

Geographical Distribution of *Sonchus* L. Species in Ukraine †

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Abstract: This paper is devoted to providing chorological information on genus *Sonchus* species in Ukraine and to mapping their distribution. We have processed the materials of the herbaria KW, KWHU, KWHU, LW, LWKS, LWS, SOF, MW and also information from on-line resources <http://www.ukrbin.com> and <https://www.inaturalist.org>. Also we carried out several expeditions. Maps were constructed using SimpleMappr. The species of the genus *Sonchus* occur throughout Ukraine. *Sonchus asper*, *S. oleraceus* and *S. arvensis* grow mostly on anthropogenically transformed areas. *Sonchus palustris* occurs more often in swamps and wet meadows. Here we also found out that *Sonchus* species in Ukraine should be classified as aboriginal. Previously, they were considered adventitious for the territory of Ukraine.

Keywords: *Sonchus*; Asteraceae; Ukraine

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1. Introduction

The genus *Sonchus* L. (Asteraceae) consists of about 100 species. The results of molecular phylogenetic studies led to the merging of genus *Sonchus* s.str. with genera *Actites* N.Lander, *Aetheorhiza* Cass., *Atalanthus* D.Don, *Babcockia* Boulos, *Chrysoprenanthes* (Sch.Bip.) Branwell, *Dendroseris* D.Don, *Embergeria* Boulos, *Kirkiarnella* Allan, *Lactucosonchus* (Sch.Bip.) Svent, *Sventenia* Font Quer and *Taeckholmia* Boulos [1–4].

There four species of *Sonchus* are in the flora of Ukraine [5]:

1. *Sonchus oleraceus* L.
2. *Sonchus asper* (L.) Hill.
3. *Sonchus palustris* L.
4. *Sonchus arvensis* L.
 - (a) *Sonchus arvensis* subsp. *arvensis*
 - (b) *Sonchus arvensis* subsp. *Uliginosus* (M.Bieb.) Nyman

Also, Sennikov [6] adduced *S. asper* subsp. *glauscens* (Jordan) Ball (\equiv *S. glaucens* Jordan, = *S. nymanni* Tineo & Guss.) for the territory of Ukraine. Plants that can be classified as *Sonchus asper* subsp. *glauscens* can grow in Ukraine—in the southern regions and Crimea. However, we cannot confirm growth of this subspecies in Ukraine, because herbarium materials are questionable and full investigation in nature cannot be carried out through military aggression by the Russian Federation and the temporary occupation of the Crimea. Therefore, in this paper we consider *Sonchus asper* in a broad sense (*sensu lato*).

Previous we studied the morphological features of the genus *Sonchus* species in Ukraine [7–9]. Aim of this work is to provide detailed chorological information on *Sonchus* species in Ukraine. Literature [10,11] contains only general information on the geographical distribution of these species.

2. Experiments

The chorological data for mapping the distribution of species are gathered in next herbaria: National Herbarium of Ukraine–Herbarium of M.G. Kholodny Institute of Botany (Kyiv, KW), Herbarium of M.M. Gryshko National Botanical Garden (Kyiv, KWHA), Herbarium of O.V. Fomin Botanical Garden of Taras Shevchenko National University of Kyiv (Kyiv, KWHU), Herbarium of Ivan Franko National University of Lviv (Lviv, LW), Herbarium of Institute of Ecology of the Carpathians (Lviv, LWKS), Herbarium of State Museum of Natural History (Lviv, LWS), Herbarium of National Dendrological Park «Sofiyivka» (Uman, SOF), as well as scanned images of herbarium specimens of Moscow University Herbarium (Moscow, MW). In general, we critically processed more than 500 herbarium specimens. Also, we have used information from on-line resources <http://www.ukrbn.com> (<http://www.ukrbn.com/index.php?id=43760>, accessed on 1 September 2020) and <https://www.inaturalist.org> (https://www.inaturalist.org/observations?taxon_id=53270, accessed on 1 September 2020). In addition to that, we carried out several expeditions to Kyiv, Poltava and Cherkasy regions of Ukraine. Maps were constructed using SimpleMappr [12]. To identify geochronological units, we used paper of Cohen et al. [13].

3. Results and Discussion

Distribution of *S. oleraceus* in Ukraine (Figure 1): Transcarpathia, Volyn, Lviv, Ivano-Frankivsk, Chernivtsi, Rivne, Zhytomyr, Kyiv, Chernihiv, Sumy, Khmelnytskyi, Vinnytsia, Cherkasy, Poltava, Kharkiv, Dnipropetrovsk (Dnipro), Donetsk, Lugansk, Odesa, Mykolaiv, Kherson, Zaporizhzhia and Crimea regions. *Sonchus oleraceus* was even found on the Snake Island (Serpent Island) in the Black Sea.

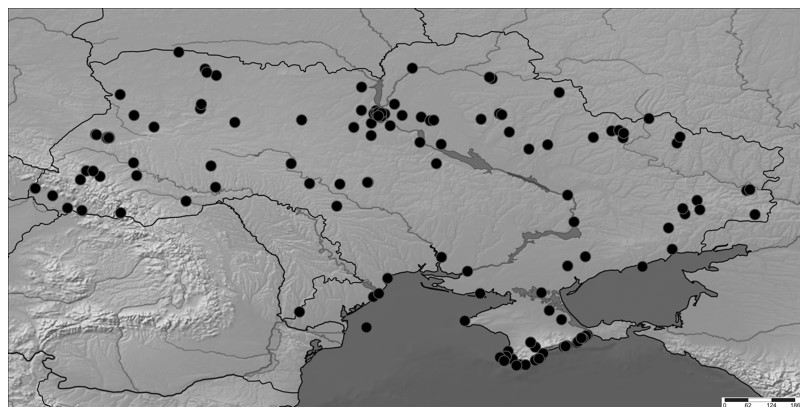


Figure 1. Distribution of *Sonchus oleraceus* in Ukraine.

Habitats: cultivated fields, disturbed wet meadows, river and lake shores, beaches, saline habitats, along roadsides, forest edges, rarely—in the woods.

Distribution of *S. asper* in Ukraine (Figure 2): Transcarpathia, Volyn, Lviv, Ivano-Frankivsk, Chernivtsi, Rivne, Zytomyr, Kyiv, Chernihiv, Sumy, Ternopil, Khmelnytskyi, Vinnytsia, Cherkasy, Poltava, Kharkiv, Dnipropetrovsk (Dnipro), Donetsk, Lugansk, Odesa, Mykolaiv, Kherson, Zaporizhzhia and Crimea regions.

Habitats: cultivated fields, gardens, disturbed wet meadows, river, lake and rate shores, beaches, stone scree, cracked rocks, saline habitats, along roadsides, garbage dumps, rarely—in the woods.

Distribution of *S. palustris* in Ukraine (Figure 3): Transcarpathia, Lviv, Ivano-Frankivsk, Chernivtsi, Zhytomyr, Kyiv, Chernihiv, Sumy, Ternopil, Khmelnytskyi, Vinnytsia,

Cherkasy, Poltava, Kharkiv, Donetsk, Lugansk, Kherson, Zaporizhzhia and Crimea regions.

Habitats: wet meadows, marsh, swamp forests.

Sonchus palustris is a rare species in Transcarpathia and Volyn. In the Transcarpathian region it is protected, and in Volyn region it requires inclusion in the list of regionally rare species [14,15].

Distribution of *Sonchus arvensis* in Ukraine (Figures 4 and 5): all regions of Ukraine.

Habitats: cultivated fields, disturbed wet meadows, saline habitats, river and lake shores, ravines, along roadsides, forests.

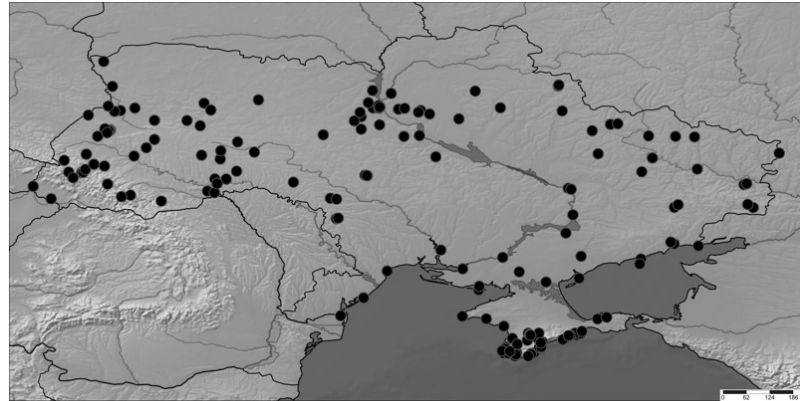


Figure 2. Distribution of *Sonchus asper* s.l. in Ukraine.

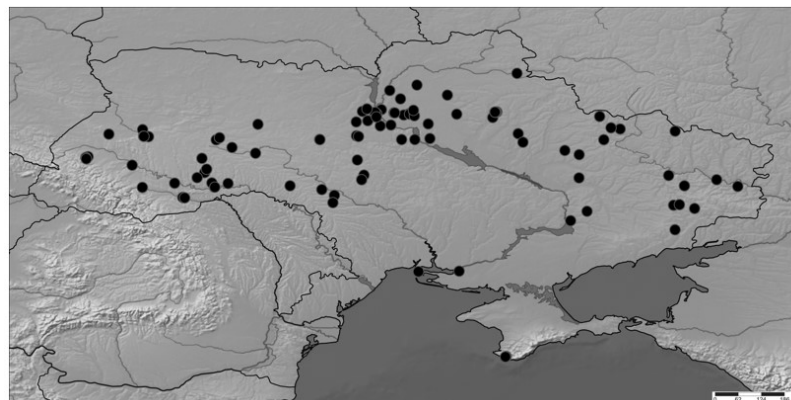


Figure 3. Distribution of *Sonchus palustris* in Ukraine.

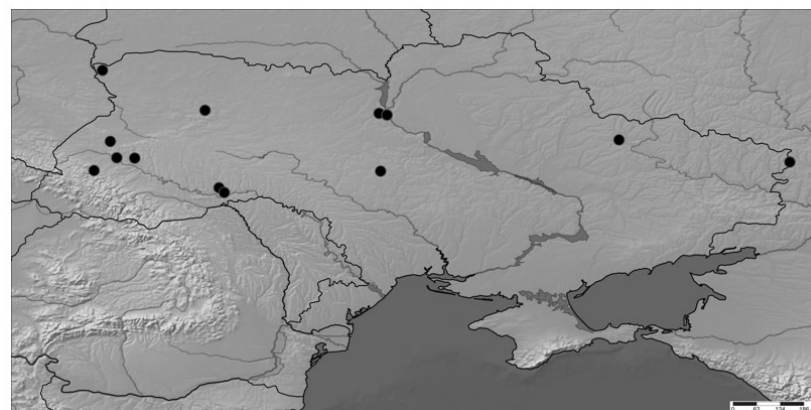


Figure 4. Distribution of *Sonchus arvensis* subsp. *arvensis* in Ukraine.

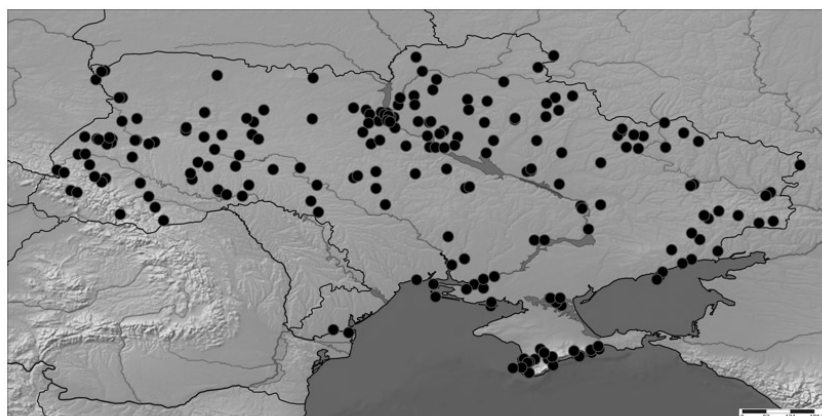


Figure 5. Distribution of *Sonchus arvensis* subsp. *uliginosus* in Ukraine.

We have found that glabrous (bare, smooth) plants of *S. arvensis* subsp. *uliginosus* are predominating in Ukraine, and pubescent plants of *S. arvensis* subsp. *arvensis* are very rare. This fact was unexpected for us because we could not find any information in the literature before. *Sonchus arvensis* subsp. *arvensis* is known from these locations: Volyn region, Shatskyi district, the outskirts of the village Svitiyaz (N. Sytschak, 02.VII. 2007, LWKS 019497!), Lviv region, Pustomyivskyi district, the outskirts of the village Sokilnyky (I. Bednarska, 15.VII. 2007, LWKS 022701!), Ivano-Frankivsk region, Rohatynskyi district, the outskirts of the village Zaluzhzhia (O. Nakonechnyi, 30.VII. 1999, LWKS 000880!), Khmelnytskyi region, the outskirts of the city Kamyanets-Podilskyi (N. Skibitska, 05.IX. 1999, LWKS 005136!), Khmelnytskyi region, Kamyanets-Podilskyi district, the outskirts of the village Velyka Slobidka (N. Skibitska, 04.VII. 1999, LWKS 003973!), Kyiv, Svyatoshyno (V. Sobko, 23.VII. 1967, KW!), Cherkasy region, Mankivskyi district, village Buky (O. Shynder, 09.IX. 2016, KW!), Kharkiv region, the outskirts of the city Merefa (P. Kozlov, 24.VII. 1925, KW!) and Lugansk region, Milovskyi district, Reserve "Striltsivskyi steppe" (O. Dubovyk, 29.VII. 1958, KW!). There are images of *S. arvensis* subsp. *arvensis* on on-line resources from Volyn (N. Sytschak, 2007, http://www.ukrbin.com/show_image.php?imageid=47291), Lviv (N. Sytschak, 2020, http://www.ukrbin.com/show_image.php?imageid=175550; N. Sytschak, 2020, http://www.ukrbin.com/show_image.php?imageid=176060) and Rivne (O. Levon, 2020, <https://www.inaturalist.org/observations/54363794>) regions and from outskirts of Kyiv (O. Levon, 2020, <https://www.inaturalist.org/observations/56165179>).

Sonchus species in Ukraine: aboriginal or adventive?

When we prepared this paper, it turned out that the status of species of the genus *Sonchus* in Ukraine is controversial. Many Ukrainian researchers believe that *Sonchus palustris* is aboriginal and other *Sonchus* species are adventive. *Sonchus arvensis*, *S. asper* and *S. oleraceus* are often referred to as archaeophytes of Mediterranean origin [16, 17, 18, etc.]. At the same time, in foreign databases the listed species are classified as aboriginal in Ukraine, please see: *S. arvensis* subsp. *arvensis* (<http://www.plantsoftheworldonline.org/taxon/urn:lsid:ipni.org:names:250029-1>), *S. arvensis* subsp. *uliginosus* (http://cichorieae.e-taxonomy.net/portal/cdm_dataportal/taxon/c9bb71ff-2d2b-47d8-ab4a-38ddd618a8be, <http://www.plantsoftheworldonline.org/taxon/urn:lsid:ipni.org:names:60439589-2>), *S. asper* subsp. *asper* (http://cichorieae.e-taxonomy.net/portal/cdm_dataportal/taxon/97a5321a-665d-4ee5-ba74-43e63de91aeb, <http://www.plantsoftheworldonline.org/taxon/urn:lsid:ipni.org:names:1003017-2>), *S. oleraceus* (http://cichorieae.e-taxonomy.net/portal/cdm_dataportal/taxon/b2702695-cc7b-466a-9b30-106551c577ce, <http://www.plantsoftheworldonline.org/taxon/urn:lsid:ipni.org:names:250268-1>), *S. palustris* (<http://cichorieae.e>

taxonomy.net/portal/cdm_dataportal/taxon/918332a2-dfa0-4899-9c19-ffafaf4ed3f9, <http://www.plantsoftheworldonline.org/taxon/urn:lsid:ipni.org:names:250281-1>).

In our opinion, paleobotanical data are important for classifying the studied species as aboriginal or adventive. Unfortunately, for the territory of Ukraine on the species of the genus *Sonchus* such data are extremely limited. It should be pointed out here that researchers often consider pollen grains of species of the genus *Sonchus* as pollen of one of the indicators of human economic activity [19,20].

Paleobotanists have identified pollen of the genus *Sonchus* in Holocene and Pleistocene sediments. In Ukraine, paleobotanists have found pollen of genus *Sonchus* species (*S. arvensis*, *Sonchus* sp.) in the sediments of the Meghalayan age of the Holocene [19–21]. In the Voronezh region of the Russian Federation (which borders Ukraine) during studies of Mesolithic sites (Northgrippian age, Holocene), researchers found pollen of *S. arvensis* [22]. Also, in the Voronezh region pollen of this species was found from the Greenlandian age of the Holocene. According to researchers, *S. arvensis* grew in grasslands [23]. And most importantly, paleobotanical studies have shown that *S. arvensis* grew in Ukraine in the “Upper” Pleistocene [24], i.e., representatives of the genus *Sonchus* grew in Ukraine before the spread of agriculture here. Therefore, they should be classified as native species in Ukraine.

4. Conclusions

Thus, the species of the genus *Sonchus* occur throughout Ukraine. *Sonchus asper*, *S. oleraceus* and *S. arvensis* grow mostly on anthropogenically transformed areas. *Sonchus palustris* occurs more often in swamps and wet meadows. Representatives of the genus *Sonchus* grew in Ukraine should be classified as native species here.

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Conflicts of Interest: The authors declare no conflict of interest.

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