FODDER PLANTS OF THE MOUNTAIN ZONE OF THE NAKHCHIVAN AUTONOMOUS REPUBLIC

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Summary. *The submitted article presents information about fodder plants of mountainous zone of Nakhchivan Autonomous Republic. In the course of comparative analysis of the collected factual materials and literature data we have studied for the first time the taxonomic composition of fodder plants of the mountain zone of the autonomous republic. As a result of the research it was established that 181 fodder plants belonging to 83 genera and 25 families are distributed in the mountain zone of the region. We also studied the position of important fodder species in the flora of the territory studied in this article, their distribution, population size estimation, productivity of pastures and hayfields by plant groups. We studied not only the species consumed directly in pastures and meadows, but also the forage value of Daucus carota and Stachys inflata in the flowering phase, determined the population structure and recommended to feed them as dry grass to animals.*

Key words*: forage crops, productivity, life forms, herbaceous plants, hay population.*

INTRODUCTION

One of the important branches of agriculture in the Republic of Azerbaijan is animal husbandry. For successful development of livestock breeding it is necessary to create a rich fodder base, and this task should be solved mainly at the expense of natural flora. The study of new fodder plants, including productivity and fodder qualities of pastures, has always been in the centre of attention of scientists of the world. Despite the vastness of natural fodder areas on the territory of our republic, they cannot fully provide the fodder base for the developing livestock breeding. This is the result of excessive keeping of livestock on pastures and insufficient care for them. As a result, valuable fodder plants have disappeared from the botanical composition of pastures, weeds have multiplied instead, and productivity has decreased. Geobotanical studies have shown that, since a significant part of pastures is used for cultivated plants, their area has been significantly reduced. As a result of irrational use of pastures, soil erosion or salinisation is observed in some places, and landslides are observed on slopes. Therefore, it is time to harmonise the practical proposals of the relevant research and economic departments with the issues of surface and root improvement of winter and summer pastures, as well as hayfields. The study of productivity of natural fodder plants, pastures and hayfields and their ecological and protective impact on the population has always aroused the interest of researchers due to its relevance. It consists in determining the taxonomic composition, bioecological features and ranges of various fodder plants (except cereals and legumes) distributed in the Gunnyut-Gapichik physico-geographical region, phytocenological assessment of populations of some species, studying the productivity of pastures and hayfields, identifying the prospects for their effective use.

One-fifth of the Earth's surface (23% or 3,100 million hectares) is occupied by pastures and hayfields, where 3.3 billion cattle, sheep and goats graze. These animals, in addition to meat and milk, are also a source of leather and wool for humans. The production of leather and wool products is a source of income for millions of people. The development of these sectors of the economy is linked to animal husbandry, which in turn depends on pastures and hayfields. The area of natural pastures in the world is twice the area of cultivated land. Pastures occupy mainly either arid areas, or very steep slopes, or areas unsuitable for agriculture, not fertile. 30% of the territory of Nakhchivan Autonomous Republic, in other words Middle-Araz natural region, falls on the share of high mountain belts, which belong to the territories of Gunnyut-Gapichik physiographic region, and the absolute altitude of these areas ranges from 900 to 3906 metres above sea level. The studied region differs significantly from other territories of Azerbaijan by its physiographic conditions, sharply continental

climate, rich flora, diverse soil and vegetation. Pastures and meadows of Azerbaijan have been studied by scientists for many years, but pastures and meadows of the Middle-Araz region have never been studied as a separate object of research. The studies conducted covered separate regions, and sometimes the names of fodder plants were mentioned in the development of some family.

Conducting scientific research on the study of fodder plants for the development of animal husbandry in the territory of Nakhchivan Autonomous Republic is of interest to scientists due to its relevance. Such scientific researches should be devoted to improvement of hayfields and pastures, creation of new hayfields, their effective utilisation, introduction in farms, obtaining fodder base, etc.

MATERIALS AND RESEARCH METHODOLOGY

Fodder plants of pastures and meadows of the flora of the Nakhchivan Autonomous Republic were periodically studied by A.A. Grosheim [23], L.I. Prilipko [28], I.I. Garyagin [25], V.J. Hajiyev [3, 22] and others. Although A.Sh. Ibragimov [6, 24], S.J. Ibadullaeva [4, 5], T.H. Talybov [26], etc. provided information on individual species of fodder plants of the territory, no separate scientific studies on fodder plants of the Autonomous Republic have been conducted.

Classical botanical, floristic, systematic, areological, ecological and statistical methods were also used in the processing of materials [29, 30]. Phenological observations were carried out according to the method of I.N. Beideman [27].

The studies were carried out on the basis of generally accepted geobotanical methods (in 2008-2011) and were of precise route and semi-stationary nature. Floristic and methodological expeditions were conducted in the territories of Gunnyut-Gapichik physico-geographical area covering the highlands of Sadarak, Sharur, Kengerli, Shahbuz, Julfa and Ordabad administrative districts of the Nakhchivan Autonomous Republic.

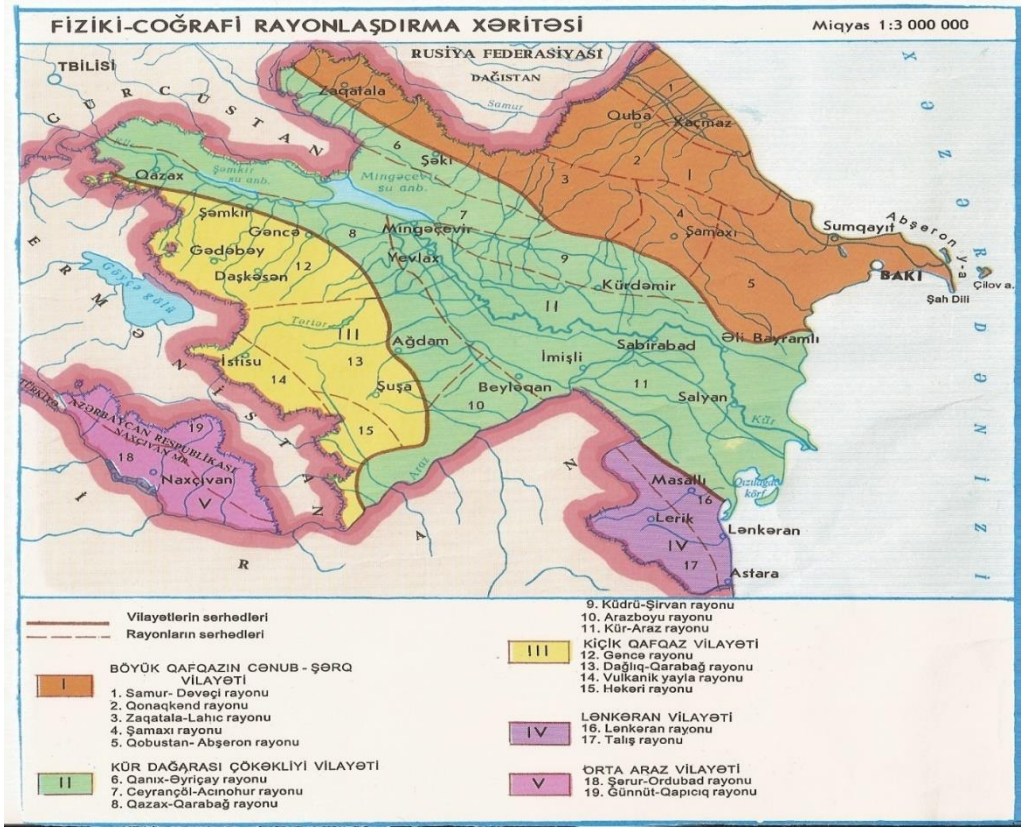


Figure 1: Expedition routes to the study area

During the research the general geography of the area, soil cover, species composition and structure of plant formations were determined and samples were taken in 3 administrative districts

(Babek, Shahbuz and Ordubad) to determine the productivity and quality of fodder plants. At the same time herbariums of plants were collected and determined.

During the expeditions, geobotanical searches were carried out in conventional field conditions [28, 31], biological features of species were clarified [32], botanical descriptions and phenological observations were carried out. Ecological indicators of plants were studied according to the methodology proposed by G.I. Paplovskaya [33], using a number of dictionaries [1].

DISCUSSION AND RESULTS OF THE RESEARCH

As a result of expeditions to the mountainous areas of the Nakhchivan Autonomous Republic, important forage species included in the flora of the area have been discovered from time to time. The materials of field studies, which formed the basis of the work, were collected in the territories belonging to the Gunnyut-Gapichik physical-geographical region. Over 100 geobotanical descriptions were compiled and up to 1000 herbarium specimens were collected during the period of field research. In the experimental plots, the records included the abundance of each species, phenophases, degree of predation, etc. A list of plants with geobotanical indices (height, vitality, projective cover, etc.) was compiled.

To determine the dynamics of total forage reserves during the year, productivity was calculated by repeated measurements in spring (April-May), autumn (October) and winter (January). To determine the load on pastures, the "Справочник по кормопроизводству" was used [34].

Ecological analysis of vegetation was carried out according to A.P. Shennikova [41]. Geographical analysis was carried out mainly according to A.A.Grossheim and N.N.Portenier [35], and a classification of vegetation was made. Although some plants occur frequently, there are also species that occur only in one phytocenosis. Therefore, comparative floristic lists were compiled for the area, and the degree of similarity of taxonomic composition was calculated by biometric method using the Serensen-Chekanovsky similarity coefficient. Kss=2s/a+b. Here: a - number of species in one zone; b - number of species in another zone; s - number of species common to both zones. The names of plants are given taking into account additions and changes of S.K. Cherepanov [36], the new multi-volume edition of "Конспект Флора Кавказа" [37] and the works of A.M. Cherepanov [37], and the works of A.M. Kovalov [37] [37] and the works of A.M. Askerov 'Summary of the Flora of Azerbaijan' [2]. [2]. To determine the integral characterisation of the demographic structure of the plant, the following population indices were used:

1. Age index.

$$\Delta = \frac{\sum k_i \times n_i}{}$$

i- ontogenetic condition k_i – "value", n_i^N - number of individuals, i-population status, N- total number of individuals in the population.

2.Efficiency indexş

$$\omega = \frac{\sum n_i \times e_i}{\sum N_i}$$

n_i- number of plants, i-condition, e_i –efficiency of plant [38].

As a result of our own research, 181 species of various fodder plants belonging to 25 families and 83 genera were identified and systematically analysed, which can be used both in treeless bare mountainous areas and in forest subalpine and alpine carpets of the Gunnyut-Gapchig physico-geographical region.

Table 1.

System analysis of natural forage plants (without legumes and cereals) of Gunnut-Gapchig physical-geographical region

Classes	Families	Genera	Species

	Number	as a percentage of the total number	Number	as a percentage of the total number	Number	as a percentage of the total number
Covert-seeded						
a) monocotyledons	3	12	6	7,32	11	6,08
b) dicotyledons	22	88	77	92.68	170	93,92
Total	25	100	83	100	181	100

In the course of the conducted research, the number of genera and species of the leading families in the flora of different forage plants of Gunnut-Gapchig physical-geographical region was compared, the results obtained are reflected in Table 2.

Table 2.

Ratio of leading families, genera and species of forage plants by numbers

№	Families	Genera		Species	
		Number	as a percentage of the total number	Number	as a percentage of the total number
1.	*Asteraceae* Dumort.	22	25,88	52	28,71
2.	*Apiaceae* Lindl.	10	10,59	18	9,94
3.	*Rosaceae* Juss.	6	7,06	24	13,26
4.	*Polygonaceae* Juss.	5	5,88	12	6,61
5.	*Caryophyllaceae* Juss.	5	5,88	8	4,42
6.	*Brassicaceae* Burnett	4	4,71	5	2,76
7.	*Lamiaceae* Lindl.	3	3,53	4	2,21
8.	*Cyperaceae* Juss.	3	3,53	5	2,76
9.	*Juncaceae* Juss.	2	2,35	3	1,66
10.	*Campanulaceae* Juss.	2	2,35	8	4,42
11.	*Geraniaceae* Juss.	2	2,35	8	4,42
12.	*Chenopodiaceae* Vent.	2	2,35	4	2,21
13.	*Rubiaceae* Juss.	2	2,35	5	2,76
	The remaining 12 families are represented by 1 genus and 1-4 species.	12	15,29	25	13,81
Total		83	100	181	100

As can be seen from the table, the main place among the studied forage plants is occupied by 149 species belonging to 13 families, which is 86.12% of the total diversity of forage plants distributed in the natural region. Each of the remaining 12 families consists of one genus, 1-4 species and totals 24 species. This also accounts for 13.81%. In the floristic spectrum of forage plants, Asteraceae families rank first (51 species or 28.71%), Rosaceae second (24 species or 13.87%), Apiaceae third (18 species or 10.41%) and Polygonaceae fourth (11 species or 6.36%). In the study area, 43 genera were classified as 2-13 and the remaining 42 genera were monotypic, represented by only 1 species.

Some forage plants are also endangered due to various ecological, geographical and anthropogenic factors. The protection of these species is one of the most important tasks. For this purpose, various measures need to be taken [32].

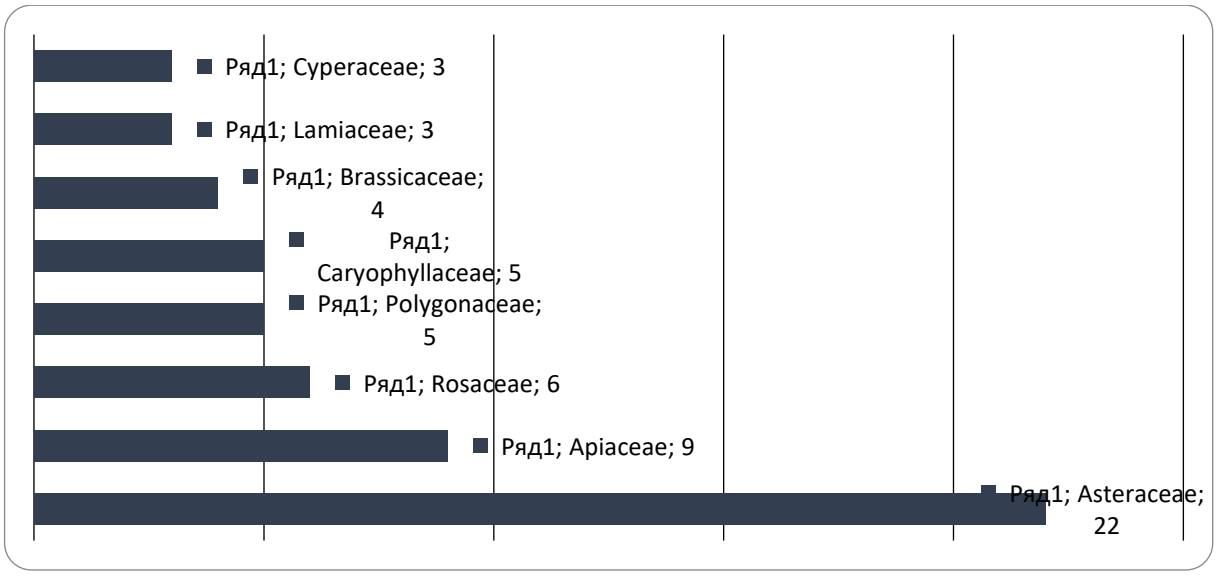


Diagram 1. Dynamics of distribution of species of leading families of natural forage plants in the Gunnut-Gapchig physical-geographical region

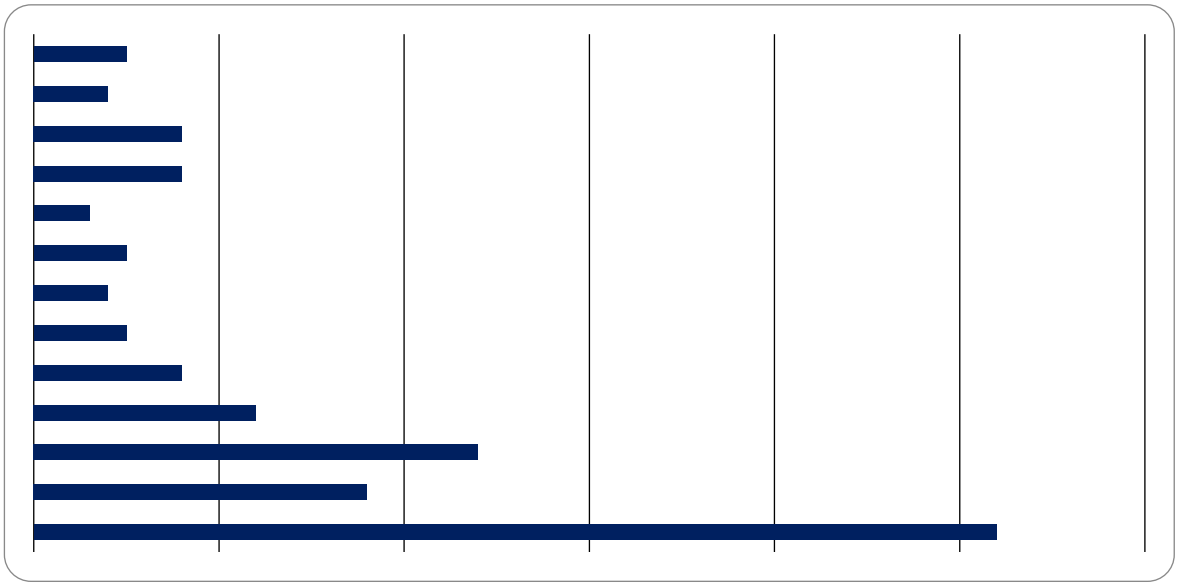


Diagram 2. Dynamics of distribution of leading genera of natural forage plants by number of species in the Gunnut-Gapchig physical-geographical region

Taking into account biomorphological features and their evolution, an ecological classification of plant life forms in the study area was given. On the basis of this classification the life forms of plants of the flora of the region were studied, and the results obtained are reflected in histograms. As can be seen from histogram No. 3.2.1., herbaceous plants (163 species, 94.2%) predominate in the composition of forage vegetation. Herbaceous plants mainly consist of perennials (77.90%), annuals (10.4%), biennials and in smaller quantities annuals or biennials are represented in the flora. The fodder qualities of annual plants were studied and it became clear that they are as good as perennials in terms of fodder value. As a result of our research in Gunnyut-Gapchig physico-geographical region it became known that these plants occupy a wide area. They can be used as a biological raw material base.

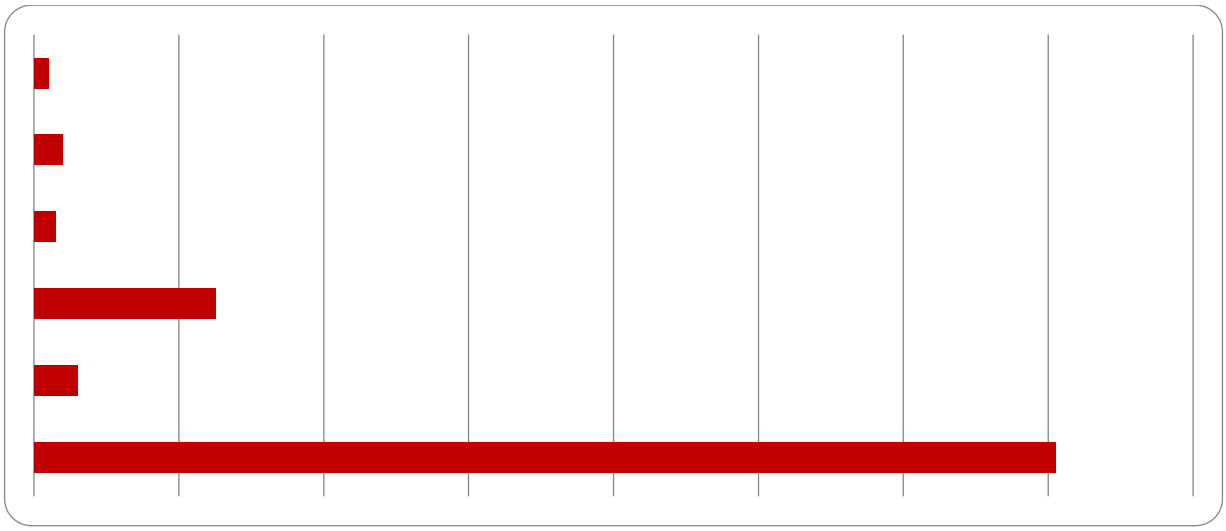


Diagram 3. Life forms of natural forage plants of Gunung-Kapichig physical-geographical area (according to the system of I.T. Serebryakov)

For conservation purposes, it is necessary first to collect information on the local exploitation of natural populations of useful plants, and then to study their stocks and productivity. After that, the ontogenetic state of the plant should be investigated, and life forms, habitat types and bioecological features should be studied to conserve its natural resources. In recent years, population-ontogenetic approaches have been most often used to assess the resources of useful plants [39, 40].

Studies in this direction were carried out in 2008-2011 and were itinerant, semi-stationary in nature. The senology and ontogenetic state of various herbaceous forage plants, including wild carrot (Daucus carota), hemlock (Heracleum trachyloma), onion (Stachys inflata), and nettle (Urtica dioica), were studied in populations where each species is distributed separately.

We have characterised the current state of Daucus carota cenopopulations (CP) in the Nakhchivan Autonomous Republic, determined the ontogenetic structure and stock of the plant, calculated the age and productivity index [24]. In the course of the study, work was carried out on 7 natural cenopopulations (1-3 ex. in Shahbuz district, 4-7 ex. in Sharur district) on the territory of Shahbuz and Sharur administrative districts, and the phytocoenological structure of each population was studied (Table 3).

Table 3.

Phytocoenological structure of Daucus carota species

№	Areas of distribution	Each of the associations is characterised by D.carota (the main elements are listed in the table).	Project cover (%)	Abundance of species Daucus carota
1	Agbulag village, Shahbuz district	*Stipa capillata* + *Atraphaxis spinosa* + *herbosum*	70	cop_2
2	Kolany village, Shahbuz district.	*Eryngium billardieri* + *Rosa canina* + *Phlomis pungens* + *herbosum*	40	cop_1
3	Şahbuz r-n Batabat massivi	*Agrostis capillaris* + *Vicia variagilis* + *herbosum*	80	cop_3
4	Şərur r-n Bağırsaqdərə	*Potentilla recta* + *Poa araratica* + *Artemisia absinthum*	70	cop_3
5	Şərur r-n Şahburbulaq ətrafı	*Thymus collinus* + *Astragalus lagurus* + *Acantholimon karelinii*	60	cop_1

6	Şərur r-n Axura k.	*Stipa capillata + Stachys atherocalyx+ Thymus kotschyanus + Kochia prostrate*	60	sp
7	Şərur r-n Havuş k.	*Artemisia lerchiana + Hordeum leporinum+ Bothriochloa ischaemum*	40	sol

Phytocenological studies were conducted during the flowering and seed development phases of the plant. As can be seen from Table 3, D. carota is characteristic of all types of vegetation (except for wetland vegetation). It is found among mountain xerophytes and steppe vegetation in the Sharur district and in the wet meadows around the village of Agbulag in the Shahbuz district. In each population of D. carota, transects with a total area of about 3 hectares were laid out and all individuals belonging to the ontogenetic development phase were counted. After calculating the mass of the above-ground and underground (root) parts of the plant using the generally accepted method, its stock was studied. The age period and type of cenopopulation (sp) of the D. carota species were determined for each plot. To refine the integral number of the demographic structure, the age and productivity coefficient of the plant were calculated, and the base spectrum was determined. The results are shown in Table 4.

Table 4.

Age structure of the species D. carota

Sp №	Population	Age period of ontogenesis (%)							Indexes	
		j	Im	V	g_1	g_2	g_3	ss, s	Δ	□
25 57	juvenile stage «	50,2 63,8 14,1	20,5 13,7 10	11 6,9 26,2	8,6 4,2 19,0	6 7,8 11,7	2,2 3,6 12,1	1,50 6,9	0,08 0,09 0,27	0,22 0,21 0,46
36	immature «	41,1 18,9	24,6 64,6	20,1 0,9	4,5 4,6	6 7,8	2,2 3,2	1,50	0,08 0,09	0,22 0,21
14	mature «	4,5 6,2	2,9 10,4	19,1 16,7	12,7 16,7	13,6 18,8	31,8 6,2	18,225	0,53 0,44	0,61 0,54

The study of productivity is not only a key area of resource research, but also demonstrates the economic significance of the price population. The main indicator for determining productivity in the D. carota species is the underground or above-ground part, taking this into account, the reserves of both the underground and above-ground parts of the plant were studied in all phases (Table 5).

Table 5.

Phytomass of D. carota species during wet periods

Age period	Above ground part (wet weight in grams)	Root phytomass (wet weight in grams)
Im	15,5 ± 1,6	4,97 ± 0,37
V	27,89 ± 4,2	6,55 ± 2,10
g_1	310,1 ± 40,9	13,6 ± 1,33
g_2	568, 3 ± 50,3	24,6 ± 2,45
g_3	421, 1 ± 40,2	15,78 ± 1,60
Ss	67,5 ± 21,5	6,45 ± 0,9

S	62,1 ± 18,9	6,12 ± 0,8

Table 6.

Annual operational reserve of the species D. carota

№ sp	Observation point	Number of plants per 1 m²	Above-ground stock, h/kg	Below-ground stock h/kg
1	Agbulag vil , Shahbuz dist.	4,6 ±0,5	205,80 ±12,24	33,3±2,9
2	Kolany vill. Shahbuz dist.	3,9±0,4	255,00 ± 15,27	36,9±3,4
3	Batabat massif of Shahbuz dist.	6,3±0,7	336,00 ± 20,00	44,0±5,4
6	Havush vill., Sharur distr.	8,1±1,2	402,70 ± 24,28	62,4±4,6
	Total	5,72±0,6	1199,5±56,2	176,6±10,03

After studying the mass of the plant in ontogenetic states, the annual operational reserve of the plant in terms of raw mass was studied (Table 6).

In the same way, we studied the phytocenological structure, age structure, phytomass by age periods, and annual operational stock of Heracleum trachyloma Fisch & Mey, Stachys inflata L., and Urtica dioica L. plants.

Table 7.

The structure of ontogenesis of the species H. trachyloma

Sp / On	1	2	3	4	5	6	7	8	9	10	∑	%
J	4	6	23	3	34	23	8	3	-	17	121	12,21
Im	6	11	29	16	23	11	-	11	-	9	116	11,78
V	9	14	33	13	16	9	4	5	-	10	113	11,48
g_1	17	25	44	56	11	17	17	-	21	23	231	23,47
g_2	22	46	67	65	13	5	-	14	-	11	243	24,69
g_3	26	39	34	39	9	6	24	26	8	14	225	22,86
ss,s	2	12	30	21	0	0	4	6	13	-	88	8,94
∑	86	153	260	213	106	71	57	65	42	84	984	100%

Table 8.

Age (growth) structure of the H. trachyloma population

SP №	SP Type	Age period of ontogenesis (%)							Indexes	
		J	im	v	g_1	g_2	g_3	ss, s	Δ	□
7 6 10	C	50,2 63,8 14,1	20,5 13,7 10	11 6,9 26,2	8,6 4,2 19,0	6 7,8 11,7	2,2 3,6 12,1	1,5 0 6,9	0,08 0,09 0,27	0,22 0,21 0,46
8 9	K	41,1 18,9	24,6 64,6	20,1 0,9	4,5 4,6	6 7,8	2,2 3,2	1,5 0	0,08 0,09	0,22 0,21
2 3 4	Y	6,34 8,40 25,1	21,7 60 20,9	8,45 6,70 12,1	19,9 27,2 21,2	21,9 26 33,1	25,8 19 33,3	9,4 7,7 11,4	0,41 0,43 0,58	0,70 0,71 0,77

5 1	T. y.	4,5 6,2	2,9 10,4	19,1 16,7	12,7 16,7	13,6 18,8	31,8 6,2	18,2 25	0,53 0,44	0,61 0,54

Table 9.

The phytocenological structure of S. inflata in different populations

Types and associations of vegetation / Research area	Composition of associations (main types are indicated)	project cover in %	abundance of species
Shahbuz district, Bichenak village surroundings	Grassland vegetation 1.sp: *S.inflata +Hordeumbulbosum+H. violaceum+ Filipendula ulmaria*	60	Soc
Batabat	5. sp: *Elitrigia caespitosa+Dactilis glomerata+ Cynadon dactylon+Alopecurus ventricosus +Phleum pratense+ S.inflata*	70	Soc
Ordubad district	Mountain xerophyte 2.sp: *Juniperus foetidissimum+J. polycarpos+ Stachys inflata +Herbosa*	30	Cop_3
Surroundings of Vanand village	➢ 3.sp:*Stachys inflata+Thymus collinus+Th. kotschyanus + Acantholimon karelinii*	40	Cop_2
Surroundings of Unus village Road of Kalaky	➢ 4.sp: a).*Stachyseta inflateum* ➢ *b). Stachys inflata+Capparis herbaceae* ➢ v) *Stachys inflata+ Herbosum* ➢	70	Soc
Julfa district	Bozgir		
Abragunus village	1.sp: *Stipa capillata+Festuca valesiaca + Stachys inflata*	30	Cop_3
Milakh village	2.sp: *Stipa capillata+Stachys inflata + S. atherocalyx + Thymus kotschyanus +Kochia prostrata*	40	Cop_2
Arafsa village	3.sp: *Festuca valesiaca+Thymus kotschyanus + Astragalus euoplus + A. cicer+ Stachys inflata*	60	Soc
Babek district	Mountain xerophyte		
Payiz village	4.sp:*Achillea millefolium+Astragalus regelii+ Stachys inflata)*	40	Cop_2
Buzgov village	5. sp: *Artemisia lerchiana+Thymus collinus+ Stachys inflata*	50	Soc
Sharur village	Grassland vegetation		
Tananam village	6.sp:*Filipendula vulgaris+Minuartia oreina+ Stachys inflata*	40	Cop_2

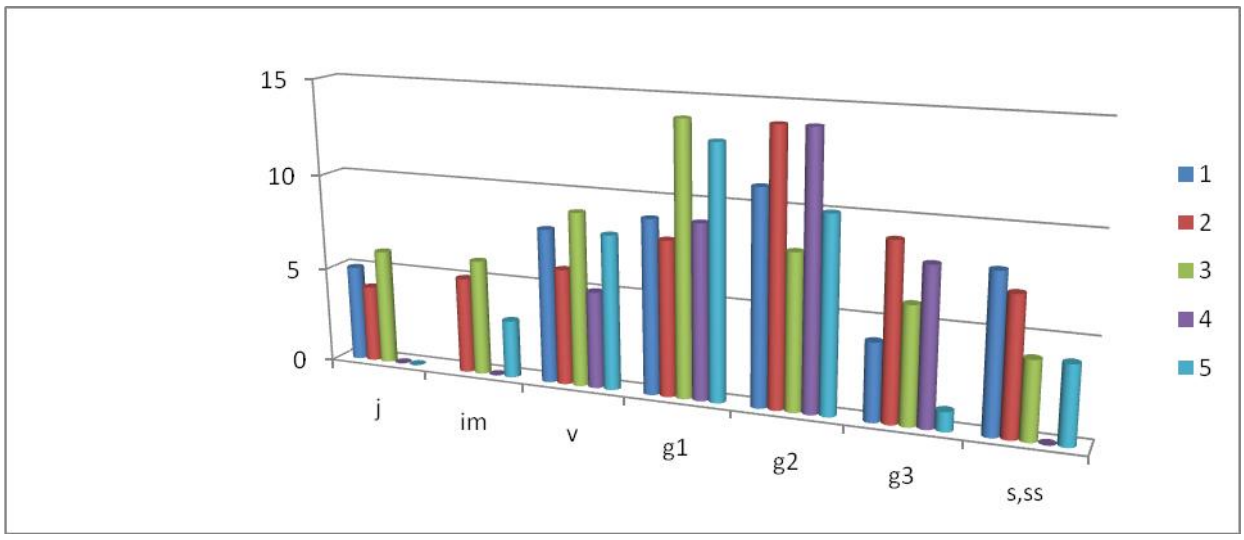


Diagram 4. Ontogenetic dynamics of the species S. inflata

Table 10.

S. inflata senopopulation assessment

№	sp type	Age period of ontogenesis (%)							Indexes	
		Y	Im	V	g_1	g_2	g_3	s, ss	Δ	ω
1 4	juvenile stage	0 7	9,8 9,3	0 7	7,3 14,0	12,2 21,0	26,8 23,2	44,0 18,5	0,74 0,50	0,72 0,49
2 3	immature stage	5,0 5,0	7,14 7,5	10 10	19,04 17,05	16,6 20,0	24,0 15,0	19,4 25,0	0,52 0,51	0,56 0,64
5 6	Mature	5,2 4,3	9,0 6,5	7,0 4,4	14,0 13,0	19,0 20,0	17,3 32,6	29,3 20,0	0,55 0,39	0,89 0,82

Table 11.

Structure of ontogenesis of Urtica dioica species

Ontogenetic period	Senopopulations										∑	%
	1	2	3	4	5	6	7	8	9	10		
J	3	6	0	2	9	11	4	5	0	7	47	3,46
Im	2	3	7	4	11	11	8	5	5	23	79	5,82
V	6	17	8	16	17	18	13	11	7	29	142	10,46
g_1	11	23	11	12	45	32	23	37	32	34	260	19,15
g_2	17	19	13	19	39	36	25	39	56	46	309	22,77
g_3	14	32	16	23	54	43	28	46	59	45	360	26,52
s,ss	3	11	23	27	21	0	0	11	43	21	160	11,79
∑	56	111	78	103	196	151	101	154	202	215	1357	100

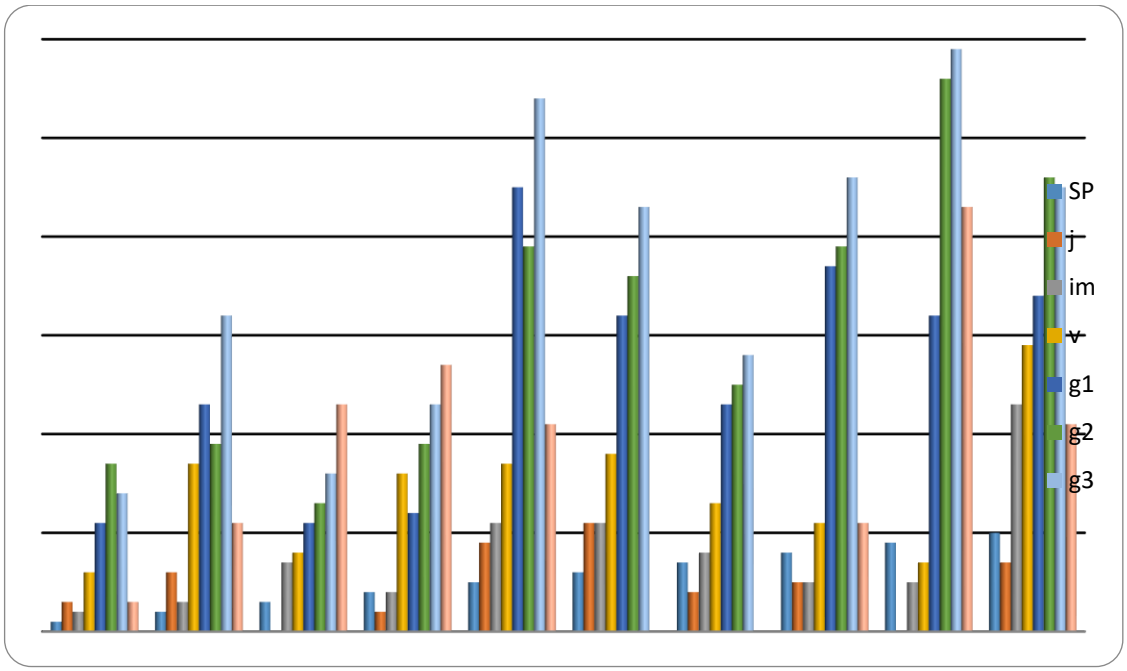


Diagram 5. Ontogenetic status of U. dioica species in populations

Table 11.

Age (growth) structure of the Urtica dioica population

SP	SP tipi	Age period of ontogenesis, total in (%)							Indexes	
		J	Im	v	g_1	g_2	g_3	ss, s	Δ	Ω
1 2 8	Fully mature	8,4 4,5 6,2	12,3 20,9 10,4	9,8 19,1 16,7	27,2 21,27 16,7	26 33,1 18,8	33,3 17,6 31,8	7,7 5,6 25	0,58 0,53 0,44	0,420, 61 0,54
3 9	mature	0 0	6 20,9	6,7 12,1	12,7 22,3	13,6 11,6	19 6,2	18,2 11,4	0,430, 28	0,22 0,21
4 5 10	immature	50,2 63,8 14,1	20,5 13,7 10	11 6,9 26,2	8,6 4,2 19,0	6 7,8 11,7	2,2 3,6 12,1	1,5 2,3 6,9	0,28 0,29 0,27	0,22 0,21 0,46
6 7	juvenile	41,1 18,9	24,6 64,6	20,1 0,9	4,5 4,6	6 7,8	2,2 3,2	0 0	0,08 0,09	0,71 0,77

Table 12.

Productivity of U. dioica species at different stages of ontogenesis
(ha/s, wet weight)

sp	Research area	socket type	mature plant
1	Surrounding of Kechilli vill. Shahbuz distr.	166,12 ± 16,8	178,00 ± 14,67
2	Surrounding of Kulus vill. Shahbuz distr.	95,78 ± 10,60	110,40 ± 16,58

3	Buzgov village area of Babek distr.	310,1 ± 40,9	421, 1 ± 40,2
4	Surrounding of Yeniyol village of Babek distr.	113,6 ± 11,33	124,6 ± 21,45
5	Surrounding of Akhura village of Sharur distr.	141,30 ± 8,44	268, 3 ± 25,3
6	Surroundings of Havush village of Sharur distr.	167,5 ± 21,5	196,45 ± 19,9
7	Area of Boyukduz village, Kahgarly	262,1 ± 28,9	340,00 ± 20,10
8	Nusnus village of Ordubad ditr.	115,4 ± 11,33	190,00 ± 15,38
9	Unus village of Ordubad distr.	98,00 ± 2,18	154,00 ± 13,19
10	Pazmary village of Ordubad distr.	168,00 ± 10,00	255,20 ± 23,30
	Total	1522,5	2238,55

RESULTS

1. The biodiversity of the Gunnut-Gapchig physical-geographical region includes 181 species of various herbaceous forage plants belonging to 25 families and 83 genera. A systematic analysis has established that of the 25 families of angiosperms, 3 (11 species belonging to 6 genera) belong to the monocotyledonous class, and 22 (170 species belonging to 76 genera) belong to the dicotyledonous class. Biomorphological analysis showed that 163 (94.2%) species of herbaceous plants (77.9% perennial, 10.7% annual), 11.4% species of shrubs and subshrubs are used as fodder plants. Of these, 150 species belong to hemicryptophytes, 24 to therophytes, and the remaining species to chamaephytes, cryptophytes, and, to a lesser extent, to phanerophytes.

2. It is clear from the floristic spectrum of the plants that the first place is occupied by Asteraceae (23 genera, 52 species, or 28.72% of the flora), the second place by Rosaceae (7 genera, 25 species, or 13.81%), and third place is held by Apiaceae (9 genera, 18 species, or 9.94%). Polygonaceae and Caryophyllaceae each have 5 genera, 8-12 species, and the rest have 1-4 species represented in the flora.

3. 37.2% (67 species) of the identified forage plants belong to the xerophilous type of habitat. The remaining areas are occupied by elements of boreal (44 species – 24.31%), ancient (3 species – 1.66%), steppe (1 species – 0.55%), desert (2 species – 1.10%), and Caucasian (43 species – 23.76%) habitat types. Among the habitat classes, 103 species (56.96%) belong to the Caucasian (55 species – 30.39%), Western Palearctic (10 species – 5.52%), Palearctic (6 species – 3.31%), Holarctic (8 species – 4.42%), Pre-Asian (15 species – 8.29%), and Mediterranean (9 species – 4.97%) elements. The remaining range classes on land are represented by 1–5 species.

4. The composition of modifiers and dominants has been determined, the vegetation of forage lands has been studied, and its classification has been compiled, including 8 types of vegetation, 18 classes of formations, 86 formations, and 120 associations. The mountain xerophytic (frigan) type of vegetation is represented by 5 classes of formations, 12 formations, and 21 associations; steppe vegetation is represented by 3 classes of formations, 10 formations, and 17 associations; shrub vegetation is represented by 2 classes of formations, 9 formations and 14 associations, forest vegetation – 3 classes of formations, 8 formations and 17 associations, meadow vegetation – 14 formation classes, 59 formations and 73 associations, wetland vegetation – 4 formation classes, 13 formations and 16 associations. Each of the other types of vegetation (oasis, rocky-gravel) is represented by several formations and associations.

5. The distribution of forage plants by zone has been established: 46 species inhabit mountain steppes, 49 inhabit steppes, forests and shrublands, 66 inhabit forests, shrublands and meadows, 93 inhabit meadows and subalpine meadows, in alpine meadows and carpets, subnival belt – 8 each, in nival and petrophilic belts – 16 each. For the Red Book of these territories, 24 rare and endangered species have been assessed.

6. For the first time, a senological assessment of forage plant populations was carried out and a baseline spectrum was determined by calculating the age, productivity coefficient and plant reserve: age index for Daucus carota Δ=0.08 - 0.28; productivity index ω=0.21-0.64 (above-ground stock - 1199.5 kg, below-ground stock - 176.6 kg); Heracleum trachyloma 22-77 (biological stock - 4316, exploitation - 2158); Stachys inflata Δ=0.36-0.74; ω=0.28-0.89 (biological reserve - 2557.7; exploitation - 1705.06); Urtica dioica Δ=0.08-0.58; ω=0.21-0.77 (rosette leaf reserve -1522.5 s and adult plant exploitation - 2238.55 s).

7. The 3-year seasonal feed mass was calculated by region: It was established that in the Babek region, 76.2% of the feed mass in summer, 77.40% in autumn-winter, and 76.3% in spring consists of various cereals. In the Ordubad district, 96.6% in summer, 95.7% in autumn-winter, and 87.60% in spring. In the Shahbuz district, various cereals account for 97.1%, 93.3%, and 83.2% of the total feed mass, respectively.

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