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RESEARCH PAPER

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Determination of Nutritional Value of *Alhaji maurorum* (*Camel thorn*) by an *In Vitro* Gas Production Technique Using a Pressure Transducer and Chemical Analyses

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ABSTRACT

The growth of salt-tolerant plant species (such as Alhaji maurorum) for ruminant production offers a major opportunity to use land and water resources that are too saline for conventional crops and forages. Alhaji maurorum is a halophyte plant that grows in all of the Iran, especially in desert areas. Pharmaceutical effects of this plant are discussed by many researchers but there was no general data about importance of it in ruminants. So an experiment was conducted for evaluation of chemical analyses and cumulative gas production of Alhaji maurorum by the current in vitro techniques. The produced gas from fermentation at 24, 48 and 96 h (GP24, 48, 96) and chemical analyses of Alhaji maurorum (DM, OM, Ash, NDF and EE) were estimated. The chemical analyses of Alhaji maurorum showed that it contained less crude protein (6.7%), medium or high NDF (35.4%) and ADF (27.2%). The total cumulative gas production for 96h incubation was 44.89ml. Alhaji maurorum can be used as a cheaper and ever available alternative fiber source for ruminants in Iran.

Keywords: Alhaji maurorum, Halophyte Plant, Chemical Analyses and Ruminants.

INTRODUCTION

In arid areas and some dry lands, halophytic plants often expand and are considered as an important source of nutrients for most groups of domestic ruminants. Palatable halophytic species are generally scarce but where present are valuable feed sources, especially during drought season for ruminants. There are several halophytic plants which are less palatable which can be used as fodder after processing. Feeding halophytes to ruminant livestock requires special precautions since the plants can impact on nutritional animal behavior and physiology. Recently the demand for halophyte forage in Iran has been increasing progressively. One of the halophyte plants is *Alhaji maurorum*, which it is a single species of genus *Alhaji* (family *Fabaceae*) found in *Iran* (Flora of *Iran*) and it is one of the important sources of traditional folk medicines. This family is rich of many edible plants and a variety of medicinal plants with important raw materials used in the pharmaceutical industries (Lewis and Lewis, 1977). Oil from the leaves of the plant is used for the treatment of rheumatism, while the flowers of the plant are used for the treatment of piles (Brown, 1995). It is also used as laxative and in diseases of the urinary tract and liver (Batanouny, 1999). Pharmaceutical effects of *Alhaji maurorum* are discussed by many researchers but there was not enough data in the importance of this plant for ruminant's nutrition. So the purpose of this paper is evaluation of some nutritional values of *Alhaji maurorum* by the current experiments for ruminants.

MATERIAL AND METHODS

Preparation of *Alhaji maurorum*

Plant samples used in this study were collected (stems and leaves) at before flowering stage from the city of Mashhad, in the Khorasan Razavi district (Iran). The samples was harvested at July 2012 in farm Research Unit of Ferdowsi University of Mashhad about 999.2 m above sea level with rainfall mean of 262 mm per year in northeast of Iran. Samples of plant were mixed and sub-samples were taken from each composite and then dried in a forced air oven (65°C) for 48 h. Samples were ground using a Wiley mill (two-mm screen) and reserved in the air dried place.

Determination of chemical analyses

Ether Extract (EE), Ash and crude protein (CP) of plant were analyzed according to AOAC (1990). The parameters of ADF and NDF were determined according to Van Soest *et al*. (1991).

Gas test

The samples from rumen fluid for the *in vitro* gas production was collected before the morning feeding from 4 Baluchi male sheep which have been nourished according to: animals were fed with 0.8 Kg DM alfalfa hay and 0.4 Kg DM concentrate (165 g CP/Kg DM/head/day (at maintenance). Animals were equipped with permanent ruminal fistula approximately 150 days before use as donor of ruminal fluid. All the sheep were fed twice daily at 07:00 and 16:00 h. All animals had free access to water. Cumulative *in vitro* gas production was recorded by using the reading pressure technique ((PTB330, Env Company) of Theodorou *et al.* (1994) with the modification of Mauricio *et al*. (1999). Rumen fluid was collected from multiple sites within the rumen of each animal separately in pre-warmed thermos flasks and transported immediately to the laboratory. Rumen contents of each animal species was strained through four layers of cheesecloth, and kept at 39 ◦C under a CO_2 atmosphere. Approximately

500 mg of plant sample was weighed into 120 ml serum bottles. Using an automatic dispenser (Jencons, Hemel Hemstead, England), 50 ml of buffer containing micro- and macro-elements, a reducing agent and a reduction indicator of resazurin, was infused to each serum bottle. Serum bottles without samples (i.e., blanks) were also included to allow correction of 96 h degradability values for residual feed from rumen fluid and four bottles of blank (containing only rumen fluid inoculums were incubated as blanks and used to compensate for gas production in the absence of substrate) and four samples of alfalfa as slandered were incubated each run. Once filled up, all the bottles were closed with rubber stoppers, crimped with aluminum seals, shaken and placed in the incubator shaker at 39 ◦C. The cumulative gas production was recorded at several incubation times (3, 6, 9, 12, 24, 32, 48, 72 and 96 h after inoculation time), using the transducer. The samples of *Alhaji maurorum* were incubated in quadruplicate.

RESULTS AND DISCUSSION

Chemical analyses of *Alhaji maurorum* is presented in table 1. *Alhaji maurorum* with 6.7 % CP have insufficient CP, that it is nutritionally classified in a low protein source. The Ash content was 10.2 % DM in *Alhaji maurorum*. The ADF and NDF contents of *Alhaji maurorum* were 27.2 and 35.4% DM. There are some contradictions in chemical analyses of halophytic plants between assays. Differences between reporters could be due to weather condition, forage production condition, stage of harvesting, Ratio of leaf to stem (leaf: stem) or genetic variation (Gihad and El Shaer, 1992; Benjamin et al., 1995).

Table 1. Chemical analyses of *Alhaji maurorum*.

	Parameters (%)					
	DM[1]	EE[2]	CP[3]	ASH	NDF[4]	ADF[5]
Alhaji maurorum	37.92±0.21	3.6±0.1	6.7±0.2*	10.2±0.21	35.4±0.53	27.2±0.43

1) Dry Matter, 2) Ether Extract, 3) Crude Protein, 4) Acid Detergent Fiber, 5) Acid Detergent Fiber
*Mean ± standard error

Table 2. The parameters from *in vitro* gas production for *Alhaji maurorum*.

	Parameters (ml)		
	96TCGP[1]	48TCGP[2]	24TCGP[3]
Alhaji maurorum	44.89±0.81*	38.12±1.42	23.39±1.76

The parameters from *in vitro* gas production for *Alhaji maurorum* are presented in table 2. Total of cumulative gas production after 96 h incubation was 44.89 ml per 500 mg of sample.

1) Total of Cumulative Gas Production after 96 h incubation (ml/500 mg of DM),
2) Total of Cumulative Gas Production after 48 h incubation (ml/500 mg of DM),
3) Total of Cumulative Gas Production after 24 h incubation (ml/500 mg of DM),
*Mean ± standard error.

Also the cumulative gas production after 24 and 48 h incubation was 23.39 and 38.12 ml respectively. Pharmaceutical

effects of *Alhaji maurorum* is discussed frequency (Bolus, 1983; Kalhoro et al., 1997; Singh et al., 1999), but there was no general data about *in vitro* gas production of *Alhaji maurorum* and its effects for ruminant nutrition, so we aren't able to compare our reports with another works.

CONCLUSION

There are many halophytic species that could be used as either forage or fodder. Animals browse most of the halophytic grasses found in Iran, which contain variable quantities of fiber and proteins. *Alhaji maurorum* is a common fodder shrub in Iran. Considering the acute shortage of fodder in the Iran, it is encouraging that we have found a suitable grass in the local flora, which can completely replace maize (conventional green fodder) and thus result in considerable saving on its purchase. The halophytic grasses such as *Alhaji maurorum* is a non-accumulator of salts, which not only improves its acceptability by animals but it also does away with the additional water requirement caused by the increased thirst of the animals fed high-salt fodder. Generally, *Alhaji maurorum* had moderate to high NDF and ADF and had a lower CP content. The cumulative gas production of *Alhaji maurorum* for 24, 48 and 96h after incubation was satisfying and generally it can be used as a fiber source for ruminants.

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