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# Analysis of wild medicinal vascular plant resources and diversity in Dabie Mountains, Anhui Province

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**Abstract**

**Dabie Mountains are located at the junction of Anhui, Henan and Hubei provinces in the East of China. With its varied altitude, climate, and soil texture, Dabie Mountains are extremely rich in wild plant resources. The 12th Traditional Chinese Medicine (TCM) Resources Scientific Expedition Team of Shenyang Pharmaceutical University conducted a study on wild vascular plants resources, especially medicinal vascular plants, through field investigation, literature review and specimen identification. There were 472 species of vascular plants belonging to 347 genera and 125 families collected during July 2018 in this area, of which 424 species were medicinal vascular plants, accounting for 89.83% of the total. From the perspective of medicinal parts, most of the medicinal plants there have values in their roots and rhizomes, as well as the whole plants. The efficacy and characteristics of these pharmaceutical dimensions were also summarized and analyzed in detail. Besides, among the wild vascular plants collected, the most dominant families with the biggest numbers of species are Compositae, Lamiaceae, Liliaceae, Rosaceae, Leguminosae, Ranunculaceae, Saxifragaceae and Polygonaceae, and the dominant genus are *Viola* and *Sedum*. In terms of life form, perennial herbs are dominant, accounting for 55.72% of the total species, followed by some annual (or biennial) herbs, shrubs and lianas. Finally, recommendations are put forward for strengthening the protection and utilization of wild medicinal plant resources in Dabie Mountains.**

***Keywords***: Dabie Mountains; medicinal vascular plant resources; plant diversity; medicinal use; protection and utilization

## 1 Introduction

Wild plant resources are important natural basic resources, which play an irreplaceable role in maintaining ecological balance and improving ecological environment. Among them, medicinal plant resources are the material basis of traditional Chinese medicine. Investigating the wild plant resources and sustaining the utilization of medicinal plant resources is of great significance for protecting ecological environment and biodiversity, realizing harmonious coexistence between human beings and nature, and promoting the construction of ecological civilization.

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Located in the east of China and at the junction of north and south of China, Anhui Province is in the transitional area between subtropical zone and warm temperate zone. Due to the abundant rainfall and diverse topography, the territory is rich in plant species. According to investigation and statistics, there are 10917 species of organisms in the province, of which 3390 species can be used as medicine.

The flora of Dabie Mountains has an ancient origin, and ancient relict plants of different geological periods have been preserved and multiplied here, such as *Pseudolarix amabilis* (Nelson) Rehd, *Liriodendron chinense* (Hemsl.) Sarg, *Nyssa sinensis* Oliv, *Emmenopterys henryi* Oliv, *Fortunearia sinensis* Rehd. et Wils and *Oyama sieboldii.* There are some tertiary relict plants and early tertiary relict plants. Different geographical components of China permeate and blend in Dabie Mountains, and there are three major flora of East China, North China and Central China in this area, making it the most ideal place for plants to grow, develop and reproduce.

In this study, Dabie mountains in Anhui Province was taken as the research area. The wild medicinal vascular plant resources and their diversities in this area were investigated and analyzed by means of field investigation, specimen collection, literature retrieval and specimen check. The collected data about species, composition and distribution of wild medicinal plant resources in Dabie mountains is conducive to the sustainable development and utilization of wild plant resources, ecological restoration and effective protection.

## 2 Materials and methods

### *2.1 Overview of Dabie mountains, Anhui Province*

Dabie Mountains are located in the east of China, at the junction of Anhui, Henan and Hubei provinces (N 31°23′-32°30′, E 114°01′-115°55′). They are the watershed between the Yangtze River system and the Huaihe River system, and also the north-south boundary of China's geography. As the eastward extension of the Qinling Mountains fold belt, Dabie Mountains stretch from east to west, with a total area of 13,890 $km^2$, bordering Wuhan in the west and Nanjing in the east. The unique geographical position makes it a famous old revolutionary base area in China. Dabie Mountains of Anhui Province include all areas of Jinzhai County, Huoshan County and Yuexi County of Anhui Province, as well as some areas of Lu'an County, Shucheng County and Qianshan County.

The terrain of Dabie Mountains is complex, including peaks, canyons, hills and inter-mountain basins, with altitudes ranging from 50 m to 1700 m. The highest peak, Baimajian, stands at an elevation of 1770 m above sea level with a slope generally around 30°. This area is a transitional zone between the north subtropical monsoon climate and the warm temperate monsoon climate, with an average annual temperature of 14-16 ℃ and a frost-free period of 210-220 d. There is abundant rainfall in the territory, with an average rainfall of 1200 mm-1500 mm and an average relative humidity of 75%-80%, forming many micro-climatic environments. The vegetation is characterized by the transition from the evergreen coniferous, broad-leaved and deciduous forest zone in the north subtropical zone to the deciduous broad-leaved forest zone in the warm temperate zone.

Due to the varied vertical height, climate, soil texture, and the ecological environment of Dabie Mountain, the plant growth conditions are superior. This has led to the development of high-quality wild plant resources represented by Jigong Mountain, Jingangtai Mountain and Liankang Mountain. The Dabie Mountains have a wide variety of wild plants with extremely extensive development and utilization value.

*2.2 Research method*

In July 2018, the 12th TCM Resources Scientific Investigation Team of Shenyang Pharmaceutical University went to Moyun Mountain, Zhangfan Village, Swallow River Grand Canyon, Jingangtai Mountain, Mazong Mountain, Tiantangzhai Mountains, Changling County of Jinzhai County, Taipingfan Township, Sun township double dragon tip of Huoshan County and other places for scientific investigation. Route survey was adopted in representative areas. We collected specimens, took photos, and recorded the collection site, time, and main morphological characteristics of plants in detail. The longitude and latitude were recorded throughout the whole process with GPS recorder.

Based on the *Flora of China* [1], *Flora of Anhui Province* [2] and *DaBie Shan Sylva* [3], the species of vascular plants in Dabie mountains were identified. The list of vascular plant resources was then determined. On the basis of this list, the list of vascular plants that can be used as medicine was established according to the *National Chinese Herbal Medicine Collection* [4], *Chinese Herbal Medicine* [5] and *Illustrated of Dabie mountains major vascular plants* [6]. The information of medicinal parts, efficacy and indications was recorded with reference to the above documents, too. Finally, we analyzed and evaluated the diversity of vascular plant resources in Dabie Mountains of Anhui province, and put forward corresponding suggestions for the conservation of species diversity.

## 3 Results

*3.1 Vascular plant species composition in Dabie Mountains, Anhui province*

According to the results of this scientific investigation, 472 species of vascular plants from 347 genera and 125 families were collected in Dabie Mountains of Anhui Province. Among them, 17 species of pteridophytes belong to 14 genera and 11 families, 4 species of gymnosperms belong to 4 genera and 3 families, and 451 species of angiosperms belong to 329 genera and 111 families (410 species of dicotyledon belonging to 294 genera and 104 families, 41 species of monocotyledonous plants belonging to 35 genera and 7 families) (Table 1).

Table 1 Vascular plant species in Dabie Mountains, Anhui Province

| Plant type | Family | | Genus | | Species | |
|---|---|---|---|---|---|---|
| | Number | Rate/% | Number | Rate/% | Number | Rate/% |
| Pteridophytes | 11 | 8.80 | 14 | 4.03 | 17 | 3.60 |
| Gymnosperms | 3 | 2.40 | 4 | 1.15 | 4 | 0.85 |
| Angiosperms | 111 | 88.80 | 329 | 94.81 | 451 | 95.55 |
| Dicotyledons | 104 | 83.20 | 294 | 84.73 | 410 | 86.86 |
| Monocotyledons | 7 | 5.60 | 35 | 10.09 | 41 | 8.69 |
| Total | 125 | 100.00 | 347 | 100.00 | 472 | 100.00 |

*3.2 Genus composition of vascular plant families in Dabie Mountains, Anhui province*

Among the vascular plants collected in Dabie Mountains, there are 102 families including 1-5 species, accounting for 81.60% of the total families, 15 families including 6-10 species, accounting for 12.00%, 8 families containing more than 10 species, namely, Compositae (31), Lamiaceae (27), Liliaceae (23), Rosaceae (23), Leguminosae (16),

Ranunculaceae (14), Saxifragaceae (13) and Polygonaceae (12). Although this group only accounts for 6.40% of the total number of families, the species contained these families account for 33.69% of the total species (Table 2).

Table 2 Species in different families of vascular plants in Dabie Mountains, Anhui Province

| No. species within families | Family | | Species | |
|---|---|---|---|---|
| | Number | Rate/% | Number | Rate/% |
| One species | 49 | 39.20 | 49 | 10.38 |
| 2-5 species | 53 | 42.40 | 156 | 33.05 |
| 6-10 species | 15 | 12.00 | 108 | 22.88 |
| >10 species | 8 | 6.40 | 159 | 33.69 |

As for genera, the genera containing only one species are obviously dominant. Among the 347 genera from the collected vascular plants, 274 genera have only one species, representing 79.19% and 58.05% of the total genera and species. 70 genera contain 2-5 species, accounting for 20.23% of the total genera, but the proportion of the number of species contained is relatively large, accounting for 39.41% of the total number of species. What's more, only two genera has 6 species, which are *Viola* and *Sedum* (Table 3).

Table 3 Species in different genus of vascular plants in Dabie Mountains, Anhui Province

| No. species within genus | Genus | | Species | |
|---|---|---|---|---|
| | Number | Rate/% | Number | Rate/% |
| One species | 275 | 79.25 | 274 | 58.05 |
| 2-5 species | 70 | 20.17 | 186 | 39.41 |
| 6-10 species | 2 | 0.58 | 12 | 2.54 |

### *3.3 Vascular plants in Dabie Mountains, Anhui Province*

The statistical analysis of different life types of vascular plants collected in Dabie Mountains shows that perennial herbs are dominant, with 263 species accounting for 55.72% of the total species. The second dominant one is shrub, with 115 species accounting for 24.36% of the total. There are 36 species of liana accounting for 7.63% of the total and 58 species of annual (or biennial) herbs accounting for 12.29% of the total species (Table 4).

Table 4 Different life forms of vascular plants in Dabie Mountains, Anhui Province

| Plant type | Species | |
|---|---|---|
| | Number | Rate/% |
| Perennial herbs | 263 | 55.72 |
| Annual (or biennial) herbs | 58 | 12.29 |
| Shrub | 115 | 24.36 |
| Liana | 36 | 7.63 |

### *3.4 Medicinal vascular plants in Dabie Mountains, Anhui Province*

The unique geographical location and rich hydrothermal resources of Dabie Mountains provide a great living environment for medicinal vascular plants, making Dabie Mountains one of the treasure houses of medicinal plant resources in China.

Located in the hinterland of Dabie Mountains, Jinzhai County is the largest mountainous county in Anhui Province, rich in medicinal resources and known as the "Western Mountain Drug Storehouse". There are 1363 species of medicinal plants belonging to 237 families and 20 kinds of rare medicinal materials. Qichun County is the hometown of Li Shizhen, the sage of medicine in Ming Dynasty. His masterpiece, the *Compendium of Materia Medica* [7], summarizes the rich experience of Chinese pharmacology and enjoys a good reputation both at home and abroad. According to the investigation, among the 1892 types of Chinese medicinal materials recorded in *Compendium of Materia Medica*, there are 1181 kinds of wild medicinal materials and 663 kinds of Chinese medicinal materials in Dabie Mountains, which is known as "the treasure house of medicinal plant resources in Dabie Mountains".

The 12th TCM Resources Scientific Expedition Team of Shenyang Pharmaceutical University investigated, collected and preliminarily identified the medicinal vascular plants in Dabie Mountains of Anhui Province. Meanwhile, the origin and medicinal parts of the medicinal vascular plants were systematically sorted out, summarized and revised by visiting local herbalists and farmers and consulting literature.

Table 5 Medicinal vascular plant resources in Dabie Mountains, Anhui Province

| Family | Genus | Species | Medicinal parts |
|---|---|---|---|
| Liliaceae | *Smilax* | *Smilax riparia* | root and rhizome |
| | | *Smilax china* | rhizome |
| | | *Smilax stans* | stem tuber, root |
| | *Lilium* | *Lilium brownii var. viridulum* Baker | fleshy leaf |
| | | *Lilium lancifolium* | fleshy leaf |
| | *Fritillaria* | *Fritillaria hupehensis* | bulb |
| | *Cardiocrinum* | *Cardiocrinum cathayanum* (Wils.) Stearn | fruit, bulb |
| | *Polygonatum* | *Polygonatum sibiricum* | rhizome |
| | | *Polygonatum cyrtonema* | rhizome |
| | *Reineckia* | *Reineckia carnea* (Andr.) Kunth | whole plant |
| | *Veratrum* | *Veratrum nigrum* L. | root and rhizome |
| | *Smilacina* | *Smilacina japonica* A. Gray | root and rhizome |
| | *Iphigenia* | *Iphigenia indica* Kunth | root, whole plant |
| | *Liriope* | *Liriope spicata* (Thunb.) Lour. | root tuber |
| | *Asparagus* | *Asparagus cochinchinensis* (Lour.) Merr. | root tuber |
| | *Disporum* | *Disporum sessile* D. Don | rhizome |
| | *Hemerocallis* | *Hemerocallis fulva* (L.) L. | root, leaf |
| | *Anemarrhena* | *Anemarrhena asphodeloides* Bunge | rhizome |
| | *Paris* | *Paris polyphylla* | rhizome |

(to be continued)

Continued table 5

| Family | Genus | Species | Medicinal parts |
|---|---|---|---|
| Valerianaceae | *Patrinia* | *Patrinia scabiosaefolia* Fisch.ex Trev | root and rhizome, whole plant |
| | | *Patrinia heterophylla* Bunge | root, whole plant |
| | | *Patrinia punctiflora* Hsu et H. J. Wang | whole plant |
| | *Valeriana* | *Valeriana officinalis* L. | root and rhizome |
| Primulaceae | *Lysimachia* | *Lysimachia heterogenea* Klatt | whole plant |
| Plantaginaceae | *Plantago* | *Plantago depressa* Willd. | seed |
| Lamiaceae | *Mentha* | *Mentha spicata* Linn. | whole plant |
| | *Lycopus* | *Lycopus lucidus* Turcz. | whole plant |
| | *Clinopodium* | *Clinopodium polycephalum* (Vaniot) C. Y. Wu et Hsuan | whole plant |
| | *Scutellaria* | *Scutellaria anhweiensis* C. Y. Wu | root |
| | | *Scutellaria pekinensis* Maxim. | root |
| | | *Scutellaria baicalensis* Georgi | root |
| | | *Scutellaria indica* L. | whole plant |
| | *Glechoma* | *Glechoma longituba* (Nakai) Kupr | whole plant |
| | *Ajuga* | *Ajuga ciliata* Bunge | whole plant |
| | *Comanthosphace* | *Comanthosphace ningpoensis* (Hemsl.) Hand.-Mazz. | whole plant |
| | | *Comanthosphace ningpoensis* (Hemsl.) Hand.-Mazz. | whole plant |
| | *Salvia* | *Salvia miltiorrhiza* Bunge | root |
| | *Stachys* | *Stachys sieboldii* Miq. | stem tuber, whole plant |
| | *Prunella* | *Prunella vulgaris* L. | ear |
| | *Rabdosia* | *Rabdosia amethystoides* (Benth.) Hara | root, whole plant |
| | *Teucrium* | *Teucrium tsinlingense* C. Y. Wu et S. Chow var. porphyreum C. Y. Wu et S. Chow | whole plant |
| | | *Teucrium pernyi* Franch. | whole plant |
| | | *Teucrium viscidum* Bl. | whole plant |
| | *Elsholtzia* | *Elsholtzia ciliata* (Thunb.) Hyland. | whole plant |
| | *Caryopteris* | *Caryopteris terniflora* Maxim. | whole plant |
| | *Leonurus* | *Leonurus artemisia* (Laur.) S. Y. Hu | whole plant |
| | *Perilla* | *Perilla frutescens* (L.) Britt. | fruit |
| | | *Perilla frutescens* (L.) Britt | stem, leaf, fruit |
| | | *Perilla frutescens* (L.) Britt. | stem leaf, fruit |
| Euphorbiaceae | *Euphorbia* | *Euphorbia pekinensis* Rupr. | root |
| | | *Euphorbia esula* L. | root |
| | | *Euphorbia maculata* L | whole plant |
| | *Phyllanthus* | *Phyllanthus ussuriensis* Rupr. et Maxim | whole plant |

(to be continued)

Continued table 5

| Family | Genus | Species | Medicinal parts |
|---|---|---|---|
| Fabaceae | *Christia* | *Christia vespertilionis* (L. f.) Bahn. f. | whole plant |
| | *Pueraria* | *Pueraria lobata* (Willd.) Ohwi var. lobata (Willd.) Ohwi | root, vine stem, leaf, flower, seed |
| | *Aeschynomene* | *Aeschynomene indica* Linn. | whole plant |
| | *Lespedeza* | *Lespedeza davidii* Franch. | root, whole plant |
| | | *Lespedeza formosa* (Vog.) Koehne | stem leaf |
| | *Sophora* | *Sophora flavescens* Alt. | root |
| | *Kummerowia* | *Kummerowia striata* (Thunb.) Schindl. | whole plant |
| | *Caragana* | *Caragana sinica* (Buc'hoz) Rehd. | root skin |
| | *Arachis* | *Arachis hypogaea* Linn. | seed |
| | *Indigofera* | *Indigofera pseudotinctoria* Matsum. | root |
| | *Lathyrus* | *Lathyrus davidii* | seed |
| | *Gleditsia* | *Gleditsia microphylla* Gordon ex Y. T. Lee | stem, fruit |
| | *Podocarpium* | *Podocarpium oldhamii* (Oliv.) Yang et Huang | root, whole plant |
| | *Crotalaria* | *Crotalaria sessiliflora* L. | whole plant |
| | *Cercis* | *Cercis chinensis* Bunge | bark |
| Ericaceae | *Rhododendron* | *Rhododendron molle* (Blume) G. Don | flower |
| | | *Rhododendron simsii* Planch. | root, leaf, flower, fruit |
| | | *Rhododendron fortunei* Lindl. | leaf, flower |
| Eucommiaceae | *Eucommia* | *Eucommia ulmoides* Oliver | bark |
| Tiliaceae | *Grewia* | *Grewia biloba* G. Don | root, whole plant |
| Aizoaceae | *Mollugo* | *Mollugo stricta* L. | whole plant |
| Menispermaceae | *Stephania* | *Stephania tetrandra* | root |
| | | *Stephania japonica* (Thunb.) Miers | root, stem, leaf |
| | | *Stephania cepharantha* Hayata | root tuber |
| | *Pericampylus* | *Pericampylus glaucus* (Lam.) Merr. | leaf, root |
| Pteridaceae | *Pteris* | *Pteris cretica* L. var. nervosa (Thunb.) Ching et S. H. Wu | whole plant |
| Balsaminaceae | *Impatiens* | *Impatiens cyathiflora* Hook. f. | root, stem, flower, leaf |
| | | *Impatiens davidi* Franch. | flower |
| Gramineae | *Lophatherum* | *Lophatherum gracile* | root |
| | *Pennisetum* | *Pennisetum alopecuroides* (L.) Spreng. | root, whole plant |
| | *Bambusa* | *Bambusa multiplex* (Lour.) Raeusch. ex Schult. var. riviereorum R. Maire | whole plant |
| Taxaceae | *Torreya* | *Torreya grandis* Fort. et Lindl. 'Merrillii' | seed |
| | *Taxus* | *Taxus chinensis* (Pilger) Rehd. var. mairei (Lemee et Levl.) Cheng et L. K. Fu | seed |

(to be continued)

Continued table 5

| Family | Genus | Species | Medicinal parts |
|---|---|---|---|
| Juglandaceae | *Pterocarya* | *Pterocarya stenoptera* | branch, leaf |
| | *Juglans* | *Juglans cathayensis var. formosana* (Hayata) A. M. Lu et R. H. Chang | fruit |
| | *Juglans* | *Juglans regia* | seed, fruit, bark |
| | *Platycarya* | *Platycarya strobilacea* Sieb. et Zucc. | leaf |
| | *Cyclocarya* | *Cyclocarya paliurus* | leaf |
| Cucurbitaceae | *Thladiantha* | *Thladiantha nudiflora* Hemsl. ex Forbes et Hemsl. | root, leaf |
| | *Trichosanthes* | *Trichosanthes kirilowii* Maxim. | fruit |
| | | *Trichosanthes rosthornii* Harms | fruit |
| | | *Trichosanthes cucumeroides* (Ser.) Maxim. | seed, root |
| | *Gynostemma* | *Gynostemma pentaphyllum* (Thunb.) Makino | whole plant |
| | *Momordica* | *Momordica cochinchinensis* (Lour.) Spreng. | seed |
| | *Zehneria* | *Zehneria indica* (Lour.) Keraudren | root tuber |
| | *Cardiandra* | *Cardiandra moellendorffii* (Hance) Migo | rhizome |
| Saxifragaceae | *Penthorum* | *Penthorum chinense* Pursh | whole plant |
| | *Saxifraga* | *Saxifraga stolonifera* Curt. | whole plant |
| | *Tiarella* | *Tiarella polyphylla* | whole plant |
| Saxifragaceae | *Chrysosplenium* | *Chrysosplenium* macrophyllum Oliv. | whole plant |
| | *Astilbe* | *Astilbe chinensis* (Maxim.) Franch. et Savat. | |
| | *Parnassia* | *Parnassia foliosa* Hook. f. et Thoms. | whole plant |
| | *Philadelphus* | *Philadelphus incanus* Koehne | stem, leaf |
| | *Deutzia* | *Deutzia crenata* Sieb. et Zucc. | root, leaf, fruit |
| | | *Deutzia scabra* Thunb | root, leaf, fruit |
| | *Hydrangea* | *Hydrangea chinensis* Maxim. | root |
| | | *Hydrangea paniculata* Sieb. | root, leaf, flower |
| Daphniphyllaceae | *Daphniphyllum* | *Daphniphyllum macropodum* Miq. | seed, leaf |
| Betulaceae | *Carpinus* | *Carpinus turczaninowii* Hance | leaf, bark |
| | *Corylus* | *Corylus heterophylla* Fisch. var. sutchuenensis Franch. | fruit, seed |
| Buxaceae | *Buxus* | *Buxus sinica* (Rehd. et Wils.) Cheng subsp. sinica var. parvifolia M. Cheng | root, leaf, branch |
| Apocynaceae | *Trachelospermum* | *Trachelospermum jasminoides* (Lindl.) Lem. | root, stem, leaf |
| Zingiberaceae | *Zingiber* | *Zingiber mioga* (Thunb.) Rosc. | root, stem, flower, seed |
| | *Alpinia* | *Alpinia japonica* (Thunb.) Miq. | whole plant |
| Hamamelidaceae | *Liquidambar* | *Liquidambar formosana* Hance | root, leaf, fruit |
| | *Loropetalum* | *Loropetalum chinense* var. rubrum Yieh | root, leaf, flower |
| Thelypteridaceae | *Fortunearia* | *Fortunearia sinensis* | branch, leaf, root |
| | *Macrothelypteris* | *Macrothelypteris oligophlebia* (Bak.) Ching | root and stem |

(to be continued)

Continued table 5

| Family | Genus | Species | Medicinal parts |
|---|---|---|---|
| Violaceae | *Viola* | *Viola concordifolia* | whole plant |
| | | *Viola diffusa* Ging. | whole plant |
| | | *Viola chaerophylloides* (Regel) W. Beck. | whole plant |
| | | *Viola betonicifolia* J. E. Smith | whole plant |
| | | *Viola angustistipulata* | whole plant |
| | | *Viola acuminata* Ledeb. | whole plant |
| Malvaceae | *Hibiscus* | *Hibiscus syriacus* Linn. | root, leaf, flower, fruit |
| Stachyuraceae | *Stachyurus* | *Stachyurus chinensis* Franch. | stem |
| Crassulaceae | *Hylotelephium* | *Hylotelephium erythrostictum* (Miq.) H. Ohba | whole plant |
| | *Sedum* | *Sedum sarmentosum* Bunge | whole plant |
| | | *Sedum aizoon* L. | whole plant |
| | | *Sedum emarginatum* Migo | whole plant |
| | | *Sedum polytrichoides* Hemsl. | whole plant |
| | | *Sedum lineare* Thunb. | whole plant |
| Campanulaceae | *Orostachys* | *Orostachys fimbriatus* (Turcz.) Berger | aerial part |
| | *Platycodon* | *Platycodon grandiflorus* (Jacq.) A. DC. | whole plant |
| | *Adenophora* | *Adenophora stricta* Miq. | root |
| | | *Adenophora tetraphylla* (Thunb.) Fisch. | root |
| Compositae | *Conyza* | *Conyza canadensis* (L.) Cronq. | whole plant |
| | *Zinnia* | *Zinnia elegans* Jacq. | whole plant |
| | *Atractylodes* | *Atractylodes* Lancea (Thunb.) DC. | whole plant |
| | *Pterocypsela* | *Pterocypsela indica* (L.) Shih | whole plant |
| | *Erigeron* | *Erigeron annuus* (L.) Pers. | whole plant |
| | *Artemisia* | *Artemisia capillaris* | aerial part |
| | | *Artemisia anomala* S. Moore | whole plant |
| | | *Artemisia japonica* | whole plant |
| | | *Artemisia annua* | whole plant |
| | | *Artemisia lavandulaefolia* DC. | whole plant |
| | *Leontopodium* | *Leontopodium japonicum* Miq. | flower |
| | *Cirsium* | *Cirsium maackii* Maxim. | whole plant |
| | *Dendranthema* | *Dendranthema vestitum* (Hemsl.) Ling | flower bud |
| | *Kalimeris* | *Kalimeris indica* (L.) Sch. -Bip. | whole plant |
| | *Arctium* | *Arctium lappa* L. | whole plant |
| | *Senecio* | *Senecio nemorensis* | whole plant |
| | *Centaurea* | *Centaurea cyanus* L. | whole plant |
| | *Gnaphalium* | *Gnaphalium affine* D. Don | stem |

(to be continued)

Continued table 5

| Family | Genus | Species | Medicinal parts |
|---|---|---|---|
| Compositae | *Carpesium* | *Carpesium abrotanoides* L. | whole plant |
| | | *Carpesium cernuum* L. | whole plant |
| | *Ainsliaea* | *Ainsliaea fragrans* Champ. | whole plant |
| | *Syneilesis* | *Syneilesis aconitifolia* (Bge.) Maxim. | whole plant |
| | *Ligularia* | *Ligularia sibirica* (L.) Cass. | root, stem, leaf |
| | *Lactuca* | *Lactuca seriola* Torner | whole plant |
| | *Siegesbeckia* | *Siegesbeckia glabrescens* Makino | whole plant |
| | *Parasenecio* | *Parasenecio forrestii* | whole plant |
| | *Crassocephalum* | *Crassocephalum crepidioides* (Benth.) S. Moore | whole plant |
| | *Solidago* | *Solidago decurrens* Lour. | whole plant |
| | *Eupatorium* | *Eupatorium fortunei* Turcz. | whole plant |
| | *Aster* | *Aster tataricus* L. f. | whole plant |
| | *Elephantopus* | *Elephantopus scaber* L. | root |
| Selaginellaceae | *Selaginella* | *Selaginella uncinata* (Desv.) Spring | whole plant |
| | | *Selaginella tamariscina* (P. Beauv.) Spring | whole plant |
| Pteridiaceae | *Pteridium* | *Pteridium aquilinum* (L.) *Kuhn var. latiusculum* (Desv.) Underw. ex Heller | whole plant |
| Acanthaceae | *Dicliptera* | *Dicliptera chinensis* (L. )Juss. | whole plant |
| | *Peristrophe* | *Peristrophe japonica* (Thunb.) Bremek. | whole plant |
| | *Rostellularia* | *Rostellularia procumbens* (L.) Nees | whole plant |
| Fagaceae | *Quercus* | *Quercus glandulifera* var. brevipetiolata Nakai | fruit |
| | *Castanea* | *Castanea mollissima* Bl. | seed |
| | *Cyclobalanopsis* | *Cyclobalanopsis glauca* (Thunb.) Oerst. | seed |
| Simaroubaceae | *Ailanthus* | *Ailanthus altissima* (Mill.) Swingle | bark, root skin, fruit |
| Orchidaceae | *Bletilla* | *Bletilla striata* (Thunb. ex A. Murray) Rchb. f. | whole plant |
| | *Goodyera* | *Goodyera biflora* (Lindl.) Hook. f. | whole plant |
| | *Cypripedium* | *Cypripedium japonicum* | whole plant |
| | *Galeola* | *Galeola lindleyana* (Hook. f. et Thoms.) Rchb. f. | whole plant |
| | *Dendrobium* | *Dendrobium huoshanense* C. Z. Tang et S. J. Cheng | whole plant |
| | | *Dendrobium officinale* Kimura et Migo | whole plant |
| | *Spiranthes* | *Spiranthes sinensis* (Pers.) Ames | root, whole plant |
| | *Gastrodia* | *Gastrodia elata* Bl. | whole plant |
| | *Cephalanthera* | *Cephalanthera falcata* (Thunb. ex A. Murray) Bl. | whole plant |
| Chenopodiaceae | *Kochia* | *Kochia scoparia* (L.) Schrad. f. trichophylla (Hort.) Schinz et Thell. | stem leaf |
| Meliaceae | *Melia* | *Melia azedarach* L. | root, leaf, flower, fruit |

(to be continued)

Continued table 5

| Family | Genus | Species | Medicinal parts |
|---|---|---|---|
| Polygonaceae | *Reynoutria* | *Reynoutria japonica* Houtt. | whole plant |
| | *Panax* | Panax ginseng C. A. Mey. | root, fruit |
| | *Antenoron* | *Antenoron filiforme* (Thunb.) Rob. et Vaut. | whole plant |
| | *Polygonum* | *Polygonum perfoliatum* L. | aerial part |
| | | *Polygonum lapathifolium* L. | whole plant |
| | | *Polygonum nepalense* Meisn. | whole plant |
| | | *Polygonum thunbergii* Sieb. et Zucc. | whole plant |
| | | *Polygonum dissitiflorum* Hemsl | whole plant |
| | | *Polygonum bistorta* L. | whole plant |
| | *Polygonum* | *Polygonum orientale* L. | leaf, fruit |
| | *Fagopyrum* | *Fagopyrum dibotrys* (D. Don) Hara | whole plant |
| | *Rumex* | *Rumex dentatus* L. | leaf |
| Dryopteridaceae | *Polystichum* | *Polystichum makinoi* | whole plant |
| | *Cyrtomium* | *Cyrtomium fortunei* J. Sm. | rhizome and petiole residue |
| | *Dryopteris* | *Dryopteris erythrosora* (Eaton) O. Ktze. | rhizome |
| Trapaceae | *Trapa* | *Trapa bispinosa* Roxb. | whole plant |
| Onagraceae | *Circaea* | *Circaea cordata* Royle | root, whole plant |
| | *Oenothera* | *Oenothera biennis* L. | root |
| Gentianaceae | *Gentiana* | *Gentiana scabra* Bunge | root and rhizome |
| | *Tripterospermum* | *Tripterospermum chinense* (Migo) H. Smith | whole plant |
| | *Swertia* | *Swertia bimaculata* (Sieb. et Zucc.) Hook. f. et Thoms. ex C. B. Clarke | whole plant |
| Pyrolaceae | *Pyrola* | *Pyrola decorata* H. Andr. | rhizome |
| Asclepiadaceae | *Cynanchum* | *Cynanchum auriculatum* Royle ex Wight | root |
| | | *Cynanchum taihangense* Tsiang et Zhang | root and rhizome |
| Hemionitidaceae | *Coniogramme* | *Coniogramme japonica* (Thunb.) Diels | root, whole plant |
| Verbenaceae | *Clerodendrum* | *Clerodendrum philippinum* Schauer var. simplex Moldenke | root, leaf, flower |
| | | *Clerodendrum trichotomum* Thunb. | root, leaf, flower, branch |
| | *Premna* | *Premna microphylla* Turcz. | root, stem, leaf |
| | *Vitex* | *Vitex negundo* L. var. cannabifolia (Sieb. et Zucc.) Hand.-Mazz. | leaf |
| | *Callicarpa* | *Callicarpa bodinieri* Levl. | root, whole plant |
| | | *Callicarpa dichotoma* (Lour.) K. Koch | whole plant |
| Portulacaceae | *Portulaca* | *Portulaca oleracea* L. | stem, leaf, fruit |

(to be continued)

Continued table 5

| Family | Genus | Species | Medicinal parts |
|---|---|---|---|
| Aristolochiaceae | *Aristolochia* | *Aristolochia fangchi* Y. C. Wu ex L. D. Chow et S. M. Hwang | root |
| | | *Aristolochia tubiflora* Dunn | root, fruit |
| | | *Aristolochia contorta* Bunge | stem, leaf |
| | *Asarum* | *Asarum dabieshanense* D. Q. Wang et S. H. Hwang (accepted name) | whole plant |
| | | *Asarum sieboldii* Miq. | whole plant |
| Loganiaceae | *Buddleja* | *Buddleja lindleyana* | stem leaf |
| Geraniaceae | *Geranium* | *Geranium wilfordii* Maxim. | stem, leaf |
| Ranunculaceae | *Pulsatilla* | *Pulsatilla chinensis* (Bunge) Regel | root |
| | *Paeonia* | *Paeonia obovata* Maxim. | root |
| | *Cimicifuga* | *Cimicifuga acerina* (Sieb. et Zucc.) Tanaka | rhizome |
| | *Thalictrum* | *Thalictrum fortunei* S. Moore | root |
| | | *Thalictrum faberi* Ulbr. | root and rhizome |
| | | *Thalictrum acutifolium* (Hand.-Mazz.) Boivin | root and rhizome |
| | *Clematis* | *Clematis chinensis* Osbeck | root and stem |
| | | *Clematis courtoisii* Hand.-Mazz. | root, vine stem |
| | | *Clematis courtoisii* Hand.-Mazz. | root, vine stem |
| | | *Clematis uncinata* Champ. | root, leaf |
| | *Aconitum* | *Aconitum carmichaelii* Debx. var. hwangshanicum W.T.Wang | root |
| | | *Aconitum scaposum* Franch. | root tuber |
| | | *Aconitum vilmorinianum* Kom. | stem tuber |
| | *Hepatica* | *Hepatica nobilis* Gars var. asiatica (Nakai) Hara | rhizome |
| | *Paeonia* | *Paeonia lactiflora* Pall. | root tuber |
| Magnoliaceae | *Illicium* | *Illicium henryi* | leaf |
| | *Liriodendron* | *Liriodendron chinense* (Hemsl.) Sargent. | root, bark |
| | *Magnolia* | *Magnolia denudata* Desr. | flower |
| | | *Magnolia liliflora* Desr. | flower bud |
| | | *Magnolia officinalis* Rehd. et Wils. subsp. biloba (Rehd. et Wils.) Law | bark, root, fruit, flower |
| | *Schisandra* | *Schisandra sphenanthera* | fruit |
| | *Sargentodoxa* | *Sargentodoxa cuneata* (Oliv. ) Rehd. et Wils. | vine stem |
| Lardizabalaceae | *Akebia* | *Akebia trifoliata* (Thunb.) Koidz. | root, stem, fruit |
| | | *Akebia trifoliata* (Thunb.) Koidz. var.australis (Diels) Rehd. | fruit, root |
| Oleaceae | *Fraxinus* | *Fraxinus bungeana* DC. | bark |
| | *Forsythia* | *Forsythia suspensa* (Thunb.) Vahl | fruit |
| Equisetaceae | *Equisetum* | *Equisetum arvense* L. | whole plant |

(to be continued)

Continued table 5

| Family | Genus | Species | Medicinal parts |
|---|---|---|---|
| Vitaceae | *Parthenocissus* | *Parthenocissus tricuspidata* (S. et Z.) Planch. | vine stem, root |
| | *Ampelopsis* | *Ampelopsis humulifolia* Bge. | root skin |
| | | *Ampelopsis japonica* (Thunb.) Makino | root tuber |
| | | *Ampelopsis delavayana* Planch. | branch, leaf |
| | *Cayratia* | *Cayratia japonica* (Thunb.) Gagnep. | root, whole plant |
| | *Pistacia* | *Pistacia chinensis* Bunge | bark, leaf |
| Aceraceae | *Acer* | *Acer henryi* Pax | root, root skin, stem skin |
| | | *Acer ginnala* Maxim. | leaf |
| | *Rhus* | *Rhus chinensis* Mill. | root, leaf, flower, fruit |
| Lythraceae | *Lagerstroemia* | *Lagerstroemia indica* L. | root, bark |
| Rubiaceae | *Serissa* | *Serissa japonica* (Thunb.) Thunb. | whole plant |
| | *Paederia* | *Paederia scandens* (Lour.) Merr. | whole plant |
| | *Galium* | *Galium bungei* Steud. | whole plant |
| | *Rubia* | *Rubia argyi* (Levl. et Vaniot) Hara ex L. A. Lauener et D. K. | root and rhizome |
| | *Adina* | *Adina rubella* Hance | whole plant |
| Rosaceae | *Emmenopterys* | *Emmenopterys henryi* Oliv. | root, bark |
| | *Exochorda* | *Exochorda racemosa* (Lindl.) Rehd. | root skin, stem skin |
| | *Fragaria* | *Fragaria vesca* L. | leaf, fruit |
| | *Sanguisorba* | *Sanguisorba officinalis* L. | root |
| | *Kerria* | *Kerria japonica* (L.) DC. | flower |
| | *Pyrus* | *Pyrus xerophila* | fruit |
| | *Prunus* | *Prunus salicina* Lindl. | root, leaf, branch |
| | *Agrimonia* | *Agrimonia pilosa* Ldb. | root, whole plant |
| | *Geum* | *Geum japonicum* Thunb | whole plant |
| | | *Geum japonicum* Thunb. var. chinense F. Bolle | whole plant |
| | | *Geum aleppicum* Jacq. | whole plant |
| | *Eriobotrya* | *Eriobotrya japonica* (Thunb.) Lindl. | fruit |
| | *Rosa* | *Rosa cymosa* Tratt. | root, leaf |
| | *Crataegus* | *Crataegus cuneata* | fruit |
| | *Duchesnea* | *Duchesnea indica* (Andr.) Focke | whole plant |
| | *Potentilla* | *Potentilla kleiniana* Wight et Arn. | whole plant |
| | | *Potentilla freyniana* Bornm | whole plant |
| | *Stephanandra* | *Stephanandra chinensis* Hance | stem leaf |
| | *Spiraea* | *Spiraea cantoniensis* Lour. | root, leaf, fruit |

(to be continued)

Continued table 5

| Family | Genus | Species | Medicinal parts |
|---|---|---|---|
| Rosaceae | *Rubus* | *Rubus corchorifolius* L. f. | root, leaf |
| | | *Rubus lambertianus* Ser. | root, leaf |
| | | *Rubus sempervirens* Yü et Lu | fruit |
| | | *Rubus coreanus* Miq. | fruit, root and rhizome |
| | | *Rubus parvifolius* L. | stem leaf |
| Solanaceae | *Solanum* | *Solanum lyratum* Thunb. | whole plant |
| | | *Solanum nigrum* L. | root, whole plant |
| | *Physaliastrum* | *Physaliastrum heterophyllum* (Hemsl.) Migo | whole plant |
| Solanaceae | *Physalis* | *Physalis alkekengi* L. | root, fruit |
| Sabiaceae | *Meliosma* | *Meliosma cuneifolia* Franch. | root skin |
| | | *Meliosma veitchiorum* Hemsl. | branch |
| | *Sabia* | *Sabia japonica* Maxim. | stem leaf, root |
| Begoniaceae | *Begonia* | *Begonia grandis* Dry subsp. sinensis (A. DC.) Irmsch. var. sinensis | root, whole plant |
| Onocleaceae | *Matteuccia* | *Matteuccia struthiopteris* (L.) Todaro | rhizome |
| Caprifoliaceae | *Viburnum* | *Viburnum dilatatum* Thunb. | stem, leaf |
| | *Sambucus* | *Sambucus williamsii* Hance | stem leaf |
| | *Weigela* | *Weigela japonica* Thunb. var. sinica (Rehd.) Bailey | root |
| | | *Weigela japonica* Thunb. | root |
| | *Lonicera* | *Lonicera japonica* Thunb. | whole plant |
| Thymelaeaceae | *Edgeworthia* | *Edgeworthia chrysantha* Lindl. | root, whole plant, flower, leaf |
| | *Wikstroemia* | *Wikstroemia pilosa* Cheng | root, stem skin |
| | *Daphne* | *Daphne genkwa* Sieb. et Zucc. | flower bud |
| Saururaceae | *Houttuynia* | *Houttuynia cordata* Thunb | whole plant |
| | *Saururus* | *Saururus chinensis* (Lour.) Baill. | whole plant |
| Umbelliferae | *Sanicula* | *Sanicula chinensis* Bunge | whole plant |
| | *Bupleurum* | *Bupleurum scorzonerifolium* Willd. | root |
| | *Angelica* | *Angelica decursiva* (Miq.) Franch. et Sav. | root |
| | | *Angelica dahurica* (Fisch. ex Hoffm.) Benth. et Hook. f. ex Franch. et Sav. | root |
| | *Heracleum* | *Heracleum tiliifolium* Wolff | root |
| | *Ligusticum* | *Ligusticum tenuissimum* (Nakai) Kitagawa | root and rhizome |
| | *Centella* | *Centella asiatica* (L.) Urban | root, whole plant |
| | *Oenanthe* | *Oenanthe javanica* (Bl.) DC. | whole plant |
| | *Cryptotaenia* | *Cryptotaenia japonica* Hassk. | stem leaf |
| Loranthaceae | *Viscum* | *Viscum coloratum* (Kom.) Nakai | stem leaf |
| Moraceae | *Cudrania* | *Cudrania tricuspidata* (Carr.) Bur. ex Lavallee | stem leaf, fruit |

(to be continued)

Continued table 5

| Family | Genus | Species | Medicinal parts |
|---|---|---|---|
| Cyperaceae | *Heleocharis* | *Heleocharis migoana* Ohwi et Koyama | rhizome |
| | *Cyperus* | *Cyperus iria* L. | whole plant |
| Theaceae | *Camellia* | *Camellia oleifera* Abel. | root, leaf, fruit |
| | | *Camellia caudata* Wall. | whole plant |
| | | *Camellia sinensis* (L.) O. Ktze. | leaf |
| Symplocaceae | *Stewartia* | *Stewartia sinensis* Rehd. et Wils. | bark, root, fruit |
| | *Symplocos* | *Symplocos chinensis* (Lour.) Druce | root, leaf |
| | | *Symplocos paniculata* (Thunb.) Miq. | whole plant |
| Cornaceae | *Cornus* | *Cornus officinalis* Sieb. et Zucc. | fruit |
| | *Dendrobenthamia* | *Dendrobenthamia japonica* (DC.) Fang var. chinensis (Osborn.) Fang | leaf, flower |
| Taxodiaceae | *Metasequoia* | *Metasequoia glyptostroboides* Hu et Cheng | branch, leaf |
| Phytolaecaceae | *Phytolacca* | *Phytolacca acinosa* Roxb. | root |
| | | *Phytolacca americana* L. | root |
| Staphyleaceae | *Staphylea* | *Staphylea bumalda* DC. | fruit |
| | | *Staphylea holocarpa* Hemsl. | stem skin, root, leaf |
| | *Euscaphis* | *Euscaphis japonica* (Thunb.) Dippel | root, fruit |
| | | *Euscaphis japonica* (Thunb.) Dippel | root, fruit |
| Brassicaceae | *Lepidium* | *Lepidium apetalum* | seed, whole plant |
| Amaryllidaceae | *Lycoris* | *Lycoris aurea* (L'Her.) Herb. | whole plant |
| Caryophyllaceae | *Pseudostellaria* | *Pseudostellaria heterophylla* (Miq.) Pax | root |
| | *Lychnis* | *Lychnis coronata* Thunb. | root, whole plant |
| | *Dianthus* | *Dianthus superbus* L. | whole plant |
| | *Arenaria* | *Arenaria serpyllifolia* L. | whole plant |
| | *Silene* | *Silene gallica* Linn. | whole plant |
| Rhamnaceae | *Berchemia* | *Berchemia floribunda* (Wall.) Brongn. | root |
| | *Rhamnella* | *Rhamnella franguloides* (Maxim.) Weberb. | fruit, root |
| Dioscoreaceae | *Dioscorea* | *Dioscorea panthaica* Prain et Burkill | rhizome |
| | | *Dioscorea nipponica* Makino | rhizome |
| | | *Dioscorea opposita* Thunb. | root tuber, whole plant |
| | | *Dioscorea bulbifera* L. | stem tuber |
| Polypodiaceae | *Lepidogrammitis* | *Lepidogrammitis drymoglossoides* (Baker) Ching | whole plant |
| | *Pyrrosia* | *Pyrrosia sheareri* (Baker) Ching | leaf |
| Pinaceae | *Pinus* | *Pinus tabuliformis* Carr. | branch, leaf |
| Santalaceae | *Thesium* | *Thesium chinense* Turcz. | whole plant |

(to be continued)

Continued table 5

| Family | Genus | Species | Medicinal parts |
|---|---|---|---|
| Guttiferae | *Hypericum* | *Hypericum japonicum* Thunb. ex Murray | whole plant |
| | | *Hypericum erectum* Thunb. ex Murray | whole plant |
| | | *Hypericum sampsonii* Hance | whole plant |
| | | *Hypericum ascyron* L. | whole plant |
| Araceae | *Pinellia* | *Pinellia cordata* | stem tuber |
| | | *Pinellia ternata* | stem tuber |
| | | *Pinellia pedatisecta* | stem tuber |
| Araceae | *Amorphophallus* | *Amorphophallus* konjac | stem tuber |
| | *Arisaema* | *Arisaema heterophyllum* Blume | stem tuber |
| | | *Arisaema sikokianum* Franch. et Sav. var. serratum (Makino) Hand.-Mazt | stem tuber |
| Aspleniaceae | *Asplenium* | *Asplenium trichomanes* L. | whole plant |
| Phrymaceae | *Phryma* | *Phryma leptostachya* L. | whole plant |
| Celastraceae | *Euonymus* | *Euonymus alatus* (Thunb.) Sieb. | root, seed |
| Blechnaceae | *Woodwardia* | *Woodwardia japonica* (L. f.) Sm. | rhizome |
| Araliaceae | *Aralia* | *Aralia chinensis* L. | root skin, stem skin |
| | *Panax* | *Panax quinquefolius* | root |
| | *Acanthopanax* | *Acanthopanax senticosus* (Rupr. Maxim.) Harms | root and rhizome |
| | | *Acanthopanax gracilistylus* W. W. Smith | root skin |
| Amaranthaceae | *Achyranthes* | *Achyranthes bidentata* Blume | root |
| Amaranthaceae | | *Achyranthes aspera* L. | root and rhizome |
| | *Celosia* | *Celosia argentea* L. | stem leaf, root |
| Berberidaceae | *Dysosma* | *Dysosma pleiantha* (Hance) Woods. | root and rhizome |
| | | *Dysosma versipellis* (Hance) M. Cheng ex Ying | rhizome |
| Scrophulariaceae | *Epimedium* | *Epimedium sagittatum* (Sieb. et Zucc.) Maxim. | whole plant |
| | *Linaria* | *Linaria vulgaris* Mill. | whole plant |
| | *Lindernia* | *Lindernia crustacea* (L.) F. Muell | whole plant |
| | *Melampyrum* | *Melampyrum roseum* Maxim. | whole plant |
| | *Mazus* | *Mazus japonicus* (Thunb.) O. Kuntze | whole plant |
| | *Scrophularia* | *Scrophularia ningpoensis* Hemsl. | root |
| | *Siphonostegia* | *Siphonostegia chinensis* Benth. | whole plant |
| Convolvulaceae | *Calystegia* | *Calystegia hederacea* Wall.ex.Roxb. | rhizome, flower |
| | *Dichondra* | *Dichondra repens* Forst. | whole plant |
| | *Nanocnide* | *Nanocnide lobata* | whole plant |
| Urticaceae | *Pilea* | *Pilea pumila* (L.) A. Gray | root and stem |
| | | *Pilea peploides* (Gaudich.) Hook. et Arn. var. peploides | whole plant |

(to be continued)

Continued table 5

| Family | Genus | Species | Medicinal parts |
|---|---|---|---|
| Urticaceae | *Elatostema* | *Elatostema stewardii* Merr. | whole plant |
| | *Gonostegia* | *Gonostegia hirta* (Bl.) Miq. | root, stem, leaf |
| | *Boehmeria* | *Boehmeria nivea* (L.) Gaudich. | root |
| | | *Boehmeria tricuspis* (Hance) Makino | root, stem, leaf, fruit |
| | | *Boehmeria silvestrii* (Pamp.) W. T. Wang | whole plant |
| Commelinaceae | *Pollia* | *Pollia japonica* Thunb. | root |
| | *Commelina* | *Commelina communis* | stem leaf |
| | | *Commelina bengalensis* | whole plant |
| Papaveraceae | *Chelidonium* | *Chelidonium majus* L. | whole plant |
| | *Macleaya* | *Macleaya cordata* (Willd.) R. Br. | root, whole plant |
| Ulmaceae | *Celtis* | *Celtis biondii* Pamp. | leaf, root skin, stem, branch |
| Pontederiaceae | *Monochoria* | *Monochoria vaginalis* | whole plant |
| Iridaceae | *Belamcanda* | *Belamcanda chinensis* (L.) Redouté | rhizome |
| Polygalaceae | *Polygala* | *Polygala japonica* Houtt | whole plant |
| Rutaceae | *Evodia* | *Evodia rutaecarpa* (Juss.) Benth. | fruit |
| | | *Evodia austrosinensis* Hand. -Mazz. | fruit |
| Lauraceae | *Phoebe* | *Phoebe sheareri* (Hemsl.) Gamble | branch, leaf |
| | *Lindera* | *Lindera reflexa* Hemsl | root |
| | | *Lindera fruticosa* Hemsl. var. fruticosa | root |
| | | *Lindera glauca* (Sieb. et Zucc.) Bl | leaf, root |
| Boraginaceae | *Bothriospermum* | *Bothriospermum tenellum* (Hornem.) Fisch. et Mey. | whole plant |
| | *Lithospermum* | *Lithospermum zollingeri* DC. | fruit |
| Myrsinaceae | *Ardisia* | *Ardisia japonica* (Thunb) Blume | root, whole plant |
| Osmundaceae | *Osmunda* | *Osmunda japonica* Thunb. | rhizome |
| Bignoniaceae | *Campsis* | *Campsis grandiflora* (Thunb.) Schum. | flower |
| Oxalidaceae | *Oxalis* | *Oxalis corniculata* L. | whole plant |

In Dabie Mountains of Anhui province, we collected 424 species of vascular plants from 116 families and 316 genera with medicinal value, accounting for 93.60% of the total number of families, 91.07% of the total number of genera, and 89.83% of the total number of species (Table 6). The main families of medicinal vascular plants are Compositae (31), Lamiaceae (24), Rosaceae (23), Liliaceae (19), Leguminosae (15) and Ranunculaceae (14), which account for 7.31%, 5.66%, 5.42%, 4.48%, 3.54% and 3.30% of the total species of medicinal vascular plants respectively. The main genera are *Polygonum* L (7), *Viola* (6), *Sedum* (5), *Artemisia* L (5), *Clematis* L (5) and *Rubus* (5). In addition, the life types of medicinal plants are mainly perennial herbs, with 232 species, accounting for 54.72% of the total number of medicinal vascular plants.

Table 6 Diversity of medicinal vascular plants in Dabie Mountains, Anhui Province

| Species composition (ratio) | 116 families (93.60%) | 316 genera (91.07%) | 424 species (89.83%) |
|---|---|---|---|
| Main families and genera (No. species) | Compositae (31)<br>Lamiaceae (24)<br>Rosaceae (23)<br>Liliaceae (19)<br>Leguminosae (15)<br>Ranunculaceae (14) | | *Polygonum* L (7)<br>*Viola* (6)<br>*Sedum* (5)<br>*Artemisia* L (5)<br>*Clematis* L (5)<br>*Rubus* (5) |
| Plant type (No. species) | perennial herbs<br>lianas<br>shrubs<br>annual (or biennial) herbs | | 232 (54.72%)<br>3 (8.02%)<br>104 (24.53%)<br>54 (12.74%) |

The medicinal plants collected in Dabie Mountains can be divided into whole plants, roots and rhizomes, flowers, branches and leaves, fruits and seeds. The results show that, the roots, rhizomes and whole plants medicinal plants are the most abundant, with 179 species each, accounting for 42.22% of the total species of medicinal vascular plants. It was followed by branches and leaves, with 80 species, accounting for 18.87%. Flowers, fruits and seeds account for 5.90%, 10.85% and 3.54% respectively, with relatively small number of species (Table 7).

Table 7 Different medicinal parts of medicinal vascular plants in Dabie Mountains, Anhui Province

| Medicinal parts | Species | |
|---|---|---|
| | Number | Rate/% |
| Roots and rhizomes | 179 | 42.22 |
| Whole plants | 179 | 42.22 |
| Branches and leaves | 80 | 18.87 |
| Flowers | 25 | 5.90 |
| Fruits | 46 | 10.85 |
| Seeds | 15 | 3.54 |

Note: Some species have multiple medicinal parts that are counted together. The ratio is the ratio of species number of medicinal vascular plants to the total species number.

## 4 Discussion

Traditional Chinese medicine originate from natural habitats and have a long-term folk application. In recent years, they have shown great development potential and industrial development prospects, and have become one of the important development directions of new drug development and the world pharmaceutical industry. Dabie Mountains are located at the junction of Henan, Hubei and Anhui provinces. The ancient forest vegetation is the concentration of wild rare plants and economic plants, and it is the guarantee of ecological and climatic balance in the vicinity of Dabie Mountains. Due to the differences in mountains, rivers, altitude, climate and soil texture, some unique microclimate conditions have been formed. The abundant medicinal plants and animal resources there make Dabie Mountains known as “the treasure house of medicinal plant resources”, which has extensive development and utilization value.

After the preliminary investigation and

diversity analysis of vascular plant resources in Dabie Mountains, 472 species of vascular plants belonging to 347 genera and 125 families have been collected. Among them, there are 424 species of vascular plants with medicinal values belonging to 316 genera and 116 families, accounting for 93.60% of the total families, 91.07% of the total genera and 89.83% of the total species. The medicinal parts are mainly roots, rhizomes and whole plants. This scientific study further supplements the types, storage, distribution and utilization of medicinal resources in Dabie Mountains, and provides practical basis for the full development and utilization and protection of these resources.

Although Dabie Mountains are rich in natural resources, the transformation of forest areas, the adjustment of industrial structure, and the blind logging in some areas have seriously damaged the living environment of animals and plants. These events severely led to the exhaustion of natural forests, and the obvious reduction of germplasm resources of some rare and endangered plants [8]. In order to solve these problems, the following suggestions are put forward. Firstly, as one of the most fundamental and effective measures to protect wild plants, the establishment of nature reserves can effectively protect the habitat of wild plants [9]. Investment in the construction of nature reserves should be increased, and the corresponding legal and regulatory system should be optimized to make species protection policy-based, institutionalized and legalized. Secondly, both ecological benefits and economic benefits with medical plants development and utilization should be considered. When the ecological environment is protected, the plant resources in Dabie Mountains can be comprehensively developed and utilized to transform the resource advantages into ecological advantages and commercial advantages. For example, in the process of tourism development, we can advocate better operation management and guide tourist behavior to reduce the damage to the environment and protect the carrying capacity of the environment [10].

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