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in

Porqueddu C. (ed.), Tavares de Sousa M.M. (ed.).
Sustainable Mediterranean grasslands and their multi-functions

Zaragoza : CIHEAM / FAO / ENMP / SPPF
Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 79

2008
pages 173-176

Determination of yields and agricultural characters of some perennial forage grasses under Samsun (Turkey) ecological conditions

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SUMMARY – This study was carried out under Samsun ecological conditions in 2005-2006 in order to determine some agricultural and morphological characters of four ryegrass, orchard grass and timothy cultivars. Main stem lengths of ryegrass, orchard grass and timothy cultivars were between 69.90-77.20 cm, 97.60-105.90 cm, 71.90-99.00 cm, respectively; dry matter yield for the same cultivars were between 3420.7-3860.7, 4560.6-4970.9, 5280.6-6180.3 kg/ha, respectively.

Keywords: Perennial ryegrass, orchard grass, timothy grass, forage.

RESUME – *"Détermination des rendements et des caractères agronomiques de quelques graminées fourragères pérennes dans les conditions écologiques de Samsun (Turquie)". Ce travail a pour but de déterminer certaines particularités agronomiques et morphologiques de quatre variétés de* Lolium perenne *L.,* Dactylis glomerata *L.,* Phleum pratense *L. dans les conditions écologiques de Samsun en 2005-2006. Alors que les longueurs de la tige principale de* Lolium perenne *L.,* Dactylis glomerata *L.,* Phleum pratense *L. varient entre 69,90-77,20 cm, 97,60-105,90 cm, 71,90-99,00 cm, les rendements en matière sèche ont été déterminés à 3420,7-3860,7, 4560,6-4970,9, 5280,6-6180,3 kg/ha.*

Mots-clés : Lolium perene *L.,* Dactylis glomerata *L.,* Phleum pratense *L., fourrage vert.*

Introduction

Grass species are used for different purposes due to resistance to grazing. Their continuous growing in wet and warm regions supplies palatable pastures. In the study conducted to find out the performance of perennial grass cultivars in Samsun location, 4501-6950 kg/ha dry matter yield, 6.7-7.8% crude protein rate, 85.9-89.6 cm main stem length, 3.33-3.58 number node in main stem were recorded by Onal-Ascı *et al.* (2003). Naturally grown cocksfoot in Kurupelit Campus, range for plant height, node number, flag leaf width, flag leaf length, crude protein ratio were found between 71.36 and 67.20 cm, 4.78 and 5.00 mm, 11.90 and 8.58 cm, 6.38 and 7.34%, respectively (Mut, 2003). As an average of two years in Samsun conditions, timothy had 7240.1 kg/ha dry matter yield and cocksfoot had 7710.7 kg/ha dry matter. Crude protein percentages in timothy and cocksfoot were 9.64 and 10.71% respectively (Ayan *et al.*, 1997). Morphological characters of perennial ryegrass, cocksfoot and timothy were compared to Ankara conditions; dry matter yield of perennial ryegrass were between 10,620 and 16,970 kg/ha, cocksfoot had between 10,110 and 13,160 kg/ha dry matter yield, and timothy yielded between 6180 and 14,870 kg/ha. Crude protein rates of perennial ryegrass, cocksfoot and timothy grasses changed between 10.04 and 15.73, 10.04 and 10.91, 6.60 and 10.23%, respectively (Gul, 2006).

The objective this experiment was to find out yield and agricultural characters of different grass species and varieties in Samsun conditions.

Materials and methods

The experiment was carried out in 2005 and 2006. Soil structure in the experimental area was clay, unsalty, neutral in pH. Organic matter content of the soil was low; P and K content were high. Considering the months in which the experiment was conducted, long term temperature mean was

11.06°C (11.23°C in 2005; 11.20°C in 2006). While long term total precipitation in vegetation period was 464.4 mm, in the first year it was 764.7 mm, it was 568.2 mm in the second year.

Three grass species as materials were used in the research: (i) Perennial ryegrass cultivars (Lipresso, Lilora, Liprinta and Rastro); (ii) cocksfoot cultivars (Husar, Lidacta, Weidac and Lidaglo); and (iii) timothy cultivars (Lischka, Liglory, Licora and Fidanza). The experiment was established in November 2004 in accordance with completely randomized block design with four replicates. Row distances were 20, 30 and 30 cm and, plot sizes were 8, 12 and 12 m^2 for perennial ryegrass, cocksfoot and timothy cultivars respectively. Nitrogen fertilizer at the level of 120 kg/ha applied to experiment area in both years (60 kg/ha in springs; 60 kg/ha in autumns). No irrigation was supplied. Morphological characters were measured in 10 plant samples randomly picked up from the plots (Anon, 2001).

Data from the research was evaluated using analysis of variance in accordance with completely randomized blocks. Duncan's multiple-range test was performed to test the difference between means.

Results and discussion

Table 1 shows that statistically significant differences were found among the cultivars concerning plant heights, internode lengths and nod numbers ($p \leq 0.01$). The highest plants samples were measured on Liglory (92.5 cm) and on Lidacta (122.1 cm) in 2005 and 2006 respectively. The longest internode was measured as 14.0 cm on Lidacta and Weidac cultivars in the first year on Lidaglo (28.4 cm) in the second year. The highest node number was determined on Lischka as 5.6 and 4.9 in 2005 and 2006, respectively (Table 1).

Table 1. Some morphological properties of perennial grass species

Sp/Cultivar	Main stem length (cm)		Internode length (cm)		Node number	
	2005	2006	2005	2006	2005	2006
D. glomerata						
Lidacta	79.3^{a-d}	122.1^{a}	14.0^{a}	26.9^{a}	4.3^{bc}	4.2^{ab}
Husar	84.4^{abc}	115.9^{ab}	12.4^{abc}	23.8^{ab}	4.2^{bcd}	3.8^{bc}
Lidaglo	90.4^{ab}	120.9^{a}	13.1^{ab}	28.4^{a}	4.5^{b}	3.8^{bc}
Weidac	76.4^{bcd}	121.3^{a}	14.0^{a}	24.5^{ab}	4.1^{bcd}	4.2^{ab}
L. perenne						
Lipresso	74.5^{cd}	79.9^{de}	13.2^{ab}	12.8^{d}	3.7^{cd}	2.9^{c}
Lilora	73.1^{cd}	73.5^{de}	11.1^{abc}	15.6^{cd}	3.7^{cd}	2.8^{c}
Liprinta	75.2^{cd}	64.7^{e}	11.4^{abc}	12.4^{d}	3.6^{d}	2.9^{c}
Rastro	66.0^{d}	77.7^{de}	10.6^{bc}	14.9^{d}	3.8^{bcd}	2.8^{c}
P. pratense						
Lischka	90.3^{ab}	107.6^{abc}	12.5^{abc}	21.2^{bc}	5.6^{a}	4.9^{a}
Licora	86.1^{abc}	89.3^{cd}	10.6^{bc}	18.3^{cd}	5.1^{a}	4.1^{ab}
Fidanza	65.1^{d}	78.7^{de}	9.9^{c}	13.9^{d}	5.2^{a}	4.1^{ab}
Liglory	92.5^{a}	100.9^{bc}	12.0^{abc}	17.3^{cd}	5.4^{a}	4.8^{ab}
LSD	13.36	17.98	2.59	5.23	0.62	0.98

Means within columns followed by the same letter are not statistically different ($P \leq 0.01$).

The longest flag leaf (20.6 cm) was measured on Weidac but cocksfoot and perennial grass cultivars were statistically in the same group. Regarding flag leaf width, statistically significant differences were found among cultivars in both years. The highest dry matter yields (3500 and 9430.3 kg/ha) were obtained from Rastro and Lischka cultivars respectively. Dry matter yields of cocksfoot cultivars obtained in 2006 were in harmony with Ayan *et al.* (1997) and lower than Gul (2006). Dry

matter yields of the perennial ryegrass cultivars were lower comparing by Onal-Ascı *et al.* (2003) and Gul (2006). The highest crude protein (9.78%) was recorded in Fidanza cultivar in 2005 (Table 2).

Table 2. Some morphological, agricultural and chemical properties of perennial grass species

Sp/Cultivar	Flag leaf length (cm)		Flag leaf width (mm)		Dry matter yield (kg/ha)		Crude protein rate (%)	
	2005	2006	2005	2006	2005	2006	2005	2006
D. glomerata								
Lidacta	17.6^{a}	15.4	5.8^{bc}	6.8^{cde}	1790 ^{b}	7443^{ab}	8.39	8.25
Husar	19.1a	13.0	5.7bc	6.7cde	1690 b	8170a	8.43	6.81
Lidaglo	19.5a	12.9	6.2bc	7.0bcd	1760 b	7890a	7.92	6.07
Weidac	20.6a	17.0	6.4b	7.2bcd	1590 b	7777a	8.71	8.91
L. perenne								
Lipresso	16.0^{abc}	14.9	4.8^{c}	4.8^{ef}	2860^{ab}	4200^{c}	6.10	8.21
Lilora	17.1^{ab}	15.7	5.1^{bc}	5.0^{ef}	2510^{ab}	4303^{c}	8.66	7.73
Liprinta	18.2^{a}	16.7	5.3^{bc}	5.3^{def}	3270^{a}	3790^{c}	8.03	7.72
Rastro	19.6^{a}	13.8	5.6^{bc}	4.5^{f}	3500^{a}	4463^{bc}	8.52	7.14
P. pratense								
Lischka	11.2^{cd}	14.0	8.8^{a}	8.9^{ab}	2810^{ab}	9433^{a}	7.95	7.14
Licora	12.3^{bcd}	13.7	9.1^{a}	8.6^{abc}	3000^{ab}	9383^{a}	8.08	9.20
Fidanza	9.8^{d}	19.3	8.4^{a}	9.6^{a}	2930^{ab}	7647^{a}	9.78	7.45
Liglory	10.5^{d}	12.1	8.8^{a}	8.5^{abc}	3020^{ab}	9350^{a}	7.84	7.96
LSD	4.814	-	1.276	0.178	1290	3149	-	-

Means within columns followed by the same letter are not statistically different (P≤0.01).

Results show that performance of Husar and Lidaglo cocksfoot cultivars; Rastro and Lilora perennial ryegrass cultivars, Lischka and Licora timothy cultivars may be considerable in Samsun conditions.

Conclusions

Genetic structure, environmental conditions and agronomical treatments highly influence the agricultural and morphological properties of the cultivars. Unsurprisingly, researchers may obtain different results, when even same material used in different or similar conditions.

Results showed that Husar and Lidaglo cocksfoot cultivars, Rastro and Lilora perennial ryegrass cultivars, Lischka and Licora timothy cultivars may be hopeful cultivars with their performance in Samsun conditions. Determination of proper species and cultivars by conducting further experiments with legume and grass mixtures may contribute to increase percentage of forage crop sowing are in field crops.

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