Regular article

Analysis of plant resources and diversity in some areas of Inner Mongolia, China

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Abstract

Inner Mongolia Autonomous Region is located in the north of China. The vast area and complex terrain of this region make it rich in plant resources. The 11th Shenyang Pharmaceutical University Chinese Medicine Resources Scientific Expedition Team investigated the plant resources and diversity in some areas of Inner Mongolia through field investigation, literature review and specimen identification. From July to August, 2017, 215 species of vascular plants belonging to 59 families and 160 genera were collected. The dominant families are *Ranunculaceae*, *Lamiaceae*, *Rosaceae*, *Fabaceae* and *Asteraceae*, with 11, 12, 15, 19, and 37 species, respectively. There are 55 families, 132 genera and 163 species of medical plant recources in some areas of Inner Mongolia. 27 vascular plants are Mongolian Medicine. In a word, our research has updated the plant recources and diversity in all areas of Inner Mongolia. Furthermore, this study provides practical and meaningful suggestions for strengthening the protection and utilization of plant resources in some areas of Inner Mongolia, which is of great significance for maintaining local plant diversity.

Keywords: plant resources; diversity; medicinal use; Inner Mongolia

1 Introduction

Inner Mongolia Autonomous Region is located in the north of China. Its geographical coordinates lie between 97°12’-126°04’ east longitude and 37°24’-53°23’ north latitude, with a total area of 1.18 million km^2 [1]. It spans about 2,400 km from east to west and approximately 1,700 km at its widest point from north to south. There are many geomorphic types in this area, including plains, hills, mountains and plateaus. It is characterized by the typical temperate zone continental climate, with an average annual temperature of 0-8 ℃ and an average annual rainfall of 50-500 mm. There are various vegetation forms in the area, such as forest, shrub, steppe, meadow, swamp and aquatic vegetation [2]. These vegeration forms belong to 2619 vascular plant species, distributed in 144 families and 737 genera [3]. The study aims to explore the plant recources and diversity and update the information

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on natural medicinal plants in some areas of Inner Mongolia.

Traditional Mongolian Medicine (TMM) is one of the most important ethnic medicines with well-established theories. It has been developed for over thousands of years among Mongolian people [4]. Inner Mongolia is rich in pharmacological plant resources. Local Mongol herdsmen frequently use herbaceous plants, especially the perennial herbs, for medicinal purposes. The roots, whole plant, and aerial parts are commonly used [5]. Compared with traditional Chinese Medicine (TCM), TMM has some unique uses in terms of medical functions and medicinal parts [6]. Traditional folk medicine can provide useful information for identifying new medicinal parts of wild plant species. Medicinal plants in the TMM have various functions, including clearing heat-fire, detoxifying, reducing swelling, heat-clearing, reducing phlegm, thermal spa treatment and dispelling coldness [7].

The 11th Scientific Expedition Team of Chinese Medicine Resources of Shenyang Pharmaceutical University updated the plant species in some areas of Inner Mongolia in 2017, through field investigation, specimen collection, literature retrieval and specimen checking. A detailed survey was conducted on resources and biodiversity to understand the types, distribution and utilization of plant resources in some areas of Inner Mongolia. The findings provide a scientific basis for the rational construction and sustainable utilization of precious plant resources there.

2 Research method

In July 2017, the 11th Scientific Expedition Team of Chinese Medicine Resources of Shenyang Pharmaceutical University traveled all over Inner Mongolia Autonomous Region from west to east. The expedition lasted 18 d, during which we collected more than 4,200 specimens, covering more than 4,200 km. Our team crossed different landscapes, including the Alxa Left Banner, Tengger Desert, Yin Mountains, Chunkun Mountain, Xilin Gol Grassland, the highest peak of the Great Khingan Mountains (Huangliangganggang), Tongliao Han Mountain and Ao Bao Mountain. Along the way, we meticulously examined the plants in deserts, mountains, meadows, grasslands, forests and other complex terrains.

The representative areas were systematically surveyed, taking into consideration factors such as topography, landform, altitude and plant type of different regions of Inner Mongolia. Throughout the survey, we collected samples and took photos along the way. Detailed records were meticulously maintained, including information such as the collection location, time, main morphological characteristics of plants. The latitude and longitude of the collected plants were recorded using a GPS logger. The vascular plant species were identified by referring to reliable sources such as the "Flora of China" and "Flora intramongolica". Subsequently, the diversity of plant resources in some areas of Inner Mongolia was analyzed and evaluated, which provides some insights into the development, utilization and protection of plant resources in some areas of Inner Mongolia.

3 Results

3.1 Analysis of vascular plant species composition in some areas of Inner Mongolia

We collected a total of 215 vascular plant species in some areas of Inner Mongolia. The species were classified into 59 families and 160 genera. Among them, there were 2 families, 2 genera, and 3 species of pteridophytes; 1 family, 1 genus and 1 species of gymnosperms; 56 families, 157 genera, and 211 species of angiosperms (including 45 families, 141 genera, and 193

species of dicotyledons; 11 families, 16 genera, and 18 species of monocotyledons). Angiosperms accounted for 94.9%, 98.1%, and 98.1% of the total number of families, genera and species, respectively. Dicotyledons were the predominant group in angiosperms. As shown in Table 1, there are relatively few species of pteridophytes, bryophytes, and gymnosperms.

Table 1 Statistics of vascular plant species in some areas of Inner Mongolia

Plant type	No.families	Ratio/%	No.genera	Ratio/%	No.species	Ratio/%
Pteridophytes	2	3.39	2	1.25	3	1.40
Gymnosperms	1	1.69	1	0.63	1	0.46
Angiosperms	56	94.92	157	98.12	211	98.14
Dicotyledons	45	80.36	141	89.81	193	91.47
Monocotyledons	11	19.64	16	10.19	18	8.53
Total	59	100.00	160	100.00	215	100.00

3.2 Analysis of plant family and genus composition in some areas of Inner Mongolia

The vascular plants we collected from some areas of Inner Mongolia were classified into 59 plant families. Most of the families had only a few species in the region. Specifically, 48 collected plant families consisted of 1-5 species, accounting for 81.3% of the total number of families. Additionally, 6 families contained 6-10 species, accounting for 10.2% of the total number of families. There were 5 families with more than 10 species. The 5 families were *Ranunculaceae*, *Lamiaceae*, *Rosaceae*, *Fabaceae* and *Asteraceae*, with 11, 12, 15, 19, and 37 species respectively. Although accounting for only 8.5% of the total number of families, these 5 families show a high species occupancy rate of over 43.7%, as shown in Table 2.

Table 2 Statistics of species in different families of vascular plants in some areas of Inner Mongolia

No.species within families	No.families	Ratio/%	No.species	Ratio/%
1 species	32	54.24	32	14.88
2-5 species	16	27.12	47	21.86
6-10 species	6	10.17	42	19.54
>10 species	5	8.47	94	43.72

As for genera, the vascular plants were classified into 160 plant genera in total. Among them, 120 genera contained only 1 species, accounting for 75.0% of the total number of genus, as shown in Table 3. There were 5 genera containing 4 species each, namely *Astragalus*, *Oxytropis*, *Geranium*, *Adenophora*, and *Potentilla*.

Table 3 Statistics of species in the different genera of vascular plants in some areas of Inner Mongolia

No.species within genus	No.genus	Ratio/%	No.species	Ratio/%
1 species	120	75.000	120	55.810
2 species	30	18.750	60	27.910
3 species	5	3.125	15	6.980
4 species	5	3.125	20	9.300

3.3 Diversity analysis of medicinal plants in some areas of Inner Mongolia

Among 215 species of vascular plants collected in some areas of Inner Mongolia, medicinal plants account for 75.8%. They are used to treat a variety of diseases in Traditional Chinese Medicine and Traditional Mongolian Medicine. There are 55 families, 132 genera and 163 species of medical plant recources in some areas of Inner Mongolia. The main families are *Asteraceae* (23), *Rosaceae* (13), *Ranunculaceae* (11), *Fabaceae* (10) and *Lamiaceae* (10), as shown in Table 4. The medicinal plants whose medicinal part is the underground stem are the most, as shown in Table 5. According to 2021 Inner Mongolia Mongolian Medicinal Materials Standard [8], 27 vascular plants are Mongolian Medicine, as shown in Table 6.

All the collected plant information is shown in Table 7.

Table 4 Diversity statistics of major medicinal plant families and genera in some areas of Inner Mongolia

Composition	Main families (No. species)
55 families	*Asteraceae* (23)
132 genera	*Rosaceae* (13)
163 species	*Ranunculaceae* (11)
	Fabaceae (10)
	Lamiaceae (10)

Table 5 Diversity statistics of medicinal parts of medicinal plant in some areas of Inner Mongolia

Medicinal parts	No. species
Whole plant	64
Undergroud stem	65
Flower	11
Branch and leaf	17
Fruit	18
Seed	10

Table 6 Mongolian Medicine in some areas of Inner Mongolia

No.	Families	Species	Medicinal parts	Medicinal value
1	Apiaceae	*Angelica dahurica* (Fisch. ex Hoffm.) Benth. et Hook. f. ex Franch. & Sav.	root	eliminating dampness, expelling pus and promoting granulation, promoting blood circulation and rlieving pain.
2	Polygonaceae	*Koenigia divaricata* (L.) T. M. Schust. & Reveal	root	warming kidney for dispelling cold.
3	Ranunculaceae	*Delphinium grandiflorum* L.	whole plant, root, seed	clearing heat-fire, destroying parasites.
4	Plumbaginaceae	*Limonium bicolor* (Bunge) Kuntze	whole	promoting blood flow, hemostasis, nourishing body.

(to be continued)

Continued Table 6

No.	Families	Species	Medicinal parts	Medicinal value
5	Lamiaceae	*Scutellaria baicalensis* Georgi	root	clearing heat-toxin and eliminating dampness, hemostasis, preventing miscarriage.
6	Zygophyllaceae	*Tribulus terrestris* Linnaeus	fruit	suppressing hyperactive liver for resolving stagnation, promoting blood flow and dispelling pathogenic wind, improving eyesight.
7	Asteraceae	*Sonchus oleraceus* L.	whole plant	clearing heat-toxin, expelling pus for detumescence.
8	Thymelaeaceae	*Stellera chamaejasme* L.	root	expelling phlegm, eliminating stagnated food, rlieving pain.
9	Oleaceae	*Forsythia suspensa* (Thunb.) Vahl	fruit	clearing heat-toxin, resolving static blood for detumescence.
10	Iridaceae	*Iris lactea* Pall.	flower, seed, root	relaxing bowels and inducing diuresis, hemostasis.
11	Gentianaceae	*Gentiana macrophylla* Pall.	root	dispelling pathogenic wind and removing dampness, clearing heat and inducing diuresis.
12	Caryophyllaceae	*Dianthus superbus* L.	whole plant	clearing heat, inducing diuresis, promoting blood circulation for removing obstruction in collaterals.
13	Polygonaceae	*Bistorta officinalis* Raf.	rhizome	clearing heat and relieving convulsion, eliminating dampness for detumescence.
14	Orobanchaceae	*Cistanche deserticola* Ma	succulent	warming and recuperating kidney yang, moisturizing the intestine.
15	Asteraceae	*Echinops gmelinii* Turcz.	root	clearing heat-toxin, detumescence, and promoting lactation.
16	Iridaceae	*Belamcanda chinensis* (L.) Redouté	rhizome	clearing heat-toxin, detumescence, and rlieving pain.
17	Cynomoriaceae	*Cynomorium songaricum* Rupr.	succulent stem	tonifying kidney and nourishing the essence, moistening dryness.
18	Rosaceae	*Potentilla chinensis* Ser.	whole plant	clearing heat-toxin, hemostasis, relieving dysentery.
19	Lamiaceae	*Leonurus sibiricus* L.	whole plant, fruit	promoting blood flow for regulating menstruation.
20	Asteraceae	*Filifolium sibiricum* (L.) Kitam.	whole plant	clearing heat-toxin, tranquillization, regulating menstruation.
21	Caprifoliaceae	*Valeriana officinalis* L.	root, rhizome	tranquillization.
22	Asteraceae	*Inula japonica* Thunb.	inflorescence	removing phlegm, controlling nausea and vomiting.
23	Linaceae	*Linum usitatissimum* L.	seed	relaxing bowels, clearing toxin and rlieving pain.
24	Fabaceae	*Trifolium lupinaster* L.	whole plant	relieving cough, easing pain.
25	Lamiaceae	*Leonurus japonicus* Houttuyn	whole plant	clearing heat-toxin, inducing diuresis for detumescence.
26	Asparagaceae	*Polygonatum odoratum* (Mill.) Druce	rhizome	nourishing yin for moistening dryness, promoting production of fluid for assuaging thirst.
27	Hypericaceae	*Hypericum longistylum* Oliv.	fruit	clearing heat-toxin, detumescence.

Table 7 Statistics of vascular plant resources in some areas of Inner Mongolia

No.	Families	Genera	Species
1	Asphodelaceae	Hemerocallis	*Hemerocallis dumortieri* Morr.
2	Nitrariaceae	Nitraria	*Nitraria tangutorum* Bobr.
3	Nitrariaceae	Peganum	*Peganum harmala* L.
4	Plumbaginaceae	Limonium	*Limonium bicolor* (Bunge) Kuntze
5	Liliaceae	Lilium	*Lilium pumilum* DC.
6	Primulaceae	Lysimachia	*Lysimachia davurica* Ledeb.
7	Plantaginaceae	Veronica	*Veronica anagallis-aquatica* Linnaeus
8	Plantaginaceae	Veronicastrum	*Veronicastrum sibiricum* (L.) Pennell
9	Plantaginaceae	Pseudolysimachion	*Pseudolysimachion rotundum* subsp. *coreanum* (Nakai) D. Y. Hong
10	Plantaginaceae	Veronicastrum	*Veronicastrum sibiricum* (L.) Pennell
11	Plantaginaceae	Limnophila	*Limnophila sessiliflora* (Vahl) Blume
12	Plantaginaceae	Pseudolysimachion	*Pseudolysimachion longifolium* (Linnaeus) Opiz
13	Tamaricaceae	Tamarix	*Tamarix chinensis* Lour.
14	Lamiaceae	Thymus	*Thymus mongolicus* Ronn.
15	Lamiaceae	Scutellaria	*Scutellaria scordifolia* Fisch. ex Schrank
16	Lamiaceae	Phlomoides	*Phlomoides umbrosa* (Turcz.) Kamelin & Makhm.
17	Lamiaceae	Clinopodium	*Clinopodium megalanthum* (Diels) C. Y. Wu et Hsuan ex H. W. Li
18	Lamiaceae	Clinopodium	*Clinopodium chinense* (Benth.) O. Ktze.
19	Lamiaceae	Dracocephalum	*Dracocephalum argunense* Fisch. ex Link
20	Lamiaceae	Scutellaria	*Scutellaria baicalensis* Georgi
21	Lamiaceae	Nepeta	*Nepeta cataria* L.
22	Lamiaceae	Panzerina	*Panzerina lanata* var. *alaschanica* (Kuprian.) H. W. Li
23	Lamiaceae	Leonurus	*Leonurus sibiricus* L.
24	Lamiaceae	Mentha	*Mentha dahurica* Fisch. ex Benth.
25	Lamiaceae	Leonurus	*Leonurus japonicus* Houttuyn
26	Euphorbiaceae	Euphorbia	*Euphorbia fischeriana* Steud.
27	Fabaceae	Melilotus	*Melilotus officinalis* (L.) Pall.
28	Fabaceae	Astragalus	*Astragalus melilotoides* Pall.
29	Fabaceae	Astragalus	*Astragalus dahuricus* (Pall.) DC.
30	Fabaceae	Oxytropis	*Oxytropis grandiflora* (Pall.) DC.

(to be continued)

Continued Table 7

No.	Families	Genera	Species
31	Fabaceae	Astragalus	*Astragalus efoliolatus* Hand.-Mazz.
32	Fabaceae	Oxytropis	*Oxytropis myriophylla* (Pall.) DC.
33	Fabaceae	Medicago	*Medicago ruthenica* (L.) Trautv.
34	Fabaceae	Kummerowia	*Kummerowia striata* (Thunb.) Schindl.
35	Fabaceae	Lespedeza	*Lespedeza juncea* (L. f.) Pers.
36	Fabaceae	Sphaerophysa	*Sphaerophysa salsula* (Pall.) DC.
37	Fabaceae	Oxytropis	*Oxytropis aciphylla* Ledeb.
38	Fabaceae	Thermopsis	*Thermopsis lanceolata* R. Br.
39	Fabaceae	Vicia	*Vicia amoena* Fisch. ex DC.
40	Fabaceae	Vicia	*Vicia unijuga* A. Br.
41	Fabaceae	Astragalus	*Astragalus laxmannii* Jacq.
42	Fabaceae	Trifolium	*Trifolium lupinaster* L.
43	Fabaceae	Oxytropis	*Oxytropis ciliata* Turcz.
44	Fabaceae	Kummerowia	*Kummerowia stipulacea* (Maxim.) Makino
45	Fabaceae	Medicago	*Medicago sativa* L.
46	Poaceae	Agropyron	*Agropyron cristatum* (L.) Gaertn.
47	Elaeagnaceae	Elaeagnus	*Elaeagnus angustifolia* L.
48	Zygophyllaceae	Tribulus	*Tribulus terrestris* Linnaeus
49	Apocynaceae	Vincetoxicum	*Vincetoxicum glaucescens* (Decne.) C. Y. Wu et D. Z. Li
50	Apocynaceae	Cynanchum	*Cynanchum thesioides* (Freyn) K. Schum.
51	Hypericaceae	Hypericum	*Hypericum perforatum* L.
52	Hypericaceae	Hypericum	*Hypericum hirsutum* L.
53	Hypericaceae	Hypericum	*Hypericum longistylum* Oliv.
54	Violaceae	Viola	*Viola collina* Bess.
55	Malvaceae	Malva	*Malva verticillat*a L.
56	Crassulaceae	Phedimus	*Phedimus aizoon* (Linnaeus) ‘t Hart
57	Crassulaceae	Hylotelephium	*Hylotelephium verticillatum* (L.) H. Ohba
58	Crassulaceae	Orostachys	*Orostachys fimbriata* (Turczaninow) A. Berger
59	Crassulaceae	Phedimus	*Phedimus aizoon* (Linnaeus) ‘t Hart
60	Campanulaceae	Campanula	*Campanula glomerata* subsp. *speciosa* (Sprengel) Domin
61	Campanulaceae	Adenophora	*Adenophora tetraphylla* (Thunb.) Fisch.
62	Campanulaceae	Adenophora	*Adenophora stricta* Miq.

(to be continued)

Continued Table 7

No.	Families	Genera	Species
63	Campanulaceae	Adenophora	*Adenophora polyantha* Nakai
64	Campanulaceae	Adenophora	*Adenophora gmelinii* (Spreng.) Fisch.
65	Asteraceae	Artemisia	*Artemisia blepharolepis* Bge.
66	Asteraceae	Strobocalyx	*Strobocalyx esculenta* (Hemsley) H. Robinson et al.
67	Asteraceae	Artemisia	*Artemisia sieversiana* Ehrhart ex Willd.
68	Asteraceae	Aster	*Aster scaber* Thunb.
69	Asteraceae	Taraxacum	*Taraxacum dissectum* (Ledeb.) Ledeb.
70	Asteraceae	Carduus	*Carduus nutans* L.
71	Asteraceae	Saussurea	*Saussurea japonica* (Thunb.) DC.
72	Asteraceae	Tephroseris	*Tephroseris flammea* (Turcz. ex DC.) Holub.
73	Asteraceae	Olgaea	*Olgaea leucophylla* (Turcz.) Iljin
74	Asteraceae	Leontopodium	*Leontopodium leontopodioides* (Willd.) Beauv.
75	Asteraceae	Sonchus	*Sonchus oleraceus* L.
76	Asteraceae	Echinops	*Echinops sphaerocephalus* L.
77	Asteraceae	Cirsium	*Cirsium esculentum* (Sievers) C. A. Mey.
78	Asteraceae	Inula	*Inula salsoloides* (Turcz.) Ostenf.
79	Asteraceae	Jacobaea	*Jacobaea cannabifolia* (Lessing) E. Wiebe
80	Asteraceae	Aster	*Aster pekinensis* (Hance) Kitag.
81	Asteraceae	Lactuca	*Lactuca tatarica* (L.) C. A. Mey.
82	Asteraceae	Echinops	*Echinops gmelinii* Turcz.
83	Asteraceae	Hieracium	*Hieracium umbellatum* L.
84	Asteraceae	Aster	*Aster lautureanus* (Debeaux) Franch.
85	Asteraceae	Synurus	*Synurus deltoides* (Ait.) Nakai
86	Asteraceae	Lactuca	*Lactuca sibirica* (L.) Benth. ex Maxim.
87	Asteraceae	Ligularia	*Ligularia fischeri* (Ledeb.) Turcz.
88	Asteraceae	Askellia	*Askellia flexuos*a (Ledebour) W. A. Weber
89	Asteraceae	Klasea	*Klasea centauroides* subsp. *chanetii* (H. Léveillé) L. Martins
90	Asteraceae	Crepis	*Crepis tectorum* L.
91	Asteraceae	Takhtajaniantha	*Takhtajaniantha pusilla* (Pall.) Nazarova
92	Asteraceae	Filifolium	*Filifolium sibiricum* (L.) Kitam.
93	Asteraceae	Erigeron	*Erigeron canadensis* L.
94	Asteraceae	Chrysanthemum	*Chrysanthemum chanetii* H. Léveillé

(to be continued)

Continued Table 7

No.	Families	Genera	Species
95	Asteraceae	Parasenecio	*Parasenecio forrestii* W. W. Smith et Samll
96	Asteraceae	Picris	*Picris japonica* Thunb.
97	Asteraceae	Inula	*Inula japonica* Thunb.
98	Asteraceae	Takhtajaniantha	*Takhtajaniantha austriaca* (Willd.) Zaika
99	Asteraceae	Cirsium	*Cirsium pendulum* Fisch. ex DC.
100	Asteraceae	Saussurea	*Saussurea alata* DC.
101	Asteraceae	Saussurea	*Saussurea nivea* Turcz.
102	Gesneriaceae	Hemiboea	*Hemiboea subcapitata* Clarke
103	Orchidaceae	Spiranthes	*Spiranthes sinensis* (Pers.) Ames
104	Melanthiaceae	Paris	*Paris verticillata* M.-Bieb.
105	Polygonaceae	Rumex	*Rumex patientia* L.
106	Polygonaceae	Rheum	*Rheum rhabarbarum* Linnaeus
107	Polygonaceae	Koenigia	*Koenigia divaricata* (L.) T. M. Schust. & Reveal
108	Polygonaceae	Bistorta	*Bistorta officinalis* Raf.
109	Polygonaceae	Knorringia	*Knorringia sibirica* (Laxmann) Tzvelev
110	Polygonaceae	Bistorta	*Bistorta vivipara* (L.) Gray
111	Orobanchaceae	Orobanche	*Orobanche coerulescens* Steph.
112	Orobanchaceae	Pedicularis	*Pedicularis verticillata* L.
113	Orobanchaceae	Cistanche	*Cistanche deserticola* Ma
114	Dryopteridaceae	Dryopteris	*Dryopteris crassirhizoma* Nakai
115	Gentianaceae	Gentiana	*Gentiana macrophylla* Pall.
116	Gentianaceae	Gentiana	*Gentiana triflora* Pall.
117	Ephedraceae	Ephedra	*Ephedra sinica* Stapf
118	Geraniaceae	Geranium	*Geranium wlassovianum* Fischer ex Link
119	Geraniaceae	Geranium	*Geranium wilfordii* Maxim.
120	Geraniaceae	Geranium	*Geranium platyanthum* Duthie
121	Geraniaceae	Geranium	*Geranium sibiricum* L.
122	Ranunculaceae	Thalictrum	*Thalictrum petaloideum* L.
123	Ranunculaceae	Pulsatilla	*Pulsatilla cernua* (Thunb.) Bercht. et Opiz.
124	Ranunculaceae	Delphinium	*Delphinium grandiflorum* L.
125	Ranunculaceae	Thalictrum	*Thalictrum acutifolium* (Hand.-Mazz.) Boivin
126	Ranunculaceae	Actaea	*Actaea asiatica* Hara

(to be continued)

Continued Table 7

No.	Families	Genera	Species
127	Ranunculaceae	Thalictrum	*Thalictrum aquilegiifolium* var. *sibiricum* Linnaeus
128	Ranunculaceae	Clematis	*Clematis florida* Thunb.
129	Ranunculaceae	Ranunculus	*Ranunculus ficariifolius* Lévl. et Vant.
130	Ranunculaceae	Aconitum	*Aconitum macrorhynchum* Turcz.
131	Ranunculaceae	Clematis	*Clematis macropetala* Ledeb.
132	Ranunculaceae	Halerpestes	*Halerpestes ruthenica* (Jacq.) Ovcz.
133	Oleaceae	Forsythia	*Forsythia suspensa* (Thunb.) Vahl
134	Equisetaceae	Equisetum	*Equisetum hyemale* L.
135	Equisetaceae	Equisetum	*Equisetum arvense* L.
136	Rubiaceae	Galium	*Galium verum* L.
137	Rubiaceae	Galium	*Galium bungei* Steud.
138	Rosaceae	Potentilla	*Potentilla supina* L.
139	Rosaceae	Prunus	*Prunus padus* L.
140	Rosaceae	Chamaerhodos	*Chamaerhodos erecta* (L.) Bge.
141	Rosaceae	Sanguisorba	*Sanguisorba officinalis* L.
142	Rosaceae	Pyrus	*Pyrus betulifolia* Bge.
143	Rosaceae	Potentilla	*Potentilla discolor* Bge.
144	Rosaceae	Crataegus	*Crataegus sanguinea* Pall.
145	Rosaceae	Spiraea	*Spiraea aquilegiifolia* Pallas
146	Rosaceae	Potentilla	*Potentilla verticillaris* Steph. ex Willd.
147	Rosaceae	Prunus	*Prunus mongolica* (Maxim.) Ricker
148	Rosaceae	Rosa	*Rosa davurica* Pall.
149	Rosaceae	Rubus	*Rubus saxatilis* L.
150	Rosaceae	Potentilla	*Potentilla chinensis* Ser.
151	Rosaceae	Sanguisorba	*Sanguisorba tenuifolia* var. *alba* Trautv.et Mey.
152	Rosaceae	Dasiphora	*Dasiphora parvifolia* (Fisch. ex Lehm.) Juz.
153	Caprifoliaceae	Patrinia	*Patrinia scabiosifolia* Link
154	Caprifoliaceae	Pterocephalus	*Pterocephalus bretschneideri* (Bat.) Pritz.
155	Caprifoliaceae	Lonicera	*Lonicera affinis* Hook. & Arn.
156	Caprifoliaceae	Valeriana	*Valeriana officinalis* L.
157	Caprifoliaceae	Patrinia	*Patrinia rupestris* (Pall.) Juss.
158	Caprifoliaceae	Scabiosa	*Scabiosa comosa* Fisch. ex Roem. et Schult.

(to be continued)

Continued Table 7

No.	Families	Genera	Species
159	Thymelaeaceae	Stellera	*Stellera chamaejasme* L.
160	Apiaceae	Angelica	*Angelica dahurica* (Fisch. ex Hoffm.) Benth. et Hook. f. ex Franch. & Sav.
161	Apiaceae	Bupleurum	*Bupleurum chinense* DC.
162	Apiaceae	Heracleum	*Heracleum moellendorffii* Hance
163	Apiaceae	Saposhnikovia	*Saposhnikovia divaricata* (Turcz.) Schischk.
164	Apiaceae	Angelica	*Angelica czernaevia* (Fisch. et C. A. Mey.) Kitag.
165	Apiaceae	Bupleurum	*Bupleurum hamiltonii* N. P. Balakrishnan
166	Apiaceae	Ferula	*Ferula bungeana* Kitagawa
167	Apiaceae	Sium	*Sium suave* Walt.
168	Cyperaceae	Schoenoplectus	*Schoenoplectus tabernaemontani* (C. C. Gmelin) Palla
169	Paeoniaceae	Paeonia	*Paeonia lactiflora* Pall.
170	Brassicaceae	Descurainia	*Descurainia sophia* (L.) Webb ex Prantl
171	Brassicaceae	Catolobus	*Catolobus pendulus* (L.) Al-Shehbaz
172	Brassicaceae	Lepidium	*Lepidium apetalum* Willd.
173	Brassicaceae	Dontostemon	*Dontostemon dentatus* (Bunge) Lédeb.
174	Brassicaceae	Rorippa	*Rorippa palustris* (Linnaeus) Besser
175	Amaryllidaceae	Allium	*Allium hookeri* Thwaites
176	Amaryllidaceae	Allium	*Allium ledebourianum* Roem. et Schult.
177	Caryophyllaceae	Silene	*Silene vulgaris* (Moench.) Garcke
178	Caryophyllaceae	Eremogone	*Eremogone juncea* (M.Bieb.) Fenzl
179	Caryophyllaceae	Silene	*Silene conoidea* L.
180	Caryophyllaceae	Silene	*Silene repens* Patr.
181	Caryophyllaceae	Dianthus	*Dianthus superbus* L.
182	Caryophyllaceae	Dianthus	*Dianthus chinensis* L.
183	Caryophyllaceae	Stellaria	*Stellaria radians* L.
184	Caryophyllaceae	Gypsophila	*Gypsophila oldhamiana* Miq.
185	Caryophyllaceae	Moehringia	*Moehringia lateriflora* (L.) Fenzl
186	Juncaginaceae	Triglochin	*Triglochin maritima* Linnaeus
187	Cynomoriaceae	Cynomorium	*Cynomorium songaricum* Rupr.
188	Santalaceae	Thesium	*Thesium chinense* Turcz.
189	Asparagaceae	Convallaria	*Convallaria majalis* L.

(to be continued)

Continued Table 7

No.	Families	Genera	Species
190	Asparagaceae	Maianthemum	*Maianthemum japonicum* (A. Gray) LaFrankie
191	Asparagaceae	Asparagus	*Asparagus cochinchinensis* (Lour.) Merr.
192	Asparagaceae	Maianthemum	*Maianthemum bifolium* (L.) F. W. Schmidt
193	Asparagaceae	Polygonatum	*Polygonatum odoratum* (Mill.) Druce
194	Celastraceae	Parnassia	*Parnassia palustris* L.
195	Amaranthaceae	Suaeda	*Suaeda przewalskii* Bunge
196	Amaranthaceae	Halogeton	*Halogeton arachnoideus* Moq.
197	Amaranthaceae	Chenopodium	*Chenopodium acuminatum* Willd.
198	Amaranthaceae	Corispermum	*Corispermum mongolicum* Iljin
199	Amaranthaceae	Agriophyllum	*Agriophyllum squarrosum* (L.) Moq.
200	Amaranthaceae	Corispermum	*Corispermum chinganicum* Iljin
201	Amaranthaceae	Suaeda	*Suaeda salsa* (L.) Pall.
202	Convolvulaceae	Convolvulus	*Convolvulus ammannii* Desr.
203	Urticaceae	Urtica	*Urtica cannabina* L.
204	Linaceae	Linum	*Linum usitatissimum* L.
205	Salicaceae	Salix	*Salix argyracea* E. L. Wolf
206	Papaveraceae	Chelidonium	*Chelidonium majus* L.
207	Papaveraceae	Papaver	*Papaver nudicaule* L.
208	Ulmaceae	Ulmus	*Ulmus pumila* L.
209	Iridaceae	Iris	*Iris lactea* Pall.
210	Iridaceae	Belamcanda	*Belamcanda chinensis* (L.) Redouté
211	Polygalaceae	Polygala	*Polygala sibirica* L.
212	Rutaceae	Dictamnus	*Dictamnus dasycarpus* Turcz.
213	Alismataceae	Sagittaria	*Sagittaria trifolia* L.
214	Alismataceae	Alisma	*Alisma plantago-aquatica* L.
215	Boraginaceae	Cynoglossum	*Cynoglossum divaricatum* Stephan ex Lehmann

4 Discussion

Our team crossed some major areas in Inner Mongolia from west to east, including the Alxa Left Banner, Tengger Desert, Yin Mountains, Chunkun Mountain, Xilin Gol Grassland, the highest peak of the Great Khingan Mountains (Huanglianggang), Tongliao Han Mountain and Ao Bao Mountain. Limited by time number of researchers and funds, we only searched in a limited area and found a limited number of plants. Further research is needed.

5 Conclusion

Inner Mongolia Autonomous Region is located in the north of China. The vast area and complex terrain of this region make it rich in plant resources. We collected 215 species of vascular plants, belonging to 59 families and 160 genera. The dominant families identified are *Ranunculaceae*, *Lamiaceae*, *Rosaceae*, *Fabaceae* and *Asteraceae*, with 11, 12, 15, 19, and 37 species respectively. 163 species of vascular plants are medicinal plants. 27 species were recorded in 2021 Inner Mongolia Mongolian Medicinal Materials Standard. Our research will be meaningful for the maitenance of the plant diversity there.

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