COMMUNITY DYNAMICS AND SUCCESSION OF A SECONDARY FRAGMENT OF SEASONAL FOREST NEAR THE RIO DOCE STATE PARK, MINAS GERAIS, BRASIL

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INTRODUÇÃO

High threats to the Atlantic Rain Forests and other tropical forests because of deforestation, fragmentation and climate change have drawn attention to research activities on community dynamics. These activities help to understand, how species richness and diversity arises and how they are maintained (Losos & Leigh Jr., 2004). An important research area is the secondary succession after forest´s logging. Even if underlying mechanisms of successional processes in tropical ecosystems like the Atlantic Rain Forest are poorly understood (Peterson & Carson, 2008), it is known that environmental conditions as light availability and nutrient supply change gradually (Laurance *et al.*, 2002). This might influence species composition: In general, species richness and diversity increase with increasing secondary succession (Liebsch *et al.*, 2008).

OBJETIVOS

This study tests the hypothesis that species richness and diversity of secondary fragments increase with succession advances. Furthermore, we have checked if there has been an accumulation of basal area and an enrichment of larger trees in older communities.

MATERIAL E MÉTODOS

The study was carried out in the forest of Mombaça, a secondary fragment situated at 19°48' S and 42°31' W adjacent to the Rio Doce State Park, Minas Gerais, Brazil. The fragment spans about 1500 ha and is part of the legal reserve of the ArcelorMittal mining company. For 28 years, the area regenerations after logging. The climate of the region is classified as tropical, type AW according to Köppen, with two pronounced seasons, dry winters and humid summers. The study was carried out in a permanent plot of 0,7 ha - a grid of 70 x 100 m. The plot is divided in 70 subplots of 10 x 10 m. The first census of all living individuals with a diameter at breast height (DBH) major or equal 3.2 cm was carried out in 2006, the second one in 2010. All individuals fulfilling this criterion were identified to species level.. Diversity indices for both surveys were calculated using the software EstimateS. The species - area relationships of both censuses were fitted by the power - law model. Species were classified in three size classes according to their diameter in 2006: Size class I comprises all individuals with a DBH smaller than 10 cm, size class II is formed by all individual with DBH smaller than 30 cm and size class II includes all individuals with DBH major or equal 30 cm. Mortality and recruitment rates, basal area loss and gain as well as the average growth rate were calculated as described in Losos & Leigh (2004) for the complete community and for each size class.

RESULTADOS

During examination period, the number of individuals decreased from 1832 in 2006 to 1746 in 2010 in the sur-

vey corresponding the total of 2315 living individuals per hectare in 2006 and 2233 individuals in 2010. The basal area increased from 11.77 in 2006 to 12.70 in 2010. 2006, 111 species from 35 families were found. Two species, Couepia monteclarensis and Inga sp. 1, leaved the community during the examination period, but eleven new species entered, so that 120 species were registered in 2010.

Diversity increased little during the examination period: In 2006, the index of Shannon - Wiener is 3.75, increasing to 3.80 in 2010. Fisher´s shows the same tendency, increasing significantly from 25.39 ±1.25 in 2006 to 29.21 ±1.41. The species - area relationship fitted by the power model shows good correlation for both censuses (R2 = 0.949 in 2006 and R2 = 0.966 in 2010). The slope of the linearized species - area relationship in the double logarithmic space is significantly higher in 2010 (0.406 ±0.009) than in 2006 (0.370 ±0.010).

The observed increase of species richness and diversity of trees in the Forest of Mombaça affirms our hypothesis. Increasing basal area in combination with decreasing number of individuals has been observed by Liebsch et al., (2007) as well and seems to be a characteristic of initial phases of succession (Chazdon, 2008). The reduction of the number of individuals has been described as stem exclusion phase by Oliver & Larson (1990).

The average growth rate between both censuses is 1.266 mm*yr - 1. The basal area gain amounts 0.446 m2*ha - 1*yr - 1, the loss is 0.212 m2*ha - 1*yr - 1. The mortality rate is 2.215 %*yr - 1, the recruitment rate is 1.042 %*yr - 1. With increasing diameter, recruitment rate is increasing (1.296 %*yr - 1 for size class I, 3.597 %*yr - 1 for size class II and 29.545 %*yr - 1 for size class III). On the other hand, the mortality rate shows the opposite behavior reducing with increasing tree diameter (3.561 %*yr - 1 for size class I, 1.077 %*yr - 1 for size class II and 0 %*yr - 1 for size class III). The high recruitment rate in size class III is due to the small number of individuals: Only 11 species are included in this size class in 2006; with two recruits during examination period, the high value is explained.

Higher recruitment and lower mortality rate in size class III than in size class II and I indicates that the analyzed forest fragment did not arrived to the end of succession: As the number of larger trees increases and the number of individuals in the complete community is reducing, the succession is still advancing (Gomes et al., 2003).

CONCLUSÃO

The Forest of Mombaça shows community dynamics which are expected: The number of individuals reduces, while the basal area per individual, species richness and diversity increase during the successional advance. (Acknowledgements: We thank to AcelorMittal for financial support and grants.)

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