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Data Descriptor

Data for Distribution of Vascular Plants (Tracheophytes) of Urban Forests and Floodplains in Tyumen City (Western Siberia)

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Abstract: Tyumen City is a large city in Western Siberia. This territory has ecological problems, which are typical to many cities around the world, including the loss of biodiversity and environment, habitat pollution, and others. This data paper presents for the first time the plant species composition of 11 natural forest and floodplain areas in Tyumen City. In a city, forests provide a refuge for both threatened plants and weeds (including alien species). In these ecosystems, unique communities are being formed, where both threatened and alien plants can co-occur. Within the city's area, forests serve as separate green "islands" among urbanized landscapes. A total of 11 forest and floodplain areas have been studied based on field surveys conducted by the authors of the paper in 2020–2022. The obtained data (8742 observations representing 434 species, accepted subspecies, and hybrids belonging to 270 genera and 74 families) serve as a basis for the modern flora of Tyumen City, its conservation, and counteraction to the introduction of alien plants.

DataSet: https://zenodo.org/record/7262972

Keywords: weeds; occurrences; data paper; vascular plants; Tracheophyta; Tyumen; Western Siberia

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1. Summary

Data on plant distribution in natural and anthropogenically disturbed habitats in various regions of the world are a priority for studying and protecting biodiversity. Publications of species lists and synopses of both flora and fauna are considered traditional in the study of taxa distribution [1,2]. However, most such publications do not contain data on the geographical coordinates of locations of both plants and animals. This does not allow us to judge features of their distribution in a study area. A possible solution to this problem is publication of datasets in the form of data papers [3–6]. These sources necessarily include geographic coordinates of each occurrence of each species. As a rule, data on distribution of many taxa from Siberia are not sufficiently represented online (however, see [3,5,7]), and thus are not available for understanding the general distribution of plant and animal species. Therefore, each dataset obtained in this region is an important contribution to fill "white gaps" in understanding of taxa distributions.

Tyumen is the first Russian city founded in Western Siberia in 1586. Since its foundation to the present, it has been an industrial, commercial, and agricultural center of a large area between the Ural Mountain range and the West Siberian Plain. The historical development of Tyumen City proceeded with the development of a typical radial-ring structure of city blocks and the absorption of adjacent villages. Particularly active construction of new modern areas of multi-story buildings began in 2000. However, during urbanization, some areas of natural vegetation were retained. They are represented by urban forests (public

parks, forest parks, forests, and groves), and floodplain habitats. Certainly, they have not been preserved in their original form. They are disturbed to a greater or lesser extent by human economic activity. These conditions form unique plant communities where both threatened and alien plants can co-exist. Such areas of semi-natural vegetation are formed mainly by native coenophilous species and represented by preserved fragments of natural plant communities. The isolation and transformation of such vegetation areas occur under anthropogenic pressure with distinct anthropogenically determined boundaries form so-called floras-anthropogenic isolates [8].

Urban forests remain among residential and industrial areas like islands in the Ocean. They preserve a natural diversity and are considered refuges, biodiversity hotspots, and sources of urban colonization for many species of living organisms. Despite their importance, no special comprehensive studies of forests in Tyumen City have been carried out. Only one publication was an exception [9]. Its authors compared three large forest parks, and five small parks and public gardens with each other and with the flora of Tyumen City as a whole. In the mentioned study [9], lists of vascular plant floras compiled over many years were used, and there was no binding of species occurrences to geographical coordinates; only an indication of the studied forest park was provided where a species was found.

In the present study, in addition to some of the forest parks from [9] (i.e., Gilyovskaya Roshcha forest park and Yuri A. Gagarin forest park), data were obtained in other large and species-rich forest areas (i.e., Vatutinskaya Roshcha forest park; Plekhanovsky Bor forest; forest on the Verkhniy Bor along the Salairskiy tract; forests in the Voinovka microdistrict and its surroundings, etc.). In addition, this dataset includes numerous observations from the Tura River floodplain, which also serves as a refuge for many species of natural flora (Zarechnyi public park, habitats inside the urbanized area in the floodplain and along banks of the Tura River), and data from large overgrown wasteland and square. It is worth noting that we have included only verified data on the current state of the forest and floodplain flora in Tyumen City. This allows us to understand the distribution of certain species and species groups (weeds, wild native, invasive, threatened) of vascular plants and to assess the contribution of each of the studied urban forests and floodplains to biodiversity conservation in Western Siberia. Some urban forests are region-level Protected Areas, but others do not have legal protection status. Data on the biodiversity in forests of Tyumen City [10] have already helped local residents and ecological activists to protect green areas from urban development. Additionally, they can serve as a decisive argument for authorities in favor of preserving green areas and achieving sustainable development goals. However, this requires data with specific geo-references, not just combined floristic lists.

This study was conducted in 2021–2022. It was aimed to identify the geographical distribution and the present composition of vascular plants in 11 natural forest and floodplain areas within Tyumen City (Table 1).

Table 1. Number of observations in 11 natural forest and floodplain areas within Tyumen City.

Number	Location	Parts of the Location	Number of Observations in Each Part	General Number of Observations in Each Location
1	Gilyovskaya Roshcha forest park	–	–	601
2	Yuri A. Gagarin forest park	–	–	1461
3	Plekhanovsky Bor forest and Plekhanova settlement	Plekhanovsky Bor forest	2464	2605
		Plekhanova settlement	141	

Table 1. *Cont.*

Number	Location	Parts of the Location	Number of Observations in Each Part	General Number of Observations in Each Location
4	Natural monument "Topolya"	–	–	77
5	Verkhniy Bor and Salairskiy tract	–	–	1279
6	Floodplains and banks of the Tura River	Left bank of the Tura River Right bank of the Tura River	1083 155	1238
7	Vatutinskaya Roshcha park	–	–	489
8	Zarechnyi public park	–	–	205
9	Voinovka microdistrict and east of the Voinovka microdistrict	Voinovka microdistrict East of the Voinovka microdistrict	342 334	676
10	Crossroads of Pervomaiskaya Street and Tovarnoe highway	–	–	29
11	Respubliki Street, along the fence of house 204, building 1 and Respubliki Street, along the fence of house 205, building 4, square	–	–	82
	Total	–	–	8742

2. Data Description

Description of each observation includes the following sections in the dataset: serial number of the observation; species name according to POWO database [11]; nomenclature notes; observation date; location; geographic coordinates (latitude, longitude); number of the route/study plot; type of observation (basis of record); systematic ranks of the taxon (kingdom, division, class, order, family, genus, species) according to GBIF database; observer name (recordedBy); identifier name (identifiedBy). In total, the dataset includes 8742 observations (available at https://zenodo.org/record/7262972; accessed on 29 October 2022).

The dataset includes data on 434 species, accepted subspecies, and hybrids of vascular plants belonging to 74 families found during field surveys (Table 2). Species known for the same areas on the basis of the literature, herbaria, or from the authors' earlier observations have not been included in this dataset. As a rule, these data did not have an accurate geo-reference and were obtained many years ago.

To assess the completeness of the present study, we have compared our dataset with previously collected data for a large urban forest of the Yuri A. Gagarin forest park [9]. In 2021–2022, we recorded 114 species in this location, while the species list, compiled in 2004–2007, included 294 species (our personal data). The lower number of species registered in 2021–2022 is explained by the fact that our study was conducted within administrative boundaries of the Yuri A. Gagarin forest park, while the species list of 2004–2007 included forest areas outside the administrative boundaries of this location. Therefore, many habitats (e.g., shores of the lake, mire) were not investigated in the present study. Additionally, the number of registered species can be lower over two study years (2021–2022) compared with four years (2004–2007).

Table 2. Taxonomical structure of the dataset.

Classes	Orders	Families	Total Numbers of Families
Lycopodiopsida	Lycopodiales	Lycopodiaceae	1
Polypodiopsida	Equisetales	Equisetaceae	1
	Ophioglossales	Ophioglossaceae	1
	Polypodiales	Athyriaceae, Cystopteridaceae, Dennstaedtiaceae, Dryopteridaceae, Onocleaceae	5
Pinopsida	Pinales	Pinaceae	1
Liliopsida	Alismatales	Alismataceae, Araceae, Hydrocharitaceae, Potamogetonaceae	4
	Asparagales	Amaryllidaceae, Asparagaceae, Asphodelaceae, Iridaceae, Orchidaceae	5
	Liliales	Liliaceae, Melanthiaceae	2
	Poales	Cyperaceae, Juncaceae, Poaceae	3
Magnoliopsida	Apiales	Apiaceae	1
	Asterales	Asteraceae, Campanulaceae	2
	Boraginales	Boraginaceae	1
	Brassicales	Brassicaceae	1
	Caryophyllales	Amaranthaceae, Caryophyllaceae, Polygonaceae	3
	Cornales	Cornaceae	1
	Cucurbitales	Cucurbitaceae	1
	Dipsacales	Adoxaceae, Caprifoliaceae	2
	Ericales	Balsaminaceae, Ericaceae, Polemoniaceae, Primulaceae,	4
	Fabales	Fabaceae	1
	Fagales	Betulaceae, Fagaceae	2
	Gentianales	Apocynaceae, Rubiaceae	2
	Geraniales	Geraniaceae	1
	Lamiales	Lamiaceae, Oleaceae, Orobanchaceae, Plantaginaceae, Scrophulariaceae	5
	Malpighiales	Euphorbiaceae, Hypericaceae, Salicaceae, Violaceae	4
	Malvales	Malvaceae	1
	Myrtales	Lythraceae, Onagraceae	2
	Oxalidales	Oxalidaceae	1
	Ranunculales	Berberidaceae, Papaveraceae, Ranunculaceae	3
	Rosales	Cannabaceae, Elaeagnaceae, Rhamnaceae, Rosaceae, Ulmaceae, Urticaceae	6
	Sapindales	Sapindaceae	1
	Saxifragales	Crassulaceae, Grossulariaceae, Paeoniaceae	3
	Solanales	Convolvulaceae, Solanaceae	2
	Vitales	Vitaceae	1
Total	–	–	74

3. Methods

3.1. Study Area

The Tyumen urban district is located in the southwestern part of the West Siberian Plain, Tyumen Region (57°09′ N, 65°32′ E). Its area is 698 km^2 with a population of 847,000 people. Tyumen Region is situated in the natural subzone of pine–birch forests. *Pinus sylvestris* L., *Betula pendula* Roth, *B. pubescens* Ehrh., and *Populus tremula* L. are the main forest-forming trees. *Tilia cordata* L. is the only broad-leaved forest-forming species, which occurs relatively rarely in the Tyumen Region. All large forest areas existing in the urban territory are pine forests disturbed and transformed to varying degrees. The floodplain is covered by grass–forbs meadows, plant communities dominated by *Carex* spp., *Phragmites australis* (Cav.) Trin. ex Steud., and *Salix* spp.

3.2. Research Design and Identification of Plants

Traditional research methods of plant geography were used for a preliminary study of forests in Tyumen City. Each area was first examined by the route method [12] to obtain a general understanding of its vegetation cover composition and structure. The next stage was a mapping of species occurrences. In each study area, transects were established, where several study 100-m^2 (10 × 10 m) plots were laid. In each study plot, all plant species were recorded using cameras. In some cases, these study plots were additionally established if threatened species or species with understudied distribution were found outside the laid transects. Field surveys were carried out from April to October

in 2021–2022. The same study forest/floodplain areas were visited two or three times in various seasons in order to reveal the largest number of plant species, depending on their phenology. Individuals of each species were photographed in each location using digital cameras (SONY DSC-HX60 and Nikon Coolpix L100). Photographs were stored in the personal digital archives of each author. They will be uploaded on the iNaturalist platform (www.inaturalist.org) in the future [13]. Geo-referencing of observations and navigation between them were determined using GPS-navigators or manually after a special investigation using Google Maps. Accuracy of the geo-referencing varied between 3 and 45 m. Names of the studied locations are given in accordance with their designations on Yandex maps (https://yandex.ru/maps; accessed on 20 October 2022). Some plants were collected in the X-BIO Herbarium, stored in the Institute of Environmental and Agricultural Biology of the Tyumen State University. Plant identification was carried out according to the "Flora of Siberia" [14]. The identification correctness of each author was double-checked by another author. The nomenclature and systematic position were given according to Plants of the World Online [11].

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References

1. Teteryuk, L.V.; Degteva, S.V.; Kanev, V.A.; Valuyskikh, O.E.; Teteryuk, B.Y.; Kulyugina, E.E. Rare and protected vascular plants in Yugyd va National Park (Russia). *Nat. Conserv. Res.* **2020**, *5*, 16–29. [CrossRef]
2. Sergeeva, E.V.; Stolbov, V.A. The fauna of lamellicorn beetles (Coleoptera, Scarabaeoidea) of the Tyumen Region. *Amurian Zool. J.* **2021**, *13*, 124–145. [CrossRef]
3. Gamova, N.S. Baikalsky State Nature Biosphere Reserve and its buffer zone: Floristic data. *Biodivers. Data J.* **2022**, *10*, e76946. [CrossRef]
4. Ruchin, A.B.; Alekseev, S.K.; Artaev, O.N.; Khapugin, A.A.; Lobachev, E.A.; Lukiyanov, S.V.; Semishin, G.B. Dataset: Fauna of Adult Ground Beetles (Coleoptera, Carabidae) of the National Park "Smolny" (Russia). *Data* **2022**, *7*, 84. [CrossRef]
5. Sandanov, D.V.; Brianskaia, E.P.; Dugarova, A.S. Dataset for vascular plants in the Red Data Books of Transbaikalia: Species distribution and pathways towards their conservation. *Nat. Conserv. Res.* **2022**, *7* (Suppl. S1), 14–23. [CrossRef]
6. Vasenkova, N.V.; Kuznetsova, N.A. A multiscale approach to evaluate the structure of diversity of Collembola in boreo-nemoral forests of the Russian Plain. *Nat. Conserv. Res.* **2022**, *7* (Suppl. S1), 38–51. [CrossRef]
7. Filippova, N.V.; Ageev, D.V.; Basov, Y.M.; Bilous, V.V.; Bochkov, D.A.; Bolshakov, S.Y.; Bushmakova, G.N.; Butunina, E.A.; Davydov, E.A.; Esengeldenova, A.Y.; et al. Crowdsourcing fungal biodiversity: Revision of iNaturalist observations in Northwestern Siberia. *Nat. Conserv. Res.* **2022**, *7* (Suppl. S1), 64–78. [CrossRef]
8. Yurtsev, B.A.; Kamelin, R.V. *Basic Concepts and Terms of Floristics*; Perm State University: Perm, Russia, 1991; 81p. (In Russian)
9. Ilminskikh, N.G.; Kuzmin, I.V. Anthropogenically isolated floras of the city of Tyumen (Western Siberia). In *Fundamental and Applied Problems of Botany at the Beginning of the XXI Century: Vol. 4*; Karelian Scientific Center of the Russian Academy of Sciences: Petrozavodsk, Russia, 2008; pp. 160–163. (In Russian)
10. Kuzmin, I.V. Botanical research in the vicinity of the villages of Ozhogina and Patrusheva (Tyumen city). In *Zyryanovskie readings*; Kurgan State University Pbl.: Kurgan, Russia, 2011; pp. 200–201. (In Russian)
11. POWO. Plants of the World Online. *Facilitated by the Royal Botanic Gardens, Kew.* Available online: http://www.plantsoftheworldonline.org (accessed on 15 October 2022).

12. Khapugin, A.A.; Vargot, E.V.; Chugunov, G.G. Research methods of vegetative cover of terrestrial ecosystems. In *Methods of Field Environmental Research*; Egorov, L.V., Ruchin, A.B., Khapugin, A.A., Artaev, O.N., Eds.; Saransk: Pushta, Russia, 2014; pp. 4–42. (In Russian)
13. Seregin, A.P.; Bochkov, D.A.; Shner, J.V.; Garin, E.V.; Pospelov, I.N.; Prokhorov, V.E.; Golyakov, P.V.; Mayorov, S.R.; Svirin, S.A.; Khimin, A.N.; et al. "Flora of Russia" on Inaturalist: A dataset. *Biodivers. Data J.* **2020**, *8*, e59249. [CrossRef] [PubMed]
14. *Flora of Siberia. Vol. 1–14*; Nauka Publ. (Siberian Branch): Novosibirsk, Russia, 2003; pp. 1987–1997. (In Russian)