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Research article

Determination of botanical composition, yield, capacity and condition of lowland pastures in eastern Anatolian region of Turkey

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Abstract

This study was conducted to determine the vegetation-covered area, botanical composition, yield, quality, capacity, condition and health of seven lowland pastures in Bingol province, Turkey. Thirty-three plant species were identified during the study. Twenty-nine of these species were found to be invaders, two were increasers, and two were decreasers. The most common species in the pastures were *Trifolium repens*, *Eremopoa persica, Poabulbosa* and *Gundelia tournefortii.*The rate of the vegetation-covered area of the pastures was determined to be 97.4%, the rate of legumes in the botanical composition was 32.7%, the rate of grasses was 50.0% and the rate of other family plants was 17.3%. The average of pastures had plant height of 24.2 cm, green fodder yield of 5820 kg/ha, dry matter yield of 1290 kg/ha, crude protein content of 19.5%, acid detergent fiber (ADF) content of 29.1%, neutral detergent fiber (NDF) content of 44.4%, P content of 0.37%, K content of 2.55%, Ca content of 1.30% and Mg content of 0.33%. It was found that the capacity of the pastures varied between 3.3 and 88.5 animal units (AU), with an average of 32.2 AU. In evaluating the condition of the pastures, it was found that 4 pastures were classified as 'medium-healthy' and 3 pastures were classified as 'good-healthy'. It was concluded that appropriate grazing systems should be applied to lowland pastures and that current yield and quality can be increased through fertilization.

Keywords: Botanical composition, Lowland pastures, Pasture capacity, Pasture condition, Pasture quality

Introduction

The roughage needed for feeding ruminant animals is obtained in Turkey from three main sources. The first of these sources is pasture, the second is forage crops grown in agriculture field, and the third is residues such as stalks and straws that are left after the harvesting of grains from cultivated field crops (Avcioglu *et al.,* 2009). Pastures are annual and perennial plant communities that grow naturally on soils with different characteristics. These plants have superior characteristics in terms of adaptation to environmental conditions, competitiveness, yield and quality. Pastures can lose their superior capabilities over time, depending on the influence of environmental factors and intensity of use (Gokkus *et al.,* 2011; Ghosh *et al*., 2022)). One of the reasons pastures lose their superior capabilities, perhaps the most important, is the damage done by animals grazing on the pastures. Indeed, animal adversely affects the pasture ecosystem through grazing the pasture plants, removing nutrients from the ecosystem, and mechanically damaging pasture plants and soils (Shinde and Mahanta, 2020; Kumar *et al.,* 2023). For pasture plants to form new shoots and leaves after grazing, they must be supplied with the necessary nutrients. The supply of necessary nutrients depends on the activity of the root system, the state of plant nutrient reserves after mowing and grazing, and the assimilation density remaining on the plant (Tukel and Hatipoglu, 1997). The yield of pasture depends largely on these factors, and the new shoots and leaves formed by pasture plants after grazing are an indicator of pasture yield.

Forage quality is determined by measurements of vegetation or by qualifying animal products. The most important characteristics of forage quality are palatability, total digestible nutrient content and energy value, and nutrient content such as protein, minerals, and vitamins. The products of the animals such as meat, milk, fleece, leather or pups are useful criteria to measure pasture forage quality (Gokkus *et al.,* 2011). Nowadays, mainly crude protein, ADF, NDF and mineral content of pasture plants are studied to determine the quality of pasture plants (Cacan and

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Kokten, 2019; Msiza *et al.,* 2022). Pastures used directly by animals and indirectly by humans, are generally under the influence of various negative factors, especially heavy grazing, untimely grazing, and drought. For this reason, the yield and quality of pasture tend to decrease worldwide. However, it is possible to restore pastures through improved management interventions and appropriate grazing systems. For such interventions, there is a need to know the basic characteristics of pastures such as yield, quality, botanical composition, pasture capacity, pasture condition and health (Cacan and Kokten, 2019; Seydosoglu *et al.,* 2019).

To this end, many studies have been conducted in Turkey to determine yield, quality, botanical composition, pasture capacity, pasture condition and pasture health (Agin and Kokten, 2013; Aydin *et al.,* 2014; Cacan *et al.,* 2014; Cinar *et al.,* 2014; Babalik and Sarikaya, 2015; Alay *et al.,* 2016; Yildiz and Ozyazici, 2017; Bakoglu and Catal, 2020; Tarhan and Cacan, 2020). However, most of these studies focused on the use of mountain pastures and there was scarcity of information on lowland pastures. Therefore, the aim of present study was to determine the vegetation-covered area, botanical composition, yield, quality, pasture capacity, pasture condition and health of seven lowland pastures and to compare the pastures in terms of these characteristics.

Materials and Methods

Study area: The field studies for this work were conducted between 15 and 18 May, 2020 in the pasture areas of Saricicek, Celtiksuyu, Buyuktekoren, Cayagzi, Garip, Kumgecit and Dik villages in the lowland of Bingol (Table 1; GDLC, 2021). Bingol province is located in the Eastern Anatolia region of Turkey and Bingol lowland is about 25 km away from the city center (38° 46′ 47.06″ N- 38° 53′37.15″ N, 40° 34′ 03.32″ E- 40° 36′ 08.52″ E). The altitude of the pastures above sea level ranged from 993 to 1073 meters. The province of Bingol generally has a continental climate. Precipitation, which usually falls as snow in the winter season, falls as rain in the spring and autumn. In June 2019 to May 2020, the average temperature of Bingol province was 13.8 °C with average relative humidity of 52.4% and total precipitation of 967.4 mm. It was found that this period was warmer than the long-term average (11.5 °C), while the relative humidity was lower (56.7%) and the annual precipitation was close to the long-term average (962.9 mm) (GDM, 2021). The pH of the Bingol lowland soils in which this study was conducted was 7.12 (slightly alkaline) with 0.47% of lime (low calcareous), 371.5 µS/cm of EC value (slightly saline), 1.68% of organic matter (low), 115.83 ppm of K (high), 7.86 ppm of available P (high), 18.24 ppm of Fe (high), 0.41 ppm o Zn (high), 0.60 ppm of Cu (adequate) and 4.63 ppm of Mn (high; Demir, 2016).

Table 1. Parcel names, numbers and areas of the lowland pastures

Parcel names	Parcel numbers	Parcel areas (da)
Buyuktekoren	137/1	1145
Cayagzi	151/1	133
Celtiksuyu	223/13	125
Dik	0/1108	750
Garip	140/1	1626
Kumgecit	150/1	1190
Saricicek	147/1	462

Vegetation survey: A 2 m x 2 m cage was placed in each of the pastures of Saricicek, Celtiksuyu, Buyuktekoren, Cayagzi, Garip, Kumgecit and Dik villages in Bingol lowland on 04 March 2020, before grazing began. During the flowering period of the plants that dominate the vegetation measurements were made using 6 loop lines in the pasture of each village from May 15 to 18, 2020. Average of the percentages of vegetation-covered area obtained in 6 loop lines in each pasture was considered as the percentage of vegetation-covered area of associated pasture. The plant species present in each loop line were divided into three groups: legumes, grasses, and other families (Aydin and Uzun, 2005). The average of the botanical composition values obtained for a plant group in 6 loop lines of each pasture was considered as the ratio of that plant group to the related pasture in botanical composition. Plant species frequency values were determined using the average of species participation rates in the botanical composition (Cacan *et al.*, 2016).

Yield characteristics: Grasses were cut from the ground using 0.5 m × 0.5 m frames in three replicates from each 2 m × 2 m cage set up to represent the pasture area, and the green fodder yield per decare was calculated. After calculating green fodder yield per decare, 500 g were removed from the samples and dried at 70 °C for 48 hours to determine dry matter percentage. Dry matter yield was calculated by multiplying the dry matter percentages obtained with green fodder yield (Cacan and Kokten, 2019).

Plant heights of pastures were determined by measuring the height in centimeters (cm) of 10 plants randomly sampled from each frame.

Quality characteristics: The crude protein (CP), acid detergent fiber (ADF), neutral detergent fiber (NDF) and macro element contents of pasture grass were determined using the NIRS instrument. Foss Model 6500 NIRS (near infrared spectroscopy) instrument and C-0904FE-Hay and Fresh Forage calibration were used in the analyses. The analyses were carried out in Faculty of Agriculture Laboratory, Ondokuz Mayıs University following standard procedures (Yildiz and Ozyazici, 2017; Karan and Basbag, 2017; Artan and Polat, 2019; Cacan and Kokten, 2019; Ozyazici and Acikbas, 2020).

Pasture capacity and condition: The average pasture capacities were determined according to the formula of Tukel (1981), where pasture capacity = (Pasture yield × Utilization rate × Area of pasture)/ (Grazing days × Daily feed consumption of an animal); while the method of Koc and Cakal (2004) was used to determine pasture condition and health (Table 2).

Statistical analysis: Data were subjected to analysis of variance according to randomized block design using the statistical package JMP (a software belonging to the SAS program). Lowland pastures were the main variable and the significant means were compared using LSD test at 0.05 probability level (Steel and Torrie, 1980; JMP, 2018).

Results and Discussion

Vegetation-covered area and botanical composition of pastures: Plant species detected in lowland pastures, vegetation-covered area and botanical composition of pastures were recorded (Table 3-4). 33 plant species belonging to 15 families were identified in lowland pastures. Of these plant species, 2 were increasers, 2 were decreasers, and the remaining 29 were invaders. The ratio of vegetation-covered area in lowland pastures ranged from 95.8 to 98.7%, with an average of 97.4%. The proportion of legumes, grasses and plants of other families in botanical composition was recorded as 32.7, 50.0 and 17.3%, respectively. The Kumgecit pasture had the highest percentage of vegetation-covered area and legumes. Cayagzi pasture had the highest proportion of area covered with grasses. Husain *et al.* (2019) recorded a total of 64 plant species belonging to 23 families and 56 genera in Gulmarg grassland of Kashmir and Poaceae was also the dominant family represented by fourteen species.

The rate of the vegetation-covered area was reported earlier as 86.48% by Gul and Basbag (2005), 84.5-99.0% by Cinar *et al.* (2014), 83.34% by Ispirli *et al.* (2016) and 96.80% by Bakoglu and Catal (2020). These results were similar to the results of this study. In botanical composition, Cacan *et al.* (2014) recorded a proportion of 26.53% grasses, 23.65% legumes and 49.80% other family plants in natural pastures, while Aydin *et al.* (2014) recorded a proportion of 10.41% grasses, 19.64% legumes and 69.96% other family plants, and Bakoglu *et al.* (2019) recorded a proportion of 33.37% grasses, 5.75% legumes and 60.88% other family plants. It was found that the proportions of legumes and grasses in lowland pasture areas were comparatively higher than the values of previous studies. This was probably due to higher amount of rainfall received by the region. Arid and semi-arid climatic conditions prevailed in Turkey, however, Bingol province received higher amount of precipitation than the average in Turkey. It was believed that high amount of precipitation or the fact that the lowland pastures were not under the pressure of drought led to higher ratio between the vegetation-covered area and the legumes and grasses in botanical composition. From the ratio of plants in botanical composition (Table 3), the most common plants in legume family was *Trifolium repens* (32.2%), while in grass family it was *Eremopoa persica* (19.0%) and *Poa bulbosa* (17.8%), and in other family it was *Gundelia tournefortii* (5.7%).

Table 2. Pasture condition and classification of health*

Pasture condition classification		Pasture health classification	
Proportion of species (%)	**Condition**	**Soil coverage ratio (%)**	**Health**
76-100	Very good	>70	Healthy
51-75	Good	55-70	Risky
26-50	Medium	55	Problematic
0-25	Weak		

* Modified according to wheeled ring method data

Table 3. The plant species, vegetation-covered area and botanical composition of the lowland pastures

Plant species*	Garip		Cayagz		Buyuktekoren		Dik		Sarıcicek		Kumgecit		Celtiksuyu	
	VC	BC	VC	BC	VC	BC	VC	BC	VC	BC	VC	BC	VC	BC
Trifolium repens[1]	34.7	35.3	22.7	23.2	34.3	35.0	22.8	23.8	30.5	31.8	50.2	50.8	24.8	25.6
Medicago sativa[1]	2.5	2.5	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Trifolium pilulare	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Legumes	**37.8**	**38.5**	**22.7**	**23.2**	**34.6**	**35.3**	**22.8**	**23.8**	**30.5**	**31.8**	**50.2**	**50.8**	**25.0**	**25.8**
Poa bulbosa[2]	16.5	16.8	30.7	31.4	16.3	16.6	8.2	8.5	18.2	19.0	9.7	9.8	21.8	22.5
Aegilops cylindrica	2.5	2.5	14.0	14.3	12.5	12.7	25.3	26.4	20.0	20.9	6.2	6.2	4.3	4.5
Eremopoa persica	28.3	28.8	16.0	16.4	6.7	6.8	21.7	22.6	8.8	9.2	20.0	20.3	27.8	28.7
Bromus tectorum	1.7	1.7	0.3	0.3	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
Bromus danthoniae	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Taeniatherum caput-medusae	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alopecurus sp.[2]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.9
Grasses	**50.2**	**51.0**	**61.0**	**62.4**	**35.7**	**36.4**	**55.2**	**57.5**	**47.0**	**49.1**	**35.8**	**36.3**	**55.3**	**57.0**
Astrodaucus orientalis	0.0	0.0	0.7	0.7	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anthemis cretica	0.8	0.8	1.8	1.9	7.5	7.6	0.0	0.0	0.0	0.0	0.0	0.0	8.7	8.9
Gundelia tournefortii	2.8	2.9	3.7	3.8	9.7	9.9	7.7	8.0	6.8	7.1	5.7	5.7	2.2	2.2
Taraxacum bessarabicum	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cirsium echinus	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cirsium arvense	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crepis sp.	0.0	0.0	0.0	0.0	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Achillea biebersteinii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0
Centaurea iberica	0.0	0.0	0.5	0.5	0.2	0.2	0.0	0.0	4.0	4.2	0.3	0.3	0.0	0.0
Anchusa azurea	0.0	0.0	4.7	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capsella bursa-pastoris	0.3	0.3	0.0	0.0	0.0	0.0	2.3	2.4	2.5	2.6	0.3	0.3	1.2	1.2
Sisymbrium orientale	1.7	1.7	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cardaria draba	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.9
Sisymbrium loeselii	0.2	0.2	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	1.7	0.0	0.0
Euphorbia denticulata	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Erodium cicutarium	0.3	0.3	0.0	0.0	0.8	0.8	0.0	0.0	4.8	5.0	0.2	0.2	0.2	0.2

Nepeta sp.	0.0	0.0	0.0	0.0	1.8	1.8	0.0	0.0	0.0	0.0	1.7	1.7	0.0	0.0
Ornithogalum narbonense	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bellevalia anatolica	0.2	0.2	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0
Alcea calvertii	0.0	0.0	0.0	0.0	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Papaver rhoeas	0.2	0.2	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Verbascum agrimoniifolium	0.5	0.5	1.3	1.4	1.3	1.3	7.8	8.2	0.0	0.0	1.7	1.7	2.2	2.2
Eryngium campestre	1.3	1.4	0.0	0.0	1.0	1.0	0.2	0.2	0.2	0.2	1.0	1.0	0.3	0.3
Other plants	**10.4**	**10.5**	**14.0**	**14.3**	**27.8**	**28.3**	**18.0**	**18.8**	**18.3**	**19.1**	**12.7**	**12.8**	**16.7**	**17.2**
Total	**98.4**		**7.7**		**98.1**		**96.0**		**95.8**		**98.7**		**97.0**	

*Based on Serin *et al.* (2008); Anonymous (2021); 1: Decreaser; 2: Increaser; VC: Vegetation covered area; BC: Botanical composition

Yield characteristics of lowland pastures: Plant height, green fodder yield, and dry matter yield of lowland pastures were recorded (Table 5). The difference between plant height, green fodder yield and dry matter yield of lowland pastures was statistically significant (P<0.01). The highest plant height was obtained in the pastures of Kumgecit and Cayagzi villages, and the highest green fodder and dry matter yields were obtained in the pastures of Kumgecit and Garip villages. The average plant height of lowland pastures was 24.2 cm, green fodder yield was 582 kg/da, and dry matter yield was 129 kg/da. These findings were similar to the plant height of 20.4 cm obtained by Tarhan and Cacan (2020), the green fodder yield of 612 kg/da obtained by Aydin *et al.* (2014), the green fodder yield of 546 kg/da obtained by Cacan and Basbag (2016) and the dry matter yield of 141 kg/da obtained by Karan and Basbag (2017).

Quality characteristics of lowland pastures: The CP, ADF and NDF contents of grass samples from lowland pastures were also recorded (Table 6). It was found that the difference between CP (P<0.01), ADF (P<0.01) and NDF (P<0.05) contents of lowland pastures was statistically significant. Highest CP content was obtained from the pastures of Dik, Garip, Kumgecit and Cayagzi villages. The lowest ADF values were obtained from the pastures outside Garip village and the lowest NDF values were obtained from the pastures of Buyuktekoren and Cayagzi villages. Average CP, ADF and NDF contents of lowland pastures were 19.5%, 29.1% and 44.4%, respectively. The results were similar to those obtained earlier by Nadir *et al.* (2012) of 16.48-18.81% CP, 24.38-26.84% ADF and 34.59-36.32% NDF and also those obtained by Cacan *et al.* (2014) of 19.69% CP, 29.48% ADF and 43.31% NDF.

Macro element contents of lowland pastures: The contents of phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg) in grass samples from lowland pastures were recorded (Table 7). It could be seen that the difference between P, K and Mg contents found in lowland pastures was statistically significant (P<0.05), but the difference between Ca content was not significant. The highest P, K and Mg values were found in the pastures of Garip village. The lowest P and K values were found in the pasture of Saricicek village and the lowest Mg values were found in the pasture of Celtiksuyu village. The average P content of the lowland pastures was

Botanical composition of lowland pastures

Table 4. The vegetation-covered area and botanical composition of lowland pastures

Lowland pastures	Vegetation covered area (%)	Botanical composition (%)		
		Legumes	Grasses	Other family
Garip	98.4	38.5	51.0	10.5
Cayagzi	97.7	23.2	62.4	14.3
Buyuktekoren	98.1	35.3	36.4	28.3
Dik	96.0	23.8	57.5	18.8
Sarıcicek	95.8	31.8	49.1	19.1
Kumgecit	98.7	50.8	36.3	12.8
Celtiksuyu	97.0	25.8	57.0	17.2
Mean	97.4	32.7	50.0	17.3

Table 5. Plant height, green fodder and dry matter yield of lowland pastures

Lowland pastures	Plant height (cm)	Green fodder yield (kg/da)	Dry matter yield (kg/da)
Buyuktekoren	24.8 bc	450 b	127 b
Cayagzi	27.6 ab	371 bc	93 b
Celtiksuyu	23.3 bc	322 bc	112 b
Dik	16.6 d	232 c	52 c
Garip	23.1 bc	1204 a	204 a
Kumgecit	32.1 a	1143 a	216 a
Saricicek	21.7 cd	350 bc	98 b
Mean	**24.2**	**582**	**129**

Means with different letters in a column differed significantly (P<0.01); 10 decares (da) = 1 hectare (ha); 1000 kg = 1 ton (t)

Table 6. Crude protein, ADF and NDF contents of lowland pastures

Lowland pastures	Crude protein** (%)	ADF** (%)	NDF* (%)
Buyuktekoren	18.6 bc	27.6 cd	39.5 c
Cayagzi	20.7 abc	26.5 d	41.3 bc
Celtiksuyu	15.2 d	28.2 bcd	48.8 a
Dik	22.4 a	29.7 b	46.3 a
Garip	21.6 ab	32.9 a	44.3 abc
Kumgecit	20.2 abc	30.1 b	45.2 ab
Saricicek	17.6 cd	28.5 cd	45.3 ab
Mean	**19.5**	**29.1**	**44.4**

*(P<0.05); **(P<0.01); Means with different letters in a column differed significantly

0.37%, while K content was 2.55%, Ca content was 1.30% and Mg content was 0.33%.

Macro elements had important roles in the growth of plants. The presence of macro elements in sufficient proportions in plants was important for their uptake by animals (Aygun *et al.*, 2018). Motsara and Roy (2008) reported that P contents should be between 0.2-0.5%, while K contents between 1.0-5.0%, Ca contents between 0.1-1.0% and Mg contents between 0.1-0.4%. It could be seen that the Ca content was slightly above the limit established by Motsara and Roy (2008), while the P, K and Mg contents were within the established limits. In addition, these results were similar to the results of earlier studies (Yildiz and Ozyazici, 2017; Karan and Basbag, 2017).

Pasture capacities, pasture condition and health of lowland pastures: The pasture capacities per animal unit (AU), pasture condition and health of the lowland pastures were also recorded (Table 8).

Table 7. Macro element contents of lowland pastures

Lowland pastures	P (%)	K (%)	Ca (%)	Mg (%)
Buyuktekoren	0.38 ab	2.68 ab	1.32	0.31 bc
Cayagzi	0.39 ab	2.70 ab	1.30	0.30 bc
Celtiksuyu	0.34 bc	2.11 bc	1.06	0.25 c
Dik	0.36 bc	3.01 a	1.16	0.34 abc
Garip	0.43 a	2.89 a	1.53	0.41 a
Kumgecit	0.38 abc	2.41 abc	1.40	0.37 ab
Saricicek	0.32 c	2.02 c	1.31	0.34 abc
Mean	**0.37**	**2.55**	**1.30**	**0.33**

Means with different letters in a column differed significantly (P<0.05)

Table 8. Grazing capacities, condition and health of lowland pastures

Lowland pastures	Grazing capacity (AU)	Pasture condition	Pasture health
Buyuktekoren	38.8	Good	Healthy
Cayagzi	3.3	Medium	Healthy
Celtiksuyu	3.7	Medium	Healthy
Dik	10.4	Medium	Healthy
Garip	88.5	Good	Healthy
Kumgecit	68.5	Good	Healthy
Saricicek	12.1	Medium	Healthy
Mean	**32.2**		

Capacity of the pastures varied from 3.3-88.5 AU and the average was calculated as 32.2 AU. It was found that the conditions of Buyuktekoren, Garip and Kumgecit pastures were 'good', the conditions of other pastures were considered as 'medium' and all the pastures were in healthy category. Pasture capacity in previous studies were reported as 10 AU in Bingol by Agin and Kokten (2013), 28.05-37.85 AU in Elazig by Karan and Basbag (2017), 40.96 AU in Sanliurfa by Polat *et al.* (2018) and 36.9 AU in Konya by Babalik (2019). Pasture condition in previous studies were reported as 'weak' in Mardin by Aydin *et al.* (2014), as 'healthy-medium' in Erzurum by Comakli *et al.* (2012), as 'healthy-medium' in Bingol by Cacan *et al.* (2014), as 'healthy-weak' in Diyarbakir by Seydosoglu (2018), as 'weak' in Mardin by Seydosoglu *et al.* (2019) and as 'healthy-medium' in Konya by Babalik (2019). These results obtained by the earlier researchers were similar to the results of the present study.

Conclusion

The rate of the vegetation-covered area of the lowland pastures and the incorporation rates of legumes and grasses in the botanical composition was high. It was recorded that plant height, green fodder and dry matter yields from yield characteristics and crude protein content from quality characteristics were high, while ADF and NDF contents were low, and P, K, Ca and Mg contents were at adequate levels. It was concluded that some of the pastures were in 'good' condition, and some were in 'medium' condition. However, all of the pastures were 'healthy'. The abundance of invader species in pastures was a problem. For this reason, it was recommended that the village pastures of Buyuktekoren, Garip and Kumgecit, where pasture status was 'good', should be grazed with appropriate grazing systems to maintain their current status. For Cayagzi, Celtiksuyu, Dik and Saricicek village pastures with 'medium' status, require enhancement in pasture yield and quality.

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