COMPARISON OF GALL SIZE BETWEEN A NATURAL AND A REHABILITATED AREA OF RUPESTRIAN FIELDS AT SERRA DO CIPÓ, MINAS GERAIS, BRAZIL

Tiago Shizen Pacheco Toma – PPG Ecologia, Universidade Federal do Rio Grande do Sul, Brazil. tiagoshizen@gmail.com.Ritiele Goulart Generoso – Universidade do Extremo Sul Catarinense, Criciúma, Brazil. Irene Gélvez Zúñiga, Yumi Oki, Geraldo Wilson Fernandes – Laboratório de Ecologia Evolutiva & Biodiversidade, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil. Milton de Souza Mendonça Jr. – Dep. Ecologia, Universidade Federal do Rio Grande do Sul, Brazil.

INTRODUCTION

Insect galls can be good indicators of environmental quality. Gall formation depends on various factors such as galler activity and the plant response. As the galler's extended phenotype, gall morphology provide information on the inducer (Stone & Schonrögge 2003). Environmental factors can affect both plant and galler, hence gall size and thickness can be affected. For instance, these features have been tested for reduction in galler mortality (Fernandes *et al*. 1999). Moreira *et al*. (2007) found higher gall abundances in areas under an intermediate rehabilitation state in pioneer species. Specific gall systems were previously evaluated for copper and nickel accumulation (Bagatto and Shorthouse 1991) and impacts of urbanization (Sumoski *et al*. 2009). The galling insect *Baccharopelma dracunculifoliae* (Hemiptera: Psyllidae) induces foliar galls in *Baccharis dracunculifolia* (Asteraceae), and is a well studied system in the Neotropics (Espírito-Santo *et al*. 2012). The plant species B. dracunculifolia has been used in rehabilitation stands in Serra do Cipó, MG, and is considered a super-host for galls.

OBJETIVES

We aimed to compare *Baccharopelma dracunculifoliae* gall size between a natural and a rehabilitated area, accounting for the influence of plant height and shoot level of gall occurrence.

MATERIAL AND METHODS

We conducted the study at two rupestrian field areas at Serra do Cipó, Minas Gerais, Brazil; one in a protected area (natural) and the other under recovery for the last two years after a rehabilitation project. The natural area was located at the Serra do Cipó National Park and the rehabilitated at Vellozia Private Reserve. Twenty *Baccharis dracunculifolia* individuals were sampled (10 in each area). Galls of *Baccharopelma dracunculifoliae* were collected from plants with more than seven galls. We measured plant height (m), and for each gall we measured gall length and diameter (mm) and registered its shoot level of occurrence (hereafter shoot level). Gall size was obtained from the equation for the volume of an ellipsoid since galls resembled this shape. We adjusted GLMs, with the logarithm of gall size as response variable. Area (natural or rehabilitated), plant height (m), galled shoot level, as well as the interaction terms, were included in the complete model, which was simplified. All analyses were performed in the R environment.

RESULTS

We collected 253 galls, 128 in the natural area and 118 in the rehabilitated area. Gall size varied greatly from 0.6 to

1000.4 mm³ and galls occurred in third to ninth level shoots. Plant height varied from 0.99 to 2.30 m. There were no differences in gall size between the two areas. Gall size varied with plant height ($t = 3.43$, $p < 0.001$), shoot level ($t = -3.05$, $p = 0.002$), and the interaction between shoot level and area ($t = 2.16$, $p = 0.031$).

DISCUSSION

Similarity in gall size between areas indicates an equivalent development of these gall inducers after two years of rehabilitation. In spite of this similarity, variation in gall size affected by plant height and shoot level reflects differences in plant size. In another study with *B. dracunculifoliae*, gall abundance was positively related to plant size (Lara & Fernandes 1994). Shoot level varied between areas probably due to differences in plant architecture visually noted in the field. On the other hand, Sumoski *et al.* (2009) found that plant architecture differed between urbanization levels in Florida, but this did not influence gall abundance.

CONCLUSION

Natural and rehabilitated areas presented similar *Baccharopelma dracunculifoliae* gall size, which varied with plant height and shoot level.

REFERENCES

BAGATTO, G. & SHORTHOUSE, J. D. 1991. Accumulation of copper and nickel in plant tissues and an insect gall of lowbush blueberry, *Vaccinium angustifolium*, near an ore smelter at Sudbury, Ontario, Canada. Canadian Journal of Botany, 69(7): 1483-1490

ESPÍRITO-SANTO M.M., NEVES F.S., FERNANDES G.W., SILVA J.O. 2012. Plant phenology and absence of sex-biased gall attack on three species of *Baccharis*. PLoS ONE 7(10): 46896

FERNANDES G.W., ESPÍRITO-SANTO M.M., FARIA M.L.1999. Cynipid gall growth dynamics and enemy attack: effects of gall size, toughness and thickness. An. Soc. Entomol. Bras 28: 211-218

LARA A.C.F., FERNANDES G.W.1994. Distribuição de galhas de *Neopelma baccharidis* (Homoptera: Psyllidae) em *Baccharis dracunculifolia* (Asteraceae). Rev Bras Biol 54: 661-668

MOREIRA R.G., FERNANDES G.W., ALMADA E.D., SANTOS J.C. .2007. Galling insects as bioindicators of land restoration in an area of Brazilian Atlantic Forest. Lundiana 8: 107-112

STONE, G. N. & SCHONRÖGGE K.2003. The adaptive signi?cance of insect gall morphology. TRENDS in Ecology and Evolution 18:512-522

SUMOSKI S.E., JOHNCOX A.J., ALTHOFF D.M., SEGRAVES K.A. 2009. Impact of urbanization on tri-trophic interactions in an endemic scrub community. Florida Entomol 92: 582-587

Acknowledgments

Acknowledgments: FAPEMIG, CNPq and CAPES