Legume Research, 42(5) 2019: 671-675
Print ISSN:0250-5371 / Online ISSN:0976-0571

AGRICULTURAL RESEARCH COMMUNICATION CENTRE
www.arccjournals.com

Influence of locations under same climatic zone on some common vetch lines (*Vicia sativa* L.)

Mehmet Oten*[1], Cengiz Erdurmus[1], S. Kiremitci[1] and Celal Yucel[2]

Bati Akdeniz Agricultural Research Institute,
07100-Antalya/Turkey.
Received: 22-01-2019 Accepted: 12-06-2019 DOI: 10.18805/LR-476

ABSTRACT

Two experiments each following randomized complete block design with three replications were conducted simultaneously in Antalya and Adana locations in 2015-2016 growing season with 9 different common vetch lines and 3 cultivars to compare their yield and quality performance with respect to 17 different characters and also to find the relationships between them. The results revealed that interlocational difference of mean values for the characters were more pronounced than those within location. From yield and quality parameters investigated in this study significant differences could be noticed for the morphological characters at large and a for a few of the quality characters. Although no line could be identified to be superior for a good number of characters, line 2 has been recognized to be superior.

Key words: Common vetch, Legume, Location, Quality, Yield.

INTRODUCTION

As regards stable agricultural production under the changing climate, genetic tailoring of different varieties to make them compatible with different climate and environmental conditions is immensely required. Stable performance of genotype over time and environment worked out through genotype x environment interaction remains a great challenge in crop improvement. Legumes are very essential nutrition for humans and animals (Arslan, 2017). Common vetch (*Vicia sativa* L.) has high adaptation capacity (Kokten *et al.,* 2016) for this reason it is a widespread forage legume in rainfed and semi arid systems of the Mediterranean Region (Dhima *et al.,* 2007; Oten *et al.,* 2018). Lack of adaptation of genotypes to different environments has been one of the most important barriers that stands in the way of the crop to be widely adopted by the farmers belonging to differeent environments. The studies on this crop under different ecological conditions in the Turkey by several researchers reveal a wide range of variation for plant height (Seydosoglu, 2014; Erdurmus *et al.,* 2010; Cil *et al.,* 2006); yield of grain (Babat and Anlarsal, 2011; Seydosoglu, 2014) and crude protein ratio (Yucel *et al.,* 2014; Temel *et al.,* 2015). Therefore, this study was carried out to determine the effects of different environmental conditions in Turkey on the yield and quality of common vetch lines and varieties to identify suitable line that can be recommended for different climatic conditions.

MATERIALS AND METHODS

The experiments were carried out in the respective fields of both Bati Akdeniz Agricultural Research Institute and Dogu Akdeniz Agricultural Research Institute in 2015-2016 growing season. Although Adana and Antalya belong to similar climate zone, but differences in precipitation and temperature even in the same year is evident. During the trial, Adana received lower total rainfall than that of Antalya. However, the temperature in Antalya was higher than that in Adana. Soil samples of Adana, collected from experimental plot before sowing revealed a salinity of 0.4 dSm^{-1}, pH 7.7, calcium carbonate ($CaCO_3$) 20.0 %, organic matter 2.0 %, clay % 31.2 % and silt 0.65 dSm^{-1}. The soil of the research area was clay-loam-silt in texture, non-saline and rich in calcium carbonate and slightly alkaline in pH. The land of the research area of Antalya had salinity 0.042 %, pH 8.5, calcium carbonate ($CaCO_3$) 33.0 %, organic matter 2.4 %, clay 33.0 % and silt 52.0 %. The soil texture was silty-clay-loamly soil containing adequate organic matter. Used plant materials in this study, obtained from the previous project called "Common vetch breeding studies". The material that 2, 4 and 9 numbered lines collected form Antalya natural flora. Also, 1,3,5,6,7 and 8 numbered lines were obtained from ICARDA (The International Center for Agricultural Research in the Dry Areas). These lines were determined as superior due to their high performance, therefore selected and used in this study. Experimental material comprising 9 candidate lines and 3 commercial varieties (Yucel, Ozveren and Alper) were used to compare yield and attributing traits from field trials conducted in the aforementioned two locations following a randomized block design with three replications. Sowing was done on November 4 and on December 10, 2015 in Antalya and in Adana respectively.

*Corresponding author's e-mail: moten07@hotmail.com
[1]Bati Akdeniz Agricultural Research Institute, 07100-Antalya/Turkey.
[2]Sirnak University, The Faculty of Agriculture, 73000-Sirnak/Turkey.

Plot size and seed rate were 5 x 2.5 m^{-2} and 100 kg ha^{-1} respectively. Compound fertilizer (50 kg ha^{-1} N and P_2O_5 10 kg ha^{-1}) was applied to the soil before sowing. Manual weeding was done as and when its required. The number of flowering days, main stem length (cm), plant height (cm), the number of main stem, main stem thickness (mm), the number of physical maturity day yield of dry matter (kg ha^{-1}), yield of grain (kg ha^{-1}), biological yield (kg ha^{-1}), thousand grain weight (g), number of pods per plant, the number of seed per pod, harvest index (%), acid detergent fiber (ADF), neutral detergent fiber (NDF), crude protein in grain (%) and crude protein in dry matter (%) were investigated in this study. Besides quality parameters, the data for other parameters were analyzed following the technical instructions for leguminous forage crops published by the Seed Registration and Certification Centre (Anonymous, 2001). Acid detergent fiber and neutral detergent fibers in straw were analyzed according to Van Soest *et al.,* (1991). Nitrogen content in seeds was determined by the Kjeldahl method following Nelson and Sommers (1980). For calculating crude protein content the nitrogen content values were multiplied by 6.25 (Oba and Allen, 1999). These data were analyzed following Duncan's Multiple Range Test at P = 0.05.

RESULTS AND DISCUSSION

Since there were 17 different characters studied in the present experiment, for convenience the mean values have been presented in two different tables. Considering the characters as presented in Table 1, significant difference could be noticed between the vetch lines and varieties as revealed by the mean values for location, genotype and genotype x location except in case of biological yield for location; main stem length, main stem thickness and yield of dry matter for genotype and main stem thickness, yield of dry matter, yield of grain and biological yield for genotype x location values. Therefore, it may be stated that location played an important role for expression of the characters. Considering the mean values for different genotypes at a particular location for a character no significant difference could be noticd but considering the same in the two different locations, the differences were significant for six different characters.

In terms of the number of flowering days, all genotypes were found to be earlier in Adana location (96 days) than in Antalya (140 days) location. Earlier studies by Sayar *et al.,* (2009), in Diyarbakır condition, Cil *et al.,* (2006) in Harran Plain conditions and Albayrak and Tongel, (2003) in Samsun conditions indicated different results. Interestingly, the previous findings corroborated the present report as observed at Antalya but they were higher in Adana than the present findings. Such differential response may be attributed to difference in sowing time in the two locations. Such significant inter-location difference of mean values

Table 1: Morphological features values of the common vetch lines and varieties.

Genotypes	The number of flowering days (Day)		The number of physical maturity day (Day)		Main stem length (cm)		Natural plant height (cm)		The number of main stem (Number)		Main stem thickness (mm)		Yield of dry matter (kg ha^{-1})		Yield of grain (kg ha^{-1})		Biological yield (kg ha^{-1})		Means
	Adana	Antalya	Adana	Antalya	Adana	Antalya	Adana	Antalya	Adana	Antalya	Adana	Antalya	Adana	Antalya	Adana	Antalya	Adana	Antalya	
1	97.3 d	143.3 ab	123.3 b	201.3 a	97.1 b	138.3 a	50.0 ac	50.6 ac	2.60 b	3.33 ab	3.53	4.16	9695	9819	1060 ıj	1360 hı	7911	8496	8203 d
2	96.7 d	143.0 ab	122.7 b	203.3 a	97.1 b	133.9 a	48.5 ac	48.3 ac	2.87 b	3.33 ab	3.20	4.09	11916	7808	1830 eh	2513 ad	11400	12456	11928 a
3	98.0 d	144.7 a	124.0 b	203.7 a	97.3 b	130.6 a	52.9 ac	55.1 ac	2.27 b	3.67 ab	3.13	4.04	12680	8237	2048 cg	2776 ab	9435	7619	8527 cd
4	96.0 d	142.7 ab	122.0 b	200.7 a	91.3 b	135.6 a	42.5 bc	51.7 ac	2.47 b	3.00 b	2.80	4.09	12381	9682	1820 eh	2237 ae	8444	8961	8703 cd
5	98.3 d	142.3 ab	125.0 b	200.3 a	87.2 b	130.0 a	44.6 ac	49.8 ac	2.80 b	2.33 b	3.33	4.13	10009	7919	1580 fı	2347 ae	10000	11005	10502 ac
6	100.0 d	143.3 ab	127.0 b	202.7 a	98.1 b	119.8 a	53.3 ac	48.9 ac	2.27 b	4.67 a	3.20	4.07	11789	9011	1441 gı	2388 ae	10844	8623	9733 ad
7	100.0 d	141.0 ac	127.0 b	200.3 a	94.6 b	125.6 a	45.7 ac	48.9 ac	2.27 b	2.67 b	2.93	4.22	12326	11089	549 j	1575 fı	8355	8969	8662 cd
8	96.0 d	142.0 ab	122.0 b	200.0 a	89.9 b	137.8 a	41.9 c	56.7 a	2.33 b	2.33 b	3.07	3.56	10807	8508	2159 bf	2434 ae	10800	12766	11783 a
9	96.0 d	142.0 ab	122.0 b	201.7 a	91.4 b	122.2 a	50.1 ac	54.8 ac	2.20 b	3.67 ab	3.07	4.01	13017	7638	2810 a	2709 ab	10844	10064	10454 ad
Yucel	96.0 d	142.6 ab	122.0 b	201.7 a	94.5 b	131.4 a	54.3 ac	52.8 ac	2.80 b	2.67 b	3.00	4.14	13803	9845	2352 ae	2307 ae	10577	11691	11134 ab
Ozveren	99.3 d	137.3 c	126.0 b	198.7 a	95.1 b	120.9 a	51.5 ac	56.1 ab	2.87 b	2.67 b	3.00	4.14	11605	8168	1944 dh	1960 ch	10264	11194	10729 ac
Alper	96.0 d	140.0 bc	122.0 b	198.0 a	94.7 b	123.1 a	42.6 ac	52.7 ac	3.20 ab	3.00 b	2.80	4.14	14074	9145	2586 ac	2201 af	9422	8308	8865 bd
Means	97.47 B	142.03 A	123.75 B	201.03 A	94.03 B	129.09 A	48.18 B	52.19 A	2.58 B	3.11 A	3.09 B	4.07 A	12008A	8906 B	1848 B	223.4 A	9858	10013	9935
Location	35733.55**		107493.39**		22132.911**		289.06**		5.12**		17.20**		1732752.6*		1732752.6**		4307.2		
Genotypes	83.83**		117.11*		781.080		495.95*		6.40*		1.22		548845.2		548845.2*		1161124.0**		
Genotypesx	120.77**		114.61*		1049.863*		475.34*		11.96**		1.2		420014.7		420014.7		283213.3		
CV (%)	1.1		1.2		5.8		8.9		1.72		7.9		15.1		9.8		11.5		

Means in the same columns are not significantly different at the P = 0.05 level. *P < 0.05 and **P < 0.01.

Table 2: Yield and quality values of the common vetch lines and varieties.

Genotypes	Thousand grain weight (g)		Number of pods per plant (Number)		The number of seed per pod (Number)		Harvest index (%)		ADF (%)			NDF (%)		Crude protein in grain (%)		Crude protein in dry matter (%)	
	Adana	Antalya	Adana	Antalya	Adana	Antalya	Adana	Antalya	Adana	Antalya	Means	Adana	Antalya	Adana	Antalya	Adana	Antalya
1	72	72.89	9.2	7.33	4.53	6.17	13.53	14.66	28.17	28.09	28.13 cd	43.92	43.9	25.61	23.53	14.88	15.52
2	83	82.81	12.73	13.33	6.2	5.83	16.15	26.69	28.09	27.37	27.73 d	44.54	43.76	25.68	22.69	15.47	15.93
3	69.67	77.62	12.6	13.67	5.87	6.33	21.95	36.9	29.46	27.73	28.60 bd	45.61	43.75	26.04	22.97	16.38	15.63
4	62	68.09	15.73	15	6.07	7.33	21.67	22.34	29.67	30.91	30.29 ad	42.92	44.06	24.95	22.84	14.53	15.22
5	71	79.82	14.8	17.67	6.13	5.83	15.81	20.31	32.97	32.83	32.90 a	44.68	44.62	26.56	23.44	15.72	16.39
6	70	71.21	27.4	16.33	5.33	7.33	13.53	24.29	33.49	32.33	32.91 a	45.71	44.39	26.09	22.21	15.54	16.15
7	60	61.69	13.93	11.33	4.87	6.17	6.52	17.52	31.15	31.42	31.28 ab	43.37	43.75	24.79	22.72	16.87	16.83
8	76.33	83.64	17.13	13.67	6	6.33	19.89	22.42	29.67	29.72	29.70 bd	41.87	42.17	25.7	23.1	14.37	16.18
9	67	76.13	19.93	16.33	5.17	6.17	25.91	27.14	30.63	31.68	31.16 ac	45.02	44.17	25.92	23.03	15.58	15.7
Yucel	69	72.94	17.47	6.33	4.8	5.17	22.28	23.2	32.15	28.25	30.20 ad	43.83	43.08	24.97	22.21	14.77	15.13
Ozveren	77	78.87	12.73	7	4.93	6.83	18.92	17.6	31.82	28.96	30.39 ad	46.38	45.28	24.89	22.57	16.77	16.16
Alper	59.33	68.8	22.27	12.67	5.6	6.17	27.93	26.11	29.35	29.3	29.33 bd	42.93	43.73	25.33	23.37	13.88	15.88
Means	69.69 B	74.54 A	16.33 A	12.56 B	5.46 B	6.31 A	18.67	23.27	30.55	29.88		44.23	43.89	25.54 A	22.89 B	15.4	15.89
Location	423.24**		256.13**		12.92**		379.08		8.05			2.11		126.80**		4.39	
Genotypes	2827.66**		932.28**		13.38		1745.46		184.44*			64.95		11.4		26.78	
Genotypes*Location	220.06		369.25		10.86		531.16		38.41			13.59		5.45		10.97	
CV	6.7		3.8		1.5		21.2		8.7			6		6.2		12.8	

Means in the same columns are not significantly different at the P =0.05 level. *P < 0.05 and **P < 0.01.

Table 3: Correlation between the investigated characters.

Investigated traits	NFD	NFMD	MSL	NPH	NMS	MST	YDM	YG	YB	TGW	NPPP	NSPP	HI	ADF	NDF	CPG	CPDM
The number of flowering days (Day) (NFD)	1.00																
The number of physicalmaturity day (Day) (NFMD)	0.99**	1.00															
Main stem length (cm) (MSL)	0.93**	0.92**	1.00														
Natural plant height (cm) (NPH)	0.34**	0.33**	0.38**	1.00													
The number of main stem (Number) (NMS)	0.38**	0.39**	0.25*	ns	1.00												
Main stem thickness (mm) (MST)	0.85**	0.86**	0.78**	0.30*	0.34**	1.00											
Yield of dry matter (kg) (YDM)	-0.67**	-0.67**	-0.62**	ns	-0.30**	-0.67**	1.00										
Yield of grain (kg) (YG)	0.32**	0.32**	0.27*	ns	0.27*	ns	ns	1.00									
Biological yield (kg) (YB)	ns	ns	ns	ns	ns	ns	ns	0.31**	1.00								
Thousand grain weight (g) (TGW)	0.30**	0.31**	0.36**	0.28*	ns	0.30*	-0.48**	0.28*	0.46**	1.00							
Number of pods per plant (Number) (NPPP)	-0.28*	-0.29*	-0.25*	ns	ns	-0.40**	0.27*	ns	ns	ns	1.00						
The number of seed per pod (Number) (NSPP)	0.41**	0.42**	0.34**	ns	0.29*	0.37**	ns	0.30**	ns	ns	ns	1.00					
Harvest index (%)(HI)	0.30*	0.30*	0.26*	ns	0.46**	ns	ns	0.77**	ns	ns	ns	0.28*	1.00				
Acid detergent fiber (%) (ADF)	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	1.00			
Notr detergent fiber (%) (NDF)	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	0.70**	1.00		
Crude protein in grain (%) (CPG)	-0.71**	-0.71**	-0.64**	-0.24*	ns	-0.62**	0.41**	ns	ns	ns	ns	ns	ns	ns	ns	1.00	
Crude protein in dry matter (%) (CPDM)	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	0.25*	ns	1.00

*P < 0.05 and **P < 0.01. ns:Non significant.

could be noted in case of main stem length also as in Adana the mean was 94.03 cm and in Antalya it was 129.09 cm. Condidering natural plant height, though there was significant difference in the values obtained in Adana location (48.18 cm) and Antalya location (52.19 cm) but they corroborated the reports of Erdurmus *et al.,* (2010) and Seydosoglu (2014). Lower mean values obtained with respect to some of the characters from the plants grown in Adana location can be explained by late sowing that allowed the plants to become mature in a short period of time. Besides, character expression by different genotypes differ with ecological conditions. In case of forage crops *inter alia* the other characters, accumulation of photosynthate in the form of dry matter is very important which was always higher in the crops harvested from Adana and the highest mean was obtained from the variety Alper (14074 kg ha^{-1}) but the same for this character, considering the other location i.e., Antalya was obtained from the candidate variety 7 (11089 kg ha^{-1}) but there was no significant difference among the varieties. It remains to be explained that how the genotypes grown late by 36 days could accumulate more dry matter than those grown 36 days earlier. However, such high dry matter has not been reported earlier (Temel *et al.*, 2015 and Kaplan, 2013). Both the highest and the lowest values for seed yield were found in Adana location in line 9 (2810.4 kg ha^{-1}) and in line 7 (549.3 kg ha^{-1}). Different seed yields by different genotypes has been reported by Seydosoglu (2014) also. Genetic differences of the varieties and different environmental conditions can be said as a reason this dissimilarity.

Among the other characters under study, the results of which have been presented in Table 2 revealed none of them had significant values for all the three statistical parameters. Thousand seed weight and the number of pods per plant exhibited significant difference with respect to location and genotype while the number of seeds per pod and crude protein percentage revealed to be significant for location and only ADF% for genotype. İnterestingly, harvest index was always higher in the lines from Antalya. Studies in common vetch by other workers on the characters like the number of pods per plant and, the number of seeds per pod (Kendir, 1999) thousand seed weight (Anlarsal *et al.,* 1999) twith 26.1-74.8 g, by Basbag *et al.,* (1999) with 45.08-46.08 g, biological yield was observed by Kendir (1999) with 2940-5010 kg ha^{-1}, by Albayrak and Tongel (2003) with 5820-8040 kg ha^{-1}, the number of physical maturity day (Albayrak and Tongel, 2003), harvest index (Cakmakci *et al.,* 1997) indicated the results of the present study are either in conformity with them or sometimes differ from their findings. Differences of ecological conditions can be considered as one of the reasons for such different results. ADF values of 30.55% and 29.88% and NDF values of 44.23% and 43.89% in Adana and in Antalya location respectively were in conformity with the earlier findings by Guzelogulları and Albayrak (2016) and by Kaplan (2013) respectively. Crude protein content of grain was 25.54% and 22.89% and the same in dry matter was 15.40% and 15.89% in Adana and Antalya locations respectively and the differences were statistically significant due to locations. The both values of crude protein were in agreement with the results of Temel *et al.,* (2015) and Yucel *et al.,* (2013).

Correlation values between the seventeen different characters of the 9 common vetch lines and 3 varieties according to location revealed the number of flowering days, number of physical maturity days, main stem length, natural plant height and yield of grain had significantly positive association with as many as nine and eight different characters each respectively,while among the quality characters like ADF, NDF and CPDM exhibited no correlation with any of the characters except ADF with NDF and CPDM with NDF. Conspicuously, YDM, NPPP and CPG revealed either significantly negative correlation or no correlation with any of the characters within the limit of this study except between these three character combinations themselves. It appeared notable that number of seeds per pod and harvest index had no negative association with any of the characters under study (Table 3). Highly significant and positive relationship was found between the number of flowering days and the number of physical maturity day (r=0.998**), main stem length (r=0.929**), main stem thickness (r=0.853**). Furthermore, the number of physical maturity day had significant association with main stem length (r=0.921**) and main stem thickness (r=0.855**). Similar studies have been made by Cakmakci *et al.,* (2006) and by Sayar (2014).

CONCLUSION

The 9 common lines and 3 control varieties of vetch showed great variation with respect to investigated parameters. On the basis of the results obtained it may be concluded that even if the locations of experiment belong to the same climatic zone the different genotypes will respond differentially even due to some differences in temperature and rainfall in the different locations. Because of such differences, the same genotypes have given different results in two locations indicating the importance of stability test.

REFERENCES

Albayrak, S. and Tongel, M.O. (2003). Adaptation of common vetch lines in Samsun conditions. 5. Field Crops Congress, Diyarbakır/ Turkey, pp: 326-330.

Anonymous, (2001). Technical instructions for testing of agricultural values (Leguminous forage crops). T.C. Ministry of Agriculture and Rural Affairs, General Directorate of Protection and Control, Variety Registration and Seed Certification Center of Turkey, Ankara, p:36.

Arslan M. (2017). Diversity for vitamin and amino acid content in grass pea (*Lathyrus sativus* L.) *Legume Res*. **40**: 803-810.

Babat, S. and Anlarsal, A.E. (2011). A study on to determination of yield and yield objects of some common vetch (*Vicia sativa* L.) varieties in Diyarbakır ecological conditions. C.U. *J. Sci. and Eng*. **26**: 37-46.

Cakmakci, S., Aydınoglu, B., Karaca, M. and Bilgen, M. (2006). Heritability of yield components in common vetch (*Vicia sativa* L.) *Acta Agr Scand B-S P*. **56**: 54/59.

Cil, A., Cil, A.N. and Yucel, C. (2006). Adaptation of some common vetch (*Vicia sativa* L.) lines in Harran Plain. *J. Fac. of Agr. of Harran University*. **10**: 53-61.

Dhima, K.V., Lithourgidis, A.S., Vasilakoglou, I.B. and Dordas, C.A. (2007). Competition indices of common vetch and cereal intercrops in two seeding ratio. *Field Crop Res*. **100**: 249- 256.

Erdurmus, C., Cecen, S. and Yucel, C. (2010). Determination of yeild and yeild components of some common vetch line and varieties (*Vicia sativa*) in Antalya conditions. *Mediterr Agric Sci*. **23**: 53-60.

Guzelogulları, E. and Albayrak, S. (2016). The effects of different sowing and harvest times on forage yield and quality of some vetch (*Vicia* spp.) species under Isparta Ecological Conditions. *J. Cent. Res. Inst. for Field Crops*. **25**: 158-165.

Kaplan, M. (2013). Effects of harvest season on forage yield and quality of common vetch genotypes (*Vicia sativa* L.). *Erciyes University J. Sci. and Tec*. **29**: 76-80.

Kendir, H. (1999). Deterrnination of some yield components of winter vetch species (*Vicia* spp.) grown in Ankara conditions, *J Agric Sci*. **5**: 85-91

Kokten, K., Cacan, E., Gokdogan, O. and Firat B. M. (2016). Determination of energy balance of common vetch (*Vicia sativa* L.), hungarian vetch (*Vicia pannonica* C.) and narbonne vetch (*Vicia narbonensis* L.) production in Turkey, *Legume Res*. **40**: 491-496.

Nelson, D.W. and Sommers, L.E. (1980). Total nitrogen analysis in soil and plant tissues. *J Assoc off Anal Chem*. **63**: 770-778.

Oba, M. and Allen, M.S. (1999). Evaluation of the importance of the digestibility of neutral detergent fiber from forage: Effects on dry matter intake and milk yield of dairy cows. *J Dairy Sci*. **82**: 589-596.

Oten, M., Kiremitci, S. and Erdurmus, C. (2018). Unveil of superior landraces of common vetch (*Vicia satıva* L.) for yield and yield components to overcome bottleneck. *Fresen Environ Bull*. **27**: 6324-6329.

Sayar, M. S. (2014). Path coefficient and correlation analysis between forage yield and its affecting components in common vetch (*Vicia sativa* L.). *Legume Res*. **37**: 445-452.

Sayar, M. S., Yucel, C., Tekdal, S., Yasak, M.S. and Yıldız, Y. (2009). The determinatıon of yield and yield components of some common vetch (*Vicia sativa* L.) lines in Diyarbakır conditions, VII. Field Crops Congress, Hatay-Turkey.

Seydosoglu, S. (2014). Researches on determination yield and yield components of some common vetch (*Vicia sativa* L.) genotypes in ecological conditions of Diyarbakır. *Turk J Agrıc For*. **1**: 117-227.

Temel, S., Keskin, B., Yıldız, V. and Kır, A.E. (2015). Investigation of dry hay yield and quality characteristics of common vetch (*Vicia sativa* L.) cultivars for in Igdir Plain download conditions. Igdır Univ. *Jist*. **5**: 67-76.

Van Soest, P.J., Robertson, J.B. and Lewis, B.A. (1991). Methods for dietary fiber, neutral detergent fiber, and non-starch polysaccharides in relation to animal nutrition. *J Dairy Sci*. **74**: 3583-3597.

Yucel, C., Avcı, M., Kılıcalp, N. and Gultekin, R. (2013). Evaluation of some common vetch (*Vicia sativa* L.) lines for forage yield and quality in Cukurova conditions. *The Anadolu J. Agr. Sci*. **28**:134-140.

Yucel, C., Yucel, D., Akkaya, M.R. and Anlarsal, A.E. (2014). Quality features in some hopefull common vetch (*Vicia sativa* L.) genotypes. *KSU, J. Nat. Sci*. **17**: 8-14.