ABUNDANCE PATTERN OF CECIDOMYIIDAE (DIPTERA) IN *OURATEA HEXASPERMA* (OCHNACEAE)

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INTRODUCTION

Several studies with elaboration of hypotheses have been made trying to understand the attack pattern of galling insects. Among them, one of the most relevant is from Fernandes & Price (1988) which explains the preference of galling insects for xeric environment, considered the hygrothermal stress hypothesis, and for places with a great number of host plants, explained by the plant species richness hypothesis. These hypotheses express a global view of richness of galling insects/host plants, with a severe influence of environment issues.

Other studies have been investigating more intrinsic factors of host plants, such as structural features, as determinant in diversity pattern of galling insects. Price (1991), for example, formulated the vigor plant hypothesis. This hypothesis predicts that plants or its most vigorous parts are preferentially selected by female galling insects as oviposition sites, because they enhance the survival chance of the offspring (Price, 1991).

The hypersensitivity reaction is a defense mechanism, against herbivorous insects, present in some *Cerrado* plants. The reaction occurs when the plant quickly responds to attack with morphological, histological and biochemical changes, that consequently causes the death of the attacked tissue (Fernandes *et al.*, 2003). The hypersensitivity reactions are pointed as one of the main mechanisms of plants resistance to galling insects (Fernandes & Negreiros, 2001).

In tropical areas the highest herbivory rates occur in young and expanding leaves (Coley & Baroni, 1996), because they present a higher nutritional quality. For this reason, the smaller and younger branches present a high rate of defense compounds, exactly to avoid attack of herbivores. This fact suggests that the hypersensitivity reactions may be more common in smaller and less vigorous branches.

OBJECTIVES

The objective of this work is to answer the following questions: 1) Do the galling insects prefer more vigorous branches? 2) Are the hypersensitivity reactions more often in smaller and less vigorous branches?

MATERIAL AND METHODS

The studied area is localized in a fragment of *Cerrado sensu stricto* remaining in an urban area of Caldas Novas, Goiás, Brazil ($17^0$42'39"S e $48^0$38'27"W). The climate of the region is characterized by rainy summers, from October to March, and dry winters, from April to September.

The study was conducted in February of 2009. The chosen plant for the study was *Ouratea hexasperma* for presenting hypersensitivity reaction when attacked by Cecidomyiidae (Diptera). The hypersensitivity reaction caused by galling insects can be easily distinguished from other herbivorous insects and pathogen as being a dark brown halo of necrosed tissue around the gall induction site which restricts the larva attack (Fernandes *et al.*, 2003).

Were sampled 24 individuals of the host plant and randomly collected five branches from each of them. The material was sent to the Laboratory of Entomology (Laboratório de Entomologia, Departamento de Biologia Geral, Universidade Federal de Goiás). It was measured in each branch, the length, the number of leaves, the total number of galls and the number of galls with hypersensitivity. The structural variables (branch length and number of leaves) were correlated with the abundance variables (total number of galls and number of galls with hypersensitivity reaction) through multiple linear regression analysis. All the analysis were made by the program Statistica 7.0.

RESULTS AND DISCUSSION

The module size did not influence the total abundance of galls ($r^2 = 0.011$, $p = 0.10$). However, the number of leaves per module was the factor which best explained the abundance of galls ($r^2 = 0.245$, $p < 0.01$). In general, to each

unit of leaf added to the module, the abundance increases in 12.4 galls.

The vigor plants is one of the most used hypotheses for explain the diversity patterns of herbivorous insects in general, and galling insects specifically (Price, 1991). This hypothesis is an extension of the plant stress hypothesis formulated by White (1969). They both take into account that the availability of resources offered by the host plant is determinant in the distribution of galling insects. This suggests that branches that offer a greater quality of resources are preferred by female galling insects during oviposition, once the greater the quality of the resource is, the greater the development and survival of the offspring will be.

Results that corroborate the vigor hypothesis are found in many works (Cornelissen *et al.*, 2008). Most of them have been investigating how the module vigor relates to the total abundance of galls. There is, however, a greater chance that vigorous modules be attacked, even if there is not a preferential selection of these modules by the galling insect (Araújo *et al.*, 2003). Investigate the relation of vigor module with distribution of galls with hypersensitivity reaction may be a clearer way to observe the real effect.

In this study, the number of galls with hypersensitivity was influenced by the length of the module and by the number of leaves per branch. Smaller and less vigorous modules presented a greater number of hypersensitivity reactions ($r2 = 0.124$, $p < 0.02$). Each centimeter unit of increase of the module size decreases 1.7 galls with hypersensitivity. The number of leaves per branch, on the other hand, positively influenced the number of galls with the reaction, being increased 4.5 galls with reaction in each leaf added to the branch ($r2 = 0.068$, $p < 0.05$).

These branches present a high nutritional quality and therefore demand a bigger investment of energy by the plants in its production. For this reason, high concentrations of tannins and phenolic compounds are usual in these branches for protect them against herbivore attack. So it is probable that younger and smaller branches present a greater number of hypersensitivity reaction than bigger branches. In case of occurrence of this, the preference of galling insects for vigorous branches may be an escape from hypersensitivity reaction and not only a response to vigor.

CONCLUSION

1) The number of leaves per branch was the vigor parameter which best explained the abundance of galling insects. 2) The hypersensitivity reactions were more common in smaller and less vigorous branches. 3) Galling insects may prefer bigger branches as an escape from hypersensitivity reactions and not only because they are more vigorous.

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