

Characterization of meadow vegetation of Shamakhi district of Azerbaijan

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Abstract: The vegetation of Shamakhi district was analyzed in the villages of Angakharan, Melham, Chukhuryurd, Akhmedly and Talishnuru. The floristic analysis allowed us to release a list of 27 taxa of 23 genera and 13 families. According to the taxonomic studies, useful plants belonging to the following families were found in Shamakhi district: Boraginaceae, Asteraceae, Caprifoliaceae, Polygonaceae, Apiaceae, Rosaceae, Verbenaceae, Rubiaceae, Hypericaceae, Fabaceae, Lythraceae, Malvaceae, Lamiaceae. The most represented families are Asteraceae and Fabaceae. The genera such as *Achillea* L., *Prunus* L., *Trifolium* L., *Lotus* L. and *Lythrum* L. were represented by two species each. *Inula helenium* L., *Daucus carota* L., *Dipsacus laciniatus* L., *Agrimonia eupatoria* L., *Trifolium medium* L., *Lotus dorycnium* L. were dominant species in phytocenosis. The result of analysis revealed three types of plant community such as: *Inula helenium* + *Dipsacus laciniatus* + *Rumex crispus*, *Dipsacus laciniatus* + *Rumex crispus*, *Lotus dorycnium* + *Trifolium medium* + *Agrimonia eupatoria*. Hemicryptophytes (67%) species form the basis of flora. It was determined that perennial herbaceous plants predominate in the studied areas. According to their beneficial properties, 10 species were classified as fodder, 8 as medicinal, 5 as edible, and 3 species as species that can be used as both feed and edible plants.

Keywords: life forms, phytocoenosis, plant community, taxa, useful plants

INTRODUCTION

The study of flora, species diversity and communities are key for solving many theoretical and practical issues in taxonomy, botanical geography, resource science,

conservation biology, and it is also required to obtain the necessary information on the species richness and diversity. Species diversity along with being an important component of biodiversity, also plays a major role in maintaining ecosystem functions, while the stability of plant community is one of the most basic functions of ecosystems, and the characteristics and patterns of change of vegetation itself can be reflected by studying the stability of the community [Zhang, Zhang, 2002; Jiang et al., 2015].

Shamakhi noted in geographical instructions of Ptolemaic (II century) was called “Shamakheya”, “Kemakheya” and described as “Ash-Shamakhiya” in Arab sources is one of the ancient cities of Azerbaijan. The surveyed administrative district is part of the botanical-geographical region identified as Gobystan [Flora..., 1950]. The area of Shamakhi district is surrounded by Greater Caucasus (GC) range, Langabiz range and Shirvan plain. The surface of the area is mostly covered with mountains. GC range occupies the southern part of the region. The sediments of Jurassic-anthropogenic period have been spread all over the area. The north-eastern macroslope of the GC, which includes part of the surveyed area, is washed by the Caspian Sea to the east, passes into the Kura-Araz lowland to the southwest, and borders on the ridges and spurs of the GC to the north [Mammadov et al., 2012].

There are fewer studies of the floristic composition of various parts of Shamakhi district [Bakhsaliyeva, Qasimova, 2015; Mammadova et al., 2016]. However, no study has been conducted to document the floristic composition of the meadow vegetation for the evaluation, management and conservation of this district’s plant heritage. Therefore, the aim of this work was to study the current species diversity, conduct taxonomic analysis, phytocoenological assessment, of useful plants in Shamakhi district.

MATERIAL AND METHODS

The vegetation of south parts of Shamakhi district was analyzed in the villages of Angakharan, Melham, Chukhuryurd, Akhmedly and Talishnuru, using generally accepted research methods such as visual inspection with the selected phytocoenosis, the method

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of trial (accounting) sites with registration of the species composition, abundance and prevalence. The trial (accounting) method was 10 test plots, sized 10 x 10 m. Field research was conducted on July 11-20, 2024. The number of plants in 10 such test plots were counted, after which the average value was calculated. [Meth..., 2015]. In order to identify the significance of the species in the association, an abundance assessment was carried out using the Gulth-Drude scale [1980] and Braun-Blanquet scale [1928].

During the expedition, vegetation analysis, phytocenological assessment, taxonomic analysis of useful plant species was carried out, the species composition of phytocoenose types (abundance, tiers, etc.) were determined [Naumov, Kirpichev, 2017]. Photos of plant specimens were taken, GPS coordinates were recorded and herbarium samples were collected. The nomenclature of taxa is given mainly in accordance with the World Flora Online database.

RESULTS

The plant wealth of the surveyed area is significant and as a result of the conducted research, the distribution areas of plant species were specified and the phytocoenotic characteristics were analysed. The table 1 provides information about collected species and their abundance.

The distribution of plant species by families showed differences (Fig. 1). A total 27 plant species belonging to 23 genera and 13 families were identified. Asteraceae was the most dominant family (8 species, 29%) followed by Fabaceae (4 species, 15%). Similarly, two families, namely, Rosaceae and Malvaceae are composed of 3 (11%) and 2 (7%) species accordingly. Boraginaceae, Caprifoliaceae, Polygonaceae, Apiaceae, Verbenaceae, Rubiaceae, Hypericaceae, Fabaceae, Lythraceae, Lamiaceae families were represented by single species.

Achillea L., *Prunus* L., *Trifolium* L., *Lotus* L. and *Lythrum* L. (Fig. 2) were the most species-rich genera with 2 species (7% each). The rest 18 genera were

Table 1. Species diversity and abundance of species in meadow phytocenoses in the south parts of Shamakhi district.

Family	Species	Abundance according to Drude
Boraginaceae Juss.	<i>Echium italicum</i> L.	Sol
	<i>Cichorium intybus</i> L.	Sp
	<i>Cirsium vulgare</i> (Savi) Ten.	Sol
	<i>Inula helenium</i> L.	Cop ₃
	<i>Centaurea iberica</i> Trev.	Sp
	<i>Matricaria chamomilla</i> L.	Sp
	<i>Achillea nobilis</i> L.	Cop ₂
	<i>Achillea filipendulina</i> Lam.	Sp
<i>Daucus carota</i> L.	Cop ₃	
Caprifoliaceae Juss.	<i>Dipsacus laciniatus</i> L.	Cop ₃
Polygonaceae Juss.	<i>Rumex crispus</i> L.	Cop ₂
Apiaceae Lindl.	<i>Eryngium creticum</i> Lam.	Sol
	<i>Rosa canina</i> L.	Sol
	<i>Prunus spinosa</i> L.	Sp
Rosaceae Juss.	<i>Prunus divaricata</i> Lebed.	Sp
	<i>Agrimonia eupatoria</i> L.	Cop ₂
	Verbenaceae J.St.-Hil.	<i>Verbena officinalis</i> L.
Rubiaceae Juss.	<i>Galium sp.</i>	Sp
Hypericaceae Juss.	<i>Hypericum perforatum</i> L.	Sp
	<i>Trifolium arvense</i> L.	Sol
	<i>Trifolium medium</i> L.	Cop ₃
Fabaceae Juss.	<i>Lotus tenuis</i> Waldst. Kit ex Willd.	Sp
	<i>Lotus dorycnium</i> L.	Cop ₃
	Lythraceae J.St.-Hil.	<i>Lythrum salicaria</i> L.
Malvaceae Juss.	<i>Alcea rugosa</i> Alef.	Cop ₂
	<i>Malva sylvestris</i> L.	Sp
Lamiaceae Martinov	<i>Stachys germanica</i> L.	Cop ₂

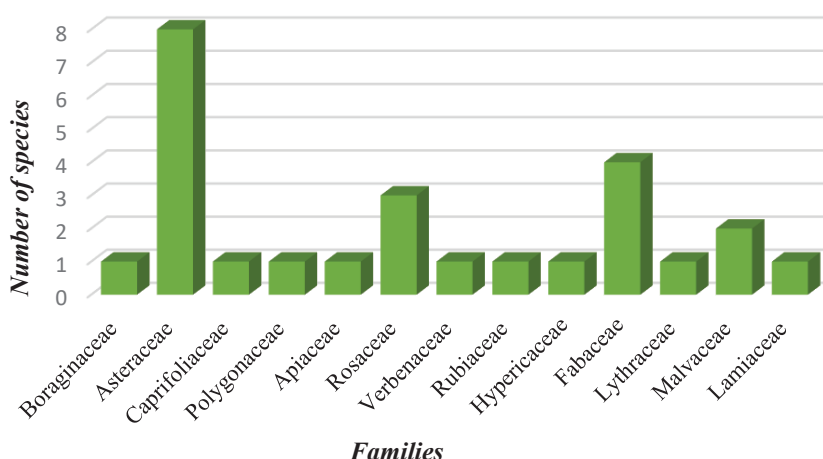


Figure 1. Distribution of plant species by families.

represented by single species (3% each).

Due to the abundance of natural resources, in particular water and sunlight in the research area right side of Gizmeydan road before reaching Pirsaat river, 1121 m (48°38' 52.8" E - 40°43' 25.7" N), perennial herbs *Inula helenium* L, *Lotus dorycnium* L., *Trifolium medium* L., biennial herbs *Daucus carota* L., *Dipsacus laciniatus* L. (Fig. 3) are distinguished. According to the Drude scale, their abundance was estimated as Cop₃ and Braun-Blanquet scale as 5 score.

It was established that in the grass cover, community of *Inula helenium* + *Dipsacus laciniatus* + *Rumex crispus* and *Dipsacus laciniatus* + *Rumex crispus* was 60-70%,

and in the community *Lotus dorycnium* L. + *Trifolium medium* L. + *Agrimonia eupatoria* L. was 80%.

One of the most well-known systems of classification of plant life forms is the system generated by C. Raunkiaer [1934], based on the position of renewal buds in relation to the soil surface. According to is system, the following life forms of species were studied: hemicryptophyte, therophyte, geophyte, nanophanerophyte, microphanerophyte. The life form classification revealed Hemicryptophytes (18 taxa, 67%) > Therophytes (4 taxa, 15%)> Geophytes (2 taxa, 7%) > Nanophanerophytes (2 taxa, 7%) > Microphanerophytes (1 taxa, 4%).

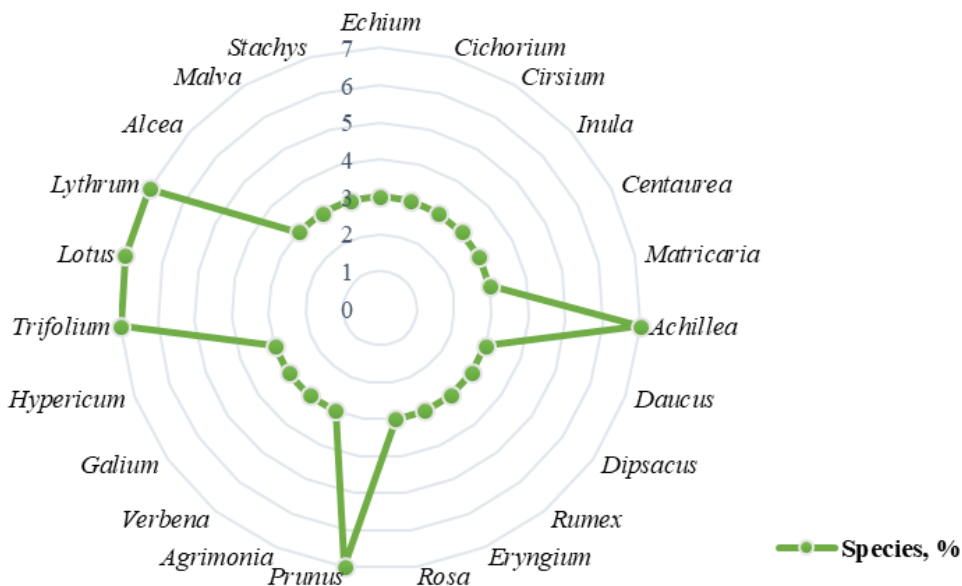


Figure 2. Distribution of plant species by genera.



Figure 3. Community with predominance of *Inula helenium* L., *Lotus dorycnium* L., *Trifolium medium* L., biennial herbs *Daucus carota* L., *Dipsacus laciniatus* L.

Some characteristics, abundance and application areas of species were studied (Tab. 2).

The life forms of the species were also studied according to I.G. Serebryakov [1964]. Analysis of life forms of species showed the absolute dominance of herbaceous plants (23 species, 88%) in the studied areas. The leading positions are occupied by perennial herbaceous forms (16 species, 61.5%) followed by biennial herbs (4 species, 15%), annual herbs (3 species, 11.5%), shrubs (2 species, 8%), tree (1 species, 4%). Meadows are combined with thickets such as *Rosa canina* L. and *Prunus spinosa* L. The tree layer includes *Prunus divaricata* Lebed. As can be seen from the phenological phases of development, many species were at the flowering stage during the study. According to their beneficial properties, 10 species

Table 2. Phenological phases, abundance and scope of application of species distributed in the study area.

№	Species	Life forms		Phenophase	Application area
		According to Serebryakov [1964]	Abundance according to Braun-Blanquet		
1.	<i>Echium italicum</i> L.	BH	1	FL	Fodder
2.	<i>Cichorium intybus</i> L.	PH	2	FL	Medicinal
3.	<i>Cirsium vulgare</i> (Savi) Ten.	BH	1	FL-FR	
4.	<i>Inula helenium</i> L.	PH	5	FL	Medicinal
5.	<i>Centaurea iberica</i> Trev.	PH	2		Medicinal
6.	<i>Matricaria chamomilla</i> L.	AH	3		Medicinal
7.	<i>Achillea nobilis</i> L.	PH	4	FL	Fodder
8.	<i>Achillea filipendulina</i> Lam.	PH	3	FL	Fodder
9.	<i>Daucus carota</i> L.	BH	5	FL	Edible, Fodder
10.	<i>Dipsacus laciniatus</i> L.	BH	5	FL-FR	Edible, (honey)
11.	<i>Rumex crispus</i> L.	PH	4	FR	
12.	<i>Eryngium creticum</i> Lam.	PH	1		
13.	<i>Rosa canina</i> L.	Sh	1	FR	
14.	<i>Prunus spinosa</i> L.	Sh	2	FR	
15.	<i>Prunus divaricata</i> Lebed.	T	2	FR	
16.	<i>Verbena officinalis</i> L.	PH	2		
17.	<i>Hypericum perforatum</i> L.	PH	2		Medicinal
18.	<i>Trifolium arvense</i> L.	AH	1		
19.	<i>Trifolium medium</i> L.	PH	5		
20.	<i>Lotus tenuis</i> Waldst. Kit ex Willd.	PH	3		
21.	<i>Lotus dorycnium</i> L.	PH	5		
22.	<i>Lythrum salicaria</i> L.	PH	2		(honey)
23.	<i>Alcea rugosa</i> Alef.	PH	4		Medicinal
24.	<i>Malva sylvestris</i> L.	AH	2		
25.	<i>Stachys germanica</i> L.	PH	4		Medicinal
26.	<i>Agrimonia eupatoria</i> L.	PH	4		Medicinal

Note: AH- annual herbs, BH - biennial herbs, PH – perennial herbs, Sh- shrubs, T – tree, FL – flowering, FR – fruiting.

were classified as fodder (38.4%), eight as medicinal (31%), five as edible (19.2%), and three species were classified as species that can be used as both fodder and edible (11.5%). Two species (8%) namely, *Dipsacus laciniatus* L. and *Lythrum salicaria* L. are honey plants. An analysis of life forms showed that the investigated area has hemicytrophite-therophyte character, with domination of hemicytrophites (18 taxa, 67 %). Meadow vegetation of is characterized by high species diversity and representativeness of valuable forage, pharmaceutical, honey and other useful plants. An important role in meadow communities played by perennial herbaceous plants. The communities are mostly dominated by next species: *Inula helenium*, *Lotus dorycnium*, *Trifolium medium*, *Daucus carota*, *Dipsacus laciniatus*. The present study was limited to the floristic composition and plant community analysis. Further field studies planned to study the impact of landscape change on the floristic composition and structure, the distribution of possible plant community types in relation to other environmental factors such as soil properties, to identify ecologically and economically important plants and their diversity and to organize the protection of endangered and economically important plant species.

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Azərbaycanın Şamaxı rayonunun çəmən bitkiliyinin xüsusiyyətləri

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Şamaxı rayonunun Əngəxaran, Məlhəm, Çuxuryurd, Əhmədli və Talışnuru kəndlərində bitki örtüyünün təhlili aparılmışdır. Floristik analiz nəticəsində 13 fəsilə və 23 cinsə aid olan 27 taksonun siyahısı tərtib edilmişdir. Taksonomik tədqiqatlara əsasən Şamaxı rayonunda Boraginaceae, Asteraceae, Caprifoliaceae, Polygonaceae, Apiaceae, Rosaceae, Verbenaceae, Rubiaceae, Hypericaceae, Fabaceae, Lythraceae, Malvaceae, Lamiaceae fəsilələrinə aid faydalı bitkilər aşkar edilmişdir. Asteraceae və Fabaceae fəsilələrinə aid ən çox təmsil olunan *Achillea*, *Prunus*, *Trifolium*, *Lotus* və *Lythrum* hər biri 2 növlə (hər biri 7%) qeyd olunmaqla ən zəngin cinslər olmuşdur. Fitosenozda dominant növlərə *Inula helenium* L., *Daucus carota* L., *Dipsacus laciniatus* L., *Agrimonia eupatoria* L., *Trifolium media* L., *Lotus dorycnium* L. aiddir. Aparılan təhlillər nəticəsində üç növ bitki birliyi müəyyən edilmişdir: *Inula helenium* L. + *Dipsacus laciniatus* L. + *Rumex crispus* L., *Dipsacus laciniatus* L. + *Rumex crispus* L., *Lotus dorycnium* L. + *Trifolium medium* L. + *Agrimonia eupatoria* L. Floranın əsasını hemikriptofitlər təşkil edir (67%). Faydalı xüsusiyyətlərinə görə bitkilər aşağıdakı kimi təsnif edilmişdir: 10 yem, 8 dərman, 5 qida, 3 həm yem, həm qida.

Açar sözlər: *həyati formalar, fitosenoz, bitki birliyi, taksonlar, faydalı bitkilər*

Особенности луговой растительности Шемахинского района Азербайджана

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Проведен анализ растительности Шемахинского района в селах Ангахаран, Мелхам, Чухурюрд, Ахмедлы и Талыштуру. Флористический анализ позволил составить список из 27 таксонов, распределенных по 23 родам и 13 семействам. Согласно таксономическим исследованиям, в Шемахинском районе были обнаружены полезные растения, относящиеся к следующим семействам: Boraginaceae, Asteraceae, Caprifoliaceae, Polygonaceae, Apiaceae, Rosaceae, Verbenaceae, Rubiaceae, Hypericaceae, Fabaceae, Lythraceae, Malvaceae, Lamiaceae. Наиболее представленными семействами являются Asteraceae и Fabaceae. Роды *Achillea*, *Prunus*, *Trifolium*, *Lotus* и *Lythrum* были самыми богатыми родами, насчитывающими по 2 вида (по 7%). Доминирующими видами в фитоценозе были *Inula helenium* L., *Daucus carota* L., *Dipsacus laciniatus* L., *Agrimonia eupatoria* L., *Trifolium medium* L., *Lotus dorycnium* L. В результате анализа выявлено три типа растительных сообществ: *Inula helenium* L. + *Dipsacus laciniatus* L. + *Rumex crispus* L., *Dipsacus laciniatus* L. + *Rumex crispus* L., *Lotus dorycnium* L. + *Trifolium medium* L. + *Agrimonia eupatoria* L. Установлено, что основу флоры составляют гемикриптофиты (67%). По полезным свойствам 10 видов отнесены к кормовым, 8 – к лекарственным, 5 – к пищевым и 3 вида отнесены к видам, которые можно использовать как в качестве кормовых, так и в качестве пищевых растений.

Ключевые слова: *жизненные формы, фитоценоз, растительное сообщество, таксоны, полезные растения*