NUTRITIONAL SENSITIVITY PER MORPHOLOGICAL COMPONENT IN *Urochloa* HYBRID UNDER TROPICAL ENVIRONMENTS

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ABSTRACT

Camello® (GP 3025) is a tolerant to drought *Urochloa* hybrid grass with high forage production, early flowering and high regrowth rates. The objective was to define nutrient concentration changes by morphological component in two tropical contrasting environments (Aw_0, Aw_1). Nutrient concentrations differences ($P \leq 0.05$) were observed among morphological components over time. In Aw_1, the morphological components showed higher protein content; lamina (12.2% *vs* 10.4%), pseudostem (9.5% *vs* 6.6%) and sheath (9.8% *vs* 6.8%), in comparison Aw_0. The Aw_0 environment promoted FAD deposition (47.9%, 46.9%, pseudostem and sheath, respectively) and lignin deposition (6.6%, 9.1% pseudostem and sheath, respectively). The nutritional changes per morphological components are the best tool to define optimal moment for harvesting on nutritional bioavailability for livestock production intensification.

Key words: *Urochloa*-Camello, GP 3025, nutrient concentration dynamic's.

INTRODUCTION

In Mexico, the tropical regions cover a total of 56 million has, classified both as dry tropics (24 million ha) and humid tropics (32 million ha), with specific temperature and precipitation regimes, influencing plant growth and nutritional seasonal changes, being the genotype x environment interaction, the most important for forage nutritive variations. Such interaction promoted high lignification rates and plant hormonal factors, inducing senescence and remobilization of endogenous nutrients (Kwon and Park, 2008), leading to rapid decline in nutritional value of pastures, affecting nutritional value and strong nutritional loss in all plant's morphological components (Bernal-Flores *et al.*, 2018). In order to understand the process and promote a livestock intensification production within tropical areas, it is necessary to carry out detailed studies on nutritional dynamics among morphological components for to establish key moments for forages use and, to achieve the highest bioavailability of nutrients.

METHODS AND MATERIALS

The study was conducted simultaneously in two locations with different environmental conditions; Ocozocoautla, Chiapas (Aw_1) and Puerto Escondido Oaxaca (Aw_0; Table 1), on established *Urochloa* hybrid (GP 3025; Camello®) pasture. The pasture in both places, received same management; fertilization doses (100-00-00; N-P-K), cutting frequency (7, 21, 35, 49 days) and cutting height (10 cm above soil level). The evaluation was carried out during 2017's rainy season. The forage samples were dried using an air forced oven at 55 ºC for 48h and fractionated into components: lamina, pseudostem and sheath at different regrowth periods (7, 21, 35 and 49 days). The samples collected were analyzed for crude protein (CP), acid detergent fiber (ADF), neutral detergent fiber (NDF) and, lignin using Near Infrared Spectroscopy (NIRS).

Statistical Analysis

Data was analyzed using two linear mixed models; specific model (morphological components within same place) and general model (morphological components between sites) fitted with R software and using the lme4 library, taking into account fixed effect location and time and random effects the individual. A linear regression model was used to determine the prediction equation.

The proposed model was as follows:

$$y_{ijk} = \mu + \alpha_i + \beta week_{ij} + \upsilon_k + e_{ijkl}$$

where:

y_{ijk} = is the response variable for individual $k = 1,2,3,4$, location $i = 1,2$ and time $j = 1,2,3,4$; μ = is the general means, α_i = is the location effect, β is a regression coefficient associated with time, υ_k is effect of the individual, $\upsilon_k \sim NIID(0, \sigma_u^2)$ and e_{ijk} is the residual error, $e_{eijk} \sim NIID(0, \sigma_u^2)$ where $NIID$ stands for normal independent and identically distributed, υ_k *and* e_{eijk} distributed independently.

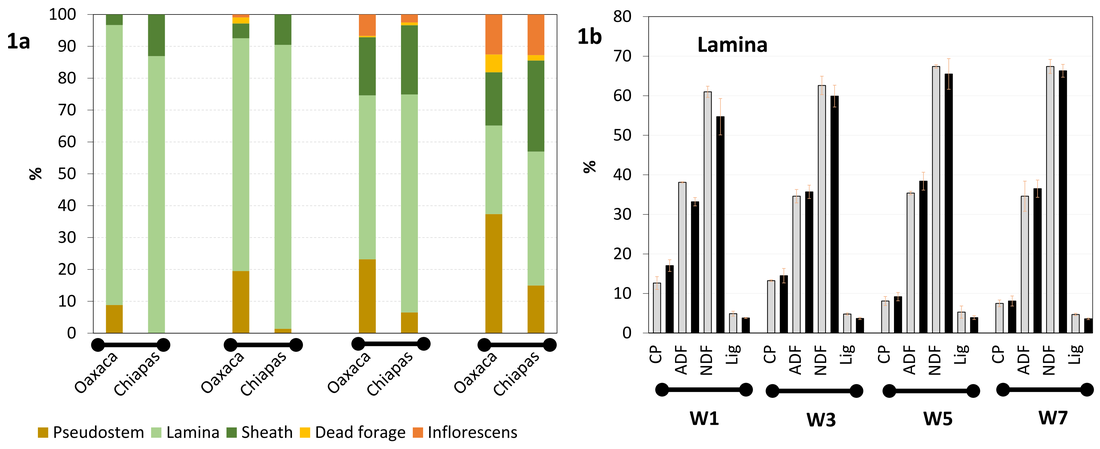
Table 1. Environmental condition for two locations during study period. Tha data are average the last four years (n=4)

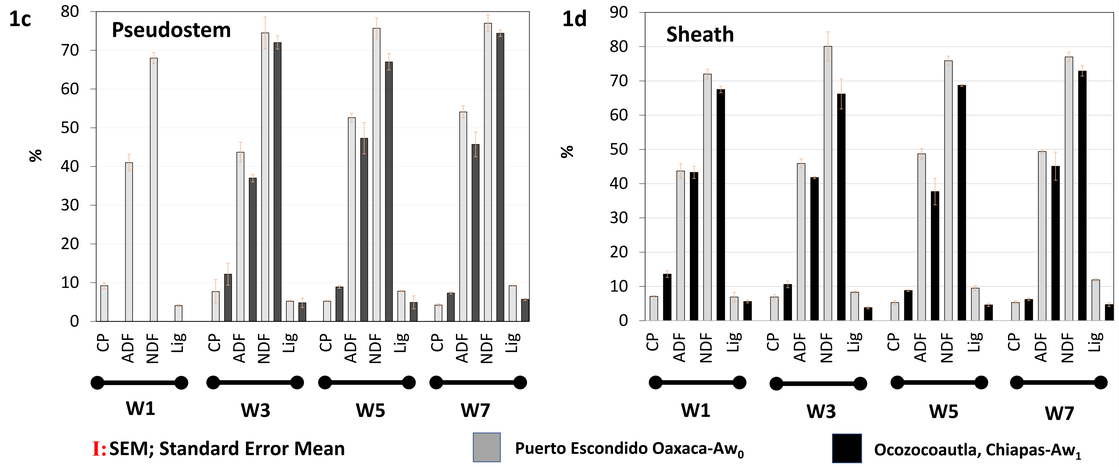
Locations	Precipitation (mm)	Mean temperature (ºC)
Ocozocoautla, Chiapas (Aw_1)	910	22.7
Puerto Escondido, Oaxaca (Aw_0)	1022	28.2

RESULTS AND DISCUSSION

Nutritional changes ($P \leq 0.05$) among morphological components were observed over time for two tropical environments. The proportion per component was different over time for both places, where Chiapas registered the highest lamina proportion for all weeks regrowth (Figure 1a). The protein lamina component in Aw_1 environment, was 25.8% higher during the first weeks in comparison Aw_0 environment (Figure 1b). Finally Aw_1 promoted a higher average lamina protein content forage than Aw_0 (8.1% *vs*. 7.5%).

Figure 1. Botanical composition (%) and nutritional dynamics by morphological component for the hybrid *Urochloa* (GP 3025) in two tropical environments. W= Regrowth week

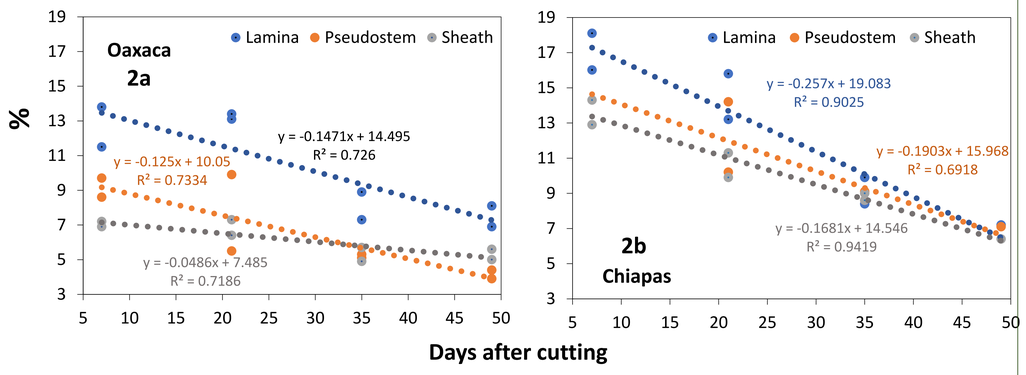




During the first week of regrowth no pseudostem growth was observed for Chiapas. The fibers (NDF, ADF) and lignin increased over time and ADF increase at pseudostem was noticeable for Aw_0 regarding Aw_1 environments (54.1 % *vs.* 41.7 %; Figure 1c). Foliar sheath was more indigestible than pseudostem in both environments, but the highest value was observed for Aw_0 environment in comparison to Aw_1, due to higher fiber content; NDF (73.3% *vs* 68.8%), ADF (47.9% *vs* 46.9%) and lignin (9.1% *vs* 6.6%; Figure 1d).

Crude protein concentrations over time showed a negative linear regression relation for both environments in all morphological components (Figure 2). The protein content was higher for Aw_1 than Aw_0 environment for lamina (12.2% *vs* 10.4%), pseudostem (9.5% *vs* 6.6%), sheath (9.8% *vs* 6.1%) probably due to autophagy (degradation of oxidized proteins) and senescence including programmed cell death (PCD; Kwon and Park, 2008). According to our prediction equation on protein losses over time; 1.47 g d^{-1}, 1.25 g d^{-1} and 0.4 g d^{-1} for lamina, pseudostem and sheath (Figure 2a), while favorable environment included; 2.57 g d^{-1}, 1.9 g d^{-1}, 1.6 g d^{-1} for lamina, pseudostem and sheath, respectively (Figure 2b).

Figure 2. Changes in crude protein (CP) content per morphological components in two Mexican tropic places.



CONCLUSIONS

The Aw_1 environments promoted higher CP concentrations for all morphological components, while Aw_0 environments promoted high amount of fiber and lignin aggregation within a short period. However, CP concentration's losses was accelerated for favorable growth environments (Aw_1). The optimal forage use grazing for intensification livestock in Aw_0 environment, should be faster than in Aw_1 environment.

LITERATURA CITADA

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