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in

Sulas L. (ed.).

Legumes for Mediterranean forage crops, pastures and alternative uses

Zaragoza : CIHEAM

Cahiers Options Méditerranéennes; n. 45

2000

pages 219-221

Article available on line / Article disponible en ligne à l'adresse :

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To cite this article / Pour citer cet article

Ventura M.R., Méndez P., Flores M.P., Rodríguez R., Castañón J.I.R. **Energy and protein content of Tedera (*Bituminaria bituminosa*)**. In : Sulas L. (ed.). *Legumes for Mediterranean forage crops, pastures and alternative uses* . Zaragoza : CIHEAM, 2000. p. 219-221 (Cahiers Options Méditerranéennes; n. 45)



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Energy and protein content of Tедера (*Bituminaria bituminosa*)

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Summary - Nutrient content was determined in tree subspecies of *Bituminaria bituminosa* (also called *Psoralea bituminosa*): *crassiuscula*, *albomarginata* and *bituminosa* collected in Canary Islands in autumn, spring, winter and summer. Crude protein content ranged 15-20% and NDF content ranged 41-56%. In vitro OM digestibility ranged 55-65%. Based on digestible OM content of subspecies, estimated net energy content ranged 4.6-5.3 MJ/kg DM, with not significant differences among subspecies neither season.

Key-words: *Bituminaria bituminosa*, *Psoralea*, shrubs, nutritive value, legume, forage

Résumé - La valeur nutritive de 3 sous-espèces de *Bituminaria bituminosa* (*crassiuscula*, *albomarginata* et *bituminosa*) a été mesurée sur des plantes prélevées dans les îles Canaries en automne, au printemps, en hiver et en été. Les valeurs de MAT obtenues vont de 15 à 20% et contenu en fibre de 41 à 56%. Calculée à partir de la digestibilité de la MO, la valeur énergétique varie de 4,6 à 5,3 MJ/kg MS sans qu'il y ait de différence significative entre sous-espèce ou selon la saison.

Mots-clés: *Bituminaria bituminosa*, arbuste fourrager, valeur nutritive, légumineuse

Introduction

Bituminaria bituminosa (called tедера or psoralea) are a taxonomic complex. They are shrub legume forages found in Mediterranean and Macaronesic areas. In the Canary Islands, several subspecies are cultivated and some subspecies even grow in the wild throughout the Islands.

Tедера, in fresh form or as hay, is traditionally used as a forage for feeding goats in the Canary Islands. Although it is frequently use as feed, very little research has been carried out to determine its nutritive value (Mendez and Fernández, 1990; Ventura *et al*, 1997).

Materials and methods

Three subspecies of *Bituminaria bituminosa* were used in this study: *crassiuscula*, *albomarginata* and *bituminosa*. Thin stems (less than 3 mm diameter) with their leaves were taken from shrubs of each subspecies in summer, autumn, winter and spring.

Samples were weighed, cut and dried at 60 °C to about 90% dry matter. Then they were ground to pass a 1-mm screen prior to chemical analysis. Organic matter (OM) and crude protein (CP) content of samples were determined according to AOAC (1990). Neutral detergent fiber was analysed according to Van Soest *et al*. (1991).

In vitro organic matter digestibility of duplicate samples of each subspecies was determined according to Tilley and Terry (1963). Based on digestible OM, digestible energy (DE, MJ/kg DM) content of the subspecies was estimated as 0.0185 x digestible OM (NRC, 1988). The net energy (EN) content was calculated using the mean ratios ME/DE = 0.82 (NRC, 1988) and EN/ME = 0.60 (Sauvant and Morand-Fehr, 1991).

Chemical composition and nutritive value of each subspecies were compared by LSD tests (SAS, 1989), and a level of $P < 0.05$ was chosen as the minimum for statistical significance.

Results and discussion

Composition of subspecies is shown in Table 1. Dry matter content ranged 57-70% in spring-summer cuts, and 73-78% in autumn-winter cuts. Protein content ranged 15-20%, similar to other legume shrubs which are grown in the Canary Islands, such as tagasaste or *Medicago arborea*.

Table 1: Proximate composition (g/kg DM) of subspecies of *Bituminaria bituminosa*.

Subspecies	Season	DM	OM	CP	NDF
<i>Crassiuscula</i>	Summer	263	915	150	512
	Autumn	216	880	186	438
	Winter	221	898	177	477
	Spring	242	891	212	478
<i>Albormaginata</i>	Summer	281	885	171	411
	Autumn	259	872	167	425
	Winter	223	866	202	444
	Spring	250	927	207	525
<i>Bituminosa</i>	Summer	259	909	171	418
	Autumn	252	878	162	458
	Winter	270	881	168	532
	Spring	230	921	196	563

Table 2: In vitro OM digestibility (%), digestible OM (g/kg DM) and estimated EN content (MJ/kg DM) of subspecies of *Bituminaria bituminosa*.

Subspecies	Season	OM digestibility	Digestible OM	EN
<i>Crassiuscula</i>	Summer	61.6	564	5.1
	Autumn	57.8	509	4.6
	Winter	61.9	556	5.1
	Spring	65.0	579	5.3
<i>Albormaginata</i>	Summer	60.1	532	4.8
	Autumn	61.5	536	4.9
	Winter	62.6	542	4.9
	Spring	62.1	576	5.2
<i>Bituminosa</i>	Summer	57.6	524	4.8
	Autumn	63.5	558	5.1
	Winter	58.3	545	4.9
	Spring	54.9	506	4.6

In vitro OM digestibility ranged 55-65% and digestible OM content of *Bituminaria bituminosa* subspecies was in the range 500-580 g/kg DM (Table 2), with no significant differences among subspecies or season. Based on these results, EN content of subspecies was estimated to be 4.6-5.3 MJ/kg DM.

Conclusions

The results of this study show that *Bituminaria bituminosa* species are legume shrubs with a protein and energy content similar to a low quality alfalfa (INRA, 1988). However, some authors (Gupta et al, 1988; Zobel et al., 1991) have reported that this forage can contain antinutritional substances (flavonoids, coumarins, etc) which could limit its intake.

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