

NEW RECORDS OF SOME ALIEN PLANTS IN THE KYIV URBAN AREA

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Resently, the new adventive plants have reached Ukraine. Some of them are already naturalized in most parts of Europe. New localities of alien plant species of genera *Galinsoga* Ruiz & Pav., *Robinia* L., *Heracleum* L., *Phytolacca* L., *Ailanthus* Desf., *Nycandra* Adans. and *Parthenocissus* Planch. are reported in the Kyiv Urban Area (KUA). The group of escaped plants at present is gaining importance in the process of "enrichment" of the alien fraction of KUA.

Key words: adventive plants, *Galinsoga urticifolia* (Kunth) Benth., *Robinia viscosa* Vent., *Heracleum mantegazzianum* Sommier & Levier, *Parthenocissus* Planch. sp., *Phytolacca americana* L., *Quercus* L. and *Ailanthus altissima* (Mill.) Swingle, Kyiv Urban Area.

The Kiev City Agglomeration (Kiev Urban Area, KUA) is situated in the central part of the eastern European plains, at the border of the forest and forest-steppe zones. Ukraine's capital, the city of Kiev (Kyiv in the Ukrainian-based transliteration), is the natural center of this urbanized area. It is surrounded by several satellite towns and smaller settlements, including Irpin, Brovary, Boryspil, Vyshgorod, and Boyarka. Kiev and its satellites are located on both banks of the Dnipro (Dnieper) River. SeminatURAL and man-made habitats are well represented in KUA, and the region's altered or disturbed plant communities are formed mostly by synanthropic plant species. During their long history in central Ukraine, and the Kiev area in particular, humans have greatly promoted the immigration of nonnative plants through migration, war, trade, agriculture, urbanization, and other activities. In the 18th century, Kiev began to develop as an industrial city. Continued development resulted in the formation of a large urbanized area with a dramatically transformed flora and vegetation.

Local and regional processes of naturalization of alien plants were studied in Kyiv in the framework of the Cand. Sci. project "The alien fraction of the synanthropic flora of the Kyiv Urban Area (KUA)" [6]. The main goal of the study was to record, characterize, and document alien species within the territory of KUA. It is also important to monitor the processes of the "retreat" of the native flora and gradual replacement of native species by alien ones in various altered habitats. Thus, dynamic changes in the flora of a large city comprise several equally important processes, among which one of the most important is naturalization of alien plants with various immigration histories (e.g. ergasiophytes – plants that were intentionally introduced and cultivated by man, and then spread from places of their cultivation) [9, 11].

The establishment of invasive exotic plant species into a natural habitat usually reduces the level of biodiversity at the site. Such processes are actively developed in urban areas, including Kyiv [7]. As an example, there are well documented historical records of escapes from cultivation from Kyiv botanical gardens: *Iva xanthiifolia* Nutt., *Impatiens parviflora* DC., *Oxybaphus nyctagineus* (Michx.) Sweet, etc. [5]. According to literature, herbarium and original data, the group of ergasiophytes and xeno-ergasiophytes of KUA consists of 230 species belonging 43 families [1, 10]. The group of ergasiophytes and xeno-ergasiophytes (plants that

are cultivated outside of the studied area, but were unintentionally introduced to Kyiv) comprise 53% species, which are more than 1.2–1.5 times more numerous than in comparison with the regional alien flora. In the taxonomic structure of the group of ergasiophytes and xeno-ergasiophytes, 10 leading families comprise 63% species. The species of *Asteraceae*, *Fabaceae*, *Apiaceae*, *Rosaceae* play the leading role in forming the stable component of the flora now (group of agriophytes – species naturalized in natural and semi-natural habitats, and hemiagriophytes – naturalized mostly in semi-natural or partly disturbed habitats) [1, 6, 9, 11]. Features of interspecies relationships of alien plants became an interesting object of investigation. Studies of species of the genera *Galinsoga* Ruiz & Pav., *Robinia* L., *Helianthus* L., *Reynoutria* Houtt., *Solidago* L. proved to be especially important.

In 1905 *G. parviflora* was first reliably reported in the Kyiv Urban Area (in Ukraine – in 1855), and in 1920–1924 it was already widely distributed in this area, where it invaded forest communities, parks, gardens, and roadsides (herbarium material at KW) [4]. At the end of the 20th century *Galinsoga urticifolia* (Kunth) Benth., widespread in Western Europe and spreading from west to east since the 1960s, was revealed in the central part of Kyiv [3, 6]. Information about new localities of the plant (L. Tolstoy Street near the Botanical Garden of Taras Shevchenko Kyiv University and along railroads of the major terminal, Kyiv-Passazhirsky) was provided. Also V.V. Protopopova found this plant in Kyiv before (personal communication). The means of immigration (the areas of initial expansion are gardens, flower-gardens, parks, etc) and further dispersal (“migration corridors”, for example, roads, railroads) of these taxa are present at the KUA now. In the Kyiv Urban Area *G. urticifolia* was found by O.G. Yavorska in 2007 near large railway stations: Kyiv-Volynsky (03.VII.2007) and Darnitsa (04.VIII.2007); in Pechersk District of Kyiv, at the edge of a flower-garden near a house in Darwin Street (30.VII.2007), in Solomyanska District of Kyiv, at the edge of a flower-garden near a house in Mishin Street, in significant numbers (10.VII.2007), Kerchenska and Martirosyan Streets (09.VIII.2007), in disturbed habitats of Novgorodska Street (11.VII.2007), and also on waste grounds between a flower-garden and the road in Smilyanska and Volynska Streets (12.VII.2007). At the last locality the two species grew together, and *G. parviflora* was less abundant than the newly revealed plant. *G. parviflora* is reported to be a diploid ($2n=16$) that shows 100% pollen viability; *G. urticifolia* (*G. ciliata* (Raf.) Blake) is a segmental allotetraploid ($2n=32$), with pollen viability varying from 90 to 100%. *Galinsoga* × *mixta* is a triploid natural hybrid between *G. parviflora* and *G. urticifolia* ($3n=24$), but all 24 chromosomes form univalents which are grouped into an unanalyzable chromosomal entanglement at metaphase I; consequently, the pollen viability percentage is 0. The newly revealed population probably represented by a putative introgressant between *G. parviflora* and the natural triploid hybrid ($2n=16$) [8]. Original data source of *Galinsoga* × *mixta* is Euro+Med Plantbase, its geographical distribution in Europe includes Slovakia, Ukraine, and some other areas. Species of the genus spread from the primary places of invasion – botanical gardens, parks, etc. In the Kyiv Urban Area *G. urticifolia* is currently a rather rare plant in the studied area; nevertheless, considering rapid dispersal of its relative in the city and adjacent areas in the beginning of the 20th century, it is necessary to draw the attention of researchers to the presence and spread of this plant. *G. urticifolia* is exacting to edaphic conditions of growth, thus the spread of this species can be expected in man-altered sites, flower-gardens and flower beds, and less commonly along railways.

The first reports of escaped plants of *Robinia pseudoacacia* L. in Ukraine were dated by 1870–1905, in KUA, later in times of the WW II (Kyiv, Golosievo, in a wood, collected by

E. Polonskaya, 1944; A.I. Barbarych observed young trees in 1947, herbarium material at KW). It actively penetrates natural and disturbed plant communities of the Kyiv Urban Area and adjacent areas. Now another North American species of the genus, *R. viscosa* Vent., is widely cultivated, especially in the southern part of the Ukraine. Its northermost hardiness of the Ukraine is not fully determined. This species is extensively used as a tough street tree in the dry localities of California and the American Southwest; it is very tolerant of poor, dry and compacted soils, and prefers sunny locations. Therefore, as an ornamental plant, *R. viscosa* is also widely cultivated in Kyiv Region. It sometimes occurs as escaped, occasionally even forming colonies (according to data of O.G.Yavorska, in Solomyanska District of Kyiv, Karpinska and Antonov Streets (27.VII.2007; 03.VIII.2007); Osokorky District of Kyiv, in disturbed habitats together with *Echinocystis lobata* (Michx.) Torr. & A. Gray (21.VII.2007), Darnitsa District of Kyiv, Bazhan Street (23.VIII.2007), as well as, according to data of S.L. Mosyakin, in Vorzel' and some localities in Vasylykiv District of Kyiv Region). It should be mentioned that in the states of the US Northeast *R. pseudoacacia* hybridized with *R. viscosa*, forming a hybrid known as *Robinia × ambigua* Poir. In Canada *Robinia × ambigua* (*Robinia × ambigua* var. *idahoensis*) is considered as presumably originated from interspecific hybridization of *R. pseudoacacia* and *R. hispida* L.

Several species of the genus *Heracleum* L. were introduced into Europe from the southwestern part Asia (mainly the Caucasus) in the 19th century; they are now widespread in many European countries, and some other parts of the Globe. At least three invasive taxa with unresolved relationships to one another are thought to occur in Europe: *Heracleum mantegazzianum* Sommier & Levier, *H. sosnowskyi* Manden., and *H. persicum* Desf. ex Fischer. Several botanists consider *H. sosnowskyi* only as an infraspecific entity of *H. mantegazzianum* or *H. pubescens*. [12]. *H. sosnowskyi* was cultivated as a fodder plant in the Polissya Region of Ukraine, and also occurred as escaped. *H. mantegazzianum* is native to the Caucasus and has been introduced into Europe and North America. Now its dispersal is registered in Western and Eastern Europe, and some parts of Russia. New localities of *H. mantegazzianum* are reported in the Kiev City (Kiev-Volynsky railway station, in significant numbers; flower-gardens where the plant is not destroyed, considered as a decorative plant. But the clear, watery sap of the plant contains toxins that cause phytophotodermatitis.

Parthenocissus Planch. (Vitaceae) is a genus consisting of about 4 species. *Parthenocissus inserta* (A.Kern.) Fritsch is widely dispersed as an escaped plant in the Kyiv Urban Area (Hydropark and parks of KUA 07.X.2002; 10.VII.2007, etc; near great railway stations: Kyiv-Volynsky (03.VII.2007), "Vydubychi" (14.VIII.2007), "Protasiv Yar" (25.VIII.2007), Darnitsa railway-carriage (14.VIII.2007), etc; in Boryspol' and some localities in Fastov District of Kyiv Region, herbarium material at KW). The creeper may kill vegetation it covers by shading its support and thus limiting the supporting plants' ability to photosynthesize. *Parthenocissus quinquefolia* (L.) Planch. native to eastern and central North America, in southeastern Canada, the eastern and central United States, eastern Mexico, and Guatemala, west as far as Manitoba, South Dakota, Utah and Texas. In Ukraine *P. quinquefolia* is cultivated as an ornamental plant, partly due to its showy deep red to burgundy fall foliage. At last time this liana is widespread in territory of KUA, in a "green zone" of Kyiv too, and adversely influence the biodiversity of the Kyiv Urban Area. Thus, *P. quinquefolia* and *P. inserta* (especially the latter) can be considered as well-established invasive species of KUA.

Now many other cultivated and ornamental plants occur as escaped. *Phytolacca americana* L. was cultivated in Ukraine as an ornamental plant since the 19th century. The first reports

of escaped plants in Crimea was dated by 1871 (Alupka), 1882 (Sevastopol), collected by V. Savinsky (herbarium materials of KW). In the 20th century *P. americana* was revealed in the northern part of Kyiv (Puzcha-Vodytsa, 1934, collected by O.L. Lypa, herbarium materials of KW). M.I. Kotov found this species as an escaped plant in Kyiv between 1916–1945 [2]. At the last time the new localities of this species has been discovered in Kyiv (Solomyanska District of Kyiv, Donetzka Street (05.VIII.2007)). *P. americana* has been collected at several localities in Kyiv only as a casual alien, near places of cultivation where it can persist for several years.

Nycandra physalodes (L.) P.Gaertn. was cultivated in Ukraine as an ornamental plant since the 19th century. Plant is native to Peru. Our reports of escaped plants in KUA was dated by summer of 2007 p. (in Pechersk District of Kyiv, at the edge of a flower-garden near a house in Darwin Street (30.VII.2007), Osokorky District of Kyiv, in disturbed habitats (21.VII.2007)).

Quercus rubra L. (*Q. borealis* Michx.) is native to Northern America. It had been found in new parts of city (in Darnitsky District of Kyiv, in "Ostrovscogo", "Nyvki" and "" parks of town, in green zone). In our opinion, a naturalized and rather invasive species in KUA.

Ailanthus altissima (Mill.) Swingle was revealed in the central part of Kyiv in 1998–2000 [3, 6]. It had been found in new parts of city (in Darnitsky District of Kyiv together with *O. nyctagineus*, *Asclepias syriaca* L.; at the edge of the flower-garden and streets (06–14.VIII.2007); near railway stations: Darnitsa (04.VIII.2007) and Protasiv Yar (25.08.07). Therefore, on territories of Kyiv plant is rapidly spreading now. *A. altissima* is included in the list of species with a high invasive potential. *A. altissima* was first brought from China to Europe in the 1740s and to the United States in 1784. Outside of Europe and the United States the plant has been spread to many other areas beyond its native range. In a number of these areas it has become an invasive species due to its ability to quickly colonize disturbed areas. In Ukraine it can be considered naturalized in southern regions, wide-spread in Cherkassy region, but its spread in Kyiv is partly caused by microclimatic peculiarities of the large city. It should be noted that *A. altissima* mostly occurs in Kyiv in comparatively warm microhabitats well-protected from climatic extremities, e.g., on sunny spots near walls and fences, and other similar habitats.

The alien plants that activity spread in KUA and adjacent areas are also *E. lobata*, *Rudbeckia laciniata* L., *Ulmus pumila* L. (especially in the central part of Kyiv), *O. nyctagineus*, *A. syriaca*, species of the genera *Helianthus* L. and *Reynoutria* Houtt., etc. We believe that the research focus in studies of Kyiv alien plants should be partly shifted now to cultivated and escaped plants, since that group at present is gaining more and more importance in the process of "enrichment" of the alien fraction of the flora of Ukraine, as compared to unintentionally introduced casual aliens, which played an especially important role in primary introductions in KUA in the 1980–1990s and were primarily associated in that period with active international trade in grain and other agricultural products. In addition to that, various aspects of environmental interactions between the native and naturalized alien plants should be also elucidated in more detail. During the ongoing studies of the native flora of Kyiv we should also pay attention to the processes of naturalization of ergasiophytes in order not to miss the dynamic and ecologically important "enrichment" of the floristic lists of semi-natural and man-altered plant communities now dominating the vegetation of the area.

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НОВІ ЗАМІТКИ ПРО ДЕЯКІ АДВЕНТИВНІ РОСЛИНИ КИЇВСЬКОЇ МІСЬКОЇ АГЛОМЕРАЦІЇ

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Останнім часом на території України з'явилися нові адвентивні рослини. Деякі з них встигли вже натуралізуватися на значній території у Європі. Повідомляється про нові знахідки адвентивних видів з родів *Galinsoga* Ruiz & Pav., *Robinia* L., *Heracleum* L., *Phytolacca* L., *Ailanthus* Desf., *Nycandra* Adans., *Quercus* L. та *Parthenocissus* Planch., які були знайдені на території Київської міської агломерації (КМА). Враховуючи вищезазначені види, слід зазначити, що роль саме здичавілих з культури рослин у поповненні неаборигенного компоненту КМА на сьогодні є провідною.

Ключові слова: адвентивні рослини, *Galinsoga urticifolia* (Kunth) Benth., *Robinia viscosa* Vent., *Heracleum mantegazzianum* Sommier & Levier, *Parthenocissus* Planch. sp., *Phytolacca Americana* L., *Quercus* L. і *Ailanthus altissima* (Mill.) Swingle, Київська міська агломерація.

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