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The determination of pasture type alfalfa lines

S. Altinok, M. Türk, T. Erol and E. Akçelik Somay

Ankara University, Agricultural Faculty, Field Crops Department, 06110-Dişkapi/Ankara (Turkey)
e-mail: altinok@agri.ankara.edu.tr

Abstract. The objective of this research was to characterize 56 collected alfalfa populations growing with two experiments from clones and from seeds in 2010 and 2011. Collected alfalfa populations were affected significantly in most observed traits over two years period. The populations of Akyurt 1.2.3, Kizilcahamam 1.2., Gudul 1, Kazan 1.2., Cankaya 1, Sincan 2, Çubuk 2, Pursaklar 1, Şereflikochisar 1. 2. 3., Nallıhan 1 had erect growing habit and their annual dry matter yield/plant were very high over the two years. They are going to be evaluated for forage-type alfalfa breeding. Apart, all the other populations are going to be subject to a graze-type alfalfa breeding program in near future, because they showed perfect results when investigate of their pasture characters. The first cut dry matter yield/annual dry matter yield (%) was highest on the population of Kalecik 1 (82%). Some of them also had high forage yields, as Golbası 1.2. and Kizilcahamam 1, as well as forage-type. They were growing horizontal, they spread on the surface and under the soil, some of them had rhizomes and they have so many tillers on their crown.

Keywords. Alfalfa-*Medicago sativa* L. – Characterization – Forage type – Grazing type.

La détermination des lignes de luzerne aptes pour le pâturage

Résumé. *L'objectif de cette recherche est de caractériser une population de 56 luzernes qui a été cultivée et rassemblée en réalisant deux essais en les années 2010 et 2011 à partir de clones et de graines. Les populations de luzerne recueillies ont été affectés de manière significative dans la plupart des traits observés sur la période de deux ans. Les populations de Akyurt 1.2.3, Kizilcahamam 1.2, Gudul 1, Kazan 1.2, Cankaya 1, Sincan 2, Çubuk 2, Pursaklar 1, Şereflikochisar 1. 2. 3., Nallıhan 1 on montré une croissance dressée et leurs rendements annuel de matière sèche / plante étaient très élevés au cours des deux années. Ils seront évalués pour la culture de luzernes fourragères. En outre, toutes les autres populations vont constituer en une proche période l'objet d'un programme d'amélioration de luzernes pour le pâturage. Car ils ont montré de résultats parfaits lors de l'examen des caractéristiques au pâturage. Le rapport de rendement en matière sèche à la première coupe / rendement annuel en matière sèche (%) était le plus élevé pour la population de Kalecik 1 (82%). Certaines d'entre elles, tels que Golbasi 1,2. et Kizilcahamam 1, ont eu également des rendements fourragers élevés, ainsi qu'ont présenté un type fourrager. Ils ont grandis de à l'horizontale, ils se sont propagés sur la surface et le sous sol, certains d'entre eux ont des rhizomes, et ils possédent de nombreuses talles sur leur couronne.*

Mots-clés. *Alfalfa*-Medicago sativa *L. – Caractérisation – Type fourrager – Type pour pâturage.*

I – Introduction

Turkey is the gen centre for a lot of quality forage plants including alfalfa species (Davis, 1970). Wild alfalfa species (*Medicago sativa* L.) can be seen often in our vegetation (Sabancı and Ozpinar, 2001). Pasture type alfalfa is generally spread under the ground, horizontal growing and it has rhizomes. And these plants are very persistent to cold and drought. Because of that, they are also very persistent to grazing and they can be used for natural pastures for over seeding and for establishing artificial pastures (Aydın *et al*., 2010). There is no still certificated pasture-type alfalfa cultivar, even they are our nature plants. But, some institutes have carried out breeding research with them nowadays. There is urgent need for these types of alfalfa species in our coun-

try. The objective of this research was to characterizee 56 alfalfa populations which were collected in the location of Ankara province as clones and seeds.

II – Materials and methods

In province of Ankara with 24 towns (about 31 km^2), wild alfalfa stems and seed pods were collected as total 56 populations from the nature during the spring and summer of 2009 and seedlings were grown in the greenhouse. Two field trials were established with all of these seedlings on 2th May of 2010 in experimental land of Agricultural Faculty on Ankara University (39º57'N, 32º53'E, 894 m altitude). One of them has 38 populations which were obtained from collected alfalfa seeds, and the other one has 20 populations which were obtained from collected alfalfa clones. These seedlings were planted in a clay loam, classified slightly alkaline (pH 7.8), rich in potassium (1400 kg ha^{-1}), poor in phosphorus (69 kg ha^{-1}) and containing 1.15% organic matter. According to State Meteorology Department, long-term observations (1975-2010) in Ankara showed that average precipitation, mean temperature and relative humidity were 403 mm $year^{-1}$, 12.1ºC and 61%, respectively. Corresponding values in 2010 were 594 mm, 14.5ºC and 59%, however they were 436 mm, 12ºC and 62% in 2011. In both experiments, the seedlings of each population were planted into one row with 80x80 cm apart. The number of plant in each row were divided to 3 as replications. 9 phenologic and morphologic observations and measurements were done and forage yields were determined for characterization on collected alfalfa plants in 2010 and 2011. The data were analyzed by GLM at the 5 and 1 % levels of significance. When a significant differences was found, a protected Duncan test was applied at the p=0.05 level for comparisons between means (SAS, 1985).

III – Results and discussion

Averaged over two years (2010 and 2011) 9 observations of 56 collected alfalfa populations were analyzed and the Duncan results were given in Table 1 and 2. According to the 36 population results which were grown from collected alfalfa seeds, average of both years, there were significant population effects on all observed traits as the level of 1% except the structure of root crown. It was not significant. However, on the results of other 20 populations which were obtained from collected alfalfa clones, population effects were significant on all observations for the mean of two years as the level of 1 %, except the rhizome number on plants which was no significance among the populations and the first cut dry matter yield/annual dry matter yield (%) that significance level is 5% among the populations.

Average of two years, the plants were grown from the seeds, the highest annual dry matter yield were obtained from the population of Akyurt 3 as 259 g/plant and the populations of Kizilcahamam 1., Kazan 2, Golbasi 2., Cankaya 1 and Golbası 1 fallowed it (Table 1). When the plants were grown from collected alfalfa clones, Şereflikochisar 1 had the highest dry matter yield as 295 g/plant and the others were Şereflikochisar 3, Kizilcahamam 1, Nallihan 1, Akyurt 1, Cankaya 1, Çubuk 1 and Pursaklar (Table 2). These high yielding alfalfa populations were mostly erect grown and they seem as forage-type. However, first cut dry matter yield/annual dry matter yield was highest on Kalecik 1 population as 82 %, which is horizontal growing graze-type population (Table 1). Our main objective was to collect and evaluate breeding material for graze-type alfalfa in this research. After field trials over 2 years, collected populations showed mostly horizontal growing and when investigated for their pasture characteristics, they were perfect on them (Van Keuren and Marten, 1988). Their first cut yields were high, their growing was horizontal, they spread on the surface and under the soil, some of them had rhizomes and they have so many tillers on their crown (Prosperi *et al*. 2006). They are good for resistance to graze and to hard environmental conditions (Aydin, *et al*. 2010). However, the populations of Akyurt 1, 2, 3, Kizilcahamam 1,2., Gudul 1, Kazan 1,2., Cankaya 1, Sincan 2, Çubuk 2, Pursaklar 1, Şereflikochisar 1, 2, 3. Nallıhan 1 had erect growing habit and their annual dry matter yield/plant in 2010 and

Table 1. The mean of some observations from seed growing alfalfa populations averaged over two years (2010 and 2011)

Populations	1*	2	3	4	5	6	7	8	9
Kalecik 1	8.0a-g**	1.3h-j	17.1h-n	99.9ab	141.4c-h	0.8a	1.0	4.7a-e	18.5j-l
Kalecik 2	8.9a	1.8c-j	16.2i-n	67.0lm	83.0e-h	0.6f-j	1.0	3.9f-h	19.6h-l
Kalecik 3	6.8 g-l	2.0a-h	20.1e-j	94.6a-d	110.8c-h	0.7a-f	1.0	4.6a-e	17.8k-m
Güdül 1	5.6 l-o	1.2h-j	27.1b-d	89.5a-g	144.9c-g	0.7a-j	1.0	5.0a	20.7g-l
Gölbaşı 1	7.2b-j	2.1a-g	23.6c-h	98.3ab	181.7a-d	0.8a-c	1.0	4.7a-e	21.8e-k
Gölbaşı 2	7.1c-j	2.3a-c	25.3b-g	102.6a	192.4a-c	0.8ad	1.0	5.0a	20.3h-l
Gölbaşı 3	7.5b-i	2.2a-e	18.6g-l	96.4a-c	150.0c-f	0.7a-g	1.0	4.9a-c	22.2d-k
Haymana 1	7.2b-j	1.3g-j	19.3f-k	93.2a-e	105.6c-h	0.8ab	1.0	4.6a-e	15.5lm
Haymana 2	7.1c-j	1.1ij	19.7e-j	92.8a-f	69.6f-h	0.7a-g	1.0	4.9ab	12.9m
Haymana 3	8.5ab	1.4e-j	19.1f-k	87.7b-h	97.7d-h	0.7a-i	1.0	4.8a-d	15.4lm
Beypazarı 1	8.0a-g	1.9a-i	14.5i-n	87.6b-h	128.0c-h	0.7a-i	1.0	4.2e-g	19.3i-l
Beypazarı 2	6.9g-i	1.4f-j	17.6h-m	88.4a-g	158.6b-f	0.8a-e	1.0	4.5a-e	21.3f-k
Beypazarı 3	6.3i-n	1.4d-j	19.9e-j	88.4a-g	155.7b-f	0.7a-i	1.0	4.5a-e	22.9d-k
Ayaş 1	7.0e-j	1.6c-j	16.3i-n	83.2c-j	112.5c-h	0.5h-j	1.0	4.6a-e	21.4f-k
Elmadă 1	7.2c-j	1.2h-j	16.6h-n	75.6g-m	153.7c-f	0.7a-i	1.0	4.5a-e	17.8k-m
Elmadă 2	7.8a-h	1.6c-j	11.0mn	82.1c-k	70.5f-h	0.7a-g	1.1	4.6a-e	18.9i-l
Elmadă 3	8.4a-c	1.7c-j	10.2n	80.3d-l	104.4c-h	0.8ab	1.2	4.3d-f	18.5j-l
Akyurt 1	5.2no	2.7a	26.4b-e	81.9c-k	169.1b-e	0.7a-g	1.0	4.4b-f	23.7b-j
Akyurt 2	6.1j-n	2.7a	18.2g-l	78.3f-m	158.1b-f	0.7a-h	1.0	5.0a	24.1a-j
Akyurt 3	5.2no	1.8b-i	26.0b-f	85.4b-i	259.0a	0.6b-j	1.0	4.4c-f	28.9a-c
Çamlıdere 1	7.1d-j	2.2a-f	12.2k-n	67.6k-m	86.6e-h	0.6b-j	1.0	4.9a-c	23.4c-k
Çamlıdere 2	6.6h-m	2.6ab	13.6j-n	68.8j-m	144.5c-g	0.5h-j	1.0	4.7a-e	29.4a
Çamlıdere 3	7.1d-j	2.6ab	18.9g-k	70.8j-m	127.5c-h	0.6c-j	1.0	4.9a-c	23.7a-j
Kızılcahamam 1	6.0j-n	2.7a	31.6b	89.5a-g	241.7ab	0.6e-j	1.0	4.9a-c	28.6a-c
Kızılcahamam 2	5.7k-o	1.4f-j	28.3bc	86.1b-i	164.3b-e	0.6c-j	1.0	4.6a-e	24.4a-i
Kızılcahamam 3	7.7a-h	1.4f-j	17.8h-m	71.6i-m	56.4gh	0.8a-d	1.0	3.5h	19.3 i-l
Çubuk 1	8.2a-f	1.3g-j	13.9j-n	50.5n	52.5h	0.6d-j	1.0	4.8a-c	19.8h-l
Çubuk 2	5.9j-n	2.3a-d	21.4d-i	68.5k-m	127.8c-h	0.5ij	1.0	4.9a-c	29.2ab
Çubuk 3	6.9f-k	2.3a-e	19.1f-k	65.1m	108.4c-h	0.7a-h	1.0	4.9a-c	26.3a-g
Bala 1	8.3a-d	1.7c-j	13.3j-n	78.2f-m	107.3c-h	0.6c-j	1.0	4.7a-e	25.3a-h
Bala 2	8.3a-e	2.1a-g	11.7l-n	64.8m	97.4d-h	0.6b-j	1.0	4.9ab	27.8a-d
Bala 3	8.3a-e	2.0a-h	10.8mn	70.8j-m	104.6c-h	0.5ij	1.0	5.0a	26.9a-f
Mamak 1	7.2b-j	1.7c-j	19.7e-j	73.5h-m	116.1c-h	0.7a-i	1.1	4.6a-e	27.2a-e
Sincan 2	6.8g-l	1.0j	26.9b-d	73.2h-m	137.2c-h	0.7a-h	1.0	4.9ab	25.3a-h
Kazan 2	4.5o	1.0j	39.6a	85.8b-i	196.8a-c	0.6g-j	1.0	4.7a-e	28.9a-c
Çankaya 1	5.5m-o	1.1ij	30.2bc	78.7e-m	192.2a-c	0.5j	1.1	3.7gh	21.9e-k

1*1: Growth habit (1-erect, 2-lateral), 2: The rhizome number on plants (1: none, 9: too much), 3: Natural plant height (cm), 4: Main stem lenght (cm),5: Annual dry matter yield (g/plant), 6. First cut dry matter yield/annual dry matter yield (%), 7. The structure of root crown (1:too much fine tillers, 2: fine tillers on main stem), 8. The depths of root crown (1: on surface, 5: on deep of soil), 9. Cutted area of plants (cm). **Means of each populations in a column followed by the same lower case letters are not significantly different ($p<0.05$).

2011 were very high. They are going to evaluate for forage-type alfalfa breeding. Apart then, all other populations are going to be subject for graze-type alfalfa breeding program in near future. Some of them also gave high forage yield as Golbası 1,2 and Kizilcahamam 1. Their performances are given in Table 1 and 2.

Table 2. The mean of some observations on clones of alfalfa populations averaged of two years

Populations	1*	2	3	4	5	6	7	8	9
Pursaklar 1	4.8f	1.0	35.3a-c	87.9ab	255.1ab	0.5b-e	1.5b	3.9b-f	23.0a-d
Evren 3	6.4de	1.0	23.2e-h	78.6b-d	103.8c-f	0.6ab	1.0c	4.6a-c	16.8cd
Keçiören 3	7.8a-d	1.3	16.9g-i	73.9b-d	127.2c-f	0.5a-e	1.2c	3.3f	20.1b-d
Ayaş 2	8.5ab	2.2	11.8i	60.4d	96.6c-f	0.6a-c	1.1c	3.4f	16.7cd
şereflikoçhisar 1	3.2g	1.0	42.7a	90.3ab	295.6a	0.4d-e	1.0c	4.5a-c	23.4a-c
şereflikoçhisar 2	3.2g	1.0	40.7ab	75.5b-d	164.5b-f	0.5a-e	1.1c	4.3a-e	19.2b-d
şereflikoçhisar 3	3.0g	1.0	41.1a	80.6a-d	267.7ab	0.5a-e	1.0c	4.7ab	23.0a-d
Polatlı 1	7.7a-d	1.3	17.8f-i	72.8b-d	115.6c-f	0.4c-e	1.0c	4.4a-d	17.1cd
Çubuk 1	5.3ef	1.1	26.8c-f	64.8cd	194.7a-f	0.5a-d	2.4a	4.6a-c	19.3b-d
Haymana 1	7.9a-d	1.0	12.2i	70.8b-d	71.7f	0.5a-e	1.0c	3.5e-f	18.2b-d
Kızılcahamam 1	7.0b-d	1.0	20.7e-i	84.8a-c	208.7a-e	0.6a-c	1.2c	3.7d-f	20.2b-d
Mamak 1	8.7a	1.0	14.5hi	74.4b-d	81.5ef	0.6a-d	1.0c	4.4a-d	16.6d
Bala 1	6.5c-e	1.0	23.9d-g	86.1ab	93.4d-f	0.7a	1.1c	3.3f	18.0b-d
Güdül 1	8.6a	1.0	11.6i	69.7b-d	94.8c-f	0.6ab	1.0c	3.8c-f	17.6cd
Çankaya 1	4.0fg	1.0	37.4ab	83.3a-c	215.7a-d	0.4c-e	1.0c	2.5g	24.5ab
Nallıhan 1	3.0g	1.0	32.3b-d	73.6b-d	224.7a-c	0.3e	1.1c	4.3a-e	20.4b-d
Kalecik 1	8.2ab	2.3	17.0g-i	84.4a-c	160.5b-f	0.5a-e	1.0c	3.7d-f	22.7a-d
Elmadă 1	8.0a-c	1.5	20.0e-i	72.8b-d	110.3c-f	0.5a-e	1.0c	4.5a-c	20.0b-d
Akyurt 1	7.5a-d	1.0	27.5c-e	87.0ab	185.3a-f	0.5a-e	1.0c	5.0a	28.5a
Sincan 1	7.5a-d	1.0	18.5e-i	100.0a	166.0b-f	0.5a-e	1.0c	5.0a	23.0a-d

1*[1]: Growth habit (1-erect, 2-lateral), 2: The rhizome number on plants (1: none, 9: too much), 3: Natural plant height (cm), 4: Main stem lenght (cm),5: Annual dry matter yield (g/plant), 6. First cut dry matter yield/annual dry matter yield (%), 7. The structure of root crown (1:too much fine tillers, 2: fine tillers on main stem), 8. The depths of root crown (1: on surface, 5: on deep of soil), 9. Cutted area of plants (cm). **Means of each populations in a column followed by the same lower case letters are not significantly different ($p<0.05$).

IV – Conclusions

After the trials over two years for 56 collected alfalfa populations, mainly graze-type and forage-type alfalfa lines were characterized. Except the populations of Akyurt 1,2,3, Kizilcahamam 1,2, Gudul 1, Kazan 1,2, Cankaya 1, Sincan 2, Çubuk 2, Pursaklar 1, Şereflikochisar 1, 2, 3, Nallıhan 1 which were forage-types and their forage yields were high, all the other populations shown graze-type characters when regard the all observed traits. For further breeding programme, selected populations are going to be used for obtaining of forage-type and graze-type alfalfa varieties.

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