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## Agronomic and Morphological Characters of Some Common Vetch (*Vicia sativa* L.) Genotypes under Trakya Region Conditions

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**Abstract:** The objective of this research is to determine the most suitable common vetch genotypes for forage and seed yield in the Trakya Region. Eleven common vetch genotypes (Kubilay, Karaelçi, Yeşilköy, Ürem varieties and Sarielçi, Yeşilsivas, Tokat, Çorum, Sivas, 283 and 25 line) were tested. According to the results, there were significant differences in plant height, pod number per plant, seed number per pod, pod width, pod length, thousand seed weight, forage and dry matter yield and seed yield. It was concluded that Ürem and Kubilay varieties were suitable for forage production, in addition to line 283 could for seed production.

**Key words:** Common vetch, *Vicia sativa* L., Trakya location, seed yield, forage yield

### INTRODUCTION

The total area devoted to field crops is approximately 24 million ha in Turkey. Cereals are the most important crops, covering 76% of the field crops area. Food and forage legumes are occupying 11% of the field crop which is roughly 2 million hectares. Forage crops sowing area are increasing slightly year by year.

Trakya region takes place in the western part of Turkey, and occupies 2.2 million ha area. Wheat and sunflower is the main crops for region. Production focuses on these crops without following a good rotation practices. For this reason, soil fertility is reduced in addition to leading underground water contamination by fertilizer applications.

Many species of *Vicia* are native in Mediterranean areas and provide valuable feed and some of them have long been cultivated. Common vetch (*Vicia sativa* L.) is grown as a winter crop mainly in Mediterranean coastal region of Turkey.

Some places of Northern Trakya Region are very suitable for growing common vetch. Common vetch is more productive than the other vetch species during winter sowing in Trakya Region<sup>[1]</sup>.

Numerous field trials have been conducted on common vetch, the stem height, number of branch, pod width, pod length, seed number per pod varied significantly in vetch species collected from natural vegetation of Çukurova Region<sup>[2]</sup>.

Forage and dry matter yield were significantly affected by the regional conditions, and changed from 12131-21714.3 kg ha<sup>-1</sup> and from 3595.8 to 7276 kg ha<sup>-1</sup>,

respectively<sup>[3]</sup>. Orak and Elçi<sup>[1]</sup> found that seed yield of common vetch genotypes varying between 1288.30 to 2712.10 kg ha<sup>-1</sup>.

It was reported that plant height changed between 19.47-62.81 cm, number of branch 2.07-3.27, pod number per plant 4.07-11.03, seed number per pod 2.66-4.77, thousand seed weight 48.41-60.43 g, seed yield 153.80-1355.10 kg ha<sup>-1</sup> in common vetch genotypes grown as a summer crop in Tekirdağ conditions<sup>[4]</sup>.

The main aim of the study was determine the most appropriate genotype of common vetch under winter sowing conditions in Trakya Region.

### MATERIALS AND METHODS

Two field experiments were conducted during 2000-2001 growing season to determine on the forage, dry matter and seed yield and yield components (Plant height, number of branch, number of seed per pod, pod length, pod width, number of pods per plant and 1000 seed weight) of common vetch genotypes under dry land condition of Tekirdağ and Uzunköprü village- Edirne.

Analyses of soil samples taken from the experimental fields are shown in Table 1. The climatic condition during the growing season is given in Table 2. Seeds of common vetch genotypes were obtained from Field Crops Department of Tekirdağ Agricultural Faculty. The genotypes (Ürem, Kubilay, Yeşilköy, Karaelçi varieties and Yeşil Sivas, Tokat, Çorum, Sivas, 283, Sarielçi and 25 lines) were sown on October 11-12th in 2000 in Tekirdağ and Uzunköprü province, respectively. Experiments were arranged in a randomized complete

**Table 1: The soil characteristics data of the experimental site (2000-2001)**

Location	Depth (cm)	Lime (%)	pH	P <sub>2</sub> O <sub>5</sub> (kg da <sup>-1</sup> )	Organic matter (%)	Texture
Tekirdağ	0-20	2.41	7.00	8.24	1.00	Clay-loamy
	20-40	2.41	6.85	7.32	0.94	
Uzunköprü	0-20	2.28	8.20	15.70	1.89	Clay-loamy
	20-40	3.64	8.20	13.50	1.83	

**Table 2: The climatic data of the experimental site for 2000-2001 and long term' mean**

Month	Mean temperature (°C)				Total rainfall (mm)				Relative humidity (%)			
	Tekirdağ		Uzunköprü		Tekirdağ		Uzunköprü		Tekirdağ		Uzunköprü	
	2000	Long term' mean	2000	Long term' mean	2000	Long term' mean	2000	Long term' mean	2000	Long term' mean	2000	Long term' mean
October	16.3	14.5	15.7	14.2	58.7	54.7	26.8	64.7	82.8	77.0	67.5	71.6
November	10.8	11.4	8.7	8.7	94.5	83.0	118.5	107.7	81.4	81.0	72.8	78.0
December	9.5	7.3	7.4	4.3	117.6	96.0	124.7	91.2	84.8	82.0	81.2	81.5
January	2.4	4.3	0.4	3.6	24.4	72.0	37.9	66.7	79.2	81.0	76.2	79.8
February	5.7	5.2	5.5	4.2	67.3	58.0	59.7	53.3	82.7	79.0	79.5	75.7
March	7.2	6.7	7.3	6.9	50.9	56.0	67.9	81.5	81.2	77.0	79.7	74.8
April	14.0	11.5	14.7	12.3	48.5	43.0	52.3	60.8	84.8	74.0	76.6	71.8
May	16.6	16.6	17.2	17.1	67.0	36.0	44.2	49.9	77.2	74.0	71.8	66.7
June	20.9	20.9	21.6	21.9	11.8	38.0	24.5	33.0	72.2	70.0	66.6	62.0

block design with three replications<sup>[5]</sup>. Plot size were 1.8 x 5= 9 m<sup>2</sup>, row spacing was 30 cm with sowing rate of 100 kg ha<sup>-1</sup>.

Some important morphologic characters such as plant height, number of branch, number of pods per plant, number of seeds per pod, pod width, pod length, 1000 seed weight were measured, in addition forage, dry matter and seed yield. Collected data were analyzed by using MSTAT statistical computer package software<sup>[6]</sup>.

## RESULTS AND DISCUSSION

The results of analysis of variance showed that genotype effects were statistically significant for all traits (P<0.05) except number of branch and dry matter yield (Table 3). Location effects were found to be important in number of branch, number of seed per pod, pod width, pod length, 1000 seed weight, forage yield, dry matter yield and seed yield. Genotype x location interaction were significant in plant height, pod number per plant, pod width, pod length, seed number per pod, dry matter yield and seed yield at P<0.05 (non significant parameters data not shown).

**Morphologic characters:** The results of experiment were given Table 3. According to results of vetch genotypes characters; plant height was determined between 62.90 cm in line Yeşil Sivas, and 92.30 cm in line Ürem.

The higher photosynthetic capacity could be achieved by the higher vegetative parts of plant. In this connection, branch number of genotypes ranged from 2.29 in Kubilay to 3.03 in line 283.

In this research according to the results of pod number per plant in genotypes ranged from 7.45 to 18.75. The other researchers such as Kendir<sup>[7]</sup> reported that pod number of common vetch was 23.08 while Açıkgöz *et al.*<sup>[8]</sup> and Atsan<sup>[9]</sup> found it was 18.2 and 9.1.

Maximum seed number per pod was found from line 25 as 6.33. However, the minimum per pod was obtained in Sarielçi. Sabancı<sup>[10]</sup> stated that seed number per pod in common vetch were 5.8 while Açıkgöz *et al.*<sup>[8]</sup> and Bucak and Anlarsal<sup>[2]</sup> found to be 6-10, 2.8-6.3, respectively.

The other characters of the pod width of common vetch varied between 4.64 and 6.90 mm. The largest pod width was found for Kubilay variety and the line of 25. The narrowest pod width was obtained from line Sarielçi. Pod width in location of Uzunköprü was found more than Tekirdağ location. Our results show similarities with the finding of some reporters<sup>[2]</sup>.

While the largest pod length was found in the line 25, the smallest one was found in the line Sarielçi. Pod length for common vetch is given by Elçi and Açıkgöz<sup>[11]</sup> as 3-7 cm, Orak and Elçi<sup>[1]</sup> as 4.3-4.4 cm, Kendir<sup>[7]</sup> as a mean of two years 3.54 cm.

1000-seed weight of genotypes ranged from 31.92 g in line Sarielçi to 63.52 g in variety Ürem and it was followed by line 283 with 61.35 g and Yeşil Sivas with 61.78 g. The results was supported by conclusions of Açıkgöz *et al.*<sup>[8]</sup> that thousand seed weight of common vetch varies between 30.5 and 63.4 g.

**Agronomic characters:** Forage yield of common vetch genotypes ranged from 18599.10 kg ha<sup>-1</sup> in Yeşil Sivas to 23546.90 kg ha<sup>-1</sup> in Ürem that was the check variety and

Table 3: Mean values and results of LSD 5% test for yield and yield components of some common vetch (*Vicia sativa* L.) lines and varieties

Characters	Location/Genotype	Yeşil Sivas	Ürem	Kubilay	Tokat	Çorum	Sivas	283
Plant height (cm)	Tekirdağ	57.00fg	93.00a-c	78.48c-e	73.47d-g	72.93d-g	55.73g	82.67b-e
	Uzunköprü	68.80e-g	91.60a-c	86.27b-e	78.00c-e	87.13a-d	78.73c-e	83.27b-e
	Mean	62.90e	92.30a	82.38a-c	75.73cd	80.03a-c	67.23de	82.97a-c
Number of branch	Tekirdağ	1.83	2.23	1.78	2.38	2.53	2.33	2.67
	Uzunköprü	3.47	3.73	2.80	3.47	3.13	3.20	3.40
	Mean	2.65	2.98	2.29	2.93	2.83	2.77	3.03
Number of pods per plant	Tekirdağ	7.00hi	21.50a	11.37d-g	16.47bc	7.43hi	14.88b-d	18.13ab
	Uzunköprü	13.00c-f	16.00bc	8.00g-i	13.53c-e	7.47hi	10.53e-h	13.20c-f
	Mean	10.00e-g	18.75a	9.68fg	15.00bc	7.45g	12.71c-e	15.67b
Number of seed per pod	Tekirdağ	5.33e-h	5.70c-g	5.77c-g	4.63h	4.87gh	4.67h	4.60h
	Uzunköprü	6.00b-e	6.57a-c	6.63a-c	5.87c-f	6.00b-e	5.97b-e	6.83ab
	Mean	5.67b-d	6.13ab	6.20ab	5.25d	5.43cd	5.32d	5.72a-d
Pod width (mm)	Tekirdağ	5.43cd	5.73bc	6.76a	5.69bc	5.55c	6.35ab	6.40ab
	Uzunköprü	6.67a	7.00a	7.03a	6.54a	6.37ab	6.43ab	6.87a
	Mean	6.05c	6.37a-c	6.90a	6.11bc	5.96c	6.39a-c	6.63ab
Pod length (mm)	Tekirdağ	46.33b-e	43.00c-g	46.84b-d	46.20b-e	47.15bc	44.67c-f	49.35ab
	Uzunköprü	42.46d-g	46.35b-e	45.17b-f	41.54fg	45.60b-f	42.30e-g	44.93b-f
	Mean	44.40d-f	44.68c-f	46.00b-e	43.87ef	46.37b-e	43.48ef	47.14b-d
1000 seed weight (g)	Tekirdağ	59.00	63.00	54.33	52.40	50.00	41.33	58.87
	Uzunköprü	64.57	64.03	61.63	54.37	51.50	50.97	63.83
	Mean	61.78ab	63.52a	57.98b	53.39c	50.75c	46.15d	61.35ab
Forage yield (kg ha <sup>-1</sup> )	Tekirdağ	13676.10	20035.40	19225.00	15086.50	17510.60	15535.00	15838.80
	Uzunköprü	23522.00	27058.40	26392.70	26152.20	26506.60	23832.70	27471.70
	Mean	18599.10d	23546.90a	22808.80ab	20619.40b-d	22008.60a-c	19683.80cd	21655.03a-c
Dry matter yield (kg ha <sup>-1</sup> )	Tekirdağ	2736.00e-g	3578.40de	1707.80g	2666.30e-g	2961.90e-g	2123.50fg	29.1190e-g
	Uzunköprü	5353.40a-c	6576.70a	6306.70ab	6188.70ab	5736.70a-c	5227.40bc	6432.30ab(kg
	Mean	4044.70	5077.50	4007.30	4427.50	4349.30	3675.40	4672.10
Seed yield (kg ha <sup>-1</sup> )	Tekirdağ	1196.70f	2458.00b	2412.50b	2028.30c	1182.70f	855.00g	3166.70a
	Uzunköprü	1935.30cd	2666.00b	1872.00cd	1340.60f	633.70g	1438.80ef	2404.00b
	Mean	1566.00ef	2562.00b	2142.30c	1684.50de	908.20i	1146.90h	2785.30a

Table 3: Continue

Characters	Location/Genotype	Sarielçi	Yeşilköy	Karaelçi	25	Mean	LSD%5
Plant height (cm)	Tekirdağ	83.50b-e	80.20c-e	104.33a	72.93d-g	77.66	Genotype: 12.750 Location*Genotype:18.032 Location: 0.271
	Uzunköprü	71.47d-g	75.00c-f	73.40d-g	98.47ab	81.10	
	Mean	77.48b-d	77.60b-d	88.87ab	85.70a-c		
Number of branch	Tekirdağ	2.07	2.77	2.27	2.20	2.28b	Genotype: 2.743 Location: 0.282 Genotype: 0.661 Location*Genotype: 0.935 Location: 0.227 Genotype: 0.533 Location*Genotype: 0.753 Location: 1.341 Genotype: 3.144 Location*Genotype: 4.447 Location: 1.946 Genotype: 4.563
	Uzunköprü	3.07	2.60	2.93	3.07	3.17a	
	Mean	2.57	2.68	2.60	2.63		
Number of pods per plant	Tekirdağ	9.87e-i	13.53c-e	10.33e-h	6.00i	12.41	Genotype: 0.661 Location*Genotype: 0.935 Location: 0.227 Genotype: 0.533 Location*Genotype: 0.753 Location: 1.341 Genotype: 3.144 Location*Genotype: 4.447 Location: 1.946 Genotype: 4.563
	Uzunköprü	16.33bc	7.33hi	9.33f-i	14.87b-d	11.78	
	Mean	13.10b-d	10.43d-f	9.83fg	10.43d-f		
Number of seed per pod	Tekirdağ	5.00f-h	6.27b-d	5.33e-h	5.67d-h	5.23b	Genotype: 0.661 Location*Genotype: 0.935 Location: 0.227 Genotype: 0.533 Location*Genotype: 0.753 Location: 1.341 Genotype: 3.144 Location*Genotype: 4.447 Location: 1.946 Genotype: 4.563
	Uzunköprü	5.47d-h	5.83c-f	5.93b-f	7.30a	6.22a	
	Mean	5.23d	6.05a-c	5.63b-d	6.33a		
Pod width (mm)	Tekirdağ	4.54e	7.04a	5.43cd	6.70a	5.97b	Genotype: 0.661 Location*Genotype: 0.935 Location: 0.227 Genotype: 0.533 Location*Genotype: 0.753 Location: 1.341 Genotype: 3.144 Location*Genotype: 4.447 Location: 1.946 Genotype: 4.563
	Uzunköprü	4.73de	5.23c-e	6.90a	6.97a	6.43a	
	Mean	4.64d	6.14bc	6.17bc	6.83a		
Pod length (mm)	Tekirdağ	45.34b-f	53.08a	52.58a	52.03a	47.87a	Genotype: 0.661 Location*Genotype: 0.935 Location: 0.227 Genotype: 0.533 Location*Genotype: 0.753 Location: 1.341 Genotype: 3.144 Location*Genotype: 4.447 Location: 1.946 Genotype: 4.563
	Uzunköprü	38.80g	42.07e-g	43.83c-f	49.23ab	43.84b	
	Mean	42.07f	47.58a-c	48.21ab	50.63a		
1000 seed weight (g)	Tekirdağ	28.70	50.08	55.00	51.08	51.26b	Genotype: 0.661 Location*Genotype: 0.935 Location: 0.227 Genotype: 0.533 Location*Genotype: 0.753 Location: 1.341 Genotype: 3.144 Location*Genotype: 4.447 Location: 1.946 Genotype: 4.563
	Uzunköprü	35.13	52.67	63.17	54.50	56.03a	
	Mean	31.92e	51.38c	59.08ab	52.79c		
Forage yield (kg ha <sup>-1</sup> )	Tekirdağ	19311.10	20931.20	17401.50	17685.40	17476.10b	Location: 195.745 Genotype: 459.062
	Uzunköprü	21615.00	22288.70	23716.30	25115.00	24879.20a	
	Mean	20463.10b-d	21609.90a-c	20558.90b-d	21400.20a-c		
Dry matter yield (kg ha <sup>-1</sup> )	Tekirdağ	3464.10de	3842.30de	3191.60ef	3134.00ef	2938.00b	Location: 40.036 Location*Genotype:93.753 Location: 8.520 Genotype: 19.982 Location*Genotype:28.260
	Uzunköprü	4569.80cd	5311.10a-c	5708.70a-c	4772.30cd	5653.10a	
	Mean	4017.00	4576.70	4450.20	3953.20		
Seed yield (kg ha <sup>-1</sup> )	Tekirdağ	1237.50f	1973.30c	1370.00f	1333.80f	1746.80a	Location: 40.036 Location*Genotype:93.753 Location: 8.520 Genotype: 19.982 Location*Genotype:28.260
	Uzunköprü	617.50g	1683.40de	1381.70f	1336.00f	1573.50b	
	Mean	927.50i	1828.40d	1375.80fg	1334.90gh		

1) Means with the same letter are not significantly different at 0.05 significance level

2) Non significant parameters are not shown

it was followed by Kubilay with 22808.80 kg ha<sup>-1</sup> yield. Location effects were found to be significant. Average forage yield of Uzunköprü location (24879.20 kg ha<sup>-1</sup>) was found to be higher than that of the average of Tekirdağ location (17476.10 kg ha<sup>-1</sup>).

Dry matter yield changed between 3675.40 kg ha<sup>-1</sup> in line Sivas and 5077.50 kg ha<sup>-1</sup> in Ürem. Ürem variety had the highest dry matter yield between the genotypes and followed by line 283 (4672.10 kg ha<sup>-1</sup>). Location effects were determined to be significant to Uzunköprü location value (5653.10 kg ha<sup>-1</sup>) was higher than Tekirdağ (2938.00 kg ha<sup>-1</sup>).

It was determined that seed yield of some genotypes were quite low, such as 908.20 kg ha<sup>-1</sup> in line Çorum and on the other hand 283 had the highest seed yield, 2785.30 kg ha<sup>-1</sup>. Some researchers such as Kendir<sup>[7]</sup> have observed that two years average seed yield of common vetch varieties was 1625.30 kg ha<sup>-1</sup> in Ankara conditions. In addition, Moneim *et al.*<sup>[12]</sup> pointed out that seed yield of common vetch may vary between 930 and 2370 kg ha<sup>-1</sup>. Other researchers were found between 1100 and 1500 kg ha<sup>-1</sup> in Tel Hadya, Syria<sup>[13]</sup>. According to other findings our results were found to be similar and higher. Differences of seed yield can be said originated from different growing conditions.

In general morphological and agronomic characters of genotypes mean values are varied significantly in both locations. Variation in number of branch per plant, number of seed per pod, pod width and length are associated closely with performance of genotypes and effect of locations.

In summary, varieties Ürem and Kubilay, line 283 produced better growth in both Tekirdağ and Uzunköprü locations. Although varieties Ürem and Kubilay had a higher forage yield than line 283, had higher seed yield than the all genotypes.

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