# Silviculture simplifies anuran-prey networks and reduces niche overlap

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## Objectives

Evaluate how *Eucalyptus* sp. silviculture impact anuran communities through prey-community reconfiguration, in comparison with a native forest. Hence, we tested the following hypotheses: (1) Anuran and prey richness will be lower in eucalyptus plantations; (2) The anuran silviculture community will to show lower niche partitioning among species and therefore a more connected, and non-modular network structure. (3) If prey diversity and abundance is lower in eucalyptus, anurans should behave as trophic generalists with broader diets that are more similar to environmental availability.

## Materials and Methods

The work was based on the diet of anurans in a region of the Atlantic Forest, in the municipality of Camanducaia, Minas Gerais, Brazil. The predominant natural vegetation is Mixed Ombrophilous Forest with Araucarias, but it is situated in a mosaic of forest remnants and monocultures of *Eucalyptus* spp. And *Pinus* spp.

Both anuran and prey availability were sampled in 28 transects equally distributed between Atlantic Forest and Eucalyptus silviculture (SISBIO #59947 and #16593). Prey availability was estimated at each location using adhesive and pitfall traps. Food items and prey in the environment were counted and their volume was approximated using the formula of an ellipsoid (Dunham, 1983).

To evaluate the effect of the environment on the community, we calculated the abundance and diversity (Shannon, 1948) of anurans and prey in both environments. The consumption of prey by anurans was described as an interaction networks. The structure of the interaction networks was analyzed for the metrics of connectance and modularity (Beckett, 2016; Liu & Murata, 2010). For the analysis of niche dissimilarity, the Bray-Curtis dissimilarity index was calculated. Finally, we used specialization and electivity indices (Hutchinson et al., 2022) to individually compare the diet of species between environments.

## Results

Anurans showed lower diversity and abundance in *Eucalyptus* plantations, in comparison with native forest. For prey available in the environment, only abundance was lower in plantations, with diversity showing no difference between environments.

Contrary to the initial hypothesis, both networks showed a moderate value of connectance, with a marginally higher value in Eucalyptus (C = 0.276) than in Forest (C = 0.253). Additionally, the eucalyptus plantation network is more modular (Qb = 0.226) than that of the native forest (Qb = 0.177). Niche partitioning among species was significant only in plantations (Figure 1).

Despite the observed differences, the specialization and electivity metrics of the predators did not differ between environments,

with all species presenting the core of their diet (50%) composed of less than two food categories. Finally, only the diet of Ischnocnema holti in the Atlantic Forest did not differ from what was expected by chance according to prey availability.

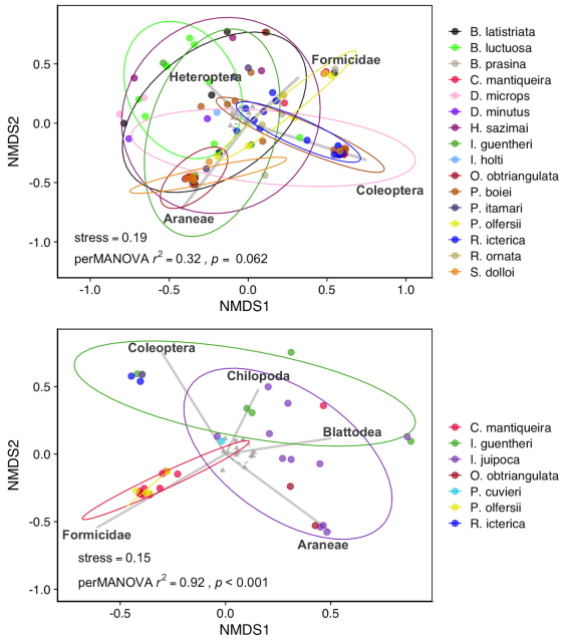


Figure 1: Diet dissimilarity among anurans in the (A) Atlantic Forest and (B) Eucalyptus community. Each point corresponds to the stomach content of an individual, and triangles represent prey availability in the environment. More distant points are less similar. Ellipses correspond to 1 standard deviation of the diet.

## Conclusions

This study highlights the significant differences in the diversity, abundance, and interaction networks of anurans and their prey between remnants of the Atlantic Forest and *Eucalyptus* monocultures. The modular structure and niche partitioning observed for the plantation environment suggest a more specialized and compartmentalized community, which underscores the greater vulnerability of this system to disturbances. We also emphasize the importance of further studies on the impact of forestry on trophic interactions.

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