**Introduction:**

In the present investigation, we conducted an observational study focusing on the abundance of the bee species Eulaema Nigrita within the confines of the Brazilian Atlantic Forest. The study encompasses a comprehensive dataset, incorporating diverse potential predictor variables such as climatic factors (mean annual temperature, precipitation, temperature seasonality, and precipitation seasonality) and aspects related to land use (specifically, the proportion of forest cover). The primary objective of this short analysis is to examine the influence of mean annual precipitation (MAP), precipitation seasonality (Pseason), and forest cover (.forest) on the abundance of bees. Our overarching hypothesis posits that a higher coverage of trees and an elevated mean annual precipitation (MAP) may inversely correlate with bee sightings, while a heightened level of precipitation seasonality around the average rainfall rate may positively influence bee sightings. This study seeks to uncover how weather and land use affect the number of Eulaema Nigrita bees.

**Methods:**

In the initial phase of our investigation, we conducted an exploratory analysis of our response variable, Eulaema nigrita abundances, to gain a comprehensive understanding of our data distribution. To achieve this, we generated a histogram depicting the abundance distribution.

Subsequently, we employed a general linear model (GLM) with a Poisson distribution to initiate our modeling process. Recognizing the presence of overdispersion in our data, as revealed in the initial Poisson GLM, we opted for a negative binomial distribution to better accommodate this characteristic.

Two distinct negative binomial GLMs were then developed. The first model incorporated predictors such as the proportion of forest cover and mean annual precipitation, while the second model considered precipitation seasonality and mean annual precipitation.

Following model development, we used the R predict function to generate predictions based on both models. The outcomes were visually represented through the creation of two plots, illustrating the influence of forest cover, mean annual precipitation, and precipitation seasonality on the abundance of Eulaema Nigrita. These plots were derived from the simulated data generated by the predictive models, providing insights into the relationships between these variables and bee abundance.

**Results:**

We commenced our analysis by examining the distribution of our response variable, Eulaema Nigrita abundances.

Histogram

The histogram of abundances closely resembled a Poisson distribution, prompting the application of a Generalized Linear Model (GLM) with a Poisson distribution.

We initiated the modeling process with a regular GLM using the Poisson family. However, this model exhibited substantial residual deviance of 17042 on 174 degrees of freedom, indicating serious overdispersion. Given this concern, we used a negative binomial distribution similar to the Poisson distribution but with an additional parameter addressing disproportionate variance.

TABLE of GLM.NB

The intercept represents the estimated log count when all predictor variables are zero (5.35). The negative slope for MAP and forest cover indicates a decrease in the log count with increasing values of these variables, while the positive slope for precipitation seasonality suggests an increase in the log count. The dispersion parameter (0.8368) aligns with the appropriate fit of the negative binomial distribution.

After looking at the combined model incorporating all three predictor variables demonstrating their collective impact on the data, we created two negative binomial GLMs, one incorporating forest cover and mean annual precipitation and the other incorporating precipitation seasonality and mean annual precipitation. These models aimed to provide a nuanced understanding of the individual and combined effects of the predictor variables on Eulaema nigrita abundances.

TABLE of GLM.NB

When all factors are zero, the starting point for our bee count is estimated to be 6.68. The bee count decreases when mean annual precipitation (MAP) and forest cover increase. Specifically, a small increase in MAP (-0.0014) has a minor impact, while a rise in forest coverage (-1.312) has a more noticeable effect. The dispersion parameter 0.7545 confirms that our chosen model, the negative binomial distribution, fits well with the observed data.

TABLE of GLM.NB

The starting point for our bee count, when all factors are zero, is estimated to be 5.03. An increase in mean annual precipitation (MAP) still has a slight negative impact (-0.0014) on bee abundance. However, precipitation seasonality shows a positive impact (0.024) on bee sightings. The dispersion parameter, measured at 0.7931, indicates that our chosen model, the negative binomial distribution, fits well with the observed data.

**Conclusion:**