THE IMPORTANCE OF FISHER'S TO MEASURE DIVERSITY OF SAVANNAH VEGETATION IN THE BOM DESPACHO REGION, MINAS GERAIS, BRAZIL

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INTRODUÇÃO

Typical savannah vegetation is composed by two distinct layers (Rizzini, 1997): A woody or tree layer composed of small trees and shrubs and an understory layer with annual or perennial grasses and herbs. The Brazilian *Cerrado*, a hotspot of biodiversity (Myers *et al.,* 2000), contains 11,242 species of seed plants species within both layers (Sano *et al.,* 2008). Filgueiras (2002) suggests, that only the minority of *Cerrado´s* species richness belong to the well - studied tree layer (i.e. Neri *et al.,* 2007, Felfili *et al.,* 2007), while 75 to 80 % of all species from the Brazilian *Cerrado* belong to the understory layer widely lacking phytosociological studies. Higher species richness of the Cerrado understory layer might be due to higher stand diversity (samples´ species richness, point or diversity) and/or higher spatial turnover (so - called diversity or variation); both are connected by a multiplicative link forming the complete species pool (diversity, Whittaker 1972).

OBJETIVOS

The objective of this article is to compare species richness and diversity from understory and woody layers from two study sites from the Brazilian *Cerrado*. Spatial turnover (variation or - diversity) is compared for both layers of this unique ecosystem.

MATERIAL E MÉTODOS

Two study sites of cerrado *sensu strictu* were selected. Ibitira is situated in the municipality Martinho Campos, MG, Brazil, at 19°24'30" S and 42°07'42" W, 743 m above sea level. Quartel Geral is situated in the eponymous municipality at 19°20'29.8" S and 45°27'00.2", 650 m above sea level. In each study site, three rows of five plots of 10 x 10 m each were installed; distance between plots and rows was 10 m. Species ocurring within plots have been identified by the authors who received support by Ana Paula Santos Gonçalves (Poaceae, Cyperaceae), Marcos E. Sobral (Myrtaceae, others) and Gilmar E. Valente (others). Cover of each species has been assessed using the scale of Braun - Blanquet. Species were divided in two groups by habitus: The woody layer is formed by all individuals considered as shrubs and small trees by Oliveira - Filho (2006), while the understory layer is formed by herbs or grasses. Categories midpoint has been used as abundance measure to calculate the indices of Shannon - Wiener (H') and Fisher´s () for both layers in each survey. diversity or variation between survey has been calculated as Sørensen similarity and Whittaker´s $_W$ (Whittaker, 1960). To compute the latter, species richness as well as H' and Fisher´s have been used. As proposed by Magurran (2004), diversity, the regional species pool, has been defined as cumulative species richness or diversity from both surveys.

RESULTADOS

In Ibitira, 135 morphospecies from 44 families were found, while Quartel Geral shows a species richness of 104 morphospecies belonging to 38 families. Most abundant families in both surveys are Poaceae (15 in Ibitira and 14 in Quartel Geral), Fabaceae (13 and 7), Asteraceae (12 and 8) and Malpighiaceae (10 in both surveys). Endangered species from the red list do not occur within the surveys.

89 of the species (38 families) from Ibitira belong to the understory layer; the woody layer is formed by 46 species from 25 families. 64 species (24 families) from Quartel Geral belong to the understory and 40 (from 21 families) to the woody layer. The relation of understory species richness to richness of woody species amounts 1:1.9 for Ibitira and 1:1.6 for Quartel Geral. These values do not support Filgueiras (2002) affirmation that for each woody species there are three to four species from the understory layer.

Diversity is significantly higher in Ibitira (H': 4.03, : 30.43 ±1.31) than in Quartel Geral (H': 3.37, : 25.66 ±1.34). In Ibitira, the understory layer (H': 3.53, : 20.15 ±1.07) is more diverse than the tree layer (H': 3.12, : 10.28 ±0.75) while in Quartel Geral Shannon - Wiener and Fisher´s deliver ambiguous results (H': 3.26 and : 13.29 ±1.39 for the tree layer and H': 2.82 as well as : 14.45 ±0.09 for the understory layer).

60 species occur in both surveys, 26 of them belong to the tree and 34 to the understory layer. Therefore, Sørensen similarity between both surveys is calculated to 0.502. The similarity between the understory layers is with 0.444 lower than between the tree layers (0.604). Defining cumulative species richness from both surveys as diversity, $_W$ is higher for the understory layer (1.556) than for the complete survey (1.500) and the tree layer (1.395). The same pattern is found when using Fisher´s to calculate $_W$: $_{Fisher}$ is highest for the understory layer (1.45) followed by complete survey (1.30) and the tree layer (1.14). Average H' from both surveys (3.70) is higher than cumulative H' (3.45), $_W$ on the basis of H' ($_{Shannon}$) delivers results smaller one (0.93). This means that diversity is smaller than diversity. As this cannot be interpreted in terms of variation or spatial turnover, such cases have been defined as stopping rule by Jost *et al.,* (2006).

Studies have shown, that H' is not sample size independent (Rosenzweig, 1995) and not normalized. Values depend the logarithm used for computation and, as outlined by Jost (2007) great changes of biodiversity are illustrated inadequately. Furthermore, as has been shown by our study, layer´s ranking is ambiguous and smaller sample units might show higher Shannon - diversity than larger units consequently, the index cannot be used to calculate - diversity.

On the other hand, Fisher´s is considered as the unified biodiversity number depending on the metacommunity size and the speciation rate within this community (Hubbell 1997). Because this index is the only sample size independent one, Rosenzweig (1995) recommends its amplified use. To our knowledge, there are no computations of - diversity using Fisher´s available in literature. Therefore, further research activities should focus on this question to test practicability of this index.

CONCLUSÃO

Species richness in the *Cerrado* vegetation is given not only because of the well studied woody layer, but especially because of the grassy layer. Besides showing higher diversity, this layer shows higher spatial turnover resulting in higher diversity. While the Shannon - Wiener Index failed to calculate - diversity in our study, Fisher´s shows broader applicableness.

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