



Electronic resources and patterns of the Russian flora

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Sergey Dudov (Moscow)



General information about Russia

1. Geography
2. Biomes
3. Resources



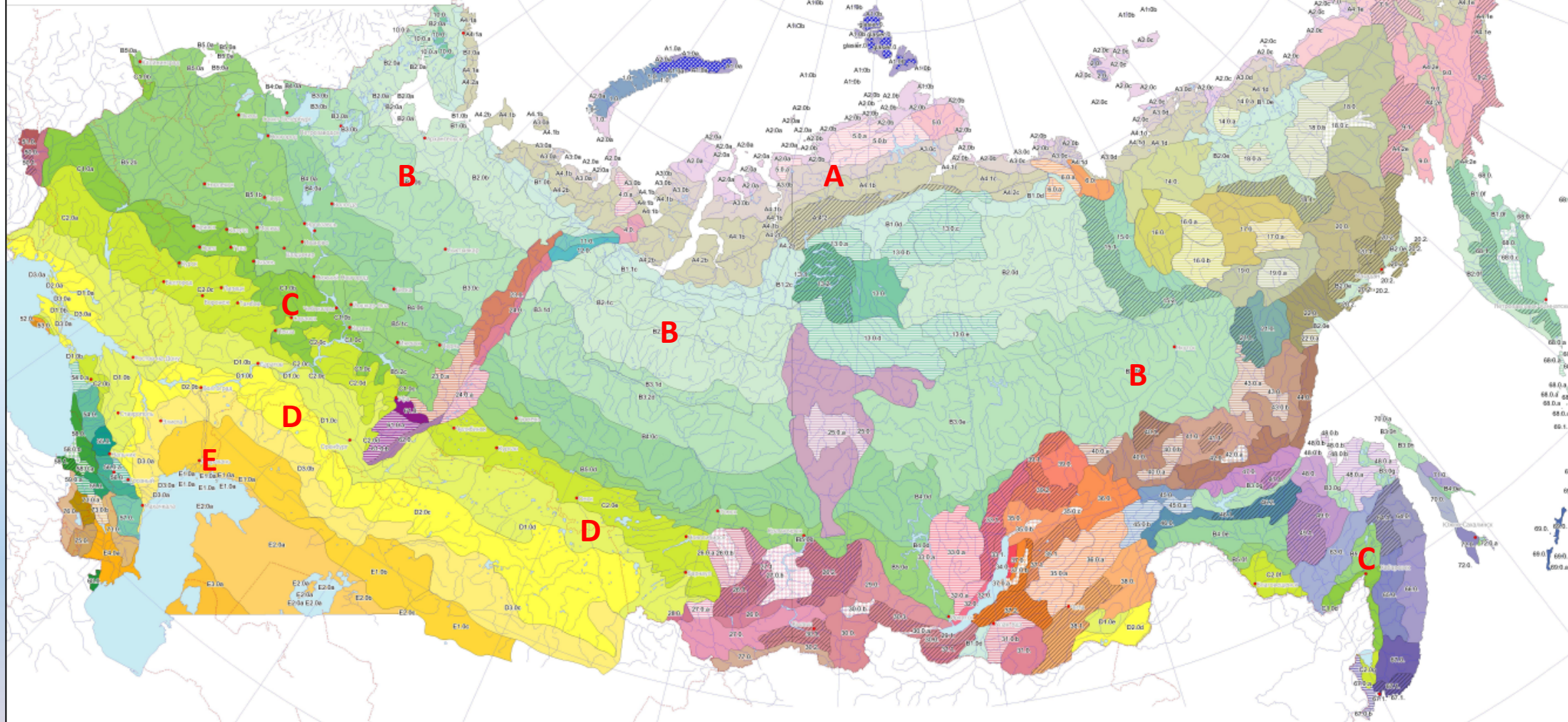
Area	17,125,191 km ² (1 st), 23% in Europe and 76% in Asia
Population	146,748,590 people (9 th)
Subdivisions	85 first-level administrative units

Зоны и типы пояности растительности России

Отв. ред. Г.Н. Огурева (растительность гор)
 Авторы: И.Н. Сафронова, Т.К. Юрковская, И.М. Миклиева (зональная растительность)

Масштаб оригинала карты 1 : 8 000 000

Москва, "Экор", 1999 г.



- A – tundra
- B – taiga
- C – hardwoods
- D – steppe
- E – deserts

Main vegetation types of Russia (zonal biomes)



Herbaria of the world: 396M specimens



Herbaria:

- World: 3,426
- Russia: 124

Specimens:

- World: 396,204,891
- Russia: 16,175,934



Herbarium collections: top countries

1. USA 78,462,700
2. France 24,046,688
3. UK 23,655,232
4. Germany 22,120,100
5. People's Republic of China 20,375,136
6. **Russia 16,175,934**
7. Japan 12,860,724
8. Sweden 12,033,000
9. Switzerland 12,027,534
10. Italy 11,596,611



Source: Thiers (2021)

http://sweetgum.nybg.org/science/wp-content/uploads/2021/01/The_Worlds_Herbaria_2020.pdf



Top herbarium collections of Russia

	Institution	Code	Collections
1	Komarov Botanical Institute, RAS (St Petersburg)	LE	6,000,000
2	Moscow State University	MW	1,044,751
3	Central Siberian Botanical Garden, SB RAS (Novosibirsk)	NS + NSK	800,000
4	Saint Petersburg University	LECB	800,000
5	Main Botanical Garden, RAS (Moscow)	MHA	610,000
6	Institute of Biology and Soil Science, FEB RAS (Vladivostok)	VLA	500,000
7	Tomsk State University	TK	500,000
8	Komi Scientific Centre, RAS (Syktyvkar)	SYKO	407,000
9	Vavilov Institute of Plant Genetic Resources (St Petersburg)	WIR	376,825
10	Southern Federal University (Rostov-on-Don)	RV	350,000

Source: Thiers (2021)

http://sweetgum.nybg.org/science/wp-content/uploads/2021/01/The_Worlds_Herbaria_2020.pdf



Standard Published Floras

1. Complete floras
2. Checklists by Czerepanov
3. Basic regional floras



Two complete Russian floras in 200 years

“Flora Rossica” (1842–1853)

written by Ledebour



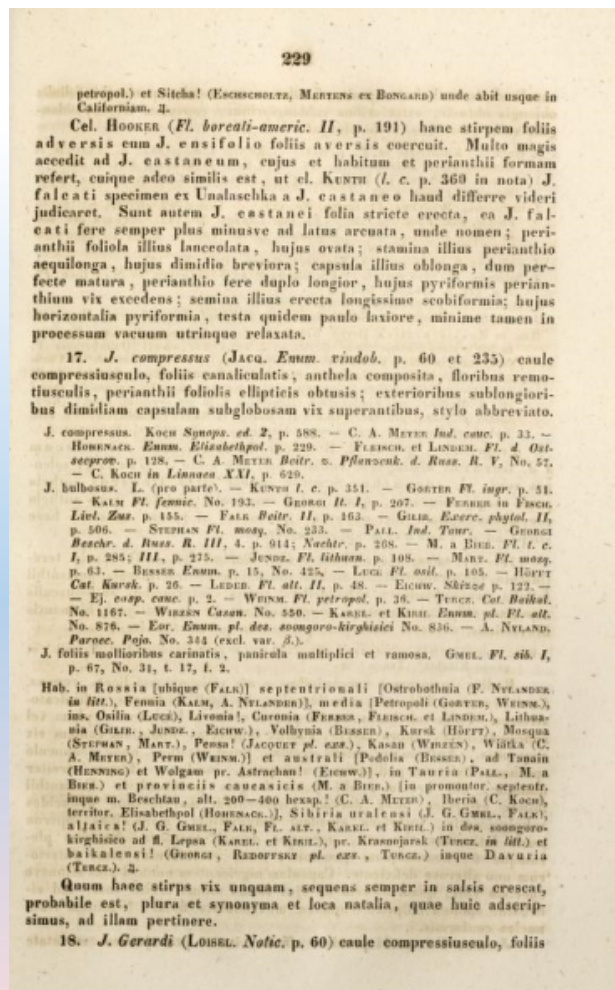
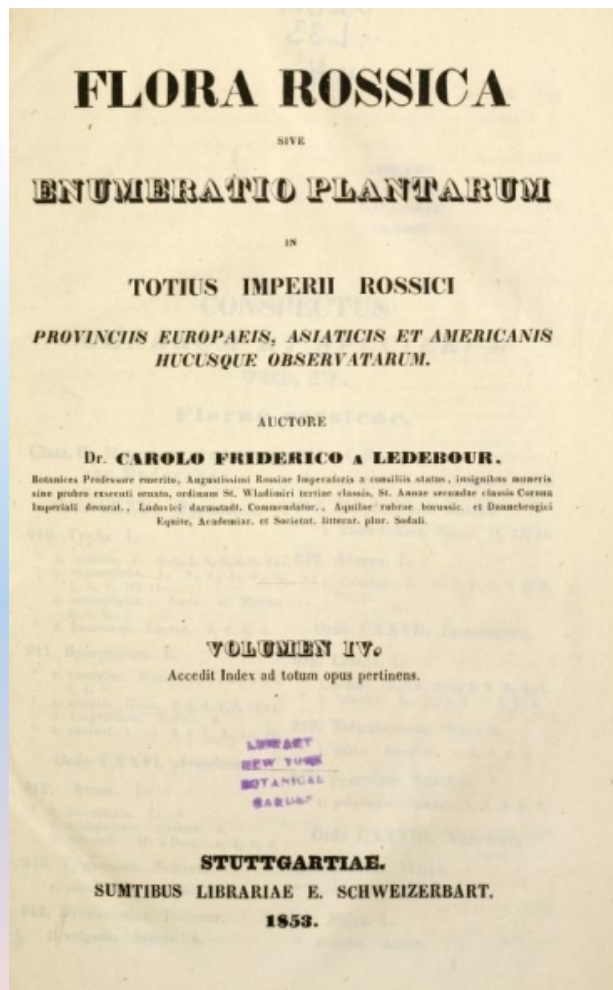
“Flora URSS” (1934–1964)

edited by Komarov





“Flora Rossica” (1842–1853) by Ledebour



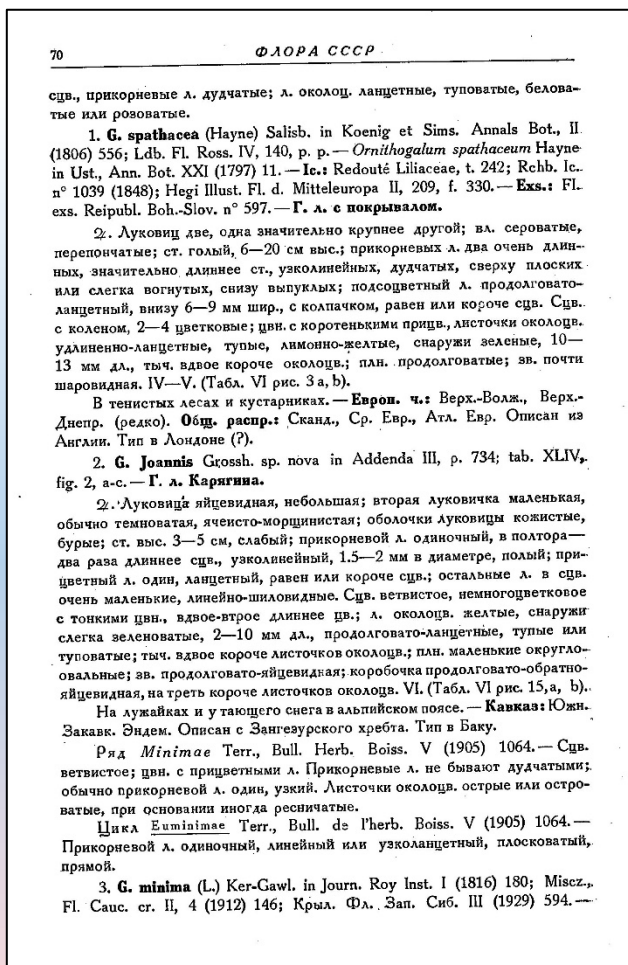
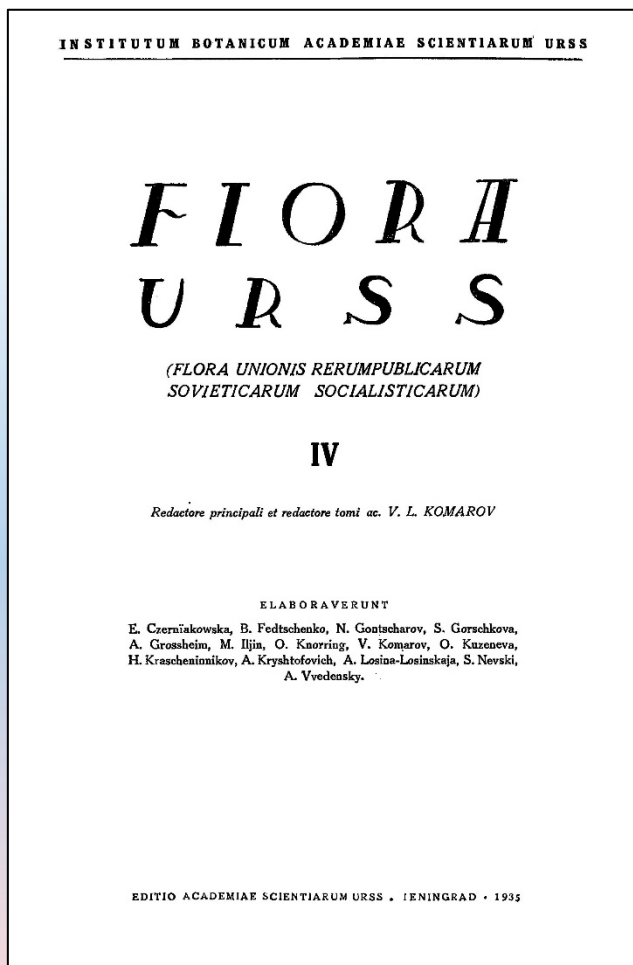
- 6,522 species
- 1,139 genera
- 146 families
- 4 volumes
- In Latin



Written by Carl Friedrich von Ledebour, a German botanists employed by Russia.



“Flora URSS” (1934–1964) by 92 authors



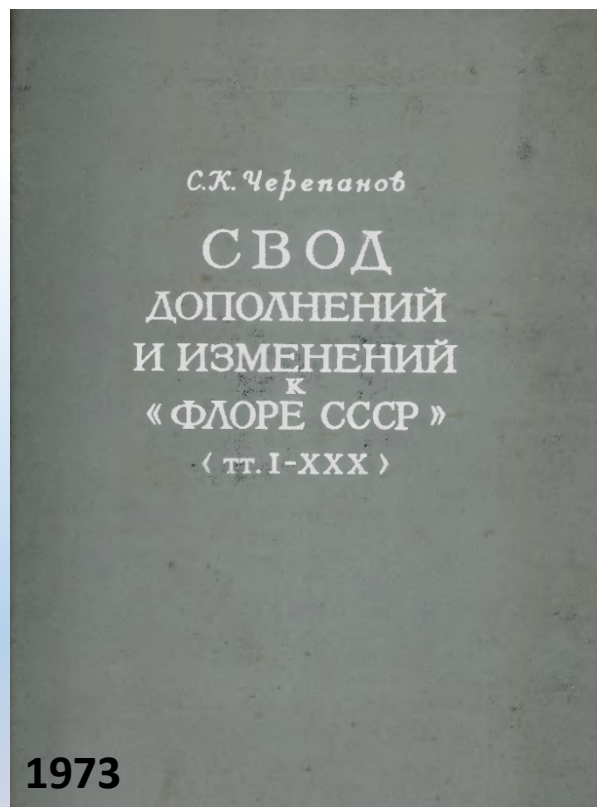
- 17,520 species
- 1,676 genera
- 160 families
- 30 volumes
- In Russian

(translated into English)

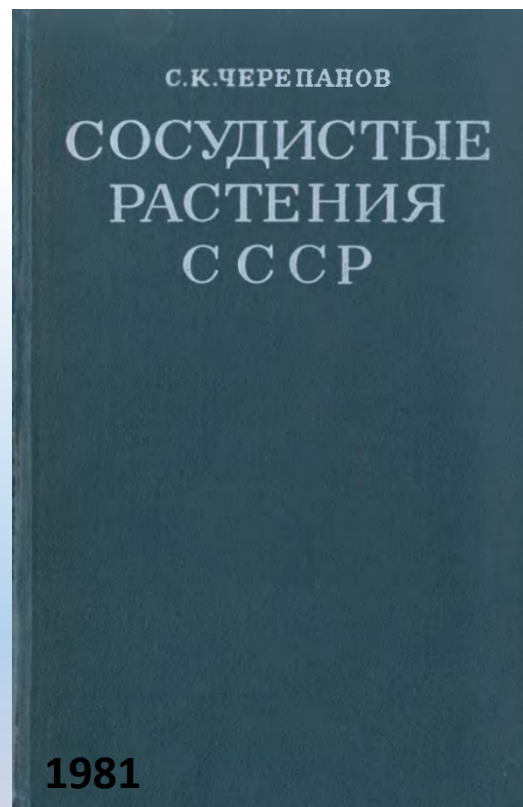
Written by Komarov Institute, RAS staff members under the leadership of V.L. Komarov (Leningrad, USSR)



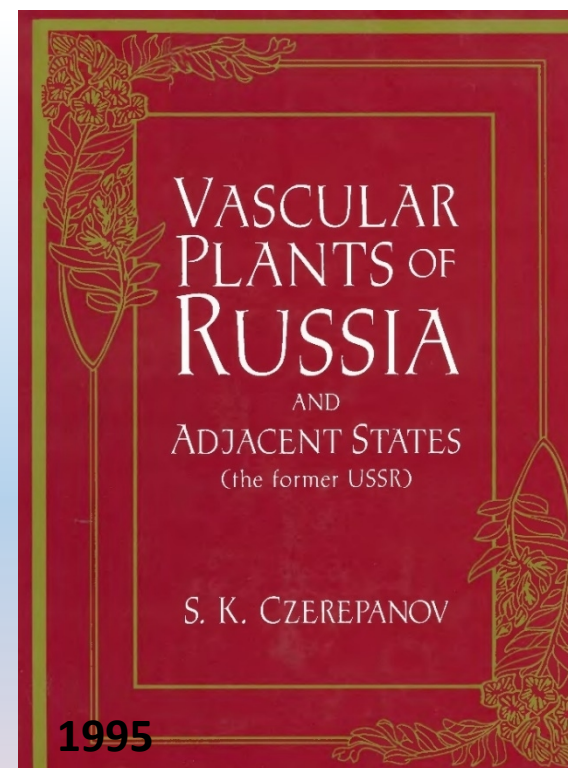
Checklists by Sergei Czerepanov



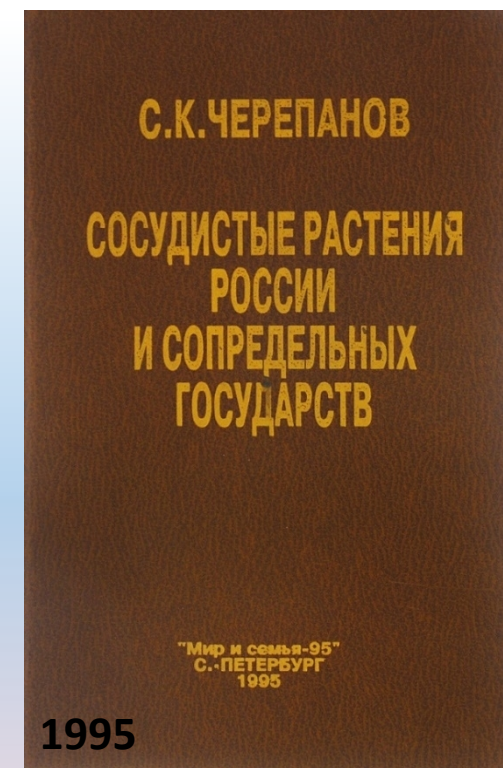
Additions to the "Flora URSS":
4,745 species and subspecies
added



A checklist #1: **22,238 taxa**
21,463 species
330 subspecies
445 hybrids

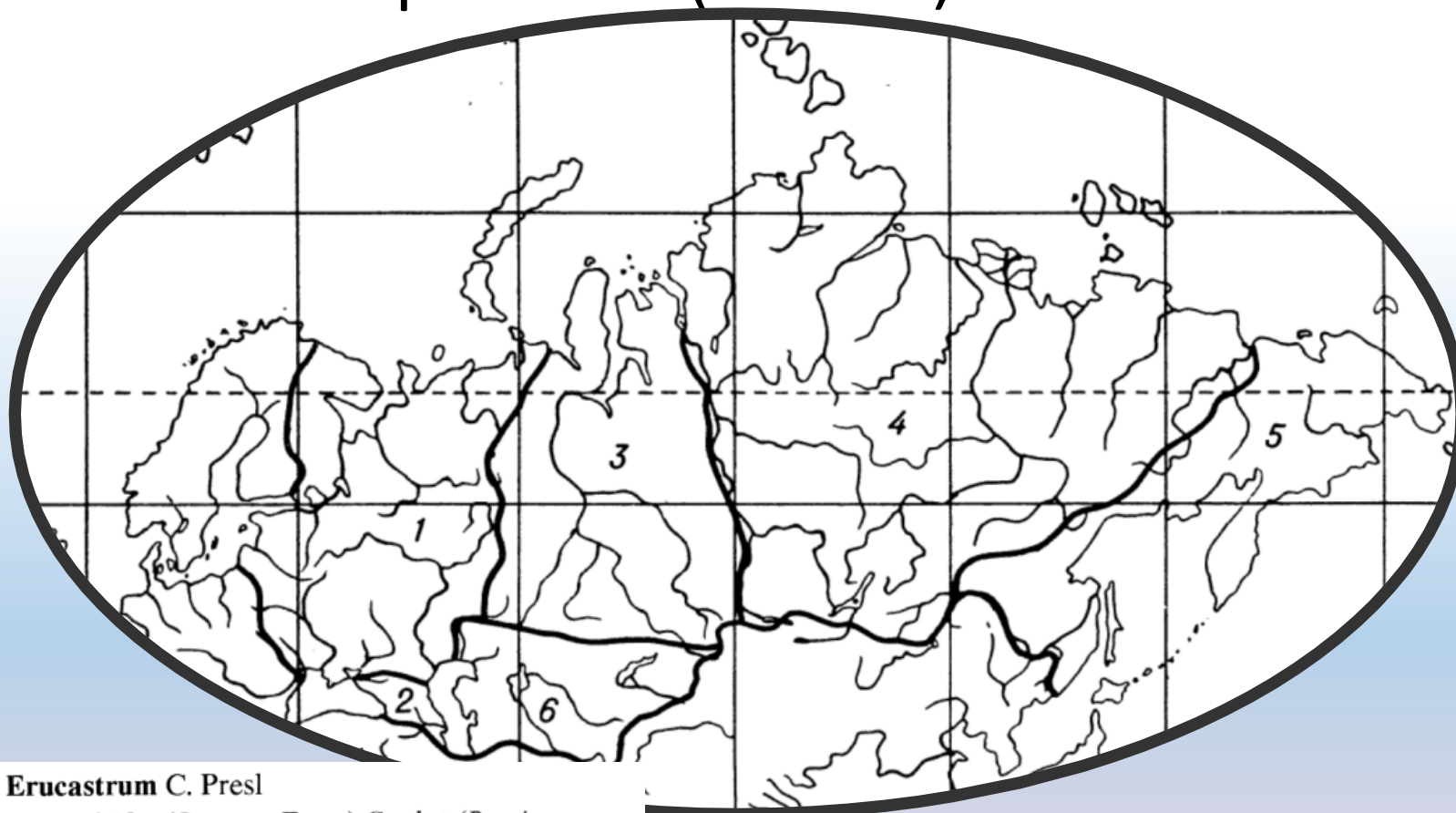


A checklist #2: **23,397 taxa** (international and Russian editions)
21,770 species, 500 subspecies, 594 hybrids,
533 most widely cultivated species





Czerepanov (1995): a distribution scheme



1. Eastern Europe
2. Caucasus
3. Western Siberia
4. Eastern Siberia
5. Far East
6. Middle Asia

Erucastrum C. Presl

armoracioides (Czern. ex Turcz.) Cruchet (*Brassica armoracioides* Czern. ex Turcz., *B. elongata* Ehrh. subsp. *armoracioides* (Czern. ex Turcz.) Aschers. & Graebn., *B. elongata* subsp. *intergrifolia* (Boiss.) Breistoffer, *B. elongata* auct.) - 1, 2, 3, 6

cretaceum Kotov (*Brassica elongata* Ehrh. var. *pinnatifida* Schmalh., *B. elongata* subsp. *pinnatifida* (Schmalh.) Greuter & Burdet) - 1

gallicum (Willd.) O.E. Schulz (*Sisymbrium gallicum* Willd.) - 1, 5(alien)

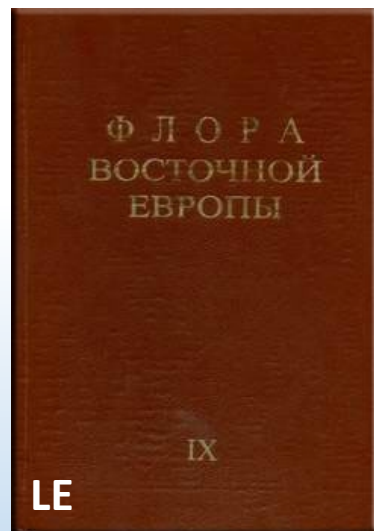
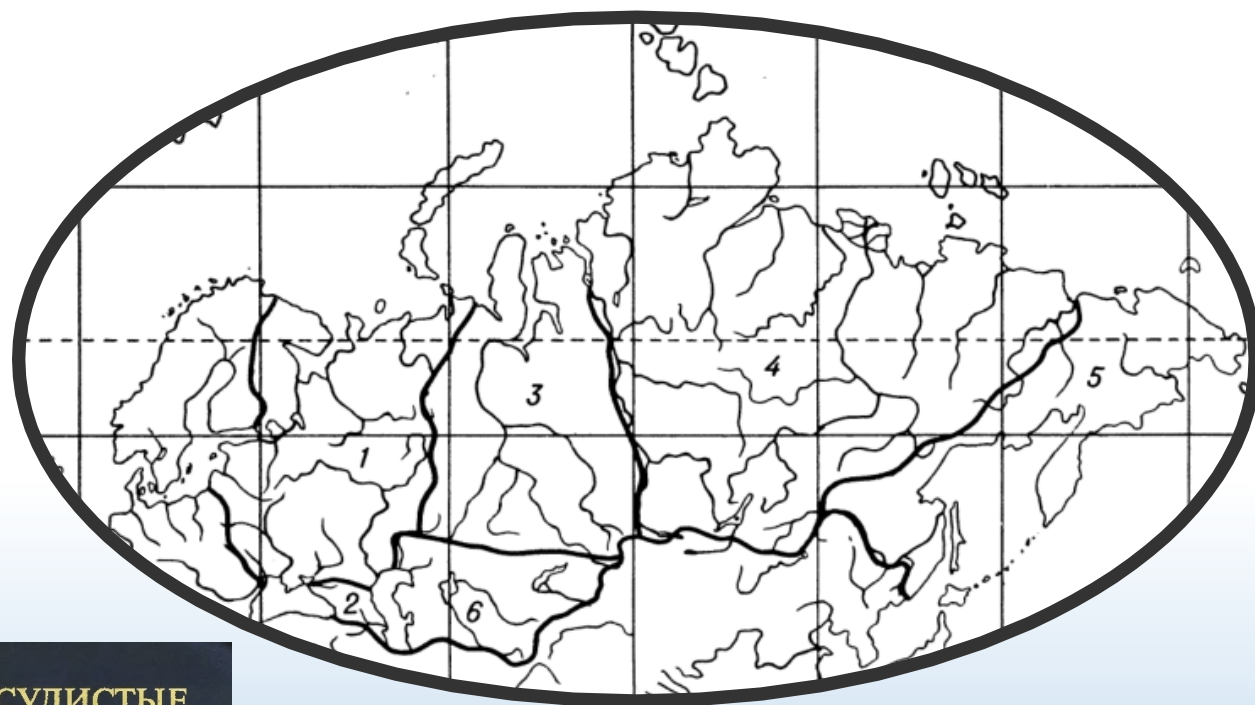
3,4,5 – in Russia

1,2 – partly in Russia

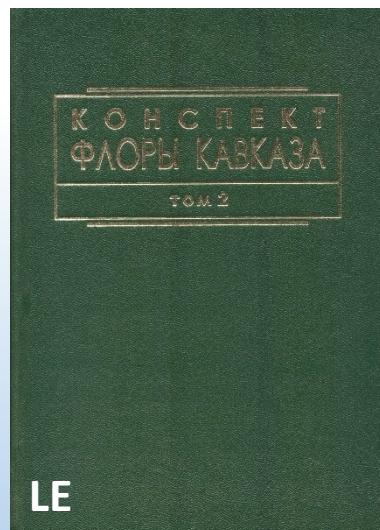
6 – outside Russia



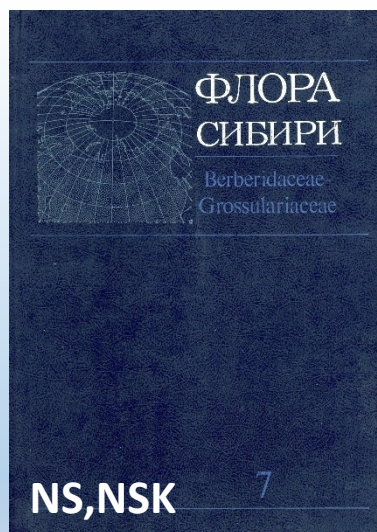
Five standard floras



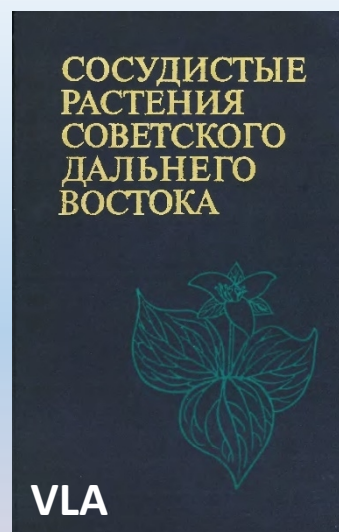
Area 1
1974-2004



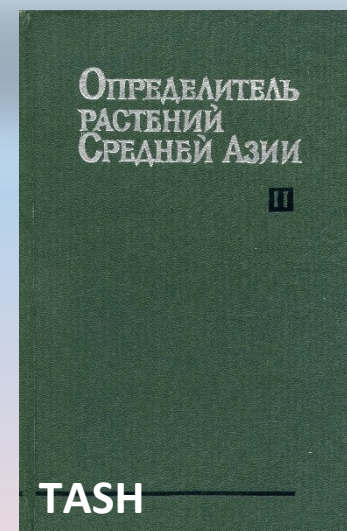
Area 2
2003-[2021]



Areas 3,4
1988-2003



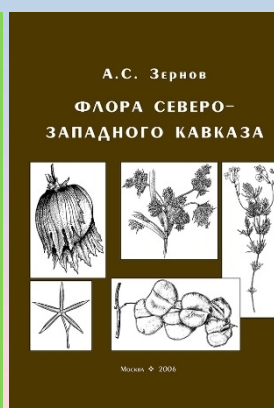
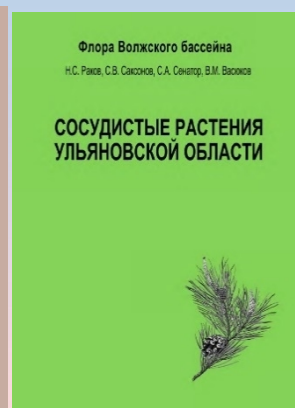
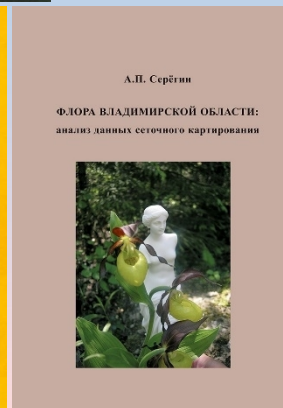
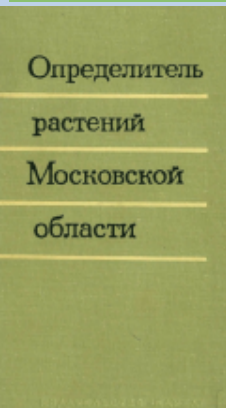
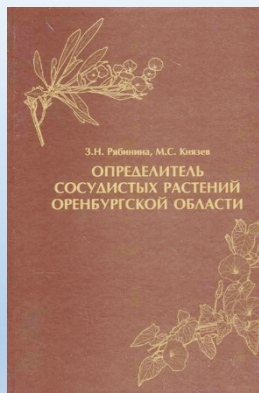
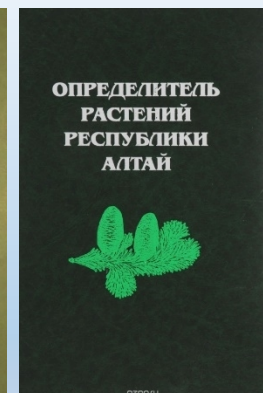
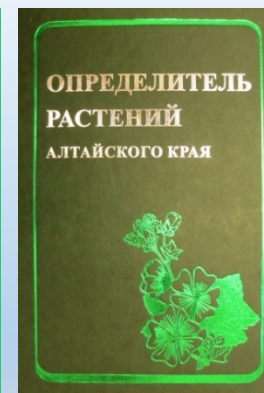
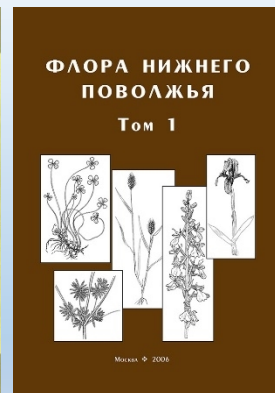
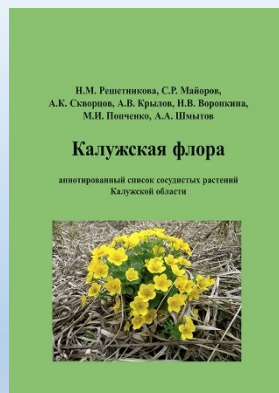
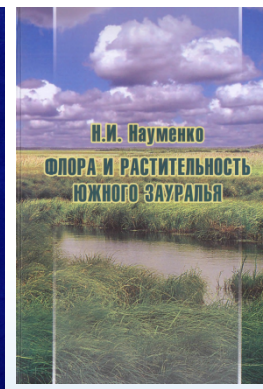
Area 5
1985-2006



Area 6
1968-1993

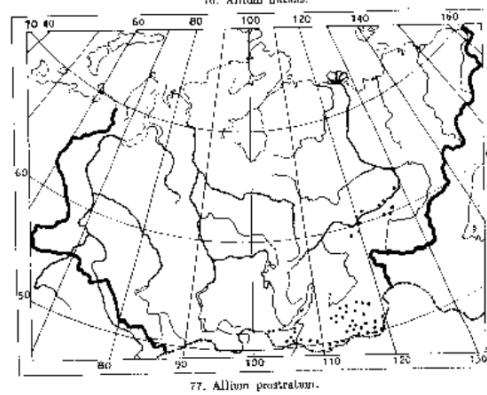
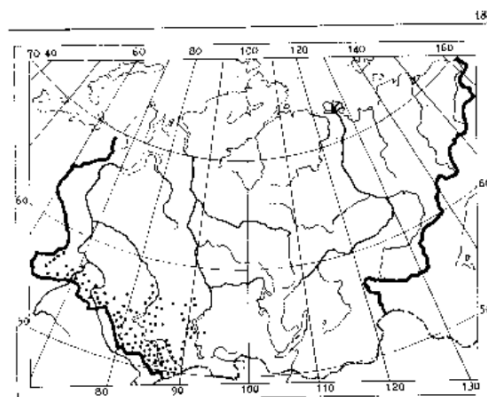
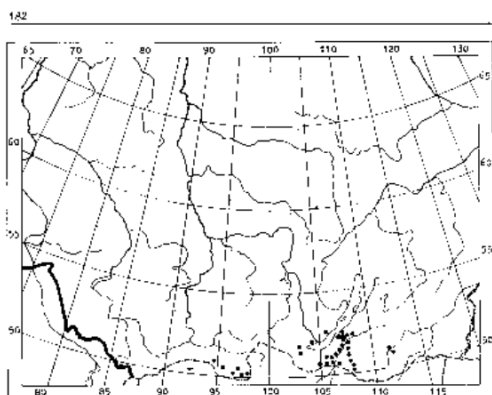


Dozens of regional floras, guides, checklists





Atlases and Floras with distribution maps



СОСУДИСТЫЕ РАСТЕНИЯ СОВЕТСКОГО ДАЛЬНЕГО ВОСТОКА

Vascular plants
of the Soviet
Far East
1986-1996

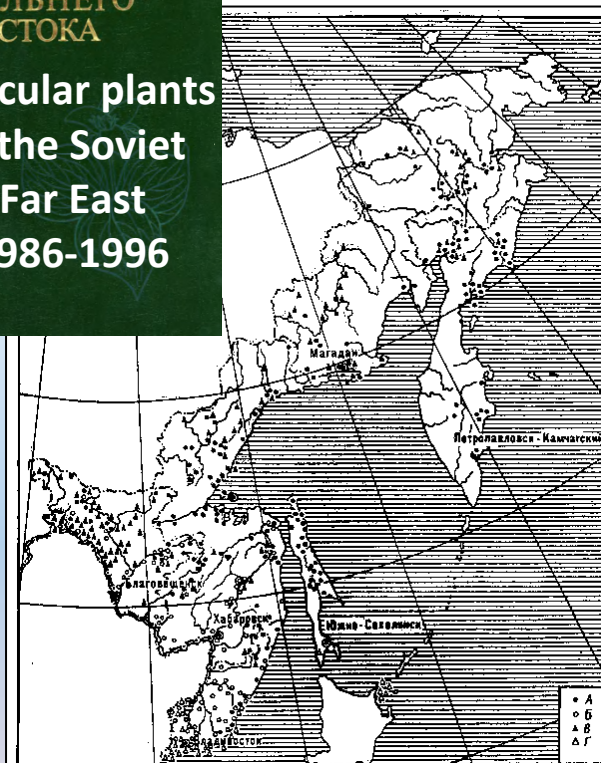
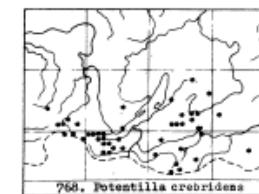
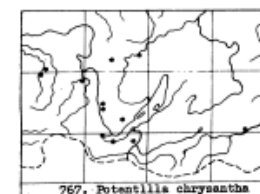
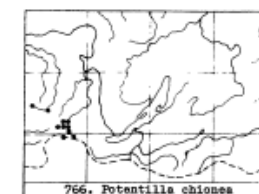
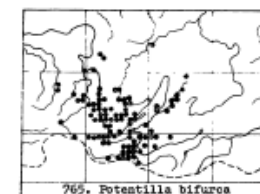


Рис. 5. А — *Betula middendorffii*, Б — *B. ovalifolia*, В — *B. fruticosa*, Г — *Alnus japonica*.

ерники. V. — Общ. распр.: Яп.-Кит. (Сев.-Вост. Китай, п-ов Корея). — Описан из Хабаров.: «Am Mittelern Amur oberhalb der Gorin-Mündung, 25 VII 1855, R. Maack» (тип — LE).

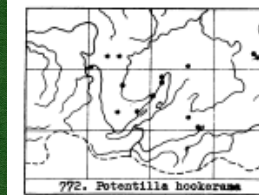
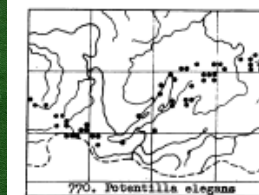
Прим. Близок к следующему виду и нередко рассматривается как подвид *B. fruticosa* subsp. *hybridula* (Trautv.) Kuhn, 1939, Rep. Inst. Sci. Res. Manch. 3: 165 (Lin. Fl. Manch.). Ухвалывались для РДВ Г.Н. Огуревый (1966) *B. reticulata* Rupr. (1857, Bull. Phys.-Math. Acad. Sci. Pétersb. 15: 378), видимо, описан по гибридным (*B. ovalifolia* × *B. fruticosa*) экз. Известен гибрид *B. ovalifolia* × *B. exilis*, с 2n = 56 (Пробатова, Соколовская, 1994).

12. *B. fruticosa* Pall. 1776, Reise Russ. Reich. 3: 758. — *B. extremorientalis* Kuzen. et V. Vassil. 1936, Вестн. Дальневост. фил. АН СССР, 21: 161. — *B. кустарниковая*.



ФЛОРА ЦЕНТРАЛЬНОЙ СИБИРИ

Flora of
Central Siberia
1979



ТОМ

ФЛОРА СИБИРИ

Исполнения
и исправления
АЛФАВИТНЫЕ
УКАЗАТЕЛИ

Flora of Siberia
1987-2003



No reliable data on the number of species in the flora of Russia

SpringerLink

On the Rostrum of the RAS Presidium | Published: February 2007

The Flora of Russia project (Russian federation)

[R. V. Kamelin](#)

[Herald of the Russian Academy of Sciences](#) **77**, 22–26(2007) | [Cite this article](#)

90 Accesses | 1 Citations | [Metrics](#)

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RAS Corresponding Member R. V. Kamelin

head president, the Russian Botanical Society, Russia
RAS Corresponding Member R. V. Kamelin

Additional information

Original Russian Text © R.V. Kamelin, 2007, published in Vestnik Rossiiskoi Akademii Nauk, 2007, Vol. 77, No. 1, pp. 22–26.

- An estimate by Kamelin (2007) is **12,500 species** – conception of moderate splitting.
- Moscow Digital Herbarium holds specimens of **10,197 species** – conception of moderate lumping used by *Catalogue of Life*.



Electronic resources

1. Digitized literature
2. Digitized herbarium collections
3. Databased literature records
4. Observations with photos from the community



Biblioteka "Flora i Fauna"

- A library of the Russian-language scanned monographs and serials on biodiversity
- 14,321 volumes
- Initiated by Alexey Shipunov (currently in US)
- Available at <http://herba.msu.ru/shipunov/school/sch-ru.htm>
- Russian language only

**Фундаментальная электронная библиотека
«Флора и фауна»**

растения, животные, грибы и водоросли, теория эволюции и систематики



Библиотека доступна по адресам: [1](#); [2](#) *.

Искать названия, содержание
Флора

Показать книг ***

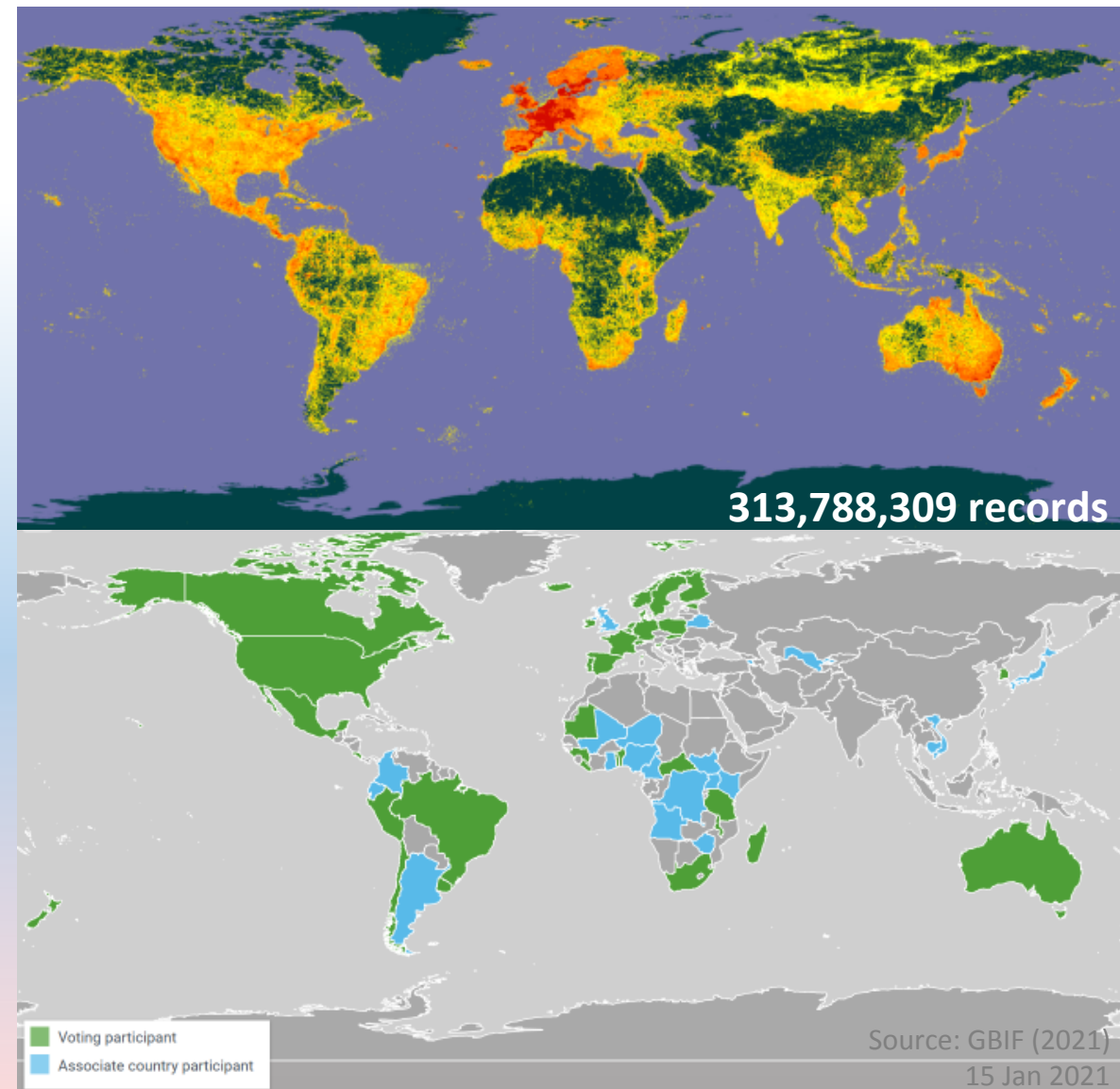
Область	Тип книги	Год	Название, формат и ссылка
Растения	Определитель	1966	Ворошилов В.Н. Флора Советского Дальнего Востока. М., 1966, CHM , PDF
Лишайники	Определитель	2019	Флора Беларуси. Лишайники. Т. 1. Candelariaceae - Verrucariaceae. Минск, 2019, DjVu+
Животные	Справочник	2009	Колтунов Е.В. Флора и фауна природного парка "Самаровский Чутас". Энтомофауна. Екатеринбург, 2009, DjVu+
Организмы	Справочник	2020	Флора и фауна острова Матуа (средние Курильские острова). Т. 1. Море. Череповец, 2020, PDF





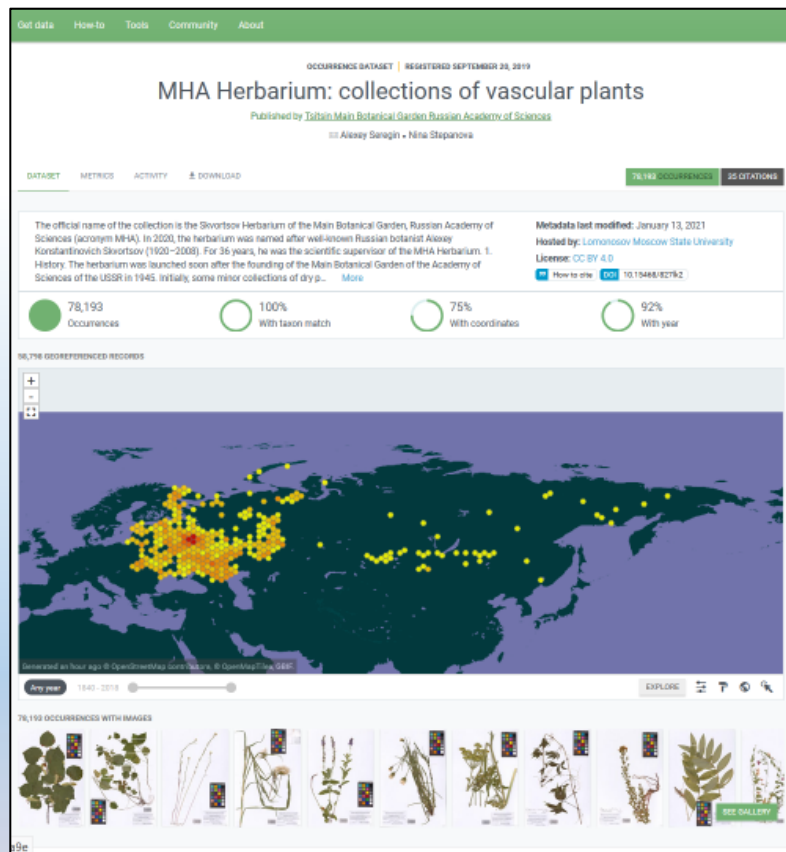
Russia in GBIF: vascular plants

1. France 58,273,994
2. Germany 27,264,091
3. Netherlands 20,562,419
4. Australia 19,328,323
5. United Kingdom 18,616,825
6. Spain 17,600,567
7. USA 17,352,134
8. Sweden 16,266,611
- ...
16. Russian Federation 2,852,102
- ...



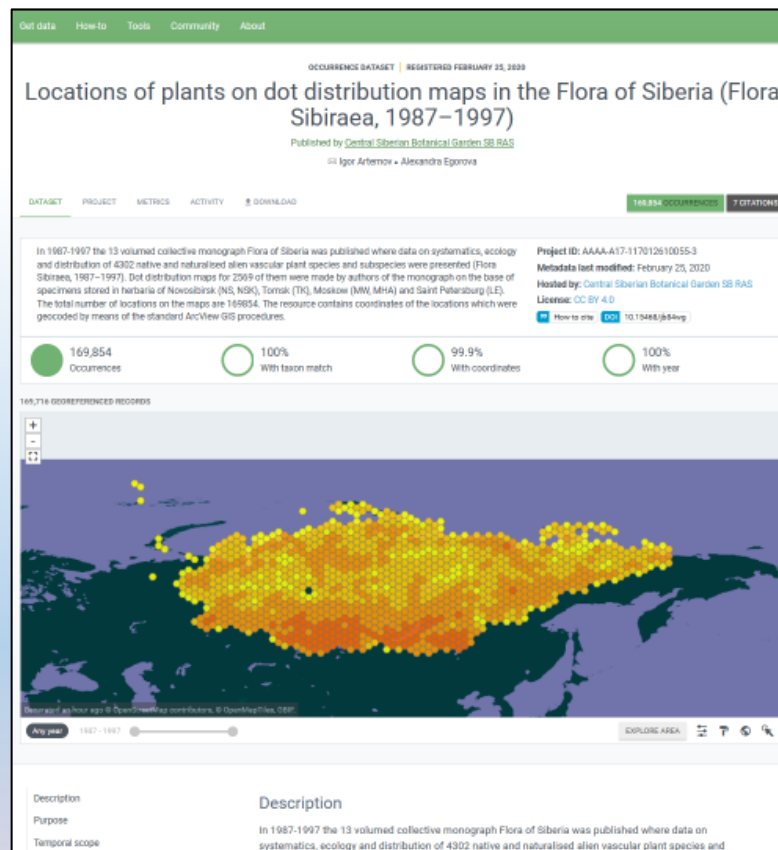


Three main sources of e-occurrences in GBIF



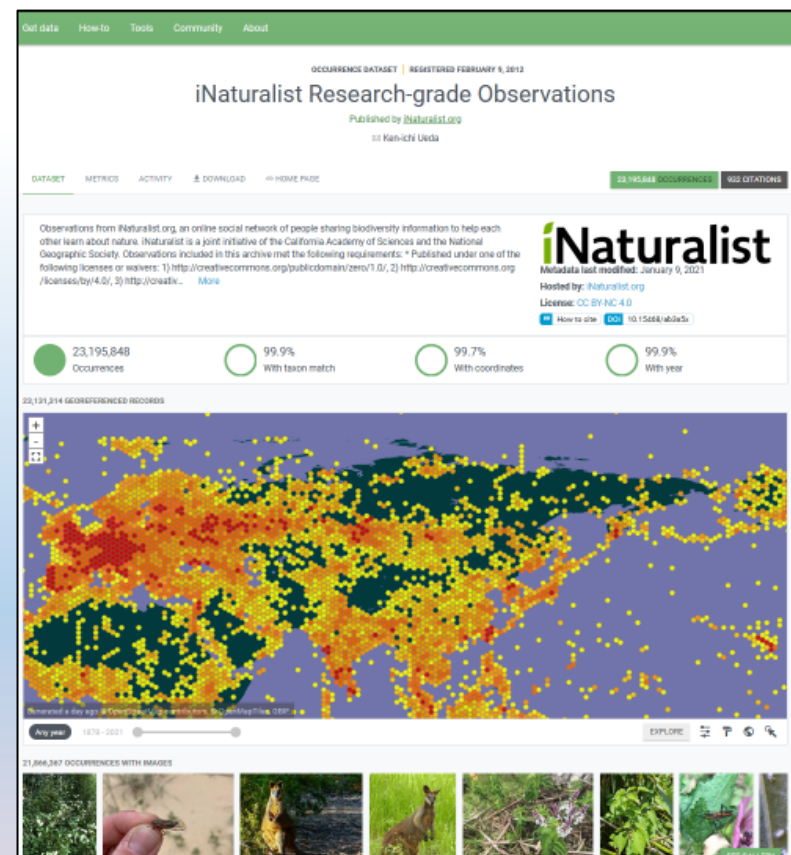
1. Digitized herbarium specimens

821,390 (29%)



2. Dots from published floras

169,854 (6%)



3. Records with photographic evidences

1,718,185 (65%)

Source: GBIF (2021)
15 Jan 2021



How many specimens are imaged in Russia?

Russia:

- 16,176,000 physical specimens
- 1,309,000 imaged
- **7,8% imaged**



World:

- 396,205,000 physical specimens
- ca. 62,000,000 imaged
- **15,6% imaged**





Top digital herbaria of Russia

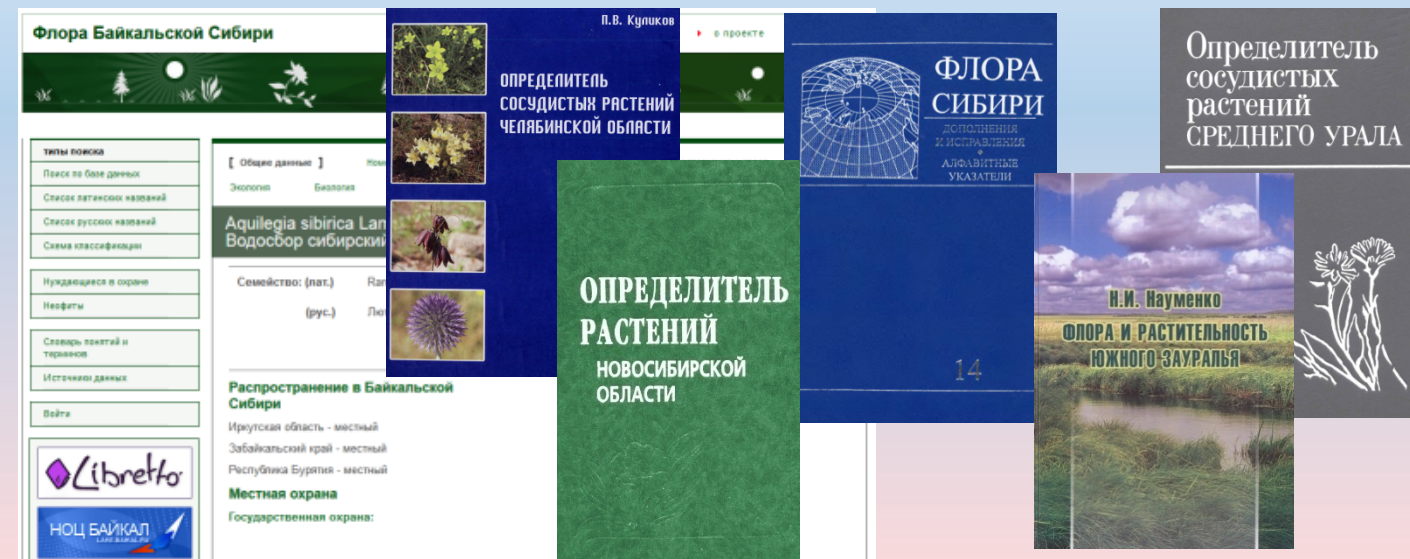
	Institution	Code	Images	Proportion of imaged specimens	Web-portal
1	Lomonosov Moscow State University (Moscow)	MW	1,029K	94%	https://plant.depo.msu.ru/ https://www.gbif.org/
2	Main Botanical Garden, RAS (Moscow)	MHA	78K	13%	https://plant.depo.msu.ru/ https://www.gbif.org/
3	Central Siberian Botanical Garden, RAS (Novosibirsk)	NS+ NSK	52K	7%	http://84.237.85.99:8081/ https://www.gbif.org/
4	Komarov Botanical Institute, RAS (Saint Petersburg)	LE	44K	<1%	http://herbariumle.ru/
5	Botanical Garden-Institute, RAS (Vladivostok)	VBGI	42K	53%	http://botsad.ru/herbarium/
6	Institute of Plant and Animal Ecology, RAS (Yekaterinburg)	SVER	18K	14%	https://herbarium.ipae.uran.ru/
7	Altai State University (Barnaul)	ALTB	17K	6%	http://old.ssbkg.asu.ru/
8	Tula State Pedagogical University (Tula)	TUL	9K	86%	https://plant.depo.msu.ru/ https://www.gbif.org/



Data mobilization from literature: Asian Russia (MAP initiative)

- Performed by Victor Chepinoga (Irkutsk) and his team
- **50** sources checked
- species lists for every **27** regions compiled
- data in form of Excel tables presented by **312,964** records
- **6,460** species, 488 subspecies, 177 varieties

No.	Family	Note	Advent	Endem	Species	Synonyms	Authors	Biblio
1255	Grossulariaceae				Ribes palczewskii		(Jancz.) Pojark.	Шлотгауз и др., 2001
1256	Grossulariaceae				Ribes pallidiflorum		Pojark.	Шлотгауз и др., 2001
1257	Grossulariaceae				Ribes pauciflorum		Turcz. ex Pojark.	Шлотгауз и др., 2001
1258	Grossulariaceae				Ribes procumbens		Pall.	Шлотгауз и др., 2001
1259	Grossulariaceae				Ribes triste		Pall.	Шлотгауз и др., 2001
1260	Haloragaceae				Myriophyllum sibiricum		Kom.	Шлотгауз и др., 2001
1261	Haloragaceae				Myriophyllum spicatum		L.	Шлотгауз и др., 2001
1262	Haloragaceae				Myriophyllum ussuriense		(Regel) Maxim.	Шлотгауз и др., 2001
1263	Haloragaceae				Myriophyllum verticillatum		L.	Шлотгауз и др., 2001
1264	Hemerocallidaceae				Hemerocallis coreana		Nakai	Шлотгауз и др., 2001
1265	Hemerocallidaceae				Hemerocallis esculenta		Koidz.	Шлотгауз и др., 2001
1266	Hemerocallidaceae				Hemerocallis lilio-asphodelus		L.	Шлотгауз и др., 2001
1267	Hemerocallidaceae				Hemerocallis middendorffii		Trautv. et C.A. Mey.	Шлотгауз и др., 2001
1268	Hemerocallidaceae				Hemerocallis minor		Mill.	Шлотгауз и др., 2001
1269	Hemerocallidaceae				Coniogramme intermedia		Hieron.	Шлотгауз и др., 2001
1270	Hippuridaceae				Hippuris lanceolata		Retz.	Шлотгауз и др., 2001
1271	Hippuridaceae				Hippuris tetraphylla		L.	Шлотгауз и др., 2001
1272	Hippuridaceae				Hippuris vulgaris		L.	Шлотгауз и др., 2001
1273	Huperziaceae				Huperzia arctica		(Tolm.) Sipl.	Шлотгауз и др., 2001
1274	Huperziaceae				Huperzia chinensis		(Christ) Czer.	Шлотгауз и др., 2001
1275	Huperziaceae				Huperzia selago		(L.) Bernh. ex Schrad.	Шлотгауз и др., 2001
1276	Huperziaceae				Huperzia serrata		(Thunb.) Rothm.	Шлотгауз и др., 2001
1277	Hydrangeaceae				Deutzia amurensis		(Regel) Airy Shaw	Шлотгауз и др., 2001
1278	Hydrangeaceae				Deutzia glabrata		Kom.	Шлотгауз и др., 2001
1279	Hydrangeaceae				Philadelphus schrenkii		Rupr. et Maxim.	Шлотгауз и др., 2001
1280	Hydrangeaceae				Philadelphus tenuifolius		Rupr. et Maxim.	Шлотгауз и др., 2001
1281	Hydrocharitaceae				Hydrilla verticillata		(L. fil.) Royle	Шлотгауз и др., 2001
1282	Hydrophyllaceae		advent		Phacelia tanacetifolia		Beuth.	Шлотгауз и др., 2001
1283	Hypolepidaceae				Pteridium aquilinum		(L.) Kuhn	Шлотгауз и др., 2001
1284	Iridaceae				Iris ensata		Thunb.	Шлотгауз и др., 2001
1285	Iridaceae				Iris humilis		Georgi	Шлотгауз и др., 2001





Atlases and Floras with distribution maps: digitization efforts

www.dmap.co.uk/index.htm

DMAP
Distribution mapping software

CONTENTS

For prospective users:
General Description
Example Maps
What the users say...
Publications
Orders and Payments
Demonstration Version
Contact Alan Morton

For existing users:
Development History
(337.6 now available!)
Data Entry
Recorder 2000/2/6
Add-on Utilities
Additional Maps
How to...
Problems
About Alan Morton

Other resources:
Transverse Mercator Calculator
UTM World Map
Links to other Sites
Contact Alan Morton

Pages last revised:
17 July 2017

Hosted by:
ICM Computing Services

General Description:

DMAP for Windows is mapping software designed specifically for producing Distribution Maps and Coincidence Maps which are displayed in colour on-screen, with multiple zoom capability. The maps can be printed at high resolution in colour or black and white, or they can be exported as high-resolution images to other software for incorporating high-quality maps in reports or publications.

Base maps for specific areas can be supplied Internet, or they can be newly-digitized using **DMAP** they can be produced by a scanner.

Data entry for **DMAP** is very flexible and can be used for biological recording software package. The other metric co-ordinates, UK PostCodes, etc.

DMAP is used by numerous individuals and of comments from a few of these users can

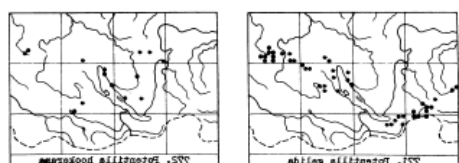
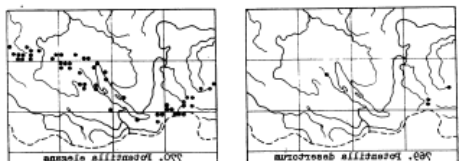
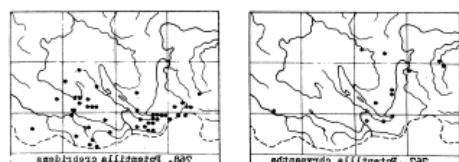
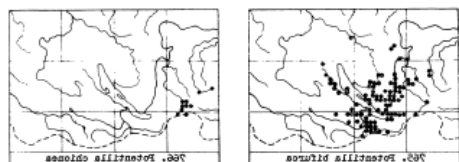
Main Features:

- Can be used for any scale of mapping
- Offers a wide range of symbol types
- A Key to symbol types can be generated
- Comes with maps for the British Isles (resolution).
- Additional maps available, including Base maps can be digitized images of Latitude-Longitude co-ordinates up British, Irish, and UTM Grid Referer
- UK PostCodes supported.
- User-supplied text can be displayed on
- Multiple zoom facility.

ФЛОРА ЦЕНТРАЛЬНОЙ СИБИРИ

Flora of Central Siberia 1979

Том II



34,893 localities for 1,284 species

№	Семейство	Род	Вид	Координаты	Страна	Год
1	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
2	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
3	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
4	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
5	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
6	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
7	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
8	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
9	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
10	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
11	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
12	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
13	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
14	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
15	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
16	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
17	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
18	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
19	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
20	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
21	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
22	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
23	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
24	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
25	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
26	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
27	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
28	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
29	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
30	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
31	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
32	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
33	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
34	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
35	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
36	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
37	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
38	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
39	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
40	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
41	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
42	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
43	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
44	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
45	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
46	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
47	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
48	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
49	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951
50	Malvaceae	Althaea	Althaea rosea	56°N 96°E	Kazakhstan	1951

НАУЧНЫЙ ЖУРНАЛ
РАСТИТЕЛЬНЫЙ МИР АЗИАТСКОЙ РОССИИ

Растительный мир Азиатской России, 2017, № 3(27), с. 70–78

http://www.izdatgeo.ru

УДК 911.2:591.9(571.5)

DOI:10.21782/RMAR1995-2449-2017-3(70-78)

**GRID MAPS OF THE COMPENDIUM
“FLORA OF CENTRAL SIBERIA” (1979) IN DIGITAL FORMAT:
OUTCOMES AND PROSPECTS OF APPLICATION**

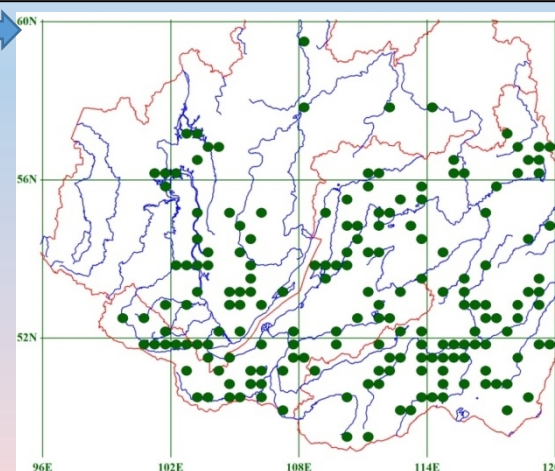
V.V. Chepinoga^{1,2}, V.A. Petukhin², D.P. Stalmakova²

¹V.B. Sochava Institute of Geography, SB RAS,
664033, Irkutsk, Ulan-Batorskaya str., 1, e-mail: Victor.Chepinoga@gmail.com

²Irkutsk State University,
664003, Irkutsk, K. Marks str., 1, e-mail: slava@isu.ru, ya.mariaru2013@yandex.ru

Floristic compendium “Flora of Central Siberia” published in 1979 was the first experience of floristic grid mapping on territory of Russia. The compendium contents grid maps for 1284 species and subspecies, representing 53.8 % of the flora. The grid system used in compendium coincides with nomenclature and national grid system of Russian geographical maps that allowed us to determine coordinates of grids and perform geographical binding of 34 893 records of mapped species. Accuracy indication of coordinates depends on the size of grid and is $\pm(14-18)$ km for the compendium. Such accuracy is quite acceptable for small-scale mapping of distribution areas of species of such large area as Central Siberia. The created database can become the basis for organizing the comprehensive information system on localities of vascular plant species within the region. Such a system is needed for various tasks of botany, biogeography, ecological modeling and nature conservation.

Kew words: flora, plant geography, grid mapping, floristic databases, vascular plants, Eastern Siberia, Baikal Siberia





Theoretical example of the text parsing (Guide for the Moscow Oblast Plants, 1966)

леса, б. ч. в тенистых или более влажных местах на рыхлой почве. По всей обл., не редко. (Рис. 108). *E. helleborine* (L.) Crantz (*E. latifolia* (L.) All.) — Д. широколистный.

4. *Malaxis*. Стеллачка

2. 10—40. VII—нач. VIII. Сыроватые хвойные, хвойно-мелколиственные и мелколиственные (береза, осина) леса, окраины моховых болот, изредка в Сев., Кл.-Дм., Зап., Вост., редко в Приокск. *M. monophyllos* (L.) Sw. (*Microstylis monophyllos* Lindl.) — С. однолистная.



Рис. 108. *Epipactis helleborine* (L.) Crantz
Рис. 109. *Corallorhiza trifida* Chatel.

5. *Hammarbya*. Мякотница

2. 8—20. $\frac{2}{2}$ VII—VIII. Моховые и осоково-моховые болота, редко в Сев., Кл.-Дм., Вост. *H. paludosa* (L.) O. Ktze. (*Malaxis paludosa* Sw.) — М. болотная.

6. *Liparis*. Лосняк

2. 8—20. $\frac{2}{2}$ VI— $\frac{1}{2}$ VIII. Сфагновые и переходные болота, на влажном илу или торфе, очень редко у сев.-вост. окраин Москвы и в Зап. (Тростенское оз.). *L. loeselii* (L.) Rich. — Л. Лёзеля.

5. *Hammarbya*. Мякотница

2. 8—20. $\frac{2}{2}$ VII—VIII. Моховые и осоково-моховые болота, редко в Сев., Кл.-Дм., Вост. *H. paludosa* (L.) O. Ktze. (*Malaxis paludosa* Sw.) — М. болотная.

6. *Liparis*. Лосняк

2. 8—20. $\frac{2}{2}$ VI— $\frac{1}{2}$ VIII. Сфагновые и переходные болота, на влажном илу или торфе, очень редко у сев.-вост. окраин Москвы и в Зап. (Тростенское оз.). *L. loeselii* (L.) Rich. — Л. Лёзеля.

Genus number

Genus name (Latin)

Genus name (vernacular)

Life form

Height

Flowering

Habitats (ecology)

Formal rarity

Distribution

Species (lat.)

Synonymy

Species (vernacular)

Определитель
растений
Московской
области

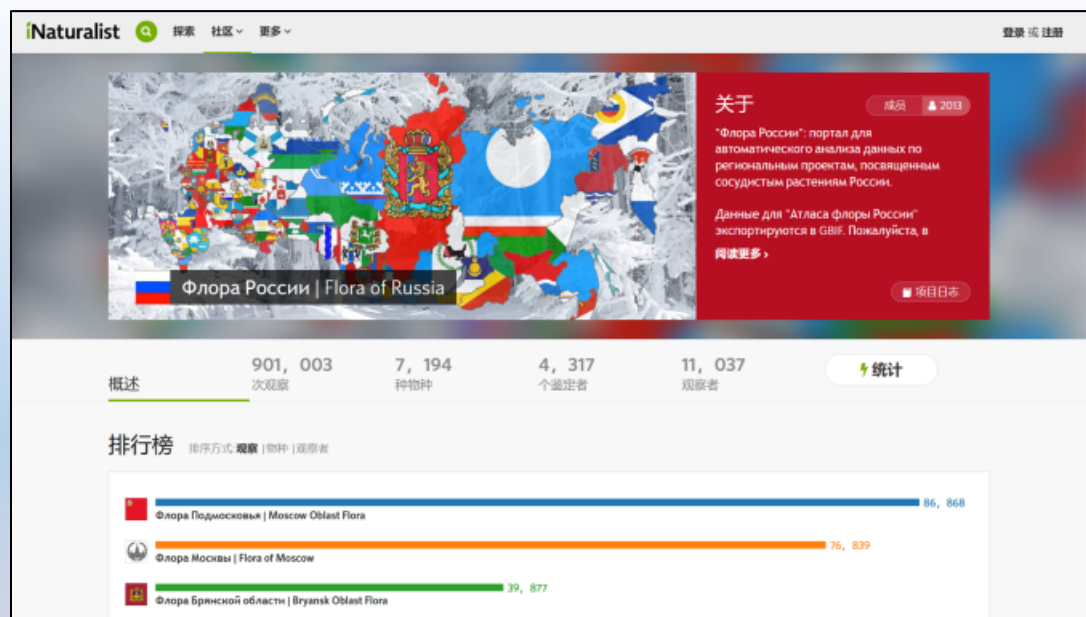


Text parsing results: a database (theoretical example)

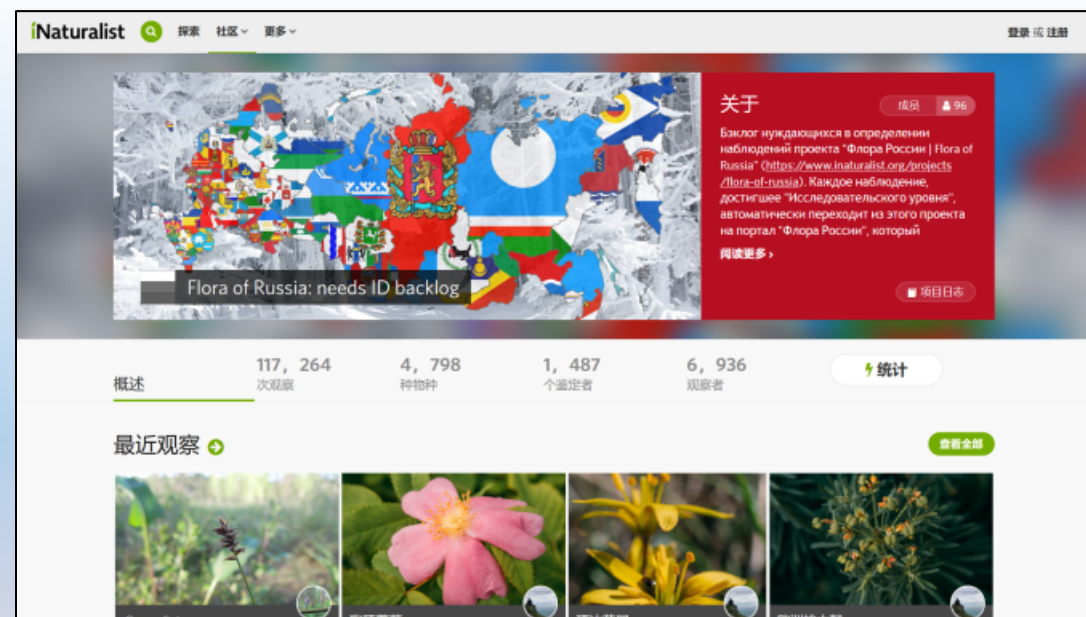
Field	Original value (verbatim)	Standardized value	Author	Reference
Genus number	5	5	A.K. Skvortsov	Определитель..., 1966
Genus name (Latin)	Hammarbya	Hammarbya	A.K. Skvortsov	Определитель..., 1966
Genus name (vernacular)	Мякотница	Мякотница	A.K. Skvortsov	Определитель..., 1966
Life form	h	Perennial	A.K. Skvortsov	Определитель..., 1966
Height (minimum)	8	8	A.K. Skvortsov	Определитель..., 1966
Height (maximum)	20	20	A.K. Skvortsov	Определитель..., 1966
Flowering period (start)	2/2 VII	Second half of July	A.K. Skvortsov	Определитель..., 1966
Flowering period (end)	VIII	August	A.K. Skvortsov	Определитель..., 1966
Habitats (ecology)	Моховые и осоково-моховые болота	Моховые и осоково-моховые болота	A.K. Skvortsov	Определитель..., 1966
Formal rarity	редко	Rare	A.K. Skvortsov	Определитель..., 1966
Distribution	Сев., Кл.-Дм., Вост.	Northern Region Klin-Dmitrov Region Eastern Region	A.K. Skvortsov	Определитель..., 1966
Species name (Latin)	Hammarbya paludosa	Hammarbya paludosa	A.K. Skvortsov	Определитель..., 1966
Author of the taxon	(L.) O. Ktze.	(L.) Kuntze	A.K. Skvortsov	Определитель..., 1966
Synonymy	M. paludosa Sw.	Malaxis paludosa Sw.	A.K. Skvortsov	Определитель..., 1966
Species name (vernacular)	М. болотная	Мякотница болотная	A.K. Skvortsov	Определитель..., 1966



“Flora of Russia” on iNaturalist: photo observations from the community



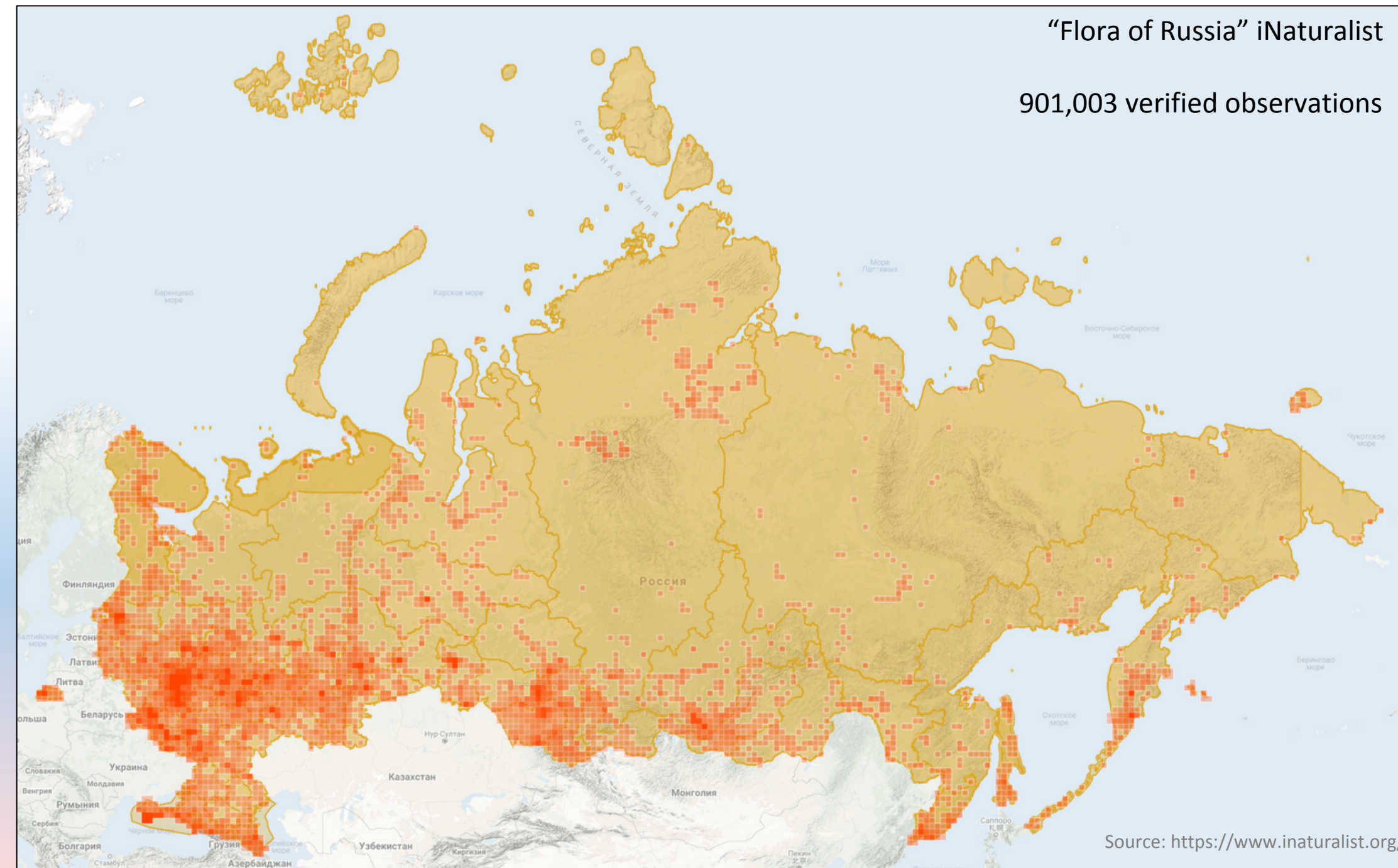
901,003 verified observations
7,194 species
11,037 observers
2,013 subscribers (members of the community)



117,264 unverified observations

“Flora of Russia” iNaturalist

901,003 verified observations

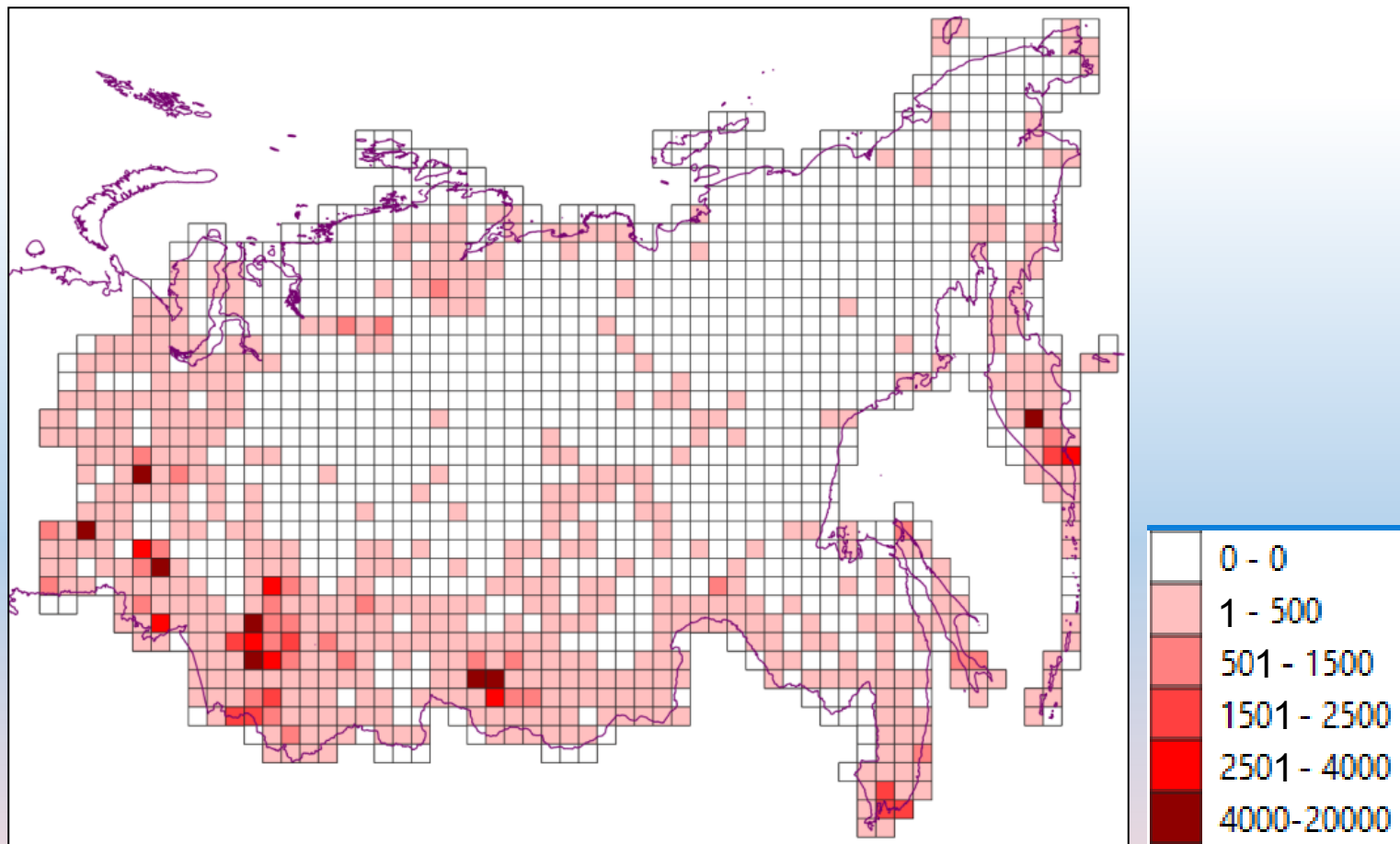


Source: <https://www.inaturalist.org/projects/flora-of-russia>

15 Jan 2021

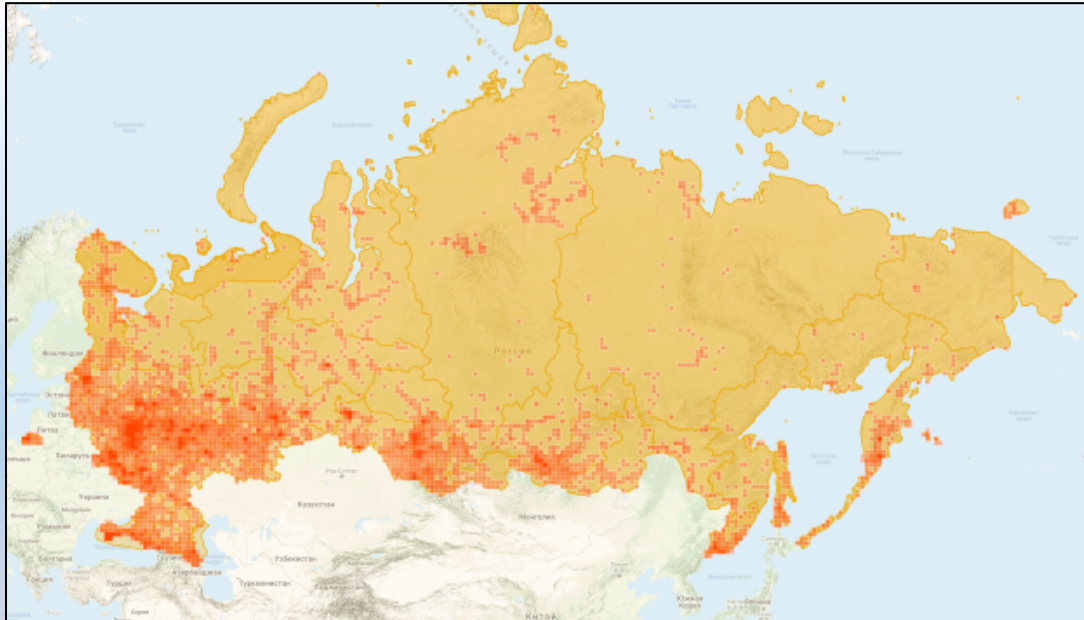


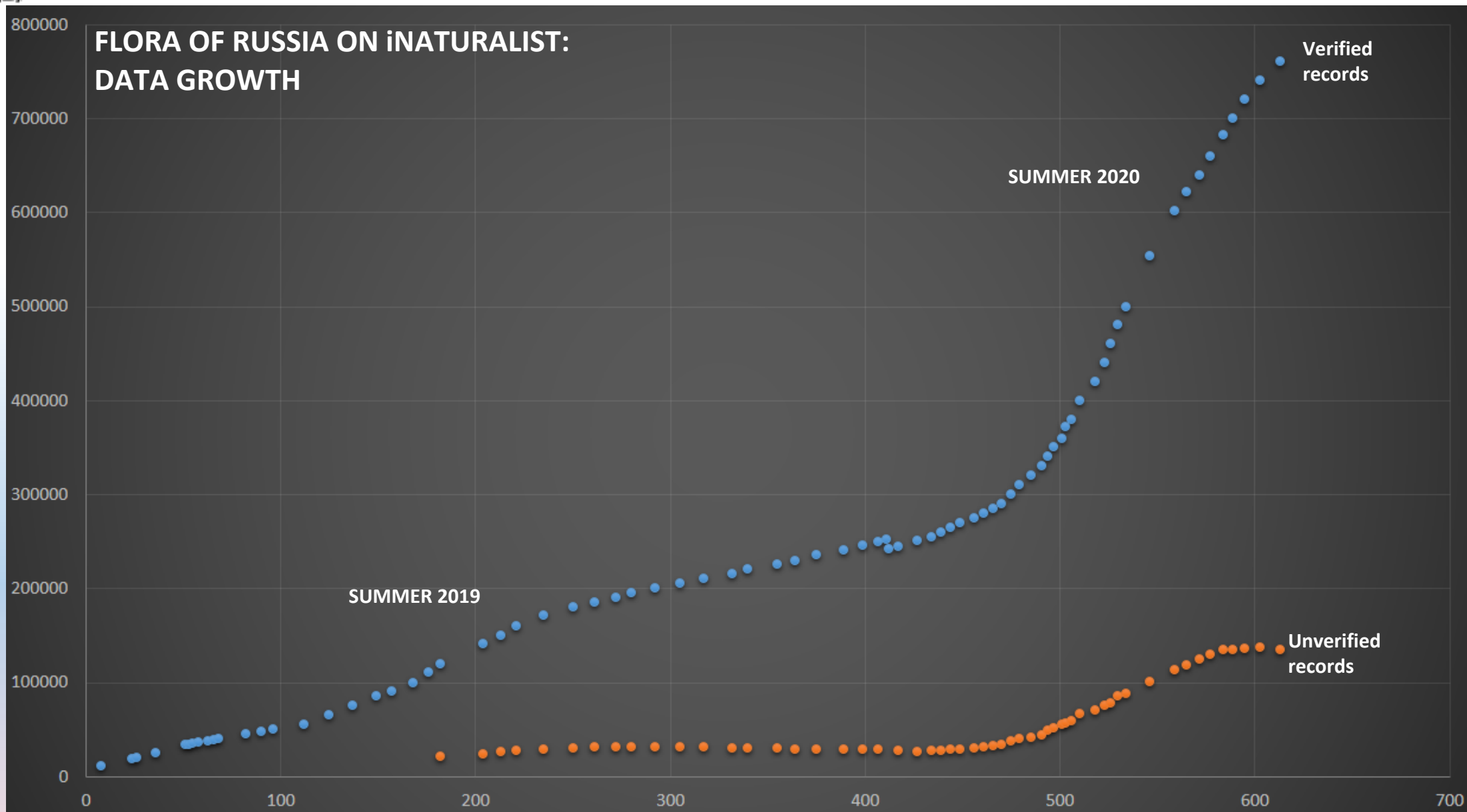
Records per 100x100 km grids: Asian Russia ("Flora of Russia" on iNaturalist)





Density of citizen science data vs. population density







Community of the project

Top observers of “Flora of Russia”



Alexey Seregin,
Moscow State University



Nikolay Degtyarev,
Central Chernozem Reserve



Nikolay Panasenکو,
Bryansk State University



Sergey Appolonov,
Independent Res., Shumerlya



Ekaterina Kashirina,
Moscow State University



Marina Gorbunova,
Independent Res., Korolyov



Vladimir Teploukhov,
Omsk Forest Department



Igor Pospelov,
Severtsov Institute, RAS

Top experts of “Flora of Russia” on iNaturalist



Dmitry Bochkov,
Moscow State University



Sergey Mayorov,
Moscow State University



Julia Shner,
Moscow State University



Alexey Seregin,
Moscow State University



Igor Kuzmin,
Tyumen State University



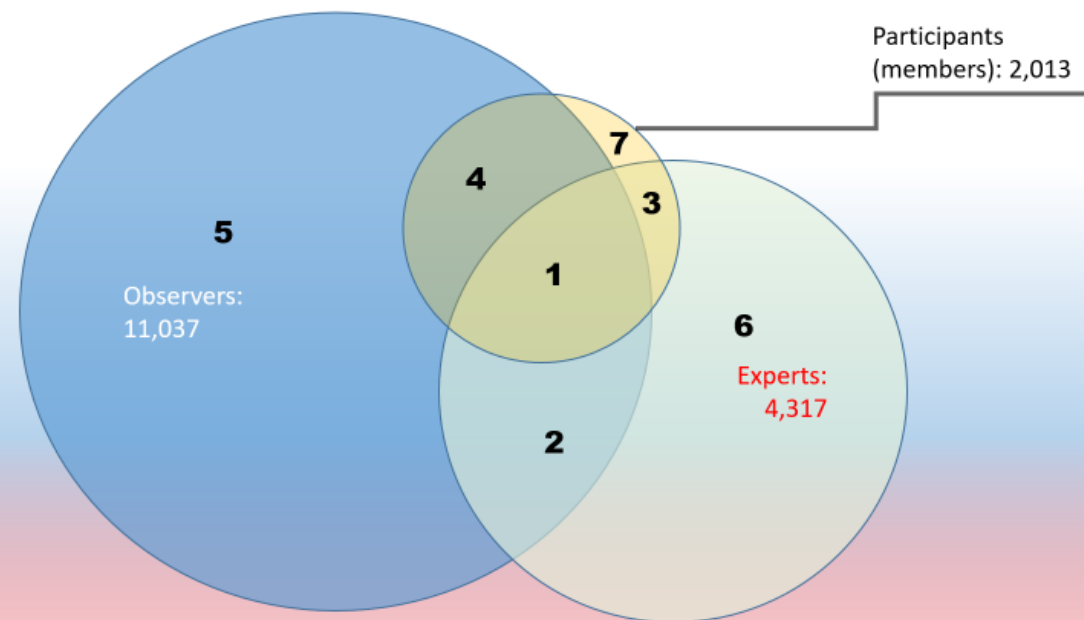
Alexander Khimin,
Pavlovsk School #2



Ruslan Nurkhanov,
Almaty, Kazakhstan



Sergey Lednev,
Moscow State University





Distribution data online (not in GBIF)



Плантариум

Открытый онлайн атлас-определитель растений и лишайников России и сопредельных стран

Общая информация

- О проекте
- Данные
- Участие
- Права
- Ответственность
- Как сослаться

Статистика

Таксоны: 49753
Определяемые виды: 5312
Латинские названия: 113143
Русские названия: 67567
Фото растений: 521886
Таксоны с фото: 23620
Географические точки: 5876
Фото ландшафтов: 31892
Активные участники: 1457

Сервисы

- **Определение растения** позволяет узнать его название по внешнему виду.
- **Поиск таксонов** даёт возможность найти изображения и описания свойств растений и лишайников.
- **Поиск регионов и точек** ведёт на страницы с пейзажами и коллекциями фото растений и лишайников из самых разных мест.

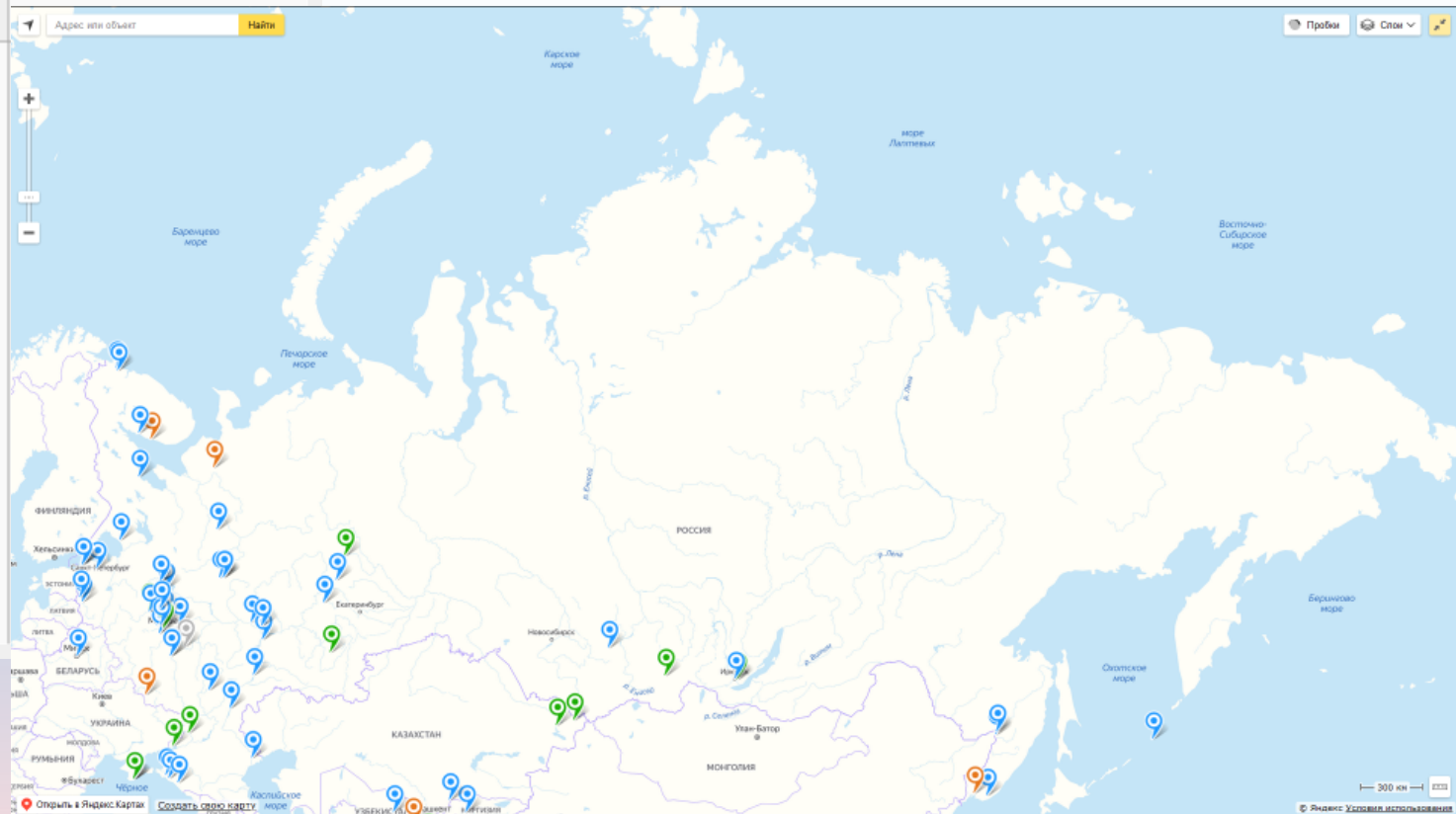
О проекте

«Плантариум» — атлас видов и иллюстрированный online определитель растений, предназначенный для широкого круга пользователей — как для любителей, так и для профессионалов — ботаников, геоботаников и экологов.

Основная задача нашего сайта — помощь в определении дикорастущих растений и лишайников, найденных на территории стран, ранее входивших в состав СССР. Цель проекта — собрать фотографии и включить в определитель как можно больше видов не

Плантариум

определитель растений онлайн



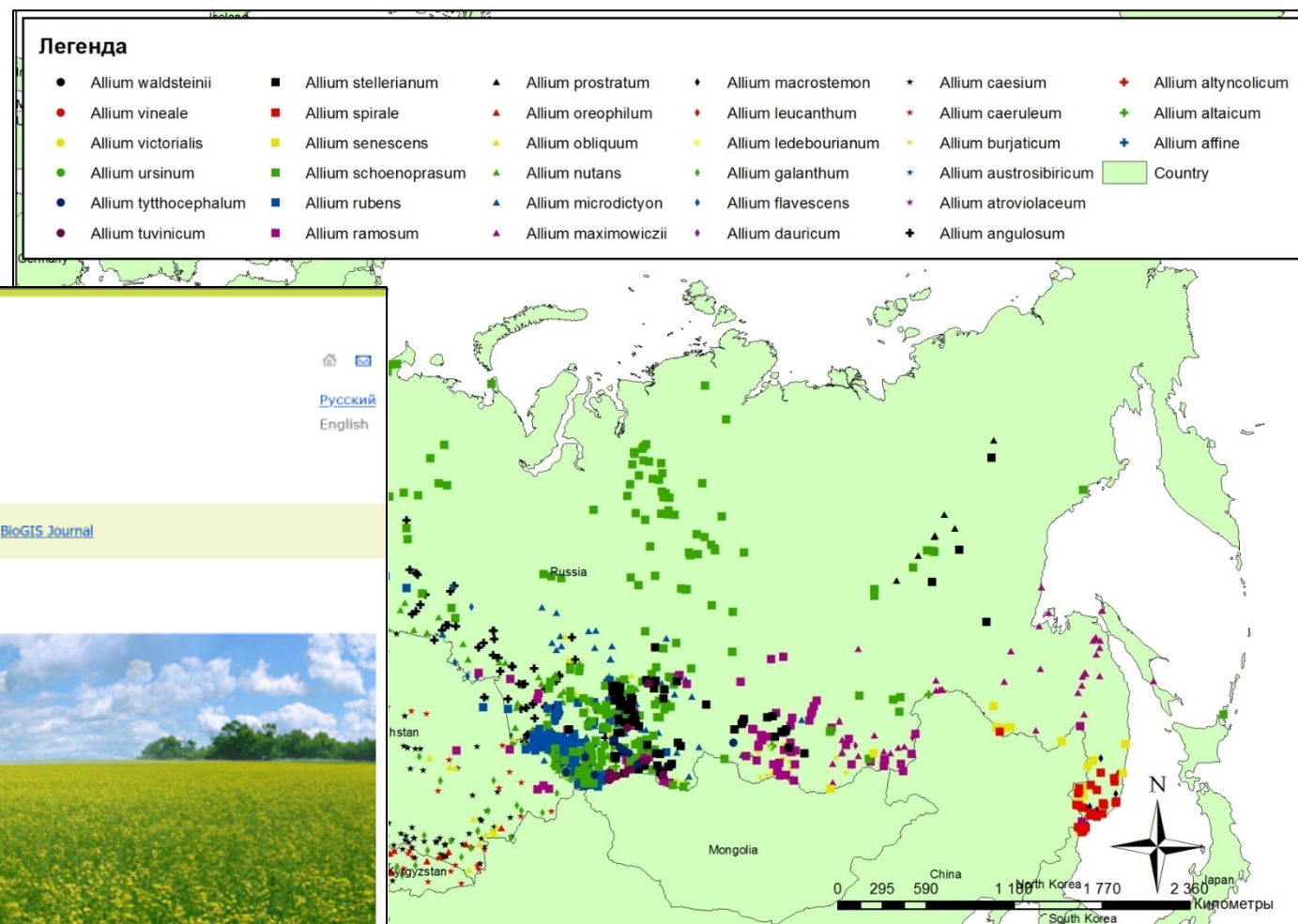
521,886 photos of plants
23,620 species with photo
1,457 members

PLANTARIUM.RU



Distribution data online (not in GBIF)

AGROATLAS.RU



Interactive Agricultural Ecological Atlas of Russia and Neighboring Countries

Economic Plants and their Diseases,
Pests and Weeds

Русский
English

[Introduction](#) [Contributors](#) [Contact Us](#) [Literature](#) [Downloads](#) [GIS school](#) [BioGIS Journal](#)

Crops and Wild Relatives

[Crops](#)
[Relatives](#)

Harmful Objects

[Diseases](#)
[Pests](#)
[Weeds](#)

Environment

[Climate](#)
[Soils](#)
[Vegetation](#)

Home

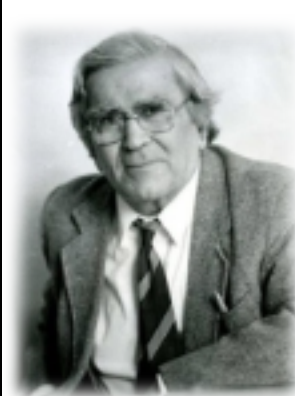


The Russian-English Agricultural Atlas is the world's most comprehensive source of information on the geographic distribution of plant-based agriculture in Russia and neighboring countries. The Atlas contains 1500 maps that illustrate the distribution of 100 crops, 560 wild crop relatives, 640 diseases, pests and weeds, and 200 environmental parameters. Additionally, the Atlas provides detailed biological descriptions, illustrations, metadata and reference lists. Currently, individual maps can be downloaded and viewed using freely available AgroAtlas GIS Utility software, which can also be downloaded at this site.



Basic patterns of the Russian flora

1. Floristic divisions
2. Species diversity: standard areas
3. Species diversity: administrative units



Four major floristic regions of Russia (Takhtajan, 1978)

Boreal subkingdom

1. Circumboreal Region (12 provinces)
2. Eastern Asian Region (2 provinces)

Area

98%

1,5%

Species diversity

?

24%

Ancient Mediterranean subkingdom

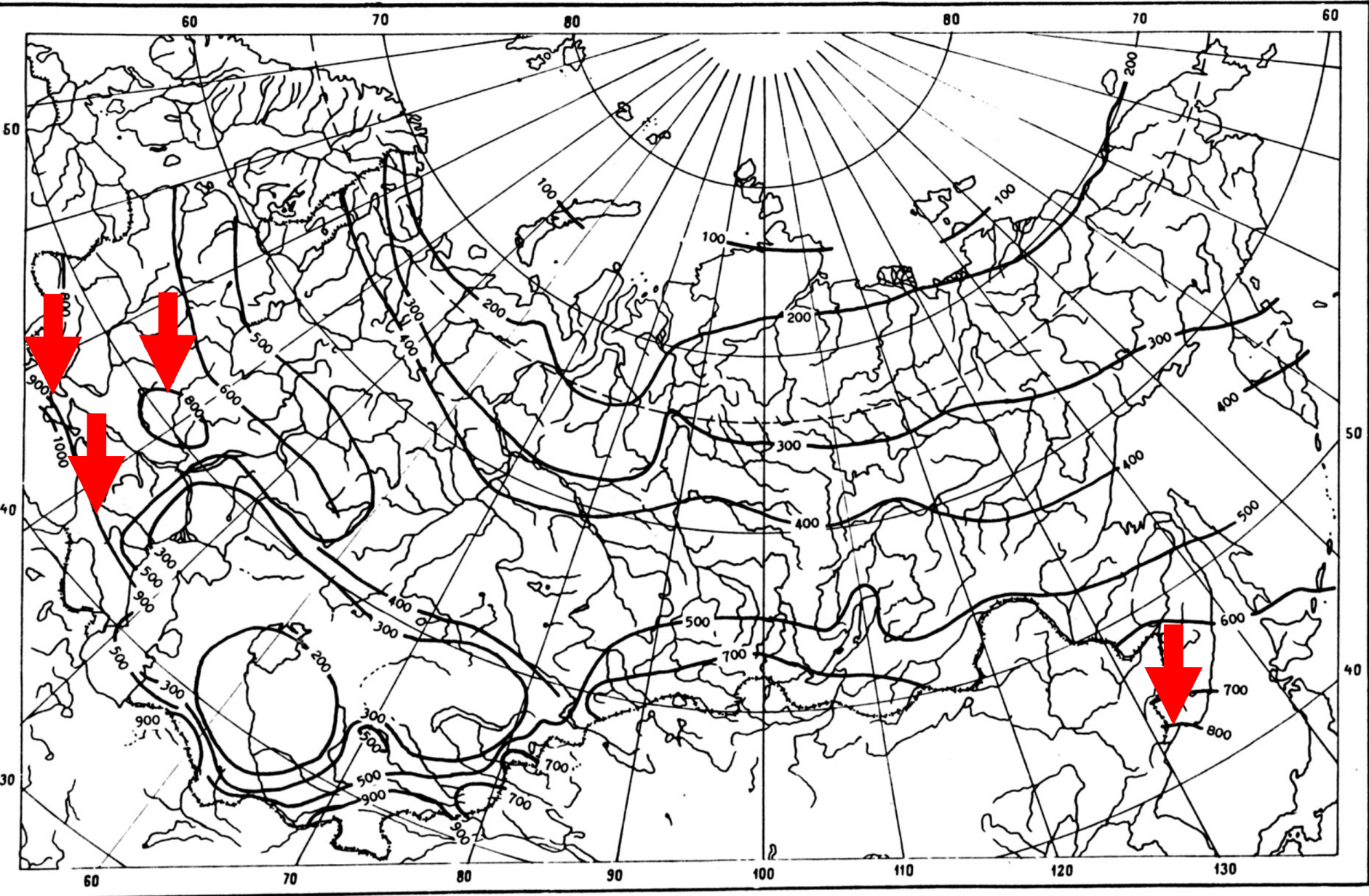
3. Mediterranean Region (1 province)
4. Irano-Turanian Region (1 province)

0,01%

0,5%

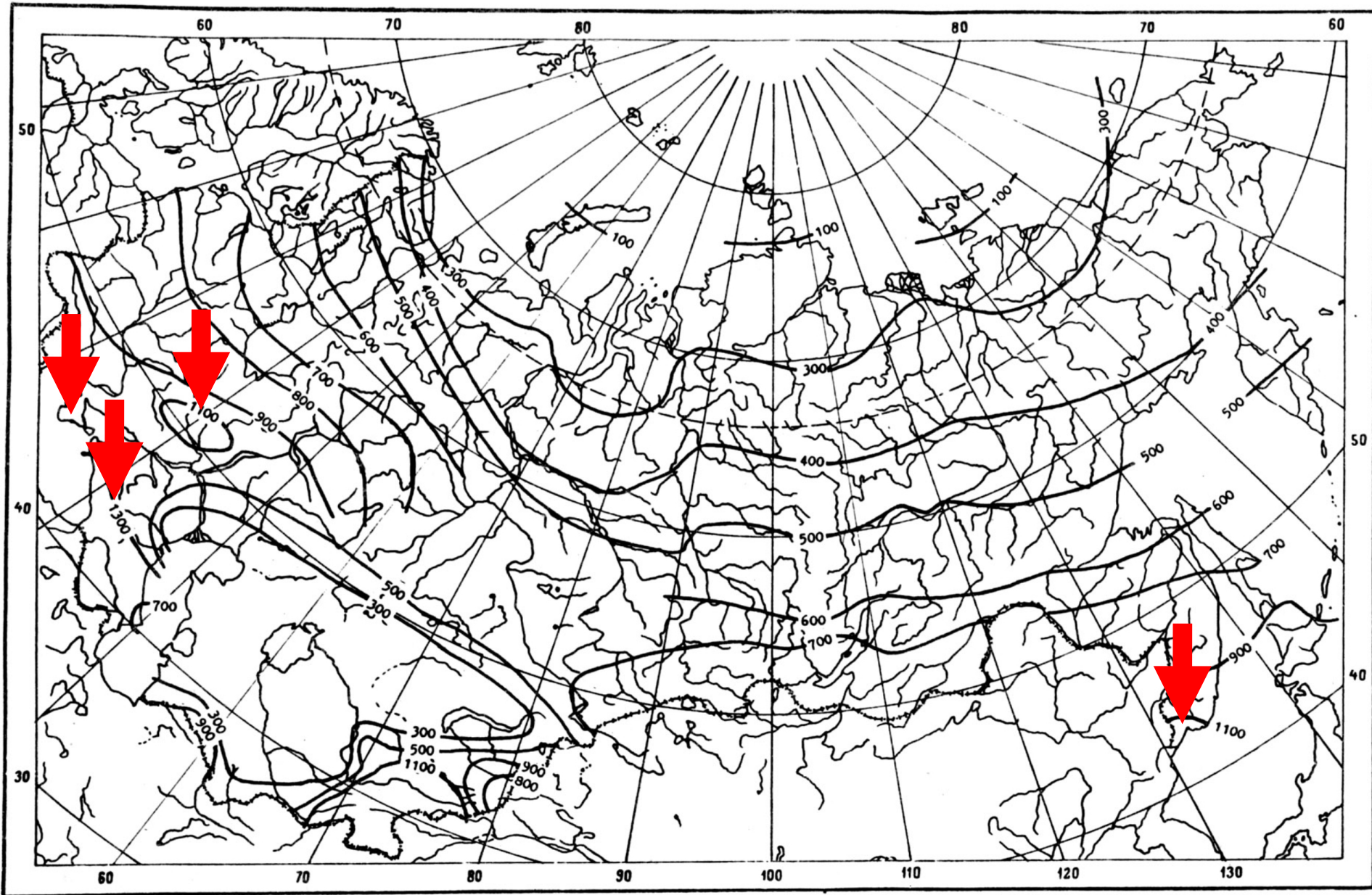
16%

10%



1. Crimean Mts.
>1,000
2. Caucasus
>900
3. Forest/steppe ecotone
(Voronezh area)
>800
4. Vladivostok area
>800

Number of vascular plant species per 100 km² (Malyshev 1992)



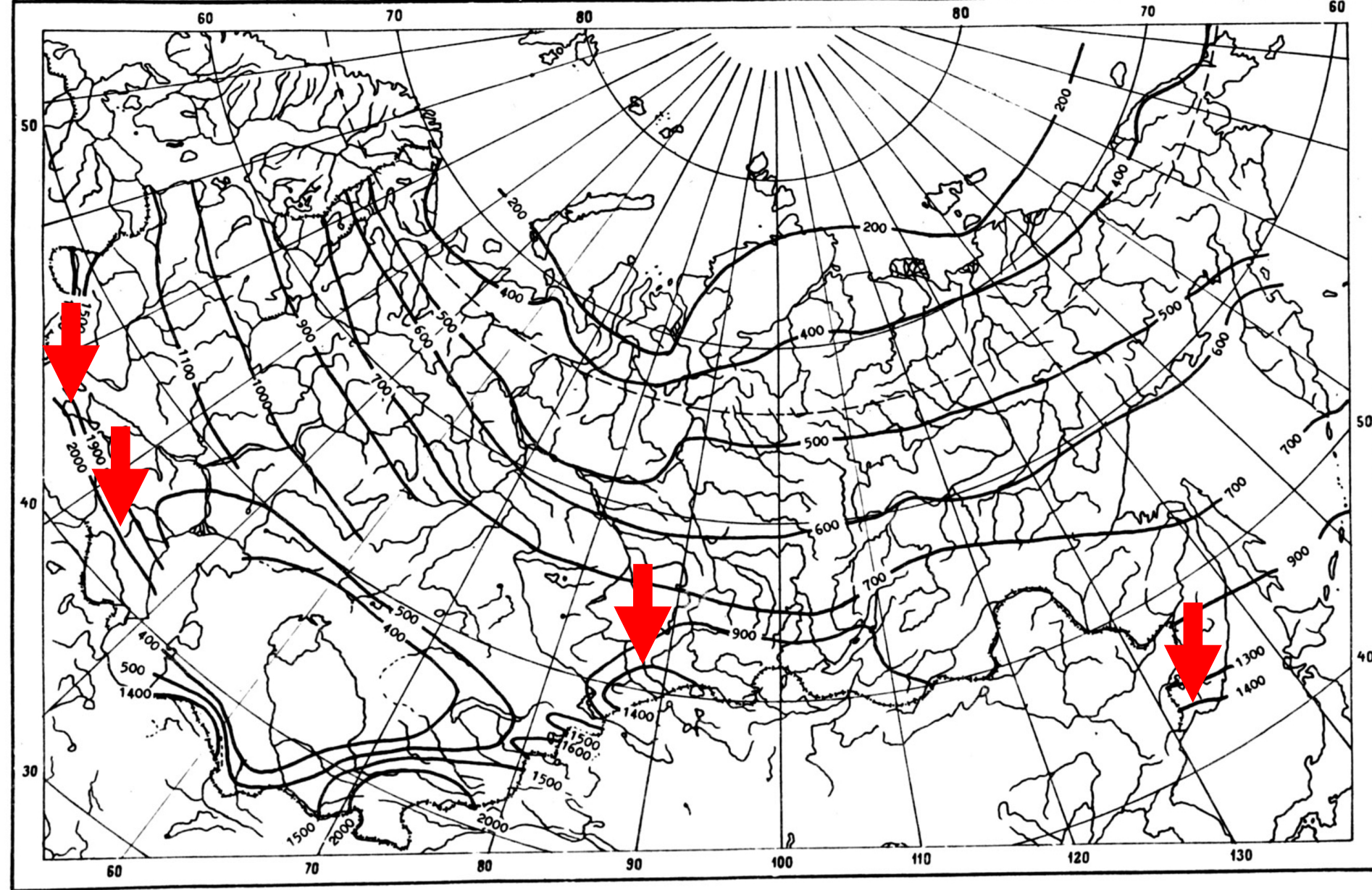
1. Crimean Mts.
>1,500 (!)

2. Caucasus
>1,300

3. Forest/steppe ecotone
(Voronezh area)
>1,100

4. Vladivostok area
>1,100

Number of vascular plant species per 1,000 km² (Malyshev 1992)



1. Crimean Mts.
>2,000

2. Caucasus
>2,000

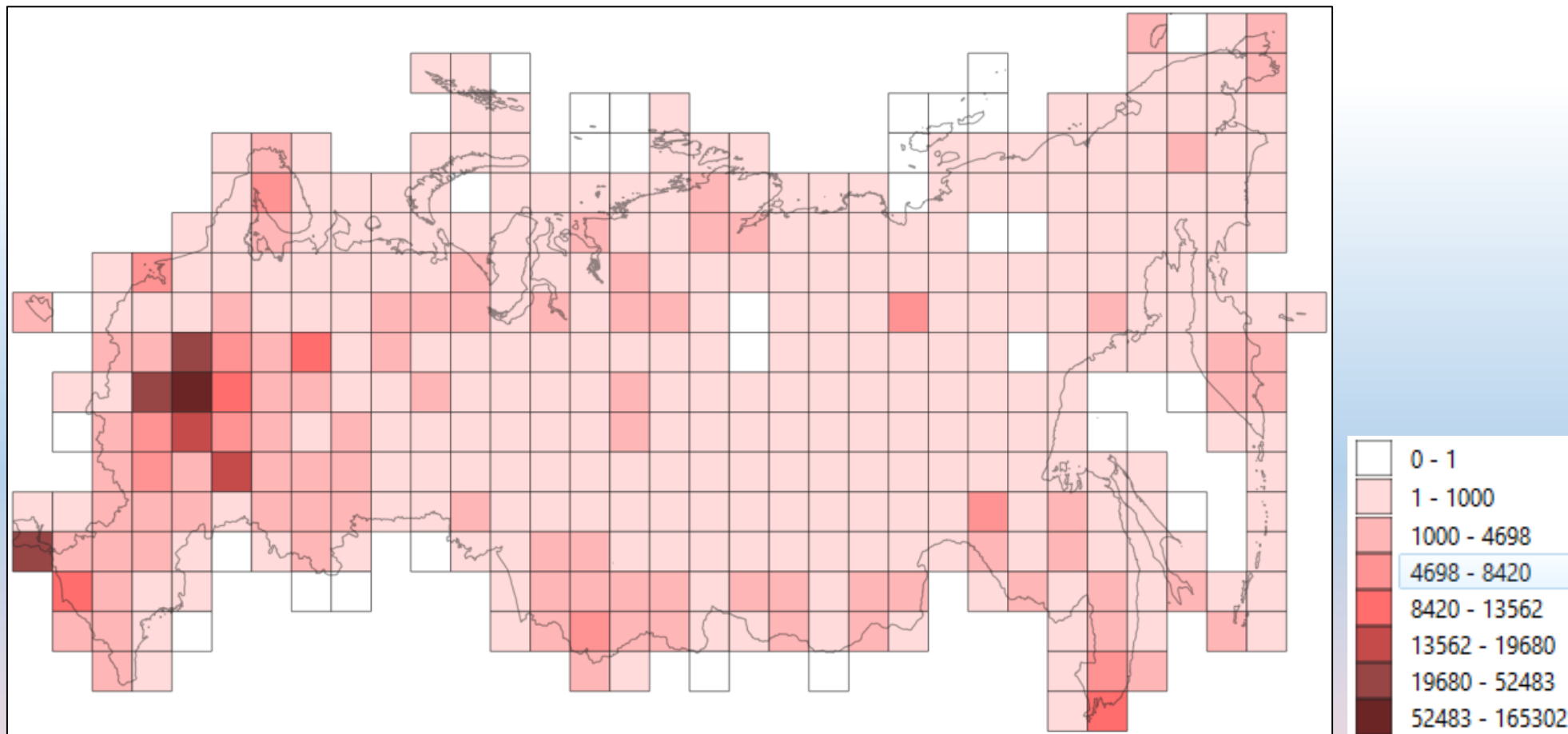
3. Altai Mts.
>1,400

4. Vladivostok area
>1,400

Number of vascular plant species per 10,000 km² (Malyshev 1992)

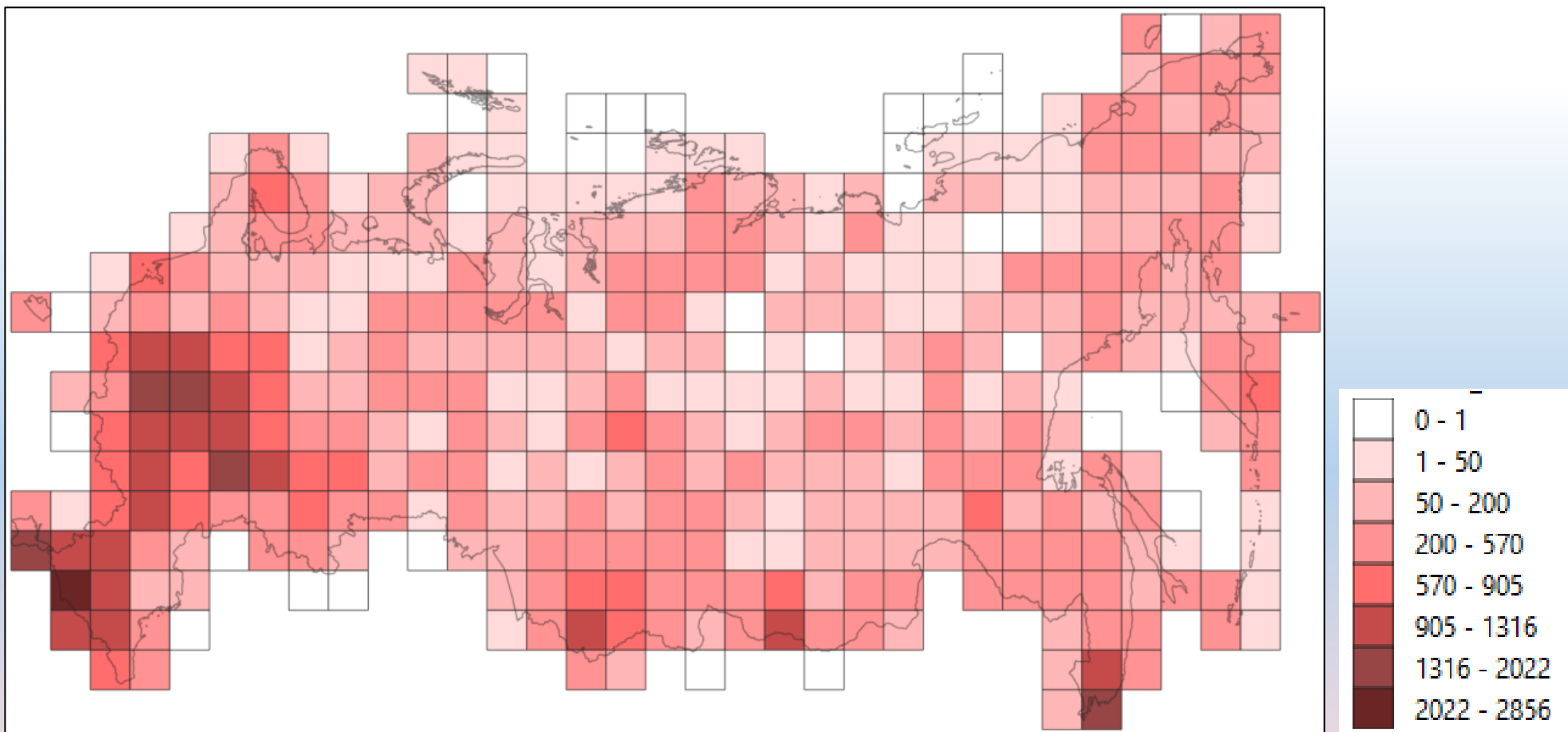


All records per 250x250 km grids (GBIF data)



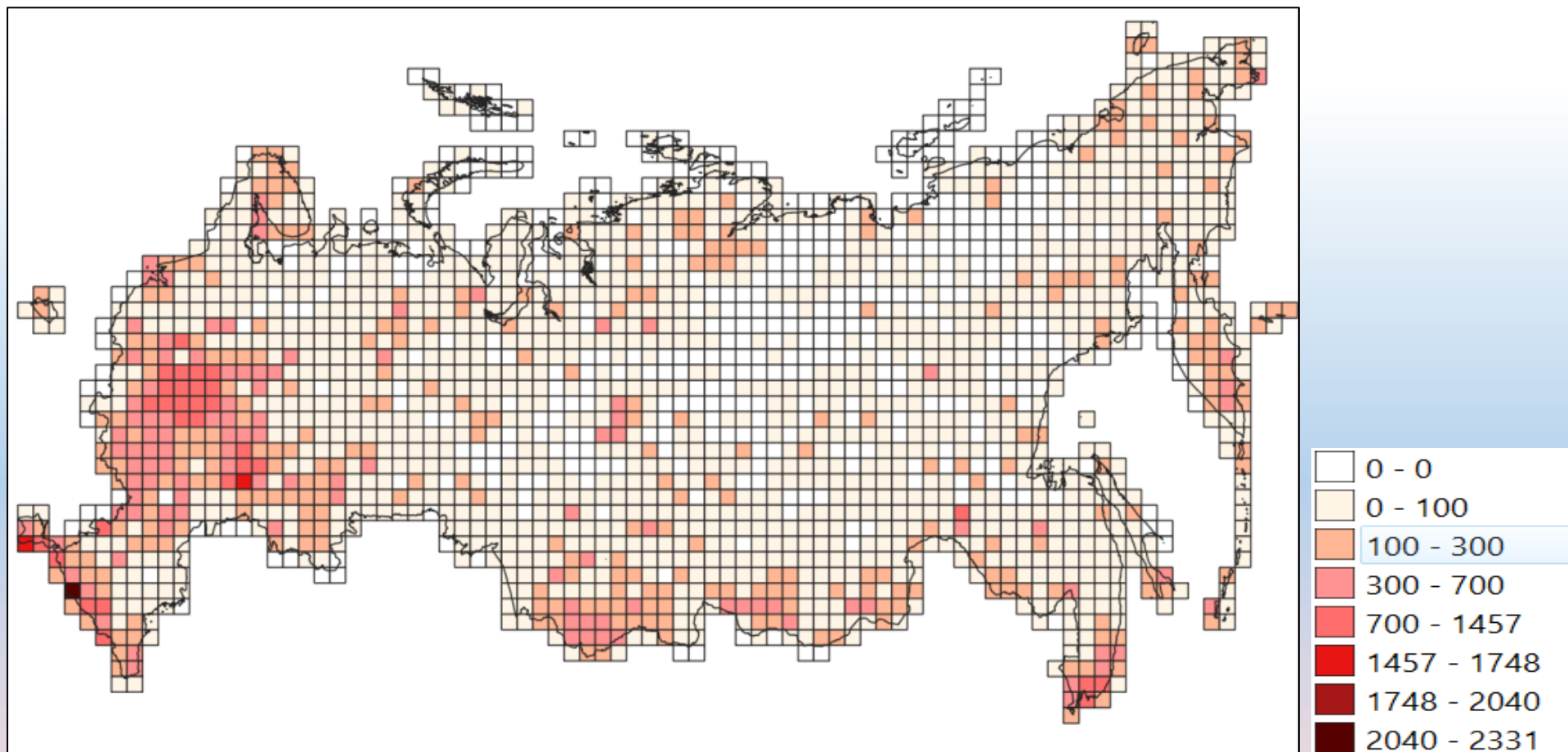


Species per 250x250 km grids (GBIF data)



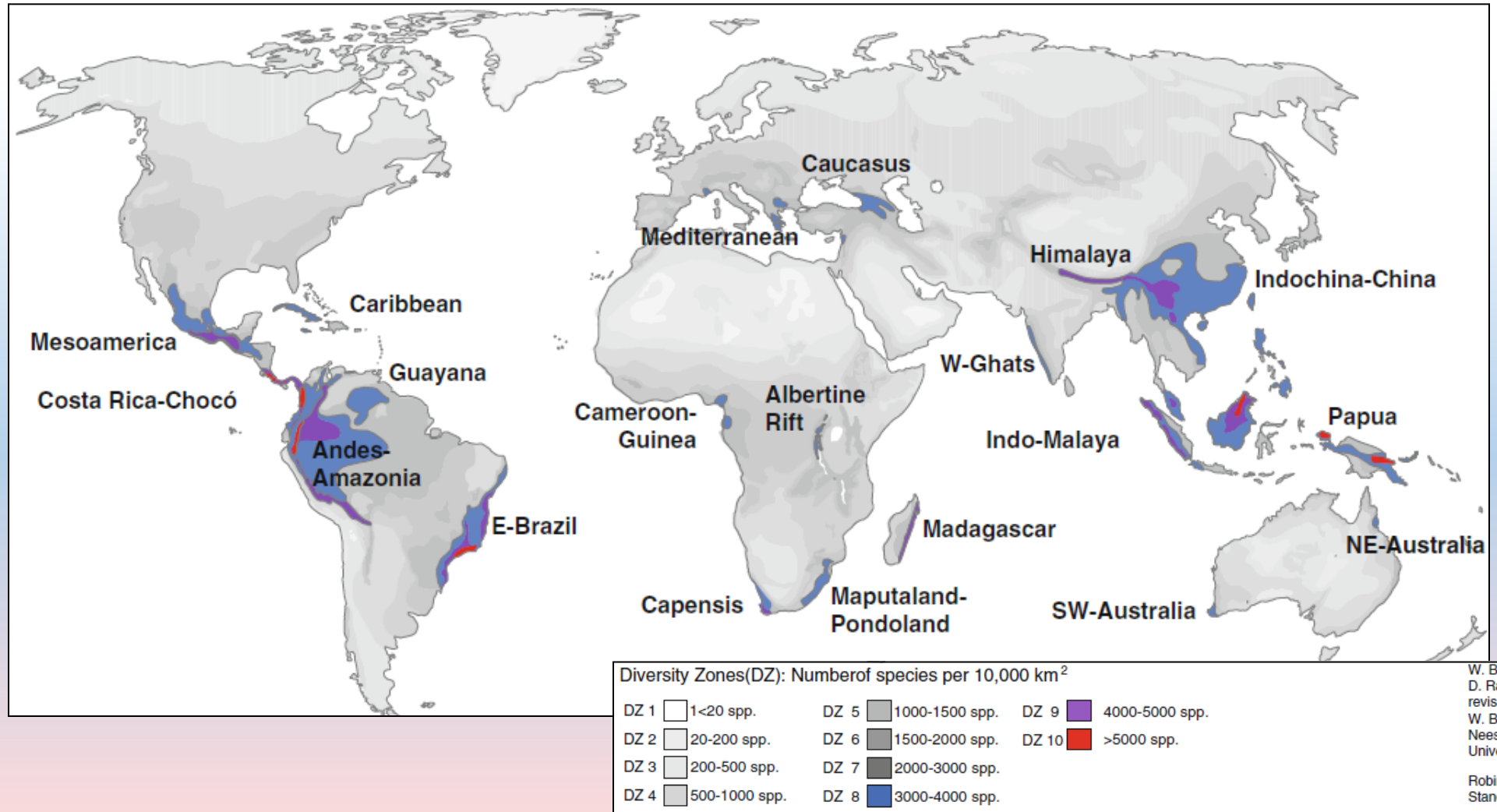


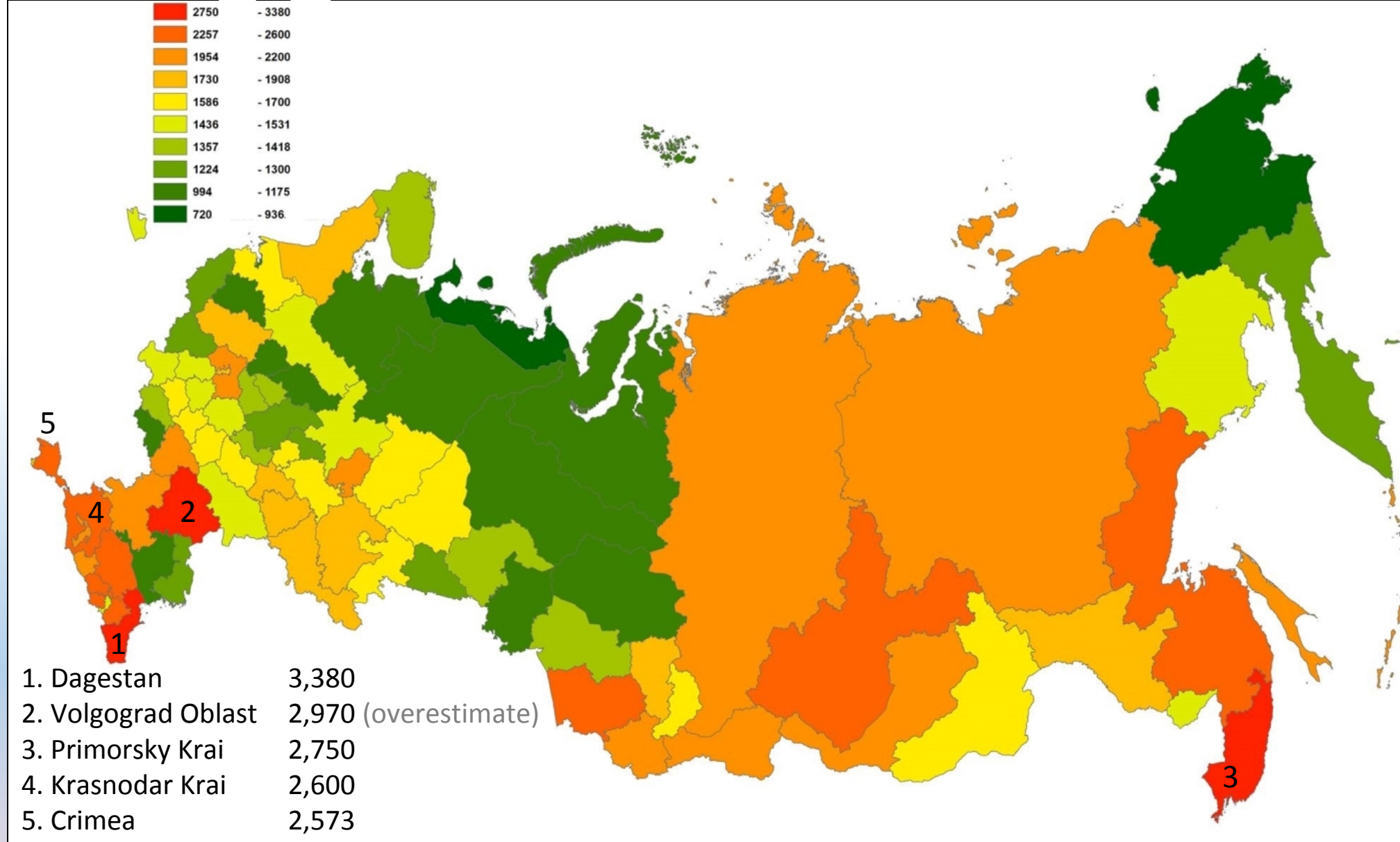
Species per 100x100 km grids (GBIF data)



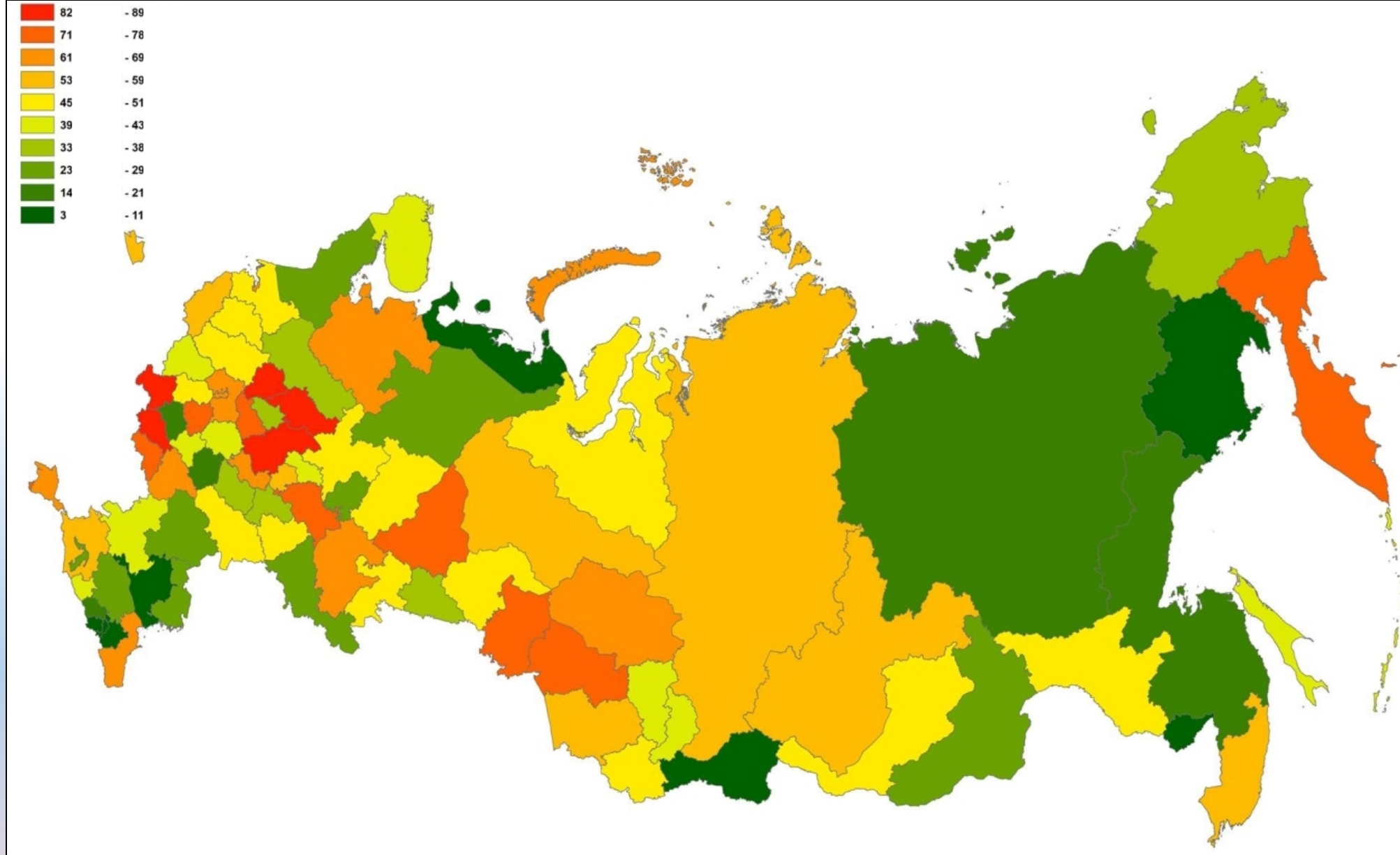


20 hotspots of vascular plant diversity (Barthlott et al. 2005, 2011)





Number of known vascular plant species per administrative units (by Igor Pospelov based upon Seregin et al. (2020))



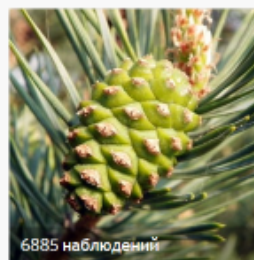
Efforts of *iNaturalist* community in documenting of species diversity (by Igor Pospelov based upon Seregin et al. (2020))

Source of data: <https://www.inaturalist.org/projects/flora-of-russia>

11 Jan 2021

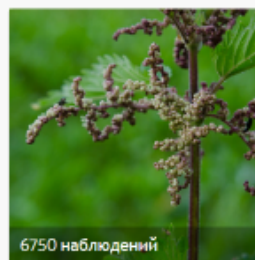


Top 20 most recorded species of the Russian flora on iNaturalist



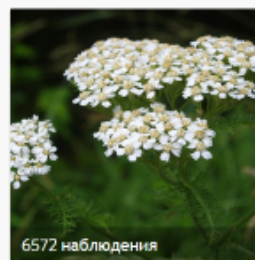
6885 наблюдений

Pinus sylvestris
Сосна Обыкновенная



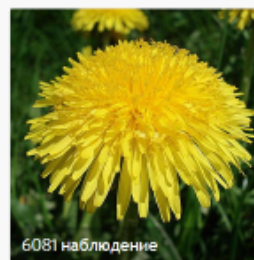
6750 наблюдений

Urtica dioica
Крапива Двудомная



6572 наблюдения

Achillea millefolium
Тысячелистник Обыкновен...



6081 наблюдение

Taraxacum officinale
Одуванчик Лекарственный



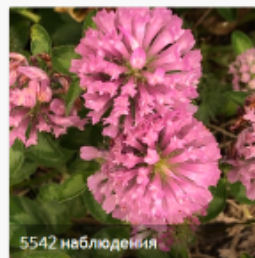
6002 наблюдения

Cirsium arvense
Бодяк Полевой



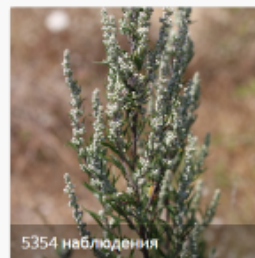
5710 наблюдений

Acer negundo
Клён Американский



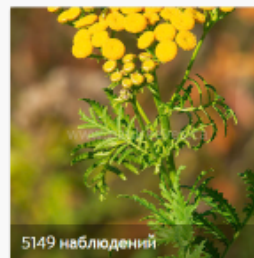
5542 наблюдения

Trifolium pratense
Клевер Луговой



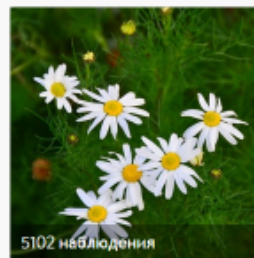
5354 наблюдения

Artemisia vulgaris
Полынь Обыкновенная



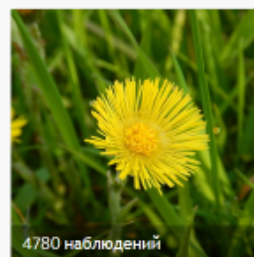
5149 наблюдений

Tanacetum vulgare
Пижма Обыкновенная



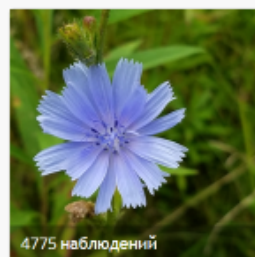
5102 наблюдения

Tripleurospermum inodorum
Трёхрёберник Продырявле...



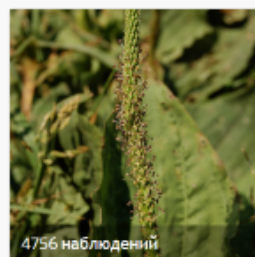
4780 наблюдений

Tussilago farfara
Мать-И-Мачеха



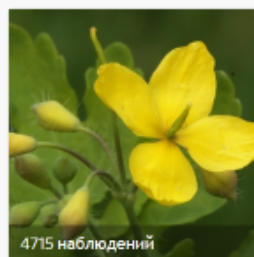
4775 наблюдений

Cichorium intybus
Цикорий Обыкновенный



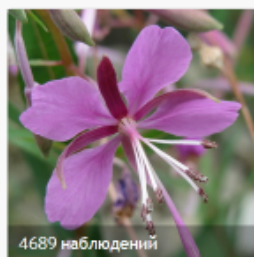
4756 наблюдений

Plantago major
Подорожник Большой



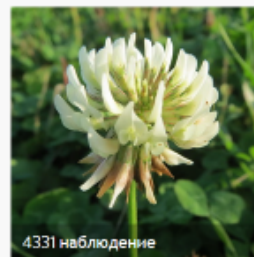
4715 наблюдений

Chelidonium majus
Чистотел Большой



4689 наблюдений

Chamaenerion angustifoliu...
Кипрей Узколистный



4331 наблюдение

Trifolium repens
Клевер Ползучий



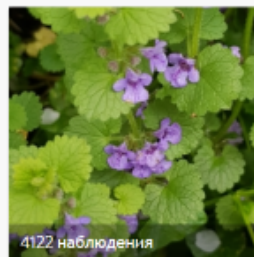
4244 наблюдения

Aegopodium podagraria
Сныть Обыкновенная



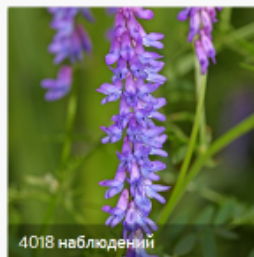
4176 наблюдений

Sorbus aucuparia
Рябина Обыкновенная



4122 наблюдения

Glechoma hederacea
Будра Плющевидная



4018 наблюдений

Vicia cracca
Горошек Мышиный



Citizen science data (left) vs. specimen data (right) for the Russian flora: top recorded species

7 740	<i>Achillea millefolium</i> L.
6 577	<i>Urtica dioica</i> L.
6 252	<i>Acer negundo</i> L.
6 076	<i>Pinus sylvestris</i> L.
5 774	<i>Tanacetum vulgare</i> L.
5 607	<i>Cirsium arvense</i> (L.) Scop.
5 423	<i>Chelidonium majus</i> L.
5 404	<i>Cichorium intybus</i> L.
5 190	<i>Trifolium pratense</i> L.
5 099	<i>Taraxacum officinale</i> F.H.Wigg.

2 187	<i>Festuca rubra</i> L.
2 024	<i>Carex nigra</i> Reich.
1 931	<i>Deschampsia cespitosa</i> (L.) P.Beauv.
1 861	<i>Poa pratensis</i> L.
1 842	<i>Equisetum arvense</i> L.
1 485	<i>Cystopteris fragilis</i> (L.) Bernh.
1 485	<i>Festuca ovina</i> L.
1 456	<i>Elymus repens</i> (L.) Gould
1 420	<i>Carex acuta</i> L.
1 392	<i>Calamagrostis purpurea</i> Trin.



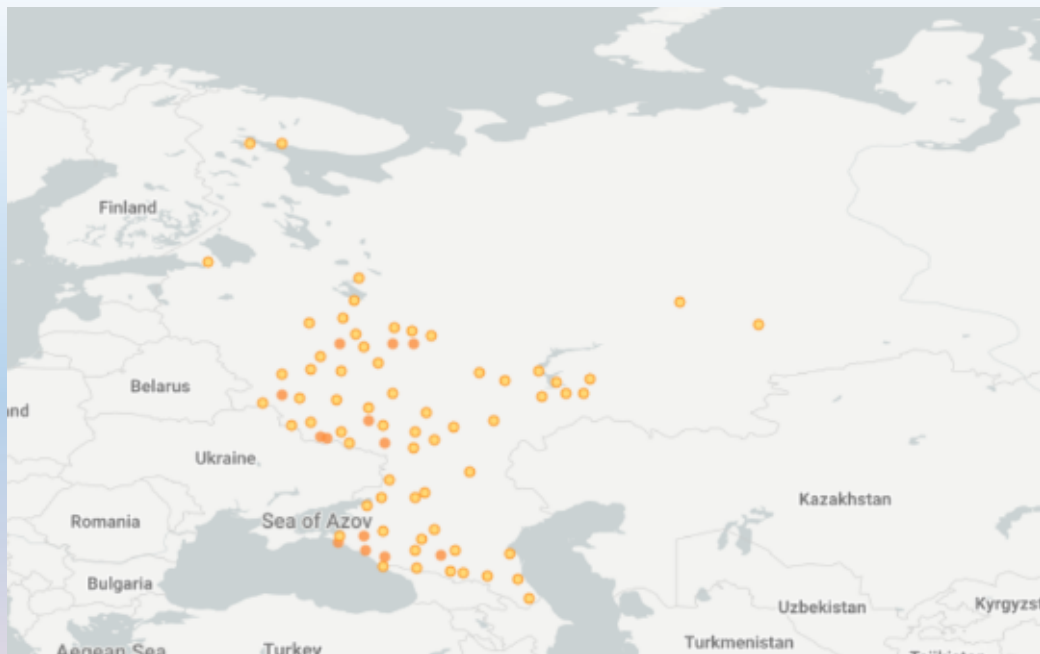
Ambrosia artemisiifolia L. in Russia: a progress

All GBIF data: 653 records, incl.

2019–2020 only: 376 records, incl.

351 records (54%) from iNaturalist

324 records (86%) from iNaturalist

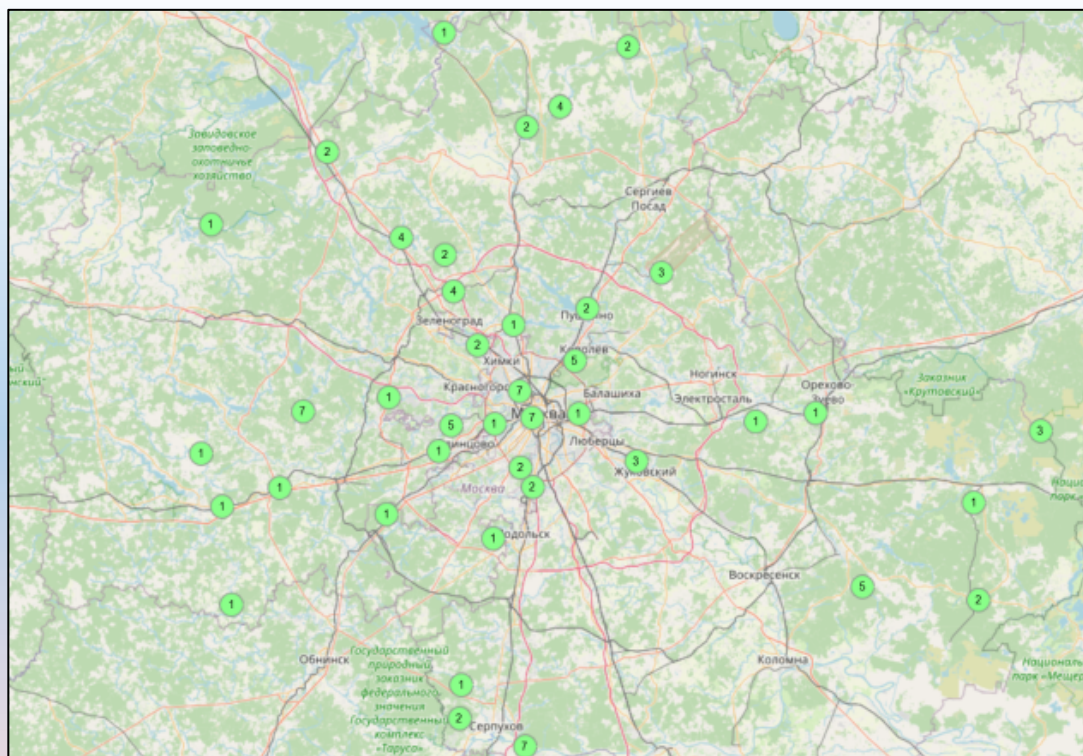




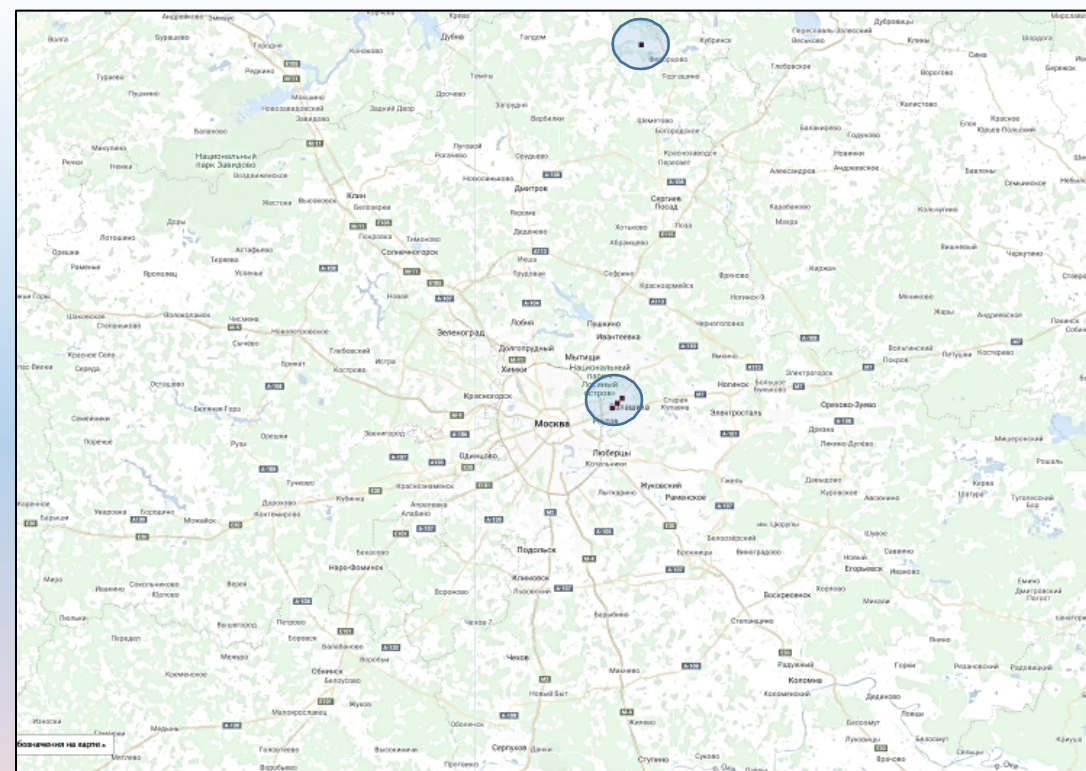
Pedicularis palustris L. in Moscow Region: a decline



Herbarium data: 122 records



iNaturalist data: 7 records (4 localities)



Sources: <https://www.inaturalist.org/>; <https://plant.depo.msu.ru/>

18 Jan 2021

Thanks for being with me today!

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