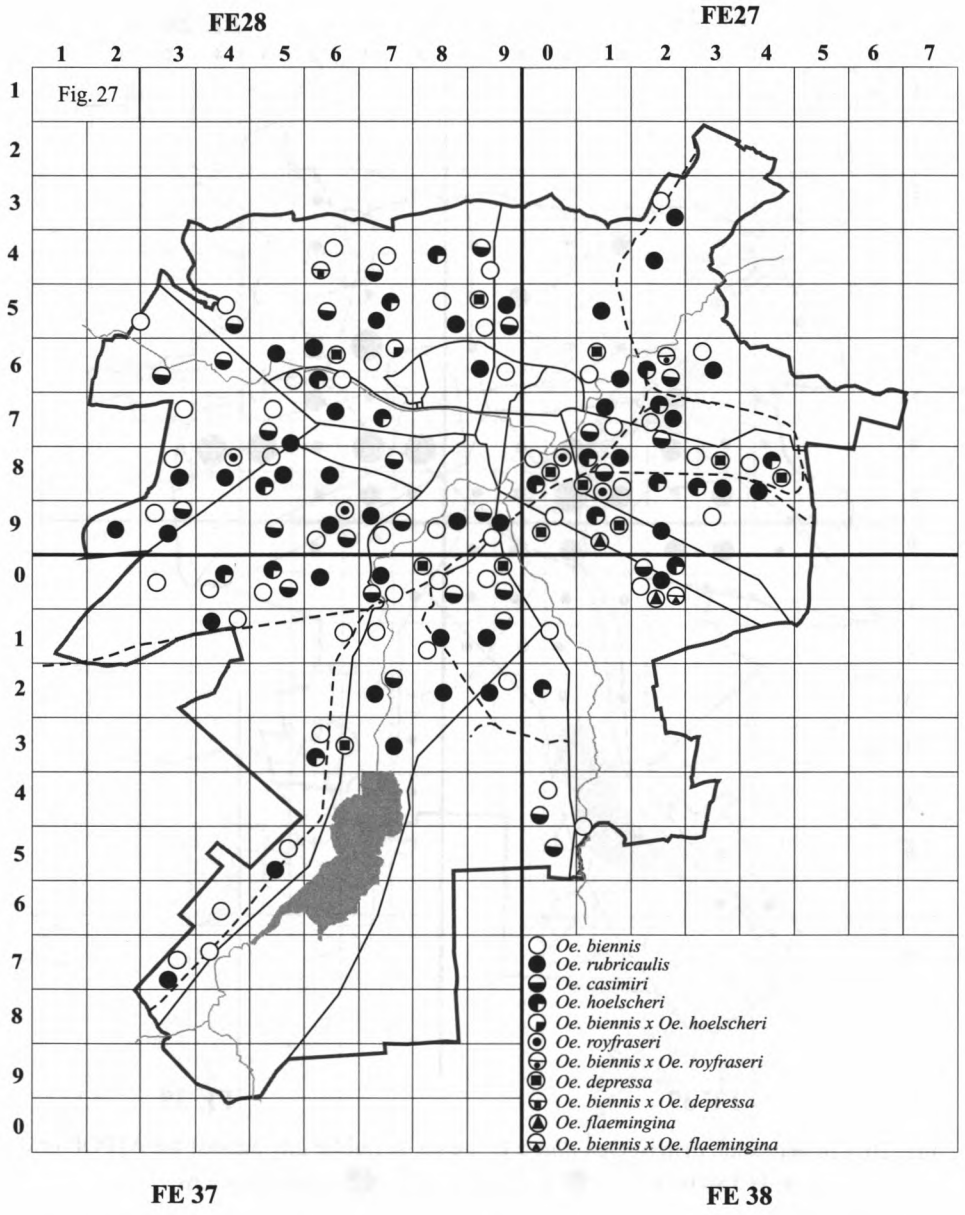


Fig. 27. Distribution of typical and spontaneous formation of hybrids *Oenothera* in Lublin city against the ATPOL grid

REFERENCES

1. Chałubińska A., Wilgat T. 1954. Podział fizjograficzny województwa lubelskiego. Przewodnik V Zjazdu PTG, Lublin.
2. Fijałkowski D. 1967. Zbiorowiska roślin synantropijnych miasta Lublina. Ann. UMCS, sectio C, 22: 195–233.
3. Fijałkowski D. 1994. Flora roślin naczyniowych Lubelszczyzny T. 1, 2. Lubelskie Towarzystwo Naukowe, Lublin.
4. Haeupler H., Muer Th. 2000. Bildatlas des Farnund Blütenpflazen Deutschland. Verlag E, Ulmer Stuttgart.
5. Jackowiak B. 1990. Antropogeniczne przemiany flory roślin naczyniowych Poznania. Wydawnictwo Naukowe UAM, Poznań.
6. Kaszewski B. M., Mrugała Sz., Warakomski W. 1995. Klimat. 1. Temperatura powietrza i opady atmosferyczne na obszarze Lubelszczyzny 1951–1990, [in:] Środowisko przyrodnicze Lubelszczyzny. Lub. Tow. Naukowe, Lublin.
7. Kondracki J. 1998. Geografia fizyczna Polski. PWN, Warszawa.
8. Kucharczyk M. 2001. Distribution Atlas of Vascular Plants in the Middle Vistula River Valley. Maria Curie-Skłodowska University Press, Lublin.
9. Kukier U. 1985. Stan zanieczyszczenia metalami ciężkimi wierzchniej warstwy gleb Lublina. Ann. UMCS, sectio B, 40: 219–228.
10. Mirek Z., Piękoś-Mirkowa H., Zając A., Zając M. 2002. Flowering Plants and Pteridophytes of Poland. A Checklist. W. Szafer Institute of Botany, Polish Academy of Sciences.
11. Renner O. 1938. Alte und neue Oenotheren in Norddeuchland. Feddes Repertorium, 100: 94–105.
12. Rostański K. 1965. Gatunki z rodzaju *Oenothera* L. na Śląsku. Fragm. Flor. et Geobot., 11 (4): 491–497.
13. Rostański K. 1965a. Kilka nowych taksonów rodzaju *Oenothera* L. z podrodzaju *Oenothera*. Fragm. Flor. et Geobot., 11 (4): 499–523.
14. Rostański K. 1968. Kilka nowych taksonów rodzaju *Oenothera* L. z podrodzaju *Oenothera*. Część II. Fragm. Flor. et Geobot., 14 (2): 189–195.
15. Rostański K. 1968a. Neofityzm występujących w Europie gatunków rodzaju *Oenothera* L. Mat. Zakł. Fitosoc. Stos., UW 25: 67–79.
16. Rostański K. 1991. Wiesiołek i jego zróżnicowanie gatunkowe w Polsce. Cz. I–II. Wiadomości Zielarskie, 2: 8–9; 4: 20–21.
17. Rostański K., Fijałkowski D. 1991. Rodzaj *Oenothera* L. na Lubelszczyźnie. Ann. UMCS sectio C, 46: 45–60.
18. Rostański K., Tokarska. Guzik B. 1998. Distribution of the American epecophytes of *Oenothera* L. in Poland. Phytocenosis, vol. 10 (N. S.). Supplementum Cartographiae Geobotanicae 9, Warszawa–Białowieża.
19. Rostański K., Witosławski P. 2003. *Oenothera flemingina* Hudziok — rzadki gatunek flory Polski. Acta. Biol. Siles. 37 (54): 9–15.
20. Rysiak A. 2004. Flora roślin naczyniowych miasta Lublina. Zakład Geobotaniki, Instytut Biologii UMCS. Mscr.
21. Stochlak J. (Red.). 1995. Raport o stanie środowiska miasta Lublina. Miejski Inspektorat Ochrony Środowiska Urzędu Miejskiego w Lublinie.
22. Sudnik-Wójcikowska B. 1987. Flora miasta Warszawy i jej przemiany w ciągu XIX i XX wieku. Wyd. UW, Warszawa.

23. Święs F., Wrzesień M. 2002. Rare vascular plants in the railway areas in Central-Eastern Poland I. The Lublin Upland, eastern part, Roztocze, Volhynia Upland. Ann. UMCS, sectio C. 57: 95–117.
24. Święs F., Wrzesień M. 2003. Rare vascular plants in the railway areas in Central-Eastern Poland II. The Lublin Upland, W Part. Ann. UMCS, sectio C, 58: 66–85.
25. Święs F., Wrzesień M. 2003. Rare vascular plants in the railway areas in Central-Eastern Poland III. Supplement Lublin–Lviv Upland, Volhynia Upland, in press.
26. Tacik T. 1959. *Oenotheraceae*, Wiesiołkowate. [in:] Flora Polska V. Rośliny naczyniowe Polski i ziem ościennych, pod red. W. Szafera i D. Pawłowskiego, 67–79. PWN, Warszawa, 209–219.
27. Takhtajan A. 1959. Die Evolution der Angiospermen Veb Gustav Fischer Verlag, Jena, 224–228
28. Takhtajan A. 1973. Evolution und Ausbreitung der Bl(tenpflanzen. Veb Gustav Fischer Verlag, Jena, 134–136.
29. Turski R., Wójcikowska-Kapusta A. 1980/1981. Ocena zanieczyszczenia środowiska w Lublinie na przykładzie zawartości Pb, Cu, Zn, B, Ni, Cr i V w glebach i roślinach. Ann. UMCS, sectio E, 35/36: 261–268.
30. Turski R., Uziak S., Zawadzki S. 1993. Gleby. Środowisko przyrodnicze Lubelszczyzny. Lub. Tow. Naukowe, Lublin.
31. Zając A. 1978. Założenia metodyczne „Atlasu rozmieszczenia roślin naczyniowych w Polsce". Wiad. Bot. 22 (3): 145–155.
32. Zając A., Zając M. (Eds.). 2001. Distribution Atlas of Vascular Plants in Poland. Laboratory of Computer Chorology, Institute of Botany, Jagiellonian University, Kraków.
33. Zarzycki K., Trzcińska-Tacik H., Różański W., Szeląg Z., Wołek J., Korzeniak U. 2002. Ecological indicator values of vascular plants of Poland. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków.