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DETERMINATION NUTRITIVE VALUE AND BOTANICAL COMPOSITION OF PASTURES IN VAN DISTRICT

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ABSTRACT

The aim of this study is to determine the botanical composition and to determine nutritive value of pastures in three locations in Van district. Samples were collected from 21 June (of flowering period) 2004. According to the results of the research, the ratio of Gramimineae, Leguminoseae and other plant species was determined as 41.81%-25.32%-32.87%, 34.57%-36.14%-29.29%, 31.19%-31.05-37.7% for Arısu, Edremit and Kurbaş pastures. The DM and CP contents of Arısu, Edremit and Kurubaş pastures were respectively 24.02%, 24.14%, 18.84%; 11.54%, 9.60%, 11.77% (P<0.05). In conclusion the Gramineae were the predominant flora of pasture. According to crude protein value, roughage obtained grasses were determined medium qualified.

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INTRODUCTION

There is increasing request for ruminant animal production because of the increasing population and improved livelihoods (Rambau *et al*. 2016, Dastagiri 2004). Economic factors and climatic changes put pressure on conventional feeds to remain unaffordable (Chakeredza *et al*. 2007). Grass has been used for cut and carry feeding animals by smallholder (Premarante and Premalal 2006; Nyambati *et al*. 2010; Rambau *et al*. 2016). Meadow and pasture areas constitute 18.8 of the total land area of Turkey. Meadow and pasture areas were 14.6 million hectares and proportion of areas for planting forage crops within field land is 11.7% (Altın *et al*. 2011; TSI, 2013). The objective this study were to determine nutritional value botanical composition of grasses obtained Van district.

MATERIALS AND METHODS

Grass sample: The feed material of the study consists of pastures taken from the producers in Arısu, Edremit and Kurubaş regions of Van province at the end of flowering (21 June).

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Van province is located between 42° 40' and 44° 30° east longitudes and 37°43' and 39° 26' north latitudes. The annual mean temperature is 8.9 °C. In order to determine the grass yield of the pastures, the weeds remaining in a 1 m^2 frame from each of the three pastures were harvested from the bottom and weighed and the grass yield of the pastures was determined. In these samples, natural dry matter analysis was made, and the hay yields of the pastures were calculated by calculation. In addition, 0.25 m2 areas were cut, divided into species when wet, and the rate of participation of species in yield was calculated (Tosun and Altın 1981).

Analytical sample: Chemical analyses were performed an triplicate samples. The fresh samples were dried at 60 °C for 72 h in a fan assisted oven. After drying samples were ground trough a 1 mm mesh screen for chemical analyses. The dry matter (DM) was determined by drying samples at 105 °C for 16 h. Crude protein (CP), Ash and EE contents of samples were determined according to the Lepper. Organic matter (OM) and nitrogen free extracts (NFE) samples were calculated from the chemical composition (Bulgurlu and Ergül 1978).

Statistical analysis: Statistical analyses were performed with the general linear model (GLM) procedure of Duncan's

multiple range test performed with the Statistical Analysis System (1998) Software (SAS, Cary, N.C.).

RESULTS AND DISCUSSION

Distribution of grasses obtained from Arısu, Kurubaş and Edremit pastures by families is given in Table 1 and plant species were given Table 2. When the distribution of plant species on the land is considered for each pastures, it is seen that the plants belonging to the Gramimineae family are the highest in the Arısu meadow, the plants belonging to the Leguminoseae family are highest in the Edremit pastures and the plants belonging to the other families are the highest in Kurubaş pastures. Proportion of gramineas in previous studies in Turkey are between 19.3%-57.0% Kaya *et al*. (2002); Bozkurt and Kaya (2010); Şen and Hatipoğlu (2010); Agin and Kökten (2013); Çınar *et al*. (2015); Öten *et al*. (2016); Babalık *et al*. (2018). Proportion of legumes in similar studies in Turkey were between 1.3%-31.0%. Babalık *et al* (2018); Agin and Kökten (2013); Öten *et al*. (2016). Proportion of other family species in similar studies in Turkey were between 25.4%-64.5% Şen and Hatipoğlu (2010); Agin and Kökten (2013); Öten *et al*. (2016); Seydosoğlu *et al*. (2019). Kaya *et al*. (2002) found 13% proportion of other family species. The result obtained from this study higher than Kaya *et al*. (2002) results. There are numerous factors influencing botanical composition. Thus the nutritive value of grasslands including water avability, effects of climate, type of soil and local geographical location (Andueza *et al*. 2010, Duru *et al*. 1998).

Table 1. Botanical composition of pasture %

Pasture	Gramineae	Leguminoseae	Other Families
Arisu	41.81±5.37	25.32±3.98	32.87±5.97
Edremit	34.57±6.88	36.14±6.02	29.29±5.59
Kurubaş	31.19±5.42	31.05±9.67	37.77±8.95

Table 2. Plant families of the pastures

Pasture	*Gramineae*	*Leguminoseae*	*Other Families*
	Alopecurus myosuroides	*Astragalus odoratus LAM.*	*Carex distans L.*
	Bromus scoparius L.	*Lotus corniculatus L.*	*Carex divulsa STOKES subsp.*
	Bromus sterilis L..	*Medicago sativa L.subsp. sativa L.*	*Cirsium arvense L. SCOP subsp .arvense*
	Cynosurus cristatus L	*Medicago sativa L.subsp. coreulea*	*Cirsium arvense SCOP subsp.vesitum*
	Hordeum geniculatum ALL.	*Trifolium hybridum L.*	*Crepis sancta L.*
	Poa angustifolia L.	*Trifoium pratense L.*	*Taraxacum androssovi*
	Poa pratensis L.	*Trifolium repens L.*	*Anchusa arvensis L.*
	Poa bulbosa L.		*Erodium circutarium L.*
Arısu	*Poa sterilis BIEB.*		*Convolvulus arvensis L.*
	Secale cereale L.		*Veronica pusilla KOTSCHY var.*
			Cardaria draba L.
			Silene vulgaris GARCKE var
			Stellaria kotschyana FENZL
			Polygonum cognatum
			Rumex cripus L.
			Salvia verticiliataL.
			Plantago lancelota l.
			Potentilla anatolica
	Bromus japonicus THUNB	*Lathyrus tuberosus L.*	*Carex dilluta BIEB.*
	Bromus lanceolatus ROTH	*Lotus corniculatus L.*	*Carex divulsa STOKES*
	Elymus nodosus subsp. Gypsicolus	*Medicago lupulina L.*	*Colchicum szovitsii FISCH*
	Glyceria plicata	*Medicago sativa L.*	*Tarxacum purpurespetiolatum*
	Hordeum bulbosum L.	*Trifolium pratense L.*	*Tragopogon longirostis BISCH.*
Edremit	*Poa angustifolia L.*	*Trifolium repens L.*	*Convolvulus arvensis L.*
	Poa pratensis L.	*Vicia sativa L.*	*Pedicularis comosa L.*
			Rhynchocorys odontophylla
			Plantago lancelota L.
			Potentilla speciosa WILD.
			Ranunculus kotschyi BOISS
			Ranunculus oxyspermus WILD
			Chellathas marantae L.
	Elymus nodosus MELDERIS subsp.	*Lotus corniculatus L.*	*Carex diluta BIEB*
	Poa angustifolia L.	*Medicago lupulina L.*	*Carex distans L.*
		Medicago sativa L.	*Cirsium arvense L.*
		Onobrychis.altissima GROSSH	*Taraxacum androssovii*
Kurubaş		*Trifolium pratense L.*	*Taraxacum purpureipetiolatum*
		Trifolium repens L.	*Convolvulus arvensis L.*
			Pedicularis comosa L.
			Cardaria draba L.
			Polygonum cognatum MEISSN
			Salvia verticillate L.
			Plantago lanceolata L.

Table 3. Green grass and hay yields of pasture %

Pasture	Green Yield	Hay yield
Arisu	2812.50±82.60b	662.50±59.45b
Edremit	1428.70±239.60a	370.00±68.77a
Kurubaş	1660.00±323.63a	361.00±87.79a

Distinct letters in the row indicate significant differences (P<0.05)

Green grass and hay yields determined in the studied pastures are given Table 3.When the grass yields of the pastures are examined; it was determined that the green grass yield was 1660-2812 kg/ha, and the hay yield was 361-662.5 kg/ha in Arısu pastures compared to the other two pastures (P<0.05). Previous studies in Turkey showed that green yield ranged between 1781-6072 kg/ha (Çaçan and Kökten 2014; Babalık *et al*. 2017; Yıldız and Özyazıcı 2017). The results obtained from this study and results of previous studies were similar. The other previous study was conducted by Seydosoğlu *et al* (2019) found green grass yield as 1600 kg/ha. This study green grass content higher than previous study conducted Seydosoğlu *et al* (2019). The hay yields ranged between 465-2208 kg/ha (Çaçan and Kökten 2014; Şen and Hatipoğlu 2010; Babalık *et al*. 2017; Yıldız and Özyazıcı 2017). While the hay yield of Arısu pastures was found to be compatible with the previous literature data, the hay yield of Kurubaş and Edremit pastures were lower than the literature reports. The difference with the literature reports is due to the grazing regime of the pastures, ecological and topographic differences.

Nutrient contents of the pastures are given in Table 4. Dry matter content of the pastures varies between 18.84%-24.02%. The highest DM content was found in Edremit with 24.14% and the lowest in Kurubaş pastures with 18.84% (P<0.05). DM findings of the study, Kaya *et al*. (2002) (25.43%), Bozkurt and Kaya (2010) (26.7-35.7%); It was found lower than the findings of Rambau *et al*. (2016) (27.79%) and higher than the findings of Agza *et al*. (2013) (17.2%). Kilcher (1981) stated that a number of factors affect the rate of change in nutrient composition with advancing plant development.

Table 4. Chemical composition of pasture %

Pasture	DM	OM	CP	EE	Ash	CF	NFE
Arısu	24.02±1.89b	89.34±0.45b	11.54±0.90b	1.43±0.05a	10.69±0.45b	37.39±0.74b	38.56±0.74a
Edremit	24.14±1.44b	91.07±0.09c	9.60±0.42a	1.37±0.05a	8.93±0.09a	36.55±0.84ab	43.55±0.61b
Kurubaş	18.84±0.79a	88.48±0.09	11.77±0.38b	1.45±0.08a	11.52±0.09c	34.81±1.52a	40.44±1.24a

DM: dry matter, OM: organic matter, CP: crude protein, EE: ether extract, CF: crude fiber, NFE: free nitrogen extract. Distinct letters in the row indicate significant differences (P<0,05).

These factors are: plant type, season, climate, soil type fertility, soil moisture, leaf steam ratio, morphological and physiological factors and may vary with annual versus perennials, grasses, legumes. OM findings of the study were found in the highest 91.07% Edremit lowest 88.48% Kurubaş pastures (P <0.05). OM findings of the study are similar to those of Kaya *et al*. (2002) (90.35%). Kaya *et al*. (2002) reported that OM concentration is inversely related to ash concentration. CP contents for meadows were determined as 11.54%-9.60%-11.77%, respectively, and the difference was statistically significant (P<0.05). Study findings, Kaya *et al*. (2002) (12.59-16.71%); Şen and Hatipoğlu (2010) (16.3-28.3%); Çaçan and Kökten (2014) (15.30-25.80%); It is lower than the findings of Yıldız and Özyazıcı (2017) (14.30-16.48%), similar to Agza *et al*. (2019) (11.5%); It was found higher than the findings of Çınar *et al* (2013) (10.1%). Denekew (2004) reported that decline in CP content of pasture along with increasing stage of harvesting and it may be due to decrease in leaf to steam ratio, dilution of the CP content by increased structural carbohydrates. Ruminant animals need a minimum of 150 g CP per kg of DM for lactation, growth stage and 75 g CP per kg of DM for rumen function (Norton 1982; Van Soest 1994).

When we examine the EE contents; 1.45% Kurubaş, 1.43% Arısu and 1.37% Edremit pastures, respectively, have the highest values (P<0.05). The EE findings of the study were lower than those of Kaya *et al*. (2002) (1.81-2.21%) and Rambau *et al*. (2016) (3.43%). Differences between the previous studies may be related to vegetation type. McDonalds *et al*. (1995) stated that fat in the forages comprises mainly galactolipids and the EE concentration doesn't change the maturity. Ash contents for pastures were determined as 10.69%-8.93-11.52%, respectively (P<0.05). Ash contents of the study Kaya *et al*. (2002) (8.75-9.55%); Bozkurt and Kaya (2016) (8.92-9.84%); While it is similar to the findings of Agza *et al*. (2013) (11. %), it was found higher than the Ash finding of Rambau *et al*. (2016) (7.71%). Solomon *et al*. (2008) indicated that there is a decrease in total ash content of the natural pasture in late maturity. These differences might be related to dilution and translocation of minerals from vegetative portion of the plant to roots at stage of maturity (Maynard *et al*. 1981). Mc Donald (1995) stated that ash concentration ranged between 8.64-10.31%. This study results met these criteria. The NFE contents of the study were determined as 38.56%-43.55%-40.44% for Arısu, Edremit and Kurubaş pastures, respectively. The highest NFE content was found in Edremit with 43.55% and the lowest 38.56% in Arısu meadow. The differences in the NFE values of the pastures were found to be statistically significant (P<0.05). CF content for Arısu, Kurubaş and Edremit pastures, respectively; It was found as 37.79%-36.55%-34.81%, and the difference was found to be statistically significant (P<0.05). Study CF findings; Kaya *et al*. (2002) (24.66-31.31%); was found higher than the findings of Bozkurt and Kaya (2016) (20.85-26%) and Agza *et al*. (2013) (27.3%).

the difference between the study findings and previous study findings is due to plant variety, soil structure, morphological and physiological factors.

CONCLUSION

The result of this study showed that the Gramineae are the dominant plant population in pasture of Van district. The crude protein contents of pasture met needs of ruminant in lactation and enough for rumen function at flora of pasture.

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