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Locations and some agricultural properties of *Medicago orbicularis* L. genotypes present in Antalya flora

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Abstract. Turkey, which is at the intersection of three gene centers, and especially Mediterranean basin, is the gene centre of many legumes used in agriculture. There are more than 900 legumes species and most of them are annual plants. 30 of these species are medic (*Medicago* L.) species. Annual medics originated from Mediterranean. 13 of them, which also have high adaptation capacity, have economic importance. With regards to contribution of the length of vegetative period, annual medics have great importance. Thus, some of the annual medics reach the grazing maturity in early spring and some of them develop after the unsuitable conditions of summer season and provide significant contribution to grass yield of pasture in late autumn. In general, despite the use of perennial plants in the world, annual medics are much more promising than perennials in the pasture with limited rainfall in summer. The ecological conditions of our country are very similar to the region where annual medics have importance in the grass yield. Annual medics have great importance for the improvement of roughage production in our country. In this study, the coordinates of spread areas of *Medicago orbicularis* L., which is one of the species of annual medics, were determined with GPS in Antalya natural flora. Also in natural flora, development shapes of plants, leaflet width and length, hairiness of leaf surface, flower color, plant length, amount of fruits in plant and hairiness in bean were analyzed.

Keywords. Annual Medic – Natural Flora – *Medicago orbicularis* L.

Localisations et certaines propriétés agricoles des génotypes de* Medicago orbicularis *L. présents dans la flore d'Antalya

Résumé. *La Turquie, qui est à l'intersection de trois centres de gènes, est le centre gène de beaucoup de légumineuses utilisées dans l'agriculture. Il existe plus de 900 espèces de légumineuses et la plupart sont des plantes annuelles. 30 de ces espèces sont medics* (Medicago *L.) espèces. Les medics annuels proviennent de la Méditerranée. 13 d'entre eux, qui ont aussi la capacité d'adaptation élevée, ont une importance économique. En ce qui concerne la contribution à la longueur de la période végétative, les médicagos annuels ont une grande importance. Ainsi, certains d'entre eux atteignent la maturité pour le pâturage au début du printemps, et certains d'entre eux se développent après les mauvaises conditions de la saison estivale et fournissent une contribution significative à la production d'herbe de pâturage en fin d'automne. En général, malgré l'utilisation de plantes parenes dans le monde, les médecins annuels sont beaucoup plus prometteuses pour les zones à faibles pluies d'été. Les conditions écologiques de notre pays sont très similaires à la région où les médics annuels ont une importance dans la production d'herbe. Les médics annuels ont une grande importance pour l'amélioration de la production de fourrage dans notre pays. Dans cette étude, les coordonnées des zones de distribution de* Medicago orbicularis *L., qui est l'une des espèces de médics annuels, ont été déterminées avec GPS dans la flore naturelle d'Antalya. Également dans la flore naturel, les formes, la largeur et longueur des feuilles, la pilosité de la surface foliaire, la couleur des fleurs, la longueur des plantes, la quantité de fruits dans la plante et la pilosité des gousses, ont été analysés.*

Mots-clés. *Médic annuel – Flore naturel –* Medicago orbicularis *L.*

I – Introduction

Diversification and development of fodder crops is important to meet forage gap in our country. Fodder crops production can be increased by using both perennial and annual forage crops and annual legume forage crops in the fallow system (Al and Baysal, 1996; Ekiz, 1995, Andic *et al*. 1996).

Pasture area of our country is about 12.3 million hectares and dry matter yield is approximately 1000 kg/ha. This low yield shows that our pastures do not have enough productivity. However, yield can be improved by breeding studies. With high adaptation capabilities, the ability to compete, rapid grow and the nutritional value the annual medics can be used in breeding pasture.

In general, despite the use of perennial plants in the world, due to the limited amount of rainfall during the summer annual medics are more promising than the perennial (Ocumpaugh *et al*., 1998). Annual medics have Mediterranean origin and can be found nearly in every region of Turkey. Annual medics has a high potential to increase forage production of our country.

II – Materials and methods

In the study, an annual medic species, button clover (*M. orbicularis* L.) were collected from the natural flora of Antalya. A random sampling method which covers the entire area of the species was used during the collections. This method is advantageous because it is possible to take samples in a wider area in less time and enable a collector to see the entire area.

Visiting dates are arranged according to the altitudes and flowering time of species in the flora. GPS values (height and coordinates) of the species are determined. To determine the characteristics of the species, growth form, flower color, plant height, number of fruits per plant, leaf width-length and hairiness on the leaf and pod values were taken.

III – Results and discussion

Location, height, and the coordinates of *M. orbicularis* L. genotypes collected from natural flora of Antalya are given in Table 1. It can be seen from table that genotypes are available from west to east area of Antalya province naturally. When we look at the altitudes, genotypes were found between 6 m and 1223 m which shows *M. orbicularis* L. can be found from the coast to the high plateaus. These findings indicate that *M. orbicularis* L. has the ability of a wide range adaptability and Mediterranean region is the native land of this species.

Some characteristic values of *M. orbicularis* L. genotypes are given in Table 2. Horizontal growth form and yellow flower color was determined. Leaf width 2.5-11.0 mm, leaf length 4.0-16.5 mm, leaf hairiness and pod hairiness 1.0-3.0, plant height 18.0-72.0 cm, and the number of fruits per plant were recorded between 2.5-46.0.

Aydin *et al*. (2010), in a study on *M. orbicularis* L. found plant height between 24.33-71.33 cm, leaf width of the 0.84-1.6 cm, leaf length and 0.7-1:58 cm. In addition, they found the status of development the genotypes as horizontal, semi-horizontal, semi-erect and observed low hairiness. These findings were similar to our data.

Karadağ (1994) also observed *M. orbicularis* L. genotypes and similar results were presented. In the mentioned study, genotypes were horizontal and different in terms of hairiness. Stem length was recorded between 16.6 - 49.2 cm.

Crawford (1985), emphasized that annual medics *Medicago lupulina* L., *Medicago arabica* L., *Medicago orbicularis* L. and *Medicago polymorpha* L. are the most economically important species.

Table 1. Location, height, and the coordinates of *M. orbicularis* L. genotypes

Genotype No	Location	Altitude	Coordinates	
1	Aksu merkez	35	36 S 0308832	UTM 4092669
2	Nebiler – Yeniköy	301	36 S 0284735	UTM 4096555
3	Akseki merkez	1053	36 S 0391923	UTM 4100520
4	Gündoğmuş	915	36 S 0399982	UTM 4074404
5	Akseki	946	36 S 0389435	UTM 4099616
6	Garipçe köyü	796	36 S 0264847	UTM 4131127
7	İbradı – Derebucak	1099	36 S 0374740	UTM 4107215
8	Korkuteli-Büyükköy	922	36 S 0259909	UTM 4114104
9	Zeytintaş mağarası	60	36 S 0332115	UTM 4091902
10	Akseki-Cevizli	1097	36 S 0393296	UTM 4114095
11	Elmalı-Finike	1037	36 S 0760941	UTM 4067773
12	İbradı-Emiraşık köyü	494	36 S 0380367	UTM 4104317
13	Kaş – Dirgenler Köyü	207	36 S 0751965	UTM 4027843
14	Kaş – Kasaba	209	36 S 0747799	UTM 4023347
15	Akçay yolu-Elmalı	1045	36 S 0753609	UTM 4059041
16	Düden	60	36 S 0304916	UTM 4097758
17	Elmalı-Finike yolu	1025	36 S 0761324	UTM 4060627
18	İbradı	949	36 S 0388869	UTM 4098920
19	Kaş - Dağbağ köyü	234	36 S 0759858	UTM 4034355
20	Elmalı-Finike yolu	1024	36 S 0764431	UTM 4055925
21	Akseki-Dikmen	884	36 S 0389957	UTM 4093797
22	Yukarı seki	13	36 S 0352399	UTM 4081207
23	Kurşunlu	69	36 S 0306068	UTM 4094547
24	Dağbeli	798	36 S 0277540	UTM 4119104
25	Kaş – Kasaba	335	36 S 0744108	UTM 4026305
26	Gündoğmuş	1002	36 S 0406799	UTM 4075668
27	Ormana-İbradı	1057	36 S 0371691	UTM 4106951
28	Çandır	6	36 S 0325424	UTM 4091391
29	Korkuteli	924	36 S 0263736	UTM 4100016
30	Çığlık – Yeniköy	298	36 S 0282818	UTM 4102750
31	Karaman köyü	135	36 S 0305529	UTM 4107502
32	Korkuteli – Büyükköy	941	36 S 0260204	UTM 4118035
33	Karaöz – Ekşili	76	36 S 0301406	UTM 4114801
34	Nebiler	273	36 S 0283929	UTM 4095758
35	Gündoğmuş-güzelbağ	676	36 S 0409262	UTM 4067566
36	Karaöz	62	36 S 0306372	UTM 4092880
37	Çandır	6	36 S 0325424	UTM 4091391
38	Evrenseki	8	36 S 0352327	UTM 4078586
39	Güloluk – Aksu	57	36 S 0334274	UTM 4121840
40	Akseki	1223	36 S 0392083	UTM 4107316
41	Ormana – Başlar	1045	36 S 0372113	UTM 4106349
42	Gündoğmuş -köprülü	515	36 S 0422884	UTM 4070055
43	Kızılkaya köyü	884	36 S 0259974	UTM 4124864
44	Alanya – Burçaklar	237	36 S 0401276	UTM 4059417
45	Akseki – Sadıklar köyü	993	36 S 0393216	UTM 4089072

Table 2. Some agricultural properties of *M. orbicularis* L. genotypes

Genotype	Growth form	Flower color	Leaf width	Leaf length	Leaf hairiness	Pod hairiness	Plant height	Fruit per plant
1	Horizontal	Yellow	6.5	8.0	2.0	2.0	57.5	46.0
2	Horizontal	Yellow	7.0	11.0	1.0	1.0	39.0	13.0
3	Horizontal	Yellow	7.2	10.1	1.0	1.0	41.0	32.5
4	Horizontal	Yellow	8.0	10.0	1.0	1.0	55.5	19.5
5	Horizontal	Yellow	6.5	9.5	1.0	2.0	34.2	14.4
6	Horizontal	Yellow	7.5	11.0	1.0	1.0	30.5	13.0
7	Horizontal	Yellow	7.2	9.5	1.0	1.0	27.4	18.6
8	Horizontal	Yellow	6.0	9.0	2.0	2.0	40.5	12.0
9	Horizontal	Yellow	7.5	9.0	2.0	1.0	30.5	15.0
10	Horizontal	Yellow	6.2	8.5	1.0	1.0	37.8	22.4
11	Horizontal	Yellow	10.5	14.0	1.0	1.0	46.0	10.0
12	Horizontal	Yellow	6.5	9.0	2.0	2.0	22.5	31.0
13	Horizontal	Yellow	7.2	9.2	2.0	3.0	32.0	16.5
14	Horizontal	Yellow	8.5	12.0	1.0	1.0	44.0	13.0
15	Horizontal	Yellow	7.0	11.0	2.0	1.0	56.0	8.5
16	Horizontal	Yellow	7.0	10.5	1.0	1.0	42.0	27.0
17	Horizontal	Yellow	8.0	10.0	1.0	1.0	47.0	39.0
18	Horizontal	Yellow	6.5	9.5	1.0	1.0	30.5	14.5
19	Horizontal	Yellow	7.0	8.8	2.0	1.0	34.2	18.4
20	Horizontal	Yellow	8.0	9.0	1.0	1.0	45.0	20.0
21	Horizontal	Yellow	5.5	8.0	2.0	1.0	18.0	2.5
22	Horizontal	Yellow	6.0	8.2	2.0	1.0	39.8	12.6
23	Horizontal	Yellow	5.3	7.7	1.0	1.0	24.0	6.5
24	Horizontal	Yellow	4.0	5.5	2.0	2.0	26.0	18.5
25	Horizontal	Yellow	10.5	12.0	1.0	1.0	30.0	20.0
26	Horizontal	Yellow	7.0	10.5	1.0	1.0	30.0	15.0
27	Horizontal	Yellow	8.2	10.4	1.0	2.0	42.2	25.3
28	Horizontal	Yellow	5.6	8.0	1.0	1.0	27.4	18.5
29	Horizontal	Yellow	6.3	10.0	1.0	1.0	40.5	29.0
30	Horizontal	Yellow	10.0	14.5	1.0	1.0	72.0	30.5
31	Horizontal	Yellow	8.4	11.2	2.0	1.0	39.8	25.6
32	Horizontal	Yellow	6.0	10.5	1.0	1.0	38.0	27.5
33	Horizontal	Yellow	7.2	9.6	1.0	1.0	42.2	21.3
34	Horizontal	Yellow	8.0	9.5	1.0	1.0	31.5	20.0
35	Horizontal	Yellow	5.0	8.0	2.0	1.0	51.0	7.0
36	Horizontal	Yellow	11.0	16.5	3.0	2.0	51.5	13.0
37	Horizontal	Yellow	8.0	10.5	1.0	1.0	35.0	11.5
38	Horizontal	Yellow	7.5	9.0	1.0	1.0	31.0	32.0
39	Horizontal	Yellow	6.0	8.5	1.0	1.0	24.0	17.5
40	Horizontal	Yellow	2.5	4.0	1.0	1.0	34.0	28.5
41	Horizontal	Yellow	6.4	8.2	2.0	2.0	33.5	22.8
42	Horizontal	Yellow	6.0	8.0	1.0	2.0	34.5	6.5
43	Horizontal	Yellow	7.6	10.2	1.0	1.0	44.6	24.0
44	Horizontal	Yellow	7.2	9.8	2.0	1.0	38.6	19.4
45	Horizontal	Yellow	8.2	12.0	2.0	2.0	58.4	30.6

Average plant height was 20.64 cm, leaf length was 11.8 mm and leaf witdh was 12.40 mm in the study of Sayar *et al.* (2010) which was carried out in a east province of Turkey. Hairiness leaves, yellow color and semi-horizontal growth form was stated. These findings were similar to our study except plant height. This difference can be attributing to the different ecological conditions of the locations.

IV – Conclusions

There is a demand for roughage in Turkey. In order to meet this need it is important to increase fodder plants production. Besides, we need to find more efficient ways to use our pastures. In the pastures breeding studies high feed value is required. Therefore, annual medics can be used in this manner.

Horizontal or semi-horizontal structure, hard seed, high adaptation ability, usable in the sub-cultivation systems and the other important characteristic of the annual medics provide many advantageous. *M. orbicularis* L. can be thought as an alternative to species which have been used in the pastures breeding programs. Because this species is naturally available in our flora and has many advantageous.

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