

The results of the field accounting of medicinal plants in the forest and forest-steppe zones of Central Russia

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Abstract. To assess the potential of the raw material base of medicinal plants and search for new plant sources of biologically active substances, it is necessary to monitor and record the biological diversity of plants, their number and abundance in natural plant communities. Plants are counted by the transect method. In the course of field research in 2022, the biodiversity, abundance, and abundance of medicinal plants in three regions of Central Russia were assessed. In the Lipetsk Region (the lower reaches of the Chichera River, the valley of the Sukhaya Lubna River), the most notable species of the Ranunculaceae families were identified: *Adonis vernalis* L. (spring adonis); Rosaceae: *Agrimonia eupatoria* L. (common agrimony); *Filipendula vulgaris* Moench (six-petalled meadowsweet). In the Samara region (floodplain of the Sok River) - Rosaceae: *Sanguisorba officinalis* L. (burnet officinalis); *Filipendula vulgaris* Moench; Ranunculaceae: *Adonis vernalis* L. In the Moscow, Ryazan region (Meshchera) species of families - Rosaceae: *Potentilla argentea* L. (silver cinquefoil) (Rosaceae), *Fragaria vesca* L. (wild strawberry), *Potentilla erecta* L. (upright cinquefoil), *Comarum palustre* L. (marsh cinquefoil); Onagraceae: *Chamaenerion angustifolium* (L.) Scop. (fireweed narrow-leaved); Asteraceae: *Helichrysum arenarium* (L.) Moench.; Caprifoliaceae: *Valeriana officinalis* L. (valerian officinalis); Hypericaceae: *Hypericum maculatum* L. (St. John's wort); Equisetaceae: *Equisetum arvense* L. (horsetail); Lamiaceae: *Stachys palustris* L. (marsh weed); Primulaceae: *Lysimachia vulgaris* L. (common loosestrife). A total of 65 species of medicinal plants have been identified. Species with a noticeable abundance are characterized as a source of a certain group of chemical compounds. To assess the potential of the raw material base of medicinal plants and to search for new plant sources of biologically active substances, it is necessary to monitor and account for the biological diversity of plants, their size and abundance in natural plant communities. Accounting of plants is carried out by the transect method. In the course of field research 2022 year, the biodiversity, size and abundance of medicinal plants in three regions of Central Russia were evaluated. In the Lipetsk region (the lower reaches of the Chicher River, the valley of the Sukhaya Lubna River), the most notable species were identified - Ranunculaceae: *Adonis vernalis* L.; Rosaceae: *Agrimonia eupatoria* L.; *Filipendula vulgaris* Moench. In the

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Samara region (floodplain of the Sok river) - Rosaceae: *Sanguisorba officinalis* L.; *Filipendula vulgaris* Moench; Ranunculaceae: *Adonis vernalis* L. In the Moscow, Ryazan regions (Meschera) - Rosaceae: *Potentilla argentea* L., *Fragaria vesca* L., *Potentilla erecta* L., *Comarum palustre* L.; Onagraceae: *Chamaenerion angustifolium* (L.) Scop.; Asteraceae: *Helichrysum arenarium* (L.) Moench.; Caprifoliaceae: *Valeriana officinalis* L.; Hypericaceae: *Hypericum maculatum* L.; Equisetaceae: *Equisetum arvense* L.; Lamiaceae: *Stachys palustris* L.; Primulaceae: *Lysimachia vulgaris* L. A total of 65 species of medicinal plants have been identified. Species with a noticeable number are characterized as a source of a certain group of chemical compounds.

1 Introduction

Monitoring of the biological diversity of plant communities, systematic observations in different ecological and geographical conditions is the basis for assessing the potential of the raw material base of medicinal plants, the search for new plant sources of biologically active substances. Research should be carried out in a stationary and semi-stationary mode, constantly accumulating information on the systematic composition of medicinal plants in the flora, plant community, the dynamics of productivity and occurrence of plants, and their quality. Based on the collected data, a list of medicinal plant species is determined, which are the object of collecting samples of medicinal raw materials for chemical analysis or harvesting of plant species in specific natural units.

2 Material and research methodology

For the knowledge of natural medicinal lands, it is important to know what types of medicinal plants are found in individual geomorphological elements, what are their levels of abundance, abundance and characteristics as a source of a certain group of chemical compounds.

The subject of the study is the biological diversity of medicinal plant species, with a noticeable abundance and abundance in the surveyed habitats (mainly river floodplains), selected for monitoring and determining the potential for collecting medicinal plant materials.

The abundance is understood as the number of individuals of plant species (ramets, genets) found per unit area (mainly, their shoots were recorded).

For such plants as wild strawberries, erect cinquefoil and others growing in clusters (homogeneous group, "spot" in the form of a circle, oval), the area occupied by them was measured. In the future, these plants are characterized by the indicator "By area" in m², since it is not advisable to count all the shoots of a plant in a "spot" of a homogeneous composition.

By abundance, we mean the proportion (in %) of the projective cover of a plant species per unit area (1 m²), obtained from the geobotanical description of the vegetation cover. Abundance is a qualitative characteristic and can be assessed in points on various scales (Table 1) [1, 2].

Plants are counted by the transect method. To do this, a cord is stretched from one point (30 m long) and in each equal segment 1 m wide and 5 m long (account sample 5 m²), the number of shoots of a certain, discovered type of medicinal plant is taken into account.

Several transects with different directions and route forms (linear, zigzag or fan) were laid on the monitoring site. Three transects were usually carried out at one counting site, linearly or brokenly located in a selected area of the habitat of medicinal plants. The area of

direct counting of plants under three transects was 90 m². With such accounting, a habitat area of about 700 m² was covered (for example, an area of almost square shape 25 m x 30 m or elongated 10 m x 70 m, etc.).

The abundance of plants was estimated by the degree of coverage (in %) of a plant species on a geobotanical site of 1 m² (Table 1).

Table 1. Scales for assessing the abundance of plants in the vegetation cover.

Degree of coverage, in %	According to Brown Blanca, points	Abundance characteristic
<1	+	Plants are rare
1-5	1	Plants are found occasionally, scattered, in small numbers
5-25	2	Abundantly
25-50	3	Abundant, there are many individuals of this species
50-75	4	Very plentiful, but does not give a background
>75	5	Plants that interlock with their above-ground parts, forming a common background

Thus, the purpose of the field work is to study, by geobotanical methods, the biological diversity of medicinal plants in the forest and forest-steppe natural zones of Central Russia, their abundance and abundance in the landscapes of the Meshchera lowland (the province of Meshchera mixed forests), the Central Russian (Central Russian forest-steppe province) and the Bugulma-Belebeevskaya uplands (province forest-steppe of the Low Trans-Volga region). Field studies were carried out in the 2022 season on the territory of the Lipetsk (lower reaches of the Chichera river, the valley of the Sukhaya Lubna river), Samara (floodplain of the Sok river), Moscow, Ryazan regions (Meshchera).

3 Results and Discussion

3.1 Tracts of the Lower River. Chichera and Bykova Sheya (Lipetsk region)

The Lipetsk Region is located in the central part of the East European Plain, at the junction of the Central Russian Upland and the Oka-Don Plain, in the forest-steppe landscape zone of the temperate zone. This forest-steppe part belongs to the Central Russian forest-steppe physiographic province. The forest-steppe of the province is ancient - pre-glacial, its flora is rich in relict species [3].

The elevated, dissected relief of the Upper Don influences the climate, soils, and vegetation. Thick ravine-beam network, where the natural biodiversity of plants is preserved. For accounting and monitoring of medicinal plants, a winding, dissected valley of the river was chosen. Chichera (a tributary of the Don River, its lower reaches), its section, from the village of Lipovka to the former village of Vasilievka (about 5 km long), as a separate, integral natural unit, with well-defined boundaries. Summary data on eight counts of species of medicinal plants (as an object of collection) with a noticeable number, counted on transects in the tracts of the Lower River. Chichera and Bykova Sheya are as follows (Figure 1):

Accounting for plots No. 1-8, the total area of accounting is 680 m².

Ranking by abundance (more than 69 ind. for the entire area of registration in ascending order) showed the following plant species: *Ajuga reptans* L. (69 (0.1 ind./m²), *Thalictrum minus* L. (131 (0.2 ind./m²)), *Euphorbia* sp. (222 (0.3 ind./m²), *Achillea millefolium* L. (252 (0.4 ind./m²), *Potentilla argentea* L. (266 (0.4 ind./m²), *Verbascum* sp. (279 (0.4 ind./m²), *Adonis vernalis* L. (462 (from 0.7 ind./m² (Chichera) to 3.8 ind./m² (Sukhaya

Lubna), *Salvia pratensis* L. (587 (0.9 ind./m²), *Medicago lupulina* L. (921 (1.3 ind./m²), *Artemisia absinthium* L. (1099 (1.6 ind./m²), *Agrimonia eupatoria* L. (1900 (2.8 ind./m²), *Galium mollugo* L. (3167 (4.6 ind./m²), *Filipendula vulgaris* Moench (3470 (5.1 ind./m²).

By area: *Potentilla* sp. (1.2 m²), *Thymus* sp. (9.46 m²), *Fragaria viridis* Weston. (87.8 m²).

Ranking by abundance in descending order (projective cover in %, 47 geobotanical sites (1 m² each) showed the following plant species:

- *Fragaria viridis* Weston – up to 80 %; *Agrimonia eupatoria* L. - 2-80 %; *Filipendula vulgaris* Moench. - 3-60 %; *Asparagus officinalis* L. - 30 %; *Verbascum* sp. – up to 30 %; *Astragalus* sp. - 8-25 %; *Galium mollugo* L. - 2-25 %.
- *Myosotis arvensis* (L.) Hill - 10 %; *Pimpinella saxifrage* L. - 8 %; *Thalictrum minus* L. – up to 8 %; *Adonis vernalis* L. - 1-6 %; *Campanula* sp. - <1-5 %; *Artemisia absinthium* L. - 4 %; *Thymus* sp. – up to 4 %; *Salvia pratensis* L.- <1-4 %; *Iris* sp. - 3 %; *Onosma simplicissima* L. - 3 %; *Potentilla* sp. - 3 %; *Allium rotundum* L. – 2 %; *Anthyllis vulneraria* L. - 2 %; *Ajuga reptans* L. – up to 2 %; *Achillea millefolium* L. – up to 2 %.
- *Polygala vulgaris* L. - 1 %; *Veronica chamaedrys* L. - 1 %. *Cerastium holosteoides* BAUMG.- 1 %; *Equisetum pretense* Ehrh. - 1 %; *Medicago lupulina* L. – 1 %; *Ranunculus polyanthemus* L. – 1 %.

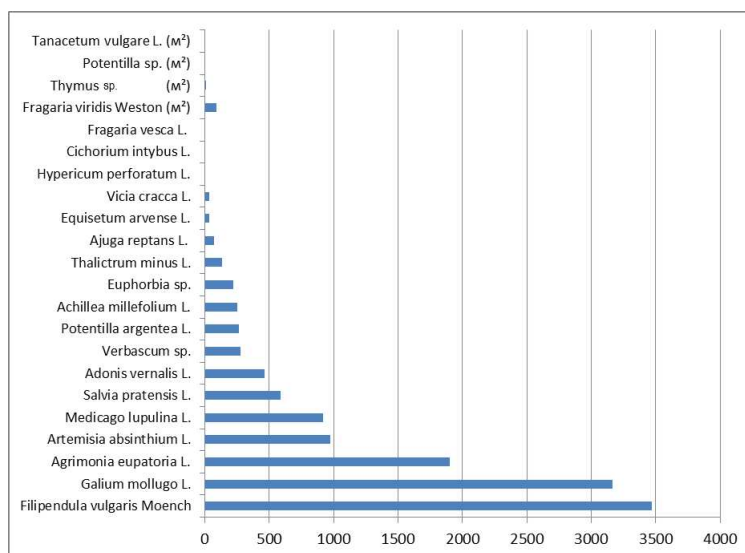


Fig. 1. Ranking according to the number of recorded medicinal plants in the tracts of the Lower River Chichera and Bykova Sheya (8 registration sites, 25 transects, more than 22 species).

A feature of the distribution of these plant species is locality, that is, the uneven growth of plants in a marked number, "spots", with a large range of percentage of projective coverage (abundance) located in certain parts of the valley and its relief elements. The determination of these indicators by the DLR in the tracts of the lower reaches of the Chichera and Bykovo Sheya rivers showed a high variability in the abundance, density, and occurrence of the estimated species. Thus, the count of spring Adonis (*Adonis vernalis* L.) showed a density in the "spot" of its growth, reaching 38 ± 8.1 ind./m² (floodplain of the Sukhaya Lubna River).

3.2 Floodplain of the Sok River (Low Volga region, Samara region, Sergievsky district, former village of Staroe Oboshino)

In the system of physical-geographical zoning of the Middle Volga region, the Soksly physical-geographical region, where the registration of species of medicinal plants was carried out in the floodplain of the Sok River, occupies the north-eastern part of the Samara region. The vegetation cover of the region consists of steppes, meadows and forests. The characteristic dissection of the relief, the terraces of the rivers above the floodplains and the gentle slopes of the watersheds are treeless and plowed. Meadow vegetation is upland meadows located along the bottom of ravines, on the lower and middle parts of the slopes, in river valleys. Flooded floodplain meadows, chosen as the object of monitoring the biodiversity of medicinal plants, have a high diversity and potential of the raw material base [4].

Based on the summary data on the surveys in the floodplain of the river. The sap (3 counts) and on the steppe vegetation site (1 count) of species of medicinal plants counted on transects with a noticeable abundance (more than 69 specimens for the entire counting area (360 m²), the following are distinguished (Figure 2):

1. Accounting for sections No. 9-11. Floodplain Sok (short floodplain meadow, left bank, 270 m²).

The following types of medicinal plants have been identified:

By abundance: *Euphorbia* sp. (118 (0.4 ind./m²), *Galium mollugo* L. (298 (1.1 ind./m²), *Achillea millefolium* L. (329 (1.2 ind./m²), *Artemisia absinthium* L. (374 (1.4 ind./m²), *Galium verum* L. (406 (1.5 ind./m²), *Sanguisorba officinalis* L. (761 (2.8 ind./m²), *Filipendula vulgaris* Moench (1377 (5, 1 copy/m²).

By area: *Potentilla recta* L. (1 m²), *Fragaria vesca* L. (5 m²).

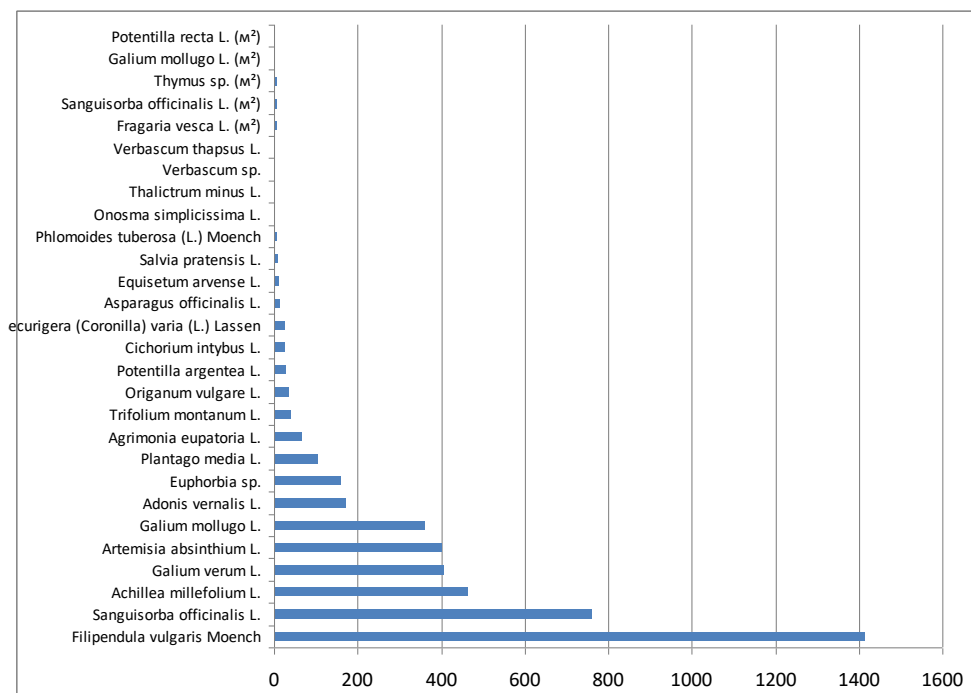


Fig. 2. Ranking according to the number of registered medicinal plants in the floodplain of the Sok River (4 registration sites, 12 transects, more than 28 species).

By abundance (20 geobotanical sites of 1 m²):
Sanguisorba officinalis L. - 1-65 %; *Galium mollugo* L. – 3-55 %; *Euphorbia esula* - <1-25 %; *Filipendula vulgaris* Moench - 1-20 %; *Potentilla argentea* L. - 1-16 %;
Thalictrum minus L. - 10 %; *Artemisia absinthium* L. - 10 %; *Fragaria vesca* L. – up to 10 %; *Galium verum* L. – 6-7 %; *Potentilla recta* L. – up to 5 %; *Fragaria viridis* WESTON - 2 %; *Vicia cracca* L. - 2 %.

2. Accounting for site No. 12. Steppe site (90 m²).

By abundance: *Origanum vulgare* L. (34) (0.4 ind./m²), *Euphorbia* sp. (41) (0.4 ind./m²), *Agrimonia eupatoria* L. (62) (0.7 ind./m²), *Plantago media* L. (74) (0.8 ind./m²), *Achillea millefolium* L. (134) (1.5 ind./m²), *Adonis vernalis* L. (171) (1.9 ind./m²).

By area: *Fragaria vesca* L. (2.2 m²), *Thymus* sp. (5.8 m²).

By abundance (10 sites of 1 m²):

Thymus sp. - 20-30 %; *Fragaria vesca* L. – up to 20 %; *Filipendula vulgaris* Moench - 3-15 %; *Agrimonia eupatoria* L. – 2 %.

3.3 Meshchera (Mitinskaya, deposit (Moscow region), Pra river floodplain, Ryazan region)

Polissya is a forest region and is located in the central part of the East European Plain, between the Klyazma and Oka rivers. The landscape is a flat plain, with sandy hills and marshy lowlands. On the tops of sandy hills there are light pine forests with lichen, in open areas there are upland meadows. Rivers flow in flat and marshy valleys.

In Meshchera, our objects of study are meadow-marsh communities, old fallows with a developed vegetation cover, dry valleys, floodplain meadows of small rivers (for example, the floodplain of the river Pra).

Based on the summary data from nine censuses in Meshchera (Moscow region, Shatursky district, Mitinskaya, Dmitrovka; Ryazan region, Spaso-Klepikovskiy district, Struzhany, shore of the river Pra), the following species of medicinal plants were noted, counted on transects and having noticeable abundance (Figure 3):

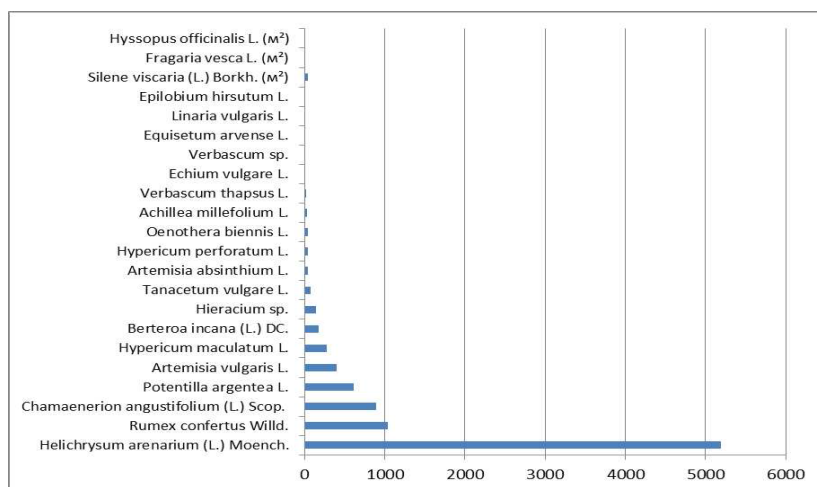


Fig. 3. Ranking according to the number of recorded medicinal plants in Meshchera (forest edge (dry land): Shatursky district, Mitinskaya, Dmitrovka; 3 registration sites, 11 transects, more than 22 species).

1. Dry habitats (upland, forest edge) (registration plots Nos. 13, 14, 21, 330 m²) (Figure 3).

By abundance: *Berteroa incana* (L.) DC. (181 (0.5 ind./m²), *Hypericum maculatum* L. (275 (0.8 ind./m²), *Artemisia vulgaris* L. (399 (1.2 ind./m²), *Potentilla argentea* L. (611 (1.8 ind./m²) *Chamaenerion angustifolium* (L.) Scop.(890 (2.7 ind./m²), *Rumex confertus* Willd.(1035 (3.1 ind./m²), *Helichrysum arenarium* (L.) Moench (5194 (up to 15.7 ind./m²).

By area: *Silene viscaria* (L.) Borkh. - 47.1 m²; *Fragaria vesca* L. 0.3 m²; *Hyssopus officinalis* L. 0.23 m².

By abundance (24 geobotanical sites (1 m² each):

Helichrysum arenarium (L.) Moench - 3-70%; *Silene viscaria* (L.) Borkh. – up to 8-70%; *Chamaenerion angustifolium* (L.) Scop - 1-40%;

Pilosella officinarum Vaill. (*Hieracium pilosella* L.) - 2-20%; *Potentilla argentea* L. - 1-15%; *Rumex confertus* Willd. - 2-10%; *Verbascum thapsus* L. - 5%; *Hypericum maculatum* L. - 3-5%.

2. Wet meadow (fallow) (registration plots Nos. 15-19, 450 m²). A summary graph of the number of plants in these areas is shown in Figure 4.

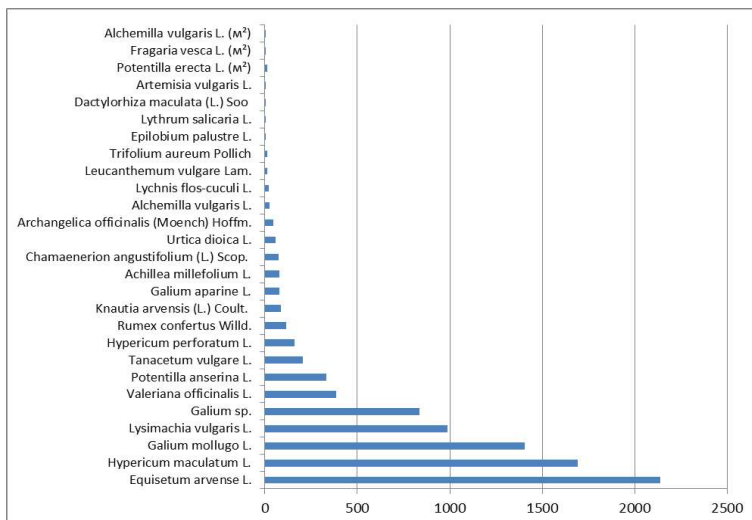


Fig. 4. Ranking according to the number of recorded medicinal plants in Meshchera (wet meadow: Mitinskaya neighborhood; Pra riverside: Struzhany) (6 registration sites, 16 transects, more than 27 species).

By abundance: *Rumex confertus* Willd. (116 (0.2 ind./m²), *Hypericum perforatum* L. (159 (0.35 ind./m²), *Tanacetum vulgare* L. (207 (0.5 ind./m²), *Potentilla anserina* L. (332 (0.7 ind./m²), *Valeriana officinalis* L. (385 (0.8 ind./m²), *Galium sp.* (834 (1.8 ind./m²), *Lysimachia vulgaris* L. (989 (2, 2 ind./m²), *Galium mollugo* L. (1407 (3.1 ind./m²), *Hypericum maculatum* L. (1692 (3.7 ind./m²), *Equisetum arvense* L. (2137 (4.7 ind./m²).

By area: *Alchemilla vulgaris* L. (2.8 m²), *Fragaria vesca* L. (3.4 m²), *Potentilla erecta* L. (12.17 m²).

By abundance (36 geobotanical sites (1 m² each):

Equisetum arvense L. - 3-70%; *Galium mollugo* L. - 2-20%; *Hypericum maculatum* L. - 2-20%; *Potentilla erecta* L. - 1-20%;

Archangelica officinalis (Moench) Hoffm. - 10 %; *Vicia cracca* L. - 6%; *Lychnis flos-cuculi* L. - 1-6%; *Rumex confertus* Willd. - 3%; *Valeriana officinalis* L. - 1-3%; *Lysimachia vulgaris* L. - <1-2%.

It is worth noting that this area is the habitat of such interesting and well-known medicinal plants as erect cinquefoil (*Potentilla erecta* (L.) Raeusch.), Valerian officinalis (*Valeriana officinalis* L.) (with a relatively noticeable abundance), angelica officinalis

(*Archangelica officinalis* L.) – 47 specimens were counted over the entire area of counts, spotted palmate *Dactylorhiza maculate* (L.) Soó – 4 specimens (species with low abundance).

3. Riverside Pra, Struzhany (registration plot No. 20, 30 m²). The most notable types:

By abundance: *Stachys palustris* L. (82 (2.7 ind./m²); *Lysimachia vulgaris* L. (91 (3.0 ind./m²); *Comarum palustre* L. (318 (10.6 ind./m²).

By abundance (6 geobotanical sites (1 m² each):

Comarum palustre L. - 15-22%; *Stachys palustris* L. - 1-10%; *Lysimachia vulgaris* L. - 1-2%; *Thalictrum* sp. - 1 %.

Table 2. Distribution of identified species of medicinal plants in the surveyed habitats by groups of chemical compounds.

Group of chemical compounds / plant species	<i>Adonis vernalis</i> L. (ChR, Sok)	<i>Agrimonia eupatoria</i> L. (ChR)	<i>Filipendula vulgaris</i> Moench (ChR, Sok)	<i>Sanguisorba officinalis</i> L. (Sok)	<i>Potentilla argentea</i> L. (Mdl)	<i>Chamaenerion angustifolium</i> (L.) (Mdl)	<i>Helichrysum arenarium</i> (L.) Moench. (Mdl)	<i>Valeriana officinalis</i> L. (Mwm)	<i>Hypericum maculatum</i> L. (Mwm)	<i>Equisetum arvense</i> L. (Mwm)	<i>Fragaria vesca</i> L. (Mwm)	<i>Potentilla erecta</i> L. (Mwm)	<i>Stachys palustris</i> L. (Mwm)	<i>Lysimachia vulgaris</i> L. (Mwm)	<i>Comarum palustre</i> L. (Mwm)
Steroids (adonitoxin, strophanthidine, cymarin, beta-sitosterol)	+					+	+	+	+				+		
Phenolic compounds (agrimol)		+													
Flavonoids (aigenin, hyperin, quercetin, quercitrin, kaempferol, rutin, luteolin)		+	+	+	+	+	+	+	+	+	+	+	+	+	+
Terpenoids (ursolic acid, linaool, alpha-, beta-pinenes, terpineol, citronellal)		+						+	+		+		+		+
Hydrolysable tannins (ellagic, gallic acid)		+		+	+	+			+			+			+
Coumarins (umbelliferone)				+			+				+		+		
Alkaloids (gambirin, valerian, methylpyrrol ketone, tekostanin, hatinin, stakhidrin)				+				+					+		
Organic acids (P-coumaric acid, ferulic, valeric, caffeic acid, chlorogenic)					+	+		+	+		+	+	+	+	+
Tannins (tannin)						+									
Phenols (P-cresol, eugenol)							+				+				
Iridoids (acevaltrate (valepotriates), dihydrovaltrate, nepetalactone, aucubin, catalpol)								+			+		+		
Esters of aliphatic acids (bornyl acetate, octyl acetate)								+			+				
Nitrogen-containing substances (choline)								+	+						
Ketones (yatamanson, 2-undecanone)								+			+				
Quinones (hypericin, pseudohypericin)									+						
Polyols (mannitol)									+						
Vitamins (riboflavin, niacin, carotene)										+					
Heterocyclic vitamins (B6, C, E)											+				
Fatty acids (gamma linoleic acid)												+			

Abbreviations: ChR, Chichera river valley; Sok - floodplain of the river Sok; Mdl - Meshchera, dry land; Mwm - Meshchera, wet meadow.

To characterize medicinal plants as a source of biologically active substances (BAS), the most prominent species identified during the surveys are divided into groups of chemical compounds. The distribution of identified species of medicinal plants in the surveyed habitats by groups of chemical compounds showed the widespread content in them, primarily of flavonoids (aigenin, hyperin, quercetin, quercitrin, kaempferol, rutin, luteolin), steroids (adonitoxin, strophanthidine, cymarins, beta-sitosterol), tannins hydrolyzable (ellagic, gallic acid) (Table 2). The assessment was carried out on the basis of the data of the reference book on biologically active substances of plant origin B.N. Golovkina, R.N. Rudenskaya, I.A. Trofimova, A.I. Schroeter [5].

4 Conclusion

In the course of field studies of biodiversity, abundance, abundance of medicinal plants in three regions, the following types of medicinal plants were identified, the most noticeable and promising in terms of collecting phyto-raw materials and analyzing groups of chemical compounds:

More than 22 species of medicinal plants have been noted in the tracts of the Lower Chichera and Bykovo Sheya rivers. Among them: Ranunculaceae: *Adonis vernalis* L. (spring adonis); Rosaceae: *Agrimonia eupatoria* L. (common agrimony); *Filipendula vulgaris* Moench (six-petalled meadowsweet).

On the accounting area in the floodplain of the river. Juice revealed more than 28 species of medicinal plants. The most notable species in this list are plant species of the Rosaceae family - *Sanguisorba officinalis* L. (medicinal burnet), *Filipendula vulgaris* Moench; ranunculus - *Adonis vernalis* L.

The following data were obtained at the registration plots in Meshchera:

Forest edge (sukhodol) (Mitinskaya, Dmitrovka, Shatursky district). When accounting revealed more than 22 species. Among them, the most notable types are:

Potentilla argentea L. (silver cinquefoil) (Rosaceae); *Chamaenerion angustifolium* (L.) Scop. (fireweed) (Onagraceae); *Helichrysum arenarium* (L.) Moench. (sandy cumin) (Asteraceae).

Wet meadow (Mitinskaya) and the Pra river shore (Spaso-Klepikovskiy district, Ryazan region). More than 27 species of medicinal plants have been identified. Among them, the most notable species are: *Valeriana officinalis* L. (Valerian officinalis) (Caprifoliaceae); *Hypericum maculatum* L. (St. John's wort) (Hypericaceae); *Equisetum arvense* L. (horsetail) (Equisetaceae); *Fragaria vesca* L. (wild strawberry); *Potentilla erecta* L. (Potentilla erect); *Comarum palustre* L. (marsh cinquefoil) (Rosaceae); *Stachys palustris* L. (marsh chist) (Lamiaceae); *Lysimachia vulgaris* L. (common loosestrife) (*Primulaceae*).

A characteristic is given of 15 species that are noticeable in terms of the number of species in relation to the content of groups of chemical compounds in them.

References

1. E.M. Lavrenko, A.A. Korchagin, Field geobotany, Acad. sciences of the USSR. Nerd. in-t im. V. L. Komarova (Acad. sciences of the USSR (Leningrad branch), Moscow, Leningrad, 1964)
2. B.M. Mirkin, G.S. Rozenberg, Explanatory dictionary of modern phytocenology (Nauka, Moscow, 1983)

3. F.N. Milkov, N.A. Gvozdetsky, Physical geography of the USSR. General review. European part of the USSR, Caucasus (Thought, Moscow, 1975)
4. Yu.N. Gorelov, Encyclopedia of the Samara Region (Part 2. Geography) / Ministry of Education and Science of the Samara Region (SamLuxPrint, Samara, 2010-2012)
5. B.N. Golovkin, R.N. Rudenskaya, I.A. Trofimova, A.I. Shreter, Biologically active substances of plant origin (Nauka, Moscow, 2001)