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COMPARISON OF FORAGE YIELD AND NUTRITIONAL VALUES OF NEWLY DEVELOPED GENOTYPES OF HAIRY VETCH (*VICIA VILLOSA* ROTH.)

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Current Trends in Natural Sciences

Abstract
The research was conducted to comprise the forage yield, quality and nutritional values of newly developed hairy vetch (Vicia villosa Roth.) genotypes. The experiment was carried out in subtropical ecological conditions at Güveçli village Süleymanpaşa-Tekirdağ, Türkiye with three replications in randomize block design. Nineteen newly developed hairy vetch lines and cv. Ceylan were used as seed materials. The genotypes were harvested at full-bloom stage to determine green and dry fodder yields (t ha^{-1}). According to the results of the study, natural plant height of hairy vetch genotypes varied between 54.30-100 cm, plant height 124.16-187.85 cm, green fodder yield 41.89-63.29 t ha^{-1}, dry fodder yield 6.35-16.73 t ha^{-1}, dry matter ratio 88.98-89.99%, crude protein ratio 16.72-16.99%, crude fiber ratio 23.51-24.00%, crude ash ratio 7.48-8.10%, NDF 45.63-45.97%, ADF 35.59-35.61%, ADL 12.15-12.20%, P 0.51-0.47%, K 1.93-1.96%, Ca 3.93-4.12%, Mg 0.47-0.50%, tetany ratio 0.42-0.44, digestible dry matter (DDM) 61.16-61.25%, dry matter intake (DMI) 2.61-2.63%, total digestible nutrients (TDN) 55.40-55.54%, net energy for lactation (Nel) 0.5631-0.5647(Mcal lb^{-1}), net energy for maintenance (Nem) 0.5982-0.6000 (Mcal lb^{-1}), net energy for gain (Neg) 0.2712-0.2730 (Mcal lb^{-1}) and relative feed value (RFV) 123.93-124.69%. The highest green fodder yield was recorded in genotypes TYF16 and TYF12, and the highest dry fodder yield in genotype TYF14. The highest crude protein ratio was found in genotype TYF17. When the RFV were examined, it is seen that the hairy vetch genotypes have the characteristic of being high quality roughage. The highest RFV was found in lines TYF16 and TYF9 and cv. Ceylan. The TYF9, TYF12, TYF14, TYF16 and TYF17 genotypes have enough potential and come to the fore to be used for forage production in sub-tropical ecological conditions.

Keywords: Green Fodder Yield, Dry Fodder Yield, Hairy Vetch, Vicia villosa Roth.

1. INTRODUCTION

Forage crop cultivation is a fundamental component influencing livestock production and the yield of animal-derived products for any region and country. It plays a critical role in ensuring optimal animal nutrition and maintaining animal health, both of which are essential for the advancement of animal husbandry. The quality and availability of forage directly affect the efficiency, productivity, and sustainability of livestock systems (Abdikoğlu and Tenikecier, 2022). High-quality roughage is an economical feed source and plays a vital role in ruminant nutrition. It provides essential nutrients such as proteins, lipids, and fiber, which support the function and balance of rumen microflora. Additionally, its richness in minerals and vitamins contributes significantly to animal health and the production of high-quality animal products (Serin and Tan, 2001).

Forage legumes hold a significant position in animal nutrition (Tekeli and Ateş, 2011). Among the legume family, vetch species are the most common group in the cultivation of annual forage crops.

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There are approximately 150-190 vetch (*Vicia* spp.) species, mostly found in the temperate regions of the Old World (Asia, Europe, and Africa), with 15 species naturally occurring in America (ILDIS, 1999; Tekeli and Ateş, 2011). The majority of cultivated vetches are native to Asia and Europe, especially the Mediterranean countries. In the flora of our country, 59 species of vetches are identified (Davis and Plitmann, 1970). There are a total of 35 taxa, including 23 species, 10 subspecies, and 10 varieties belonging to the genus *Vicia* in the Thrace Region (Orak et al., 2017).
Hairy vetch (*Vicia villosa* Roth.) is a leguminous forage crop that can grow in a wide range of climates, from temperate climate zones to continental climate zones characterized by harsh winters and dry summers. The plant has a high tolerance to both cold and drought. With the warming of the weather in spring, the plant shows rapid development. Therefore, its cultivation gains importance especially in regions where the hot climate period is short. Although the plant is highly drought-tolerant, its yield is considerably higher in regions with abundant rainfall. Areas where annual precipitation ranges between 300–550 mm are suitable for the plant to perform well. Hairy vetch is also resistant to short-term waterlogging, which is a desirable trait during periods of high rainfall (Tekeli and Ateş, 2011). The forage obtained from mixtures of hairy vetch with cereal grasses is used directly as green fodder for animals or preserved as silage. Due to the relatively small size of its seeds, unlike other vetch species, it is not commonly used by crushing and feeding the seeds to animals; instead, it is generally grown for seed production. However, it should be noted that when the seeds are crushed and fed to animals, neurotoxic amino acids may cause convulsions and paralysis (Mayland et al., 2007). Hairy vetch can withstand temperatures as low as -17°C. Regarding drought and cold resistance, hairy vetch takes the lead within the vetches (Tekeli and Ateş, 2011).
In the world and in Thrace-Türkiye, the effects of climate change are increasingly evident each passing year. Especially in the last five years, these changes have been observed not only in Tekirdağ but also in other provinces and districts in the Thrace region. For instance, when examining the climate data of the region, it is observed that monthly precipitation amounts are irregular, even if they are close to or similar to the long-term averages. The precipitation that should be spread over a month often falls in one or a few days (Tenikecier, 2023; Tenikecier and Ateş, 2023). Therefore, determining the responses of the existing crop species and varieties and develop new genotypes to climatic irregularities and other adversities is crucial for the sustainability of agricultural production.
Newly genotypes were developed in the context of the drought and cold resistance and high green and dry fodder potential of the hairy vetch. The aim of the research was to comprise the forage yield, quality and nutritional values of newly developed hairy vetch genotypes at Tekirdağ-Türkiye sub-tropical ecological conditions.

2. MATERIALS AND METHODS

The research was conducted in Güveçli, Süleymanpaşa, Tekirdağ, Thrace, Türkiye in 2023-2024 winter season with three replications in randomized block design. The soil properties of the research are were given in Table 1.
Tekirdağ has a 8.90 °C mean temperature, 335.20 mm total precipitation and 79.60% relative humidity at long term period (1972-2022) between december and may, with a typical subtropical climate. The mean temperature, total precipitation and relative humidity were recorded 11.37 °C, 330.20 mm and 80.78% in the study area between December 2023-May 2024 (Anonymous, 2024). Certified cultivar 'Ceylan' and 19 newly developed hairy vetch lines were used as seed material.

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Seeds were sown at 8 kg ha^{-1} (Tekeli and Ates, 2011), in to 6 rows with 5 m long plots by hand with 0.25 m inter-row space on 14 December 2023. A basal fertilizer containing nitrogen and phosphorus

Table 1. Soil properties of the experimental area

	Quantity	
pH		7.40
Lime	%	11.05
Organic Matter	%	3.57
N	%	0.18
P	(ppm)	96.83
K	(ppm)	506.64
Ca	(ppm)	8110.27
Magnesium (Mg)	(ppm)	376.66
Iron (Fe)	(ppm)	7.10
Copper (Cu)	(ppm)	1.64
Zinc (Zn)	(ppm)	2.17
Manganese (Mn)	(ppm)	19.68

(20-20-0, 40 kg N ha^{-1} and 40 kg P ha^{-1}) was incorporated into the soil at the time of seedbed preparation. The plots of the hairy vetch genotypes were harvested at full-bloom stage. The natural plant height (cm), plant height (cm), green fodder yield (t ha $^{-1}$), dry fodder yield (t ha $^{-1}$), dry matter (DM) ratio (%), crude protein (CP) ratio (%), crude fiber (CF) ratio (%), crude ash (CA) ratio (%), neutral detergent fiber (NDF, %) content, acid detergent fiber (ADF %) content, acid detergent lignin (ADL, %) content, phosphorus (P, %) ratio, potassium (K, %) ratio, calcium (Ca, %) ratio, magnesium (Mg, %) ratio, tetany ratio (K/Ca+Mg), digestible dry matter (DDM, %), dry matter intake (DMI, %), total digestible nutrients (TDN, %), net energy-lactation (Nel, Mcal lb^{-1}), net energy-maintenance (NEm, Mcal lb^{-1}), net energy-gain (Neg, Mcal lb^{-1}), relative feed value (RFV, %) were determined. Natural plant height and plant heights were measured by meter. The half of the plots were harvested and weighed to determine the green fodder yield. Over 60°C's can damage protein and elevated fiber and lignin values when oven drying (Reed and Van Soest, 1984). Fresh samples were dried at 55 °C for 48 hours followed by storage for a further day at room temperature (Tenikecier and Ates, 2019), and weighed to determine the dry fodder yield, then ground to small (≤1 mm) pieces and used for the analyses. DM ratio was determined as described by Pereira et al. (2019). The samples were analyzed for N using procedures of the Association of Official Analytical Chemists (AOAC, 2019). CP ratio of the samples were calculated by multiplying N contents by a coefficient of 6.25. The CF and CA ratios, NDF, ADF and ADL contents were determined by Weende and Van Soest methods (AOAC, 2019; Van Soest et al., 1991). The samples were wet-fired with nitric-perchloric acid, and P content was determined spectrophotometrically, while K, Ca and Mg contents were obtained using an atomic absorption spectrophotometer (ICP- OES, inductively coupled plasma-optical emission spectrometer) (Isaac and Johnson JR, 1998). The tetany ratio was calculated described as (Cherney et al., 2002). The digestible dry matter (DDM), dry matter intake (DMI), total digestible nutrients (TDN), net energy lactation (NEl), net energy-maintenance (NEm), net energy-gain (NEg) and relative feed value (RFV) were calculated according to the equations adapted from common formulas for forages (Schroeder, 1994). All samples were analyzed in duplicate.

All data were analyzed statistically by analysis of variance and means of treatments were compared using Tukey test using TARPOPGEN-TARIST software.

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3. RESULTS AND DISCUSSIONS

The research results were given in Tables 2-5. The differences between the means of the natural plant height, plant height, green fodder yield, dry fodder yield, DM, CP, CF, CA, NDF, ADF, ADL, Ca, tetany ratio, DDM, DMI, TDN, Nel, Nem, Neg and RFV were found statistically significant at $P \leq 0.01$, P and K were found statistically significant at $P \leq 0.05$ and Mg was found statistically non-significant.

The natural plant heights of hairy vetch genotypes varied between 54.30-100.00 cm and the highest was determined in TYF4 genotype. Plant heights of the hairy vetch genotypes varied between 124.16-187.85 cm and the highest were determined in TYF9 and TYF21 (187.35 cm and 187.85 cm) genotypes. Green fodder yields and the dry fodder yields of the hairy vetch genotypes were varied between 41.89-63.29 t ha^{-1} and 6.35-16.73 t ha^{-1} respectively. While the highest green fodder yields were determined in TYF12 and TYF16 (63.00 and 63.29 t ha^{-1}) genotypes, the highest dry fodder yield was in TYF14 genotype. Çelen et al. (2005) determined the dry fodder yield of hairy vetch 6.07 t ha^{-1}. Türk et al. (2009) determined the dry fodder yield of hairy vetch at full bloom stage 3.81 t ha^{-1}. Zeybek (2010) determined the plant height 96.70 cm and green fodder yield 18.28 t ha^{-1} of hairy vetch in Tekirdağ conditions. Özdemir et al. (2021) obtained plant height, green fodder and dry fodder yields between 126.90-169.50 cm, 18.80-24.46 t ha^{-1} and 0.31-0.48 t ha^{-1} from hairy vetch genotypes respectively. Plant heights of the hairy vetch genotypes were determined higher than Zeybek (2010) and Özdemir et al. (2021). The green fodder and dry fodder yields were determined higher than those researchers.

While the DM ratios of hairy vetch genotypes were varied between 88.98-89.99%, the highest ratios were determined in TYF34 (89.89%), TYF28 (89.90%), TYF1 (89.95%) and TYF21 (89.99%) genotypes respectively. While the CP ratio of hairy vetch genotypes were varied between 16.72-16.99%, the highest ratio was determined in TYF17 genotype. The CF ratios of hairy vetch genotypes were varied between 23.51-24.00% and the lowest ratio was determined in TYF4 genotype. The CA ratios of hairy vetch genotypes were varied between 7.48-8.10% and the lowest ratio was determined in TYF1 genotype. Çelen et al. (2005) determined the CP ratio 16.25%. Turgut et al. (2006) determined the CP of the hairy vetch at different harvest stages between 16.00-20.20%. Türk et al. (2009) determined the CP ratio of hairy vetch at full bloom stage 13.88%. Georgieva et al. (2016), determined the mean of the CP and CF of hairy vetch genotypes 211.40 g kg^{-1} and 230.45 g kg^{-1} respectively. Güzeloğulları and Albayrak (2016) determined the CP of hairy vetch 21.35%. Akdeniz et al. (2018) determined DM 89.70%, CA 3.90% and CP 26.83% of four hairy vetch genotypes respectively. Özdemir et al. (2021) determined the CP and CA ratio between 17.30-18.50% and 8.90-9.70% respectively. Özyiğit and Bilgen (2006) determined the CF and CA 23.44% and 9.97% respectively. The DM, CP, CF and CA results were found similar to the researchers.

The NDF, ADF and ADL content of the hairy vetch genotypes were varied between 45.63-45.97%, 35.59-35.61% and 12.15-12.20% respectively. While the lowest NDF content was determined in TYF16 genotype, the lowest ADF content was determined in TYF28 genotype and the lowest ADL contents were determined in TYF4, TYF9 and TYF13 (12.15%) genotypes. Turgut et al. (2006) determined the NDF of the hairy vetch at different harvest stages between 43.90-54.00%. Türk et al. (2009) determined the NDF and ADF 28.54% and 22.44%. Georgieva et al. (2016), determined the mean of the NDF, ADF and ADL of the hairy vetch genotypes 438.40 g kg^{-1}, 378.45 g kg^{-1} and 74 g kg^{-1} respectively. Akdeniz et al. (2018) determined NDF 37.92%, ADF 12.73% and ADL 3.24%

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Table 2. Natural plant height, plant height, green fodder yield, dry fodder yield and dry matter ratio of hariy vetch genotypes

Genotypes	Natural Plant Height (cm)	Plant Height (cm)	Green fodder Yield (t ha $^{-1}$)	Dry Fodder Yield (t ha $^{-1}$)	Dry Matter ratio (%)
cv. Ceylan	67.89i	124.16b	41.89k	6.35i	89.60ab
TYF1	71.30h	155.45ab	52.20def	13.05cde	89.95a
TYF4	100.00a	131.10b	49.86e-h	10.42gh	88.98c
TYF9	87.10d	186.35a	53.00de	14.45bc	89.82 ab
TYF10	98.40b	167.25ab	47.65g-j	15.58ab	89.60 ab
TYF12	64.70j	140.25ab	63.00a	13.08cde	89.04c
TYF13	92.50c	150.75ab	47.00g-j	13.16cde	89.34bc
TYF14	82.30e	164.40ab	59.87ab	16.73a	89.62ab
TYF16	79.00f	145.75ab	63.29a	12.01efg	89.81ab
TYF17	58.50l	149.90ab	54.80cd	12.26d-g	89.75ab
TYF19	77.60f	144.15ab	50.73efg	11.64e-h	89.71ab
TYF20	74.20g	172.15ab	43.71jk	9.82h	89.72ab
TYF21	63.50j	187.85a	50.80d-g	14.28bcd	89.99a
TYF24	93.20c	168.75ab	57.91bc	10.91fgh	89.84ab
TYF27	70.50h	151.85ab	52.00def	11.27e-h	89.70ab
TYF28	56.50m	137.45ab	49.51e-h	15.85ab	89.90a
TYF30	71.50h	156.75ab	52.00def	11.56e-h	89.98a
TYF33	61.20k	149.60ab	48.20f-i	12.52c-f	89.82ab
TYF34	60.70k	164.15ab	46.13hij	11.72e-h	89.89a
TYF36	54.30n	128.85b	44.87ijk	9.80h	89.84ab
Mean	*74.24*	*153.85*	*51.42*	*12.32*	*89.69*
Tukey	1.5609**	54.7920**	4.0707**	2.0964**	0.5104**

** P ≤ 0.01

Table 3. Crude protein ratio, crude fiber ratio,crude ash ratio, NDF, ADF and ADL of hariy vetch genotypes

Genotypes	Crude Protein Ratio (%)	Crude Fiber Ratio (%)	Crude Ash ratio (%)	NDF (%)	ADF (%)	ADL (%)
cv. Ceylan	16.91a-e	23.81cde	8.04a	45.63i	35.61a	12.18ab
TYF1	16.79ef	23.67g	7.48b	45.94ab	35.50de	12.19ab
TYF4	16.98ab	23.51h	8.10a	45.97a	35.51cde	12.15b
TYF9	16.87a-e	23.86b-e	7.92a	45.78e-h	35.51cde	12.15b
TYF10	16.93a-d	23.70fg	7.94a	45.85def	35.53cde	12.17ab
TYF12	16.81def	23.82cde	7.95a	45.85cde	35.50de	12.20a
TYF13	16.84c-f	23.79def	7.91a	45.90a-d	35.56a-d	12.15b
TYF14	16.96abc	23.83b-e	8.07a	45.76fgh	35.55a-e	12.17ab
TYF16	16.80ef	23.70fg	8.03a	45.73h	35.55a-e	12.16ab
TYF17	16.99a	23.79def	7.91a	45.88bcd	35.54b-e	12.17ab
TYF19	16.81def	23.76efg	7.98a	45.83d-g	35.53cde	12.18ab
TYF20	16.72f	23.77efg	7.87a	45.79e-h	35.60ab	12.19ab
TYF21	16.79ef	23.77efg	8.02a	45.77e-h	35.54b-e	12.18ab
TYF24	16.86b-e	23.90abc	8.03a	45.85cde	35.54b-e	12.17ab
TYF27	16.87a-e	24.00a	8.05a	45.85cde	35.56a-d	12.19ab
TYF28	16.82def	23.93ab	7.94a	45.84d-g	35.49e	12.16ab
TYF30	16.86b-e	23.81cde	7.97a	45.94abc	35.54b-e	12.18ab
TYF33	16.96abc	23.76efg	8.00a	45.85cde	35.57abc	12.20a
TYF34	16.84c-f	23.88bcd	8.02a	45.83d-g	35.55a-e	12.19ab
TYF36	16.96abc	23.93ab	7.91a	45.76gh	35.55a-e	12.18ab
Mean	*16.87*	*23.80*	*7.96*	*45.83*	*35.54*	*12.17*
Tukey	0.1270**	0.1044**	0.3886**	0.0868**	0.0653**	0.0410**

** P ≤ 0.01

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Table 4. P, K, Ca, Mg contents and Tetany ratio of hariy vetch genotypes

Genotypes	P (%)	K (%)	Ca (%)	Mg (%)	Tetany ratio (K/Ca+Mg)
cv. Ceylan	0.49ab	1.94ab	4.12a	0.49	0.42b
TYF1	0.48ab	1.95ab	3.97bcd	0.49	0.44a
TYF4	0.46b	1.94ab	3.94cd	0.48	0.44a
TYF9	0.49ab	1.95ab	4.01b	0.50	0.43ab
TYF10	0.50ab	1.96a	3.96bcd	0.48	0.44a
TYF12	0.48ab	1.95ab	3.93d	0.47	0.44a
TYF13	0.47b	1.93ab	3.96bcd	0.49	0.43ab
TYF14	0.51a	1.92b	3.99bcd	0.48	0.43ab
TYF16	0.49ab	1.95ab	3.97bcd	0.50	0.44a
TYF17	0.49ab	1.95ab	4.00bc	0.48	0.44a
TYF19	0.48ab	1.95ab	3.97bcd	0.49	0.44a
TYF20	0.49ab	1.94ab	3.99bcd	0.49	0.43ab
TYF21	0.50ab	1.95ab	4.02b	0.49	0.43ab
TYF24	0.50ab	1.94ab	3.94cd	0.50	0.44a
TYF27	0.48ab	1.93ab	3.99bcd	0.49	0.43ab
TYF28	0.49ab	1.95ab	3.97bcd	0.49	0.44a
TYF30	0.49ab	1.94ab	3.94cd	0.48	0.44a
TYF33	0.49ab	1.96a	3.99bcd	0.49	0.44a
TYF34	0.48ab	1.94ab	3.97bcd	0.49	0.43ab
TYF36	0.49ab	1.95ab	3.98bcd	0.50	0.43ab
Mean	*0.49*	*1.94*	*3.98*	*0.49*	*0.44*
Tukey	0.0378*	0.0319*	0.0689**	ns	0.0150 **

*P≤ 0.05, **P ≤ 0.01, ns: non-significant

Table 5. DDM, DMI, TDN, Nel, Nem, Neg and RFV of hariy vetch genotypes

Genotypes	DDM (%)	DMI (%)	TDN (%)	Nel (Mcal lb^{-1})	Nem (Mcal lb^{-1})	Neg (Mcal lb^{-1})	RFV (%)
cv. Ceylan	61.16d	2.63a	55.40e	0.5631e	0.5982d	0.2712d	124.69a
TYF1	61.25a	2.61c	55.53ab	0.5646ab	0.5999a	0.2729a	124.02ghi
TYF4	61.24ab	2.61c	55.52abc	0.5645abc	0.5997ab	0.2727ab	123.93i
TYF9	61.24ab	2.62b	55.52abc	0.5645abc	0.5997ab	0.2727ab	124.45abc
TYF10	61.22abc	2.62b	55.49a-d	0.5642abc	0.5994abc	0.2724abc	124.22c-g
TYF12	61.25a	2.62b	55.53ab	0.5645ab	0.5998ab	0.2728ab	124.26c-g
TYF13	61.20a-d	2.61c	55.46b-e	0.5638b-e	0.5990a-d	0.2720a-d	124.04f-i
TYF14	61.21abc	2.62b	55.47a-e	0.5640a-d	0.5991a-d	0.2721a-d	124.43bcd
TYF16	61.21abc	2.62b	55.47a-e	0.5640a-d	0.5991a-d	0.2721a-d	124.51ab
TYF17	61.21abc	2.62b	55.48a-d	0.5640a-d	0.5992abc	0.2722abc	124.11e-i
TYF19	61.22abc	2.62b	55.49a-d	0.5642abc	0.5994abc	0.2724abc	124.27c-f
TYF20	61.17cd	2.62b	55.42de	0.5633de	0.5984cd	0.2714cd	124.28b-e
TYF21	61.22abc	2.62b	55.48a-d	0.5641a-d	0.5993abc	0.2723abc	124.42bcd
TYF24	61.22abc	2.62b	55.48a-d	0.5641a-d	0.5993abc	0.2723abc	124.20d-h
TYF27	61.20a-d	2.62b	55.46b-e	0.5638b-e	0.5990a-d	0.2720a-d	124.17e-h
TYF28	61.25a	2.62b	55.54a	0.5647a	0.6000a	0.2730a	124.32b-e
TYF30	61.21abc	2.61c	55.48a-d	0.5640a-d	0.5992abc	0.2722abc	123.97hi
TYF33	61.19bcd	2.62b	55.45cde	0.5637cde	0.5988bcd	0.2718bcd	124.16e-i
TYF34	61.21abc	2.62b	55.47a-e	0.5639a-e	0.5991a-d	0.2721a-d	124.25c-g
TYF36	61.21abc	2.62b	55.47a-e	0.5640a-d	0.5991a-d	0.2721a-d	124.45bc
Mean	*61.22*	*2.62*	*55.48*	*0.5641*	*0.5992*	*0.2772*	*124.26*
Tukey	0.0530**	0.0068**	0.0755**	0.0008**	0.0010**	0.0010**	0.2401**

**P ≤ 0.01

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respectively. Özdemir et al. (2021) determined the NDF and ADF between 47.60-48.40% and 36.1-39.30% respectively. The NDF, ADF and ADL results were found similar to the researchers

The P ratios of the hairy vetch genotypes were varied between 0.47-0.51%, K ratios were varied between 1.93-1.96%, Ca ratios were varied between 3.93-4.12% and Mg ratios were varied between 0.47-0.50% respectively. While the highest P ratio was determined in TYF14 genotype, the highest K ratio was determined in TYF33 genotype and Ca ratio was determined in TYF1 genotype. While the tetany ratios of the hairy vetch genotypes were varied between 0.42-0.44, the lowest tetany ratio was determined in cv. Ceylan. Çelen et al. (2005) determined the P, K, Ca, Mg and Tetany ratios of the hairy vetch 0.55%, 2.07%, 4.24%, 0.29% and 0.45 respectively. Türk et al. (2009) determined the P, K, Ca, Mg and Tetany ratios of the hairy vetch 0.18%, 1.39%, 1.44%, 0.37% and 0.80 respectively. The P, K, Ca, Mg and Tetany ratios results were found similar to the researchers.

The DDM ratios of the hairy vetch genotypes were varied between 61.16-61.25%, DMI ratios were varied between 2.61-2.63%, TDN ratios were varied between 55.40-55.54%, Nel was varied between 0.5631-0.5647Mcal lb^{-1}, Nem was varied between 0.5982-0.6000 Mcal lb^{-1}, Neg was varied between 0.2712-0.2730 Mcal lb^{-1} and RFV was varied between 123.93-124.69%. The highest DDM of the hairy vetch genotypes were determined in TYF1, TYF12 and TYF28 (61.25%) genotypes. The highest DMI of the hairy vetch genotypes was determined in cv. Ceylan genotype. The highest TDN, Nel, Nem and Neg of the hairy vetch genotypes were determined in TYF28 genotype. The highest RFV of the hairy vetch genotypes were determined in cv. Ceylan (124.69%), TYF16 (124.51%) and TYF9 (124.45%) genotypes. Özdemir et al. (2021) determined the DDM, DMI and RFV value between 58.30-60.80%, 2.48-2.52% and 114.00-117.00% respectively. The results were consistent with those reported by previous researchers. The observed differences may be attributed to variations in regional conditions, climate, and cultivar characteristics.

4. CONCLUSIONS

When the research results examined the highest green fodder yield was recorded in lines TYF16 and TYF12, and the highest dry fodder yield in line TYF14. The highest crude protein ratio was found in line TYF17. When the RFV were examined, it is seen that the hairy vetch lines have the characteristic of being high quality roughage. The highest RFV was found in TYF16, TYF9 and cv. Ceylan. The TYF9, TYF12, TYF14, TYF16 and TYF17 genotypes have enough potential and come to the fore to be used for forage production in sub-tropical ecological conditions.

5. REFERENCES

Abdikoğlu, D.İ., Tenikecier, H.S. (2022). The current status of forage crops at trakya region and determination of roughage deficit. ISPEC 9th International Conference on Agriculture, Animal Sciences and Rural Development, 19-20 March, Burdur, Turkey.

Akdeniz, H., Koç, A., Hossain, A., El Sabagh, A. (2018). Nutritional values of four hairy vetch (*Vicia villosa* Roth.) varieties grown under mediterranean environment. *Fresenius Environmental Bulletin, 27(8)*, 5385-5390.

Anonymous. (2024). Turkish State, Meteorological Service. Retrieved, April 30, 2024, from, https://mgm.gov.tr/

Anonymous. (2025). Tarpopgen-Tarist Statistical Software. https://tarpopgen-tarist.com/

AOAC (2019). Official Methods of Analysis of AOAC International. 21st Ed, Association of Official Analytical Chemists, USA.

Cherney, J.H., Mikhailova E.A., Cherney, D.J.R. (2002). Tetany potential of orchard grass and tall fescue as influenced by fertilization with dairy manure or commercial fertilizer. *Journal of Plant Nutrition, 25,* 1501-1525.

Çelen, A.E., Çimrin, M.K., Şahar, K. (2005). The herbage yield and nutrient content of some vetch (*Vicia* sp.) species. *Journal of Agronomy, 4(1),* 10-13.

Davis, P.H., Plintman, U. (1970). *Vicia* L. Flora of Turkey and East Aegean Island. Volume No. 3. Edinburgh University Press, Edinburgh.

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Georgieava, N., Nikolova, I., Naydenova, Y. (2016). Nutritive value of forage of vetch cultivars (*Vicia sativa* L., *Vicia villosa* Roth.). *Banat's Journal of Biotechnology, VII(14),* 5-12. https://doi.org/10.7904/2068–4738–VII(14)–5

ILDIS. (1999). International Legume Database and information Service. Retrieved, May 10, 2019, from, http://www.ildis.org/

Isaac, R.A., Johson, W.C. Jr. (1998). Elemental Determination by Inductively Coupled Plasma Atomic Emission Spectrometry. In: Kalra, Y. P., Ed., Handbook of Reference methods for Plant Analysis, pp. 165–170. Crc Press.

Mayland, H.F., Cheeke, P.R., Majak, W. (2007). Forage-induced Animal Disorders. In: Forages: The Science of Grassland Agriculture. Barnes, R.F., Nelson, C.J., Moore, K.J., Collins, M. (eds). Blackwell Publishing, Ames, Iowa, USA, p. 697-707.

Orak, A., Şen, C., Nizam, I., Güler, N., Ersoy, H., Tenikecier, H.S., Demirkan, A.K. (2017). Determination of morphological characteristics and forage yield of some vetch species collected at Trakya Region. 2nd International Balkan Agriculture Congress, 16-18 May, Tekirdağ, Turkey.

Özdemir, S., Uçar, R., Kökten, K., Kaplan, M., Çaçan, E. (2021). Evaluation of some hairy vetch (*Vicia villosa* Roth.) varieties in terms of herbage yield and quality in Bingöl ecological conditions. ISPEC 8th International Conference on Agriculture, Animal Sciences and Rural Development, 24-25 December, Bingöl, Turkey.

Özyiğit, Y., Bilgen, M. (2006). Effect of different cutting stages on some quality factors in various legume forage crops. *Akdeniz University Agricultural Faculty Journal, 19(1),* 29-34.

Pereira, D.S, Lana, R. de P., Carmo, D.L. do, Costa, Y.K.S. da (2019). Chemical composition and fermentative losses of mixed sugarcane and pigeon pea silage. *Acta Scientiarum Animal Sciences, 41(1),* e43709.

Reed, J.D., Van Soest, P.J. (1984). Estimating the nutritive value of crop residue and agro-industrial by-products by chemical methods. Proceedings of the FAO/ILCA Expert Consultation 5–9 March, Addis Ababa, Ethiopia.

Schroeder, J.W. (1994). Interpreting Forage Analysis. Extension Dairy Specialist (NDSU), AS-1080, North Dakota State University, USA.

Serin, Y., Tan, M. (2001) Introduction to Forage Crops Culture (In Turkish). Atatürk University, Agricultural Faculty Press, No: 206, 217pp.

Tekeli, A.S., Ates, E. (2011). Forage Legumes. Renovated II. Printing Sevil Grafik Tasarim ve Cilt Evi, Tekirdag, Turkey (In Turkish).

Tenikecier, H.S. (2023). Effect of different sowing times on seed yield of some hungarian vetch (*Vicia pannonica* Crantz.) cultivars. Ege 10th International Conference on Applied Sciences, 22 -24 December, İzmir, Türkiye.

Tenikecier, H.S., Ates, E. (2019). Effect of altitude on morphological and nutritive characteristics of orchard grass (*Dactylis glomerata* L.) collected from natural flora of Ganos Mountain in Thrace region, Turkey. *Range Mgmt. & Agroforestry, 40,* 286-292.

Tenikecier, H.S., Ateş, E. (2023). Effect of different sowing times on seed yield of some common vetch (*Vicia sativa* L.) cultivars. Ege 10th International Conference on Applied Sciences, 22 -24 December, İzmir, Türkiye.

Turgut, L., Yanar, M., Kaya, M., Tan, M. (2006). Raw nutrient contents of some vetch species harvested in different maturity stages and their in situ ruminal degradabilities. *Atatürk University Agricultural Faculty Journal, 37(2)*, 181-186.

Türk, M., Albayrak, S., Yüksel, O. (2009) Effects of fertilisation and harvesting stages on forage yield and quality of hairy vetch (*Vicia villosa* Roth.), *New Zealand Journal of Agricultural Research, 52(3),* 269-275. https://doi.org/10.1080/00288230909510511

Van Soest, P.J., Robertson, J.B., Lewis, B.A. (1991). Methods for dietary fibre, neutral detergent fibre, and nonstarch polysaccharides in relation to animal nutrition. *J. Dairy Sci., 74,* 3583–3597.

Zeybek, A. (2010). The cultivars belong to some vetch species determined Tekirdağ lowland conditions yield and plant characteristics. MSc. Thesis. Konya: Selçuk University, Turkey (In Turkish).

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