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TECHNICAL NOTE

Chemical Composition of Sickle Bush (*Dichrostachys cinerea*) Leaf Petiole from Two Different Plant Heights Dried at Room Temperature and in a Stove at 55 °C

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INTRODUCTION

Chemical composition limits a great deal the amount of nutrients and/or anti-nutritional substances provided by the foliage after consumption. These characteristics will show how this foliage should be used as a supplement of energy, protein, minerals, or the three combined, as well as the possible antinutritional effects of its secondary metabolites (McDonald *et al*., 2011).

The major nutritional relevance of *Dichrostachys cinerea* is its high foliar volume during the dry season, when the pasture availability is very low.

The drying method may influence on the nutritional value, possibly due to the oxidation of some compounds, particularly polyphenols (Deinum and Maassen, 1994). Therefore, the aim of this study was to determine indicators of chemical composition of leaf petioles of sickle bush (*Dichrostachys cinerea*) from two different plant heights, which were dried by two methods.

DEVELOPMENT

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The samples were collected at Roberto Rodriguez Cooperative of Agricultural Production (21.6 NL and 78 WL), in the municipality of Camagüey, province of Camagüey, Cuba. The plants were developed in dryland, without treatment or fertilization on non-gley plastic soil (Hernández *et al*., 2015).

The samples of *D. cinerea* leaf petioles were collected at random, by hand, from at two different levels (1 and 2 m high), from 10 trees, before 9:00 am in the dry season, simulating animal leaf browsing. The samples were placed in plastic bags, and were carried in an ice box to the Agroenvironmental Control Laboratory (LABCA), from the Animal Development and Production Studies Facility, at the Ignacio Agramonte Loynaz University of Camagüey, Cuba, to perform the study. The time lapse between sample collection and arrival at the university lasted 40 minutes.

In the laboratory, the two bags with the samples (from the two plant height levels) were placed on two trays where the leaves were homogenized manually. Each portion in the trays was divided in two, in order to perform an equal number of drying treatments, at room temperature (27 ^{o}C), for approximately 96 h, and 55 ^{o}C in a stove with forced air heating, until reaching a constant weight (24 h). After drying, the samples were crushed in a hammer mill (SK-1), until they could pass through a 1 mm sieve. All were kept in glass jars with frosted caps, until analysis. The drying temperature and heights were regarded as the independent variables of the study.

Determinations were made using successive 200 g quartering from the total sample crushed material.

The dry matter (residual) was determined in a stove with forced air heating, at 105 °C ± 1 °C, until a constant weight was achieved. The ash was determined by incineration at 550 °C. The crude protein (CP) was determined by the Kjeldahl method, using protein digester KDN-04D, and distillation system ZDDN-II (China).

The neutral detergent fiber (Van Soest and Wine, 1967) was obtained with fiber digester CXC-06.

The procedures used are in the LABCA Laboratory Manual, which follows the recommendations of A.O.A.C (1995). All the analyses were done by triplicate.

The means from the indicators studied were compared through analysis of variance, and Duncan's multiple comparison technique (1955). IBM® SPSS® Statistics (Version 22) was used for statistical analysis.

Table 1 shows some indicators of the chemical composition of leaf petioles of whole sickle bush plants, from two different heights and drying temperatures.

Table 1. Effects of drying and plant height on chemical composition indicators of leaf petioles leaves of *D. cinerea*

Drying temperature	Cutting height (m)	Dry matter (%)	Ashes (%)	Crude protein %	Neutral Detergent Fiber
55 ºC	1	35.2[a]	9.9[a]	12.9[a]	43.8[a]
55 ºC	2	44.5[b]	6.4[b]	11.2[b]	43.5[a]
Room	1	34.3[a]		13.2[a]	43.2[a]
Room	2	47.5[b]		11.8[b]	43.9[a]
±SE		3.30	0.45	0.47	0.16

Unequal letters on every column indicate a significant difference ($p<0.05$) (Duncan, 1955).

No significant differences ($p<0.05$) were observed in the temperatures evaluated, but there were differences as to plant height in DM and ash contents: the lower the leaves, the more ashes and crude protein (CP) were present, but less dry matter (DM), whereas the Neutral Detergent Fiber (NDF) was the same in the two heights.

Cárdenas *et al.,* 2016, reported that in the proximal chemical composition of *Estilosantes falcata* (L) Greuter and R. Rankinas, the longer the re-shooting time was (105-135 days), the higher DM and CP were (2.8 and 3.0%, respectively). This contradicts the results of this experiment as to protein, but coincides regarding dry matter. Moreover, Pedraza *et al.* (2008), in 30, 72, and 153 cm sickle bush plants, reported very similar DM contents to this study, whereas CP in the above study was higher in all the cases, up to 17%, at 72 cm high.

In studies done on C*ratylia argéntea,* (Castillo-Gallegos, Ocaña-Zavaleta, and Jarillo-Rodríguez, 2014), the re-shooting ages were evaluated at 3, 6, 9, and 12 weeks, and just like in this study, they found a reduction in the contents of CP, which increased with age in the dry season, particularly at 12 and 15 weeks of re-shooting. The NDF content was similar at re-shooting ages of 6-12 weeks, and increased in about 6 per cent units at 15 weeks after re-shooting.

Coincidentally, Demdoum, Delgado Enguita, and Muñoz Pérez (2010) studied leguminosae *Onobrychis viciifolia Scop*, and concluded that the cutting effects have a negative impact on forage production and on the chemical composition, DM/plant, and CP content.

CONCLUSIONS

The chemical composition indicators of *D. cinerea* studied are not affected by the type of drying, but CP was higher in the 1 m high plants, whereas DM was lower.

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AUTHOR CONTRIBUTION

Conception and design of research: EE, SM, RP; data analysis and interpretation: EE, SM, ML; redaction of the manuscript: EE, SM, RP.

CONFLICT OF INTERESTS

The authors declare no conflict of interests.