УДК 581.9

Видовой состав высокогорной флоры Монгольского Алтая

The species composition of high mountain flora in the Mongolian Altai

Гундэгмаа В.[1], Мунх-Эрдэнэ Т.[2],Сувдцэцэг Ч.[1]

Gundegmaa V.[1], Munkh-Erdene T.[2], Suvdtsetseg Ch.[1]

[1] Отделение биологии, Институт математики и естественных наук, Монгольский национальный университет образования, г. Улан-Батор, Монголия. E-mail: chalkhorum@gmail.com; suvdaa314@gmail.com

[2] Лаборатория систематики флоры и растений, Институт общей и экспериментальной биологии, Монгольская академия наук, г. Улан-Батор, Монголия. E-mail: tmunkhu@gmail.com

[1] Deparment of Biology, School of Mathematics and Natural Sciences, Mongolian National University of Education, Ulaanbaatar, Mongolia

[2] Laboratory of the Flora and Plant systematic, Institute of General and Experimental Biology, Mongolian Academy of Sciences Ulaanbaatar, Mongolia

Реферат. Нами отмечено 560 видов сосудистых растений, принадлежащих к 202 родам из 60 семейств высокогорной флоры (тундра, альпийский и субальпийский пояса) Монгольского Алтая. 58,8 % видового состава изученной территории составляют 10 семейств: Asteraceae, Fabaceae, Caryophyllaceae, Ranunculaceae, Rosaceae, Poaceae, Cyperaceae, Orobanchaceae, Brassicaceae and Salicaceae. 471 вид (84,2 % от общего видового состава) составляют многолетние травянистые растения, а также 5 видов древесных растений.

Summary. Our survey recorded 560 species of vascular plants belong to 202 genera of 60 families from the flora of High Mountain (tundra alpine and subalpine) in Mongolian Altai. About 58,8 % of species compositions are dominated by 331 species of 84 genera in 10 families (Asteraceae, Fabaceae, Caryophyllaceae, Ranunculaceae, Rosaceae, Poaceae, Cyperaceae, Orobanchaceae, Brassicaceae and Salicaceae) for this region. About 84,2 % of the total species composition is the life form of the perennial herbs (471 species) and there are 5 species of woody plants recorded in the region.

Materials and methods

We have used our collections carried out during research works on the project “Nature and ecology, evolution” in Mongolian Altai in 2014. Also we used the results of works from Khukh Serkh, Deluun soum of Bayan-Ulgii province conducted in 2015, and the research conducted in northern soums of Gobi-Altai province in 2015, as well as cooperated research project “Flora and vegetation of Mongolian Plateau” with School of Ecology, Inner Mongolian University in 2017.

To identify plant specimens, we used the books of Flora SSSR (1941), Flora of Siberia (1988), Flora of Central Siberia (1979) and Flora of East Europe (2001).

In terms of nomenclature, we followed the work including Angiosperm Phylogeny Group III (2009) and Plant Nomenclature (2012). In order to identify plant specimens we used binocular stereoscopic microscope “MBS-10”.

Results and discussions

1636 plant species are recorded in the steppe zone of Mongolian Altai Mountains (Urgamal et al., 2014). As a result of our survey, 560 species of vascular plants are registered in the subalpine belt, alpine belt and mountain tundra, and this is about 34,2 % of the whole plant composition of Mongolian Altai Mountains.

We determined 560 species belong to 202 genera and 60 families, they are distributed in following zones: mountain tundra (173 species), alpine belt (226 species) and subalpine belt (378 species). Our result shows that the highest diversity of flora composition in the highlands of Mongolian Altai Mountains has the flowering plants (Magnoliopsida), which in total includes 538 species belong to 53 families (88,3 %) and 192 genera (95 %) (Table 1). Other 32 species are composed of a few species of coniferous trees (*Larix*

sibirica Ledeb., *Picea obovate* Ledeb. and *Pinus sibirica* Du Tour), some shrubs (*Juniperus* sp.), small shrubs (*Ephedra monosperma* J. G. Gmel. ex C. A. Mey.), fern and horsetail etc.

The highest diversity family in the highlands of Mongolian Altai Mountains is Asteraceae with 65 species from 21 genera. Ten families which represent the 58,3 % of the species composition are Fabaceae, Ranunculaceae, Caryophyllaceae, Rosaceae, Cyperaceae, Poaceae and Brassicaceae (Table 2).

Table 1

Divisions of the vascular plants in Mongolian Altai Mountain

Division	Families		Genera		Species	
	Number of species	%	Number of species	%	Number of species	%
1. Polypodiophyta [Fern & horsetail]	5	8,4	6	3,0	16	2,9
2. Pinophyta [Gymnosperm]	2	3,3	4	2,0	6	1,1
3. Magnoliopsida [Flowering plants]	53	88,3	192	95	538	96
a. Magnoliidae [Dicotylendons]	41	68,3	165	82	456	84,6
b. Liliidae [Monocotyledons]	12	20	27	13	82	11,4
Total	60	100	202	100	560	100

Table 2

Families with the highest diversity of species

Families	Genera		Species	
	Number	%	Number	%
1. Asteraceae [Compositae]	21	10,3	65	11,6
2. Fabaceae [Leguminosae]	5	2,5	38	6,8
3. Ranunculaceae	13	6,4	37	6,6
4. Caryophyllaceae	12	6,0	37	6,6
5. Rosaceae	12	6,0	32	5,7
6. Cyperaceae	6	3,0	28	5,0
7. Poaceae [Graminae]	13	6,4	27	4,8
8. Brassicaceae [Cruciferae]	10	4,9	23	4,1
9. Orobanchaceae	3	1,5	23	4,1
10. Salicaceae	2	1,0	17	3,0
Total	97 genera	48%	327 species	58,3

The genus *Pedicularis* includes the highest number of species (21 species) from 10 leading genera of highlands flora. The following genera represent about 26 % of species composition: *Oxytropis* DC (20 species), *Salix* L. (15 species), *Saussurea* DC (14 species), *Potentilla* L. (13 species), *Allium* L. (12 species), *Carex* L. (12 species), *Astragalus* L. (11 species) and *Ranunculus* L. (9 species) (Table 3).

The species of the mountain tundra, alpine and sub-alpine belts of the Mongolian Altai Mountains are classified into six groups according the categories of the life forms of I. G. Serebryakov (1962, 1964) (Table 4).

The examined highlands flora includes 5 species of woody plants (*Larix sibirica* Ledeb., *Pinus sibirica* Du Tour., *Picea obovata* Ledeb., *Populus laurifolia* Ledeb. and *Populus tremula* L.), 28 species of shrubs (*Caragana jubata* (Pall.) Poir., *Comarum salesovianum* (Steph.) Asch. & Graebn., *Cotoneaster uniflorus* Bunge, *Grossularia acicularis* (Sm.) Spach, *Juniperus pseudosabina* Fisch. & C.A.Mey., *Lonicera altaica* Pall., *Pentaphylloides fruticosa* (L.) O. Schwarz, *Ribes graveolens* Bunge, *Rosa oxyacantha* Bieb., *Salix bebbiana* Sarg. and *Salix glauca* L. etc), 15 species of subshrubs (*Arctous alpina* (L.) Nied., *Betula humilis* Schrank, *Dryas grandis* Juz., *Dryas oxyodonta* Juz., *Empetrum nigrum* L., *Salix arctica* Pall., *Salix berberifolia* Pall., *Salix nummularia* Andess. and *Vaccinium vitis-idaea* L. etc), 22 species of half-subshrubs

Table 3

Top 10 genera with highest number of species

Genera	Species	
	Number	%
1. *Pedicularis* L.	21	4,1
2. *Oxytropis* DC.	20	3,8
3. *Salix* L.	15	2,9
4. *Saussurea* Salisb.	14	2,6
5. *Potentilla* L.	13	2,4
6. *Allium* L.	12	2,2
7. *Carex* L.	12	2,2
8. *Astragalus* L.	11	2,1
9. *Juncus* L.	10	1,9
10. *Ranunculus* L.	9	1,8
Total	146 species	26 %

Table 4

Distribution of species according the life form (system of I. G. Serebryakov (1964))

Life form	Number of species	%
1. Woody	5	0,8
2. Shrubs	28	5,1
3. Subshrubs (bushes)	15	2,6
4. Half-subshrubs	22	3,9
5. Perennials	471	84,2
6. Annual or biennials	19	3,4
Total	560 species	100 %

(*Artemisia argyrophylla* Ledeb., *Biebersteinia odora* Steph., *Dryadanthe tetrandra* (Bunge) Juz, *Oxytropis acanthacea* Jurtzev, *Potentilla biflora* Willd. ex Schlecht., *Stellaria petraea* Bunge, *Stellaria pulvinata* Grub. and *Waldheimia tridactylites* Kar. & Kir. etc), 471 species of perennial herbs (*Achillea alpina* L., *Adoxa moschatellina* L., *Bupleurum aureum* Fisch. ex Hoffm., *Crepis nana* Richard., *Erigeron oreades* (Schrenk.) Fisch. et Mey., *Saussurea baicalensis* (Adams) Robins., *Eritrichium alpinum* Ovczinnikova, *Cardamine bellidifolia* L., *Chorispora bungeana* Fisch. & C.A. Mey, *Cerastium lithospermifolium* Fisch., *Stellaria crassifolia* Ehrh., *Astragalus alpinus* L., *Hedysarum consanguineum* DC., *Swertia obtusa* Ledeb., *Pedicularis amoena* Adans ex Steven, *Corydalis pauciflora* (Steph. ex. Willd.) Pers., *Veronica porphyriana* Pavlov, *Papaver pseudocanescens* Popov, *Ranunculus longicaulis* Ledeb. ex A.Spreng., *Thalictrum alpinum* L. and *Potentilla crantzii* (Crantz) Beck ex Fritsch etc) and also 19 species of annual or biennial (*Androsace fedtschenkoi* Ovcz., *Androsace filiformis* Retz., *Androsace lactiflora* Fisch. ex Duby, *Comastoma azureum* (Bunge) Zuev, *Comastoma falcatum* (Turcz.) Toyok., *Comastoma pulmonarium* (Turcz.) Toyok., *Gentiana aquatica* L., *Gentiana prostrate* Haenke, *Gentianella acuta* (Michaux) Hitt., *Juncus bufonius* L., *Juncus nastanthus* V.I.Krecz., *Koenigia islandica* L. and *Melandrium apricum* (Turcz.) Rohrb. etc).

LITERATURE

APG (Angiosperm Phylogeny Group) III. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG III // Bot. J. Linn. Soc., 2009. – Vol. 161. – P. 105–121.

Flora of China, 2018. URL: /http://www.efloras.org/.

Plant nomenclature, 2018. URL: /http://www.theplantlist.org/browse/A/

Urgamal M., Oyuntsetseg B., Nyambayar D., Dulamsuren Ch. Conspectus of the vascular plants of Mongolia. – Ulaanbaatar: Admon Printing, 2014. – P. 334.

Серебряков И. Г. Экологическая морфология растений. Жизненные формы покрытосеменных и хвойных. – М.: Высш. шк., 1962. – 378 с.

Серебряков И. Г. Жизненные формы высших растений и их изучение // Полевая геоботаника. – М. – Л: Наука, 1964. – Т.3. – С. 146–193.

Флора Восточной Европы. Том X. / Отв. ред. и ред. тома Н. Н. Цвелев. – СПб.: Мир и семия; Издательство СПХФА, 2001. – 670 с.

Флора Сибири. Lycopodiaceae – Hydrocharitaceae. Т.9. / Сост. Л. И. Кашина, И. М. Красноборов, Д. Н. Шауло и др. – Новосибирск: Наука. Сиб. отд-ние, 1988. – 200 с.

Флора СССР, Т. 10. /Сост. Н. В. Ковалев, В. Л. Комаров и др. – М.; Л.: Изд-во АН СССР, 1941. – 673 с.

Флора Центральной Сибири, Т.1 / Под ред. Л. И. Мальшева, Г. А. Пешковой. – Новосибирск: Наука, 1979. – 533 с.