Journal of Multidisciplinary Engineering Science and Technology (JMEST)
ISSN: 2458-9403
Vol. 4 Issue 3, March - 2017

Economic Assessment Of New Feed Crops Resources In Different Ecosystems Of Lesser Caucasus (Within The Azerbaijan Republic)

Prof. Sayyara Ibadullayeva*, Ms.Sabina Akhundova, Ms.Gunay Nasibova****
*Ethnobotany laboratory of Institute of Botany of ANAS,*Biology Deparrtment of Azerbaijan-Baku,
**State Agrarian University, Azerbaijan-Genge
ibadullayeva.sayyara @mail.ru

***Abstract*—easonal productivity and economic efficiency of feed crops for botanical groups in different ecosystems (flat and treeless arid mountainous areas, flat and mountain forest areas, alpine mountain-meadow and meadow-steppe areas) of botanical-geograhical district - Lesser Caucasus (within the Azerbaijan Republic) have been presented in paper. Modern conditions of both summer and winter pastures were studied and resource assessments of basic feed groups were carried out. As a result domination of motley grass feed groups have been determined in compared with cereal and legume.**

Keywords—feed crops, motley grass, cereal, legumes, productivity, economic efficiency

I. İNTRODUCTION

There is a long history of liverstock migration in Azerbaijan. During the years in summer season liverstock migrated from winter pasture to summer pasture, and in autumn season from winter to summer pastures. Climate and productivity of natural pastures and hayfields provides an opportunity pasturage here liverstock all the year round. Natural feeding lands are nearly 2,5 mln hectare (winter and summer pastures) in the our Republic. Pasturage of liverstock in natural pasture conditions enhancing effects on their produstivity (meat, milk, wool). Because natural feeds rich by proteins, microelements and vitamins, which are necessary for liverstock and also the main condition for feed quality [7]. On natural feed pastures not spent any money, and as a result, base cost of livestock products is low here. In general, based botanical groups of some of feed crops (cereal, freckles etc.) have been studied [10], but feed specific of motley grass have been established only for concrete regions, for whole republic has not been a full inspection [9].

Although natural feed lands area are wide in Republic territory, but that are not enough for feed base of developing livestock. The main reason for this is lower productivity of pastures. This is the result of excessive grazing and lack of care for pasture. Therefore, valuable fodder plants disappear from the botanical composition of the pastures, and to replace them by the weeds, resulting in reduced pasture productivity.

Large areas of pastures used for the cultural section and as results areas of pasture have considerably decreased have been shown geobotanical investigations. So, soil erozion, soil salinization and landslides on the slopes are results of ineffective using of pastures [5; 6].

Productivity and economic efficiency of forage crops in three natural ecosystems – flat and treeless arid mountain; flat and mountain forest regions; alpine mountain-meadow and meadow-steppe have been established in results of the researche. Soils in this ecosystems have slightly different features due to their legal status [8].

Given the above the main goal of researche was resource assessments of feed crops in Lesser Caucasus botanical-geographical region (within Azerbaijan) and find out their economic benefits for the country.

II. MATERIAL AND METHOD

The research were carried ou in the three natural ecosystems of the Lesser Caucasus – flat and treeless arid mountainous (Girmizi Samukh, Palantoken, Bozdag, Akhar-Bakhar chain); flat and mountain forest regions (Steppe plateau, Ortaceyrancol, Chobandag); alpine mountain-meadow and meadow-steppe (Goygol-Sari rock, alpine meadows of Dashkesen, pastures of Gedabek) in 2014-2016.

From the same area every mounth take 10-15 samples places, divides them into botanical groups (cereal, legume, motley grass) and after determinated wet and dry mass for productivity determination. For productivity calculation has been used the following formula:

$$T = \frac{M x Y}{H x D}$$

T - number of cattle for 1 hectare of pasture (by the number of cattle heads); M – productivity of dry grass eaten by cattle on 1 he of pasture (by centners); Y - feed units in 100 of aboveground mass of pastures (kg); H - feed unit needed per head of cattle per day (taken for small cattle – 1.3kg, for cattle – 3.9kg); D - number of

grazing days on pastures for 1 year (taken 245 days).

Main classical morphological-geographical, ecological, phytocenological methods of botany for comprehensive study of collected materials [1:2:3] have been used. Economic efficiency has been appointed [4;12]

Location of spread feed crops in plant types in each of 3 ecosystems, the degree of layering in phytocenosis have been observed, assosiation and formation have been identified, calculated surface coating of areas, structure of plant location area, identify places where the most frequent items found plants species, attitude to edificators, their plots saturation, the role and the extent of the areas and indicators of economic rationality of the studied areas have been established [1;11] in rezults of field researches and expeditions.

III. RESULTS AND DISCUSSION

The influence of grazing on the soil and also plantar cover have been revealed in results of research. In this case takes place with eaten plants and damage by claws of vegetation and changes of soil regimes. During the grazing soil usually solidified, and at this time of the removal of water by capillaries to the surface and evaporation leads to soil salinization. Degradation of turf cover in sandy soils is getting to stronger wind erosion and etc. All these negative processes related to the haphazard and excessive grazing of livestock in pastures.

Territory of natural feed crops of all 3 ecosystem's consists from spring-winter pastures, hayfields, year-round use pastureland. This category of lands for their legal regime has the slightly different features. So, state ownership summer and winter pastures shall be given in the short-term and long-term lease to individuals and legal entities. The general use of meadows and pastures kəndətrafı retained verilməklə municipal property. Hayfields and pastureland are issued for general use, and preserved in municipal ownership.

Productivity of the wet and dry mass of wormwood-ephemers formation of semi-desert vegetation of flat regions and also wormwood-petrosimonia and wormwood-gengiz -caragane formations of desert type phytocenosis by seasons in autumn (October-November), winter (December-January) and spring (May-June) have been determined in results of geobotanical researches. Botanical composition and structure of formation varies depending from affevting of soil-climatic factors on vegetation and particular meteorological conditions (air temperature, precipitation) have been revealed.

Productivity of formation (in vegetation) spread in grey soils on winter pasture of flat and treeless arid mountain districts (Girmizi Samukh, Palantoken, Bozdag, Akhar-Bakhar chain) also have been revealed.

25-30 species (80%-feed, 20%-harmful and poisonous plants) are included in wormwood-ephemer formations. Dry grass mass for botanical groups of wormwood-ephemer formation (in autumn – 39c/he, in winter - 2.9c/he motley grass; in the spring – 2,2c/he cereal, and 0.7 c/he legumes) were found in 2014 (first study year). In the fall of the year, average temperature of the area $15,4^0$ C, in winter - $2,2^0$ C and in spring - $12,7^0$ C, and in the same seasons the average monthly amount of rainfall in the autumn - 231,3 mm, in winter – 178,2 mm, in spring – 182,3mm.

In 2015 the productivity of this formation in autumn – 3,2c/he, in winter 2,3 c/he motley grass, in the spring – 2,5 c/he cereal and 1,2 c/he legumes (total 9,35 c/he) were registered.

By the way, in 2016 in the same season the average monthly temperature -$14,8^0$ C, in the winter - $3,8^0$ C and in spring - $9,0^0$ C.

Productivity has declined compared to the previous two years; in autumn – 2,7 c/he and 1,6 c/he motley grass in winter, the same in spring 2.5 c/he cereal and 1.8 c/he legume (total 8,6c/he) were found; the average annual temperature in autumn - $15,7^0$ C, in winter - $4,4^0$ C and $13,8^0$ C in spring; the average annual amount of rainfull changes from 231,3 to 178,2mm.

As shown from table 1 (for 2014-2016 years), productivity of this formation in 2014 – 9,7 c/he, in 2015- 9,3 c/he and in 2016 - 8,6 c/he, an average - 9,2c/he.

So, in 2015 compared to 2014-2016 productivity declined (from 9,7c/he to 8,6c/he). Total area of winter pastures of flat and treeless arid mountain zones - 4851,5 hectars (Table 2).

For determination of nutritional phytocenosis and density of pasture in biochemical compounds of plants have been ecalculated moisture absorbent - 12,9%, ash in the dry matter - 14,6%, protein – 9,7%, lipids - 3,2%, NES (nitrogen extractive substances) – 36,7% (table 5 and 6), as well as on the basis of these data have been established than in 100kg of formation 46,5 feed units and digestible protein - 4,7.

Thus, grazing on hectare of pasture for wormwood-ephemers – 1,6, wormwood-petrosimonia - 0,9, wormwood-gengiz-caragane 1,8 heads of small cattle (table 4) with considering term used of plant cover of ecosystems of winter pasture, small cattle, sheep daily feed rate (1.3 feed unit), productivity (dry mass) and feed units in 100 kg feed. In this sense, grazing capacity of wormwood-efemer, wormwood-petrosimonia and wormwood-gengiz-caragane formations - 646.5 heads of small cattle. It also means greater economic benefits.

Table 1-The average annual productivity of Wormwood-ephemer formation (eaten dry mass for the 2014-2016years)

Botanical groups	SEASONS					
	Autumn		Winter		Spring	
	c/he	%	c/he	%	c/he	%
Cereal	–	–	–	–	2,5	27,2
Legume	–	–	–	–	1,2	13,0
Motley grass	3,2	34,8	2,50	25,8	–	–
Total:	3,2	34,8	2,50	25,8	3,7	40,2
Average productivity	–	–	9,2	–	–	100

Table 2-The average annual productivity of Wormwood-petrosimonia formation (eaten dry mass for the 2014-2016 years)

Botanical groups	SEASONS					
	Autumn		Winter		Spring	
	c/he	%	c/he	c/he	%	c/he
Cereal	–	–	–	–	1,3	18,3
Legume	–	–	–	–	0,9	12,7
Motley grass	2,8	39,4	2,1	29,6	–	–
Total:	2,8	39,4	2,1	29,6	2,2	31,0
Average productivity	–	–	7,1	–	–	100,0

Table 3-The average annual productivity of Wormwood-gengiz-caragane formation (eaten dry mass for the 2014-2016 years)

Botanical groups	SEASONS					
	Autumn		Winter		Spring	
	c/he	%	c/he	c/he	%	c/he
Cereal	–	–	–	–	1,8	15,4
Legume	–	–	–	–	1,2	10,3
Motley grass	5,2	44,4	3,5	29,9	–	–
Total:	5,2	44,4	3,5	29,9	3,0	25,7
Average productivity	–	–	11,7	–	–	100,0

Table 4-Average annual productivity of formations in winter pastures lands of flat and treeless arid mountainous areas (eaten wet and dry mass (t/ha) for the 2014-2016 years)

Years	FORMATIONS					
	Wormwood-ephemers		Wormwood-petrosimonia		Wormwood-gengiz-caragane	
	wet	Dry	wet	Dry	Wet	Dry
2014	14,5	9,7	8,7	6,2	16,3	10,9
2015	13,8	9,3	9,5	6,8	18,9	11,8
2016	12,8	8,6	11,9	8,4	20,9	12,3
Average productivity	13,7	9,2	10,1	7,1	18,7	11,7

Table 5-Indicators on the biochemical composition of plant cover of winter pasture of flat and treeless arid mountainous areas.

Formations	Moisture absorbent,%	Absolute dry matter,%					In 100 kg feeds (by kg)	
		Ash	Protein	Fat	Cellulose	Nitrogen-free extractives	Feed unit	Digestible protein
Wormwood-ephemers	12,9	14,6	9,7	3,2	22,9	36,7	46,5	4,7
Wormwood-petrosimonia	12,0	9,4	6,8	2,4	33,9	35,5	32,8	3,3
Wormwood-gengiz- caragane	14,0	6,1	8,4	2,7	27,8	41,0	41,7	4,2

Table 6Indicators of validity period, productivity, forage quality and grazing rate for formations of winter pasture area

Formations		Period of use (by days)	Productivity (in dry mass, c/he)	In 100 kg feeds		Pasture load per hectare (number)	
Name	area (he)			Feed unit	Digestible protein	Cattle	Small cattle
Wormwood-ephemers	189,6	210	8,9	46,5	4,7	1,6	303,4
Wormwood-petrosimonia	92,5	210	7,1	32,8	3,3	0,9	83,2
Wormwood-gengiz-caragane	144,4	210	11,7	41,0	4,0	1,8	259,9

Motley grass-cereal formation is one of the more common in flat and mountain forest zones (Steppe plateau, Ortaceyrancol, Chobandagh). 33 higher plant species, from them 5 species - shrubs, 7 species - grains, 2 species - legumes, while the rest motley grass make up botanical composition. Dominants of formation from cereal - tourniquet mat grass (stipa) and from motley grass – cow-parsnip. Clover in the second tier by 3-4 ball, hawthorn is subdominant by 2-3 ball in first tier. The average height of the grass cover - 10-180sm and the average density - 35-45%

Productivity of feed crop of pastureland over the year depends from the amount of rainfall, temperate weather, soil fertility, technical condition of pastures have shown the geobotanical studies. Some species of trees, shrubs, grains, legumes and motley grass of

plant cover in the early stages of vegetation best eaten by animals. In addition to these plants in pastures meets harmful and poisonous plants, which do not eat by animals at all or very badly eaten.

The biochemical composition of vegetation in pastures, feed resources and capacity has been identified. Some formations are separate studied, from them 1 sample have shown in Table 7. For determination of density of pasture is important to know dry aerial part of formation, feed units and amount of digestible protein

Table 7-Biochemistry compositions of motley-grass-bromegrass formations of flat and mountain-forest areas.

Name of formation	Sample number	Moisture absorbent,%	Absolute dry matter,%					In 100 kg feeds (by kg)	
			Ash	Protein	Fat	Cellulose	Nitrogen-free extractives	Feed unit	Digestible protein
Motley-grass-bromegrass	7,12	21,78	10,68	11,42	10,64	2,89	24,92	50,13	56,08

As can be seen from the table in 154.5 hectares area in dry grass product of motley grass-bromegrass formation in per 100kg - 56.08 feed units and 6.49 kg digestible protein. In the aerial part of this formation moisture

absorbent - 10.8, ash - 10.42%, protein - 10.64%, fat - 2.89%, cellulose - 24.22%, 50.13% of nitrogen extractive substances.

Load on 1 hectare of pasture can be calculated by the following formula knowing productivity of formation and their feed units.

$$T = \frac{4,7x56,08}{1,3x245} = \frac{263}{318} = 0,82 \approx 0,8$$ can graze head of small cattle

In 1 hectar of the same formation

$$T = \frac{4,7x56,08}{1.3x245} = \frac{263}{955} = 0,27 \approx 0,3$$ can graze head of cattle

If for 1 hectare of pasture is known number of cattle and hectares of area are possible to calculate how many head of small cattle and cattle can graze (Table 8).

Table 8-Areas of pasture for formations, productivity, nutritional value and volume

number	Name of formation	Kind of pasture	Areas across the border		Surface mass productivity, c/he	İn 100 kg feed		Feed resourses			Pasture capacity (with a score of heads of small cattle and cattle)	
1	Motley-grass-bromegrass	Bushy	he	%	4,7	Feed unit	Digestible protein	Feed	Feed unit	Digestible protein	In 1 ha	In Total area
			154,6	17,08		56,03	6,49	727	408	47	0,3	124/46

Anual cereal is wild distributed forage crops in winter pasture of alpine mountain-meadow and meadow-steppe ecosystems. Plant of Cereal family always good develop in earlier spring and forms green feed mass. Anual cereal plant is relatively less in forming green palnt cover in the Spring on the winter pasture in in hillsides area. Some annual motley grass instead them are majority and considered a valuable fodder plants . Some species of alfalfa and peavine of Legume family are very prelevant in some pastures.

Productivity of dry fodder crop mass of alpine mountain-meadow and meadow-steppe ecosystems in summer of 2014 were 569c/he and more part consist motley grass – 4,33c/he. Other part consist from cereal – 135 s/ha, legume – 0,01c/ha. Productivity of dry fodder crop in autumn-winter season was 5,67c/he, from them 4,71c/he – motley grass, 0,96 s/he – cereal and legume. High productivity in assosiation are observed in Spring season.

Productivity of dry fodder crop mass in

2015 – 11,15c/he, from them 8,56c/he held motley grass.

Productivity was higher in 2016 compared to 2015 (summer 2015-4,72c/he, in 2016-5,66c/he, accordingly in autumn-winter season 3,93c/he-4,77c/he, in spring - 6,73-7,35c/he).It is also, of course, has been connected with climate factors. The temperature in alpine-mountain-meadow and meadow-steppe ecosystems in spring season $14,6^0$C, in autumn $16,9^0$C, in winter $4,9^0$C; rainfall in spring – 111mm, in autumn – 103mm, in winter – 80mm.

The data about productivity ob plant groups of alpine-mountain-meadow and meadow-steppe ecosystems have been shown in next tables.

Table 9-Productivity for botanical groups of alpine-mountain-meadow and meadow-steppee ecosystems (for 2014-2016 years)

Years	Botanical groups	SEASONS											
		Summer				Autumn-Winter				Spring			
		15.VI—15 IX				15.XI–20.II				1.III–15.V			
		Wet weight		Feed supply		Wet weight		Feed supply		Wet weight		Feed supply	
				Wet	Dry			Wet	Dry			Wet	Dry
		c/ha	%	c/ha	c/ha	c/he	%	c/ha	c/he	c/ha	%	c/ha	c/ha
2014	Cereal	2,37	24	1,91	1,31	2,15	21	1,51	0,92	4,77	24	3,58	2,41
	Legume	0,12	1	0,09	0,05	0,10	1	0,06	0,04	0,49	3	0,37	0,18
	Motley grass	7,25	75	5,72	4,33	7,98	78	6,31	4,71	12,27	70	10,81	8,56
	Total	9,74	100	7,72	5,69	10,23	100	7,88	5,67	17,53	100	14,76	11,15
2015	Cereal	0,24	3,8	0,16	0,09	0,38	4,9	0,15	0,08	1,68	16,5	1,22	0,83
	Legume	0,06	1	0,04	0,02	0,09	1,2	0,05	0,01	0,45	4,4	0,24	0,14
	Motley grass	6,07	95,2	5,54	4,61	7,26	93,9	6,62	3,84	8,08	79,1	7,31	5,76
	Total	6,37	100	5,73	4,72	7,73	100	6,82	3,93	10,21	100	8,77	6,73
2016	Cereal	0,35	5,3	0,23	0,16	0,61	6,3	0,32	0,21	2,44	20,6	1,87	1,42
	Legume	0,07	1	0,04	0,02	0,12	1,2	0,08	0,04	0,27	2,3	0,19	0,11
	Motley grass	6,26	93,7	5,89	5,48	8,94	92,5	7,25	4,52	9,12	77,1	7,75	5,82
	Total	6,68	100	6,16	5,66	9,67	100	7,65	4,77	11,83	100	9,81	7,35

Total productivity of dry fodder mass for some assosiation according to the seasons have been given as the results of three-year studies. As shown from the tables every year motley grass of alpine-mountain-meadow and meadow-steppe ecosystems on spring, summer, autumn and winter pastures has highest parametrs. Feed grains and legumes are high in quality but productivity parametrs of motley grass is higher for the wild spread.

The cost-effectiveness of traditional high-protein feed crops have been established in results of long-term studies. Some montley grass (mallow species) are considered to be even more effective than legume. For example, comparative economic efficiency of mallow species has been identifiedwith feed legumes.

The highest yield of food have been recorded for legume plants (clover, alfalfa, vetch etc.) and mallow species populations during practice. Product cost base of mix mallow and corn compared by legume is very low. High productivity of mallow species provides net income and a high level of profitability. is also used For silage, in used periods a similar pattern for high-protein feed crops botanical groups can be observed.

Overall, during the used period economic efficiency of botanical groups of maltow grass and legumes for green mass was significantly higher. The economic efficiency of main spread and researched botanical groups of motley grass and legume have been shown in table 10.

Legumes and motley grass created groups with higher economic efficiency as can be seen from the table. Cost is between 23,70-23,83 for collecting and drying of fodder crops from 1 hectare. However, the benefit changing from 46,18-52,04. This income is more than 2 times.

The following recommendations are offered an experimental field studies:

• To pay attention to topography, soil structure, climate, geoposition, productivity, water classification and the capacity under applying systematic grazing on pasture fields;

• The number of cattle, depending on capacity and the burden should be strictly adhered to pasture area. Norm of grazing depends from relyef on area, climate, plant cover, rainfall or drought year; in areas exposed to erosion, grazing should be limited or completely banned;

• For prevent erosion poseses on pastures bushes logging in the high slopes, also cattle grazing on the hillside with a high propensity for rainy days is not recommended.

• Measures to improve the surface and the rational use of pastures are necessary to conduct. Noxious and toxic weeds inedible by livestock on pastureland are also need to be destroyed before flowering . Annually, in areas with a rare grass cover and perennial trampling necessary to sow frost-resistant seeds of fodder plants and graze the cattle only after the restoration of the vegetative cover of the soil have been recommended.

• Fertilization is required for improve biology productivity of pastures and hayfields with considering botanical components of plant cover and physical and chemical features of the soil.

Table 10-The economic efficiency of motley grass and legums

Variants	Productivity, t/he	Crop for 1 he		costs per 1 he, AZN	Cost, AZN			Net profitAZN	Rate of profitability, %
		Feed units,t	Protein, t		Green weight	Feed units	Prote-in		
Trifolium pretense + motley grass	47,65	7,33	1,21	23,76	0,52	3,24	19,63	48,75	10,16
T.arvenser + motley grass	48,72	7,66	1,32	23,78	0,48	3,10	18,02	52,04	10,83
Medicago rigidula + motley grass	50,19	7,61	1,29	23,83	0,47	3,13	18,47	51,50	10,70
M.orbicularis + motley grass	45,81	7,06	1,11	23,70	0,51	3,35	21,35	46,18	9,64

REFERENCES

[1]. Beideman I.N. Methods of studying the plant phenology and plant communities. - Novosibirsk: Nauka, 1974. 153 p. (by rus.)

[2]. Beydman N.N. The development of soil vegetation in flats of East Transcaucasia. / Proc .: Improving fodder in the steppe, semi-desert and desert zones. Moscow-Leningrad, 1954, pp.244-254.(by rus.)

[3].Flora of Azerbaijan. 1-8 vol., Baku: Publishing house “The Academy of Sciences of Azerbaijan SSR”, 1950-1961

[4].Guidelines for the analysis of feed. Moscow: 1982, 253 p.
[5]. İbadullayeva S.C., Aliyeva R.M. Characteristic of erosion process in Mingachevir / Mat. of Institute of Botany of ANAS, Vol. XXXIII, 2013, pp.97-99 (by azerb.)
[6]. İbadullayeva S.C., Nabiyeva F.X. Development Appropriatenesses of Deserting Processes in The KAP and The PAAR. Global Advanced Research Journal of Geography and Regional Planning (ISSN: 2315-5018) Vol. 1(5), 2013. pp.234-239
[7]. Maharramov S., Mammadli T., Ibadullayeva S. Forage crops in the mountainous areas of the Nakhchivan Autonomous Republic (motley grass) Public house “Elm-Tehsil”, Baku, 2015, 222 P.
[8]. Mammadov G.Sh. Social, economic and ecological basis of effective use of land resources of Azerbaijan, Baku, Public House “Elm”, 2007,854p.(by azerb.)
[9].Nabiyeva F.Kh., İbadullayeva S.J., Ibrahimova A.Sh. Fodder resources of winter pastures // Agrarian science. ISSN 0869-8155, Moscow-2011, pp.10-12 (by rus.)
[10]. Natural forage crops of hayfields and pastures. Cereals and freckles / Editorial staff
[11]. Rabotnov T.A. Metody study of seed propagation of herbaceous plants in communities // In book: Field geobotany. Moscow: Publishing House of the USSR Academy of Sciences. 1960-V.2.
[12]. Taranov M.T., Sabirov A.H. Biochemistry of feed. M., "Agropromizdat", 1987, 222 p.