

Use of medicinal plants distributed in lowland Karabakh in ethnoveterinary medicine

Movsumova Nuri Vagif, *Ibadullayeva Sayyara Jamshid

Department of Ethnobotany, Institute of Botany, Ministry of Science and Education of the Republic of Azerbaijan, 40 Badamdar Highway, Baku AZ 1004, Azerbaijan

*For correspondence: ibadullayeva.sayyara@mail.ru

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The research work was conducted in the territory of lowland Karabakh during 2020-2022. The main goal of the work was to reveal medicinal plants used in ethnoveterinary and their effectiveness in terms of the development of animal husbandry, which has an ancient history in the region. During the research, ethnobotanical survey methods were used, statistical analyzes were carried out, plant samples were collected and determined according to classical and modern methods. Interviews were conducted with 123 local residents aged 40 and over living in 56 villages of the study area. Of those who took part in the interviews, 78 were women, 45-men, 67 were engaged in agriculture, 56-doctors. As a result of surveys, it was found that out of 1100 species distributed in the territory, 39 species belonging to 15 families are used in the treatment of various diseases in ethnoveterinary medicine. The effectiveness of the species in diseases, the degree of reliability and the value of use were also evaluated. The consensus factor was high for skin diseases (ICF 0.91), fever (ICF 0.98) and eye diseases (ICF 0.88). The value of the use of *Artemisia absinthium* (0.70) and *Mentha longifolia* (0.69) was the highest according to the number of references obtained. The reliability rate of *Salvia verticillata*, *Urtica urens*, *Urtica dioica*, *Plantago lanceolata*, *Artemisia absinthium*, *Achillea filipendulina* and *Glycyrrhiza glabra* was the highest (100%). Since 16 of the species used as medicine are fodder plants, they directly affect the health of animals in grazing areas.

Keywords: Ethnoveterinary, lowland Karabakh territory, medicinal plants and methods of their use

INTRODUCTION

As it is known, folk medicine was formed on the basis of the customs and traditions and the millennial experience of various peoples and cultures. Different nations have different ways of using and taking medicinal plants, and there are treatment methods based on these national traditions. These treatment methods are widely used among the local population as pearls of folk medicine to this day (Muin, 1347; Abu Ali Ibn Sina, 1982). However, some methods of application of the doctors who developed various methods of treatment have remained unknown until now. The reason for this is that ethnobotanical knowledge is transmitted orally from one generation to another,

and this information has not yet been fully documented. Existing publications rely on previous literature, thus, the possibilities of using plants are limited in terms of scope. As a result, this has led to the creation of gaps in the documentation of medicinal plants distributed in the territory of the republic. Ethnobiological studies conducted in the regions of Azerbaijan in the last decade (Aghayeva, Ibadullayeva, 2012, 2013; Ibadullayeva, 2013; Ibadullayeva et al., 2015, 2022) is aimed at updating and scientific justification of existing knowledge. However, the mechanism of medicinal plants used in non-traditional medicine in the flora of Azerbaijan as a whole has not been fully determined.

Ethnoveterinary, a branch of ethnobotany, has

an ancient history. Because the primary occupations of people were animal husbandry - horse breeding, poultry farming, cattle breeding, beekeeping and other special care for animals. As a result of this, developed, individual and private farms were created. Animal husbandry is one of the main occupations of the people living in the Karabakh region of Azerbaijan. The people who are engaged in this work turn to medicinal plants because they are available more quickly during the treatment of animals, especially in the area of lowland Karabakh. In modern times, ethnoveterinary, as a separate field of research, is being investigated in many ways in the countries of the world (Münir et al., 2019; Sökand and Pieroni, 2016; Brekhna et al., 2019).

The main purpose of the research is to scientifically substantiate and document oral knowledge during the return of the displaced population to the liberated Karabakh region, as well as to contribute to the development of animal husbandry, which is the main occupation of the population in the research area.

MATERIALS AND METHODS

Study area: The research work was carried out in the southwestern part of the Lesser Caucasus, in the territory of lowland Karabakh. It includes the northeast of Tartar district (a.s.l. 227 m, E

40°21'04" və N 4°55'55"), Agjabadi district (a.s.l. 34 m, E 40°02'46" and N 47°25'37"), Barda district (a.s.l. 87m, E 40°22'25" and N 47°07'30"), Aghdam district (a.s.l. 350 m, E 40°03'02" and N 46°55'09") (Fig. 1). The low-sloping, undulating plain surface areas of the district are composed of continental and marine sediments of the anthropogenic system. Chestnut, gray and meadow-gray, salty soil types are typical for the soil cover of the area. The climate is semi-desert and dry-arid with hot-dry summers and mild-cold winters. The amount of annual pre-cipitation varies between 250-500 mm. The average maximum annual temperature is 14-27°C (July-August), min. 1-7°C (January-February) (The World Weather). The water supply of the study area is mainly through channels, springs and rivers. Among the rivers here are Tartar river, Kura river, Incechay, Khachinchay, Gargarchay. The biggest rivers and their tributaries pass through the area. A sparse Tugai forest is spread on the banks of the Kura River.

Method of survey: Surveys were taken from 123 local residents aged 40 and over living in the study area during 2020-2022. During the interviews, ethnobotanical methods were used (Martin, 2004; Chursin, 1929; Cotton, 1996). Interviews were conducted in 56 villages in the study area. Of those who took part in the interviews, 78 were women, 45-men, 67 were engaged in farming, 56 - doctors (Fig. 2).

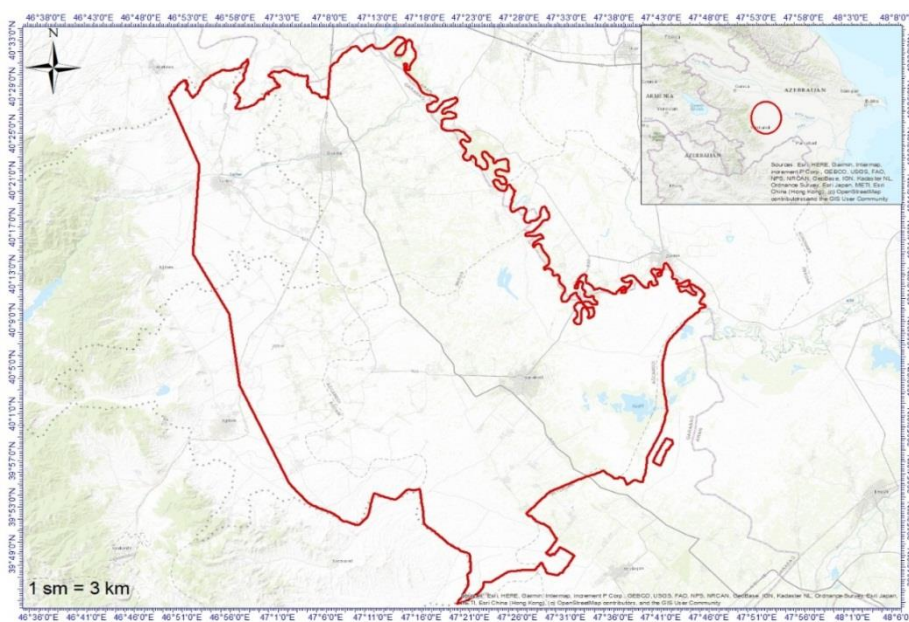


Fig. 1. Map of the studied lowland Karabakh area

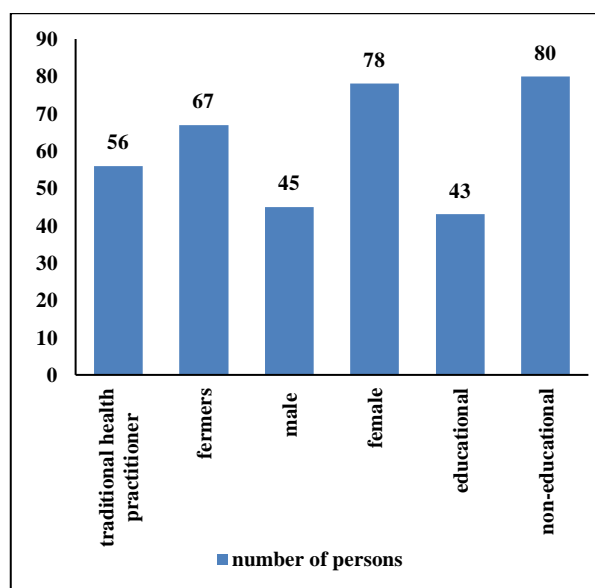


Fig. 2. Classification of respondents on different categories

First, to treat common and widespread diseases, information on local names of plants, their usage, distribution areas, collection and drying was collected, and special forms prepared for questionnaires were filled out. At this time, the informants' knowledge about medicinal plants was registered and they were given information about medicinal plants that are common in the area, but whose use is unknown.

More than 20 ethnic groups live in the region: Turks, Russians, Ukrainians, Tatars, Kurds, Jews, Lezgis and others. Data from different ethnic groups are also summarized. Surveys were also conducted among the population group engaged in farming. The results of the conducted surveys were analyzed comparatively, the parts of medicinal plants used in ethnoveterinary, the method of preparing mixtures and their application were investigated.

Collection and determination of plant samples: During numerous expeditions to the research areas, plant samples were collected and information about the effect properties was obtained. They were identified according to the "Flora of Azerbaijan" and handed over to the Herbarium fund of the Institute of Botany (BAK). "International Code of Botanical Nomenclature" was used in the nomenclature of the species, "Key to plant of the Caucasus" in the determination of

the species. The names of families are based on the angiosperm phylogenetic group (APG III, 2009), and the naming by A.Asgarov (2016) and "The World Flora Online".

Statistical analyses: On the basis of surveys, the signs of the disease identified in animals and the organs of occurrence were grouped into 8 categories. Informant consensus factor (ICF) was estimated as follows (Trotter and Logan, 1986):

$$ICF = (N_{uc} - N_s) / (N_{uc} - 1),$$

where N_{uc} is the number of references to usage, N_s is the number of species based on each reference.

The fidelity level (FL) of the use of each species in different diseases was also calculated (Begossi A., 1996). In terms of this bioactivity, it allows determining how effective medicinal plant raw materials are in the treatment of diseases.

$$FL = S_f / T_f (\%)$$

where S_f is the frequency of references to one species in any disease, T_f is the number of total references to that species.

The degree of suitability of each plant in the treatment of various diseases by the local population is determined by data use value (UV) (Philips et al., 1994).

$$UV = \sum U/n$$

where U is the number of references given by each informant about the use of the plant species, n is the number of respondents.

RESULTS AND DISCUSSION

As a result of surveys conducted among the local population in the study area, it was determined that out of 1098 species distributed in the area, 39 species belonging to 15 families are used in the treatment of various diseases in ethnoveterinary medicine (Fig. 3). Of these, representatives of the families *Lamiaceae*, *Asteraceae* and *Fabaceae* are widely used in the treatment of animals, both as part of feed mixtures and as separate applications.

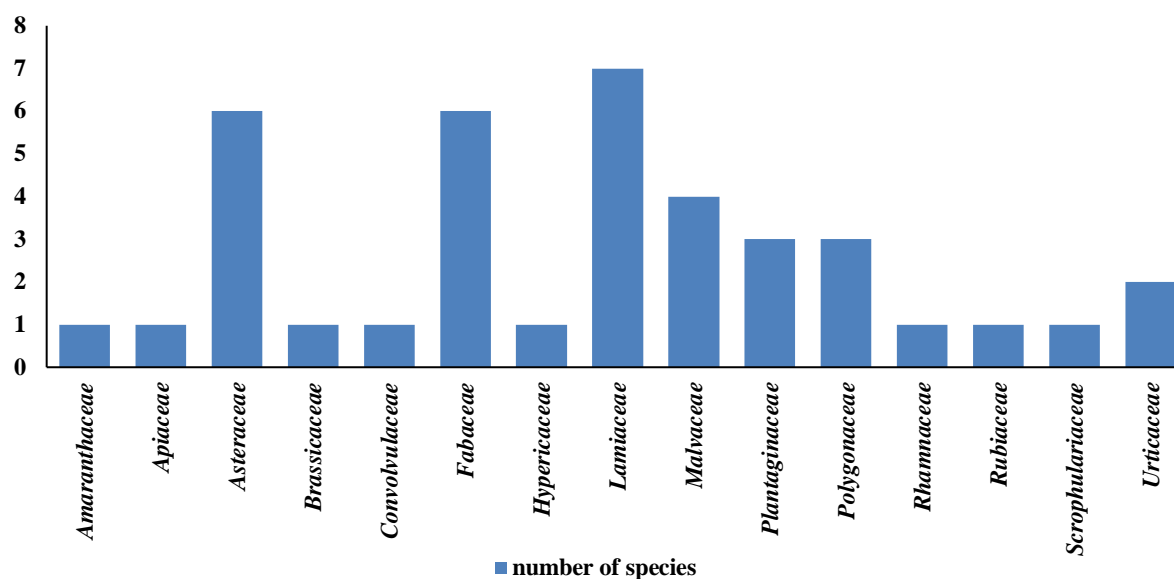


Fig. 3. Distribution of species used in ethnoveterinary by families

Table 1. Informant consensus factor of medicinal plants used in ethnoveterinary

Name of the disease	Number of references about usage, N_{uc}	Number of taxa, N_s	Informants consensus factor (ICF)
Gastrointestinal diseases	36	12	0,69
Skin diseases	45	5	0,91
Eye diseases	27	4	0,88
Fever	46	2	0,98
Worm disease	19	4	0,83
Respiratory diseases	39	9	0,79
Urinary tract diseases	47	9	0,83

Based on the surveys, the effects of treatment with medicinal plants were summarized and the identified diseases were grouped into 7 categories (Table 1). Diseases of the gastrointestinal tract, respiratory tract and urinary tract were the most common in the survey. Worm disease is widespread among animals. The effectiveness of medicinal plants in terms of their effect on diseases was calculated by the data consensus factor, based on the number of references given in the surveys. Skin diseases, fever, and eye disease had a high consensus factor. A large number of references to a small number of species in the same diseases indicates a high bioactive effect of these species.

Among the species used in ethnoveterinary in the study area, the use value of *Artemisia absinthium* (UV 0.70) and *Mentha longifolia* (0.69) species was the highest according to the

number of references obtained. The number of references (71-66) made by the population to *Glycyrrhiza glabra* (0.59), *Urtica dioica* (0.58), *Arctium lappa* (0.55), *Plantago lanceolata* (0.55), *Plantago major* (0.54), *Hypericum perforatum* (0.54) species was more than other species (table 2). Thus, the population prefers the use of leaves (30%), aerial parts (25%) and flowers (10%) of medicinal plants in different ways because they are more effective in the treatment of animals (Fig. 4). Brewing, decoctions and extracts prepared from plants are administered orally to animals or in the form of epitheme.

Based on the results we obtained, we can say that most of the plants used for medicinal purposes are herbs. They are spread from the plains to the foothills on dry stony-gravel slopes, crops, and meadows.

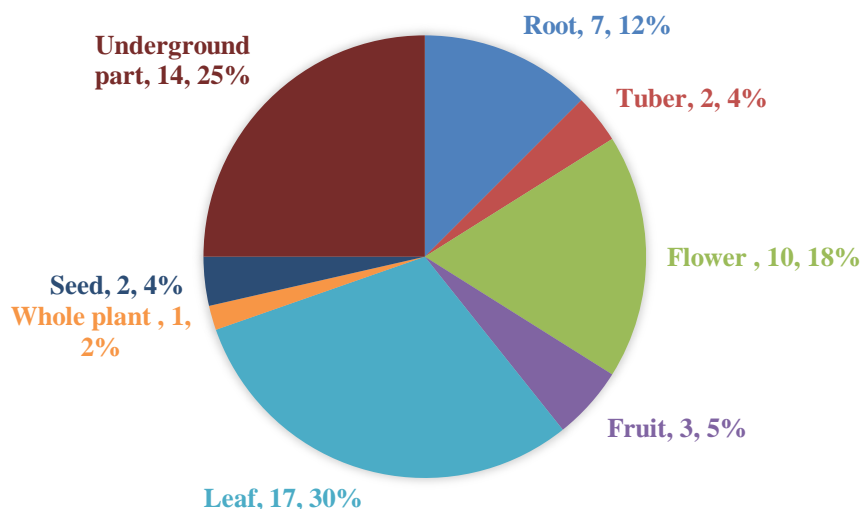


Fig. 4. Parts of plants used for treatment

Table 2. Medicinal plants used in ethnoveterinary in lowland Karabakh, their FL and UV

No.	Names of medicinal plants	Habitat	Life form	Used part	Instructions for use	Use in diseases	FL (%)	UV
1	2	3	4	5	6	7	8	9
1.	<i>Mentha longifolia</i> (L.) L. (<i>Lamiaceae</i>)	Waterside grassy areas	Perennial herb	Leaves	By oral administration	In gastrointestinal disease	83.00	0.69 (85)
2.	<i>Rumex obtusifolius</i> L. (<i>Polygonaceae</i>)	In screes	Perennial herb	Roots	In the form of epitheme	Hemostatic	64.21	0.25 (31)
3.	<i>Rumex crispus</i> L. (<i>Polygonaceae</i>)	Meadow	Perennial herb	Leaf, rhizome	By oral administration, in the form of epitheme	Gastrointestinal, lung diseases, diarrhea, dysentery	56.30	0.29 (36)
4.	<i>Salvia aethiopsis</i> L. (<i>Lamiaceae</i>)	In screes	Perennial herb	Roots, fruits	By oral administration	In cleaning the urinary and biliary tract	82.11	0.14 (17)
5.	<i>Salvia verticillata</i> L. (<i>Lamiaceae</i>)	On clayey slopes	Perennial herb	Aerial part	By oral administration, in the form of epitheme	In inflammatory diseases, in the treatment of wounds	100.0	0.20 (24)
6.	<i>Rhamnus cathartica</i> L. (<i>Rhamnaceae</i>)	In dry meadows, bushes	Bush	Fruits	By oral administration	As an anthelmintic due to its laxative effect	96.70	0.38 (47)
7.	<i>Lamium album</i> L. (<i>Lamiaceae</i>)	In the meadows and crops	Perennial herb	Aerial grassy part, flowers	By oral administration	Wound healing, gastrointestinal, skin and lung diseases, etc.	67.30	0.42 (52)
8.	<i>Stachys pubescens</i> Ten. (<i>Lamiaceae</i>)	In dry steppes	Perennial herb	Aerial part	By oral administration	In respiratory disease, as a laxative for constipation	60.03	0.32 (39)
9.	<i>Hypericum perforatum</i> L. (<i>Hypericaceae</i>)	In bushes, on grassy slopes	Perennial herb	Aerial part	By oral administration and in the form of epitheme	Gastrointestinal inflammation, in the treatment of eye ulcers	100.00	0.54 (66)
10.	<i>Verbascum pyramidatum</i> M.Bieb. (<i>Scrophulariaceae</i>)	In screes, on rocky and gravelly slopes	Perennial herb	Leaves	By oral administration	Gastrointestinal diseases, diarrhea	56.80	0.11 (13)

Table 2 continued

1	2	3	4	5	6	7	8	9
11.	<i>Persicaria lapathifolia</i> (L.) Delarbre (<i>Polygonaceae</i>)	At the water's edge	Annual herb	Root and leaves	By oral administration	Gastrointestinal, liver diseases	91.80	0.38 (47)
12.	<i>Malvella sherardiana</i> Jaub.et Spach (<i>Malvaceae</i>)	On dry clayey slopes, crops	Perennial herb	Aerial part	By oral administration	Urinary tract and kidney inflammation	81.20	0.21 (26)
13.	<i>Trifolium pratense</i> L. (<i>Fabaceae</i>)	In dry meadows	Perennial herb	Inflorescence and leaves	In the form of epitheme	Anti-inflammatory in eye diseases and skin wounds	87.56	0.36 (44)
14.	<i>Cichorium intybus</i> L. (<i>Asteraceae</i>)	In the crops, along the roadsides	Perennial herb	Roots	By oral administration	Choleretic, in diseases of the liver and kidneys	76.23	0.46 (57)
15.	<i>Urtica urens</i> L. (<i>Urticaceae</i>)	In the crops	Perennial herb	Inflorescence and leaves	By oral administration	In gastrointestinal diseases, as an antipyretic	100.00	0.33 (40)
16.	<i>Urtica dioica</i> L. (<i>Urticaceae</i>)	Near residential areas, bushes	Perennial herb	Leaves	By oral administration	In kidney inflammation, intestinal, antitussive, as anthelmintic	100.00	0.58 (71)
17.	<i>Malva neglecta</i> Wallr. (<i>Malvaceae</i>)	In the crops, near residential areas	Perennial herb	Flower and sepal	By oral administration	In inflammatory diseases of the respiratory tract, gastrointestinal tract	75.00	0.42 (52)
18.	<i>Medicago minima</i> (L.) Bartal. (<i>Fabaceae</i>)	In dry steppes	Annual herb	Aerial part	By oral administration	As a diuretic, as a analeptic	64.80	0.39 (48)
19.	<i>Plantago major</i> L. (<i>Plantaginaceae</i>)	In meadows	Perennial herb	Leaves, dried plant	By oral administration	Gastrointestinal diseases, cough	98.00	0.54 (66)
20.	<i>Plantago media</i> L. (<i>Plantaginaceae</i>)	In bushes, dry slopes	Perennial herb	Leaves	In the form of epitheme	Wound Healing	91.24	0.41 (51)
21.	<i>Plantago lanceolata</i> L. (<i>Plantaginaceae</i>)	Dry, grassy slopes	Perennial herb	Leaves	In the form of epitheme	Hemostatic, against inflammation of the eyes	100.00	0.55 (66)
22.	<i>Silybum marianum</i> (L.) Gaertn. (<i>Asteraceae</i>)	In arid areas	Biennial	Young leaves and seeds	By oral administration	In diseases of the liver, as a choleretic agent, when cleansing the intestines	86.70	0.35 (43)
23.	<i>Cirsium vulgare</i> (Savi) Ten. (<i>Asteraceae</i>)	On roadsides, in arid areas	Biennial	Inflorescence	By oral administration	In cleaning the bile ducts	75.78	0.26 (32)
24.	<i>Artemisia absinthium</i> L. (<i>Asteraceae</i>)	In dry bushes, screes	Perennial herb	Leaves and flowering tips	By oral administration	Helminthic disease, gallbladder, liver, gastrointestinal diseases, diseases of the upper respiratory tract	99.00	0.70 (86)
25.	<i>Achillea filipendulina</i> Lam. (<i>Asteraceae</i>)	On the roadsides, in bushes	Perennial herb	Grass, flowers and leaves	By oral administration	For bleeding, analgesic, gastrointestinal cramps carminative	100.00	0.50 (61)
26.	<i>Laser trilobum</i> (L.) Borkh. (<i>Apiaceae</i>)	On the roadsides, bushes	Perennial herb	Fruit, leaf and root	By oral administration	Antipyretic	60.00	0.17 (21)
27.	<i>Nepeta racemosa</i> Lam. (<i>Lamiaceae</i>)	Dry stony-gravelly slopes	Perennial herb	Aerial part	In the form of epitheme and by oral administration	Analgesic, hemostatic	54.40	0.15 (18)

Table 2 continued

1	2	3	4	5	6	7	8	9
28.	<i>Origanum vulgare</i> L. (Lamiaceae)	In meadows	Perennial herb	The aerial part during the flowering period	In the form of epitheme and by oral administration	For diseases of the oral cavity, skin wounds, stomach cramps	91.36	0.36 (44)
29.	<i>Galium rubioides</i> L. (Rubiaceae)	In meadows	Perennial herb	Whole plant	In the form of epitheme and by oral administration	As an analgesic, wound healing, choleric, diuretic	56.70	0.12 (15)
30.	<i>Arctium lappa</i> L. (Asteraceae)	Roadsides, bushes	Biennial	Aerial part, the root	In the form of epitheme and by oral administration	As an astringent, wound healing, diuretic and choleric agent.	95.43	0.55 (67)
31.	<i>Glycyrrhiza glabra</i> L. (Fabaceae)	In the plains, on the foothills, on the river banks	Perennial herb	Root and rhizome	By oral administration	Anti-inflammatory in cough	100.00	0.59 (72)
32.	<i>Lotus caucasicus</i> Kuprian. (Fabaceae)	Stony-gravelly slopes	Perennial	Aerial part	By oral administration	During inflammation of the kidneys and urinary tract	89.54	0.29 (35)
33.	<i>Galega orientalis</i> Lam. (Fabaceae)	In open fields and around the forest	Perennial herb	Aerial part	By oral administration	Used as anthelmintic and diuretic	67.89	0.20 (24)
34.	<i>Melilotus officinalis</i> (L.) Pall. (Fabaceae)	In the meadows, in the bushes	Biennial herb	Leaves, flowers	By oral administration and in the form of epitheme	As expectorant for respiratory diseases, carminative, in the treatment of purulent wounds	74.33	0.24 (29)
35.	<i>Chenopodium album</i> L. (Amaranthaceae)	On the roadsides, in the crops	Annual herb	Aerial green part	By oral administration	Used as a diuretic	87.88	0.15 (18)
36.	<i>Malva nicaeensis</i> All. (Malvaceae)	At the water's edge	Annual herb	Inflorescence and leaves	By oral administration	In purulent sores in the mouth, dry cough	91.06	0.27 (33)
37.	<i>Malva setigera</i> K.F. Schimp. & Spenn. (Malvaceae)	Screens, on dry slopes	Annual herb	Roots, flowers	By oral administration	Respiratory disease, diarrhea, abdominal cramps	98.37	0.22 (27)
38.	<i>Brassica campestris</i> L. (Brassicaceae)	On the roadsides, in the crops	Annual herb	Seeds, leaves	In the form of epitheme	For festering wounds	67.80	0.34 (42)
39.	<i>Convolvulus arvensis</i> L. (Convolvulaceae)	In screes, in the crops	Perennial herb	Aerial green part	By oral administration	As laxative	56.70	0.21 (26)

In general, animal diseases appear during seasonal changes. Changes in vegetation cover and reduction in nutrition, or epidemiologically, the spread of diseases among animals are observed. Since 16 of the 39 species used as medicine are fodder plants, they directly affect the health of animals in pastures. But the change of season has a negative effect on it, doctors and farmers only apply mixtures made from medicinal plants in different ways in treatments.

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Aran Qarabağ ərazisində yayılmış dərman bitkilərinin etnobaytarlıqda istifadəsi

Mövsümov Nuri Vaqif qızı, İbadullayeva Səyyarə Cəmşid qızı

Azərbaycan Respublikası Elm və Təhsil Nazirliyinin Botanika İnstitutu, Bakı, Azərbaycan

Tədqiqat işi 2020-2022-ci illər ərzində Aran Qarabağ ərazisində aparılmışdır. İşin əsas məqsədi bölgədə qədim tarixə malik olan heyvandarlıq təsərrüfatının inkişafı baxımından etnobaytarlıqda istifadə olunan dərman bitkilərinin və onların təsir effektivliyinin aşkarlanması olmuşdur. Tədqiqatlar zamanı

etnobotaniki sorğu üsullarından istifadə edilmiş, statistik təhlillər aparılmış, bitki nümunələri toplanaraq, klassik və müasir metodlara uyğun təyin edilmişdir. Müsahibələr tədqiqat ərazisinin 56 kəndində yaşayan yaşı 40 və yuxarı olan, 123 yerli sakinəndən götürülmüşdür. Müsahibələrdə iştirak edənlərin 78-i qadın, 45-i kişi, 67-si fermer təsərrüfatı ilə məşğul olan, 56-sı isə təbirlər olmuşdur. Sorğular nəticəsində müəyyən edilmişdir ki, ərazidə yayılmış 1100 növdən 15 fəsiləyə daxil olan 39 növ etnobatırlıqda müxtəlif xəstəliklərin müalicəsində istifadə olunur. Növlərin xəstəliklərdə effektivliyi, etibarlılıq dərəcəsi və istifadə dəyəri də qiymətləndirilmişdir. Dəri xəstəliklərində (ICF 0.91), qızdırmada (ICF 0.98) və göz xəstəliklərində (ICF 0.88) konsensus faktoru yüksək olmuşdur. *Artemisia absinthium* (0.70) və *Mentha longifolia* (0.69) növlərinin istifadə dəyəri əldə olunmuş istinadların sayına görə ən yüksək olmuşdur. *Salvia verticillata*, *Urtica urens*, *Urtica dioica*, *Plantago lanceolata*, *Artemisia absinthium*, *Achillea filipendulina* və *Glycyrrhiza glabra* növlərinin etibarlılıq dərəcəsi ən yüksək olmuşdur (100%). Dərman kimi istifadə olunan növlərdən 16-sı yem bitkisi olduğundan otlaq sahələrində heyvanların sağlamlığına birbaşa da təsir göstərir.

Açar sözlər: Etnobatırlıq, Aran Qarabağ ərazisi, dərman bitkiləri və onların istifadə üsulları.

Этноветеринарное использование лекарственных растений, распространенных в Аранско-Карабахском регионе

Мовсумова Нури Вагиф гызы, Ибадуллаева Сайяра Джамшид гызы

Институт ботаники Министерства науки и образования Азербайджанской Республики, Баку, Азербайджан

Исследовательская работа проводилась на территории Аранского Карабаха в течение 2020–2022 гг. Основная цель работы заключалась в выявлении лекарственных свойств растений, используемых в этноветеринарии и эффективности их действия в условиях развития животноводства, имеющего в регионе древнюю историю. В ходе исследований применялись методы этноботанического обследования, проводились статистические анализы, собирались и определялись образцы растений по классическим и современным методам. Опрошено 123 местных жителя в возрасте 40 лет и старше, проживающих в 56 селах исследуемой территории. Из принявших участие в опросе 78 женщин и 45 мужчин, 67 занимались сельским хозяйством, 56 врачей. В результате обследований установлено, что из 1100 видов растений, распространенных на территории, 39 видов, входящих в 15 семейств, используются при лечении различных заболеваний в этноветеринарной медицине. Также оценивались эффективность вида при заболеваниях, степень надежности и стоимость использования. Фактор консенсуса (ICF) был высоким при кожных заболеваниях (ICF 0,91), лихорадке (ICF 0,98) и заболеваниях глаз (ICF 0,88). Ценность использования *Artemisia absinthium* (0,70) и *Mentha longifolia* (0,69) была самой высокой по количеству полученных ссылок. Виды *Salvia verticillata*, *Urtica urens*, *Urtica dioica*, *Plantago lanceolata*, *Artemisia absinthium*, *Achillea filipendulina* и *Glycyrrhiza glabra* имели наивысшую степень достоверности (100%). Поскольку 16 видов, используемых в качестве лекарственных средств, являются кормовыми растениями, они напрямую влияют на здоровье животных на пастбищах.

Ключевые слова: Этноветеринария, Аранский Карабах, лекарственные растения и способы их применения