

ENDEMISM AND RICHNESS OF INSECT GALLS FROM AMAZON RAINFOREST AREAS IN RONDÔNIA (BRAZIL)

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INTRODUÇÃO

The insect galls are abnormal growths of plant tissue induced by insects, within which they develop, finding shelter against adverse environmental conditions, protection against predators and parasitoids, and food source (Mani 1964). The galling insects present high specificity in relation to their host plant, being usually monophages, and producing a morphologically and structurally unique gall in its host plant (Carneiro *et al.* 2009). Some ecological studies indicate that the greatest diversity of Cecidomyiidae species is found in Amazon rainforest but only 2% of these species are known for this biome (Julião 2007). Data on galling insects and their host plants remains unknown for the other Brazilian states which include this phytogeographic domain, as the state of Rondônia. This gap impairs the knowledge of the diversity of these insects, as well as studies on the biogeography and geographic distribution of the same.

OBJETIVO

In this context of lacking information, the objectives of this work are to verify endemism of the insect galls in the studied areas and to test the hypothesis of plant family size.

MATERIAIS E MÉTODOS

The field works were performed in three municipalities of Rondônia: Campo Novo de Rondônia, Cacaulândia and Monte Negro, all inserted in Amazon rainforest domain. Along each trail, aerial organs of herbaceous, shrubby and arboreous plants were surveyed for insect galls up to two meters in height. Both galls and host plants were collected and transported to the Laboratório de Díptera in Museu Nacional/UFRJ, Rio de Janeiro State, Brazil. The host plant endemism was based on data of Flora do Brasil website (2019). The galling species were considered endemic when associated exclusively with endemic host plants. The relationship between galling species richness and plant family size were evaluated. According to plant size hypothesis, gallers are richer in species on plants from taxa also richer in species (Fernandes 1992). To model the relationships between galling species richness and plants size, we use zero-altered poisson models and zero-altered negative binomial models following the routine of the package "msne" and the "gamlss" (Hilbe 2014). The response variable (galling species richness on plant galled) is a count and cannot obtain the value zero. We refer to the variable as being zero truncated (Hilbe 2014). But the analyses were not able to deal with the variance heterogeneity. Because the residues did not behave well we use the non-parametric Spearman correlation test (Sprent and Smeeton 2007) to determine relationships between galling species richness and plant family size. Statistical analysis was conducted using the R statistical package (R Development Core Team 2017).

DISCUSSÃO E RESULTADOS

We found a total of 103 host plant species, distributed in 69 genera and 35 families, hosting 152 insect galls morphotypes. The galling species richness increases positively with the plant family size (Spearman: $r = 0.74$; $S = 1907$, $p < 0.001$). Larger plant taxa potentially offer more hosts and consequently bear a greater number of galling insects (Fernandes 1992). Gallling insect richness was positively correlated with plant family size as larger plant families hosted more galling species than smaller plant families. Host plants from related or closer lineages contain similar chemical compounds and plants belonging to the same taxon in a sympatric condition would result in the speciation of galling insects via host replacement (Jermy 1984, Futuyma *et al.* 1995, Joy & Crespi 2007). These results corroborate previous studies carried out at the Neotropical region such as Carneiro *et al.* 2014. The taxon of the host plant appears to be the best predictor of the number of insect species at one site. All host plants are native, except *Lantana camara* L. (Verbenaceae), which is naturalized. Among native plants, seven species are endemic to Brazil: *Adenocalymma coriaceum* A.DC. (Bignoniaceae), *A. magnificum* Mart. ex DC. (Bignoniaceae), *Casimirella ampla* (Miers) R.A.Howard (Icacaceae), *Croton* cf. *spruceanus* Benth. (Euphorbiaceae), *Hymenolobium excelsum* Ducke (Fabaceae), *Myrcia splendens* (Sw.) DC. (Myrtaceae) and *Platymiscium filipes* Benth. (Fabaceae). Each species presented only one gall morphotype, except *M. splendens* with two morphotypes and *A. coriaceum* with three morphotypes, possibly totaling ten endemic galler species.

Although there are no studies on endemisms of Cecidomyiidae species, Maia and Mascarenhas (2017) proposed some species as endemic when they are exclusively associated with endemic host plant species. Based on this same argument, we suggest the endemism of the gallers which are associated with endemic host plants.

CONCLUSÃO

The plant size hypothesis was corroborated reinforcing the importance of the plant composition for gall richness. The spatial distribution of the majority of the gall morphotypes was accidental, indicating the high diversity of insect galls in the studied area.

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