NUTRITIONAL SENSITIVITY PER MORPHOLOGICAL COMPONENT IN Urocloha HYBRID UNDER TROPICAL ENVIRONMENTS

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ABSTRACT
Camello® (GP 3025) is a tolerant to drought Urocloha 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. (Camello®, Aw). Nutrient concentrations differences (PSO 0.05) were observed among morphological components over time. In Aw, the morphological components showed higher protein content; lamina (9.5% vs 6.6%) and sheath, (9.8% vs 6.8%), in comparison Aw. The Aw 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 moments for harvesting on nutritional productivity for livestock production intensification.

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-environment interaction, the most important for forage nutritive variations. Such interaction promoted high photosynthesis and plant hormonal factors, inducing senescence and mobilization of endogenous nutrients (Kwon and Park, 2008), leading to rapid decline in nutritional value of pastures, affecting nutritional value and structural 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 usage, 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) and Puerto Escondido Oaxaca (Aw, Table 1), on established Urocloha 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 yearly’s rainy season. The forage samples were dried using an air forced oven at 55 °C 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:

\[ y_{ijk} = \mu + \alpha_i + \beta_j + \gamma_k + \epsilon_{ijkl} \]

where \( y_{ijk} \) is the response variable for individual \( k \in [1, 2, 3], i \in [1, 2], j \in [1, 2], \mu \) is the general mean, \( \alpha \) is the location effect, \( \beta \) is a regression coefficient associated with time, \( \gamma \) is effect of the individual, Aw, \( \epsilon_{ijkl} \) is the residual error, \( \epsilon_{ijkl} \sim \text{NID}(0, \sigma^2) \) where \( \text{NID} \) stands for normal independently and identically distributed, \( \alpha_i \) and \( \gamma_k \), distributed independently.

RESULTS AND DISCUSSION
Nutritional changes (PSO 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 environment, was 25.5% higher during the first weeks in comparison Aw environment (Figure 1b). Finally Aw, promoted a higher average lamina protein content forage than Aw, (8.1% vs 7.5%).

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

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

CONCLUSIONS
The Aw environments promoted higher CP concentrations for all morphological components, while Aw, 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). The optimal forage use granting for intensification livestock in Aw, environment, should be faster than in Aw, environment.

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