

Investigation of Wild Herbs Based on Three Different Communities

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Abstract. Based on field investigation and statistical analysis, the characteristics of wild herbs in different communities are discussed in this paper. The results showed that there were 32 species and 30 genera of 14 families in the wild herbs of the three communities. *Cynanchum chinense* R.Br. and *Setaria viridis* (L.) Beauv are the three community common herbs. *Pterocypselia indica* (L.) Shih and *Cirsium setosum* are common to the *Cerasus* sp. community and *Malus micromalus* community. *Polygonum*, *Chenopodium album* and *Pharbitis nil* (Linn.) Choisy are common to the *Malus micromalus* community and *Robinia pseudoacacia* L. community.

1 Introduction

Wild plant germplasm resource is an important part of a region's natural ecosystem. Many wild herbs have good resistance, adaptability and ornamental value in natural condition[1-3]. By systematically investigating and utilizing the status of the wild plant resources in the study area, the economic development and ecological environment construction can be promoted[4-6]. In order to find out the difference and connection between different undergrowth herbs, this paper investigated the undergrowth herbs of three plant communities in University of Jinan.

2 Materials and methods

2.1 Research Area

The research area is located at the foot of Qinglong mountain, west campus of University of Jinan. The climate is warm temperate monsoon climate, the surface vegetation is mainly deciduous broad-leaved forest, and the soil is brown soil. The main areas surveyed were *Cerasus* sp., *Malus micromalus* and *Robinia pseudoacacia* L. community.

2.2 Research methods

The wild herbs from three communities in the study area were investigated from May to July 2018. A large square of 10m*10m was set in three communities respectively. Within the sample cube, herbs were measured with a small sample box of 1m*1m. The species, frequency, coverage and height of herbs were recorded respectively.

Each community was set up with 3 large sample cubes, and 3 small sample cubes were randomly set up within each large sample cube.

3 Discussion and results

3.1 Overall situation

This paper investigated the *Cerasus* sp., *Malus micromalus* and *Robinia pseudoacacia* L. community of University of Jinan. The results showed that there were 32 species of herbs, including 30 genera and 14 families. There were 20 species of herbaceous plants in the *Cerasus* sp. community, and 9 families were involved. The number of species of herbaceous plants in the *Malus micromalus* community was 13, and the number of families involved was 7. The number of species of herbaceous plants in *Robinia pseudoacacia* L. community is 9, and the number of families involved is 8. (Table 1)

Table 1. Herbaceous conditions in three communities margins.

Community	Species of herbs	genus of herbs	families of herbs
<i>Cerasus</i> sp. community	20	18	9
<i>Malus micromalus</i> community	13	12	7
<i>Robinia pseudoacacia</i> L. community	9	9	8
Total	32	30	14

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In the three communities of herbaceous plants, compositae has the largest number of species, up to 13. Secondly, leguminosae, liulaceae, gramineaceae and spinaceae, the number of other family plants are 1(Fig. 1.).

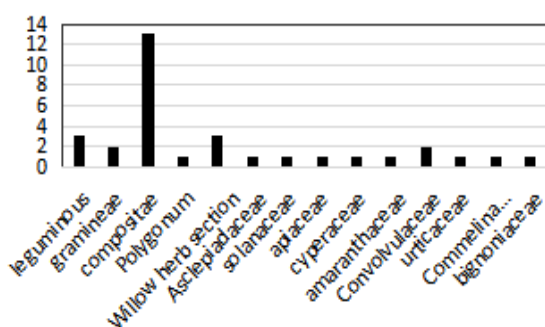


Fig. 1. Number of species of each family of herbs.

Table 2. Species of each family of three community herbs.

Family	Species of herbs The overall species	Cerasus sp. community Herbaceous species	Malus micromalus community Herbaceous species	Robinia pseudoacacia L. community Herbaceous species
leguminous	3	3	0	0
gramineae	2	2	1	1
compositae	13	8	5	2
Polygonum	1	0	1	1
Willow herb section	3	2	1	0
Asclepiadaceae	1	1	1	1
solanaceae	1	1	0	0
apiaceae	1	1	0	0
cyperaceae	1	1	0	0
amaranthaceae	1	0	1	1
Convolvulaceae	2	0	2	1
urticaceae	1	0	0	1
Commelina communis	1	0	0	1
bignoniaceae	1	1	0	0
total	32	20	12	9

From Table 2, we can see the herbaceous species of compositae are the largest in the three communities. In the Cerasus sp. community, compositae was followed by leguminaceae, gramineae, and willows. In the Malus micromalus community, the subfamily of compositae is the family spiraceae. In the Robinia pseudoacacia L. community, the distribution of herb species is relatively dispersed.

3.2 Frequency

Table 3. Frequency distribution of three community herbs.

Frequency (%)	Species of herbs The overall species	Cerasus sp. community Herbaceous species	Malus micromalus community Herbaceous species	Robinia pseudoacacia L. community Herbaceous species
90-100	1	1	1	0
70-90	2	1	1	0
50-70	4	3	0	2
30-50	5	5	2	2
10-30	13	7	5	2
0-10	7	3	4	3
total	32	20	13	9

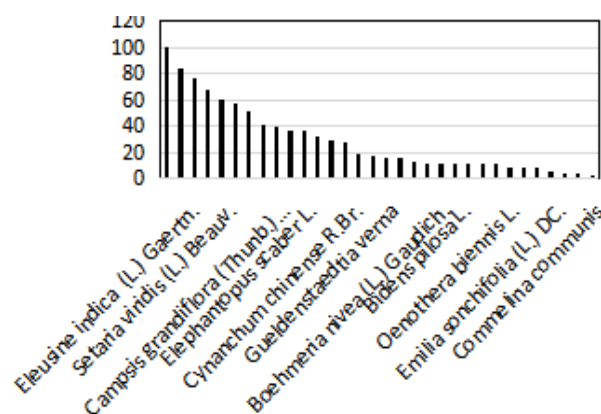


Fig. 2. Frequency of different herbs.

From Table3, we can see the maximum number of herb species is generally concentrated in the frequency 10-30%. As can be seen from Table 3 and Fig. 2, Eleusine indica (L.) Gaertn is the herb with the highest average frequency in the three communities, reaching 100%. Secondly, the frequency of six herbs, such as Crepidiastrum lanceolatum (Houtt.) Nakai, Artemisia carvifolia, Setaria viridis (L.) Beauv., Trifolium Linn., Gaura lindheimeri Engelm. et Gray, is 50-90%. The frequency of 5 herbs, such as Pharbitis nil (Linn.)Choisy, Kummerowia striata, Elephantopus scaber L., Gaura parviflora Douglas, Cynanchum chinense R.Br., is 30-50%. The frequency of 13 herbs, such as Pterocypsela indica (L.) Shih, Chenopodium album, Gueldenstaedtia verna, Picris hieracioides Linn., Solanum nigrum L., Boehmeria nivea (L.) Gaudich., Oenothera biennis L., Ipomoea triloba L., Taraxacum mongolicum Hand.-Mazz., is 10-30%. The frequency of 7 herbs, such as Cirsium japonicum, Polygonum, Sonchus arvensis Linn., Commelina communis, Bidens bipinnata Linn., is less than 10%.

In Cerasus sp. community, Gaura parviflora Douglas had the highest occurrence frequency, reaching 100%. The frequency of 4 herbs, such as Crepidiastrum lanceolatum (Houtt.) Nakai, Trifolium Linn., Solanum nigrum L., Picris hieracioides Linn., is 50-90%. The frequency of Pterocypsela indica (L.) Shih, Elephantopus scaber L., Setaria viridis (L.) Beauv., Cirsium setosum, Campsis grandiflora (Thunb.) Schum., is 30-50%. The frequency of 5 herbs, such as Kummerowia striata, Gueldenstaedtia verna, Taraxacum mongolicum Hand.-Mazz., Gaura lindheimeri Engelm. et Gray, Eleusine

indica (L.) Gaertn., *Cynanchum chinense* R.Br., is 10-30%. And the frequency of *Sonchus arvensis* Linn., *Cirsium japonicum*, *Cyperus rotundus* L., is less than 10%.

In *Malus micromalus* community, *Setaria viridis* (L.) Beauv. had the highest occurrence frequency, reaching 100%. Then *Artemisia carvifolia*, the frequency is 76%. The frequency of *Cynanchum chinense* R.Br., *Pharbitis nil* (Linn.) Choisy, is 30-50%. *Heteropappus hispidus* (Thunb.) Less., *Bidens pilosa* L., *Oenothera biennis* L., *Ipomoea triloba* L., is 10-30%. The frequency of *Polygonum*, *Pterocypsela indica* (L.) Shih, *Cirsium setosum*, *Chenopodium album*, is less than 10%.

In *Robinia pseudoacacia* L.community, *Setaria viridis* (L.) Beauv. had the highest occurrence frequency, reaching 60%. Then *Pharbitis nil* (Linn.) Choisy, the frequency is 50%. The frequency of *Chenopodium album*, *Cynanchum chinense* R.Br., is 30-50%. And *Boehmeria nivea* (L.) Gaudich., *Polygonum* is 10-30%. The frequency of *Emilia sonchifolia* (L.) DC., *Bidens bipinnata* Linn., *Commelina communis*, is less than 10%.

3.3 Coverage

Table 4. Coverage distribution of three community herbs.

Coverage (%)	Species of herbs The overall species	<i>Cerasus</i> sp. community Herbaceous species	<i>Malus micromalus</i> community Herbaceous species	<i>Robinia pseudoacacia</i> L.community Herbaceous species
>20	2	1	2	0
10-20	5	2	2	4
5-10	5	4	0	0
1-5	18	12	8	4
<1	2	1	0	1
total	32	20	12	9

From Table 4, we can see the maximum number of herb species is mainly concentrated in coverage 1-5%. As can be seen from Fig.3 and Table 4, the coverage of different herbs varies greatly. *Artemisia carvifolia* and *Eleusine indica* (L.) Gaertn were the highest coverage, reaching 28% and 22% respectively. The coverage of 5 herbs, such as *Setaria viridis* (L.) Beauv., *Crepidiastrum lanceolatum* (Houtt.) Nakai, *Pharbitis nil* (Linn.) Choisy, *Cyperus rotundus* L., *Cynanchum chinense* R.Br., is 10-20%. The coverage of 18 herbs, such as *Campsis grandiflora* (Thunb.) Schum., *Elephantopus scaber* L., *Gaura lindheimeri* Engelm. et Gray, *Trifolium* Linn., *Chenopodium album*, *Boehmeria nivea* (L.) Gaudich., *Oenothera biennis* L., *Gaura parviflora* Douglas, *Gueldenstaedtia verna*, *Solanum nigrum* L., *Bidens pilosa* L., *Heteropappus hispidus* (Thunb.) Less., *Pterocypsela indica* (L.) Shih, *Picris hieracioides* Linn., *Polygonum*, *Kummerowia striata*, *Ipomoea triloba* L., *Sonchus arvensis* Linn., *Cirsium setosum*, *Taraxacum mongolicum* Hand.-Mazz., *Bidens bipinnata* Linn., is 1-5%. The coverage of *Commelina communis*, *Cirsium japonicum* is less than 1%.

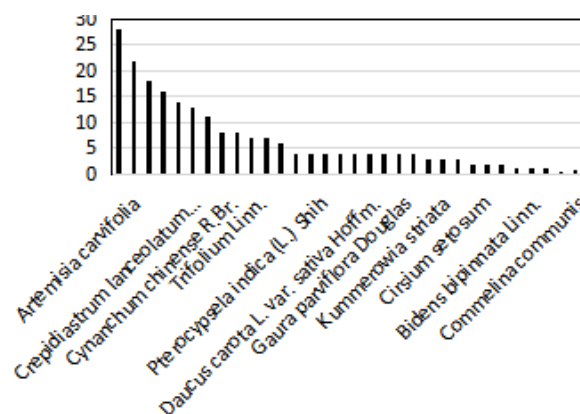


Fig. 3. Coverage of different herbs

In terms of different communities, the total coverage of *Cerasus* sp. Community was the largest, followed by *Malus micromalus* community, and *Robinia pseudoacacia* L.community was the lowest.

In *Cerasus* sp. Community, *Gaura parviflora* Douglas was the highest coverage, reaching 22%. The coverage of *Crepidiastrum lanceolatum* (Houtt.) Nakai, *Cyperus rotundus* L., is 10-20%. The coverage of 4 herbs, such as *Picris hieracioides* Linn., *Setaria viridis* (L.) Beauv., *Trifolium* Linn., *Solanum nigrum* L., is 5-10%. The coverage of 12 herbs, such as *Pterocypsela indica* (L.) Shih, *Cirsium setosum*, *Campsis grandiflora* (Thunb.) Schum., *Kummerowia striata*, *Taraxacum mongolicum* Hand.-Mazz., *Elephantopus scaber* L., *Gueldenstaedtia verna*, *Gaura lindheimeri* Engelm. et Gray, *Eleusine indica* (L.) Gaertn., *Sonchus arvensis* Linn., *Cynanchum chinense* R.Br., is 1-5%. The coverage of *Cirsium japonicum* is less than 10%.

In *Malus micromalus* community, *Setaria viridis* (L.) Beauv. was the highest coverage, reaching 38%. Then *Artemisia carvifolia* 28%. *Cynanchum chinense* R.Br., *Pharbitis nil* (Linn.) Choisy, the coverage is 10-20%. The coverage of 8 herbs, such as *Heteropappus hispidus* (Thunb.) Less., *Bidens pilosa* L., *Oenothera biennis* L., *Pterocypsela indica* (L.) Shih, *Ipomoea triloba* L., *Polygonum* is above 1%.

In *Robinia pseudoacacia* L.community, the coverage of *Cynanchum chinense* R.Br. is 17% only. The coverage of *Pharbitis nil* (Linn.) Choisy, *Setaria viridis* (L.) Beauv., *Chenopodium album*, is 10-20%. The coverage of *Boehmeria nivea* (L.) Gaudich., *Polygonum*, *Bidens bipinnata* Linn., *Emilia sonchifolia* (L.) DC., is 1-5%. And the coverage of *Commelina communis* is less than 1%.

3.4 Herbs common to all three communities

Table 5. Frequency of herbs common to all three communities.

Herbaceous species	<i>Cerasus</i> sp. community	<i>Malus micromalus</i> community	<i>Robinia pseudoacacia</i> L.community
<i>Cynanchum chinense</i> R. Br.	15	40	32
<i>Setaria viridis</i> (L.)	44	100	60

Beauv.			
Pterocypsel a indica (L.) Shih	28	4	-
Cirsium setosum	20	4	-
Chenopodiu m album	-	4	33
Polygonum	-	8	10
Pharbitis nil (Linn.)Choi sy	-	32	50

Table 6. Coverage of herbs common to all three communities.

Herbaceous species	Cerasus sp. community	Malus micromalus community	Robinia pseudoacacia L.community
Cynanchum chinense R. Br.	3	12	17
Setaria viridis (L.) Beauv.	4	38	12
Pterocypsel a indica (L.) Shih	4	4	-
Cirsium setosum	3	1	-
Chenopodiu m album	-	1	10
Polygonum	-	3	2
Pharbitis nil (Linn.)Choi sy	-	12	15

Table 7. Height distribution of three community herbs.

Herbaceous species	Cerasus sp. community	Malus micromalus community	Robinia pseudoacacia L.community
Cynanchum chinense R. Br.	20	46	75
Setaria viridis (L.) Beauv.	25	37	30
Pterocypsel a indica (L.) Shih	52	41	-
Cirsium setosum	21.5	26	-
Chenopodiu m album	-	14	17.5
Polygonum	-	5	21
Pharbitis nil (Linn.)Choi sy	-	16	48

We can see from Table 5, Table 6 and Table 7, the frequency, coverage and height of *Setaria viridis* (L.) Beauv are the highest in *Malus micromalus* community, the middle of *Robinia pseudoacacia* L.community, and

the lowest in *Cerasus* community sp. The frequency of *Cynanchum chinense* R.B. was the highest in *Malus micromalus* community and lowest in *Cerasus* sp. Community. The coverage and height were highest in *Robinia pseudoacacia* L.community, followed by *Malus micromalus* community, and lowest in *Cerasus* sp. Community.

The frequency and height of *Pterocypsel a indica* (L.) Shih were higher in *Cerasus* sp. Community, but the change in coverage was not significant in two communities. *Cirsium setosum* has a higher frequency and coverage in *Cerasus* sp.community, and a higher height in *Malus micromalus* community. The height of *Polygonum* in *acacia acacia* community was significantly higher than that of *Malus micromalus* community, while the frequency and coverage of *Polygonum* changed little between the two communities. The frequency, coverage and height of *Chenopodium album* and *Pharbitis nil* (Linn.) Choisy in *Robinia pseudoacacia* L.community are all greater than *Malus micromalus* community.

4 Conclusion

It's a wonderful thing that three different communities has evolved different understory herbaceous plants under the same soil texture, the same time succession and secondary succession after retillage. Plant succession is a so complicated process. We should continue to study it.

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